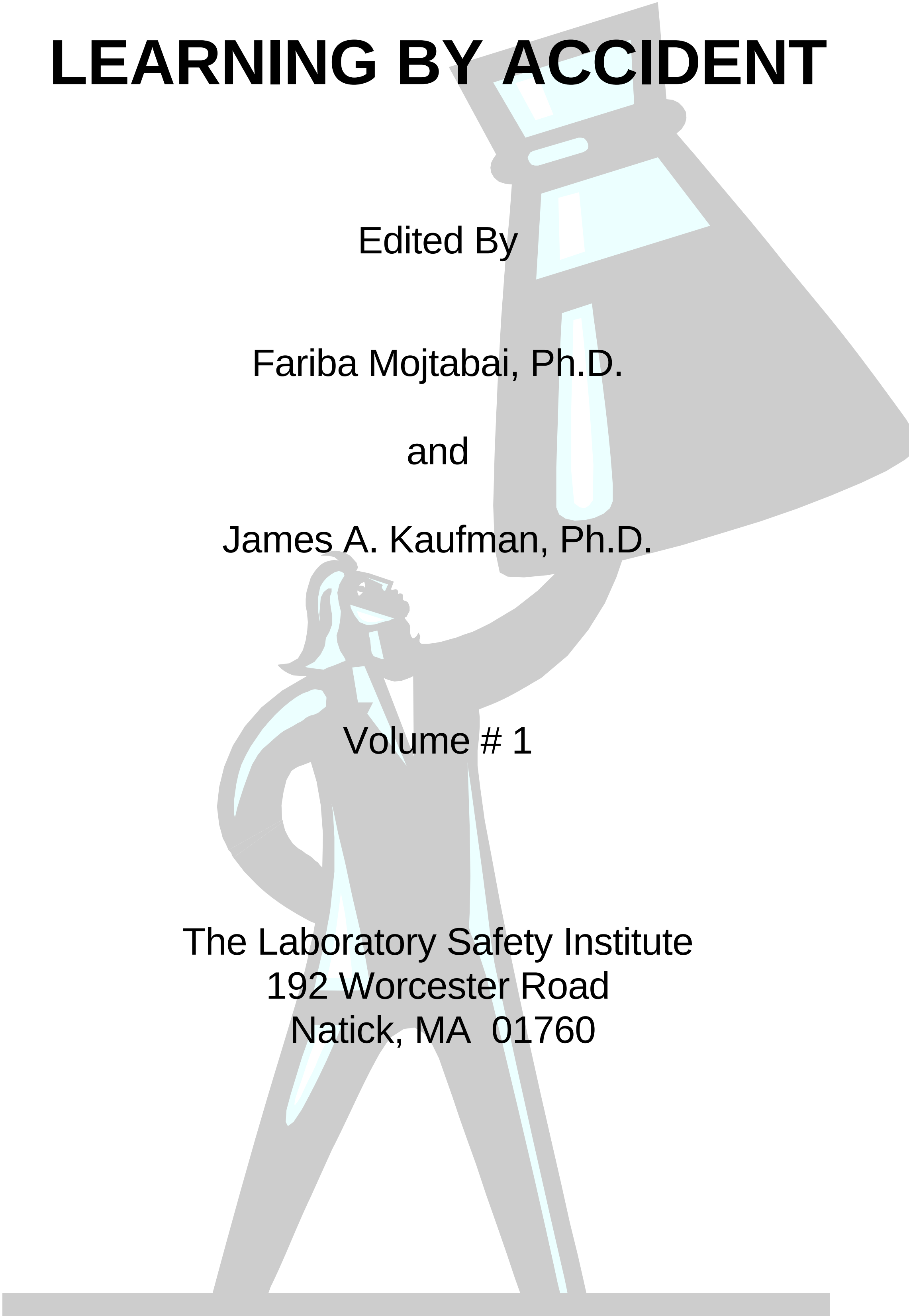
LEARNING BY ACCIDENT



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We wish to thank the many science teachers who contributed the anecdotes, stories, newspaper articles, and accident reports that are the heart of this book. Thanks to Barbara Jerome for her help with the manuscript typing. And, thanks to Don Dix for introducing me (JAK) to the importance of laboratory safety.

INTRODUCTION

Since founding the Laboratory Safety Institute in 1978 (as the Laboratory Safety Workshop), I've been involved in offering lab safety training programs for science teachers. One of our activities during these training programs is the sharing of accident experiences. Teachers spend a few minutes writing an accident summary and then describe and discuss these accidents with each other.

Several things invariably happen. Teachers are amazed by both the number and seriousness of the accidents. Many teachers have had similar experiences. Teachers realize that they have been "lucky not to have had a particular accident”. And, teachers are glad to have heard these examples to share with their colleagues and students.

That's what this book is all about. A sharing of anecdotal accounts of laboratory accidents. Hopefully, it will be a valuable resource for you to experience vicariously the many ways that people got into trouble in the lab. Hopefully, it will give you real life examples to share with your students.

I should point out that although these accident accounts have been edited for general technical correctness and consistency of style, no attempt has been made to verify the descriptions. Some accidents may, in fact, be described more than once by different teachers.

Somewhere in Tom Peters' In Search of Excellence, I read a story about a computer scientist who asked his computer: "when will you learn to reason like a human being?" The computer spun its tape drives and flashed its lights for a few moments and then spat out a piece of paper. On the paper was the answer, "That reminds me of a story."

That's how we learn best. We remember stories and we extrapolate from them easily. Perhaps, that's why Peters is so successful. It's been said that whenever data competes with folk lore, folk lore wins 21-0!

That's the incredible power and value of these accounts of laboratory accidents. Use them in your science teaching to help you identify potential problems. Use them to help get the message across to your "invincible" students. They'll remember these true stories. Use them so that "Learning is no Accident".

On the next page is a copy of the "Accidents" handout that we use in our science training programs. Please feel free to Xerox this page and use it in your science department for a group activity. And naturally, we would be delighted to receive contributions from you and your colleagues for the next edition of LEARNING BY ACCIDENT.

ACCIDENTS

How often have you heard someone say, "I don't have to worry about that. I've never had an accident." You can see the person's bad habits and the increased probability of disaster striking.

For many people, the "remoteness" of accidents makes them seem unlikely. Yet, each of us is probably familiar with one or more serious accidents with which we have had either direct involvement or intimate knowledge.

The sharing of these experiences heightens our awareness of the dangers in the lab.

Please spend about twenty minutes writing a summary one, two, or three of the most serious laboratory accidents with which you are familiar. Who? What? When? Where? Why?

What were the errors that were made? What might have been done to prevent such an event from occurring?

Then, please take turns reading some of the descriptions of the incidents and allow the others to identify what they believe to have been the errors and what might have been done to prevent the accident.

I would like to collect these written descriptions to include them in a permanent collection for distribution to other science teachers. Please indicate if you wish to place any restriction on use or distribution.

LEARNING BY ACCIDENT

Alcohol Lamp

1. In a biology lab, students were using the flame from an alcohol lamp as a heat source. One girl's lamp blew up and spilled flaming alcohol all over the tabletop. We were very lucky. A fire blanket smothered the flame. The flaming alcohol easily could have ignited her clothing and hair. She was sitting and that made her slow to move and created greater danger. Students should stand. (6)

2. In a class of 28 upper level students there were seven lab benches with four seats per bench. Two students were completing an experiment to determine the solubility of sodium chloride and potassium nitrate. They were heating two beakers of water with alcohol lamps. In order to maintain even heating, a spare, but fully covered lamp was nearby for use when the first ran out of fuel. Contrary to instruction when the first bottle was nearly empty, one of the students with tongs removed the bottle, uncapped it and attempted to fill it at the lab station. Naturally, the bottle cap was hot and he dropped the bottle spilling the contents onto the lab table. In panic, he knocked over the lighted lamp igniting the spilled liquid.

Instead of notifying the instructor immediately, he attempted to smother the flame with paper towels-being successful in smothering the fire. He disposed the toweling properly. However, when he went back to the lab station, the other student put a match to the remaining fluid in order to burn it off. The first student, in panic, tried to blow it out causing a more extensive flame. The student suffered singed eyebrows, eyelids and hair. He was taken to the hospital. No serious damage occurred except for a good fright. (207)

3. A biology teacher was filling an alcohol lamp. The alcohol lamps wick was either very hot or still lit. There was an explosion which sent several students to the hospital with serious burns. (301)

4. A female student was safely performing an experiment. Two other students in the room decided to fool around with each other. The girl doing the experiment was using an alcohol lamp. The girl was involved in her experiment and did not notice the two fooling around. They hit her set up, knocking over the alcohol lamp. The alcohol spilled, ignited in her face causing first and second degree burns to her face. She spent 3 years in plastic surgery. (359)

Other cases include: 61

Autoclave

5. We were using an autoclave designed like a pressure cooker. When the cooker completely cooled the lid could not be removed. To remedy this problem, I would slightly loosen the safety bolts and heat the pressure to a pound or two. One day as I did this procedure, the lid blew and I received second degree burns on most of my back. I considered myself lucky to receive only a minor injury. (488)

Blood

6. In conducting a blood typing laboratory, a student of mine passed out. When she fell, her head split open, losing consciousness again. She also broke a tooth. This was a nightmare. A seemingly innocent lab experience ended in disaster.

Now students must have a partner when doing the lab. They must sit down in their seats and remain seated during the lab. I now limit participation only by those who are most willing. Students always were and still are required to obtain parental permission for the lab.

It never occurred to me that she or anyone would not have the common sense to sit down if they felt ill, instead of wandering around the room. (12)

7. A student passed out while typing blood. He hit his head on the floor and suffered a mild concussion. (162)

Boiling Stone

8. My students were running an experiment on distilling homemade wine in freshman physical science. They were heating it on a hot plate in an Erlenmeyer Flask. The student had not placed boiling stones into the flask. I attempted to add the stones to the flask and when I dropped them in it sprayed--mostly on me. (398)

Burn

9. A student working with glass tubing, bending it for lab work picked it up too soon burning her fingers. (67)

10. A prankster held a piece of just fire polished glass tubing up to the face of another student burning his lip. (111)

Burner

A. Alcohol Burner

11. We used alcohol burners up until last year. Many of them leaked around the top. One student had pulled the wick up too far, and after using it for a few minutes it became engulfed in flame from the excess alcohol around the top brought up by the high wick. This in itself would not have been a problem but one of the girls working with him had long hair. I had seen the initial flare-up and grabbed the girl to pull her away. The kids thought the whole thing was very funny since nothing tragic had happened.

The alcohol burners are no longer for student use. In their place are electric hot plates which have introduced a new set of hazards. (39)

12. I have spent the last 15 years involved in scientific research and teaching. In all those years, I have never been involved in nor have direct knowledge of any serious accidents occurring. I have had a few minor fires, one in biology lab where the student decided to use paper towels for pot holders and one in chemistry lab where alcohol fumes ignited causing a small fire. Fortunately the student was quick enough to cover the beaker with a fire proof pad and extinguished the flames before the situation became dangerous. These two minor incidences have made me critically aware of the possibilities of fire and I am extremely cautious now when using burners that the students are aware of the dangers and that proper ventilation is available. (47)

13. In an eighth grade IPS class, alcohol burners were being used that were filled with ethanol. Some students had refilled their burners from non-drip squeeze bottles, then settled down to work with the other students. Alcohol burners were lit and in use for a few minutes. Suddenly, a wall of flame flashed across the room, running diagonally through the desks. No student was hurt, no materials were damaged and the fire ended in moments. Fire officials and insurance inspectors were brought in. They could not, after a thorough investigation, come up with any specific cause. They felt that it was tied somehow to the use of ethanol and recommended a change to methanol. (75)

14. Our students cause a flare-up of IPS alcohol burners at least once a year. (109)

15. A sixth grade class was doing experiments with alcohol burners. Alcohol was also in squirt bottles for refilling. "Horseplay" occurred and a student picked up a bottle and squirted it. It was near the flame. The flame followed the stream back to the source and the wash bottle exploded. Two students were seriously burned with third degree burns covering 40-60 percent of their body-mostly the torso. One student ran through the halls and the fire was extinguished by a student from a neighboring room with a jacket. The other student's fire was put out using a fire blanket. The school was sued. (183)

16. In an I.P.S. lab next to my room alcohol burners were being filled when one ignited. The room did not have fire blankets, shower or fire extinguisher. Six students were injured, two very badly. My jacket acted as one fire blanket. Students were unaware of how to pull the fire alarm (or where they were located). They had to read instruction before pulling alarm. (77)

17. In a junior high school science lab, a session was being conducted by a substitute teacher (at the instruction of the regular class room teacher). In this activity, alcohol burners were in use. These burners were to be filled with plastic squirting type bottles. As the lab session was being conducted, one student squirted alcohol at another student with the stream unfortunately passing through the flame of a burner seriously burning another student. (350)

18. A ninth grade physical science class met in a large but ill-equipped room. Because there were no gas jets in the room, the students performed experiments (IPS sequence)

with alcohol burners. And, because the lab furniture did not accommodate the number of students in the class, some students sat at chair-desk combination units.

A teacher with extensive knowledge of chemistry, but relatively few years of teaching experience allowed one student to perform his experiment at his chair-desk. Because the desktop was slanted, his ignited alcohol burner slid off and dropped into his gym bag and ignited it. Fortunately, the teacher was nearby, and again fortunately, was close to the fire blanket, which he used to smother the flames. No injury resulted but the bag and contents were burned. (424)

19. I seldom wear finger nail polish but had some on one day when I lit an alcohol burner. The polish caught on fire. Aside from a scorched nail, I had no burns. (483)

20. In a ninth grade IPS class students were using alcohol burners when the heat and pressure build up caused one to break spreading flaming alcohol all over the desk and floor. The alcohol set some notebooks that were on the floor on fire. Fortunately, no students were injured. While the alcohol burned out quickly, a carbon dioxide extinguisher was needed for the notebook fires. (493)

Other cases include: 123, 352

B. Bunsen Burners

21. A teacher, trying to illustrate the results of evaporation of water from a salt solution, had placed the salt solution in the lid of a Petri dish. The water wasn't evaporating fast enough and the class period was rapidly coming to an end so he decided to help evaporation along by heating the Petri dish over a Bunsen burner flame. The Petri dish was not Pyrex and it shattered. Students were near the demonstration desk. Fortunately they were not hurt. (15)

22. Our chemistry lab is small and often class size makes conditions very close. The lab room is very long with the teachers lab table at one far end. In October, a group in the back of the classroom had a bunsen burner lit. The rubber hose on the burner was hanging very close to the flame and caught on fire.

Fortunately the lab tables had small cans of fire extinguishers on them. The girls knew to shut off the gas and reach for a can to extinguish the flame. The girls did not call to me for help. It being early in the year, I guess they didn't want me to get upset with them or yell at them for their carelessness. But, I was happy that they were paying attention when I gave my talk on safety and did know to shut off the gas and were aware of where the fire extinguishers were. (46)

23. I was demonstrating to my chemistry students how to recover solid salt from saline solution by the process of dehydration. After I had finished the demonstration, I requested that the students should pick up bunsen burners, connect them up, and have the burners lit.

While doing this, one of the student's burners caught on fire and there was a mild explosion which followed. The students were quickly evacuated from the lab and I shut off the gas line. The reason why this accident occurred was due to the faulty burner. (69)

24. In my chemistry lab the students were using bunsen burners. A fire started at one station because the gas hose had become loose and there was a leak which ignited the hose itself. I had given sufficient safety instructions and the student knew enough to turn off the gas and to smother the fire with a towel. (72)

25. An eighth grade girl received minor burns on her hands and arm. In this instance the instructor was giving an "expanding gasses" demonstration using a sealed can (containing a small amount of water). The can was being heated directly on a bunsen burner. The can exploded and water splashed on the student.

This room was not equipped with a fume hood, shower, blanket, etc. (80)

26. Two girls were burned in a high school chemistry lab when the hose separated from a bunsen burner shooting flames at their heads and the back of their necks. (81)

27. Students will sabotage bunsen burners to make flame throwers or block the gas jet with paper or pencil tips. This happened once. Kids responded well and now are very careful when initially lighting burners. (84)

28. A student's hair caught fire in a chemistry lab when he leaned over the bunsen burner. Instructions had been given to secure long hair with rubber bands. The girls in the class complied with the instruction. Boys with long hair did not all comply. The male teacher elected not to insist on strict compliance feeling that the boys will be careful. (110)

29. Typical finger burns are expected with Junior High students with their first experience with bunsen burners and glassware. (112)

30. Ninth graders using bunsen burners played a game where they'd squirt water into the flame. Students laughed and horsed around and soon the glass eye dropper broke. (113)

31. While using burners in a small lab area with a long burner hose, the burner tipped on to it's side. The burner hose had wrapped around the sink faucet. That caused it to become unbalanced. No students were injured but all were frightened. (115)

32. A first year teacher was working at a lab bench in a preparation room. He had an evaporating dish in which he had a material which he was attempting to dissolve.

To his left was a lighted bunsen burner. He poured some ethanol from a gallon jug into the evaporating dish, then put the jug down with the screw cap slightly ajar. The exhaust fan was on in the room. The vapors from the gallon of ethanol were presumably pulled toward the bunsen flame by the exhaust fan. The ethanol ignited and shot all over the teacher's arms and chest and up the wall to the ceiling.

The teacher in the adjacent room ran into the room, used the fire blanket on the accident victim and the fire extinguisher on the wall. The accident victim was treated by a local M.D. and released. (140)

33. A student got burned when he forget that the iron ring was hot after using his bunsen burners. (178)

34. During a lab while I was a teacher's aide, we were drying organic glassware with bunsen burners before a Grignard reaction. The student had not tightened her clamps sufficiently and her round bottom flask began to slip. Her instinctive reaction was to stop it before it broke. She grabbed the foam pad from the lab kit to use as a pot holder. The glassware was so hot that it melted the foam to her skin. She suffered severe burns on two fingers. (197)

35. A bunsen burner struck back. The student did not turn gas completely off and consequently the burner barrel became extremely hot. The instructor later moved the burner and severely burned his thumb and two fingers. (211)

36. While in college, a classmate took a volatile flammable reagent to her station to use in an experiment. She placed it next to the bunsen burner. The reagent caught fire and so did the student. Luckily another student just embraced her to suffocate the fire while another got the fire blanket to finish the job. (296)

37. In a biology lab, a bunsen burner "exploded" with flames shooting out from the bottom. I was getting equipment out for the lab exercise I was going to do the next day. I took out about five or six bunsen burners that had not been used for quite some time. I set them aside with the rest of the lab equipment. I decided I would try part of the experiment ahead of time. I quickly took one of the burners (did not check it over and was talking to a colleague at the same time) and connected the burner to the gas jet. I lit the burner. It immediately shot flames up from the bottom of the burner. I singed my eyelashes and hair. I reached around and shut off the jet. Later, I got quite shaken up. The valve on the bottom was missing. (363)

38. One day I was demonstrating the heating of a test tube containing reactants to my high school chemistry class. I was holding the burner by the base in my other hand. Somehow or other the burner tubing came loose and the flames ignited my shirt.

The chest area of my shirt was on fire. I put the burner down - shut off the gas - and patted out the fire. At the same time I asked the girl in the front row to open the window near her saying, "if you hadn't noticed - it has become awfully warm in here!" (407)

39. A ninth grade IPS lab was using bunsen burners. One burner tubing came loose and the window curtains were ignited. The student received minor burns. The fire was extinguished with a carbon dioxide extinguisher. (418)

40. During a micro-biology lab, one student had just completed the fixing of a slide of bacteria and stain using a bunsen burner. Another student, who had been having difficulty with the procedure, asked the first student if he could examine the slide. The slide was handed hot end toward the receiving student. Unfortunately, the "sample" had been heated much too much and as a result caused a rather severe burn to the student who accepted it. (450)

41. The use of bunsen burners has the most potential for disaster. Our original burners were quite old; some were corroded to the point of where gas could not be passed through them. The oxygen intake adjustment was located on the underside of the burner. This often caused students to either shut off the oxygen supply completely, extinguishing the flame and letting gas escape. This problem has been remedied by the purchase of new burners, along with the understanding that whenever a flame goes out the gas is shut off immediately. The older burners, in addition to being hard to regulate, were also unstable. Several times, an inattentive student would knock the burner over. (463)

42. A student passed his arm with a shirt on over a bunsen burner. It melted the shirt to his arm. (498)

Other examples include: 47, 49, 72, 84, 152, 187, 312, 345, 358, 359, 360, 361, 362, 363, 364, 365, 428, 448, 458

C. Gas Burner

43. A student using a gas burner delayed the ignition and then ignited a cloud of gas burning the hair on his arms. The student did not follow instructions. (65)

<u>Chemicals</u>

Acetic Acid

44. Another senior chemistry major was heating a reaction mixture for reflux containing acetic acid. After heating for several minutes, the student realized she had forgotten to add boiling chips. The boiling chips were added to the hot reactor mixture causing a flash evaporation into the face of the student. Safety glasses and a lab coat prevented injuries no more serious than minor facial burns. (102)

45. A chemistry teacher was returning a half full four-liter bottle of glacial acetic acid to its storage cabinet, a shelf in a lower unit of a wooden cabinet in a prep room. As he was placing the bottle on the shelf the shelf support gave way causing the bottle to fall back out onto the floor and shatter. As he tried to move out of the way and was in a crouched position, he slipped forward and his hands were cut by the glass and burned by the acid. In addition one knee touched down in the acid causing burns of the lower leg as well. (364)

Other cases include: 177, 343, 353, 406

Acetone

46. When I was 9 months pregnant, and teaching AP Chemistry, I was involved in a lab fire. An open beaker of acetone was too near a hot plate which unfortunately had a frayed wire. A spark started the fire. I was trapped between the demo desk and chemical supply cabinet. Fortunately, two students thought quickly. One extinguished the fire; the second wrapped me in the blanket, an unnecessary but appreciated prevention, since the fire was out quickly.

The most serious damage was the lecture we got from the custodian on our "taking matters into our own hands." We should have left the fire and evacuated the building! (20)

47. In an organic lab we were drying acetone. We heated with bunsen burners. It flashed. The lab instructor never informed us of the volatile nature of anything. We thought we were doing a good job but obviously we were wrong. (428)

48. In my college days, we used "trench benches". The uphill class member dumps in acetone (etc.). The downhill member extinguishes matches. The result was several trench fires. (429)

49. I witnessed an acetone fire when a graduate student opened a small bottle two to three feet away from a bunsen burner. The vapors ignited from that distance. (253)

Acid

50. A graduate student doing an approved experiment using concentrated acid resulted in an explosion which injured the student. She was wearing and using correct safety gear. A lab assistant was close by but not in the room. He came in, and quickly assisted the student from the lab. The specific cause was not verified. (58)

51. A student performed the unauthorized mix of two materials (metal and acid). It flared up causing facial burns. A wash was quickly used and there was no permanent damage. (108)

52. A chemistry teacher permitted a student to carry a stock bottle acid to her lab table. As she was lifting the bottle or jug onto the tube, she did not quite clear the top. The bottle broke as it hit the edge of the table, its contents being spilled onto the student. The girl was badly burned and a lawsuit is still pending against the teacher and the school department. (200)

53. My lab partner brought 250-300 ml of strong acid in a 600 ml beaker and set it down on the bench against which I was leaning. The bottom was knocked out and the acid ran down the front of my cotton trousers. By the time all was rinsed away, there was no front on my trousers. (281)

54. A student accidentally spilled acid on his teacher when, while horsing around, he knocked over a small dropper bottle. The acid wasn't too concentrated but dissolved the teacher's nylons! No damage to her skin occurred thanks to quick clean up action. (331)

Other cases include: 173, 331, 339, 348, 349, 400, 413, 417, 419, 421, 430, 445

Acetylene tank

55. A student broke into the metals shop, bypassed a burglar alarm, and carried a large acetylene tank to the office. The shop teacher had, to his credit, locked away the key to the acetylene tank in his office. The student, not being able to open the tank, took papers from a nearby file and piled them under the tank. Then, he lit the papers. The temperature of the tank increased and began to allow the acetylene to escape through blow plugs. The ensuing fire melted and warped a 5-inch steel vault door. Structural damage was confined to the room but the entire floor was covered with soot. (233)

Agar

56. A student-heating agar on the stove tried to pick up the flask when it began to boil over. A slight burn on her fingers resulted. A school accident report was filed. A local hospital burn hotline was called. Professional medical treatment was not required. (238)

57. I was heating agar in a three-liter flask with a small stirring magnet. I tried to heat it quickly and to pour plates for the afternoon lab when it broke. There was no shield and I wasn't wearing goggles. I was severely burned trying to do too much too fast without adequate safety equipment. (294)

58. An accident occurred while heating agar in a five-liter flask. The teacher, who had a Ph.D. in biology, was heating the agar too fast and without a stirring bead. The agar blew out the top all over his face and eyes. He was severely burned. (352)

59. In preparing a 2000 ml nutrient agar (boiling) while giving an exam to a class, I set the beaker down on a counter that must have had a tiny particle of dirt on it. The beaker broke and all the agar spilled out over my table and the table with the students. The students' clothing and legs were splattered. (369)

Alcohol

60. A science laboratory aide was generating oxygen using sodium peroxide in an Erlenmeyer flask, by pouring in small amount 30-40ml of water. It worked well until the time an unclean flask was used. Apparently there was a small amount of alcohol in the flask. Heat generated set the alcohol on fire and the stopper popped up. A small piece of glass tubing broke. No injuries occurred. No shield had been used but safety glasses were worn. The aide had been told not to push the stopper in too hard--this probably kept the flask from exploding. (8)

61. A science room I shared with another teacher was used every teaching period. We were doing an experiment on measuring temperature. All the alcohol lamps with regular

wicks were being used. The other teacher had taken old lamps with loose caps and placed felt strips in them to overcome the lamp shortage. A student borrowed one of these to do the experiment. The lamp must have had a hairline crack in it (not visible). When the lamp was lit, it exploded spewing alcohol all over the table.

The students were sent from the room. When I went for the fire extinguisher it was empty. I cleared that desk and surrounding desks of books and materials. I went for the fire blanket--it was just a regular blanket. When the alcohol burned itself out, we returned to the room. I no longer use that style alcohol lamp and never did nor will store lamps full. Fortunately, no one was hurt and no damage occurred except to the "not real" fire blanket. (56)

62. A student was dumping alcohol into a sink when another student threw a match into the sink. A fire resulted causing second degree burns. (116)

63. A student trying to show off spiked his soft drink with alcohol he obtained from the lab. The result was permanent brain damage. (192)

64. In a college microbiology lab, a classmate had a petri dish filled with alcohol catch on fire with a fire heated loop. He did not realize the loop was hot enough to ignite the alcohol. (308)

Other Cases include: 1, 4, 15, 20, 85, 86, 87, 155, 435

Ammonia

65. During a freshman lab period in college, my lab partner was looking for a certain solution which was supposed to be used in the experiment. Unfortunately, students had taken the beakers of unmarked solutions back to the desks away from their marked spots. In any case, my partner was unsure which solution was which. So she decided to smell them to see which was the ammonia which we were supposed to use.

She put the beaker under her nose and breathed in deeply. Seconds later, she almost passed out on the floor. She went outside to get some air and regain her composure and eventually came back in to resume the experiment. (73)

66. After having eggs thrown at her house on mischief night, a Portland, Maine housewife went to clean off the remains the next day. While outside, she mixed a solution of household ammonia and clorox bleach. She was killed. Someone saw her pass out and called an ambulance. One attendant was overcome and later died. (220)

67. During the ammonia fountain demonstration, pressure built up in the flask causing an explosion. The flask was shattered. Fortunately, no one was injured. (324)

Other cases include: 69

Ammonium Chloride

68. During a chemistry lab a student slipped on the floor causing two 200 ml glass stoppered bottles of reagents to fall. One contained concentrated ammonium hydroxide. The other concentrated hydrochloric acid. Both broke on the cement floor. I immediately directed all students to leave the lab. Just as everyone was safely exited, a cloud of ammonium chloride formed filling one half of the room. The room was ventilated to remove the fumes. (481)

Other cases include: 418

Ammonium Hydroxide

69. During a chemistry experiment, the positive qualitative indication was that a slight odor of ammonia could be detected by sniffing the test tube when sodium hydroxide was added to the unknown chemical and then heated. The student doing the experiment had grabbed the bottle of ammonium hydroxide by mistake and when he sniffed the tube for the faint smell, the ammonia nearly knocked his nose off. (260)

Other cases include: 68, 175

Benzene

70. A now retired college professor used to write with a wax pencil on an overhead projector. He would clean up using Benzene. The practice had gone on for years. (210)

71. About four years ago, I was using an old lab manual as a source of chemical experiments. One of the lab assignments involved the use of nonpolar solvents like benzene and carbon tetrachloride. There was one sluggish student who came in during the middle of a Thursday afternoon to do his lab assignment. The deadline for doing the work had passed by two days ago. I set him off doing the work, cautioning him about the hazards of benzene and carbon tetrachloride ("use fume hood, avoid contact with flame") and then I went off to correct the other students' lab reports. About 10 minutes elapsed. Suddenly, I heard the blast of a carbon dioxide fire extinguisher. I looked out into the lab and saw a cloud of smoke.

The student had attracted one of his friends (not a chemistry student) and both of them had tried to test the flammability of benzene. They had touched a match to an open beaker of the stuff. Of course, the benzene burst into flame. The student reacted to the sudden "whoof" of flame by jumping back and knocking the burning benzene off the lab bench and onto the floor. My science department chairman rushed out with a fire extinguisher and put out the fire before any damage was done. Close Call! (335)

72. A senior taking a chemistry course had his last lab of the week on Friday from 2-5. Friday was party day. The lab called for heating benzene on a water bath. The student was in a hurry and heated with a bunsen burner. Vapors over flowed, ignited, trailed back

and blew up in his face. The student ran to the shower--it did not work. The fire blanket fell apart. His goggles melted. Finally the fire went out. (427)

Other cases include : 88

Benzoyl peroxide

73. A lab tech spilled a quantity of material containing benzoyl peroxide. He waited till it dried then proceeded to scrape it off the floor with a putty knife. The result was a flash fire. (252)

Bromine

74. In college, a student near me was heating bromine in a test tube "out" in the lab (not under the hood). I was nearby and started choking and had to go outdoors. A nurse took me to an emergency room to be checked, but I was fine by then. (9)

75. Twenty-five years ago a bromine retort was knocked over by a student. That experiment was never done again. No need for this type of lab in high school. (105)

76. A high school student picked up a bottle of bromine and being unaccustomed to its density dropped the bottle causing a problem with vapors. (246)

77. While taking inventory of chemicals in the storeroom, my student lab assistant pulled a metal container down from an overhead shelf. The container had been oxidized and gave way spilling the contents (bromine saturated vermiculite) over the student. The bottle fell and broke, further splattering the student and causing severe burns. (291)

78. A two-milliliter sample of bromine had been transferred to a test tube, sealed, and put inside another bottle which was also sealed. When the teacher using the sample was putting away other chemicals from the same lab experiment, the box of chemicals tipped and the double container broke, splattering bromine on her legs.

The problem began with the fact that there were no shelves in the classroom (other than the ones on which chemicals were stored) where a container of chemicals could be rested. So, she was holding the entire box in the poorly lighted room. Once the spill occurred, she rushed from the storeroom (there were neither faucets nor showers in there) to her own classroom where the sink was inoperable. It leaked and was flooding the second floor so had been shut off. By the time she ran down the corridor to the ladies' room, the bromine had eaten through her stockings but fortunately had been in such small droplets that they only slightly irritated the skin underneath.

At this time, the school was undergoing evaluation. The head of the science committee shrugged off the episode and said we wanted miracles. Fortunately, within the next few years, parents complained enough to get our rooms refurbished. We now have water, ventilation and safety showers in each lab as well as our workroom. (435)

Calcium hydroxide (Lime)

79. In the art department in a college, the bulk supplies were received in paper bags. One project had the students making plaster of Paris casts of hands. A student grabbed the wrong bag and used lime instead. The student artist is now minus several fingertips and needed extensive plastic surgery. (446)

Carbon disulfide

80. While using carbon disulfide for dissolving sulfur, filter papers were placed in a wastebasket after use. No burners were permitted to be lit until all filtering was completed. However, the wastebasket contained fumes of carbon disulfide from the used filter papers. A hot test tube was thrown into the basket resulting in an explosion with flames reaching the ceiling. Fumes necessitated evacuating the room. No one was hurt. (347)

81. Students were dissolving sulfur in carbon disulfide. Someone spilled the carbon disulfide. It was wiped it up with paper toweling which was then tossed into the garbage can. The can exploded resulting in a fire. Fortunately, a student reacted immediately with a fire extinguisher. (403)

82. Carbon disulfide was being distilled to purify it for use in gas chromatography. A heating mantle was used for the distillation but the chemist neglected to carefully check the fittings in the distillation apparatus. About 30 minutes after the distillation was started, the mantle ignited the escaping carbon disulfide vapors. (404)

Other cases include: 192, 253

Carbon tetrachloride

83. Illness resulted from inhaling carbon tetrachloride fumes after a large container of carbon tetrachloride broke on the floor. (259)

Other cases include: 71

Charcoal block

84. In high school chemistry, we were trying to oxidize chemicals on a charcoal block. We had to blow through a tube and I fainted, falling back and hitting my head. Luckily, I missed the bunsen burner and only suffered bumps on my head. (269)

Chlorophyll

85. In a tenth grade biology class, we were doing some starch tests on variegated leaves of plants to show the importance of chlorophyll. A first step in the process was to boil the leaves in alcohol to extract the chlorophyll from the leaves. The beaker containing the alcohol was in a water bath on a hot plate. The hot plate had exposed heating wires. After the chlorophyll had been extracted, the students would use forceps to remove the leaves from the boiling alcohol. During removal, some alcohol dropped onto the hot plate and ignited. This small flame ignited the boiling alcohol in the beaker. The fire was extinguished by covering the beaker.

The hot plates have been replaced by new ones with enclosed coils. (168)

86. While students were extracting chlorophyll from leaves by boiling in alcohol, some alcohol spilled onto the electric burner. It developed into a small fire. It was quickly extinguished by a fire extinguisher and there were no injuries. (367)

87. A teacher was demonstrating the extraction of chlorophyll from a plant leaf to a seventh grade biology class. The plant leaf was in a beaker of alcohol which was immersed in a beaker of boiling water heated by a hot plate. The demonstration was being done in front of the class on the demonstration table and all students were in their seats.

The teacher noticed that the alcohol was almost all evaporated and removed the smaller beaker with tongs and set it down next to the hot plate. The teacher took a one-gallon can of alcohol and started to refill the beaker. Suddenly the alcohol ignited and the gallon can became a blowtorch shooting out to the front row of students.

The can was immediately moved away. However, one girl was severely burned, as were the books and papers. The desktop was charred. (421)

88. At a boys' school in Connecticut around 1974 a biology teacher ran out of time to prepare a chlorophyll chromatography lab. So, the teacher set up a hot plate to heat benzene for extraction of the chlorophyll from spinach right beside her as she lectured to another class. There are still green stains on the chalkboard of that room as a result of the explosion that occurred. The flask, by happy miracle, had the grace to explode in the direction of the chalkboard. The students and teacher were uninjured. (422)

89. A student in a biology class was heating ethyl alcohol to remove chlorophyll from leaf matter. It caught fire causing the beaker to break. The fire spread. The teacher moved the class back and the fire was extinguished. The total damage was one burned pocket book and the broken beaker.
(431)

Other cases include: 373

Chromic acid

90. A student in a quantitative analysis lab was cleaning glassware with chromic acid solution. The lab was staffed by a graduate student. I was in my office at the time. I was drawn to the lab by screams and the noise of confusion. The student had splashed the

cleaning solution into his eyes. His goggles were around his neck and he had contact lenses that were not allowed to be worn in the lab. Luckily they were hard lenses. We irrigated for 15-20 minutes with an eyewash hose and were able to flush out the lenses and clean the eye. Subsequently he received medical attention and had no loss of sight. (194)

91. I know a fellow who in a research lab was dragging a battery jar of chromic acid cleaning solution closer towards himself. The jar cracked wide open, and he was instantly drenched from the waist down. Fortunately, he was only 50 feet from a shower room. His race down the hall was noted as much for his bottom-less attire as for his speed. He had been wearing only a single layer Army "cooks and bakers" outfit, so in spite of prompt dilution the burns were considerable. (242)

92. At a Midwest University in 1983, an untrained technician was carrying one gallon of chromic acid cleaning solution. The container struck the corner of a lab bench and shattered. No safety shower was present.

The technician was more concerned about clean-up rather than her safety. She was hospitalized for three weeks and required skin grafts. (479)

93. In college, two other students in my class were making chromic acid to clean their glassware. They mixed it in an old reagent bottle. The heat broke the bottom of the bottle right out and spilled the acid all over the floor and down the side of the hood. It shorted out the switch to the hood. No injuries just embarrassed students. (486)

Copper Sulfate

94. Eighth grade student was using copper sulfate in an experiment. She was slow in cleaning up at the end of the period. Subsequently, she didn't wash her hands even though I had instructed students to do so. She left in a hurry. Much later in the day she rubbed her eye and it began to burn. She ended up going to an eye doctor with some damage done to the sclera from the chemical. (146)

95. Two years ago, I had a student who decided to taste copper sulfate crystals during a lab. Naturally, they had been told not to ever taste anything in the lab. He was taken to the hospital, given syrup of ipecac, threw up all afternoon and was fine. He was not allowed to do anymore labs. (487)

Cyanide

96. While pipetting by mouth on two different occasions, I managed to take in cyanide on one and strong sodium hydroxide on the other. (216)

Ethanol

97. A distillation with ethanol as the solvent, was being conducted in a ground glass system. The steam was not working so the lab assistant instructed the students to use an

open flame. One student's system did not have a good joint and it exploded. No injuries, but a mess resulted. (37)

Other cases include: 13, 32, 89, 112, 152, 197, 198

Ether

98. A student left the plastic snap-off lid ajar on can of ether. The can was placed in a non-explosion proof refrigerator. An explosion occurred which blew the door off the refrigerator and through a nearby cinder block wall. Luckily, the accident happened after school hours. No one was injured. (172)

99. A friend was performing an experiment and was heating ether to speed up a reaction. The next thing he knew he was covered from head to toe with flames. He escaped serious injury due to the presence of an overhead shower. (188)

100. In the biology department at my high school someone, put a half full bottle of ether in the refrigerator, supposing (I guess) it would be less "reactive" at a lower temperature.

It blew the door of the refrigerator across the room and started a small fire. It was on a weekend so no students were in the building and no one got hurt. (316)

101. In a college organic lab, ether was being used. The vapors were very heavy. Someone ignited a burner in the corner of the lab. The fumes ignited and a flash of light moved across the ceiling as the ether ignited. (322)

102. In using ether in a hood to anesthetize rats, some of the fumes escaped into the lab. It created nausea and sickness in several students. (367b)

103. A person was working one evening in a university graduate lab. No one else was in the immediate vicinity. While pouring ether from a large glass ether container, the bottle was either dropped or cracked on the side of the hood. The long lab coat worn by the worker ignited. Luckily, as he ran out into the hallway, another person was passing who put him on the ground and smothered the flames. (372)

104. In the course of an experiment in organic chemistry, I introduced ether into a separatory funnel containing a strong alkali solution which had been heated in a previous step. I had not cooled the material sufficiently. When I closed the funnel and shook, it the stopper blew off and the still warm contents went all over the bench, the floor, and me.

Only a few students were in the lab at the time and no one noticed what had happened. I proceeded to clean up the mess by soaking up the liquid in paper towels and throwing them in the wastebasket, then rinsing with wet paper towels which I added to the wastebasket.

Then, I went to the men's room to clean myself up. By that time the ribs on my undershirt had left black stripes on my chest. The area under my belt was solid black. I then proceeded to the infirmary where I was treated.

In summary the main cause was my failure to read the instructions properly. The instructor was not in the room at the time. I never thought of using the emergency showers which were available. Amazingly, the ether never ignited. (145)

105. Ether exploded in a refrigerator during the summer. It destroyed that area of the laboratory. It should not have been stored for another year without regular peroxide testing. (161)

106. A chemist was evaporating ether from ten beakers in a hood. She left for a few minutes and while she was gone a co-worker turned on a hot plate in the corner of the same hood to use for his own work. He left his beaker on the hot plate and left for a few minutes. The chemist evaporating the ether returned and did not realize that the hot plate had been turned on. An explosion occurred and she was severely burned. Her safety glasses saved her eyesight. (385)

Ethyl ether

107. In a government research laboratory a senior scientist uncovered some old bottles of ethyl ether. Having an immediate need for ether, the scientist attempted to remove the top from the can. Finding this difficult, he used a pair of steel pliers to twist the cap. Boom!! He lost one eye and two fingers. (54)

108. I was involved in an accident with the explosion of a very small quantity of diethyl ether. At the time, I had never been told that peroxides formed in ether and was evaporating a sample on a steam bath. I had just removed the container from the bath and had taken a few steps away from the hood when the container detonated. Fortunately, I was out of range. However, I never found any piece of the container bigger than 1-2 millimeters. (302)

Formaldehyde

109. Three gallons of unused formaldehyde was kept in a plastic container in the storeroom. The supply was of unknown age. The plastic became brittle and broke. The fumes were detected first, but by then the liquid had seeped into the porous concrete. Fortunately, the leak was during the summer so students were not affected. The fire department responded and cleared the immediate problem. The area was flushed with water. For weeks, the fumes burned your eyes in the room. Ventilation has been ordered. (62)

110. Old dissection specimens had been stored in metal storage cans for years. They were kept in a prep room and forgotten. They were stored in formaldehyde. One of the cans developed a leak in a seam. The formaldehyde leaked through the floor to the office area below.

The adjacent lab area was immediately closed and students evacuated. The EPA was called to test for air concentrations. The office remained closed for several months. In the end, the ceiling and carpeting had to be replaced. (175)

111. I had my class ready to dissect frogs. I removed some of the frogs which were preserved in formaldehyde using my bare hand. For one month after that I had peeling skin. Since then, I always wear gloves. (190)

112. About three years ago a student brought in some "free" chemicals for the school. These included a bottle of concentrated (50 to 100%) formaldehyde in a gallon glass container. The department head suggested it be given to biology. The biology teacher placed the container on the floor near his desk. The bottle was kicked and broken. I immediately told the assistant principal to get the fire department but he insisted that the head custodian could clean it up.

The fumes quickly spread throughout the building and eventually the fire department had to be called. The custodian suffered serious eye irritation. (204)

113. A student working in the lab at night left the door to the dissection cooler storage open and formaldehyde fumes filled the lab to dangerous levels. The problem was solved in short time by completely opening up the room to the outside. (340)

114. Several years ago, back in the days of universal formaldehyde, two girls were rinsing a frog prior to dissection. One girl, in an act of horseplay, threw the frog into the dissecting tray in front of the second girl. A small quantity of remaining formaldehyde splashed into her eye. The girl refused to use the readily available eyewash due to the care and time involved in preparing her eye make-up. (460)

115. In a high school biology class, the students were performing a dissection on a frog and formaldehyde splashed into a girl's eye. The student informed the teacher and an eyewash was used for several minutes. The teacher asked the student to inform him if any further problems developed during the day as a result of the injury. (489)

Formalin

116. I was a co-op student working in a hospital histology lab. Among other duties, it was my responsibility to load the specimen buttons which were in baskets and in buckets filled with formalin onto a machine. The baskets were actually attached to the machine and the buckets were set up so that the baskets were dipped into them over a 24-hour process. Besides formalin, other buckets contained paraffin and water. In any case the machine had two tiers of this particular set up. The second tiers bottom level was about four feet high.

The machine had been moved one day and when I went to load it, it tipped. This caused a bucket of formalin to splash onto my face and into my eyes even though I was wearing reading glasses. My supervisor immediately pushed me to the eyewash. Fortunately, my eyes were only bruised and scratched. (315)

Gas

117. There was work being done on the water pipe under the teacher's demonstration table. Somehow a small hole was put into the gas line. The gas somehow ignited while the teacher was in the middle of a class. Because the fire started without being noticed, it got going pretty good. Because the shut off was hard to reach, it was very difficult to put out the fire. (9)

118. A leaking gas jet was discovered. No accidents but a great concern because of what could have happened. (68)

119. Students in a ninth grade physical science class accidentally knocked the top off a gas valve which had been loosened by older students playing around.

There was an immediate major gas leak. I cleared students out and opened the windows. I got another teacher to alert the administration. I could not find a pipe wrench to shut the valve. It took 20 minutes to turn it off. The janitor was not readily available. The school was not evacuated. (160)

120. In one of the schools where I taught, the gas shut off valve was outside in a main corridor. On several occasions someone turned the valve on in the corridor while a student inside had left the gas valve on. The main shut off in the corridor could not be locked because of fire laws. On two occasions our area of the building was evacuated because of the gas leakage.

This was potentially dangerous to all, especially because the lab was located next to the lavatory where students would sometimes smoke. If someone had lit a cigarette there could have been an explosion. (208)

121. For about five or six months I taught biology for one or two periods a day in the same classroom. I could always smell natural gas when I entered the room, particularly when I opened any drawer in the demo desk or the cabinet beneath the sink.

I reported this to my department chairman and other teachers using the room. No one else could smell this. I finally complained so much that the section custodian checked and found nothing. I was considered a nagging woman.

I complained to the principal who finally called the gas company. The gasman arrived with his sniffer machine and while I was conducting a class he was checking under the sink. All of a sudden, he whispers to me to get everyone out of the room. I moved them elsewhere. This is after six months of 150 students using the room every day. Within ten minutes, he requested that everyone in the wing of the building be evacuated.

The gas supply pipe was embedded in the concrete slab floor. It was cracked within the slab beyond the shut off beneath the sink. The location of the next shut off was not immediately available. Thus the evacuation of the wing. Finally, the shut off was found in the ceiling of the hallway.

I continue to thank God that this room was not used for chemistry except for lecture purposes. (433)

122. A friend was working for a car transport company. Driving a car from Florida to Mass. he discovered a rear tire was smoking by the time he reached South Carolina. When he stopped, the tire caught fire. The fire department was called but refused to respond because he was just outside the city limit. People stopped to watch but everyone stayed

back as the tire burned until gone. After the fire was out and most of the people had left, my friend thought about getting his belongings out of the car. Luckily he had not yet approached the car because suddenly the entire car exploded. Burning gas flew in all directions. Three boys were burned badly but were partially protected by the long sleeves of their shirts, plants and shoes. A woman in light summer clothing was killed. (436)

123. I was teaching I.P.S. at a private school. The room was fitted with permanent lab benches containing sinks and gas jets. The fixtures were in disrepair. Some of the nozzles could be turned round and round because they were broken off from the plumbing. I did not use the gas jets in the I.P.S. course. We used portable lab stations, peg boards and alcohol burners. On one of the lab benches, the access plate to the plumbing was not in place and the copper tubing of the gas system was exposed.

During a class, a student smelled gas. To check--I don't know if he was in earnest or joking--he lit a Bic lighter. The gas escaping from a split in the copper tube ignited. I promptly cleared the classroom while the department head, who was teaching next door, turned off the gas at the source. (443)

Other cases include: 35, 128, 366, 348

Gasoline

124. Many students are unaware that you can't pour or leave open containers of a flammable solution near an open flame. On a high school camping trip, I saw an incident where an individual poured gas onto a fire to get it going. The individual felt he could pour it quickly enough so that the gas in the container wouldn't ignite. Not so! It did!. (202)

125. One easily preventable accident I witnessed was that of a young neighbor replacing a fuel pump on his car. He started the project with complete confidence in his ability and knowledge of
the situation, both of which he over-evaluated.

After several hours of effort, caused mostly by using improper tools, he succeeded in removing the fuel pump but not without also dispersing about a cup full of gasoline.

Installing the new pump was also a challenge to his ability and knowledge or inexperience in proper thread alignment. As he had cross threaded the fuel lines to the pump, it was guaranteed to leak. When he started the engine, gasoline sprayed out of the connection and dripped onto the ground.

Viewing this in dismay he decided to mediate for a few moments and evaluate the situation. Naturally he had to have a cigarette while he mediated. Fortunately, he was aware enough to walk a safe distance from the car before he lit the cigarette. Suddenly, a possible cause of his problem came to him and he headed back to the car. Realizing he was smoking as he was approaching the car he dropped his cigarette to the ground to step on it. The flames that followed resulted in serious burns about the legs, face, and arms requiring hospitalization and skin grafting procedures. (206)

126. A mother of two toddlers tried to wash road tar off with gasoline in the bathtub. The gas hot water heater pilot ignited the gasoline on the children causing their deaths. The accident occurred in Springfield, Massachusetts in 1979. (214)

127. One of my students washed a greased filled floor with gasoline in his home auto shop. The garage also had a wood stove. When he cleaned his floor with gasoline the vapors were ignited by the stove and he was killed by the explosion. (293)

128. A couple of years ago, my husband literally torched himself because he was over-tired and actually unaware of what he was doing.

We had just returned from a rather long day of festivities which included a wedding, a reception and a late 2 1/2 hour drive up to Maine. As we got in the door we noticed it was very cool in the house and decided to build a fire in the wood furnace. Everyone was exhausted and simply wanted to go to bed. My husband was no exception.

He went into the basement, loaded up the furnace with wood and threw gasoline on the wood--figuring it would be a quick way to ignite the wood. Only problem was he couldn't find the matches. He went upstairs to locate the matches. Meanwhile the gasoline fumes had begun to accumulate. He went back to the basement, opened the furnace door, ignited the match. There was a large flash of light as the gas fumes ignited and acted as a torch. He was lucky enough to have brought his arm up to protect his eyes. His injuries consisted of singed eyebrows and a severe burn on the arm. (400)

Gun powder

129. The purpose of the experiment was to produce evidence for chemical reactions having taken place. At the beginning of the lab exercise a large open container of black gunpowder, the teacher's supply for the day, was placed on a lab cart behind (3 feet away) the area where a reaction involving the gunpowder was to be conducted. The teacher planned to dole out the gunpowder personally as students came to that station to work. In addition, he planned to cover it before any reactions were held at the station.

Before the teacher could do this and just after pupils began to work, he was distracted by questions. While so distracted, he did not see a student take the entire supply of gunpowder to the station. There, the student took an apparently small sample and ignited it. Sparks from the burning gunpowder fell into the large container and ignited it. The entire gunpowder supply ignited. Flames shot five or six feet high, sparks flew in all directions up to fifteen feet away and smoke and flames filled the room.

The student was wearing goggles but received small burns on his face. He had not tied his lab apron and as a result some sparks burned holes in his clothing. No one else was injured even though five people were within three feet of the event. We were lucky.

Insufficient communication by the teacher and poor student safety practice contributed to this accident. (129)

130. Once I loaded a .357 pistol with six grains of gunpowder. It should have only been three grains. There was quite an explosion. It could have been deadly. The problem was that there was no counter on the index arm and I did not reweigh. (334)

Hydrochloric acid

131. When in a college organic lab, we were working on a synthesis of our own design as one of our final labs. We used one that was similar to one of our assigned labs, but not identical. The reagents used were much more reactive than our previous experience showed. We started an hour early. By the time the rest of the class had arrived we were ready to start "synthesizing". Hydrochloric acid was a product of this reaction so we set up a sodium hydroxide trap. The reaction proceeded so quickly that hydrogen chloride gas came out of the condenser and filled the room. The teacher evacuated the room while we stopped heating. We had to clean up and start again. We had assumed that the similar chemicals would have the same reactivity. We used too much of the reactants. More research about the reaction was necessary. (1)

132. A friend was doing research in a chemistry lab. He and a working partner stopped for lunch in the lab. My friend reached for and drank what he thought was a beaker of water. It actually was hydrochloric acid. He destroyed his upper palate and esophagus. (30)

133. A rather nervous student was using concentrated hydrochloric acid. He somehow managed to splash the acid into his eye. He was, I believe, trying to identify a gas that was being evolved and tried to heat the test tube at the same time.

There was no accident equipment available and both the instructor and myself worked hard with water trying to wash the eye out before taking the student to the nearest hospital about twenty miles away.

The main error was the failure of the instructor to warn the students about the dangers in using concentrated acids. The students were not properly instructed on lab procedures, especially about looking into tubes or open bottles. (126)

134. A teacher wanted to demonstrate alternative energy sources. Hydrogen, a highly flammable gas was to be generated by mixing concentrated hydrochloric acid with zinc in a small test tube. A one-hole rubber stopper was inserted with a long tube. After allowing the reaction to continue for a few seconds, the teacher ignited the gas as it left the tube. The gas burned and suddenly the flame backed up into the test tube, spontaneously igniting all the gas. The tube shattered and sprinkled glass and hydrochloric acid over the students in the front row. Remarkably, no one was injured. (170)

135. A student while mouth pipetting a dilute hydrochloric acid solution, was whacked on the back by his friend. This resulted in the student getting the acid in his mouth, and swallowing a small amount.

The student's mother came in a few days later to complain to the principal. The teacher had instructed in pre-lab that acid should be decanted into graduated cylinders to measure and that mouth pipettes were to be used only where innocuous reagents had to be measured. He disobeyed instructions.

The outcome was that there was no legal action. The boy's tongue was red and denuded of papillae which came back in a few weeks. His teeth had never been so clean. (196)

136. A college freshmen chemistry student dropped a bottle of concentrated hydrochloric acid on the desk. It broke and splashed over his body. Luckily, the teaching assistant neutralized the acid with sodium bicarbonate solution. (Editor - only water is recommended. Flush for 15 minutes, removing clothes as necessary. Seek medical assistance). (289)

137. One gallon of hydrochloric acid was left on a lab table under the hood when apparently for no reason the bottle cracked and the acid spilled over the table and floor.

Unfortunately, a student was walking by the table at the same time. The acid splashed on her shoes, nylons, legs and dress. The student froze in her tracks. The teacher immediately ripped off the nylons and brought the student to the shower. A deluge of water prevented any serious scars. (339)

138. During an I.P.S. lab, a student doing an experiment involving the evolution of hydrogen by reacting zinc and hydrochloric acid in a test tube, found a rubber stopper on the lab table and inserted it in the mouth of the test tube. After some vigorous shaking the gas pressure built up and threw some of the acid out of the tube on to his shirt. Fortunately, flooding with water minimized the damage. For some reason, the stopper had not been put away when a previous experiment had been taken down. (360)

139. The day before the opening of school I loaded a lab cart with newly arrived supplies. I proceeded to roll the cart out of my classroom to distribute the supplies to other classrooms and storage. The cart wheels struck the shallow threshold in the doorway, the cart stopped and inertia carried the concentrated hydrochloric acid glass jug off the cart. It smashed on the hallway floor. The fumes were terrible. I got a face full. Other teachers would not heed my alarm to leave their rooms, so I pulled the fire alarm. No real injuries. The damage to the floor is still evident four years later. The hydrochloric acid was neutralized with baking soda. (387)

140. A chemistry instructor was diluting hydrochloric acid on a crowded bench. He dropped the entire bottle. It shattered splashing his pants with the concentrated acid. The quick removal of the pants prevented injury and drew a standing ovation from the class. (419)

141. When I was a student in high school, the student next to me knocked over a bottle of hydrochloric acid which landed on my knees. It didn't cause any serious injuries mainly because our school had an operating shower in the lab. I think my class should have been warned about the dangers of chemicals. (495)

Other cases include: 68, 158, 173, 333, 354, 393, 482

Hydrogen

142. While testing hydrogen gas in a test tube, a piece of burning wood splint landed on student's arm. (250)

143. During the production of hydrogen gas, a clogged glass tube caused the reaction flask to explode. Fortunately, no injuries resulted. (285)

144. A teacher was demonstrating the reaction between hydrogen and oxygen. The teacher was filling a one gallon plastic bottle with a small hole in the bottom and a one-hole rubber stopper in the top. The stopper had an eyedropper tube in it. The hydrogen was ignited and since the hydrogen oxygen mixture was correct, the whole thing blew up imbedding chunks of plastic in the lab benches. There were no injuries because everyone had hidden before hand. (305)

145. During an experiment using hydrogen gas, the generator was exposed to the open air by removing the two-hole stopper thistle tube and delivery tube unit. The student waved his burning splint over the mouth of the flask gas generator. As would be expected, a terrific explosion resulted. Luckily, the student got away with a minor hand injury. Glass was strewn in all directions. The student claimed this was an accident. (333)

146. Mr. X was demonstrating the hydrogen and oxygen reaction using a eudiometer with wires embedded in the top so that the gases could be ignited with a spark from two coils. Usually the combined volumes were limited to 15 - 30 ml (in a 100 mL tube) however, Mr. X decided to use approximately double this, and assuming that the reaction was an "implosion" hence there was no danger. When the spark was applied, the glass tube shattered. Fortunately, no one was hurt by flying glass. (354)

147. In a ninth grade IPS class, students were generating and testing hydrogen and oxygen gases using wood splints. Two students sitting next to a wall were disposing the used wood splints by pushing them through a small hole in the wall. The resulting fire inside the wall caused approximately $4000 in water damage and reconstruction to the wall. (491)

Other cases include: 134, 138, 219, 226, 305, 306, 489

Hydrogen peroxide

148. A biology class was doing an experiment on enzymes. Hydrogen peroxide was added to some liver and a gas was supposed to be released. Students supposedly added 3% hydrogen peroxide to the food in a test tube and were instructed to shake the test tube. They stoppered the tubes with their thumbs. In no time students complained of bubbling and burning sensations on their skin. About 10 students suffered burns before the activity was stopped. The teacher had the students wash their hands profusely. They went to the school nurse and the local hospital.

The problem seemed to be that 30% hydrogen peroxide had been dispensed instead of 3%. The hydrogen peroxide had been taken from a large gallon stock bottle stored in the biology refrigerator. The label had not been carefully read. (343)

149. Slight tissue damage resulted from using 30% hydrogen peroxide substituted for 3% hydrogen peroxide in catalysis experiment. (466)

Other cases include: 247

Hydrogen sulfide

150. Inordinate sensitivity to escaping natural gas and hydrogen sulfide has caused several student headaches. (241)

Other cases include: 158

Hydrogen sulfite

151. Near the end of the school year, a teacher was cleaning out stock solutions and bottles that were no longer labeled. The sink had been incorrectly plumbed to(with) another sink about 12 feet away in the photography dark room. The dark room filled with hydrogen sulfite gas.

We were told the problem arose because there was a common trap beneath the floor even though each sink had its own trap. (199)

Iodine

152. This past fall, I walked into a classroom when a lab was being conducted by a newly hired teacher. Big bottles of ethyl alcohol were set out; a liquid was running down the table; a bunsen burner had been turned on and a bottle of iodine crystals was open with crystals around the bottle. A student had a test tube shaking it, aimed at another student. I did not see the teacher so I screamed the teachers name and asked where are you? What is going on? At the same time, I grabbed the boy's arm with the tube.

You can imagine my surprise the next day when I got notified that the teacher had called the local association claiming harassment. (79)

153. I was working as a chemical technologist for a company that sold radioactive isotopes to researchers around the world. Part of my job was to dispense liquid solutions of radioactive iodine (I-125). The lab contained several hoods with sophisticated filter systems. We wore protective eyeglasses, gloves, and lab coats.

Despite the precautions taken, the worker in the hood next to me accidentally spilled some I-125 on the apron of the hood. He had the door of the hood open too far and the air suction was poor. I-125 is very volatile and he did not tell me what he had done so I could evacuate the lab. We both suffered from over exposure as we inhaled the radioactive fumes. The I-125 ended up in my thyroid gland.

I discovered something was wrong when, upon leaving the lab, I checked myself with a G.M. tube and it screamed when it got to my throat. (341)

154. A sloppy head researcher left I-125 on tabletops and chairs. His technician now has a "hot" thyroid and hands. (374)

155. Students were working with bacteria. One student after disinfecting the tabletop with alcohol/iodine disinfectant, tried to see if it actually was flammable. Three students were burned. (376)

Lead

156. The students had made clay models in an eighth grade activity on stats of matter. We melted lead in a tin can and molded lead paperweights. The room was well ventilated with a large window fan. I lifted the tin can with the molten lead and started to pour the lead into the mold. This particular mold had not dried completely and when the hot lead vaporized the water in the clay it boiled up splattering me with hot lead. When I was burned I pulled my hand back instinctively and in doing so slapped the hot lead on a student standing near me. He was not hurt but this could have been a very bad situation. (351)

Lead Nitrate

157. A large eighth grade class was using lead nitrate solution. One team of students had poured about 50 ml into a beaker and were working on setting up another part of the experiment. One of the "wise guy types" decided it would be cool to drink the mixture. (All students have to take a safety quiz at the beginning of the year and agree to follow safety procedures). The student ended in the hospital and had his stomach pumped. (219)

Magnesium

158. A colleague was having a physical science class do an experiment in which small pieces of magnesium metal were placed in diluted hydrochloric acid. The containers were also metal but should not have reacted. However, one student's container generated a horrible odor, not unlike hydrogen sulfide. The room had no windows or fume hood but students were not evacuated. Possibly they should have been although there were no reports of illness. The cause of the reaction and the identity of fumes was identified. (59)

Other cases include: 207

Magnesium peroxide

159. As a young chemistry enthusiast, I ignited a mixture of powdered magnesium and sodium peroxide with a match. It burned so rapidly I was unable to move my hand away quickly enough and received severe and nasty burns on the hand which took a few months to heal. (13)

Mercury

160. On a weather unit demonstrating a barometer, one student ran up, grabbed the mercury, my purse and took off. He put the mercury in his pocket. The building was very old. My name was mud--there was sulfur everywhere. (445)

161. In a freshman science lab, three mercury thermometers were broken. Mercury particles were all over. No pipettes were used to clean up. It was suggested that the suction tube of the vacuum cleaner be used. The mercury particles mixed with the dust and lint.

That afternoon during a biology lab, a student lost a contact lens. After an unsuccessful search on the floor, it was decided to use the vacuum cleaner. After vacuuming the floor, the contents of the bag were removed to sift through.

With their bare hands they looked for the contact lens through the piles of lint, dust and mercury particles. All the particles were thrown into the wastebasket at the end of the search. The contact lens was not found but the students did have fun squeezing and separating mercury from the dust. The teacher termed it a COHESION experiment. (452)

Methanol

162. A teacher was doing a demonstration using alcohol. To enhance the experiment more methanol was added but too close to the flame. The experiment exploded away from the teacher and toward students who were surrounding the table. A shield was not being used. (184)

Other cases include: 13, 373

Molten salt

163. I was running a molten salt reaction in a sealed tube and it got too hot. I pulled it out of the tube furnace, saw that something was wrong and tried to jam the tube back into the furnace. I didn't make it and it exploded. My safety glasses were chipped. A two inch square piece of vycol glass became embedded in my arm. The area was cooked medium rare. Several stitches were required. I have a scar on the inside of my upper left arm. (248)

Naphthalene

164. A fifth grade teacher demonstrating recrystallization of naphthalene, over heated the naphthalene causing a fire and large smoke cloud. The result was early dismissal of school to ventilate the building and prevent children from becoming ill. (147)

Nitric acid

165. A student was sent to the chemistry stockroom to get concentrated nitric acid for her art teacher. He wanted to etch something. The student accidentally spilled the concentrated nitric acid on herself - burning her arm. She immediately was given first aid - her arm was flushed with water and the arm was covered with baking soda. Then, she was rushed to the accident room of the nearby hospital. The arm was permanently scared. The parents sued the school department even though all the aid given was correct. (24)

166. A low level college prep student picked up a small bottle of concentrated nitric acid and spilled a small amount on his leg. He was afraid or embarrassed to mention it to anyone and sat through 20 minutes of class before smoke and dissolving pants and burning flesh forced him to report the incident. The teacher immediately washed the area with large amount of water, neutralized the acid with base and sent the student (with another student to help him) to the nurse for medical treatment.

When: Acid spilled in between periods.

Where: Chemistry lab. Acid was kept in hood because a demo involving the acid was to be shown during the period.

Why: Student had heard from previous classes that the demonstration was interesting and wanted to try it himself before class. Teacher had left room between classes to get a make-up test for another student. (76)

167. Students were performing a lab on special chemical reactions. Prelab preparation included discussion of each procedure, hazards of chemical involved, concentrations of chemicals and hazards, quantity of chemical to be used (given verbally as well as on written direction), discussion of new techniques and demonstration of techniques.

One group of four students measured 3 ml of concentrated nitric acid. The directions specified to add 4-5 pieces of copper wire mesh and collect a small quantity of gas. This group added a large quantity of copper to acid which caused a vigorous reaction. They probably also used a larger quantity of acid than specified. They then attached gas delivery tube.

The reaction mixture splattered, splashing acid over one student's hands, sweater and face. Third degree burns resulted. Safety goggles protected eyes. The students face and hands were quickly washed with cold water and then soap. The student was sent to the nurse, then to the doctor. (108)

168. While unpacking supplies a two-liter bottle of concentrated nitric acid broke and spilled on the floor. No injury resulted. The acid was diluted with water and mopped up. (150)

169. Several years ago when I worked as a bench chemist, I routinely used hydrofluoric acid. Since it was a common practice, my respect for the potential damage to the body was less than it should have been.

While handling a Teflon dish containing hot hydrofluoric acid and nitric acid, my thumb came in contact with it. Hydrofluoric acid burns cause no immediate pain, so I was not aware of the contact. About one hour later the pain began. Medical treatment included injection of calcium gluconate under the thumbnail in order to prevent the acid from reacting with the bone. The end result was that a part of my thumb actually rotted and came off with the bandage. It all could have been avoided by wearing rubber gloves. (153)

170. A student in high school lab removed a ground glass stopper from a stoppered bottle "properly" but it dripped some concentrated nitric acid on her skin. She washed for ten minutes with water, applied sodium bicarbonate paste and was sent to nurse. She only suffered discoloration of the skin because of her quick action. Gloves should have been worn and a different dispensing bottle used. (198)

171. A level two biology class had been working with concentrated nitric acid during a lab. The bell rang for the class change. The students quickly finished but in their haste spilled some of the acid on the bench. The same student using this bench after a break began to notice a burning sensation on his arm. The student had placed his arm on the spilled nitric acid and was only protected from a serious burn by the fact he was wearing a thick ski sweater. Several large holes had burned through the sweater. Luckily, it had not penetrated the shirt. The student had his arm completely rinsed off and was sent to the school nurse. (234)

172. As an undergraduate, I kicked over a large jug of concentrated nitric acid in a stockroom. The nitric acid burned a hole through my shoe and I have a scar on the inside of my left foot. (247)

173. A company had a 2000-gallon acid storage tank, rubber lined for storage of concentrated hydrochloric acid. An employee, newly appointed to the position of "engineer" in charge of maintaining chemical supplies, decided to use it for a windfall supply of concentrated nitric acid. Twenty-four hours later dense brown fumes caused several lab workers to recommend removal of the acid. Complete drainage was impossible, so the reaction continued. The next day, a young (22 years old) maintenance man was instructed to flush the tank. The manhole cover had seized and he didn't care to hold the hose to fill the tank with well water, so he screwed it onto the only other filler opening in the tank. When the tank began rumbling, he climbed down the ladder and was running away when the tank blew. His head, neck and back were covered. His skin and hair were stained the typical nitric acid stain color and the oxide fumes filled the abutting building easily four times the size of this lecture hall and two stories tall. The air was sufficiently red-brown to hamper vision from half down the building to the end wall. The building was evacuated.

The employee caught by the acid was hospitalized in a burn unit of a local hospital for several months. He had been doused thoroughly with water, but because it was well water it put him in shock and nearly killed him.

Miraculously no one else was hospitalized, even the three or four people who were exposed to the fumes while trying to help the maintenance worker. The accident resulted in no changes in concern for worker safety or additional education of workers. (275)

174. In a workshop demonstrating various experiments, one assistant was moving a five liter container of concentrated nitric acid which did not have the cap on tightly. It fell to the floor and much of the acid spilled on the lecturer and assistant.

The assistant rushed out to wash his face. He later returned with only his eyes not burned by the acid. He was wearing reading glasses at the time.

These were all "scientists" with a "knowledge" of handling chemicals. (295)

175. While in the prep room, a student took a five-pint bottle of concentrated nitric acid by the top. Unknown to him, the cap was not secured so the bottle dropped and smashed on the floor. I immediately emptied a five-pint bottle of ammonium hydroxide to neutralize the acid and flushed the area with water. (309)

176. In a college lab involving nitric acid, the previous class had failed to properly clean up spilled nitric acid. The entering freshman believed wet spots were water. Contact with skin and clothing produced skin burns and many holes in his clothes. (321)

177. A technician was recrystallizing an organic compound from boiling acetic acid. Needing more solvent, she went to the end of the bench for another bottle of acetic acid. Returning to the refluxing mixture, she started to add more acetic acid. Suddenly, there was a loud "whoosh" and an eruption of boiling acetic acid hit the ceiling.

I was very puzzled to explain the event until I remembered noticing a cloud of brownish fumes immediately after the eruption. An examination revealed that the technician had taken a bottle of concentrated nitric acid instead of the acetic acid.

Fortunately, there were no injuries. (326)

178. As an undergrad in a chemistry lab, we were heating a solution containing nitric acid. My lab partner was picking the hot beaker up with tongs and lost control. She yelled watch out while she let it fall away from herself. I had my back turned but was aside of her. The hot acid hit me on my arm. My lab coat sleeve was rolled up to my elbow and that protected my upper arm. My lower arm was exposed to the chemical. I did not feel any pain. We washed the area and covered it. Looking back, I believe we did not wash it enough.

During the night, I felt pulsing sensations on the arm. The next day a local doctor advised me to see a burn specialist. He treated me with some "new" enzyme treatment. The burns healed but it wasn't long before it began to twitch and the skin scar began to grow. I had to have skin grafts and radiation. (342)

179. In a college chemistry lab doing qualitative analysis a student was heating concentrated nitric acid to boiling as part of the experiment. He did not have enough solution. To save time, he added cold nitric acid to boiling nitric acid. The flask exploded. The student did not have his safety glasses on. He was put under the shower and the nurse was called. Thanks to fast action he did not lose his eye sight but was scarred badly around his eyes and face. (344)

180. One evening a call came to the lab asking if we would be able to perform urinary nickel analysis. Three workers had been exposed to nickel carbonyl and the lab was asked to do the test. The test required an analysis of urine every four hours through out the night.

By two AM everyone was just a "little" tired. To speed up the process of digesting the organics in the urine (they were being heated on a hot plate) perchloric acid was used along with the usual nitric acid. The problem came when the samples became dry and the heat caused the containers to explode. Fortunately, we knew we were tired and at least had the samples cooking in a closed laboratory hood. (414)

181. In an eighth grade class, the students were working in a self-paced environment. One of the tasks was to perform a lab using concentrated nitric acid. The bottles were just labeled "acid". One student squirted acid on a young girl's cheerleading skirt. A time period elapsed and the girl eventually felt a burning sensation and looked down to find large holes in her skirt. No aprons were being worn. (472)

182. In a high school chemistry lab, the students were working on an experiment involving the use of concentrated nitric acid. The acid was contained in a small reagent bottle with a ground glass stopper.

A female student attempted to open the bottle using only one hand. When the student lifted the ground glass stopper, it did not free itself from the mouth of the bottle, but rather lifted the entire bottle off the lab bench. When the bottle was several inches above the lab bench, it finally dislodged itself from the stopper and fell on the lab bench, spilled as it fell over on its side, and spilled the concentrated nitric acid on the student's clothing. The student suffered a slight acid burn on the skin where the acid had penetrated through the clothing.

While having been instructed in the proper method of opening such a bottle at the beginning of the year, this accident occurred at the mid point of the year, and the teacher had not reviewed the correct method before the lab. While the students had been wearing safety goggles, none wore lab aprons. (475)

Other cases include: 265, 274, 415, 431, 491

Nitroglycerin

183. A sophomore in a college chemistry course made some nitroglycerin. Realizing that after he had made the mixture and that what he had done was against the rules, he concealed his activities by placing the substance out on the windowsill. During the evening it rained and the water mixed with the nitroglycerin making it even more reactive.

The next day the student admitted to the instructor what he had done. The instructor called the city bomb squad to dispose of the substance. They retrieved the substance with a hook and ladder and detonated the substance in a playing field. The explosion shook the entire campus. (306)

Nitrous oxide

184. A student working on a science fair project was using nitrous oxide gas. Much of the project was being done at home. On one particular evening the student intentionally inhaled the gas by using a mask-devise obtained while he worked part-time in a local

hospital. When the student was discovered by his parents, he was already suffering respiratory arrest. Attempts to revive him failed when he began to vomit, aspirated his own vomit and suffocated. The student was 16 years old--a high school junior.

It seems the biggest error made as regards this story is that the student was doing his project at home rather than in school under the supervision of a faculty member. Secondly, more care should have been exercised by the hospital personal when discarding used medical equipment. Thirdly, serious questions should be raised regarding the type of project to be done and the materials which will be used. (158)

Oxygen

185. During the demonstration of a burning candle's behavior with pure oxygen, the oxygen hose got too close to the flame and the hose ignited. A student turned off the burner but in the process burned his shirt. (223)

Other cases include: 41, 60, 144, 146, 147, 208, 209, 305, 306, 329

Osmium tetroxide

186. A graduate student was preparing a concentration of 1% osmium tetroxide which should be prepared under a hooded vent with extreme caution. Proper gloves, apron and ventilation should be used. It is used to "fix" tissue for electron microscopy. The student was careless and inhaled some of the vapors upon breaking the capsule where the osmium tetroxide is held. This caused the student to be asphyxiated. (444)

Petroleum ether

187. An organic chemistry student was recovering a chemical dissolved in petroleum ether. In order to speed things up he used a Bunsen burner to boil off a little of the solvent. The vapors caught fire. He panicked and spilled the remainder causing some charred clothes but no medical problems. (245)

Phenolphthalein

188. A student got phenolphthalein in his eye. We washed the eye out and called the Mass. Eye and Ear clinic. (222)

Phosphorus

189. At the end of a period a student was cleaning up his desk (chemrock top) after a lab that used some red phosphorus. While wiping the top with a paper towel, the friction(?) caused some ignition. The student received some minor burns. (25)

190. We were demonstrating the reaction that occurs when elemental phosphorus is allowed to dry out in a crucible. The crucible accidentally tipped allowing the liquid contents of the crucible to permeate nearby textbooks. Now the textbooks begin to smolder whenever allowed to dry! (27)

191. A chemistry teacher was using white phosphorus in a demonstration at the front of his chemistry class. After slicing off a small sample, he was placing the bar back in its "oil" jar when the bar spontaneously ignited. (Phosphorus spontaneously ignites in air at temperature 86 F). Apparently, the friction of the cutting process had been enough to raise the temperature above 86 F. White phosphorus is used by the military as an artillery marker because it produces a dense white smoke. The teacher attempted to drop the bar into a sink a foot or two away on the same counter. But, in all the smoke he missed the sink and only succeeded in knocking over the entire jar of phosphorus and having it smash on the floor. The smoke was so dense that the entire school was evacuated and when the fire fighters came they were unable to locate the source. It burned out on its own and no one was injured. (60)

192. For several years only very small pieces of phosphorus were handled or dissolved in carbon disulfide, etc. The standard high school demonstration of spontaneous combustion was performed by allowing the carbon disulfide in the solution to evaporate from wet filter paper

One day a full stick of phosphorus was exposed in a hood while I was talking about the substance. A little smoking was followed by a large fire. A student attempted to put the fire out with a high-pressure dry chemical extinguisher at close range. The phosphorus disintegrated into hundreds of small pieces. Most were extinguished, however, some were scattered onto his clothing and caused burns. (244)

193. I was giving a lecture on the phosphorus family of elements and had a small sample of white phosphorus on the demonstration table. The sample was set in a shallow dish while I allowed it to come up to its combustion temperature. As I was waiting, I turned to write a list of phosphorus' properties on the board. A student noticed the phosphorus beginning to smoke, got up from his seat, walked to the front of the room, and picked it up. The phosphorus immediately burst into flame and burned his thumb to the bone before I could do anything to stop it. (410)

194. In 1950, a chemistry experiment concerning the properties of phosphorus involved the use of white phosphorus. A tiny pea sized piece was distributed to each student in a 50 ml beaker of water. The students were instructed how to handle the phosphorus safely and warned about the dangers involved.

During the post-laboratory discussion immediately following the experiment, the teacher noticed a wisp of smoke rising from the pocket of a student's pants. The teacher immediately soaked the area with water and then had the student remove the contents of his pocket.

The student had wrapped his piece of phosphorus in his handkerchief "to investigate its properties more fully at home." Fortunately, he had many thicknesses of the handkerchief next to his skin so that it merely burned a hole in his pants. (425)

195. A physics teacher was teaching chemistry and was instructing the students on the dangers of red phosphorous. He dropped his glass jar of phosphorus which burst into flames. He covered it with a metal wastebasket and sent for a maintenance man who came running with a carbon dioxide fire extinguisher. He kicked over the wastebasket and up went the red phosphorus again. He blasted it with the carbon dioxide and there was now several small fires around the lab. The kids loved it.

There was no fire prevention equipment in the lab. There was no instruction for maintenance men. The wrong container for red phosphorus was used. (441)

Picric acid

196. While checking chemical storage, a bottle of picric acid was found. That was brought to the attention of the principal who wanted to dump it down the sink. He was convinced to call the fire department. They carried it out to the school dumpster where it exploded. (393)

Potassium

197. The most serious accident in my lab happened to me. I had read an article- recommending disposal of bits of potassium and sodium metal in ethyl alcohol (lower reactivity than in water). I placed two small bits of potassium into my ethyl alcohol (200 ml), it fizzed and exploded. My right arm and the table top were aflame as my class watched in amazement. I put the fire out by wrapping my arm in the apron of my lab coat and coiled my body around my arm. The fire was extinguished in seconds. The small fire on the tabletop burned itself out as I watched. Guess what? Our ethyl alcohol contains 5% water. (49)

198. In 1986 a student was using equipment from another lab drawer instead of his own which was against school policy. He cleaned the beaker with water. The beaker blew up but the student was not injured even though he was not wearing goggles. We think the drawer was not cleaned from the year before and potassium was present in the beaker. The teacher was negligent in this case, as she did not enforce the use of goggles. (1530)

199. Too much potassium was placed in water for a demonstration. It blew the container over but a strong shield protected all. (287)

200. A student took some potassium in his pocket. It started smoking in the hall. Luckily, the person seeing the smoke did not use water to put out the smoke. The incident resulted in second-degree burns on his leg which required skin grafting. (314)

201. Two boys in a chemistry lab upon seeing a demonstration of sodium and potassium in water and took a piece of potassium metal. They then went to the boy's locker room and dropped the small piece of potassium into the toilet where it exploded. No students were injured however the toilet was destroyed. (313)

202. A fellow teacher was demonstrating the reaction of potassium metal and water in a chemistry class. The piece she was using exploded scattering many small pieces of potassium metal, some of which landed in her hair. By the time a student had come for me in an adjoining classroom, she had doused her hair in water, which caused the many small pieces to react singing her scalp and hair. I used tweezers and picked out the pieces. Fortunately, she was wearing safety glasses and only suffered minor burns to the scalp. (492)

Potassium dichromate

203. In a eight grade IPS class, prelab instructions were given. A small amount of potassium dichromate was in a watch glass. The teacher and 27 students were in a room designed for 20 students (using NSTA specs).

A student responded to a dare and inhaled the potassium dichromate. With so many in the class it is taking a high risk. (123)

204. In a high school chemistry lab, a student was dispensing potassium dichromate. She had gloves on. Apparently the bottle slipped in her hand and she spilled some on herself. The teacher was busy speaking with other students and when the student called to her she asked her to wait until she was finished addressing these students. The girl persisted and did receive the teacher's attention. Immediately she instructed the girl to remove her stockings since the spill had occurred on her legs and to wash thoroughly. The girl was sent to the nurse. No injury had been sustained. An accident report was filled out and filed. (299)

205. One purpose of this beginning chemistry experiment was to observe the solubility of potassium dichromate in water at various temperatures between 20C to 70 C. The students weigh out a specified amount of the crystals, add them to water and warm the mixture in a water bath until they dissolve.

In my pre-lab instructions, I cautioned about having a stable ring stand and iron ring attachment to avoid accidental dumping of the hot water.

I reminded the students to wear their safety glasses and aprons, although I thought to myself that this lab really is not at all hazardous.

Ten minutes later, I had a girl with potassium dichromate dust in her eye. She blew it off the weighing paper into the test tube. A week earlier, I had installed the portable squeeze bottle eyewash which we used for first aid. The she went to the nurse and hospital for further washing. No serious damage resulted. (336)

206. When I was in physical chemistry class as a student, I was cleaning a viscometer with concentrated sulfuric acid - potassium dichromate solution. This is a powerful oxidizing agent. As I poured the solution down the tube, some liquid spilled on my right thumb.

I proceeded to reading directions and placed my thumb on my cheek. The immediate sting drove me to a nearby sink. The instructor made me a paste of sodium bicarbonate and sent me to the infirmary. They didn't know what to do. I ended up with a black charcoal skin patch on my cheek for six weeks. The doctor hoped that when it fell off a hole did not remain on my face. Lucky for me, I had hit the water and got the sodium bicarbonate paste fast enough. (394)

Potassium nitrate

207. I was trying to demonstrate the thermite reaction. I attempted to ignite the potassium nitrate-filter paper fuse using a lighter. It didn't work so I waited about three to four minutes and then approached to put a new ignition paper strip into the mixture.

Suddenly, it ignited. I was lucky that no injury resulted. It was a shocking experience. I've never tried that ignition method again. A better way is to use a piece of magnesium ribbon as a fuse. Split the end of the ribbon for easier ignition. (157)

Other cases include: 2

Potassium perchlorate

208. Oxygen was being generated from potassium perchlorate. A student heated the tube too close to the stopper. The rubber stopper ignited and a very violent burning ensued. (239)

209. In an introductory level, non major, college chemistry course an experiment called for 2 ml of potassium perchlorate and manganese dioxide to produce oxygen. A student used 20 grams and the test tube exploded sending the student to the infirmary with minor injuries. Be sure student know the metric system units. These did not. (119)

Propane torch

210. I used a propane torch in my chemistry lab to heat a relatively small amount of copper carbonate in order to drive off carbon dioxide which we identified by bubbling the gas through a limewater solution. The compound began to get red-hot so we stopped heating it. After the lab, I examined the large test tube that the copper carbonate was in. It looked as though the glass had begun to soften and the weight of the compound had deformed the bottom of the test tube. Carbon dioxide was still coming out of the test tube when we stopped heating it. I'm not sure what may have happened if we had not noticed the problem, but it would probably just have been a messy situation to clean up. (74)

Silver nitrate

211. When I was in college silver nitrate was cheap and used in many inorganic experiments. Someone had left crystals on a lab area prior to my lab. As we cleaned up the area, some of the crystals fell into my shoes which had an open cut out design on the top. A few of the crystals fell between my toes burning holes into my skin. There was no pain. I was totally unaware of the burns I received. Some burned through nearly to the bone. (32)

Sodium

212. This story I got third hand, but it is the worst I've heard. Teachers in a local high school were cleaning out the stockroom and threw a large piece of sodium into a sink which had water in it. The stockroom was blown out the window. Fortunately nobody was seriously hurt. Please don't publicize this because my school department is very intolerant of "bad publicity." Their attitude is the worst safety hazard. (2)

213. A teacher was demonstrating sodium metal when the metal began smoldering. As a reflex he threw it into a sink, whereupon it exploded, shattering the sink. (18)

214. About 15 years ago, two of our chemistry teachers were returning sodium to the storage room for proper storage. The sodium started reacting with the moisture in the air. The senior teacher knew what was about to happen so he covered the chemical with a fire blanket. Needless to say there was an explosion, the force of which helped send the two teachers out the door. No one was injured. One was temporarily affected psychologically.

The room caught fire and there was a series of other explosions from other chemicals. The accident was confined to that one room which was completely destroyed. It happened on a Friday afternoon 10 minutes after dismissal. The fire department responded. (31)

215. This incident occurred when I was a science teacher at a 7-12 high school. A relatively inexperienced (second year) eighth grade teacher decided he was going to demonstrate the wonders of sodium to his class. He dropped a walnut size piece into a beaker; the results were, of course, spectacular, including flames to the ceiling and destruction of the teacher's pants. He had to leave for the day. Fortunately, nothing more serious resulted. (70)

216. A teacher was showing the reaction of sodium metal with water. The container too small and the amount of sodium too great. The sodium exploded causing a very quick evacuation of classroom. Fortunately, no major damage resulted. (83)

217. A chemistry teacher was trying to impress on students the hazard of working with sodium metal, demonstrated by adding a small chunk to beaker with water. The beaker broke and small slivers of glass embedded rather dramatically in the teacher's face. (87)

218. One of our first chemistry demonstrations was with sodium. I used what I thought was the recommended "pea size" piece. The beaker blew up. Luckily I had safety glasses on and the students were far enough away so that no damage occurred except to my psyche! (133)

219. The most memorable lab accident that I am familiar with involved glass breakage. A 600 ml beaker broke as the result of an explosion of hydrogen gas. What the instructor had planned on doing was to illustrate the rapid reaction of sodium and water. To prohibit the splashing of the resulting alkaline solution, a glass cover was placed over the beaker after the sodium was dropped into the beaker of water.

My investigation of the situation revealed that the sodium had been improperly stored and had formed a coating (probably sodium oxide). The glass cover trapped the resulting hydrogen gas which then in turn exploded. (151)

220. A student got into a storage area while the custodial staff was cleaning. He found an open cabinet containing sodium. He stole a fairly large chunk and took it to the bathroom. He severely damaged the bathroom and nearly killed himself. (155)

221. High school teachers were cleaning up in the stockroom. They put some sodium in the sink. There was a reaction and the stockroom was blown up. Fortunately the teachers were blown in the right direction and weren't seriously hurt. (185)

222. A chemistry teacher accidentally dropped a jar containing sodium metal into a sink in which there was several inches of water. The bottle broke and the sodium reacted causing an explosion. The entire room was destroyed causing thousands of dollars of damage. Fortunately no one was hurt because the accident happened after school. (191)

223. In moving from one campus to another, we accidentally left sodium metal behind. In our attempt to set up our new facility, we did not get back to the old campus before the custodial staff started cleaning up. They had put the sodium metal in a plastic bag and left it in an outside storage area, behind the athletic facilities of the new campus.

We went to look for the metal and told the custodial staff that there was a potential hazard. In their attempt to dispose of the metal, they threw it into a river. The plastic storage bag floated so the custodians threw rocks at the bag as they ran along the side of the river. When the metal container containing the sodium finally sank, it exploded sending a water column 20 feet into the air, only a few feet away from a major overpass. (231)

224. Cleaning up after lab, a small piece of sodium was swept down the drain. Everything was ok until it hit the water in the trap. (249)

225. In one of my demonstrations of the reactions of the alkali metals and water, a piece of sodium metal was ejected from the surface and exploded in mid-air.

Had the water level in the beaker been lower, the metal would probably have been contained by the walls of the beaker. As a lecture demonstration, students were asked to approach my lecture table, no goggles, only a shield. Therefore, they were totally unprotected for the ensuing explosion. Luckily, no one was injured. (278)

226. We were producing hydrogen with sodium and water. The class room/lab was left open. A student came in during a "break" and cut a chunk of sodium. He put it in the drain because he thought its funny. The drain exploded. (292)

227. A student-teacher wanted to demonstrate how a metal reacts with water. He took a chunk of sodium and dumped it into water. A mini mushroom cloud exploded. Nothing or no one got hurt. (298)

228. An honors chemistry student was assisting his teacher in cleaning up after a class in which chemicals had been used in a series of demonstrations. In his hurry, he carried a number of chemicals at once. On his way to the prep room a container filled with a water solution spilled into a beaker containing sodium. The sodium reacted violently, causing glass to fly in all directions. The student lost an eye. (320)

229. A high school student stole a half-pint bottle of sodium metal. The contents were tossed into a toilet near a major exit corridor. An explosion resulted, but smoke of a toxic nature was the more serious problem. The fire department was called. The area was vented. The fire Marshall swept up the sodium from the floor and deposited the material into a toilet so it could be "sent away". Another small fire resulted. Most activities in the school resumed with little interruption. No further mention of the incident was made to the public. (332)

230. I was supervising a study hall in a chemistry room when I noticed smoke coming from the chemistry storeroom. Investigating, I found a student experimenting with metallic sodium by placing chunks of it in water. He was not being supervised. The amount of sodium he had in his possession was equal to four sticks (one pound) of butter. The container he was using was labeled calcium by the teacher so the students would not know that it was sodium. (365)

231. In graduate school, a fellow student had finished work with a flammable solvent dried with sodium. To dispose of the material it was poured into a sink. He was working alone in the lab. It ignited and flashed over him, igniting him. Before the flames were extinguished he had extensive burns and was hospitalized about one year. Several years later, he returned to finish his work on an advanced degree. (378)

232. Sodium taken by a student was placed in a washbasin in the men's bathroom. A minor explosion resulted. (368)

233. For an unknown reason a seventh grade general science teacher put a good-sized piece of sodium metal into a lab sink filled with water. An explosion occurred. Luckily, no one was hurt. (405)

234. About 1974 a student at a Connecticut boys' school was inspired by the mini-drama when sodium reacts with water. He thought sodium could be more impressive if dropped into a urinal as a fellow student was addressing the urinal for its intended use. He thus carefully wrapped a bit of sodium in many layers of paper toweling, put it "safely" in his back pants pocket, and went off down the hall.

Not too far down the hall his pants ignited, he was probably saved from fatal or near fatal burns only by an English teacher who rushed out of a room, smothered the flame to a smolder, and removed the student's pants right there in the hall. (423)

Other cases include: 197, 198, 201, 308, 344, 489

Sodium bicarbonate (baking soda)

235. When I was a student teacher, I decided to bake seaweed cookies at home for my students. The clerk in the health food store told me to soak the kelp and then deep fry it in oil.

I placed a very large pan of oil on the stove to heat and left the room. I returned to find the pan engulfed in flames. I panicked and not wanting to burn my parents house down (it had begun to char the wall behind the stove) I picked up the pan and ran out of the house with it. I burned my hand badly and needed plastic surgery. I should have used salt or baking soda to suffocate it. (45)

Other cases include: 136, 139, 165, 170, 206, 248

Sodium chlorate

236. Sodium chlorate decomposition. A student did not check on all leaks. A fire resulted. All students were evacuated from the room in less than one minute. I pulled the burner away and only received second degree burns on my hands. No students were hurt. Students did have goggles on. (5)

Sodium hydroxide

237. A highly respected chemistry teacher gave his usual careful prelab discussion. A recalcitrant student was unimpressed by the cautions concerning sodium hydroxide and proceeded to shoot pellets about the room when the teacher wasn't watching. One went down a very shy girl's blouse neck onto her back. She stopped at the end of the lab to ask the teacher if sodium hydroxide was as bad as he'd said but said she was just curious and had no special reason to ask.

She left her next class in severe pain and was seriously burned before the pellet was removed. Her parents sued the teacher and the student. The teacher was exonerated; the student was held and his parents paid a substantial fine. (127)

238. A student tossed several sodium hydroxide pellets into the air and caught them on his lip much the way students do with small candies. Although he had been warned as to the dangers of sodium hydroxide he was surprised as to how much the pellet burned. He flushed his lip for several minutes and was sent to the nurse who continued the flushing.

He returned to school the next day with a slight scar. He related to the class that his lip continued to burn throughout the night and up until the next morning. (182)

239. A student was preparing a six molar solution of sodium hydroxide. He was using a glass-stirring rod to dissolve the solid pellets in water. The student struck the sidewall of the 1000 ml beaker causing it to shatter and spill its contents over the table and the student. Luckily, he had on a rubber apron and was not injured. The finish on the table was messed up. (257)

240. While weighing out sodium hydroxide pellets, a student dropped two of them into his cowboy boots. He didn't realize he had done this until his feet were blistered. (273)

241. A teacher making a strong solution of sodium hydroxide in the prep room added a large amount to water in a Florence flask (no goggles). To aid in dissolving, the flask was lifted and swirled whereupon the quick heat build up caused the flask to burst. The teacher was showered with the concentrated solution of sodium hydroxide suffering severe chemical burns to the face. (310)

242. Students were warned right from the start of the school year not to sit on the lab benches. Any student who did was assigned to detention. Toward the end of the year when I left the class to get a chemical for a demonstration, one student sat on the lab bench. He sat in a liquid which he assumed was water but was in fact sodium hydroxide which had been spilled in the previous class. He was off the bench by the time I returned and fearing detention never mentioned to me that he had sat in something. His corduroy pants acted like a sponge and soaked up the small amount that was on the bench. On the bus home his rear end started to burn. As a result, he had to have a skin graft. (328)

243. A student assisting a professor in a research project orally pipetted a 1.0 molar sodium hydroxide solution. The student swallowed a mouthful and had to be rushed to the hospital. Apparently, student had not been instructed to use a safety bulb. (337)

244. A student using a Dewar flask containing sodium hydroxide solution hit the bottom of the inside container with a thermometer. The bottom cracked and broke forcing the solution into the evacuated portion of the flask. The liquid burst through the top of the flask and into the student's face. (371)

245. A tenth grade biology student was using Biuret with ten molar sodium hydroxide to test for protein. The class has been instructed to use eye droppers to dispense the solution. The student used a pipet by mouth and of course over filled it to his mouth removing many layers of tissue. (412)

246. A custodian received chemical burns from strong sodium or potassium hydroxide which was allowed to sit in a puddle on a lab bench after class. (415)

Other cases include: 69, 96, 131, 280, 292, 457

Sodium superoxide

247. The project involved the preparation of sodium superoxide. A laboratory aide using hydrogen peroxide and sodium peroxide had the mixture blow up in his face. The explosion was powerful enough to move out a temporary wall about six inches and toss a large chair about ten feet across the room. (303)

Sucrose

248. A classic experiment is to drive water out of sodium bicarbonate to determine the formula for waters of hydration. As the students were working, they took the sodium bicarbonate from the hood area. When heating, we detected the odor of something burning. Suddenly one group noticed black ooze spilling over the evaporating dish onto the table.

Apparently, in going to the hood area, sucrose was used instead of bicarbonate. Although both chemicals were labeled properly, I now use the practice of only putting out chemicals for one experiment. (474)

Sugar

249. A teacher had potassium chlorate and sugar out during the same lab. Students mixed this and made rocket fuel. Seven test tubes blew up before the lab could be stopped. One student was hit in the back with flying glass. Luckily, no injuries resulted. (497)

Sulfur

250. The equivalent weight of some metals was being determined by reaction with sulfur in heated covered crucibles. Twenty-four students were performing the experiment in a lab large enough for 150 but with poor ventilation. When students lifted the cover of their crucible to observe whether the sulfur had completely reacted, sulfur dioxide was generated in enough volume to smell it. Many students looked into the crucible every few minutes and inhaled enough sulfur dioxide to get headaches and to complain of chest pain or breathing problems. Five students were taken to a hospital emergency room and released that day. The lab experiment is no longer performed. No legal actions were taken. (48)

251. When I was a beginning chemistry teacher, I was doing the then popular experiment - allotropic forms of sulfur. I had demonstrated the correct method of heating test tubes but the room was such that at least half the students were working with their backs to me wherever I would be in the room. I did not see that one student was holding the test tube

so that the sulfur which boiled out of the tube fell directly upon her hand where it sat and continued to burn. (149)

252. A student was heating a mixture of iron and sulfur in a small test tube using a test tube holder. The holder became hot so he pulled it out of the flame. Test tube dropped and burned the floor tile. (243)

253. During a lab on the allotropic forms of sulfur, a student who had been instructed during pre lab to dispose of his carbon disulfide in a beaker in the exhaust hood, poured about one milliliter of carbon disulfide in the crock where a hot test tube, which was not supposed to be there until it cooled, rested. The carbon disulfide ignited. (304)

254. During a lab experiment on the various forms of sulfur, a student experienced a severe allergic reaction and possibly asthma to sulfur gases. The student had extreme difficulty breathing and had to be carried from the lab. (353)

Other cases include: 80, 81, 160

Sulfuric acid

255. Students in a ninth grade physics class were constructing batteries using dilute sulfuric acid, when a student carrying a full 500 ml beaker dropped it. The acid spattered on her legs and two adjacent students. The other students had jeans on and only damaged their clothes and shoes. The girl was immediately flushed with water and only suffered minor acid burns to her legs and feet. (494)

256. A student was retorting some sulfuric acid in hood. A hot plate was being used. The flask broke with sulfuric acid falling onto the hot plate. The hood was not working properly and fumes escaped into the lab. The entire floor had to be evacuated. (36)

257. One of my students was instructed to use about 3 ml of 2 M sulfuric acid with about 1/2 ml of sodium sulfite crystals. He mixed 3 ml of 18 M sulfuric acid with 2 ml of sodium sulfite. He recovered from sulfur dioxide inhalation at the nearby medical center. (41)

258. When I was a teaching assistant in graduate school one of my students knocked an Erlenmeyer flask containing concentrated sulfuric acid off the bench. It hit the floor and bounced splashing the acid up onto his T-shirt and jeans. He immediately headed for the shower which unfortunately was across the room. On the way he removed his shirt (it was in shreds) and dropped it in a sink. He was able to wash off the acid leaving only red marks. His jeans were also in shreds. His quick action prevented much worse burns. (43)

259. On the second floor, a one-gallon bottle of concentrated sulfuric acid was broken on the floor. The acid ate through the floor and was dripping on the drafting tables in the classroom below. Upon investigation, the drafting teacher knew it wasn't a water leak. Neutralization and clean up followed. (63)

260. A very inexperienced person had been hired as a long-term substitute teacher in chemistry. During the course of an experiment a student read the lab instructions incorrectly and poured concentrated sulfuric acid into a beaker of boiling water. The results were spectacular. The damage to the ceiling is still visible in the chemistry lab. Miraculously no injury resulted. (71)

261. A sophomore taking an honors chemistry study course splashed the contents of a zinc/sulfuric acid generator in his eye when pouring it into a waste container that was kept in the hood. Washed area around and in eyes with water but contact lenses apparently retained some of the acid. Teacher had student remove contact lenses and wash the area with water. Student then went for medical treatment.

The accident occurred at the very end of period with students and teacher trying to get ready for the next class (five minutes between classes). The student thought the experiment was over and therefore did not need to wear safety glasses. (77)

262. One student got some sulfuric acid on his hand. On his way to the sink to rinse it off, he absentmindedly wiped his hand on his corduroy pants. The teacher noted the pants smoking slightly and immediately used the emergency shower to the "pleasure" of the other students. (88)

263. Four students sitting in close proximity-two side by side, with their backs to the other two who were also side-by-side. Experiment involved gentle agitation and periodic venting of a solution containing sulfuric acid.

One student who seemed to be more involved in conversation, neglected to vent his flask. The top burst off spraying him and his neighbors with the solution. Goggles were worn, however it was primarily sprayed on their backs.

No major (or minor) burns were incurred. After assessment of his condition, the student was sent home to shower and change. (104)

264. A teacher was picking up a large bottle of sulfuric acid and the bottom fell out. The acid fell all over the teacher's lab coat and all over the floor. The teacher removed his lab coat and went to the nurse's office, removed his clothes and took a shower. We evacuated the building and called the fire department who came within three minutes to neutralize and mop up the acid. (107)

265. A first year high school teacher and two honors level juniors were cleaning up the chemistry lab at the end of the school year. They were putting sulfuric acid and nitric acid from small reagent bottles back into original containers to store over summer. The large bottle on lab table imploded on sealing, spraying the two students and the teacher with concentrated acid. Eye irritation, holes in clothing, along with broken glass was the only damage.

Reagents should not be stored this way. I also believe that another student, as a prank, switched contents of sulfuric acid for nitric acid or vice versa. Although student error could be involved, these were academically talented, responsible students working directly with the teacher (me). Safety goggles prevented eye injuries.

The department head told me to give a personal check to the students to pay for their damaged clothing. He would reimburse me with school funds. The parents, thinking it was coming from my personal funds, refused to accept payment. (118)

266. A student was working with zinc and dilute sulfuric acid generating hydrogen. The equipment was a thistle tube and a gas bottle.

Because the reaction wasn't fast enough the student put a piece of zinc into the thistle tube (of course it wouldn't go down the tube). One of them added more acid to the thistle tube on top of the zinc. He then proceeded to light a burner and was pointing it at the top of the thistle tube. It was at this point that he was detected and stopped.

Fortunately, the accident was prevented but could have been drastic. The student was removed from the class permanently. (134)

267. Someone had improperly placed a bottle (1 pint) of concentrated sulfuric acid on a storage shelf which had sliding glass doors. I opened the opposite glass door, and the bottle fell. It broke and splashed on my trousers and shoes. I threw my shoe off and placed my whole leg under a washbasin, the type used in photo developing.

The glass doors were dangerous because they would not slide properly if materials were stored on top of the cabinet. They have been removed. However, the sulfuric acid bottle should have been placed properly on shelf to prevent being knocked over.

I lost a brand new pair of shoes and the holes in my socks and trousers made for a very first hand learning experience. (143)

268. We recently had a student in ninth grade deliberately put dilute sulfuric acid in his eye. It was being used in an Earth and Space lab. It was later determined that the young man had a history of self-inflicted pain producing events. This student requires special attention. (154)

269. A student poured the contents of a recently used 10 ml graduated cylinder over the forehead of another student. The pourer said she thought it was water. However, the clear, colorless liquid was actually sulfuric acid!

Needless to say, the victim reacted immediately. Fortunately, the liquid was square in the center of her forehead. The teacher rushed her to the eyebath, rinsed the burned area and instructed her to keep her eyes shut and covered.

The mishap ended with a burn on the forehead. Instruction on the care and use of concentrated sulfuric acid had been part of the prelab preparation. The resulting lawsuit involved only the student who did the pouring. Her family's insurance company settled the case out of court. (173)

270. I thought I had made all safety precautions for using concentrated sulfuric acid. I poured small amounts into stoppered bottles and put the bottles into the lab sinks at each lab station. The students were told to be with proper equipment, goggles, etc., to measure ten millimeter into a graduated cylinder and then to add the acid to the reaction in the test tube. Students were warned to keep it in the sink.

One boy took the graduated cylinder out, put it on the counter and then accidentally knocked it off onto the boy next to him. (230)

271. In January 1968, a bottle of sulfuric acid (not labeled dilute) was being filled from a large bottle of concentrated sulfuric acid. The bottle broke; acid ran off table, down my leg, into my shoe. The results were burns and scars on my left leg, minor loss of the charred cupboard door and floor tiles. The loss of trousers, shoes and a hell of a lot of aggravation. (240)

272. Sulfuric acid was spilled on the desktop and down the front of the lab drawers. We cleaned the desktop and treated minor burns on students' hands and legs. Later that week, another student was burned by the acid on the front of the drawers. I never thought to check all areas around the spill and wash them too. (255)

273. A chemistry teacher missed the demo table with a five pound bottle of sulfuric acid. He and several students were injured. He was distracted by a student who had asked him a question. (263)

274. A student holding a test tube containing a mixture of concentrated nitric and sulfuric acids was attempting to adjust his eyeglass strap while holding the tube. He poured the mixture down his back causing severe acid burns on his back. (370)

275. A colleague was shaking a five-pint bottle of sulfuric acid and water mixture. The bottle shattered and she was drenched. She washed her body. However, throughout the remainder of the day, her clothing gradually disappeared and ultimately she was attired in an overcoat and shoes. The stain of this event is still apparent on the demonstration table 18 years later. (389)

276. I enjoy doing demonstrations and have often used demonstrations from Alyea's book. In my second year of teaching I decided to show a flashy demonstration that involved the production of chlorine oxide by reacting concentrated sulfuric acid with white phosphorous and potassium chlorate under water. The sulfuric acid was added through a thistle tube placed in 250ml graduate so that the acid directly contacted the phosphorus, potassium chlorate mixture at the bottom of the graduate which was filled with water. I tested the demonstration first and it worked well. I set the demonstration up on my lab bench and about half way through the demonstration, because I had added the sulfuric acid too quickly, pressure built up and blew the thistle tube, which was half full with concentrated sulfuric acid, to the ceiling where it shattered and showered me with acid and water. Fortunately, I wasn't hurt and when I saw that my students were unhurt and also truly in awe of my powers, I dismissed the class.

I quickly went home. We lived on campus at a private day school. I took my clothes off and threw them in the shower hoping to stave off the inevitable destruction of my wardrobe. My wife came home about three hours later and seeing my wet clothes in the shower was sure that somehow I had met my demise in the lab and had disappeared down the drain. (432)

277. A middle school student was injured when he stirred his sulfuric acid solution with his finger. (438)

278. A teacher, during a free period, dropped a bottle of concentrated sulfuric acid on a wooden floor. The acid bottle broke, flooding the floor. The teacher rushed to get the bicarbonate but could not find enough to cover the spill. When he ran to me in my office, we located enough bicarbonate to cover the spill. (457)

279. We had a quantity of glassware being cleaned in a solution of sulfuric acid and potassium dichromate. It was left on a counter in the chemistry lab overnight. One of the custodians, apparently curious about what it was, picked up the container. It slipped from his hands and dropped on the lab bench and broke. he didn't bother to clean it up. By the next morning the solution had eaten the side of the cabinet and all the tiles off the floor for a distance of five feet in all directions. (469)

280. Bread was placed inside glass petri dishes to grow some mold. One student told another to press down on the bread. The student pressed down on the glass until it shattered. Luckily, the glass didn't become imbedded in his hand. (280)

Other cases include: 351, 369, 389, 455, 456, 490, 496

Trichloroethane

281. At a printing press manufacturer, a spray painter went to draw some 1,1,1-Trichloroethane (a solvent to preclean metal parts before painting). This was in a 55-gallon drum and was connected by a pressure system so it would pour. A valve had been left open by mistake. The painter, 55 years old and epileptic, was saturated from head to toe with the solvent.

He was on medication and did not experience a seizure. He had safety glasses on, not a full-face mask. He did use an eyewash immediately and an emergency shower. He was transported to the hospital by ambulance soaking wet. He developed extreme irritation in both eyes causing swelling and interfering with his vision for two weeks. He was under the care of an ophthalmologist for a month.

He developed a chronic skin irritation of the groin area lasting over one year requiring the services of a dermatologist. All his skin peeled.

He was hospitalized for one week for cardiac arrhythmias. They luckily subsided. (11)

Xylene

282. A gallon jug of xylene was dropped by a teacher in school. The school was evacuated. Several students were treated for nausea. (386)

<u>Contamination</u>

283. A second year chemistry student was performing an experiment when an explosion occurred. The cause was traced to contamination of one reagent. Prior to this day a

student accidentally returned some "extra" reagent into the wrong container instead of discarding. (262)

284. A student was using as the starting reactant in an experiment a chemical which had been produced in another lab. The material was contaminated and started to spatter. Although the student was wearing safety goggles, some material entered his eye, causing a painful burn. The damage was not permanent. (290)

285. Swimming pool chemicals mixed improperly in a plastic bucket overheated and resulted in a small fire. (396)

286. A serious explosion, resulting in a student nearly losing the use of his hand, occurred when he was stirring a mixture of two oxidizable compounds. They had become contaminated with a third strong oxidizing agent. He was not aware of the contamination that had been caused by another student's using the chemicals prior to his experiment and that student's using the same spatula in more than one reagent jar. (264)

Dissection

287. A student in an honors biology class was dissecting a worm when suddenly some of the preservative splashed into her eye. The teacher immediately flushed her eye with water and then sent her to the nurse. The nurse continue to flush her eye and then referred her to a doctor. This young lady was fine. After seeing her, the doctor called the school to warm us that if she had been wearing plastic contact lenses more serious problems could have occurred. (171)

288. During the dissection of a cat, one student was returning the cat into the storage bag. She did not have goggles on as she thought the bag was dry. After closing the bag she wiped her forehead. Preservative entered her left eye and caused a burn of the cornea. The teacher flushed her eye and sent her to the nurse. There was concern for her vision for close to a month. (174)

Other cases include: 110, 111, 113, 114, 115, 347

Electric

289. When I was around 10 years old, I attended my sister's 15th birthday party at a friend's new swimming pool. As teenagers are wont to do, we were playing 45's at poolside. When one record ended, I jumped out of the pool to turn it over. The record player had an electrical short and I got a severe shock. A sharp minded 15 year old quickly unplugged the record player. (3)

290. A friend of mine was cutting the grass along the poolside. She was standing on concrete which was wet with water. She had an electric-mini grass cutter with a strap attached to her shoulder. As she began to cut the edges of the grass, she became

practically paralyzed because she was experiencing shock. We removed the grass cutter and then brought her to the emergency room. She experienced numbness and the shakes for a while. (21)

291. Students sit on metal stools to work at lab tables. One student inserted a dissecting needle into the electric socket. The shock jolted her from her seat and shorted out the entire lab and half the hallway.

I have no idea why the student decided to put the metal instrument into the socket. Perhaps the shock could have been prevented if the stool had rubber tips on the legs. When the stools where first purchased they did have rubber tips, but the rubber dries out and falls off. (40)

292. I was mixing a sodium hydroxide solution for my lab team and classmates. A classmate was impatient with the dissolving rate. He got the electric stirrer and turned it on before placing it in the solution. (He had been told not to get it or use it. He had also been told by myself and the lab tech. to turn it on after it was in the solution). Some of the solution splashed up into my face. Since my eye protection was only eyeglasses, some splashed into my eye. Fortunately we had an eyewash and I was near a sink. We flushed my skin and eyes immediately. (55)

293. In a seventh grade earth science class we were using a lab for a classroom. A student put a paper clip in a live electric outlet. (124)

294. A seventh grade science class met in a classroom that had electric outlets along the edge of the island type lab tables. A student inserted a metal pen in one of the outlets. He received a severe shock. Since nothing could be done about placement of the outlets, childproof plugs were purchased and inserted in the outlets. The accident, while not severe in itself, had potential to be quite dangerous. (131)

295. A student stuck a paper clip into an electrical receptacle on a lab bench. Fortunately ground fault circuit breakers had been used to replace regular breakers for the lab bench circuits. The GFI tripped as it was supposed to and no problem resulted.

The student then decided to do the same with a wall socket not on the ground fault circuit. He burned his fingers to the bone. (311)

296. A boy was electrocuted in a physics class while doing a project in front of the class. The project involved high voltage and current. The teacher was not negligent and is still teaching although the death of the student was devastating. (318)

297. The separating of water, wires were crossed resulting in flames. Student unplugged source of electricity. (319)

298. The end of the electrical cord on a microscope light became frayed causing a short circuit. It burned out the wiring in the lab table. (325)

299. In the ninth grade classroom, students take notes at low lab tables. A student placed his metal pen into an electrical outlet and caused a spark to be produced. Only minor burns were experienced. (399)

300. A student stuck tweezers into a pedestal mount electrical outlet. Luckily no harm came to the student. But, it blew out power to the science wing of the building. (390)

301. An above ground swimming pool had the filter pump connected to an electrical outlet on the side of the house. The person was in the pool using the vacuum which was attached to the filter. In attempting to backwash the filter, she touched the pump and was electrocuted. (401)

302. When you use the broiler on an electric stove it is necessary to leave the door open. One night while broiling dinner the broiling element on my 18 month old stove exploded and the electricity arced. Fortunately, a potential accident was avoided but had anything flammable been in the area something more serious could have happened. (437)

303. During a physics demonstration a student, while speaking after the demonstration part of the project was completed, absent-mindedly placed broken power leads in one hand and was electrocuted. (439)

304. A teacher was slightly injured by electric shock while demonstrating conductivity of electrolytes with light bulb and electrodes connected to 110 volts. (465)

Other cases include: 86

Electrodes

305. We were collecting hydrogen and oxygen in one test tube over both electrodes. Contact between the electrodes in the gas launched the test tube rather spectacularly. (227)

306. In an IPS lab doing simple electrolysis of water, a violent explosion occurred when the two electrodes were somehow jostled, relocated into the upper chamber, and made contact with each other. The spark caused ignition of the hydrogen and oxygen which were, of course, being collected in the same compartment. Many high velocity glass fragments resulted. (236)

Other cases include: 304, 315

Exit Doors

307. A student fainted on the wrong side of a classroom door. No one could open the door to help her. (391)

Fire

308. There was a fire started by a student throwing a match into a coat closet in a science classroom. The classroom contained a locked metal chemical storage cabinet. When the fire department arrived they were going to hose down the room with water when I remembered the cabinet and suggested they refrain from getting it wet. They wanted to open it but no one had the key. They managed to put out the fire without wetting down the cabinet. When we were able to open the cabinet several days later we found a dangerous mixture of chemicals stored inside, including organics, concentrated acids, sodium and potassium. (138)

309. At SMU, an explosion and fire resulted in the death of a graduate student. Hearing the explosion, two instructors rushed into the lab from the offices across the hall. One attempted to put out the fire with his suit coat, the other his hands. Both professors received serious burns on their hands, arms, and face. Both professors are permanently disabled and missed months of work. (201)

Other cases include: 12, 23, 46, 49, 62, 73, 103, 117, 164, 197, 198, 214, 236, 356, 357, 362, 363

Florence Flask

310. A new Florence flask was being evacuated so we could measure the density of air. The flask imploded (normally a few seconds would never do this). Glass went in every direction striking the students and me. I was at the vacuum pump making sure that the vacuuming procedure was correct. Small glass pieces went into all my open skin areas. (91)

Other cases include: 241, 333, 488

Glass

311. A student took a reference book out of a bookcase which had sliding glass doors. One door came off track, fell toward student and broke, shattering glass in the direction of student involved as well as two other students. Fortunately no one was hurt. This happened at the end of a testing period in a science classroom. It happened because the glass door was not secured on track properly. Student did not realize that, nor did I. (14)

312. I am the science lab technician at a junior high school. I had a very hectic day with the seventh grade class all day, doing a "States of Matter" lab, using glass beakers, bunsen burners and ice. At the end of the day, I had the students put all the beakers on the front bench to be washed. I did not notice that two beakers hit each other and one beaker had been broken with a jagged edge. I started washing the beakers and

stacking them to dry on the bench. I was in such a rush to get done before I went home. I didn't see the broken beaker and consequently ended up with about 20 stitches in my right hand. I lost no workdays and was glad it was me and not a student that got cut. I am now very careful of all glassware being used in our lab. (26)

313. A student lost a finger from cuts from broken glass. He inserted tubing in a stopper without using prescribed safety procedure. (28)

314. A student attempting to force glass tubing into an unlubricated stopper, put a pretty nasty gash in the palm of her hand. She was treated by the nurse after inspection for broken bits of glass. (50)

315. In an eighth grade IPS class, an electrolysis of water experiment was being conducted in which both gases are collected in the same test tube. Students were instructed to turn off the power and unplug the sub-station before removing the electrodes and removing the test tube of gases.

One student did neither. She did not turn off the power nor did she unplug the sub-station. On trying to remove the electrodes, they touched, sparked and caused the gases to explode. The beaker shattered sending glass and water into the air and at the student. She did have her safety goggles on and was not injured in any way. She was quite upset and began to cry.

The experiment had been set up on counter space around room using pegboard, clamps, test tubes, beaker, etc. Eleven others had set up same experiment at same time. Why did this one fail? The student failed to follow the procedure. (61)

316. Glass tubing went through a student's hand when trying to put the tubing in a rubber stopper. Student was not wearing gloves nor did he lubricate the glass tubing properly. (92)

317. An advanced chemistry student was attempting to insert a glass tube into a rubber stopper. During the insertion process the glass tube broke and the sharp end of the tube penetrated completely through the end of the thumb. The student had been instructed on the proper procedure and was aware of the procedure, but the student was attempting to save time by taking a short cut. The teacher involved was in a different part of the lab when the accident happened. The incident was used as an object lesson for that class and other chemistry classes to follow. (99)

318. A student was walking with a glass beaker filled with water to his table and dropped a metal cylinder into the beaker. The beaker bottom dropped out. (114)

319. A student was seriously cut while washing a beaker. He moved the beaker quite vigorously and bumped the side of the sink. Some tendons in the palm of his hand were cut and surgery was required. (117)

320. While a lab was going on, a friend of one student was walking past the lab. They saw each other through the window in the door. The student in the room went to the door to

say "hi" placing his face against the window. The other boy made a punching motion towards the window. He misjudged and punched the window breaking the glass. He cut his hand and his friend got glass splinters in his eyes which almost cost him his sight. (132)

321. Two students were using pipettes with pipet bulbs. As one student held the bulb, the other was trying to insert the end of the pipette into the bulb. The pipette broke and split length-wise, forming razor sharp edges. The student holding the pipette was cut severely and began to bleed profusely.

He was transported to the hospital by another student. The cut required several stitches and just missed severing a tendon. (166)

322. Students were exploding firecrackers during school hours. Several students decided to place a cherry bomb with a cigarette as the fuse in a wall enclosure which housed a fire extinguisher. The covering was made of glass. The cigarette burned to the point where the fuse was ignited. At that moment, a female student was passing the extinguisher. The explosion shattered the glass and severely cut the student. She died on the way to the hospital. (181)

323. A student cut his hand while washing a crucible which broke while he was scrubbing it. (205)

324. Carelessness with glassware led to a deep cut requiring stitches in the groove between the index and middle finger. (258)

325. A shard of broken glass was left on a tray by a student. As I emptied the tray after class, the glass stuck in my hand. (270)

326. A student was heating a mixture over a flame in a test tube. The test tube broke and the flammable solution instantly burst into flames. (271)

327. Bread was placed inside glass petri dishes to grow some mold. One student told another to press down on the bread. The student pressed down on the glass until it shattered. Luckily, the glass didn't become imbedded in his hand. (280)

328. A student in an advanced chemistry class disregarded instructions and drove glass tubing through his finger. (288)

329. In a local company, a chemist was preparing oxygen from potassium per chlorate and manganese dioxide when the mixture suddenly exploded. The flying glass punctured the chest and stomach areas causing serious injuries. (417)

330. An eighth grade student wanted to "bring a test tube home." He stuck it in his belt under his shirt before leaving class. As he left the room it broke and he received cuts on his abdomen. (451)

Other cases include: 60, 90, 134, 146, 217, 219, 239, 265, 279, 332, 340, 342, 361, 394, 397, 413, 416, 423, 433, 442, 454, 457, 458, 463, 464, 465, 466, 467, 469, 473, 474, 475, 476, 477, 478, 479, 488, 492

Goggles

331. While making esters in a high school science class, and following all "safety directions", the test tube "popped" and, although it had been pointed away from me - it spit its contents (hot organic acids and whatever else) within a three inch circle around my mouth. The result was serious, but curable burns. No safety mask or goggles were recommended. Full face shields and use of a hood would have helped. (23)

332. Seventh graders were working on an experiment that involved a 250-watt light bulb, a container of water and a container of sand. Each contained a thermometer in it. The concept was that sand is heated faster than water by the sun. Students were arranged on both sides of the lamp. One student flicked water onto the hot glass of the light bulb and it exploded. A piece of glass struck that student under the eye. He required four stitches. No goggles were being worn. (29)

333. While setting up apparatus for an experiment a student was attaching a Florence flask to a ring stand. The flask came out of her hand. Broke on the lab table splashing the beaker's contents onto her face. Her goggles were around her neck at the time and the weak hydrochloric acid solution splashed into her eyes. She was wearing contact lenses!

Be aware that students will remove their goggles without conscious awareness that they have pulled them off. (42)

334. A student, writing up her lab report on one side of a lab table, got some hot chemicals in her eye from a student heating these liquids across the table from her. No damage was done, as her eyes were washed out immediately and were checked by a physician. The girl was not wearing goggles. Although she was not personally conducting the experiment, she was in a dangerous position. The other student was not using proper lab technique in heating the liquids and I was not aware of this immediately, being on the other side of the room. The girl came to me first, instead of to the eyewash.

Since then I have tried to avoid these errors by:

1) Requiring all people who are at a lab table at any time to wear their safety goggles. I also impose grade penalties, well as disciplinary action (by the school, if necessary) to help enforce this.

2) As a class, we discuss the hazards of each lab and I tell them that my primary role is to check on their lab technique for safety purposes. In other words, I monitor and check for lab safety practices more carefully and try to keep them alert for this too.

3) We discuss what their response (and their lab partner's response) must be in cases such as this. (Sometimes I repeat this part, but this is done prior to their ever working in the lab, at the beginning of the year. I would like to plan to review these procedures periodically through-out the year.

4) They are not allowed to sit at the bench to write up their reports. Also, lab stools have been removed. (52)

335. A student had completed a course in analytical chemistry in college. While cleaning equipment for checking out of lab, using dichromate-cleaning solution, he dropped his bottle of cleaning solution in the sink, splashing the liquid in his eyes. He was wearing contact lenses and not goggles. A senior class lab assistant, supervising another lab, walked in on the scene and started to flush the student's eyes. Another student came to get me. I reached the scene, asked about safety goggles and about contact lenses. The lab assistant and I removed his lenses and kept flushing. Another student had been instructed to call the hospital and let them know we were coming. Later an accident report was filed.

Student was angry at himself. His comment was, "I know better; it's my fault." Hospital bandaged and treated his eyes. He lost no sight, had no scars and repeatedly thanked us for our immediate action. He had received extensive safety introduction and had signed a safety agreement. (85)

336. In one lab, a student was heating a liquid in a test tube. In the pre-lab discussion, the use of safety goggles and direction of the tube were covered, as was the care to heat gently--in and out of the flame. This student found one hand was tiring so he switched to the other hand turning the test tube to face himself while it was in the flame. Fortunately, he did have the safety goggles on--some of the liquid hit the goggles. None hit his face. (89)

337. A young woman working in a chemical plant lost the sight in one eye due to a splash. (95)

338. In a general science experiment, an Alka Seltzer tablet was reacted in a stopper closed bottle. The stopper was blown out of the bottle and hit a student in the eye. The lab is not performed anymore. The instructor's lack of knowledge caused this problem. (106)

339. In an event involving horseplay, a student squirted, from a dropper, what he thought was water, over his shoulder and hit someone in the eye. There was enough acid in the dropper to cause serious irritation for a week. The student who was struck had to be treated medically on three successive days. Goggles were being worn but they didn't completely shield the eye. (156)

340. Students in a second year chemistry class were preparing glass bends for use in an experiment. One student decided to see what would happen if he melted both ends shut on a small piece of tubing. After he did this, he continued to hold the tubing over the burner flame. The glass exploded into many small fragments.

There was no personal injury involved as he was wearing goggles. He also had on a long sleeved shirt. No other students were close enough to be affected. The results could have been very much worse. (167)

341. Rock chip flew into a student's eye during a rock and mineral-testing lab. The type of eye protection available was inappropriate. (330)

342. A student standing at a neighboring lab station approximately seven feet away was struck in eye by broken glass when a large graduated cylinder was accidentally was knocked over at the adjoining lab station. He had no goggles on. The injured student was not performing a lab but was in lab area at the time. (338)

343. This occurred in a high school lab. Two students were heating zinc and acetic acid in a test tube. Unfortunately, they put a rubber stopper in it. The pressure built up and the tube exploded. A girl not involved in the experiment caught something in her eye. We were lucky because she had acetic acid in her eye and the doctor said it would help clean her eye out. (358)

344. In a high school lab two students were combining their efforts on a lab exercise involving concentrated nitric acid. In adding acid to a solution, it was splashed into the eyes of one of the students. No eye protection was being worn. An eye wash unit was not available. (368)

345. Students were using matches to light bunsen burners. The hot match fragments flew into the students eye with resulting corneal burn. This happened twice in the same week in two different buildings. In both cases, no eye protection was being used. (409)

346. A ninth grade student, while testing for protein was heating a mixture of the unknown acid and water in a test tube. The mixture was heated too vigorously and splashed against the side of a students face. Although the student was wearing goggles some of the mixture reached the eye.

Fortunately, prompt action on the part of the teacher in rinsing the eye with tap water prevented any damage. (449)

347. Most familiar to me are accidents occurring during dissections. Every year, some student will forget or refuse to put on goggles. One particular teacher in the department has an accident each year involving liquid from dissecting animals spitting into the eye of the student. Then, the student has to have their eye flushed out, be sent to the nurse and then to the hospital. (454)

348. Student spilled a dropper bottle of acid on his shoulder and chest when he went to adjust his goggles with an open dropper bottle in his hand. (456)

349. A science teacher reached to the top shelf and brought down an acid bottle with a glass stopper. The stopper was loose. While talking to another staff member, the teacher tipped the bottle as it came down and spilled acid into eyes and onto face and chest. Hospitalization was required. (477)

350. A student was shaking mixtures of halogens and halide ions in trichloro-trifluoroethane (TTE) to show reactions using stoppered test tubes. Hand heat vaporized the TTE, the stopper popped off and she got the mixture of TTE halogens and halides in her eyes because that school had no safety glasses. (480)

351. This incident took place in a chem. II lab. A student was transferring concentrated sulfuric from a 100 ml ground glass bottle to a small graduated cylinder.

After the pouring task was complete, the ground glass bottle slipped from the student's grasp. The bottle hit the desk causing a geyser effect with the liquid. While the bottle was dropping the student looked down. Safety glasses were worn, not goggles. The student suffered burns to the face. (484)

352. In an eighth grade lab activity using alcohol burners, safety procedures had been reviewed before the lab. The first item was to obtain and wear eye goggles. A student went to the sink area to fill the alcohol lamp. Squirt bottles were used to fill the lamps. The student removed his goggles to fill his lamp. The ethyl alcohol glanced off the burner into his eyes. The student had goggles was alone at the time. His eyes were flushed and the student was sent to the nurses' office. No damage to eyes resulted. (467)

353. A tenth grader in biology lab was doing an exercise in an Acid-Base Indicator lab. Each student had a burner, four ounce dropping bottles with pipets, an indicator solution, and pH paper. All the liquids were clear. The student, for some reason, pointed the dropper into his eye and squirted the liquid (dilute acetic acid) into his eye. The teacher immediately had the student flush eye and sent to the nurse. No permanent damage occurred. (470)

354. Student A squirted student B with a solution labeled hydrochloric acid. Goggles were around the neck and not over the eyes. Student A was squirted in the eye. When the student complained of burning in the eye, the eye was washed. The student was sent to the nurse, later to the doctor. (473)

Other cases include: 57, 90, 114, 115, 116, 129, 153, 174, 179, 182, 205, 232, 236, 261, 263, 265, 280, 281, 284, 287, 288, 292, 365, 395, 406, 491

<u>Hair</u>

355. In an ninth grade IPS lab a first year teacher was showing her students how to light a burner. One of her female students had a long ponytail. After lighting the burner she turned around to tell the teacher that she had the burner going and her ponytail caught fire. The fire was put out with a fire blanket. The back of the students neck burned as well as her upper back. She spent two days in the hospital and was back in school at the start of next week. (53)

356. A student's bangs caught fire in an IPS lab from alcohol burner. (177)

357. In graduate school, a student with waist length hair had it catch on fire and subsequently became a bald graduate student with some 2nd degree burns on her neck and face. (213)

358. In an organic lab in college, we were using separatory funnels and some very flammable solvents. A young woman with beautiful long hair worked across from me. For some reason her bunsen burner was on. After she shook the mixture, she opened the top

to release the pressure and immediately the vapor burst into flames. It was over very quickly but her eyebrows and hair around her face were burned.

I cannot believe how little safety instruction we received. It was assumed that we knew a lot more than we did. (300)

359. In a lab using bunsen burners, a girl with a rather voluminous hairdo, intent on the reaction taking place on the burner, leaned over the beaker and flame. Her hair began to catch fire. The instructor had to pat out the flames. No damage was done to the student. She was an example to the class on the importance of tying back one's hair.

One of the most disturbing aspects was the other students' reaction. They tended to crowd around to see what had happened, making escape and fast action virtually impossible. (366)

360. The bunsen burner had been incorrectly adjusted and the flame came out the bottom of the burner and caught the burner hose and the student's hair on fire. This happened when the student tried to adjust the burner instead of just shutting the gas off. (377)

361. A high school senior was bending glass with a bunsen burner. She had her burner too close to the edge of the table. As she bent down to put something in her lab drawer, her hair caught fire. She had a large amount of hair spray in her hair. She managed to put it out before serious damage occurred. Only the ends of her hair got burned. (379)

362. A black girl's hair caught on fire as she leaned over a bunsen burner. The large amount of hair spray used on her Afro was a serious contributing factor. The accident resulted in serious facial and scalp injury. Extensive plastic surgery had to be performed. The accident has resulted in a lawsuit that is now pending. (395)

363. A female student leaned over her bunsen burner to write down her observations. At the same time, she was talking to the instructor. Her bangs caught on fire. The instructor slapped out the fire and the lab continued. (406)

364. A ninth grade girl was doing a lab with a bunsen burner. The girl had an Afro hairstyle with hair spray on. She bent over to write in her notebook and ignited her hair. The teacher rushed to fire blanket and smothered the flames. The girl's scalp and face were seriously burned.

The teacher was sued for not using water in the fire. The girl also sued the hair spray manufacturer. All is still pending (2/26/84). (408)

365. A female chemistry student bending over cutting (scoring) glass tubing with a triangular file set fire to her hair because she could not see the bunsen burner flame against the black background of the table top.

She had on goggles. There was no fire blanket. There was no prior instruction to always shut off the burner when not in use. There was no shower available. (440)

Other cases include: 11, 28, 43

Hood

366. A gas was being generated in a fume hood by reacting a metal with acid being fed to the reaction through a thistle tube. One student didn't want any gas wasted, so he pinched the tubing while transferring from one container to another. (It was a water-soluble gas.) The acid backed up out of the thistle tube, spraying out in fountain fashion. The hood shield was down, so only a little got on his hands, which were immediately washed. The hood was a mess, but it was easy enough to clean up. (90)

367. Early this school year, we installed exhaust systems in our biology class/lab room. About a week after becoming operational, a chemistry teacher in a nearby chemistry class/lab room opened the hood and immediately felt irritation in her eyes. There were no classes underway and she was only moving equipment to be used later. She immediately washed her eyes with water and was taken to a doctor. She had received chemical burns on her eyes but fortunately, after several weeks and medical treatment, she was fully recovered.

During the investigation it was determined that the register pressure created by the exhaust fans possibly combined with wind conditions had made it possible for chemical dust to be drawn into the room through the hood. We now require the hood to be "turned on" before it may be opened. (169)

368. When the fume hood window stuck, the cable was exposed and when I reached up to try to loosen it, it snapped back into place, cutting my thumb. I needed several stitches. (179)

369. A nitrogen analysis was being done with a Keldahl apparatus. Concentrated sulfuric acid and fertilizer were heated to reflux. The equipment was not set up properly. The test tube inside did not have a hole in it, which was supposed to release pressure. Concentrated sulfuric acid sprayed in many directions. Each student had an apparatus and none were in a fume hood. (283)

370. A biology teacher was preparing in the exhaust hood a solution to be used in a class. Some chemicals had been stored in the hood and there was an explosion and fire. He was seriously burned on his hands, arms and face. (317)

Other cases include: 25, 74, 93, 103, 106, 137, 153, 180, 186, 192, 248, 253, 256, 261, 331, 421

Hot Glass

371. A student, using his mouth strangely, said to me: "Don't tell Dr. Wilson, but I burned my mouth." The answer to how was that he had put hot glassware (a rod he was fire polishing) in his mouth to cool it quickly.

The student wasn't stupid but he clearly didn't think. I tell the story to my kids every year to illustrate the need to think before acting. (96)

372. In a high school tenth grade chemistry class a student was burned picking up hot glass. Cool water was applied for several minutes and then the student was sent to the nurse. (225)

Hot Plate

373. We were dissolving the chlorophyll from spinach leaves using methanol on a hot plate. The level of alcohol got low during class, so I was refilling it too quickly. I had left the beaker on the hot plate. Fumes spilled over and ignited. The flash fire went up the wall behind the hood. It scared both my students and me. The fire was quickly extinguished. (82)

374. A hot plate was inadvertently left on a side counter of a biology lab. A student, not realizing the plate was hot, placed his entire hand flat on the plate and was apparently unaware of the burn he was receiving. By the time he lifted his hand from the hot plate, he had received an extensive and very serious burn. The teacher was in the lab at the time. He immediately got coverage for the classroom and took the student down to the nurse. (100)

375. In an organic III lab, a girl was making a derivative of one of her unknowns. She was heating with a hot plate and the reaction mixture burst into flames. Nobody really knew what to do. (267)

Other cases include: 8, 11, 46, 85, 87, 88, 106, 256

Hot Water

376. A ninth grade student heated water in a stoppered flask. The internal pressure due to evaporation built up and exploded the flask. Fortunately, the student was not injured but he learned a valuable lesson. (16)

377. A student in one of my science classes spilled some very hot water on her hand. Fortunately a serious burn did not result. Running cold water over the hand was sufficient treatment. The student’s error was in handling a beaker of very hot water with out protective equipment. (17)

378. Students were boiling water for a water bath. They boiled it so vigorously that the test tubes moved to one side and the beaker of boiling water spilled. Everyone was able to get out of the way so that no one was burned. The students had not followed instructions. (66)

379. A student had set up a water distillation apparatus using flasks, tubing, etc. During the operation of the experiment, the heated flask burst spraying steam and hot water over the lab table. The flask itself did not shatter but rather cracked in half so that glass penetration was not a problem. (256)

380. During distillation, a student's hand was scald by boiling salt water when a test tube shattered. (453)

381. Snapping a test tube out of the clamp while it was immersed in a hot water bath caused the beaker to break and spilled hot water on student's leg. (455)

Hydraulics

382. We were doing a unit on hydraulics in a physical science class. I wanted to demonstrate Pascal's principle--that an increase in pressure on an enclosed fluid is distributed equally throughout the container. To do this we placed a glass gallon jug in a plastic dishpan, filled the jug with water, wrapped the jug in saran wrap to keep glass from flying around when the container broke. We then stoppered the bottle with a rubber cork and prepared to break the bottle by giving the stopper a gentle tap. I explained the principle to the class and handed over the rubber mallet to one of the kids. The student raised the mallet and smashed it down on the jug with a huge amount of force. The jug shattered with a great deal more force than I had intended and glass flew across the room hitting several students in the face. No one was hurt but they could have been. (434)

Hydrogen Generator

383. In a high school lab a hydrogen generator tubing became clogged. The thistle tube assembly shot up against the ceiling. No injuries resulted. (323)

384. A small semimicr hydrogen generator had a pressure build up. The delivery hose had become pinched and closed off. The stopper and funnel blew off and embedded in the ceiling. There were no student injuries since they had safety glasses and aprons. (120

Improper Behavior

385. In a biology class with 26 students and only 10 microscopes, students were working in pairs, observing and recording observations in their notebooks. The other students were involved in work at their seats. They took turns with those using the microscopes.

An uninvolved student, after several reminders by teacher to get involved went to a student who is looking through the eyepiece of a microscope and hits him on the head. The students eye was bruised as it was pushed against the eye piece. (125)

386. When I was in high school, a fellow student had a self-made eyedropper lodge in his palm. This occurred due to fooling around by squirting water. The eyedropper went through his hand as he tried to protect himself. This accident occurred due to lack of class discipline and lack of prior warnings. (128)

387. One accident involved horseplay. A student pushed another's head down into a microscope lens. Outside of an irritated eye, there was no permanent injury. (135)

388. A nasty student "branded" another student with a hot wire loop. The outcome was neither serious nor permanent. (286)

389. During the course of a horse playing incident one student responded to water thrown at him by grabbing a beaker containing what he thought was water. Unfortunately, it was a rather concentrated solution of sulfuric acid. However, the victim had turned so that the acid solution struck him on the back eating through his shirt and T-shirt. Fortunately, it was completely absorbed by these fabrics with no skin damage. As a high school student at that time it made a big impression on me. (361)

390. A few years ago, I was employed at a die casting company where we were using injection-molding machines for die casting metals. The molten metal was gravity fed from a large reservoir into a cylinder where a piston pressed, with enormous pressure, the molten metal into the die. On a particular day, the piston got stuck into the up position. One worker was trying to release the piston when it let go cutting off most of his hand.

When he returned to work he was being trained by me to light up the furnaces. Scrap metal was placed in ten-foot diameter containers four foot high. The metal was re-melted and then a pump was lowered by a chain and a large section of pipe was used to get the molten metal from the vat and the die casting machines. One day a piece of metal got caught in the chain about five feet above the vat. Against my advice, this worker stepped on the rim of the vat and almost fell into it. I refused to work with him any longer, both for my safety and his. (392)

391. A student removed chemicals from a locked classroom after school. He mixed them at home. It started smoking and he tried to carry the mixture from the basement to the outside. He got to the back door when it blew up. It tore off the back door. Over 100 stitches were needed to take care of the cuts on the student. No legal action was taken by the parents. (496)

Other cases include: 15, 17, 54, 160, 230, 238, 269, 322, 339, 354

Improper Disposal

392. The bottom of a plastic disposal bottle dissolved as the second type of waste was poured in. (93)

393. A student pouring out acids into water/sink did not know it was hydrochloric acid. He did not protect himself. He later did not understand why his clothes were falling apart. (383)

394. I have only had some minor cuts resulting from improper glass disposal practices such as wastebaskets. (448)

395. As a culminating activity to a first year chemistry program, each student had been given an "unknown." They had to determine what was in the unknown by performing a series of tests. After each test the materials were poured down the sink. All of a sudden one sink gave a loud popping noise and liquid was projected from the sink. Two students were sprayed as well as the wall, metal cabinet and chairs in the vicinity.

Response by the Instructor was to place the sprayed students under the shower and drench them. As a result the students had minor skin burns on face and arms. His quick action prevented more serious burns. Students had protective goggles and lab aprons. The paint on the cabinet and chairs washed right off. (471)

Other cases include: 80, 81, 104, 161, 171, 223, 246

Improper Handling

396. A teacher tried to open a "frozen" chlorine gas bottle. The stem broke and contents erupted violently. The teacher ingested a large amount of vapor. (137)

397. During my first year of teaching I encountered, a large glass jar with a stopper jammed into it. Using force I tried to twist the rather large stopper out of the jar. With my left hand firmly holding the neck of the jar and my right hand twisting the stopper - I labored. Suddenly, I twisted the neck of the jar off and my left hand clamped down on the broken glass of the jar's neck. What resulted was a severe cut in my left thumb that cut my tendon and just missed the main blood supply. Unfortunately, the medic who sewed me up failed to repair the tendon. I'm left with some loss of movement in my left thumb. (152)

398. A friend was working in one of the fast food chain restaurants and was on the clean up duty after the restaurant had closed. They were in the process of moving some of the carbon dioxide cylinders which were used in the dispensing of coca-cola. While transporting, one of them fell three feet from a counter, snapping off the valve. The cylinder shot through a four-inch counter and struck the leg of a fellow employee. The leg was broken. (232)

399. A rat crawled out of its cage. This was noticed by a student who walked over, caught the rat and was then bitten as she attempted to return it to the cage. (329

400. In an organic chemistry lab, a student was carrying a beaker of acid around the lab and another student accidentally bumped into the student carrying the acid. It spilled all over the innocent party causing minor burns and damaging the students clothing. (357)

401. On the day preceding Thanksgiving vacation, which tends to provide a difficult job in harnessing students attention, I had scheduled a lab for my ninth grade class. The nature of the lab was what later presented the problem.

The injury was not out of the ordinary: a female had been heating a kettle with a mixture in it. The mixture was not of the flammable nature but of the edible variety. The student reached to take her pan of peanut brittle off the tripod where it had been brought to a boil. She got the potholder too close to the flame and it caught fire.

Instead of letting go of the pot and holder, she hung on trying to save her peanut brittle. Her palm, thumb, and first two fingers were burned. Her hand was immediately immersed in cold water. She was taken to the school nurse and was seen later in the day by her physician. (420)

Improper Instruction

402. A burned hand resulted when a student grasped a hot ring clamp to disassemble apparatus. A pre-lab discussion may have prevented this situation. Subsequent labs took care of this inadequacy. (121)

403. As a first year chemistry teacher, I was demonstrating the "activity series of metals" according to a text-book suggestion. I heated metals in order of increasing activity in powdered form mixed with powdered sulfur. The powdered tin and sulfur in a stoppered test-tube when heated exploded the test tube, driving the glass tubing which was in the stopper one-half inch into a wooden door. Bits of the glass cut my face above my eyebrow, narrowly missing the eye socket. I was wearing no safety equipment, no glasses, and did not know the potential danger of what I was doing. The blood trickled down over my eye as my students shouted, "Do it again! Do it again! (375)

404. Although I have never been involved in a serious accident, minor mishaps have occurred with my labs. Often times, these can be just as upsetting to the students and may affect their attitude towards the class and to continuing science study. (462)

Other cases include: 94, 104, 124, 269

Improper Lab Safety

405. A student inserting glass tubing put a piece through his hand. The student had violated all safety procedures. (38)

406. A student was performing a make-up lab in electrolysis using a weak acetic acid solution. The student had been advised that goggles were to be worn. It is standard procedure to have students wash their hands after class. The laboratory exercise was completed uneventful. Later in the afternoon, the department was called by the infirmary about the student who had been in the lab. Her left eye was badly inflamed. The student assumed it was from rubbing her eyes after she left the lab. Subsequently, because of a previously undiagnosed healing mechanism problem, the student's eyelid area was not healing properly. She underwent several repair operations. Several years later, she reported to us that her eye was back to normal. An accident report was filed.

No lawsuit was filed nor action against any individual or the school. Student had signed the safety contract required by the school. (86)

407. A student who failed to wash his hands after the lab got a substance in his eye during the passing time between classes. The substance was never identified but did cause temporary damage. (212)

408. A faucet was ripped off its stand and my room became a shallow bath. It was a special needs biology class. They kept playing with the faucet until it finally broke. I cleared the room so no one could slip and get hurt. (226)

409. A girl in a biology class went around the edge of a wooden lab table and picked up a bad splinter leading to an infection. The incident resulted in a suit. (228)

410. In an art class, a student carving a linoleum block slipped and his tool through his palm. (229)

411. In a college lab, a chemistry student was performing an identification of unknown organic substances. He inhaled many of the substances he was working with. He used the eyewash, not once but twice within a five minute period.

The student had no idea the first time it happened and had been careless the second time. The department had no real safety program. (349)

Improper Storage

412. One summer, a container of preserved material leaked in the storage room. It was discovered by custodians. The department chairman was called in to assist. (64)

413. A student picked up a reagent bottle stopper top. The reagent bottle fell from underneath and broke. The student was splashed with acid and broken glass. (136)

414. Newly hatched chicks were placed in a cardboard carton to dry. A goose-neck lamp with a 100-watt bulb was placed over the carton to provide heat. The intense heat set the carton on fire which melted the insulation on the lamp cord and also ignited the storage cabinets in the preparation room.

Fortunately, a biology teacher discovered the fire and put it out completely emptying two fire extinguishers.

This accident could have been prevented by placing chicks in an approved "brooder" when they are hatched. Also, the fire alarm should have been pulled to evacuate students from the building. (141)

415. A chemistry teacher prepared for a lab which involved moderately concentrated nitric acid. The acid was placed in 250 ml plastic squeeze bottles for students to use to dispense it during the lab. The bottles were labeled nitric acid and were placed on a lab table in the back of the room, the front half of which was a seating area.

While the teacher was in an adjacent prep room acquiring other materials before the school day began, two boys in the teacher's homeroom started squirting each other using the bottles they thought had water in them. Both received moderate facial injuries because of their horseplay. (142)

416. While giving an introductory lesson on safety and prevention of accidents at the beginning of a school year, I knocked a liter graduate cylinder into the lab sink. Result of this accident, $38.00 to replace the graduate cylinder and a very embarrassed teacher. (144)

417. Acid had been left in a beaker and placed back in the side storage cabinet in a student's lab area. The beaker should have been cleaned out and thoroughly washed. The next student, who came to lab, opened the cabinet to get out the beakers. The beakers dropped and acid spilled on her leg. She was doused with water and given a change of clothes, as well as taken to the doctor. No serious injury resulted. (176)

418. A student took a test tube with zinc powder, ammonium chloride or ammonium nitrate and I think a third chemical, placed it in his jeans pocket and went to his next class. The test tube exploded and he started getting burned. He cautioned them not to throw water since he knew that would be more reactive. His pants were removed and he was taken to the hospital.

There had been a substitute in the chemistry class. The chemicals were not on display but in an unlocked cabinet. (180)

419. When moving from an old building to a new one, several gallons of acids were left behind along with unlabeled bottles of chemicals. Vandals entered the old building. Empty bottles of acid were found inside and outside of the building. Vandals were never caught. Injuries were never reported. (193)

420. Approximately ten years ago in a low ability level ninth grade physical science class an experiment was done using hydrochloric acid. Approximately three months after the lab, the teacher, administration and school committee were served with papers for an acid burn to a physically disabled student supposedly caused during the lab.

The student who had low physical sensation in the lower torso and extremities supposedly sat in acid placed on his chair without his knowledge by another student.

The student relates he knew he had a problem upon leaving class. He went to the locker room, changed his clothes, did not wash, and did not report it to anyone for over two months!

Early in the year and in all pre-labs, the teacher had frequently talked to students about reporting accidents and mishaps. The student had signed a safety form (contract) agreeing to do so.

Even though litigation continued for over 7 years, an out of court settlement went in favor of the teacher.

A great suspicion was that the student had stolen some acid in a bottle which either broke or opened in his pocket. His fear of accusal led to the long delay in reporting. (195)

421. In a university chemistry lab a student was working with a burner in the hood. Bottles of acid were located nearby. The entire hood area burst into flames. The flames surrounded the bottles of acid. The lab instructor calmly walked over to the fire extinguisher and put the fire out. The calmness of the instructor prevented panic. (348)

422. A student in a biology lab was routinely walking by a side counter to his lab station when he brushed his body against a fire extinguisher which was hung on the wall from a plastic holder. The plastic holder broke and the fire extinguisher fell on his foot, causing bruising, swelling, and some tendon-ligament problems which persisted for about a month.

Apparently, the fire extinguishers had never been brushed against before and so the strength of the plastic holders had never been tested. Presently heavy metal wall mounts are being purchased to replace the plastic ones. (362)

423. As a class demonstration, we were making a latex white paint in a glass beaker. To let everyone help out, everyone helped stir the mixture. When the paint was completed, I, the instructor, picked up the beaker to give it one final "stir" and the bottom broke out. The floor, as well as the desk, and I was totally covered with white paint. I lost the shirt, pants and shoes I was wearing. The class loved it. (384)

424. A student was working on a project in the chemistry prep-room. He may have been using a Hoffmann apparatus which served as the ignition source. An explosion occurred causing damage and slight injury to the student - singed eyebrows and hair. There was no special storage of flammable liquids. (402)

425. Because of the limited storage space in our science department, all chemicals were stored in three hanging cabinets for both chemistry and biology. Shortly after being appointed, I was in the preparation area with a student when a cabinet pulled loose from the wall. It fell forward and hit us both. In the process, several bottles broke and their contents spilled. Luckily both the student and myself were not injured but the potential was enormous. (430)

426. An old refrigerator at the college broke down over the week-end. The chemicals stored in the refrigerator heated up and blew out a wall. (442)

427. Students in a seventh grade life science class were using Exacto knives to cut a carrot specimen for a microscope slide (wet mount). One student failed to return his knife to the proper location-a wooden instrument block on the lab table. He left his knife on his lab table instead. The knife rolled off the table where the student was sitting. The point embedded in his thigh. There was lots of blood. (458)

428. A teacher was concluding a demonstration regarding evaporation in the classroom. To speed things up, he poured the liquid into a large culture disk and proceeded to heat with a bunsen burner.

Shortly, the disk cracked, fell to the demonstration table, and shattered into hundreds of pieces. Needless to say the teacher and students were surprised and upset. So much for evaporation. One little girl in the front row raised her hand and asked if she could sit in the back of the class! (461)

Other cases include: 78, 98, 110, 112, 160, 168, 173, 195, 220, 223, 267, 279, 370, 399

Improper Supervision

429. Mid year exams were in progress. The chemistry teacher instructed several of the senior students who were members of his AP Chemistry class to take inventory of chemicals stored in the room adjoining the chemistry lab. While the students were taking the inventory, no instructor was present to supervise this activity. One of the male students, a National Merit Scholarship recipient, took several different chemicals, without the knowledge of his teacher and placed them in his locker. This was done around 8:20 A.M. About 11:15 A.M. a loud explosion occurred in the area of the student's locker. About 30 lockers were blown away from the wall and when it was over seven students and three teachers were injured. Cases are in litigation. (355)

430. A student, curious as to what would happen if he mixed all the acids in the reagent racks, produced a unique mixture in a round bottom flask. The professor entered and the student "hid" the mess by balancing it on the window sash. A while later, having forgotten it, he opened the window, doused himself and began to scream, "My eyes, my eyes!" Fast eyewash and showering and emergency room treatment saved him. (97)

431. Several years ago in a junior high science lab, the teacher left the room leaving a large bottle of concentrated nitric acid and a bottle of ethyl alcohol on the front desk.

One student took a medicine dropper and dropped a small amount of ethyl alcohol into the bottle of nitric acid. The nitric acid bottle burst, splattering the acid onto the face and legs of a girl near the desk. The girl ran out of the room, hysterical and was later found hiding in the boiler room. The delay in washing the acid off her body of course produced serious scarring. (203)

432. In a high school lab during independent study, two students were working without supervision in a small room with no windows and no ventilation. An explosion occurred. One student lost the sight of one eye and fingers from one hand. Although the instructor was away at a conference, he was sued. (388)

433. A student in a general chemistry lab was doing an unauthorized experiment. He was preparing ammonium triodide, commonly used in initiation ceremonies. (When sprinkled on the floor it pops when you step on it.) When the solution was being suction filtered through a buchner funnel, the material exploded. The porcelain funnel was shattered. No one was hurt. (346)

434. An experienced chemist was working in a laboratory preparing Nd(Cl04)3.4MeCN, as per the procedure in Inorganic Chemistry. Synth. 21, 2867(1982). He was doing this on his own, without having had this synthesis authorized by his supervisor. Instead of drying the product at room temperature, he dried it at 80 ^{o}C overnight, in vacuo. He proceeded to examine the dry product, having removed his safety glasses. Two graduate students saw this, and wanted to admonish him regarding the glasses, but felt uncomfortable telling a knowledgeable chemist, with years of experience in synthesis, what to do. The chemist used a spatula to examine the dry residue, where-upon the small quantity of product exploded, causing the loss of one eye, and injuring two fingers. A sample of the compound had been sent in for analysis; it analyzed for a new compound, Nd(Cl04)3.2MeCN. The tetra acetonitrile had been tested for impact sensitivity, and found to be safe.

The explosion was relatively small; had safety glasses been worn, damage would have been minimal. (478)

435. In my first year of teaching, I had students do projects. Several groups decided to make soap. Before the actual lab exercise took place, we went over the procedure. One group forgot to place the alcohol mixture in a water bath. A fire resulted. No one was injured. There were only a few spots on the lab table. (485)

436. In IPS class, students work with isopropyl alcohol, testing for flammability. The teacher had required the students to do all flammability testing in the front of the room under his direct supervision. During the unknowns portion of the course, one student was demonstrating the flammability of his unknown to a fellow student. To do this, he wrapped paper towel into a long roll and poured liquid down it. It also dripped down his arm. He then lit the paper lighting his arm! He received third degree burns on his arm. Although he had not followed the directions of the teacher, the parents threatened suit. After several meetings the matter was resolved. (34)

Improper Technique

437. The school nurse had given a student a refrozen chemical ice pack for an eye injury. The plastic bag began to leak and the solution burned the student's eye. The student, familiar with first aid, immediately flushed his eye with water. I believe treatment included wearing an eye patch for 1-2 weeks. There was no (known) permanent damage. (4)

438. As a former meat cutter working his way through college, a friend was using a hand saw to cut through meat bone. He slipped on liquid on the floor severing his right arm just above the elbow. (218)

439. We were doing a physics demonstration with high vacuum. I had evacuated the bell jar and to demonstrate it had lifted the entire pump solely by the bell jar over my head. Unfortunately, I hadn't shut the pet cork completely and with the whole apparatus freely suspended, it separated. The lump where the bell jar knob struck my forehead (just above the eye) swelled instantly to eye size. (221)

440. In a high school tenth grade chemistry class, a student cut his finger using the improper technique while glass cutting. (224)

441. A 44-minute lab with 30 eighth grade students was being conducted at midyear. The students had received lab safety procedures. There lies the problem. A review of techniques and procedures is necessary. In this lab area, there are 6 lab tables with 5 students working per table. There are 2 gas outlets on each table. The experiment was designed to see how the students could weigh, measure, heat and analyze their results. During the heating portion of the experiment the materials were supposed to have been heated lightly for 2-3 minutes. Unfortunately, one group used too high a heat and was not paying attention to their activity. The test tube cracked, the ingredients over heated, and

shot out of the tube. Fortunately, no one was injured. Goggles and aprons were used for the procedure. (235)

442. Poor lab technique resulted in student putting glass tubing through his hand. (261)

443. The students had made clay models in an eighth grade activity on stats of matter. We melted lead in a tin can and molded lead paperweights. The room was well ventilated with a large window fan. I lifted the tin can with the molten lead and started to pour the lead into the mold. This particular mold had not dried completely and when the hot lead vaporized the water in the clay it boiled up splattering me with hot lead. When I was burned I pulled my hand back instinctively and in doing so slapped the hot lead on a student standing near me. He was not hurt but this could have been a very bad situation. (351)

444. About six years ago, I was working as a maintenance person for a Municipal Park. I had to pick up some empty drums at the road department. These drums were to become garbage cans for the park. They had been filled with dissolvers for snow.

The person in charge started to torch the tops off. When he touched the top, an explosion occurred. He did not puncture a hole in the drum. I was thrown three feet and hit my head. The lid landed next to me. My facial and body hairs were burnt. I lost 10% of my hearing. (266)

445. A high school student mixed available acids. They boiled over causing some damage to physics apparatus but no damage to students. (284)

446. In my biology class, a student went to clean the hamster cage. In trying to take the hamsters out, he got bitten. He was immediately sent to the nurse. (297)

447. A high school student sniffed an unknown chemical to find out what it was. He was hospitalized. (397)

448. I told all my students to shut off their bunsen burners and begin cleaning up. One student shut his off while his partner wanted it lit, even though they were all to be turned off. The student took a rolled up paper towel, lighted it and began walking across the room to re-light his burner. When I looked up the paper and flame were close to his hands. Fortunately, he was close to a sink where I dragged him to extinguish the flames.

He was not injured and was expelled from school for continued disturbances. (482)

449. In an earth science lab, the students were evaporating materials from an evaporating dish. Tongs were provided to handle the dishes but the student failed to use the tongs. He burned his hands. (490)

Other cases include: 73, 135, 277, 369

Labeling

450. I received two new bottles of "potassium chromate" this year. When I used them for labs, the wrong results were obtained. I then looked up properties of this chemical and realized that it was supposed to be a yellow solid, not a white solid. (33)

451. When I came to the school where I am now teaching I assumed the lab had been left in a safe and clean condition. During a demonstration I reached for a test tube rack. An unseen and unmarked beaker filled with liquid fell splashing me. I immediately washed my face and hands flushing my eyes with water. Later during the demonstration I noticed my dress was totally pock marked by the acid. (44)

452. During a lab on identification of a liquid unknown, a student drank a portion of his sample as part of his testing procedure. Fortunately for him, it was water.

I also caught a student drinking water from his graduated cylinder, assuming it was "safe".

Both students were warned about the inappropriateness of eating and drinking in the lab, but had chosen not to listen. (51)

453. I was getting an experiment ready involving bleach. I took a small amount out and put it along with a medicine dropper in an unlabeled beaker. A student came in before school and thinking it was water waved the dropper in the air. I got a few drops in my eye and ended up with corneal scratches and an eye patch. (189)

454. A friend was working in the laboratory using several organic solutions. They were not labeled. They got mixed up and an explosion resulted. My friend was burned and severely cut by the glass particles. As a result he lost the sight in his right eye. (217)

455. A junior high student who had volunteered to clean up a chemistry lab was working alone before the start of school. He accidentally dropped a full test tube containing unlabeled concentrated sulfuric acid onto the stone counter. It broke spilling the liquid onto his leg. The acid burned through his jeans and ate away at his skin. A passing teacher hearing screams ran in and flushed the leg with water. He ended up having to have skin grafts. No law suit evolved and the teacher was reprimanded. (276)

456. My lab assistant began mixing a mislabeled sulfuric acid solution in an old 500ml graduated cylinder. Thinking he was diluting a .1 M solution the combination of the highly exothermic reaction plus the type of glass (non-Pyrex) being used led to the explosion of the cylinder. While the assistant was fortunately wearing a lab coat and mixing the solution over a stainless steel sink, the acid/glass did impregnate his pants bottoms and shoes. Slight burns to the legs resulted. (279)

457. Although not part of an organized laboratory program, a few students of a particular science teacher periodically volunteered to remain after class to help with "general cleanup". On one occasion, two girls were washing glassware in the classroom. The teacher left the room to make a phone call. The girls finished with the available glassware before the teachers return and began to look around for additional items to clean. They went into a closed but not locked preparation room where one of them spilled concentrated

sodium hydroxide on the back of her hand from an unlabeled beaker. She did not rinse her hand rapidly enough and the skin was burned and plastic surgery was needed.

The school and the teacher were sued for negligence. The school insurance company settled out of court for approximately $4000. (459)

458. In a high school chemistry lab, the teacher was heating a test tube over a bunsen burner to loosen a jammed stopper. The tube contained dried, unknown chemicals. The tube exploded sending shards of glass some ten feet across the lab and lacerating the back side of the neck of a twelfth grade student. Third degree burns and scarring were the result. Stitches and plastic surgery were required. (476)

Other cases include: 181, 230, 271, 419

Negligence

459. In 1974, as a first year teacher, I had just completed a dissection in a freshman biology class. The class had 34 students in a lab with only one sink to clean up. As students rushed to finish with cleanup, the bell rang and I neglected to count instruments.

Later in the day, I found that one of my students had stolen a scalpel and stabbed another student in English class. The victim was not seriously injured, only requiring a few stitches. The accident could have been prevented by only distributing a certain number of instruments and then making sure they were all returned before dismissing class. (499)

Pendulum

460. A laboratory experiment on the simple pendulum was being conducted in the physics laboratory. The students were instructed to allow the pendulum to swing on a small arc so that the support stand would not fall. One student took it upon himself to swing the pendulum in a large arc and the stand did start to fall. As the student went to catch the falling stand his lip was cut by the pendulum clamp that was attached to the stand. The student did learn a lesson along with the other students in the lab. As I mentioned to the students after the accident- while his lip was cut, the pendulum clamp could have hit him in the eye. (This is why eye protection should be worn in all labs - Ed.). (7)

Pipet

461. A senior chemistry major was placing a rubber bulb on a pipet. He held the pipet below the volume bulb. The neck snapped at the top of the volume bulb driving the neck four inches into his wrist. Luckily, no serious damage was done; no deadly chemicals were in the pipette. (101)

Other cases include: 135, 321

Razors Blade

462. A student cut his hand with single edge razor blade. (163)

Rubber Stopper

463. My most serious accident occurred my first year of teaching when a student attempting to insert a glass tube into a rubber stopper inserted it into the palm of his hand requiring immediate attention by a physician. (148)

464. In a ninth grade IPS class, I had just reviewed the procedure for putting a thermometer in a rubber stopper. Many students appeared bored and facial expressions indicated, "Do we have to listen to this again". Immediately after I finished a young lady who had not listened snapped the thermometer in half and drove the broken edge into the palm of her hand. It bled profusely.

Fortunately the school nurse was available and the hospital was next to the school building. (164)

465. In an organic chemistry lab a classmate was putting glass tubing through a rubber stopper. While pushing the tube through the top, the glass shattered and glass went totally through his palm. (187)

466. A ninth grade student using preassembled glass tubing (right angle bevel) in a rubber stopper. She had been told not to dismantle it. She did so anyway and then tried to shove the right angle bevel back into the stopper without using proper procedure which she had been taught.

It broke and went through her hand severing a nerve. She had to have surgery. She was an up and coming baton twirler. (215)

467. A cut hand occurred while placing a glass tube into a rubber stopper. The student was forcing the tube, it snapped and was driven into his hand. (254)

468. Doing a lab on fermentation, a student was trying to insert a standard Celsius thermometer into a rubber stopper. Instead of applying a lubricant to ease the thermometer through the stopper, he just attempted to force it through. It consequently broke and the student received a laceration to the palm of his hand. (265)

469. A student attempted the insertion of glass tubing that had already been bent into a rubber stopper. The stopper had not been lubricated. The glass tubing broke, went through a towel used to wrap the tubing and punctured the student's hand. The lab book showed the use of the towel.

The student went into shock and passed out. The tubing entered the palm of the hand and protruded. The happened in the third week of my first year of teaching!. (268)

470. A student took a core sample of his palm as he tried to push glass tubing into a rubber stopper with the flat section of his hand. (272)

471. Working with glassware, as a first year teacher, I was demonstrating how to cut glass tubing and place it in a rubber stopper. A "big" football player decided to not listen to the rest of the explanation and go it on his own by sheer brute strength. He not only shoved it through the stopper but also deep along the full length of his fore finger severing tendons. Not realizing the severity of his injury, he sauntered up reporting his accident to me.

I ran his hand under water as it was bleeding profusely. When I instructed him to go to the nurse, he laughed the injury off as being minor. When I pointed out to him that the white "thing" I could see was his bone, he immediately passed out. I had two students carry him to the nurse.

I preface every lab I do on bending glassware with this story. The atmosphere is set and my students seem much more cautiously aware of the need for proper technique. (307)

472. A girl in high school did not make a clean break in her glass tubing. The piece with the sharp end was not fire polished and was used to make a right angle bend. When placing the right angle bend into a rubber stopper (without glycerin) she had the glass break off in her hand (no towel around glass). She went to the hospital for stitches. (312)

473 During a lab class a student was trying to put glass tubing through the one-hole rubber stopper. The tubing broke and it went into the student's hand. (345)

474. A student was trying to force glass tubing through a stopper. The tubing broke and slammed into the palm of the student's hand resulting in severe lacerations of the palm. (380)

475. A student putting a piece of glass tubing through a one-hole rubber stopper became impatient and the glass tubing broke. Fortunately, only a minor cut resulted. (381)

476. While forcing a glass rod into a rubber stopper, the glass rod broke. The rod forced down into the persons' hand. (382)

477. A twelfth grade student was inserting glass into a rubber stopper. The glass broke and pierced the backs of two fingers and her hand. (413)

478. A student was badly cut when a piece of glass broke while he was inserting it through a stopper. The student had not followed directions. (416)

479. I informed the class that if there is any resistance do not force the thermometer into the hole. Remove the thermometer and place glycerin on the thermometer. This procedure was not to be performed individually until observed by the teacher and given the O.K. to continue. The student in question, after observing the position of the teacher, took the thermometer and placed it into one of the holes. He then attempted to place the glass tubing into the second hole. He placed his palm over the right angle bend. The tubing broke and inserted itself into the palm of his hand causing a cut of about two centimeters. (447)

Other cases include: 343, 497

Safety Glass

480. Before mandatory use of safety glasses, a biology student had preservative squirted into his eye from a dissection he was doing. (122)

481. In a senior physics laboratory, a Hooke's Law experiment being conducted on a table using rods with dull ends to hold the springs. A short student turned abruptly and jammed the end of a rod into his eye. No major problems from injury.

I immediately made all students wear safety glasses in all labs. Also, I suggested that all equipment be constructed so it does not extend over the lab table. (This is sometimes impossible in physics labs). (159)

482. A student was using eyedropper bottles in an experiment. A bottle was picked up by the rubber stopper and the stopper pulled out dropping the bottle into the sink. The angle of the hit was such that O.1M hydrochloric acid splashed into her eye. (The safety glasses were perched on top of her head). Fortunately her lab partner quickly splashed waster into her eye. No real damage occurred. (274)

483. "The Fire-Breathing Dragon" - While demonstrating rapid oxidation by melting potassium chlorate in a test tube and then inserting a wood splint, the teacher failed to notice that a solid plug had formed. The result was that when ignition occurred, molten potassium per chlorate was launched a distance of five to ten feet. No shield was in use at the time. Fortunately, the test tube was pointing away from the students and the instructor. Unfortunately, numerous fires erupted on the teachers desk and demonstration table. The desk blotter and a week's worth of student papers, exams, and homework were beyond saving. (426)

484. A chemical splash went from a bench over the rim of a teacher’s safety glasses into her eye. (94)

Other cases include: 44, 106, 163, 202, 218, 384, 434

Scalpel

485. An accident occurred in a high school biology lab where a student was using a scalpel for dissection. It slipped and sliced into her lower leg. The wound required 3 stitches. (10)

486. In a tenth grade lower level biology class, we were preparing dissection of a cat. There were 22 in the class set up in an old style chemistry classroom. The tops of the lab tables are so high that the students must stand. Each student had his own cat and there were 4 students at each table, one at each corner. Each student had a wax lined tray, scissors, two probes, scalpel, notebooks, lab guide, and a list of cautions to be observed. The tables were crowded.

Student "A" was using the scalpel in dissection. Another student called out a derogatory comment. Student "A" reacted by turning in the direction of the sound, not dropping the scalpel but holding it in left hand, blade out. During the turn he sliced through, almost to the bone, the outer rear portion of student "B"s arm.

This resulted in a large number of stitches, a four-centimeter permanent scar and minor loss of feeling in B's lower arm due to a few severed minor nerves. He was also treated for the possibility of tetanus infection and received long-term physical therapy to avoid any permanent limb use loss.

No legal action was taken by the parents of the injured student. (139)

Other cases include: 459

Shield

487. A fifth grade science teacher heated an aquarium with a 500-watt flood lamp. The flood lamp did not have a shield and the extension cord was partially wrapped around the base of the lamp. The lamp was positioned near a bulletin board filled with paper projects, etc. Saturday morning a cleaning worker smelled smoke outside the lab, entered and saw the ten-foot bulletin board smoldering and in flames. The lamp had burned through the cord in several places and the cord apparently ignited and the flame spread to the wall. The cleaner threw water on the fire and put it out. I think the entire science wing would have gone, perhaps the school, if nobody had caught the fire within the first several minutes. What surprises me is that most everyone just breathed a short sigh of relief, never quite believing the damage could have been great. I was the one who had to make an issue of it. (130)

488. I was doing a demonstration using a 500 ml Florence flask, a one-hole stopper, and a thermometer showing how lowering the vapor pressure can lower the boiling point. I used the same flask for six periods. First, boiling water then stoppering the flask and inverting it in a ring on a stand and pouring cold water over it. In the last class demonstration, the flask imploded causing glass to splatter everywhere.

Fortunately, I had the apparatus set up over the sink in the demonstration table so that most of the glass dropped into the sink. Fortunately no one was hurt.

I should have used a new flask for each class and used a safety shield. (165)

489. A demonstration of the chemical activity of group one metals was conducted without an explosion shield in place. A deep vessel was used with only a small amount of water. An explosion occurred due to the build up of hydrogen gas. The vessel shattered and alkali and sodium fragments were scattered around lab. Luckily, there were no injuries. (209)

Other cases include: 57, 162, 199, 225, 331, 483

Shower

490. In a medical (hospital) setting: In a sink, one technician was diluting some concentrated sulfuric acid, using a large, glass funnel which allowed acid to be admitted, by drops into a large container of water. The quick movement by a worker near the sink caused the funnel to tip, splashing acid over two workers' legs, clothing, and the floor.

There was no overhead shower nearby so water had to be obtained from a sink. Acid burns and ruined clothes resulted, as well as a small "hole" in the floor. (27)

491. In graduate school, I was working late in an organic lab (by myself but with goggles and an apron on). On the other side of the lab a young man was sitting on a lab stool, legs entwined in stool's rungs. He was doing some kind of experiment requiring extensive distillation apparatus. He was boiling a mixture in a flask and the bottom of the flask fell out. The liquid (later learned to be primarily nitric acid) pooled in his lap. Unfortunately, he could not get his legs out of the rungs of the stool in time. The sound of his stool falling over, along with his scream alerted me to the seriousness of the situation. I ran to his aid, pulling him - dragging him actually, to the shower. It didn't work. I dragged him around the corner to another shower. That shower didn't work. My screams, by this time, had alerted help- other students. We poured water by the beaker full on the boy's lap which was by this time turning to jelly. (78)

492. In a chemistry lab, a still was set up and in use. It was an all glass still, made from "scratch." One day, the still blew up. Luckily, only two students were in the lab at the time and no one was hurt. It was found that the cause of the explosion was vandalism. Someone had melted closed the glass bend where the steam left the flask. (356)

Other cases include: 16, 72, 78, 91, 92, 99, 104, 137, 262, 281, 395

Thermometer

493. When I was in college, I broke a thermometer in my hand during a chemistry lab. I had to have some small pieces of glass removed. (22)

494. A student was performing an IPS expansion experiment. The student put her thermometer into a tube. Pressure built up and shot the thermometer across the room. (251)

495. A female student in a college chemistry class was inserting a thermometer into a stopper. The thermometer broke and she ended up with it through her palm. (411)

Other cases include: 161, 244, 464, 468, 479, 488

Thistle Tube

496. Lab Experiment- Preparation of hydrogen by the action of sulfuric acid on zinc metal.

Students were given a pre-lab lecture and demonstration. All safety considerations were thoroughly discussed. All students were instructed to have their apparatus set up approved by me before adding the sulfuric acid into the thistle tube. All set ups were approved before commencing experiment.

A stopper assembly blew off of a generating bottle. Acid was sprayed onto some students. Fortunately, students were wearing safety glasses and aprons. The acid was washed off in time. No serious injuries resulted.

A bent solid stirring rod had been used in the stopper assembly instead of glass tubing. This was not obvious and not noticed by me during inspection of the apparatus. In a previous lab, glass-bending technique was taught and the bent glass tubing was put into a box from which students obtained glass for this experiment. How did this bent stirring rod end up in that box? Prank? Error? (35)

497. A very common accident occurring in a chemistry lab is that of breaking a thistle tube while attempting to put it into a rubber stopper. In my first year of teaching, a student succeeded in putting the broken end well into the palm of his hand. (468)

498. I was a beginning teacher taking over a classroom in mid semester. The first day of class was a gas preparation lab. I was the inexperienced teacher that allowed the students to make the set up without much instruction and no safety instruction. The daughter of the school board chairman tried to push her thistle tube through the stopper by pressure on the end.

The glass broke, the tubing went through her palm and had to be removed surgically from the back.

No lawsuit, no long term problem, I did not get fired. (500)

Other cases include: 266, 276, 366, 383

Tweezing Needle

499. During class after having been reminded of the care needed for the "tools" used in the lab, a male student thought it was "just a joke to prick a student with a tweezing needle. It resulted in a doctor's visit and a tetanus shot to protect her from lockjaw, etc. (98)

UV (λ) Light

500. A lab technician had her corneas burned when her boss left the U.V. light on under a tissue culture hood. She didn't realize it until several hours later. (373)

Ventilation

501. Two 15-year-old students were working without supervision in a small windowless room. There was no ventilation. An explosion occurred. One student lost the sight in one eye and a finger from one hand. Although the instructor was away at a conference, he was sued. (237)

502. I was working in a local lab doing testing on foods and beauty aids. The lab was an instrumentation lab with high-pressure liquid chromatography and gas chromatography equipment. It was in a closed off unventilated area with no exits or windows. We worked with numerous carcinogens, had pressurized gases in the room and many dangerous situations arose. The possibility of fire was high. I complained several times there was no exit, windows for escape or even ventilation. I was getting severe dizzy spells and was losing my equilibrium. I complained again though they never had a serious accident. The workers were all afraid to speak up. The situation still exists. It is too bad people can't speak up for fear of losing their jobs. (327)

Other cases include: 78, 156, 186, 432

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APPENDIX I. About the Laboratory Safety Institute

The Laboratory Safety Institute is a non-profit organization whose mission is to make health and safety an integral and important part of science education, work, and life. LSI provides training, publications, audio-visual materials, and responds to requests for information.

LSI was founded in 1978 by James A. Kaufman, Ph.D., Laboratory Safety Consultant and Chemistry Professor at Curry College. His experience working for the Dow Chemical Company convinced him that schools and colleges were not doing enough to encourage health and safety. Studies by LSI and others have shown the accident rate at schools and colleges to be 100 to 1000 times that of Dow and DuPont.

Since 1978, Dr Kaufman has trained nearly 30,000 science educators and scientists. His brand of safety training is a unique blend of technical information, practical and inexpensive solutions, humor, and accounts of accidents drawn from a collection of over 3,000 examples.

LSI has produced two lab safety-training audio-visuals:
The One-Day Lab Safety Audio Course (5.5 hours) and...
The Two-Day Lab Safety Video Short Course (eight, 90-minute VHS Cassettes)

LSI Publishes a newsletter: "Speaking of Safety"

LSI offers seminars and short courses for national, regional and state organizations. LSI conducts lab safety training conferences in the summer at locations throughout the United States.

LSI is supported by corporate sponsors, agencies, associations, generous individuals, its members. Members receive a newsletter subscription, use of the audio-visual lending library without rental fee, a 10% discount on most LSI publications, and use of the Toll Free, 24-hour Lab Safety Information Hotline.

The Journal of Chemical Education called The Laboratory Safety Institute "A national resource for safety conscious science teachers".

If you would like to help support the efforts of The Laboratory Safety Institute:
1. Subscribe to "Speaking of Safety"
2. Become a member of LSI (partially tax deductible)
3. Make a contribution (tax deductible)

For more information about LSI, contact:
Jim Kaufman, Laboratory Safety Institute, 192 Worcester Road, Natick, MA 01760
Email: info@labsafety.org; 508-647-1900; Fax: 508-647-0062

Free copies of our “Laboratory Safety Guidelines”, Publications List, Audio-Visual Lending Library List, and Introduction to The Laboratory Safety Institute (containing seminar schedule and membership Information) are available on request.

APPENDIX II. About the Editors

Dr. Fariba Mojtabai is a Research Associate at the Laboratory Safety Institute and a Research Associate at the Brigham and Women's Hospital. She is employed by CVS Pharmacy as a Pharmacy Manager. She received her bachelors degree in Pharmacy & Chemistry from Massachusetts College of Pharmacy and her Ph.D. in Pharmacy from the Massachusetts College of Pharmacy.

Dr. James Kaufman is President of The Laboratory Safety Institute, President of Kaufman & Associates and former Professor of Chemistry at Curry College. He received his bachelors degree in chemistry from Tufts University and his doctorate in organic chemistry from WPI.

After two years as a post-doctoral fellow in the WPI Chemical Engineering Department converting garbage into fuel oil, Dr. Kaufman joined the Dow Chemical Company's New England Research Laboratory as a Process Research Chemist. During his four years with Dow, he became increasingly involved in laboratory safety related activities. He authored "Laboratory Safety Guidelines". Originally distributed by Dow, now over two million copies of the widely requested and reprinted brochure are in circulation.

Dr. Kaufman is the founder and president of The Laboratory Safety Institute - a national, non-profit center for safety in science and science education. LSI's lectures and training programs, AV-lending library, Mini-Grants, Internet discussion list, and publications help academic institutions throughout the world. LSI is supported by grants from individuals, foundations, companies and professional societies.

The Laboratory Safety Institute conducts seminars, short courses, audits and inspections for schools, colleges, and companies. They also provide advice on regulatory compliance, safety program development, facilities design and editorial commentary on laboratory texts.

Dr. Kaufman is a former, ten-year member of the American Chemical Society's (ACS) Council Committee on Chemical Safety and is past-chairman of the 2,500-member ACS Division of Chemical Health and Safety. He is the author-narrator of the ACS Audio Course on Laboratory Safety and editor of "Waste Disposal at Academic Institutions" from Lewis Publishers. He recorded and edited the "One-Day Laboratory Safety Audio Seminar" and "Two-Day Lab Safety Video Course." Most recently, he co-authored "Safety Is Elementary: the new standard for safety in the elementary science classroom."

APPENDIX III. How You Can Help

The Laboratory Safety Institute gratefully acknowledges the generous support of our sponsors. Our major benefactors have been:

ACS Council Committee on Chemical Safety, ACS Division of Chemical Health and Safety, Cabot Corporation Foundation, and Fisher Scientific-EMD, Flinn Scientific, Honeywell-Bull, Lab Safety Supply, National Safety Council / Foundation for Safety and Health, Northeastern Section of ACS, Polaroid Foundation, Union Carbide.

As we expand both the number and scope of our services, we need the voluntary support of those who enjoy and appreciate our efforts. Furthermore, it is vital that our professional and corporate supporters see their commitments to the Laboratory Safety Institute matched by the enthusiastic financial support of individuals. May we invite you to help by becoming a "Friend of the Laboratory Safety Institute".

Please be generous. It is a worthy cause.

* * * * * * * * * * * * *

Yes, I would like to make a donation as a "Friend of the Laboratory Safety Institute" in one of the following categories:

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192 Worcester Road
Natick, MA, 01760

Checks should be made payable to the LABORATORY SAFETY INSTITUTE.
The Laboratory Safety Institute is a tax-exempt organization under Section 501 (c)(3) of the IRS Code.

"Laboratory Safety in Academic Institutions" by S. Pesta and J.A.Kaufman appeared in the October 1986 Journal of Chemical Education. The article summarizes the results of a national survey of accidents and injuries in college and university chemistry departments for academic years 1978-82.

"List of Agencies and Associations" lists professional, trade, and government agencies.

"No Lesson is so Important and no Task so urgent that we cannot take time to Teach Science Safely" is an attractive 8-1/2 x 11" poster. Free

"Publications" lists materials available from the Laboratory Safety Institute

"Safety Equipment Vendors" list safety equipment suppliers.

"Safety in the School Science Laboratory" is the 500-page text prepared by NIOSH and CSSS. These Xerox copies will require a three-ring binder. Single copies are available and discounts on multiple copies. Call LSI for current prices.

"Selected Laboratory Safety Bibliography" by J. A. Kaufman includes recommended materials for school, colleges, universities, industries, arts departments, and vocational education. Free

"Speaking of Safety" is our newsletter. We invite reader contributions and discuss accidents, books, equipment, good ideas, and other laboratory safety topics.

"Teach Science Safely" is a 2" x 6" cardboard reminder that will stand on your desk. Single copies free.

"Workshop and Seminar Information" is a special packet of materials describing the national, regional, and statewide training programs offered by the Laboratory Safety Institute.

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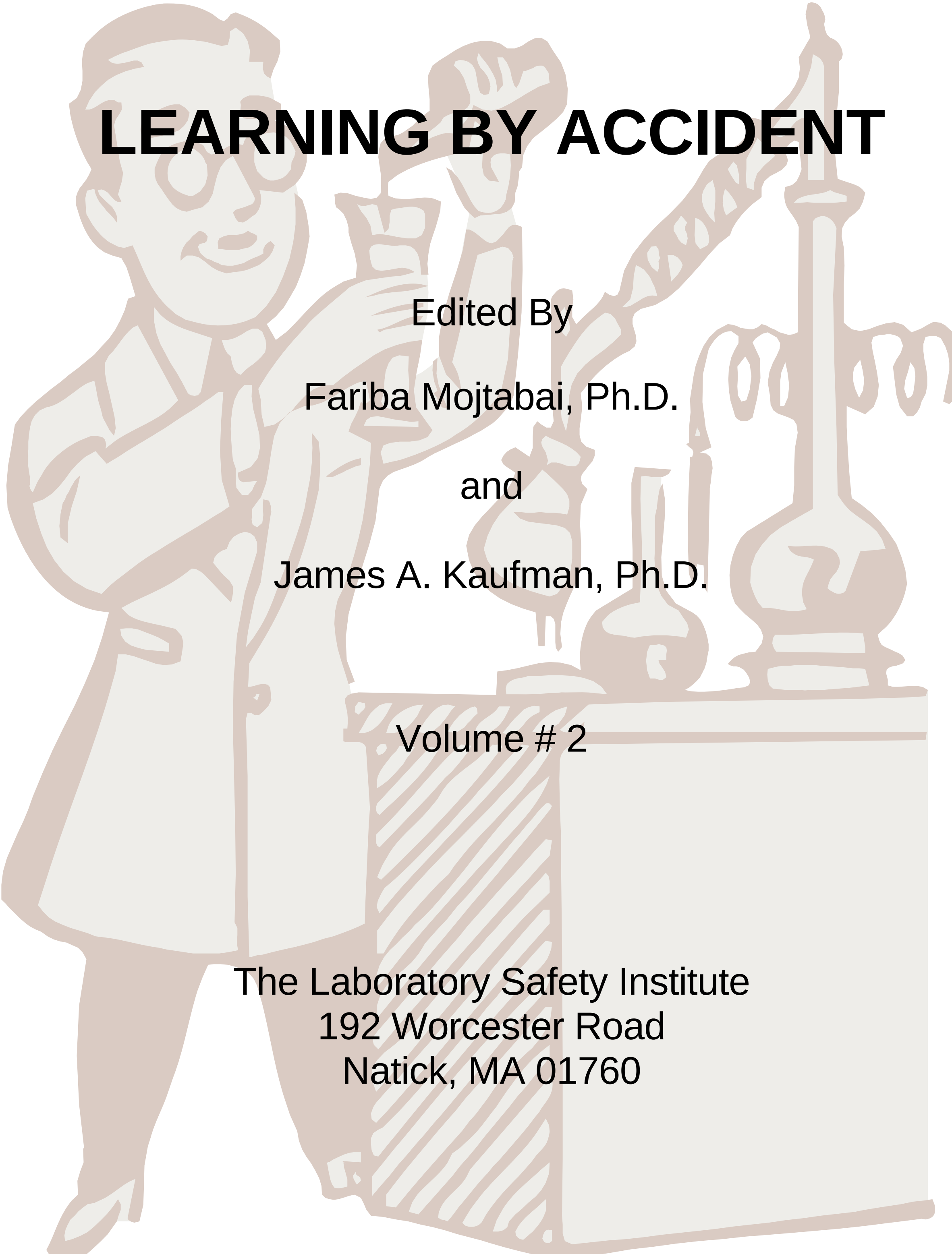

LEARNING BY ACCIDENT

Edited By

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and

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Volume # 2

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ACKNOWLEDGEMENTS

We wish to thank the many science teachers who contributed the anecdotes, stories, newspaper articles, and accident reports that are the heart of this book. Thanks to Barbara Jerome for her help with the manuscript typing. And, thanks to Don Dix for introducing me (JAK) to the importance of laboratory safety.

INTRODUCTION

Since the founding of the Laboratory Safety Institute in 1978 as the Laboratory Safety Workshop, I've been involved in offering lab safety training programs for science teachers. One of our activities during these training programs is the sharing of accident experiences. Teachers spend a few minutes writing an accident summary and then describe and discuss these accidents with each other.

Several things invariably happen. Teachers are amazed by both the number and seriousness of the accidents. Many teachers have had similar experiences. Teachers realize that they have been "lucky not to have had a particular accident”. And, teachers are glad to have heard these examples to share with their colleagues and students.

That's what this book is all about. A sharing of anecdotal accounts of laboratory accidents. Hopefully, it will be a valuable resource for you to experience vicariously the many ways that people got into trouble in the lab. Hopefully, it will give you real life examples to share with your students.

I should point out that although these accident accounts have been edited for general technical correctness and consistency of style, no attempt has been made to verify the descriptions. Some accidents may, in fact, be described more than once by different teachers.

Somewhere in Tom Peters' <u>In Search of Excellence</u>, I read a story about a computer scientist who asked his computer: "when will you learn to reason like a human being?" The computer spun its tape drives and flashed its lights for a few moments and then spat out a piece of paper. On the paper was the answer, "That reminds me of a story."

That's how we learn best. We remember stories and we extrapolate from them easily. Perhaps, that's why Peters is so successful. It's been said that whenever data competes with folklore, folklore wins 21-0!

That's the incredible power and value of these accounts of laboratory accidents. Use them in your science teaching to help you identify potential problems. Use them to help get the message across to your "invincible" students. They'll remember these true stories. Use them so that "Learning is no Accident".

On the next page is a copy of the "Accidents" handout that we use in our science training programs. Please feel free to photocopy this page and use it in your science department for a group activity. And naturally, we would be delighted to receive contributions from you and your colleagues for the next edition of LEARNING BY ACCIDENT.

ACCIDENTS

How often have you heard someone say, "I don't have to worry about that. I've never had an accident." You can see the person's bad habits and the increased probability of disaster striking.

For many people, the "remoteness" of accidents makes them seem unlikely. Yet, each of us is probably familiar with one or more serious accidents with which we have had either direct involvement or intimate knowledge.

The sharing of these experiences heightens our awareness of the dangers in the lab.

Please spend about twenty minutes writing a summary one, two, or three of the most serious laboratory accidents with which you are familiar. Who? What? When? Where? Why?

What were the errors that were made? What might have been done to prevent such an event from occurring?

Then, please take turns reading some of the descriptions of the incidents and allow the others to identify what they believe to have been the errors and what might have been done to prevent the accident.

I would like to collect these written descriptions to include them in a permanent collection for distribution to other science teachers. Please indicate if you wish to place any restriction on use or distribution.

Alcohol lamp

503. Alcohol lamp blew up, and the alcohol leaked around the cap. We no longer use alcohol lamps. (923)

Autoclave

504. After autoclaving a bottle containing a liquid solution, I moved the bottle before it had time to cool down to room temperature. The glass stopper then shot from the top of the bottle and boiling liquid spilled all over my arm. (806)

Battery

505. My 14-year-old son and I were using battery (jumper) cables to start the lawn mower. I had my son start the car. It was in gear. The car lunged forward and smashed into the mower. It almost got me. I was lucky. (603)

506. I was in a rush to connect the battery cables. I incorrectly connected the cables. Battery flew up in my face. I rushed inside to flush my face, hair and skin. It took more than one and one-half hour to dilute it. (693)

Other cases include: 616

Blood

507. Freshman biology students were pricking fingers to type their blood samples. In two cases, students passed out as a result of becoming hyper about sticking their fingers. (525)

508. While typing blood for students in our lab, a student fainted and struck his head on a radiator. He required stitches. (548)

509. A student fainted during a blood typing lab. He collapsed into a row of beakers on a lab bench. (551)

510. A student was instructed on how to prick his finger to obtain a blood sample for blood testing. He fainted and required 14 stitches to close the gash on his head.

In the future all students are instructed to sit while doing this activity and to lie on the floor if they feel faint. (655)

511. In a biology class in New Hampshire in 1985, a student passed out during a blood typing lab. The procedure involved, extracting blood by pricking finger with a lancet, placing a drop of blood on a prepared slide, adding anti A and anti B sera and reading

the results. After a few moments, a young man came to the desk for the boy's room pass. As the pass was being prepared he keeled over backwards, fell flat on the floor and knocked his head. He was left on the floor until the nurse arrived. Fortunately he was unhurt. (937)

512. My daughter fell on the steps and cut a high gash over her forehead. Blood spurted all over the place. I had to rush her to the emergency room where she received eight stitches. (969)

Other cases include: 580, 812, 972, 973

Burn

513. A student picked up a nonasbestos pad. The hot pad burned his thumb and index finger. It stuck to his fingers until he shook it loose. (599)

514. A ring stand with ring, triangle, and crucible started to fall. The student had been working on an experiment for two hours. She was nearly through and didn't want to lose the fruits of her efforts. Without even thinking about it, she grabbed the top of the ring stand post and suffered second-degree burns on her hand. (619)

Burner

A. Alcohol burner

515. Long straight hair was very popular with the girls in 1972. In my IPS class a girl turned her head quickly and it passed over an alcohol burner. Her ponytail caught fire and her lab partner put the fire out with her hands before I could get to the girl. There was no injury except shorter hair. (523)

516. A teacher, knowing she would be out, arranged for a film, a written assignment, and an IPS lab. The department chairman had a substitute teacher do the lab. The lab involved using alcohol burners. During the lab several students were refilling the burners from a gallon container of alcohol. One of the students did not notice that the wick was not completely extinguished and due to poor visibility of the alcohol flame, the vapors ignited and a number of students were burned. Two required extensive hospitalization and reconstructive surgery. (555)

517. In a freshman science course an alcohol burner ignited. A student brushed it onto the floor and yelled, "fire." Students near the fire moved back. Another student went to the sink and filled a beaker with water. The teacher quieted the class by speaking calmly. He tried to blow the fire out (it was small). He accepted the beaker of water and poured it over the fire and the burner and he made sure the fire was out. Then, the

teacher instructed the student to clean up with large bunch of very wet paper towels. Fortunately no glass was broken.

The teacher praised his students for quiet, calm behavior. (572)

518. Students were asked to use alcohol burners as heating sources. One student dropped the lighted burner and her sleeve caught on fire. The teacher immediately brought her to the safety shower. It did not provide water when activated. The fire blanket had deteriorated. The teacher then removed his coat for use in smothering the fire.

The girl was moderately burned but psychologically the damage was very great. It is currently in litigation. (645)

519. In an IPS class a student was heating a test tube of water with an alcohol burner (methyl alcohol). The top to the burner was not on tightly. The burner knocked over and ignited the counter top. The student tried to blow out the fire. It spread across the counter. The students got my attention and stood back. I took the fire blanket and threw it on the floor. The fire was extinguished. (662)

520. A large eighth grade IPS student knocked over the alcohol burner. The bottle broke and the alcohol spilled out. There was a roll of paper towels standing on the lab bench. It was quickly saturated with alcohol and instantly caught on fire. The fire was soon extinguished with the fire extinguisher. We were lucky. (663)

521. A teacher was running a self-paced middle school physical science program from a published text program. One student was doing an alcohol burner lab while another student was working with a beaker ring stand experiment with flammable liquid. The teacher was in the back of the room. The beaker student stood up and upset the ring stand. The liquid caught fire. Both students, on fire, ran into the hall. One of the students received severe burns before the principal got a chance to catch up with her and roll her with a fire blanket. The other was in a burn ward for one year.

The school, publishing company, and the teacher were sued to the hilt! (720)

522. In 1981, an advanced science student was working in the microbiology lab after school on a science project. The project involved transferring bacteria from established cultures to sterile media using an alcohol burner to heat the inoculating loop. The teacher was in the room preparing for the next day's lab. The student inadvertently knocked over the alcohol burner on the table and alcohol spilled from the burner onto the tabletop where it ignited. The flames were difficult to see.

The student extinguished the burner. He smothered the tabletop fire with a fire blanket. Alcohol burners are no longer used. (776)

Other cases include: 555, 657, 660, 661

B. Bunsen burner

523. A female student set the right side of her hair on fire by leaning into the Bunsen burner flame. I reached for a towel from a student’s counter. Before I could get to her, her lab partner put it out with her hands. (516)

524. A student could not get his Bunsen burner lit. The jet remained open for some period of time as he tried to light the burner. Finally, after repeated attempts with the flint/striker, the entire area burst into flames.

The teacher immediately shut off the gas at the main valve and the flames subsided. There were no injuries or damages. (576)

525. A college student was drying a burette with acetone at the lab bench across from mine. Impatient with the process, he warmed the burette with a Bunsen burner and soon had a flame jet shot from the mouth of the burette. He shook the burette into the sink and the flames from the acetone shot up to 23 feet. The student snapping his fingers couldn't remember the word he was looking for "Fire". Cooler heads prevailed, an extinguisher was applied and the crisis was soon over. (579)

526. During distillation of a flammable liquid vapors were ignited due to the improper containment of vapors, i.e., collecting vapors by condensation in a test tube that is in a cold water bath. In the case sited, the tubing carrying the vapors to the water bath was knocked out and the Bunsen burner ignited the vapors. (607)

527. In a middle school, two girls were working with Bunsen burners. One turned on the burner without telling her partner. The partner bent over to check the adjustment while the first girl lit the burner. Since the burner was on for about 15 seconds, the second girls face and head was in the "fireball" as the burner and excess gas went up in flames. Her hair and eyebrows were singed almost completely off. (671)

528. During a high school chemistry lab, when I was a student, someone turned on a gas valve then left to get a match. Another student struck a match to light a Bunsen burner nearby. A flash of flames singed the hair off the face and arms of the student. This was an example of gross negligence. The student should have had more common sense than to walk away leaving a gas valve turned on. (678)

529. After demonstrating the proper technique to be used in lighting a Bunsen burner, students were instructed to put on goggles and aprons and go to the lab to practice. As I was moving from one lab group to the other, a student in the back of the room forgot to check the gas adjustment valve on the burner. He lit a match, turned on the gas and the top of the lab table caught fire.

There was not a gas adjustment valve in the burner. A fellow student had removed it as a joke. The gas poured out the bottom. Fortunately, only a few hairs were singed. A student at another station reached over to turn off the main valve as I was too far away to be of help and the student was frozen into a motionless state. (728)

530. While using a Bunsen burner, a student pulled the hose off the burner. The fuel ignited as it came from the nozzle, making a torch. The student became so scared he

froze. Fortunately another student saw what was going on and turned off the gas supply. The students were not seriously burned. (729)

531. During a lab, a girl in my accelerated group reached up to tighten a clamp on the bar above the worktable. She reached over the Bunsen burner her wool sweater caught on fire. Her lab partner immediately hit her and put the flame out. There was no injury to either girl. (732)

532. I was taking a chemistry class in high school. One day during a lab, a young man nearly died from severe burns to this head. It all happened so quickly that it still seems like a blur. A girl caught her hair on fire and when the victim saw this, he tried to save her hair. He got his arm tangled in the Bunsen burner. Another girl increased the flame in panic and his face was severely blasted. By the time calmer head got control the boy was in serious shock. (757)

533. In Hudson, New Hampshire (1984), two teachers were attempting to unblock the pipes that lead away from the fume hood. Birds' nests had blocked the hood's outside holes. The teachers thought they had cleared the passages. When they used a Bunsen burner in the fume hood it exploded. Both teachers were severely burned. (802)

534. In New York State, 1982, eleventh graders (Regents Chemistry) were heating a hydrated salt to remove water and find the percentage of water. One student, contrary to instructions, heated too strongly. When it began to boil, he reached under the crucible to remove the Bunsen burner. The salt boiled over causing a burn that took weeks to heal. (842)

535. A student was working at a lab bench in the 60's. He attached a list of notes to the reagent shelf at eye level. He put his Bunsen burner on the bench, lit it, and subsequently ignited the list. Chemicals were everywhere. Fortunately, no one was hurt. (883)

536. In 1986, a student's nail polish caught fire by a Bunsen burner. It caused pain, fear and cosmetic injury. (919)

537. On the first day of a freshman chemistry laboratory, the students were learning about basic laboratory equipment and techniques. One part of the experiment dealt with using the Bunsen burner. The students were adjusting the gas flow into the burner by using the gas valve at the bottom of the burner. One student unwittingly totally unscrewed the valve so that it fell off. When she turned on the gas, it came out both from the top and the bottom of the burner. Therefore, when she lit the burner after a few seconds, fire came out the bottom. The rubber tubing used to connect the burner to the bench cock was old and had chemicals on it, so it too caught fire. I immediately put out the fire with an extinguisher since the student froze. Possible dangers: overcrowded lab, stools crowded the aisles making impossible a quick escape. (951)

538. A student was heating a test tube set up in a ring stand with a Bunsen burner. She accidentally pulled off the gas tubing. A flame shot out from the table. The student was not hurt but she "froze" and couldn't react. A fellow student reached over from the other side of the table and shut the gas before I got there. Luckily, no one was injured. (959)

539. In a high school chemistry lab in 1970, a boy reached over his lit Bunsen burner to get a chemical off the shelf. He set his shirt on fire. We now are sure we do not place chemicals on the shelves above the lab benches. (970)

Other cases include: 560, 582, 600, 619, 682, 705, 753, 782, 833, 850, and 851

C. Gas Burners

540. At a high school in 1986, LPG fueled the gas burners in the lab. The tank was outside and piped in through the basement to the two science classes. Someone entered one of the classrooms and turned on several gas jets at night. In the morning, the custodian noticed the odor before he put the lights on. The class was closed for two days to allow for ventilation. After that, the central gas shut off was kept off, unless it was requested to be on by one of the teachers. (826)

D. Propane Burners

541. A teacher burned his hand while using a propane burner during a class. Someone installed the valve incorrectly. (518)

<u>Chemicals</u>

Acetone

542. Many years ago I had a practice teacher who had recently discovered that the glassware could be cleaned and dried by using the sequence of soap and water, distilled water, alcohol and finally acetone. Thinking that the glassware was finally dry, the teacher had the students set up the experiment to prepare oxygen gas by allowing water to drop from a dropping funnel onto sodium peroxide. Probably eight or ten such setups in the lab were set off because the energy released by the exothermic reaction was enhanced by the residual acetone vapors that were still in the flasks.

Fortunately no injuries occurred but things were really popping for a while. (650)

543. An experiment involved dealing with acetone on paper chromatography. A girl in the lab became fond of the odor given off by the acetone after she had been told not to inhale it. She became nauseous at home and was taken to the hospital. She stayed over night. (697)

544. A student tried to dry an Erlenmeyer flask over a burner after rinsing it out with acetone. It burst into flames, he dropped it in the sink and the sink ignited. I used a dry chemical extinguisher and had to evacuate the lab because of fumes. He was not hurt. (740)

Other cases include: 525, 589

Acid

545. A student stole a bottle of concentrated acid and placed it in another student's locker. When the student opened his locker the bottle crashed to the floor and broke. (552)

546. An employee spilled a large container of acid. The acid was diluted and caused damage to his clothing. Immediately, he flushed himself with water and no injuries were reported. (586)

547. While I was a student in high school, I volunteered to help clean the chemistry lab. During the clean up, I pulled an evaporating dish off the top shelf that was over my head. Some "water" spilled on the front of my shirt and hands. I washed and dried my hands and used paper towel on my shirt.

That afternoon, as I was dressing for baseball practice, I noticed a hole in my shirt. By the time I got home I had only a row down the front where the fabric was double and a red stomach. The "water" was acid of some type. I was fortunate. I could have lost my sight. (730)

548. The department head at my school has several student lab aides who set up labs and do other chores. Last year, a senior girl was a lab aide. One day she was making up an acid solution and she carried about 200 ml of concentrated acid in a 500 ml beaker. Before she got to her destination the bottom of the beaker just plain fell out. She had not noticed any defects in the beaker. Anyway, the acid poured down the front of her. I was teaching a class at the time but the department head was sitting right there and she immediately began to pour water all over the student. The shower was on the other side of the room. Once the acid was fairly diluted she went to the locker room to continue rinsing herself. There were no burns or irritations but her new slacks were ruined. (822)

549. April 23, 1987, in Winsted, Connecticut, a high school junior was doing an acid/base titration. She picked up some spilled chemical, either 0.5M hydrochloric acid or 0.6M sodium hydroxide. She wiped her eye and it started to burn. The teacher flushed her eye for ten to fifteen minutes with water, then she send her to a local hospital for observation at the emergency room. Luckily there were no burns, only irritation. Her lab glasses were hanging around her neck. (833)

550. In 1963, we were working with acid during a high school chemistry lab. Some acid spilled. Small droplets hit my shirt. They made holes in it. I did not realize it until the next day. (858)

551. In college, I dropped a tray of concentrated acids and bases. I was overcome with fumes until a professor took me to the sink. (899)

552. A ninth grade student was told not to touch the acid bottles on the demonstration desk. She did and then she touched her mouth. She was afraid and did not mention any word to the teacher. Her lips started burning. She put Chap Stick on her lips and sealed it in the acid. She had to go to the doctor the next day to treat her lips. (948)

553. During a middle school IPS lab, a student spilled concentrated acid on a pair of designer jeans. The jeans sported new holes and large discoloration spots. No attempt by the classroom teacher was enough to protect the students. The parents complained. This prompted some safety modifications. (832)

Other cases include: 633, 674, 828, 871, 885, 907, 909, 932, 937

Agar

554. A student was making two liters of nutrient agar in a prep room as part of an independent study project. He was using a two-liter beaker and heating it directly on a gas range. When the agar dissolved he picked up the beaker with tongs. The bottom broke out spilling very hot agar all over his shoes and pants. He was very uncomfortable for a while but his accident did not require medical treatment. (580)

Alcohol

555. A student opened up an alcohol burner while it was burning. The alcohol spilled on the student's hands. Luckily, it was put out without damage. The student had not followed the instructions. (517)

556. A seventh grade general science teacher was pouring alcohol from one container to another and it ignited. Nearby was a burning alcohol lamp. Soon the teacher had a burning lab tabletop. Fortunately, there were no injuries. (564)

557. Four students received third degree burns over 70% of their bodies. A Vermont private school hired a non-certified, yet qualified science instructor. This instructor was demonstrating phase changes of liquids to a gas using a nontraditional technique heating alcohol in an open container with an open flame. Once the initial 100 ml had evaporated, several students wished to observe the demonstration once again. The instructor consented and poured approximately 100 ml of alcohol into another beaker leaving the supply canister uncapped. She poured it directly into a hot beaker with open

flame underneath. Needless to say it flashed. All the students were huddled around and one knocked over the supply container onto the floor where it exploded. The rest was a disaster. A six million dollar lawsuit followed. (567)

558. In a ninth grade IPS class, a lab group was heating a flask with an alcohol/water mixture for fractional distillation purposes. The flask was not held by a clamp, as it should have been. In checking the apparatus I did not notice it wasn't clamped.

While heating with a Bunsen burner the flask got knocked to the lab bench top, caught fire and caused the wooden test tube rack to catch fire. Flames headed for the wall.

The teacher put out the fire using a fire blanket. No personal damage. Students jumped back and froze. (617A)

559. A biology teacher was heating alcohol on a hot plate with open coils. The fuel source was still open on the counter. The alcohol in the beaker caught in fire. Other containers spilled in the upset and spread the fire to her pocketbook and clothing. Fortunately only minor burns resulted.

The accident resulted from a lack of planning and ignorance of very basic safety issues. (638)

560. A teacher was having students in an ecology course prepare specimens of plants and animals indigenous to that area as part of her natural history unit. One of the activities suggested was the preparation and mounting of skeletons. In the preparation of bones the students were to boil the bones in alcohol to free them of grease. The set up in the room consisted of six boiling stations, each equipped with a 1000 ml beaker, and about 500 ml of alcohol. This was to be heated by Bunsen burner. Few minutes before the end of the class, the students turned off their burners and dried their bones. Students in five of the stations discharged the alcohol, the sixth just turned off the burner.

The next class entered and the teacher was in the storage room next door. Some of the inquisitive kids explored the new "toys" on the back counter. By this time the alcohol in the sixth burner ignited. One of the students acrylic sweater caught on fire and the student was severely burned.

Moral: Watch whom you share a room with. They may not be as safety conscious as you. (723)

561. In an organic lab a lab partner was pouring alcohol into a reflux condenser. When he spilled some of the alcohol down the hot plate, it burst on fire. A fire extinguisher nearby saved the day. (725)

562. During my first year of teaching, I was having my advanced anatomy class extract chlorophyll from plant leaves. This requires boiling the leaves in alcohol. I had several beakers of water in a large pan on an electric stove. One of the students accidentally spilled some of the alcohol on the burner while putting his test tube into the water bath. The alcohol ignited and ignited all of the other test tubes. I threw a wet towel over the pot. (734)

563. In January 1986, at Booth Jr. High School in Fayette County, Georgia in an eighth grade junior high earth science class; the teacher was demonstrating a volcanic eruption. During the first period, the ammonium dichromate volcano worked properly and all went as planned. During the second period demonstration when the teacher added alcohol as an ignition, the volcano blew up. Several students were seriously burned. (795)

Other cases include: 577, 591, 660, 715, 823, 842, 857

Ammonia

564. A student entered the class and picked up a stoppered bottle of highly concentrated ammonia. He unstoppered the bottle, and took a deep "whiff" of its contents. She did not "quaff" the vapors. The results were immediate and uncontrollable flow of mucous from the nose and tears from the eyes. (535)

565. A careless student spilled concentrated ammonia. The fumes caused coughing, gasping, etc. I saved the day, by using a lot of water to dilute the ammonia and helped in mopping the floor. (625)

566. After some discussion on the proper way to smell an unknown chemical substance, a student was asked to demonstrate. A vial of ammonia (smelling salts) was broken and handed to the student. He was instructed to show the class proper technique. He took the vial and put it to his nose. He took a deep breath and fell down. (682)

567. In a freshman chemistry lab, a student pipetted 15-Molar ammonia by mouth. He got 56 ml of the solution in his mouth. The roof of his mouth "fell out", and the student fainted. He was taken to the hospital by an ambulance within 10 minutes. He was hospitalized for two days. (752)

568. A student deeply inhaled ammonium hydroxide wondering if it was similar to household ammonia. His breathing was temporarily "arrested". He did this in spite of repeated warning to not sniff or smell any chemicals. (773)

569. A friend of mine had a problem with their septic tank backing up into the bathroom and eventually into the finished playroom in the basement. Once the septic tank problem was taken care of, she set about cleaning the playroom. She used ammonia and bleach to clean the area. The fumes generated burned her throat, eyes and she had to be taken to the hospital. (989)

Other cases include: 587, 939

Ammonium Hydroxide

570. A substitute teacher with no science preparation had the class build kites. The kites were stored in the storeroom. The substitute permitted students to retrieve the kites without supervision. A student stepped on the bottom shelf to reach the kites. The shelf support dislodged and the shelf dropped and bottles of ammonium hydroxide, glacial acetic acid and isopropyl alcohol fell to the floor. Dense fumes formed. The fire department was called. Hose lines were run to the room on the second floor and smoke evacuation fans were used. (526)

Other cases include: 568, 902

Barium Chloride

571. A tall ninth grade boy threw barium chloride over his shoulder joking that salt over your shoulder is good luck. A girl standing behind him had her mouth open and the barium chloride landed in her mouth. (Couldn't do that again if he tried!) She spit it out, washed her mouth with water. We called the Poison Control Center who reassured us. (771)

Benzene

572. A chromatography experiment required the use of benzene. The benzene residue was disposed of in the lab sink. A ninth grade IPS class did a flammability test on an unknown at the sink as instructed. The student dropped the paper into the sink as instructed. Fortunately, the student jumped back in time and everyone left the room until the "fallout" was over. (661)

573. An experiment required using benzene, seeds, electrodes and a spark coil to illustrate "dipole moments". It resulted in ignition of the solvent. Major problems arose when a fire extinguisher was used to put out the flaming beaker.

The errors were in the instructions given to the students, selection of the solvent and instruction on the use of fire extinguisher.

A better experiment was the "safety shoot." (708)

Bromine

574. A student was working on a laboratory preparation of liquid bromine. He had collected the bromine in a test tube. The student spilled and burned his right hand fingers, during the transfer of the unsecured test tube.

Gloves were not used, and the safety instructions were not given and the directions of the experiment did not detail a procedure for the collection of the liquid bromine. (508)

575. A chemistry teacher was helping a student with a science fair project before school began. The project involved separating chemicals using bromine. The teacher wisely decided to do that part for the student. The bromine water failed to go into the opening of the separatory funnel and ran down on his hand.

Severe burns and tissue destruction resulted instantly. He held his hand in running water and removed his ring. The burns were the worst under the ring, which was also discolored.

One of the first aid charts suggested the use of glycerin as a soothing ointment. It took over a month for the wounds to heal but they only left faint scar tissue. There was no permanent impairment but it did look terrible while the healing was taking place. Severe pain was experienced for the first several weeks. (519)

576. In the second half of a general chemistry class, a student came in late and unprepared. The experiment involved the use of bromine. Rather than speak to the professor and prepare properly, he copied the set up of another student. He began to boil the bromine and the fumes began to spread throughout the lab. The student left his workbench to obtain other reagents. The professor became aware of what was going on and dismissed the student from the lab. (680)

577. In 1974, a second year high school senior chemistry student was working on a science project in a laboratory adjacent to my classroom, under the direction of his chemistry teacher. This project involved the production of liquid bromine. The student brushed the collection container off the desk and then tried to catch it. The container broke and it covered the student's arms with liquid bromine. He was severely burned in spite of a speedy trip to the safety shower followed by flushing with alcohol. He was permanently scarred. (781)

578. The instructor had the stopcock open while filling a large burette with bromine in an organic class during the pre-lab explanation. Bromine bottle hit the desk and broke. It covered his hands and bromine Fumes filled the air. The instructor had bromine burns. The class was canceled while first aid was given. (1000)

Butane

579. This accident happened in October 1986, at Henry Abbott Tech. In a study hall being housed in a chemistry lab, a student filled an empty pen with butane and lit the gas in the pen. The pen cover also ignited and the student panicked throwing the pen into the radiator that was on. The radiator contained a mountain of warmed gum wrappers. They instantly ignited. There were flames three foot high.

Two students tried to put the fire out although the teacher had insisted all students leave the room. One student was sent to pull the fire alarm and found that it did not work. A second alarm was tried and the alarm was sounded. The gas in the lab was shut off, the room and the school was evacuated.

Since this happened at the end of the day, the school buses blocked the entrance for the emergency equipment. The fire went out, no one was hurt, but it took 55 minutes to get emergency personnel on the scene.

The incident resulted in a new set of policies for:

1) Butane and all lighters
2) Students attempting to use fire extinguishers
3) School bus parking at the end of the day
4) Cleaning radiators
5) Safety equipment in labs
6) Repair of fire extinguishers. (804)

Butanol

580. Several years ago, I worked in a medical laboratory and had to perform a routine blood test for iodine. The procedure involved extracting the iodine with butanol, evaporating the butanol and then converting it to inorganic iodine with chloric acid. I guess I had not evaporated all the butanol and on being heated with chloric acid it exploded. Luckily, no injuries were resulted. (837)

Carbon dioxide

581. I wanted to discharge a carbon dioxide cartridge in class, allowing it to get cold to demonstrate loss of heat in decompression. I had arranged a means to hold the cartridge with pliers. I had a student hold the pliers tightly while I broke the seal. The student was startled when the seal broke giving off a loud hiss. He let go of the pliers. The cartridge took off like a bullet, bouncing off the back wall of the room. (698)

Other cases include: 767

Carbon disulfide

582. A student lab team of three girls in the eleventh grade had been performing an experiment with carbon disulfide and sulfur crystals. Upon completing that part of the lab, the waste carbon disulfide was poured into the lab sink. The next part of the experiment required heating sulfur. Upon lighting the Bunsen burner, the match was thrown into the ink. Flames promptly arose from the sink. Turning on the faucet put out the fire. The students were not injured.

The accident would not have occurred had carbon disulfide been disposed of properly, as well as, the match or even if the sink had been flushed with water. (783)

583. In Connecticut about 1:00 P.M. in an eighth grade classroom in 1978, a teacher spilled carbon disulfide which had phosphorus in it. The teacher was demonstrating spontaneous combustion. He evacuated the classroom and dried the solution with a cloth. Since then, the demonstration has been discontinued. (880)

584. Before we started the experiment the instructor explained all the warnings and preparatory phase. The experiment involved separation of the components of a mixture containing carbon, sulfur and sodium chloride. The class was told not to bring the solvent containing carbon disulfide near open flame. One student did and her synthetic fiber sweater caught on fire. Much embarrassment and second-degree burns. (990)

Other cases include: 686, 698

Charcoal

585. A neighbor was critically burned while lighting a charcoal fire for the barbecue with lighter fluid. The flame followed up the can and it exploded. He died a week later due to his burns. (601)

586. A young male was starting a backyard barbecue using charcoal. He poured charcoal lighter starter onto hot coals. As he released pressure on the can he created negative pressure in the can. The fire ignited and was sucked back into the can. The can exploded. The boy received severe upper body burns. He had several months of hospitalization and plastic surgery. (701)

Chlorine

587. In my early days of teaching, I was doing a lab with high school senior boys using chlorine collected by displacement of air in a wide mouth bottle. One part of the student procedure was to blow across the bottle mouth to check for moisture affinity as in hydrochloric acid.

One of the students put the bottle up to his face and then inhaled preparatory to blowing, getting a respectable dose of the gas. He reacted immediately by starting to cough. I made him inhale a whiff of ammonia and sent him to the school infirmary. I stood by for a couple of hours while he tried to cough his lungs out and I sweated blood.

No permanent damage. Last time I heard about him he had become a doctor. (654)

588. The instructor was not aware of the recent ductwork and removal of upper hood duct. He was generating chlorine in a hood. Fumes diverted into the stockroom. The administration refused to evacuate but did call the fire department on the persistent advice of the faculty. (710)

Chlorophyll

589. In 1978, students were performing an experiment, from the BSCS (green version) lab manual on chromatography. The experiment called for the removal of chlorophyll

from fresh spinach by placing spinach, sand and acetone in an electric blender and mixing for three minutes. As soon as the blender was turned on the acetone ignited. I would imagine the friction between the sand and the blender caused the blender to ignite. No one was injured. I had performed this procedure about a dozen times before this accident. (766)

590. In Alvine High School, May 1987, a biology teacher had her students prepare an extract of chlorophyll for chromatography. The extract was prepared by heating spinach leaves in ethyl alcohol. The procedure was carried out in the fume hood and a hot plate was used as heat source. The teacher had instructed her students that there shouldn't be any open flames or sparks in the lab. She had unplugged the mimeograph machine that is adjacent to the fume hood. Every precaution had been taken to insure a safe lab situation. Near the end of the period one of her students took a pair of forceps and placed one end into an electrical outlet. A spark was created. Fortunately no fire or explosion resulted.

The student has been forbidden to participate in labs until he demonstrates that he can exercise proper lab procedure. (855)

591. I was boiling alcohol in a flask on an electric hot plate to extract chlorophyll from geranium leaves. I put a piece of cotton in the mouth of the flask to prevent any splashing. The alcohol fumes wetted the cotton and a single drop of alcohol dripped onto the hot plate from the damp cotton. The drop ignited on the plate, lit the cotton which ignited the alcohol and a fire ball shot up to the ceiling. That was in my first year of teaching. (868)

592. In October 1986, while extracting chlorophyll from a geranium leaf, I noticed the methyl alcohol boiling out too quickly. I needed to add extra solvent. I poured more alcohol from a container with a six-inch spout. Some leaked onto the hot plate and an explosion occurred. (898)

593. In 1971, West High School, during chlorophyll extraction lab, it was suggested to use a blender for the solvent extraction. A small amount of solvent had been spilled on the tabletop. When the blender was turned on the solvent on the table caught on fire. Apparently, a spark from the switch ignited the solution. (936)

594. In my first or second year of teaching biology, I was doing a unit on photosynthesis. Students were assisting with the demonstrations. We were removing the chlorophyll from a variegated leaf by boiling it in methanol. To reduce danger from flammability, I was using a water bath on a hot plate. My assistant was removing the beaker of alcohol from the beaker of water when he dropped it on the hot plate. The spill ignited and spread flames all over he table and floor.

Some papers, which should not have been near, caught fire. A "helpful" student ran in the back and brought out a propane tank he thought was a fire extinguisher. Fortunately, I saw it and snatched it away. I put the fire out with an extinguisher. If the papers had not been there, the flames would have probably burned out by themselves. (974)

595. During a Biology demonstration on chromatography in 1978, I was showing my students how to extract chlorophyll from spinach leaves. Using a water bath and Bunsen burner I was heating a combination of acetone and alcohol. The solution over flowed and the fire spread on the demonstration table. Fortunately I smothered the fire and no damage was done other than extreme embarrassment on my part. (976)

Other cases include: 562

Deionizing water

596. I had a water deionization cartridge explode on me. The granules expanded so rapidly that the plastic container ruptured. The contents were harmless but I fell off the lab table from the surprise. (925)

Dichloro benzene

597. We were going to determine the melting point and freezing point of paradichlorobenzene. Two students heated the tubes directly not following verbal instructions. One heated with rubber stopper on. The contents landed on his lab partners hands and the other open tube caught on fire. There were flames to the ceiling. (640)

Ethanol

598. A high school chemistry teacher was doing a flame test showing the color of ethyl alcohol. She had left the stock bottle of alcohol on the demonstration table near the area she was conducting the flame test. The bottle exploded producing a directional explosion outward towards the watching students. Three students were seriously burned. (558)

599. We were determining the density of water and ethyl alcohol. Both liquids were on our supply table and were in Erlenmeyer flasks. A student picked up the flask with ethyl alcohol and it slipped out of his hand. On its way down to the floor, alcohol splashed on his partner’s sweatshirt creating a tie dyed effect. It also splashed on my shoes dissolving some of the dye on the leather. The fumes were very pungent and glass was all over the table and floor. Students complained of the annoying odor. Even after opening the windows it took at least ten minutes to ventilate the room. The student was obviously aware of how dropping a container with a common liquid can be dangerous. (712)

600. I was working in a sterile biological hood where ethanol is commonly used as a disinfectant. I was using an open flame from a Bunsen burner to sterilize the opening of

a bottle. I knocked over the container of ethanol and it caught on fire. The fire spread over the working surface. Fortunately, the hood contained the fire and it was self-extinguishing. (805)

601. This is an old case at Clarkson College in Potsdam, New York, around 1953. While boiling an ethanol solution over a steam bath generated by a burner flame, the solution vapors fell into the flames and ignited the mixture. In attempting to smother the flame, the solution was knocked over. Some spilled on hands and caused severe burns. (873)

Other cases include: 590,594, 675

Ether

602. In a college chemistry research lab, a student was refluxing a reaction with ether. He was using improperly fitted ground glass joints. Ether vapors escaped and crawled along approximately fifteen feet. Another student, unaware of the reaction that was being carried out, lit a burner. The vapors caught on fire, spread across the lab bench and the reaction vessel caught fire.

The fire extinguisher used on the flames destroyed much of the expensive glassware. Fortunately, there were no more serious problems. The loss of reactants was disturbing to the student who had spent a long time preparing them. (666)

603. In 1965, a student across the bench from mine, in the organic chemistry lab, was preparing to transfer some ether into another container. I could see the fumes of the ether "creeping" out and down toward the lab bench. About ten feet away there was an open flame. The flame ignited the ether. The beaker broke in his hand and ignited the ether all over his arm. He received second and third degree burns. (913)

604. In 1985, a student of mine was doing a makeup lab during another lab section, which was doing a different experiment. He was a senior chemistry major and was evaporating ether. He used a hot plate contrary to directions, and all prior instructions. Fortunately, he was working in the hood, because the ether caught fire. I tried to put out the fire by inverting a beaker over the Erlenmeyer flask, but the force of the burning ether blew the beaker off and it broke. I evacuated the lab and let the fire burn out. Subsequently, I have never allowed a makeup lab unless the student is doing the identical experiment as the rest of the class. The instructors' attention should not be divided by two experiments being run at the same time. (985)

Formaldehyde

605. During a science project report, students were passing around a specimen preserved in formaldehyde or some other preservative. It was a chicken heart or similar biological item inside a sealed baby food jar. One boy dropped the jar about 6 to 8

inches onto his desktop. The jar did not break, the cover did not come off and yet some preservative somehow sprayed out into his face and eyes. At the time, we had no eyewashes of any kind so I put his head into a sink and washed out his face and eyes and called the nurse. She took him to the hospital. There was no injury to the student. (604)

606. A five-liter bottle of formaldehyde was dropped in a biology room with no ventilation. A shop vacuum was used to recover liquid and it was covered over with sawdust. (711)

607. The class was working on dissecting a pig embryo. The students were working in groups of three to four. In attempting to cut through the chest cavity of the specimen some of the formaldehyde that was used to preserve the embryo, was spilled on the student opposite to the dissector. The student panicked and overacted. She became frantic and in her effort to get to the water supply, she over turned several pieces of furniture. (755)

608. A student splashed formaldehyde in her eye while she was performing a dissection procedure. She was not wearing safety glasses. There was no eyewash facility in any of the biology labs. The student had to be sent to the nurse at the other end of the building. (849)

609. In Connecticut, workers were fixing a roof over a tank of formaldehyde. The tank was used in the making of permanent press clothes. The tank was pressurized and supposed to be "shutoff" with the safety relief valve re routed. The safety valve released and the workers were sprayed with hot formaldehyde. Two workers went to the hospital with burns, and one passed out from the fumes and two became ill. There were five men involved and five men were hurt in some way. (905)

610. A student splashed Formaldehyde in his eye during a dissection procedure. He was not wearing safety glasses and he was performing improper dissection technique. This occurred in the animal biology lab where there were no eyewash facilities in any of the biology labs. Student had to be sent to the nurse at the other end of the building. (945)

Gas

611. A new teacher wanted to do some "chemical magic." He dipped the end of a gas tube into liquid detergent and then turned on the gas to make gas bubbles. Later he ignited the tube with a match, causing small explosions. Many bubbles burst before they could be "exploded" and the room filled with a gas odor. No one was injured. (587)

612. A valve with long handle under the hood bench top controlled the gas in the hood. If a student unscrewed the valve too much, the entire storage area under the hood top

became filled with methane gas. This happened once and the methane gas exploded. (648)

613. A student turned on the wrong gas jet to light a burner. The ignited gas sent a jet into the lab. The student's hair was singed. Others quickly turned off the jet. (689)

614. Gas grills with "automatic" ignition are electrically igniting the propane. If it doesn't ignite and the gas continues to flow in, finally you may get a spark "Boom"! Use great caution. (696)

615. On a camping trip, I was filling a lantern with white Kerosene gas. It was dark, so I lit a candle and stuck it to the other end of the wooden picnic table where I was working. As I unscrewed the cap on the lantern I heard the escaping pressure. Fumes escaped and traveled along the tabletop. The fumes ignited and followed their way back to the lantern that also ignited. I picked up the lantern to bury it with dirt. Some fuel spilled on the can of fuel. Fortunately, the can was closed. No one was hurt. (735)

616. Two former students broke into our high school. They had constructed a bomb with a battery timer and gasoline. They had also turned on all of the gas jets. The main shut off had been turned off by a safety minded teacher. The bomb worked. Nearby residents reported the incident. The school did not have an alarm system connected to the fire department. Four hours later the state police responded. The lab was completely destroyed. (736)

617. I was working in a gas station. One of my responsibilities was to clean engine parts prior to re installation. I took a large plastic tub and I pumped three gallons of gas into it. While carrying it back to my work area, my foot slipped on some grease and the gas poured down from my stomach to my feet. Within a minute, my skin began to sting. (754)

618. While teaching eighth grade IPS in a very expensive private school near Boston, I had the occasion of being frightened and ready to resign from my teaching profession. One day, I was late to the class due to a phone call that I received from a parent. When I got to the class, I found a ninth grader pretending to teach a class in a goof ball manner. I send him to his appropriate room and I started the lecture. I noticed the smell of gas. Evidently, the ninth grader had turned on the main gas valve and proceeded to turn on two gas jets at the lab stations.

The principal felt this could be handled in house. I refused to enter the lab unless a lock and a key were provided for the main gas shut off valve. I requested only two copies of keys, one for me and one for the head custodian. I warned the authorities and continued by telling them that if my demands were not met there would be no more labs and I would resign at the end of the school year. He met my demands. (835)

619. This happened in a New York Public School on Long Island. In a chemistry class, the students were going to work with Bunsen burners which had all been checked and were properly working. However, there was a homeroom in the classroom with a non-science teacher. Apparently someone fiddled with the screw on the bottom of a few of

the burners. When the students tried to light their burners, a few of them complained they would not light. As the teacher began to help the first group of students he quickly noticed the smell of gas and recognized the problem. He ran to another group who was trying to light their burner with a spark lighter. He pushed them away just in time before a fireball exploded from the burner. All the hair on his hand was completely singed off. Luckily there were no other injuries. There was a great potential for at least two or three students to have been badly burned.

Since this happened the administration has made attempts to comply with our request that science classrooms not be used for other classes or for homerooms of teachers other than science. (872)

620. In 1973, a Volkswagen caught on fire due to improper engineering. The gas line connected directly over the engine exhaust manifold. I went back in the house to get my wallet while the engine was idling. A fire started and all I could do was watch. (933)

621. I allowed too much gas to escape before lighting the oven. The gas ignited and burned my face and hair. This occurred in my kitchen. (965)

Other cases include: 529, 530, 538, 554, 579, 643, 654, 706

Gasoline

622. As a teenager I remember my brother was working in my father's workshop on a gasoline engine using gasoline. The gas spilled and ignited. I ran downstairs to see what happened. I ran upstairs to get baking soda. My father poured water on the fire and fortunately the fire did go out. My brother then informed us we were lucky since gasoline fires can spread by trying to extinguish them with water. (848)

623. Someone poured gasoline from a five gallon can over a brush pile that had been built on at the same site as the previous day. The gasoline caught on fire. The gasoline splashed on the person’s body and he was in flames. He rolled to put out the flames. He received minor burns on one hand. Gasoline can, boiling gas, stayed until cool. (995)

Gun powder

624. In Westerly High School, Rhode Island in 1953, a chemistry lab involved separation of the components of gunpowder. Some students tried to put the components back together. The result was an explosion. No one was injured. (889)

Hydrochloric acid

625. While cleaning test tubes in the chemistry lab, a student assistant scratched his ear while he was holding a tube containing concentrated hydrochloric acid. He poured the acid down the side of his face and neck. (521)

626. A student was stirring a mixture of copper oxide and copper together with hydrochloric acid in a test tube. He broke the test tube because he didn't follow instructions. Instead of stirring lightly and not going near the bottom of the test tube, he was very rough in his actions, tapping the bottom of the tube. (597)

627. During the completion of a lab, a substitute in a middle school asked a class to stopper and shake the test tube containing hydrochloric acid. The student incorrectly shook the tube causing the stopper to fly out spraying hydrochloric acid in his lab partner's face. (673)

628. A female student took hydrochloric acid from the storage table and dropped it. The room filled with a cloud and the girl spilled some on herself. She fled and went right to the girls' room to take off her clothing. She washed off her skin. I made sure the exhaust fan was on.

I evacuated the room and tried to get help. I send few students to get the nurse, the housemaster and the janitor. No one could be found.

We stayed out of the room until a janitor finally came. He knew enough to use plain water to clean the floor. (691)

629. While I was a lab assistant in college, I was making a large container of dilute hydrochloric acid. I added a lot of water to the concentrated hydrochloric acid. The fumes were overwhelming and I evacuated the lab. I felt very stupid. (713)

630. After giving verbal directions to my junior chemistry class, the student left their desks and walked to their lab stations. The first thing they were instructed to do was to put on an apron and a pair of goggles. One girl was reaching down to get her apron and goggles. Her partner was curious about the reagent bottle of dilute hydrochloric acid and picked it up to read the label. It slipped from her hand and hit the lab table. The ground glass stopper popped out and the girl who was reaching down for her goggles got splashed in the face and eyes by acidic solution.

The goggles and aprons should be located outside the hazard area where dangers exist and students should wear them before entering the area. (721)

631. In an organic lab hydrochloric acid was being generated as a byproduct. The acid was allowed to bubble into the water. The reaction appeared to stop when the solution almost immediately solidified. The reaction vessel was opened and the acid was rushing out. The experimenter was standing close by and he received a good whiff of the gas almost causing respiratory arrest. (731)

632. In 1974, I was a senior chemistry student. One day late in afternoon, I was working alone in the laboratory. I was placing a half-filled bottle of hydrochloric acid

back on the shelf to clean up. I was in a hurry. The bottle broke when I hit it against the shelf. It did not splash on me but the choking odor filled the room. I turned on all the fume hoods and doused it with sodium bicarbonate then diluted it with water. I then cleaned it up with paper towels. (786)

633. In March 1987, an honors chemistry laboratory was performing an acid/base titration. I prepared a 1.00 molar hydrochloric acid solution (approximately 500 mls). The students were using the acid solution to standardize their base, sodium hydroxide. A student came to the desk and poured out the required 20 mls of the solution from the 1000 ml Erlenmeyer flask. Upon setting down the flask, the bottom of the flask broke. The hydrochloric acid solution went on the bench and ultimately on the floor. There were four students in the area. Fortunately, all students had their gloves, aprons and goggles on. We cleaned up the solution with paper towels. (814)

634. In 1896, in Newton, Massachusetts, a school custodial worker was carrying a leaking gallon container of concentrated hydrochloric acid. He dropped the container. He bent down as it fell and it splashed up into his face. Since he was required to carry cases of hydrochloric acid down stairs, he was wearing gloves and eye protection. He should have been wearing grip proof gloves. (817)

635. In 1987, an honors chemistry class was using burettes filled with hydrochloric acid. I was taking a reading at one station and put my ungloved hand behind the burette. It broke in two spilling the contents on my hand and the table. Fortunately, it did not splatter. I was able to hold onto the broken half so it didn't shatter over the table. (820)

636. In New York City in 1987, a student was inverting a gas measuring tube, The tube contained six molar hydrochloric acid and distilled water. Somehow, the hydrochloric acid came in contact with Magnesium, which was at the bottom of the tube, and hydrogen gas was generated. The tube sprayed hydrochloric acid and water in the student's face. Fortunately, she had her goggles on. (894)

637. A high school chemistry student was wearing goggles and a lab apron. She managed to pour a small amount of concentrated hydrochloric acid from eye level over the top of her lab apron down her front. A small amount was involved. Although a shower was available, I elected to rush her across the hall, strip her and wash her down in the girls' room. Her blouse reacted and her bra dissolved. If it had been sulfuric acid, I would have put her under the shower.

I instantly evaluated the accident and made the judgment call that stripping this Hispanic diplomat's daughter in front of a coed class would have been more traumatic than rushing her to the girls' room as I did. Sulfuric acid, nitric acid, etc., no question, shower. (906)

638. In a college lab, a male student was speaking to me while he was pouring a liquid (hydrochloric acid.) It spilled down on my lab coat and my closed shoes. It disintegrated my lab coat and my shoes as well as my nylons. (916)

639. A student lab assistant turned while holding a two-liter beaker filled with concentrated hydrochloric acid. She hit the beaker against the edge of the bench breaking the beaker and spilling the contents on her skirt and legs.

The teacher immediately picked her up and put her in the sink and washed off the hydrochloric acid. No injury occurred except one pair of disintegrated panty hose. (996)

Other cases include: 549, 644, 654, 776, 841, 845, 979, 995

Hydrofluoric acid

640. In 1974, while I was a graduate student at the University of Connecticut, a student was carrying a container of hydrofluoric acid up a stairway and fell. The acid spilled on her arm giving her severe burns. (986)

Hydrogen

641. A student was doing an electrolysis experiment for a science fair project. The hydrogen was being used as an alternate fuel source. This was my first year of teaching and the student was that of another teacher. On this day, we combined our classes to look at and demonstrate some of the projects. There were approximately 40 students and two teachers in a relatively small room.

As I remember, the hydrogen was to be pushed out of a storage device (small glass jar) by water displacement and burned by mixing with air at another point. I was elected by the other teacher to light the hydrogen. The fire backed into the glass jar and exploded. No one was injured. But, my awareness for safety was enlightened. (507)

642. While producing hydrogen in a large quantity in a 1000ml flask, a glowing splint was placed at the mouth and the resulting flame burnt the hair off the students' arm.

This was not a planned lab and the student was doing this as a fun activity. The teacher did not authorize it. The student was removed from the lab for the year. (557)

643. After teaching how to use a test tube of hydrogen as a torch before igniting jet of gas being produced, a student immediately lit the jet with a match. Air mixed with hydrogen caused explosion of apparatus. Fortunately, no injury occurred. (626)

644. In the experiment involving the reaction of zinc metal with hydrochloric acid to produce hydrogen gas, the instruction manual said to hold the test tube containing gas upside down. It said to place the lighted wood splint at the mouth of the test tube. I always wondered if there was a possibility of the test tube shattering as a result of this. So, I told students to always wear eye protection and hold the test tube at arm's length with test tube holders. As it turned out, one day, a test tube did explode as a result of the experiment. No one got hurt because all my instructions had been followed. I feel these safety steps should be added to lab manuals for this common experiment. (632)

Other cases include: 711, 723, 730, 739, 845, 995

Hydrogen peroxide

645. Because everyone remained calm no students were hurt the day the paint on the new iron rings caught on fire in one lab group. Another lab set up was knocked over and another student at the same moment broke the beaker of hydrogen peroxide. We let the iron ring fire burn out, picked up and mopped up the knocked over experiment and beaker. (760)

Hydrogen phosphate

646. A woman instructor from the Biological Division of our college asked if she could do some work of her own using our lab space. Apparently, whomever she talked to said fine and assumed she was knowledgeable about what she wanted to do.

The chemistry labs were not in session and no one was on duty when I just happened by. I found that she had just dropped a two-liter glass bottle filled with concentrated hydrogen phosphate acid on the floor. She did not use a carrying device and was not wearing goggles or an apron. She was bending down on the floor trying to clean it up.

I immediately told her to go to the next room and remove any clothing that had been splashed, wash herself, etc. She had almost no slacks on by this time.

Subsequently, I checked on her with safety solution and the lab technician came in with a safety spill clean up kit. This is a prime example of why never working alone is important. (653)

Hydrogen sulfite

647. A student forgot the axiom "Do as you ought, add acid to water," and put hydrogen sulfite in test tube and added water. The solution bubbled up and splattered on the arm of the student causing burns. (717)

Iodine

648. In a medicinal chemistry lab in 1984 a student working next to me was mouth pipetting an iodine solution. He ended up with a mouth full of iodine. (993)

Magnesium

649. We were using magnesium strips in the lab. After lighting we put them in watch glasses, some of which were not Pyrex. One shattered upon contact with the magnesium strip. No one was hurt. But, the breaking glass startled them. (514)

650. A boy stole the key for the storeroom. He took some potassium chlorate and magnesium ribbons. He tried to make a bomb at home with the chemicals and plastic tubing. An explosion took place. Both his hands were blown off at the wrist. His home was severely damaged. (627)

651. In a laboratory, an experiment involved the reaction of magnesium powder with sulfur. The experiment called for mixing the two elements and heating it in a test tube that was held by a clamp in the hood. The reaction started vigorously. In one case, the bottom of the test tube broke and the contents of the tube poured over a student hand. The student was holding the burner in his hand. The student was burned but fortunately not seriously.

Since that time, the burners have been held in a clamp with a long handle. (646)

652. In a makeup-lab while a school was being renovated, a student took magnesium powder and threw it on a burner flame and caused a serious fire. The chemistry teacher got the fire under control before it got out of hand. But he burned his hand seriously in the process. Safety fire blankets, extinguishers, etc. were not available due to the Lab's temporary status. (539)

653. In Mount Carmel Academy, New Orleans, Louisiana, a student in a fellow teacher's class dropped a piece of burning Magnesium in her shoe. It caused a very nasty burn on her foot. The pre-lab discussion had included the correct method of handling this material. A demonstration had been given, and all possible precautions had been included. (947

654. While doing a Magnesium ribbon/ hydrochloric acid lab, one of the girls decided to pick up the gas collecting tube to see what was happening. She put her finger over the bottom of the tube and lifted it. Of course it sprayed on the face of the girl on the other side. The eyewash was used and the girl was sent to the nurse. It turned out ok. (991)

Manganese

655. I was working in an industrial laboratory. We kept a slurry of ammonium persulfate in a beaker for oxidizing manganese. We also kept a solution of sodium sulfite as a reducing solution in a phosphorus determination. Solid ammonium persulfate and sodium sulfite were both stored in five-pound boxes in the same cupboard. I needed some additional ammonium persulfate slurry quickly. Holding the beaker in one hand, I removed what I presumed to be ammonium persulfate from a box and added it to the beaker. Unfortunately it was sodium sulfite. The mixture boiled over and severely burned my hand. (642)

Mercury

656. Students were helping in the chemical storage area. The next day, a substitute was in and was conned into allowing the work to continue. There was a mercury spill that the students were afraid to tell about. Until the regular teacher was cleaning up and moving materials at the end of the year, the pool of mercury in the area remained undetected. (537)

657. Spring 1985, in an eighth grade Physical Science Class, we were doing the boiling point determination experiment. We used a 250ml Erlenmeyer flask, a thermometer, water, and alcohol burner.

Obviously, heating resulted in vapor pressure build up in a closed container. The flask exploded and the thermometer broke resulting in spilled mercury. The students were wearing eye protection and no injury occurred. If a flammable liquid was in use the results could have been tragic. We now use alcohol rather than mercury thermometers. (838)

658. In New Hampshire, 1986, we were doing the balloon construction and flight lab activity. We made a 100-gram balloon out of tissue paper, glue and tape. We went outside to try it. We were using Coleman stoves and three-foot sections of chimney pipe to funnel the hot air into the base of the balloon. One student stood on a stool holding the top of the balloon. I held the base over and around the chimney pipe. Another student held the thermometer suspended by a thread through a small opening at the top of the balloon, just as the instructions had indicated.

The balloon was pretty inflated when the student holding the thermometer dropped it. It dropped straight down the balloon and pipe into the flame of the camp stove. It burst. Holding my breath I moved the stove well away from the parking lot where the class was working. The mercury droplets were bouncing around in the flame. The following year I did the experiment using red colored alcohol thermometers. (808)

659. About twenty-five years ago, around 1962, I set up a demonstration with a mercury barometer. A long tube in an open dish. We did this experiment 25 years ago, even though we knew of mercury's poisonous properties. A student walked casually past and knocked the apparatus over. Mercury went everywhere, all over the wooden floor, and into the cracks. We worked for hours to clean it up. (882)

Other cases include: 707, 835, 991, 992

Methanol

660. In a junior high science lab, the teacher was assisting the students with their experiment. An equipment check out room was set up in the chemical storage and prep room within the lab. The students would check out their equipment and would return it upon completion of the experiment. Two students were responsible for checking out the

equipment. It also included filling and refilling alcohol burners. A student brought his alcohol burner to the check out room to have it refilled. After the lab assistants filled the burner, they proceeded to light the burner not realizing that they had not replaced the cap on the plastic pint alcohol bottle.

Apparently, the methanol fumes ignited causing a tremendous explosion. The teacher immediately rushed into the room expecting to find two dead bodies. To his amazement, the students did not appear to be seriously hurt. They seemed stunned and complained about a ringing noise in their ears, but no other physical damage was evident.

The alcohol was running down the cabinets that contained more highly volatile substances such as acetone, benzene, carbon tetrachloride, etc. Fortunately, what happened was that the explosion extinguished the flames, which could have caused a more violent explosion if the chemicals in the cabinet would have ignited.

The students were taken to the school clinic and were checked by the school nurse. She couldn't find anything wrong with them. She allowed them to calm down a little and then sent them back to class. Praise the Lord. Thank God for Miracles. (527)

661. During an IPS experiment, a teacher left a can of methanol on the demonstration desk so students could refill their burners. One of the students went up to the desk and took out his lighter and put it near the mouth of the container causing an explosion. The students’ clothing caught fire. The other students near the back of the room were unable to leave since there was only one door and that was at the front. The teacher grabbed the fire blanket and wrapped it around the student. Another student put the fire out with the extinguisher. The fire alarm did not work when it was pulled. (658)

662. We were using model airplane fuel (castor oil, methanol and nitromethane) from a metal can. In the past syringes would have been used to transfer fuel. Now, 110 with more affluent times, electric pumps and batteries were put in a box together with the fuel. Needless to say, it was not too long before the battery shorted on the metal can and ignited the methanol. (999)
Other cases include: 519, 592, 904

Muriatic acid

663. My husband was adding water to muriatic acid. It splashed into his eyes. We grabbed the garden hose, rinsed and went to the hospital for additional care. (982)

Nitric acid

664. Two girls in chemistry class were working back to back. Suddenly, one called out to the other. As they both turned around, one girl, who had a beaker of concentrated nitric acid in her hand, bumped to the other girl's elbow. The acid splashed on both girls' shoulders and ran down their arms. One girl passed out and the other panicked.

We drenched both with water and then used limewater to neutralize the excess acid on the skin. Both were then taken to a local doctor. (504)

665. I allow selected students to use nitric acid from a small plastic container with a plastic, screw-on, eyedropper top. The bottle was not returned to the proper place on the shelf. Later, I picked up the bottle by the top (a mistake) and lifted it about 4 inches high before the bottom fell off. The eyedropper lid had barely been screwed on. The acid splashed directly into my eye. Fortunately, the sink was about three feet away and there was no damage. (511)

666. A teacher was attempting to generate some nitrogen dioxide gas for a demonstration. In haste, he added the powdered copper directly to a small amount of concentrated nitric acid in a test tube instead of dropping the acid onto the copper. Acid splattered out of the tube onto the teacher's arms and hands along with a large puff of gas (which was not a major problem as this was being done in the hood.) The teacher washed immediately and was not burned. His shirt was ruined. (560)

667. While conducting a redox experiment, pupils were to heat an iron salt solution and then add powdered copper. Unfortunately another teacher left a bottle of dilute nitric acid nearby and I didn't see it. A pupil carelessly used the nitric acid not reading the label on the bottle, assuming it was distilled water. When he added copper, the solution erupted spilling corrosive liquid onto the floor and expelling Nitrogen oxide fumes into the area. The floor was badly damaged but no one was injured. Fortunately, everyone was using safety equipment and the room was well ventilated. The accident became a valuable lesson, as we analyzed what went wrong and illustrated that accidents often occur during seemingly harmless experiments. (634)

668. We assigned a student to dispose unlabeled bottles of chemicals. She opened a large bottle containing a gallon of nitric acid that had been closed with a rubber stopper. The contents blew out at her. We washed it off quickly. No damage was done. The potential for harm was enormous. (665)

669. A student added concentrated nitric acid to a heated reflux reaction. He did not follow the instructions, and added the acid all at once rather than over 15 minutes. The reaction blew out back onto the student. Fortunately, safety glasses and the shower saved any permanent damage to the students' face, etc. His clothes were destroyed. (751)

670. In a chemistry lab doing quantitative analysis, we were doing Kjeldahl protein determinations. The retort bottle with nitric acid and sulfuric acid fell, broke, and released fumes. It began to eat into the linoleum floor. I threw baking soda and sodium hydroxide on the spill after opening the windows. I soaked up the mess with brown paper towels leaving a permanent scar on the floor and a healthy respect in my memory. (756)

671. A student used a hand centrifuge with a nitric acid solution during a qualitative analysis lab. The centrifuge arm broke. The students in the area were showered with nitric acid. One student had his goggles on top of his head. Acid got splattered in his eye and permanent scarring occurred. (761)

672. A professor was teaching about rocketing to the science club. He stored the chemicals under the lab hood. Nitric acid ate through the wire ring under the hood and caused a short that in turn started a fire. It produced poison gas. (798)

673. In 1971, a middle school student using a dropper bottle of concentrated nitric acid was severely burned by the acid. She had gone to the designated area for using the acid and placed on her goggles. She was to add a few drops of the acid to a test tube. While holding the dropping bottle in one hand and the dropper in the other, another student asked her for the time. She rotated her wrist to see the watch causing the nitric acid to spill on her arm. (812)

674. In 1981, a lab experiment required 12-molar nitric acid. I had the acid in Wheaton dropper bottles on an upper shelf. A high school student went to get the acid. He picked up the bottle by the dropper and pulled it towards himself. The bottle fell off the dropper splashing acid into his face. His goggles were on top of his head. I immediately took him to the eyewash and washed his eyes for 15 minutes. Then I took him to his eye doctor. No damage was done to his eyes. He had been instructed to wear his goggles, and had chosen not to.

The acid should not have been on a shelf at the eye level. A different type of bottle might have been used to store the acid. (827)

675. Two, second-year chemistry students were in the lab after school talking to the teacher. The teacher was paged to the office and left the students in the lab. One student wanted to "try something." He mixed two chemicals (concentrated nitric acid and an alcohol, perhaps ethyl), which produced nitrogen oxides. He was not wearing safety glasses but luckily avoided direct contact with his face. He washed his face and arms with plenty of water. No permanent injury resulted. They only suffered temporary redness of the face and hands. I doubt the teacher ever knew. (844)

676. At the Pfizer Plant in Canaan, Connecticut, around 1970, a worker in the mineral lab was carrying a gallon bottle of nitric acid with one hand, up a flight of stairs. The bottle's bottom hit a step. The pure concentrated acid covered the lower half of his body. He stripped and rushed to the shower in the next building. It took months to heal. (886)

677. In 1972, I was a student in the college. One day I was cleaning some glassware with nitric acid in chemistry lab. It splattered all over. "Heat generation." (890)

678. At Ridgefield HS, in Connecticut, a student put nitric acid into a beaker as the class ended. All glassware was put into the sink. It was the last class of the day for the teacher. So, he put all used glassware in the sink and started to clean it. Water went

into the nitric acid. It blew up into his eyes, face and upper body. He was out of work and under doctor's care for one year. (917)

679. In a New Hampshire, in 1976, during a laboratory experiment, a student picked up Barnes Dropping Bottle of nitric acid by the rubber top. He dropped the bottle. He made an attempt to catch it with his hands. It bounded off his hands and concentrated nitric acid poured out of the bottle down the front of his shirt and onto his face. Minor burns resulted with some permanent scarring. Sodium bicarbonate paste was used to contain the spread and control burns. (939)

680. In 1977 in the Springborn labs, a technician was heating metal samples in nitric acid. He was sitting on a stool reading a magazine while waiting for the samples to be dissolved. He knocked a beaker of acid off the hot plate and onto his knees. He was in the basement with no safety shower available. (987)

Other cases include: 637, 776, 937, 941

Nitrogen

681. I once went to a happy hour at the campus pub. I left my keys and books in the lab. After several beers, I went to the lab to get my keys and fell hitting the nitrogen tank. Good thing I had it strapped to the lab bench. No one was in the lab. (582)

Nylon

682. We made nylon. A student noticed a note on the bottom of the lab sheet that said nylon fibers would be strengthened by heat in an industrial process. He decided to use a Bunsen burner, to heat his nylon in the beaker containing flammable liquid. A fire resulted. No injuries were reported. (789)

Other cases include: 638

Oxygen

683. The junior high principal was, at one time, a science teacher for the seventh and eighth grades. The demonstration involved decomposition of water and testing for the presence of oxygen gas using a glowing splint. He, of course, tested the wrong gas tube and an explosion occurred. The "sound of falling glass continued for 30 seconds." Surprisingly, no one was hurt. (561)

684. The accident that immediately comes to mind involves the generation of oxygen from potassium chlorate using manganese dioxide as a catalyst. The reagent and

catalyst are heated together in a test tube from which a glass tube extends to a water bath. Oxygen is collected in a water bath by displacing water from inverted collecting jars. When the chemicals are heated, you have to be extremely careful not to let them touch the rubber stopper. This happened on at least three occasions during the past two years in our labs resulting in intense fires within the test tubes. The fire led to small explosions. (577)

Other cases include: 697, 703, 704, 705, 706, 739

Phenolphthalein

685. After explaining how to use a Hach water testing kit that uses reagents pre-measured in capsules, a student in class who was an "acid burn out" ate several of the capsules. We took him to the nurse. The capsules contained phenolphthalein, the active ingredient in Exlax. No injury occurred. But, the student was out of school for several days. (546)

Phosphorous

686. A chemistry teacher was required to use a small science room for lecture. He had demonstration materials on a cart. The demonstration involved dissolving white phosphorous in some carbon disulfide. When poured on a filter paper and allowed to evaporate, it ignites the filter paper. The teacher set the filter paper in a funnel so some of the solution dropped through onto the top of the cart. It was wiped up with a sponge. The filter paper and the sponge went up in flames. No damages or injuries were reported, just frazzled nerves. (565)

687. A student tucked a piece of yellow phosphorus into his pocket. The resulting fire made it difficult to remove his pants from his legs. No permanent damage occurred. (639)

688. I was in a high school chemistry class using phosphorus. We were told to put phosphorus (pea size) in a deflagrating spoon, heat it under the hood and transfer it, still under the hood, into a container containing a mixture. I tried to speed up the lab because of the crowd of students near the hood waiting to heat their phosphorus. After heating I moved away from the hood to place it in the container. The phosphorus caught on fire. If it had not been for my chemistry teacher pushing me back under the hood, I would have caught on fire. (674)

689. I was demonstrating the low kindling temperature of white phosphorus. I removed a small piece from a jar of water using goggles, tongs, apron, etc. Phosphorus burst into flames with pieces flying throughout the table. A small piece fell on my keys that were at the end of the table. At the end of the period, I picked up my keys and my body

heat ignited this piece of phosphorus. As a result I still have a very bad scar today. (703)

690. A student teacher under my direction was distributing red phosphorus. He was using a knife to cut the cylinder. The friction caused the rod to ignite. The student teacher became excited and knocked over the container with many phosphorus cylinders in it. It ignited. We evacuated the students, put the cylinders in more water and began to wipe up the spill. Tiny bits of phosphorus were on the paper towels. As the towels dried the paper ignited in the trash. Finally, we carried all bits and pieces of paper to the incinerator. (763)

691. In 1965-66 school year, most of the students were on a field trip leaving approximately seven students in the class. They were all juniors. I had chosen to entertain and educate these remaining students by a series of chemical demonstrations. All safety precautions were exercised at the beginning of each demonstration. The chemicals involved were closed and returned to my demonstration desk.

At the end of the demonstration all equipment was put away and the students were given the remainder of the period as a study period. I went to work in the adjacent stockroom while the students continued with their study hall.

One girl decided to emulate a portion of one of my demonstration. This was totally contrary to my instruction throughout the year. Never do any unauthorized experiment. She mixed some potassium chlorate and red phosphorus in a glass beaker by stirring it with a metal spatula. It exploded! She received powder burns in her eyes, 23 stitches in her hand, singed hair and chemical products imbedded in the skin of her face. In addition, the flying glass cut two other students. I walked out of the stockroom just before the explosion occurred but could not reach her in time.

This former student, twenty years later, is presently a math teacher in the same Senior High School. (811)

692. In 1959, in a high school lab, we were using potassium chlorate and manganese dioxide to make oxygen. Once the Oxygen was collected, it was to be reacted with red phosphorous.

The student mixed potassium chlorate, manganese dioxide and red phosphorous. The explosion sent three people to the hospital from flying glass. One student never regained movement of his thumb.

The instructor was in the lab talking to another group of students. (843)

693. In November 1986, Canon City, Colorado, three honors chemistry students made a preparation for future demonstration called an "Armstrong Mixture." These torpedoes contained small quantities of potassium chlorate and red phosphorous wrapped in white paper. These students followed all instructions to the letter and were supervised during the procedure.

The total amount of substance prepared was estimated to be about two to two and one half tablespoons. Exactly 23 pea-sized portions were divided, separated and left to dry under the fume hood.

Very late that night the mixture detonated. The fume hood was destroyed in the explosion. All connections to the hood were intact but the fume hood itself is totally inoperable.

The reason for the detonation is unknown. A possible contamination of the chlorate is suspected. An emergency bulletin was prepared to warn many other instructors of the hazards encountered. It was recommended that the procedure not be done at all and dropped from the repertoire of teacher demonstrations. (847)

694. In 1982, a piece of yellow phosphorous was being cut for an experiment. It burst into flames. A female student broke out in red "hives." She was taken to the emergency room where it was discovered she was allergic to the specific gas produced. (878)

695. In 1985, a small spill of red phosphorus was not noticed. Another person brushed up the powder with his hand. The person was severely burned. This accident occurred in a chemistry supply and prep room in Connecticut. (885)

696. Fifteen years ago in upper New York state, a student working in a lab prep room was using a rusty knife to cut a piece of white phosphorus. He started a fire that produced a large quantity of irritating smoke. (909)

697. Westchester Co., NY 1959, in a high school chemistry class the teacher used a rusty metal spatula as he described the lab preparation of oxygen with potassium chlorate and manganese oxide. Once prepared the students were to burn some red phosphorus in a bottle of Oxygen. The teacher dipped the spatula in each of the chemicals in turn to demonstrate the amounts to use. He must have inadvertently transferred some of the phosphorus into the potassium chlorate. Later as the test tubes were being heated one set up blew up. Luckily no injuries occurred. (915)

698. Christmas, Alvirne High School, 1983. In performing a demonstration using fire writing, we prepared a solution of yellow phosphorus dissolved in carbon disulfide, leaving the solution in a plastic dropping bottle (probably a 1 oz. container.) The carbon disulfide container was left in the hood very close to the dropper bottle when the demonstration was done. The phosphorus sticks were removed to the storeroom.

After the demonstration, we left the dropper bottle and carbon disulfide container in the hood, probably several inches away from the edge of the counter top. Apparently, a small piece of not dissolved phosphorus was lodged in the tip of the dropper bottle. The carbon disulfide solvent evaporated, the phosphorus piece ignited and, the solvent in the dropper bottle ignited. When we returned from lunch the flames were spreading toward the carbon disulfide container and were also dripping over the counter edge towards the floor. We removed the carbon disulfide bottle and drained the fire extinguishers trying to smother the flames. The small goblets on the floor were taken care of. The rest of the flammable solution was pushed into the hood sink where the extinguisher foam was finally successful in quenching the flame.

Obviously, if we had the proper extinguisher the situation would have been less dramatic. No damage was sustained. We used special insulated gloves to push the flammable material into the sink. The carbon disulfide/phosphorus solution filled roughly one-half of the dropper bottle. We got the idea of the demonstration from a Tested Chemical Demonstrations book. The demo had worked successfully several times before. In retrospect, we were not prepared for the potential accident. The container should not have been left so near the counter edge and the dropper bottle should have been capped. Fortunately, we did keep an otherwise clean fume hood. (942)

Other cases include: 586, 655

Potassium

699. In a multi purpose chemistry lab, a student assistant had cut a moderate sized piece of potassium metal for a demonstration. He had it on a spatula and was moving it over to the lab bench where it fell and bounced into a beaker of hot water. The reaction was explosive. The beaker shattered and hot potassium hydroxide splattered. (583)

700. Some students in a seventh grade honors chemistry class put a piece of metallic potassium down the drain to "see what would happen." The sink and drain were destroyed. Luckily no one was injured.

Should potassium or sodium even be available for use with this age student? (770)

701. I had a small accident while demonstrating the reactivity of potassium with water. The potassium exploded when it came in contact with the water. No one was injured. (836)

Potassium chlorate

702. A student was heating a covered crucible one third full of potassium chlorate to determine mole relationships in a decomposition reaction. The potassium chlorate was heated too rapidly and melted. It boiled over the edge of the crucible. The student's hand was under the crucible and hot melted potassium chlorate poured onto it. (749)

703. In preparing oxygen by decomposition of potassium chlorate with manganese dioxide the delivery tube became clogged with liquefied potassium chlorate and manganese dioxide. Pressure built up to a point where the test tube blew up. (775)

704. This incident occurred while, making oxygen from potassium chlorate and manganese dioxide. The student did not listen to instructions, did not read the instructions and did not wait for the teacher to inspect the set up.

What he did was to add sulfur to the two chemicals that were to be used as a test. The rubber stopper came off shooting out burning sulfur. A fellow student was hit with a piece of sulfur and it burned a hole in her blouse. No one was hurt. (895)

Other cases include: 650, 691, 692, 771, 831, 872, 940, 684, 693, 697, 702

Potassium chromate

705. In a high school chemistry class we were collecting oxygen gas from potassium chromate decomposition. The instructions were to remove the delivery tube from the trough when decomposition was completed. In order to remove the gas bottles without the loss of oxygen, the students left the delivery tube under water and turned off the Bunsen burner. Within seconds, the test tubes exploded one at a time. Fortunately, no one was injured. We have discontinued that experiment. (862)

706. In a New Hampshire High School Chemistry class, 1981, we were collecting oxygen gas from potassium chromate decomposition. The safety instructions were to remove the delivery tube from the trough when decomposition has been completed. Goggles were not available. In order to remove the gas bottles without loss of oxygen the students left the delivery tube under water and turned off the Bunsen burner. Within seconds the test tubes exploded one at a time when the water backed in. Fortunately, no one was injured. The experiment has been discontinued. (943)

Potassium Iodide

707. A student with very sensitive skin was working with solutions of mercury (II) chloride and potassium iodide. She began to itch on one hand toward the end of the lab although she did not recall having spilled any solutions on her hands. I had her rinse her hands and arms for several minutes. Then, she washed her hands with soap and water. I suggested her to stop at the emergency room after school just to be sure. I also checked on her during the day,. She said she was doing fine. She did stop in the emergency room and was all right. I also had her fill out the accident report provided in our school.

I think I was thorough. My husband is a lawyer and the student is the daughter of a school committee member. (633)

Potassium permanganate

708. I made a solution of potassium permanganate and one kid came up to the demo table and said "Oh, Kool-Aid" and pretended to drink it. I immediately got the nurse and she gave an antidote that made the student sorry that he had pretended to drink it. (532)

Sodium

709. In demonstrating the reactivity of sodium, a large piece was put into a container containing water causing an explosion upwards and outwards. Thankfully, students were far enough away and were not harmed. The instructor was dressed appropriately but the ceiling was damaged. (536)

710. A teacher next door to me was demonstrating the sodium and water reaction. He wanted to make sure the students remembered the activity of sodium so instead of using a tiny amount of sodium and cold water he used a larger than normal amount and hot water. The explosion caused the ceiling tiles, glass, etc. to go everywhere. Luckily, no one got hurt. (538)

711. An explosion occurred when too much hydrogen was produced after sodium metal was placed in water. The glass container broke. (540)

712. A teacher left a piece of sodium metal in mineral oil was left in an unmarked beaker after a demonstration. A student placed the beaker in the sink with dirty beakers. A technician turned on the water so he could wash the beakers. The resulting explosion resulted in cuts to the technician's arms and face. (553)

713. In a state university many, many five-gallon cans of highly volatile, flammable substances were all kept in a subbasement with virtually no ventilation. A sodium fire resulted when a container broke and sodium was exposed to the air. The stock person attempted to put out the fire with a carbon dioxide extinguisher with the result that the flames literally leaped at him causing moderate to severe burns to his hands, arms, face and head. He was hospitalized. (554)

714. A new teacher was demonstrating how metallic sodium reacts with water. Students were sitting at desks in front of the demo desk. Neither the teacher nor the students were wearing goggles. Too much sodium was used and the beaker exploded with a piece of glass cutting a student. Luckily, the injury was not too serious. (584)

715. I destroyed some tiny pieces of sodium by putting them into alcohol. When no more bubbling took place I dropped it down the sink drain. It was too soon. A small explosion occurred in the drain. Fortunately, no damage was done. (631)

716. A colleague had carefully cut individual pieces of sodium from a much larger block. The average piece was about one-half the size of a pea. He was cutting under kerosene. Then, he allowed each student to drop his/her piece into a petri dish. All students were wearing goggles. All went well as it had been each year that he had performed this. All of a sudden, the sodium exploded in front of one girl. Her uniform caught fire. The teacher wrapped her in a fire blanket immediately but she was frantic. She grabbed her goggles and pulled them off. This caused the eyes to become seriously irritated. Burns on the skin resulted.

As she was leaving school, two students tried helping in the clean up. The sodium hydroxide burned their hands plus small bits of sodium exploded as they wiped the counter with a wet sponge. It burned the sponges considerably. (636)

717. In a general chemistry lab, a student, although warned about the hazards of sodium, deliberately placed chunks of sodium in a Florence flask filled with water. The explosion blew the flash to pieces and imbedded glass in his hand. (668)

718. This accident revolved around a demonstration performed by the teacher on the reactivity of a small piece of sodium metal in water. The sodium metal reacted actively producing a great deal of hydrogen gas that exploded. The teacher expected the explosion as it was the high light of the demonstration. However, the teacher did not expect the 600 ml beaker to break and scatter sodium hydroxide solution and small molten pieces of sodium onto the floor, as well as, the front row of student desks. Luck and foresight had caused the teacher to ask the student in the front row to move to the back of the room. Only books and papers left on the student desks were involved. A lengthy clean up ended the period. (686)

719. The experiment was the reaction of sodium with water. While the teacher was absent, a student duplicated the experiment. He used a large amount of sodium and a small amount of water. He was taken to the hospital by ambulance and treated for body and face burns. (709)

720. One afternoon after school, I was detaining two young ladies whom I had found smoking in the girl's room. I was only a student teacher at the time. The chairman of my department (a much older gentleman and one I felt wiser than me) was in the chemical storage room working. The storage room was located between my classroom and another.

Somehow, some solid sodium came into contact with some water and caused an explosion that ignited all of the flammable substances in the storage area.

The bottom line was both classrooms and the storage area was totally destroyed. Black ash was all over the third floor. Miraculously, there were no injuries. (716)

721. The chemistry lab was the closest location for the math department secretary to fill the urn-type coffeemaker. She walked into the lab one morning and turned on the faucet as was her habit. What she did not know was that the chemistry teacher who had come in early to do some lab preparation for the day, had taken some solid sodium out of its container and left it in the sink! There was an impressive explosion. Fortunately, no one was injured and there was only damage to the sink. (748)

722. A teacher was doing a demonstration with metallic sodium. He placed small pieces of sodium in a beaker of water to show reactivity. This demonstration was done with success for four classes. By the fifth class the teacher was feeling confident and got too careless. He chose a substantially larger piece of sodium. On adding it to the water, it exploded shattering the beaker and sending glass and water all over him and the front of the class. Luckily, no harm came to the students or the instructor. (782)

723. The lab involved demonstrating the reaction of metallic sodium and water. The sodium was enclosed in a small piece of paper towel. As the sodium reacted with water

the paper towel helped to contain the hydrogen gas liberated. The hydrogen exploded spreading tiny bits of sodium all over the ceiling, floor and lab demonstration desk. Luckily, the students were a safe distance away. (785)

724. In 1970, a chemistry teacher was called out of class to help the principal with a project downstairs. A teacher in an adjoining room was told to keep an eye on the students. A boy in the chemistry class went to an unlocked shelf on which chemicals were stored in alphabetical order. He got a large chunk of sodium and went to the boy's bathroom down the hall. He threw the sodium down the toilet. There was a series of explosions. The toilet was shattered. The student was not injured. (788)

725. In a private school (March 1987) a teacher demonstrated the addition of sodium to water in each of five classes. The fifth time this was done an explosion occurred blowing a hole in the ceiling. Ten students were taken to the hospital with cuts from the shattered glass of the beaker. (793)

726. A high school chemistry teacher was demonstrating the reactivity of sodium with water. She had the class gather around the demonstration table and showed them how soft the sodium was. Then, she cut a piece off but it rolled away and fell into the sink and down the drain. One of the students leaned over the sink to look at the sodium. The student received moderate facial burns when the reaction occurred. (813)

727. In 1979, a teacher wanted to demonstrate the reaction of sodium in water. While she was holding the sodium storage bottle over a large beaker with about a liter of water in it he attempted to slice off a small piece. The entire piece (about a 3-cm cube) fell into the beaker.

The teacher was wearing lab coat, apron and goggles but no hand protection. The student had no protection at all. The resulting reaction caused serious damage to the teachers' hands. Three students were hurt, one seriously. The lawsuit was settled out of court. (819)

728. In Massachusetts, during the winter of 1985, a high school junior tossed a piece of sodium metal into a trough. A girl on the opposite of the bench was pouring contents of her test tube into the trough and her face was close to it. She got splattered. Fortunately, she had on goggles. (816)

729. In Vermont, April 1986, my department chairman, a fifty-year-old male, pushed a large amount of sodium down a sink in the hood. He thought that it had completely oxidized by allowing the metal to be exposed to the air for several years!. When the water came in contact with the sodium it exploded. Fortunately, most of the hood was closed up. He only received burns on his arm and a couple of spots on his face. The hood was a mess. This happened while I was teaching a class in the room next to the lab. (829)

730. In 1963 in Catskill Central School, New York, a teacher was showing the reaction of sodium in water to produce hydrogen and sodium hydroxide. Either the teacher or

the students wore no safety glasses or apron. The eighth graders were unimpressed with the reaction and pressed the teacher to add more sodium. The result was a severe explosion. Fortunately, no one was injured. (888)

731. In 1967, I put a very small piece of sodium metal into a large container of water. Due to rainy weather, I kept the students in the classroom for the demonstration. I usually take them out into the schoolyard. A fire started and covered the ceiling with soot. (904)

732. In 1971, Manchester High School, Manchester, CT. A student stole some sodium metal from a chemistry laboratory and hid it in his pants pocket. As he walked down the hall it began to burn his leg. An English teacher heard his screams, smothered the flames, and removed his clothing. The student was sent to the hospital. (911)

733. A second year science teacher threw a piece of sodium metal into a bucket of water causing an explosion which injured the teacher and blew apart a quarter inch thick etched glass "chalk board." Three pupils were injured, suits instituted and the teacher's contract was not renewed. He lost a week's work due to his injuries. No shielding or goggles were used. (916)

734. In 1985, a student was adding a small quantity of metallic sodium to an evaporating dish filled with water the student felt something bite him and then experienced a burning or stinging sensation.

All precautions had been followed: a small quantity of sodium, gloves and goggles were used as well using a glass plate as a shield. I had the student to take a shower. (931)

735. A college professor dropped a piece of sodium metal into water. The sodium reacted explosively and a piece of the sodium lodged in his eye. He went blind in that eye. (932)

736. In 1976, at a Junior High School, I was demonstrating the reactivity of sodium metal with water. I chose a large piece of sodium. Then I dropped the piece into a beaker of water. There was a terrific explosion. A girl in the front row stated that bits of glass were blown into her eyes. Fortunately, the nurse did not find any glass in her eyes. (957)

737. During a spring semester, 1986, at Adelphi University, a professor of Methods of Teaching Science Class asked our class of eight students a question relating to the most reactive metals on the periodic chart. We discussed the different groups. He showed us a bottle of sodium in turpentine and discussed the sodium’s reactivity. He took out the chunk of sodium and placed it on the desk when suddenly the metal caught fire. Luckily, he was able to smother the flame before it got out of hand. (981)

Other cases include: 700

Sodium bicarbonate

738. When mixing baking soda and vinegar in a closed container, the top burst. Liquid was shot into the air. (897)

Other cases include: 632, 679, 756, 776, 777, 670, 885

Sodium carbonate

739. An IPS student at Salisbury School, Salisbury, Connecticut was preparing hydrogen and oxygen by electrolysis of a solution. Both electrodes were in the same test tube. A spark between the electrodes ignited the mixture. The test tube exploded. Fortunately, the student was wearing safety glasses. (875)

Sodium Hydroxide

740. In a quantitative analysis lab, the student across the bench from me was pipetting sodium hydroxide orally, no bulb. He ended up with a mouthful of strong base. (544)

741. Another student squirted a student with water from a squirt bottle. The second student squirted back. The bottle contained 0.1-molar sodium hydroxide. Luckily, no injuries resulted. Students were held after school, wrote signed and dated accounts. Parents were called. Students were suspended from lab for the rest of that project. They were given a zero for that lab. (573)

742. A lab assistant spilled sodium hydroxide solution on her wool skirt. She was not wearing an apron or coat. No damage occurred, only financial loss. (612)

743. Working in a lab during a summer, a fellow worker pipetted sodium hydroxide solution by mouth. He received great damage to the inside of his mouth. He had to be fed by tube for many weeks after the accident. (613)

744. A girl spilled droplets of sodium hydroxide on her skin. She neglected to tell anyone or to wash it off. Hours later she went to the nurse. An area of her skin that looked as if she had been burned. (733)

745. In college, a student spilled sodium hydroxide on her clothes. She was hosed down. (772)

746. In 1986, in high school chemistry II AP class, a student had gone to the station where chemicals for the particular lab were being kept. He was getting some fairly concentrated sodium hydroxide. He collected his chemicals in a beaker and turned to go back to his place. Another student was standing behind him. As he turned, he

bumped into the other student splashing sodium hydroxide into his own face. Luckily, he was wearing his goggles. We flushed with water and there was no damage. (777)

747. A high school sophomore (1979) ignored warnings to use a pipette filler when measuring quantities of Sodium hydroxide solution. When the instructor's back was turned he tried to pipet quickly using his mouth. While doing this, another student interrupted him. He lifted his head while still drawing up the solution. The solution went into his mouth. He gasped. The eyewash was used immediately to flush his mouth and his throat. The eyewash has a great force and large quantities of water can be used quickly. The result was only a few sores on his lips and the soft tissue in his mouth. (810)

748. In a high school chemistry lab a student heated a concentrated solution of sodium hydroxide too vigorously. The solution spattered and it burned the arms and face of the student and his lab partner. Goggles were on, thankfully. (924)

Other cases include: 549, 633, 670, 716, 718, 730, 838, 841, 979, 986

Sodium peroxide

749. Students were performing a chemistry lab using sodium peroxide. They were instructed not to discard the sodium peroxide in the wastebasket. One did and a wastebasket fire resulted. The fire extinguisher was directly over the wastebasket. (861)

750. A student stole some sodium peroxide after seeing how it reacts with water. He put it in some math paper and put it in his shirt pocket. Later in the day, it burst into flames.

This was early in my career and I trusted too much and was careless in surprising the students. (992)

Other cases include: 542

Sodium thiosulfate

751. A chemistry student was performing an experiment on heat of crystallization. This involved melting sodium thiosulfate in a hot water bath. The student used a clamp and clamped the tube onto the ring stand while the sodium thiosulfate was melting. After the experiment was completed, the student was remelting the chemical and set the test tube in the beaker without removing the clamp or attaching it to the ring stand. He stepped to the sink at the bench and the beaker, test tube and clamp fell to the bench then the floor. It scattered broken glassware and sodium thiosulfate all over. (860)

Sodium sulfide

752. I had students dispensing sodium sulfide solution at a dispensing table. One of the students dropped the 500 ml bottle. The fumes spread through the lab and it had to be evacuated. I made sure that I dispensed the chemicals in the future labs myself and did not allow the students to handle the dispensing bottles. (952)

Other cases include: 655

Sulfur

753. In 1986, a high school student was heating iron filings and sulfur in an attempt to make iron sulfides. She was using a test tube holder over a Bunsen burner. After the heating had been proceeding for about ten minutes her hand got tired and she attempted to change hands. In the process, the test tube was dropped and the contents splashed on her hands. She received a very bad burn to her little finger that took several weeks to heal and left a scar. The experiment should have been done with a ring stand and test tube clamp. (809)

Other cases include: 582, 651

Sulfur dioxide

754. I accidentally generated sulfur dioxide gas because the sulfuric acid bottle that I used was mislabeled as dilute instead of concentrated form. This happened in a high school classroom. The entire wing in the school had to be evacuated. (972)

Sulfuric acid

755. A bottle of concentrated sulfuric acid was stored in an obscure corner of the room. A fight broke out between two students and they knocked over the bottle. Luckily, the acid only affected the students' shoes and did not come in contact with their skin. (533)

756. A student spilled sulfuric acid on an apron and neglected to report the accident. He failed to clean the apron. The next student to use the apron, a girl, complained that her stockings were falling apart. Her legs were washed down with a sodium bicarbonate solution. The stockings were removed and her legs washed again with sodium bicarbonate. (502)

757. Students were working in the lab after school on a science fair chemistry projects. A student was starting to synthesize plastic. He was following a procedure (to the letter) from a copy of the Journal of Chemical Education. Among other reagents involved were concentrated sulfuric acid, glacial acetic, etc. A reagent was being added a drop at a time via glass tubing to open mouthed Erlenmeyer flasks. The flasks were wrapped in

cloth based on the instructions given in the procedure. Because the reaction did not take place after a specified time, the student peered down into one of the flasks. At that instant, the reaction took place with a whoosh sound. A mixture of reagents and products pushed up out of the flask into his eyes.

At the hospital emergency room, the resident doctor literally was able to peel the formed plastic from one of his eyeballs. The happy ending was that the eye specialist judged that no permanent damage had been done to the eye. (541)

758. The laboratory storeroom temperature was kept too high. Liquids would often vaporize in containers. An undergraduate teaching assistant was opening a new bottle of concentrated sulfuric acid and the vapor pressure caused liquid to splash on his arms. He had goggles on and was working under the hood but the glass window was not all the way down and the acid splashed under it. It burned through the lab coat into his skin before he could wash it off. (542)

759. A student used a pipet to squirt concentrated sulfuric acid at another student because he didn't like him. The student's pants were eaten through and skin burns on his leg resulted. (550)

760. In a middle school, a student stirred some sulfuric acid with his finger. (559)

761. While rearranging the stock room I dropped a gallon of concentrated sulfuric acid on the slate floor. It shattered, splashing acid on my leg from the knee down. The faucet was right outside the room and copious amounts of water saved my skin although my pants and shoes were gone.

To clean up, I used all the carbonate and bicarbonates I could find to neutralize and absorb. I then scooped it up and buried it in sand. Final mop up was with dilute sodium hydroxide solution. (992)

762. In a chemistry lab after school, a student was diluting concentrated sulfuric acid under direct supervision. He was correctly adding acid to the water. When he was finished, he carried the one and one-half liter concentrated acid bottle to the side bench. Because the density of acid is so much greater than water and because the bottle was correspondingly heavier than a similar bottle of water, the bottom of the bottle was held a little lower than the top of the bench. The bottom of the bottle sheared off in one piece covering the student with acid from belt to toes. Since this was before showers were in the classroom the student had to be taken to the gym, about 300 feet away. Fortunately, he did not sustain injuries. (588)

763. An instructor allowed his students to use concentrated sulfuric acid during a high school chemistry lab. A student assumed the container had water in it. He dropped it causing the sulfuric acid to spill all over the lab floor. The student had his clothes removed immediately and was showered. He did not receive severe burns. No one else was injured. Female faculty members cleaning up ruined their shoes. Their nylons dissolved just from the spatters. (616)

764. A college chemistry instructor was crippled. He had to use crutches. He was working alone in the lab one day. A bottle of concentrated sulfuric acid fell spilling the acid on the floor. His crutches slipped out from under him. He landed in the acid on his back. A janitor heard his screams and helped get him to a shower. The teacher was hospitalized for two to three weeks with burns from his neck to his shoes. (628)

765. My lab assistant was about to wash the glassware. The sink was full of beakers. He held a beaker under the faucet and turned the water on. The full force faucet caused the water to splash up and sprinkle on his face. The wet spots on his face concerned him.

I asked him if there was anything in the beaker when he picked it up. He thought there might have been a little clear liquid. There was the possibility of sulfuric acid since I had used some of this chemical. I had him flush his face and then sent him to the hospital for eye treatment.

This resulted in detailed precautions of how to hold a beaker under the faucet. (641)

766. During a lab, a high school chemistry student mixed concentrated sulfuric acid and water incorrectly, even after having been taught the correct procedure. The solution immediately boiled and splattered out of the beaker, and went all over his arm, which was covered by a sweater. The arm of the sweater disintegrated. (643)

767. During the preparation of carbon dioxide for volumetric determination, a student did not add water to marble chips used in the generator. When the concentrated sulfuric acid was added the reaction was violent and moved rapidly through the calcium chloride drying tube. His quick mentioning to me what had happened helped me to act fast. I stopped the reaction by flushing it with water in a nearby sink. (657)

768. Bottles of sulfuric acid were stored on the shelves that were constructed of boards and brackets. The brackets corroded and there was an acid spill. The university fire department was called to clean it up. (687)

769. I heated water in a beaker on a ring stand in the lab area to make coffee. I picked up the wrong beaker. It was diluted sulfuric acid. Fortunately, the acid was further diluted when I added more water to it. I tasted the acid immediately. I took several Alka-Seltzer tablets and drank a solution that the chemistry teacher made up. There were no lasting effects. Fortunately, no one was injured. (724)

770. A girl went to dump a test tube of sulfuric acid down the drain. She accidentally hit the faucet and spilled the acid on her hand. It blistered immediately. I put it under water and I sent her to the emergency room. She had some scars for a few weeks. All healed nicely. (746)

771. In a thermite reaction demonstration powdered aluminum and ferric oxide mixture was placed in a paper filter cone. Potassium chlorate and sugar mixture was placed on top. Concentrated sulfuric acid was used to "ignite" the mixture. When the reaction

takes place, there are some sparks that fly around. Unfortunately, I had placed the beaker with the potassium chlorate/sugar mixture nearby. One of the sparks landed in the mixture and the entire contents then proceeded to burn with a pretty, purple flame. (751)

772. A teaching assistant who was a nun and wearing the long black habit was lifting a large five-liter bottle of concentrated sulfuric acid and dropped it at her feet. The bottle broke. The habit actually hindered her safety as it absorbed the acid and held it to her legs and feet. Although she was aided quickly, she was impaired for several years and still has scars. (753)

773. During the mid-sixties I was working in a Nuclear Medicine Laboratory. I was making up a glassware cleaning solution. The solution was a mixture of dichromate and sulfuric acid. I was using gloves. But, some how I spilled the acid on my lab coat. It ate through my coat and tie.
(759)

774. Several years ago, a junior high school teacher who had many years of experience reached up on a high shelf to get a gallon bottle of concentrated sulfuric acid. As she stepped back to turn around, her foot slipped on a wet spot on the storeroom floor. She fell dropping the bottle. The bottle broke and splattered her thoroughly. Luckily, another teacher nearby heard her cry out, rushed into the storeroom, stripped off her clothing and put her into the safety shower. She spent weeks in the hospital with serious burns. She has permanent scarring. (769)

775. During the spring of 1985, students were studying redox reactions. The lab required that they heat the reaction mixture in a test tube. One of the reagents was concentrated sulfuric acid. An eleventh grade student pointed the test tube at himself and it erupted. Immediately, his lab partner poured water all over him. After much dilution the student was then sent to the school nurse. The lab area was cleaned up. No serious injury resulted. He did have goggles on but no apron. Instruction for proper heating techniques had been given. (787)

776. In the early eighties in Waltham, Massachusetts, my work involved testing of low-level metals. Because of this, we had to clean all our glassware with a mixture of hydrochloric, nitric, and sulfuric acids. We would clean the glassware with soap and water, then let them soak in the acid bath. One day, while in a hurry, I mixed the three acids in the hood in a one liter plastic bottle. I was not wearing gloves. But, I did have safety goggles on. I mixed the three acids and capped the bottle. Later in the day, I opened the bottle again. Pressure had built inside the bottle and the acid sprayed all over the hood, my hands, my lab coat and my face. I had on two gold rings, which turned a copper color. I immediately ran to the sink and rinsed my hands with water then sodium bicarbonate. I was very lucky. I don't know why my hands are not permanently scarred. I did learn to never work in the lab when in a hurry and to always wear safety equipment. (807)

777. In 1950, New York City, during college organic chemistry lab, students were performing a reaction using the hood. The directions were to add one to two milliliters of concentrated sulfuric acid. One of my classmates' reactions did not start. So, she added 20 ml of concentrate sulfuric acid. Still, there was no reaction. I suggested she speak to the chemistry instructor who was sitting in his office reading. Before he could come into the lab her experiment exploded. Chemicals splashed over me. The other students had the presence of mind to take sodium bicarbonate solution and pour it on me. My lab coat, stockings, skirt and blouse disintegrated. I had to return home at rush hour on the New York subway wearing a lab coat. (840)

778. In the spring of 1981 in New York, sugar and sulfuric acid were mixed in a wide mouth flask at a safe distance from the class. After one minute had elapsed an explosion occurred. There was no "safety shield." Paste showered students. Minor burns resulted but no glass injury was reported. (912)

779. An attractive 17 year old, twelfth grade student in Pensacola, Florida Chemistry II class, was doing the lab wearing her cheerleader uniform.

The student was working at her lab station when she hit a graduated cylinder containing sulfuric acid (diluted) with her elbow and spilled it on herself. She knocked the acid container over with her right arm. Parts of her body were disfigured, i.e. the injury included acid burns on the left arm, thigh and leg). The teacher was not wearing gloves, goggles or an apron.

She was place under the shower located within two feet of the lab station for approximately five minutes. Then, a slurry of sodium bicarbonate was poured over affected areas and she remained under the shower for at least an additional five minutes.

The student's chemistry teacher and the assistant principal escorted her to the hospital. A hospital staff person notified her father by phone.

The school district was being sued for damages and alleged:

Count I Negligence (Excerpts ONLY)

5. The entire chemistry program was so negligently operated, planned, and maintained that Plaintiff, (the student), was seriously burned by concentrated sulfuric acid. The errors and omissions of Defendant, School Board, and its agents included, but were not limited to, the following:
   - A. Failure to provide adequate protective clothing.
   - B. Failure to follow established safety guidelines for the handling of concentrated sulfuric acid.
   - C. Failure to provide adequate safety training.
   - D. Failure to provide adequate and necessary supervision.
   - E. Failure to follow proper and safe laboratory procedure.

Count I Dangerous Conditions (Excerpts ONLY)

7. At the time and place aforesaid, there was a dangerous condition on the premises; to wit, concentrated sulfuric acid.

8. The aforesaid condition was not properly guarded, not properly warned against, nor was it necessary for the teaching of chemistry; safer alternatives being available.
9. The condition was either caused by Defendant or its agents or had existed long enough so that they should have known about it.
10. As a consequence of the condition aforesaid, Plaintiff suffered bodily injury and resulting pain and suffering, disability, disfigurement, mental anguish, loss of capacity for the enjoyment of life, expense of hospitalization, medical and nursing care and treatment, loss of earnings, and loss of ability to earn money. The losses are either permanent or continuing and Plaintiff will suffer the losses in the future.

This is the first serious litigated science incident this school district has encountered in over ten (10) years. The student's parent DID NOT try to resolve the problem with school district officials or the school district insurance carrier.

The evidence indicates that the student's partner told her to be careful prior to the occurrence of this incident. Neither she nor her teacher wore a lab apron, glove or goggles. During the deposition, which was three (3) years later she COULD NOT identify the acid.

The case was reserved at $40,000,00, including defense cost at $10,000 (calculated estimation of monetary exposure.)

POSSIBLE PREVENTION MEASURES:

1. Prohibit the wearing of improper clothing in a chemistry lab.
2. Written safety procedures posted.
3. Student(s) should have been required to wear an apron(s) if attired in improper clothing.
4. The teacher should reiterate selected safety procedures during pre-lab.
5. Safety test administered by teacher.
6. Documentation by teacher of safety instructions given to students.
7. Hindsight. (956)

The out-of-court settlement was around $35,000.

780. During graduate school while working on my master's thesis I was pipetting concentrated sulfuric acid from a flask into various beakers. While pipetting over my lap I dropped the pipette through the flask and acid poured onto my lap. (966)

Other cases include: 637, 670, 754, 902, 938

Tar

781. Walking from the hotel in Mexico City, I felt something hot. Workmen on the roof were pouring tar material that somehow landed on me. (692)

Toluene

782. I was performing an organic synthesis in my undergraduate lab. The synthesis required using toluene as a solvent. I heated the apparatus with proper cautions. I reached to a point in the synthesis, which required addition of other reagents. This step required cooling the apparatus and turning off the Bunsen burner. I chose instead to move two or three feet away and open the round bottom flask to add chemicals without cooling or turning off the Bunsen burner. Toluene is volatile at room temperature but even more so at the increased temperature. The vapors spread across the lab bench and ignited, reaching the flask in my hand. Fortunately, only first degree burns and embarrassment resulted. The fire was quickly put out with an asbestos pad covering the flask. (893)

Other cases include: 987

<u>Electricity</u>

783. I work in a room shared by another teacher. The other teacher had been using plaster of Paris to make casts of fossils from clay molds. Someone had put plaster into an electrical outlet. The plaster had then solidified. My class had been doing an activity that involved the use of scissors. A student apparently was poking at the covered outlet with the scissors just prior to clean up. The tip of the scissors broke through the plaster and the student was shocked jolting him from his metal stool. The student tried to retrieve the scissors and was jolted again, knocking him to the floor. He was taken to the hospital where he was treated. He continued therapy for several days. When he returned, he walked with a limp because his legs had been wrapped around the legs of the stool. (510)

784. A student stuck his forceps in an electrical outlet. He didn't think the outlet was live. Luckily, he only blew a fuse. (549)

785. During my first year of teaching, I was demonstrating to another person the difference between a series and a parallel circuit. Talking as I went along, I disconnected the metal rods with two hands. The rods were not covered. Electricity flowed through me. (591)

786. An appliance distributor delivered and wired a 220-volt electrical dryer. The installer incorrectly wired the appliance line cord to the terminal strip inside the dryer so that 110 volts appeared on the unit's exterior cabinet. The paint on the device effectively insulated the user for three months. By accident I happened to be walking by the dryer with a #10 ground wire. This uninsulated wire was to be connected to some nearby radio transmitting equipment. The wire lightly brushed against a screw on a recessed panel at the bottom of the cabinet. The wire was instantly welded to the screw. The resulting current draw blew one 60-amp cartridge fuse and knocked out half of the electrical service to the house. (690)

787. A student sitting at a lab table started to pull the faceplate off the receptacle at the desk. By putting some object into the exposed receptacle, he created a large spark that came out of the desk very close to him. It was a case of idle hands during a class. Since this time, we have reduced the use of labs for classes (non-lab instruction). (879)

788. A teacher left a heat lamp on to warm a terrarium. The heat lamp was near a bulletin board and the cord was wrapped around the base of the lamp. A short occurred and the papers on the bulletin were set ablaze. The Saturday watchman put out the fire in time. (88)

789. A physics teacher, inexperienced with American high school students, told the class not to fool around, and then left a group of senior boys with a power pack and several leads having alligator clamps. One of the students in investigating what the pack could do, grasped the lead by the metal clamp, obtaining a nasty electrical burn and scaring the other students. Fortunately, the accident was no worse than this, though it tended to grow with the retelling. (949)

790. A student was doing an electrical experiment working with 120 V AC. He wanted to know what would happen if he connected the red and black wires while he held the bare ends of the wires. I stopped him in time. (964)

791. In August 1987, my husband and I were inside a garage. Some vines had grown into the garage and wrapped around the lighting fixture wires. A man outside the garage was pulling the vines off the garage one by one. He was using a great deal of force and could not see the potential hazard. We cut the vines from the inside so he wouldn't pull down the wires. (977)

792. In the 1984-85 school year, a biology teacher had to deal with equipment that had not been checked thoroughly. A wall receptacle was part of a track system. The whole thing was loose and various other receptacles did not work. The teacher went to pull out the plug on a microscope. There was a large explosion. She received a bad burn on her hand that required emergency room treatment. (846)

793. A technician reached to turn off a blender. He was knocked three or four feet across the lab when he touched the blender. It shorted. (545)

794. A student plugged in a microscope and the lamp (Swift 900 series) exploded scarring the student and making other students uncomfortable about using anything electrical.

Previous students had wrapped the cord too tightly. The soldered connection in the lamp housing short-circuited, clearly a design flaw in a widely used microscope. (581)

795. A high school sophomore was working in a lab. The lab was designed with electrical outlets at student desk level. A student put his spiral notebook on the desk

and the loose metal end went into the live outlet. The circuit blew before anyone was injured. A portion of the spiral was melted. (623)

796. A former teacher at our school went to turn the geyser lights on with a light switch key. She really got zapped out cold for a while. She had put the key into a faulty receptacle.

Periodic maintenance checks might have prevented this. (675)

Other cases include: 589, 614, 662, 949, 975

Fire extinguisher

797. While cooking in a fry pan, I wanted to remove it from the stove. I used a potholder with some printing on it. The lettering stuck to the pan. I returned the pan to the burner and a fire occurred where the lettering stuck to the pan. Luckily, I had an extinguisher nearby. (743)

798. I was heating a water bath in a beaker on a ring stand too close to a pegboard in an IPS class. The board started to smoke and then broke out in flames. A nearby extinguisher saved the day. (747)

799. A special education student, roaming the halls and skipping class, ran into a 48 member seventh grade Life Science Class. Students were seated all over the room, at the back, etc. The Special Ed. student yelled a remark to the class, a reply was immediately forthcoming. At that point, the Special Ed. student grabbed the fire extinguisher and shot it at a girl's face. She had irritations of the face and eyes that required medical attention. (779)

800. In the 1970's, I was demonstrating chemical fire extinguisher to my seventh graders. The rubber tubing that was connected to the metal nozzle popped off and the chemicals spewed into the room while I was holding the rubber tubing. . It must be inverted to allow acid and chemical to mix and begin reaction. (975)

Other cases include: 544, 561, 579, 602, 652, 661, 698, 749

Flask

801. In a high school Regents Chemistry, lab a student heated a closed flask. The stopper did not release and the flask exploded. Fortunately, no serious injuries resulted. (973)

802. A Florence flask that contained a rubber stopper half way down the glass neck was submitted to the chemistry teacher. After school, the flask was set on a tripod and

wire gauze and heated to blow out the stopper. The flask exploded just after the teacher left the prep room for a second. No one was injured. (994)

Other cases include: 821, 843, 852, 979

Glass

803. After listening a "thousand times" to the proper way to insert a glass rod into a cork, a student inserted a glass rod into (and through) her hand. No glycerin or hand protection was used.

The glass rod was pulled out before I arrived. I applied pressure with a cloth and walked the student down to the nurse. (513)

804. In a biology lab, an aquarium was sitting on a lab table next to the lecture area. Without warning, the tank ruptured, spewing glass and water on the students sitting near by. Luckily, there were no injuries, only soaking wet students who were sent home to change clothes. (515)

805. When heating a glass rod to make a stirring rod, a student, instead of pressing down with his thumb on top, held it in his hand at a 45-degree angle while pressing. The tube broke in half, and punctured the index finger and cut the top of his hand. (534)

806. A class of 26 students included three who had eyes so blood shot you could see "road maps" in their eyeballs. The class was shown how to cut glass tubing and several students were even individually guided in methodology by the instructor until he felt that all knew how to cut glass. Then he showed them how to fire polish and bend glass. At the end of the instructions, he told the students to start their experiments.

Within seconds one of the students' approached him with a smile. He said, "I believe I have a problem" as he pressed on his bleeding palm. The other side of the hand also seemed cut. The glass tube had gone through the palm of his hand. No toweling was used when snapping the tube. The instructor sent the student to the nurse with a compress on the cut. A few minutes later his partner came up with the same problem; however, he didn't have any glass penetration through his palm.

I remarked to the class how pleased I was that they had remained calm through the event. To my amazement, I discovered they believed the event was part of my demonstration. (575)

807. I was using a bell jar and a vacuum pump. Vaseline was on the bottom of the jar to aid in creating a seal. This made it quite slippery. I broke the bell jar and the glass sliced my hand. (590)

808. The microscope cart had glass sides. One of the sides was broken. In reaching over the cart to open a window, a boy cut his arm. (594)

809. In trying to put a stopper on the tube, the glass broke and the push force was adequate enough to pierce and go all the way through the palm. (596)
810. In a department store a customer walked through a plate glass window instead of the door. She received severe cuts requiring stitches. Now, there are warnings striped on the window. (614)

811. I was teaching astronomy and demonstrating the phases of the moon. They began on a lab to mimic this process. Each student was given a light bulb/globe set up on lab benches. Everything was going smoothly. When suddenly a light bulb exploded sending glass chips everywhere.

No one was injured. How can this be prevented? This happened while my principal was observing me! (652)

812. While explaining and demonstrating how to insert glass tubing into a stopper the teacher was talking to students, answering questions and showing how not to force the glass into the stopper. A student spoke out, the teacher looked up and pushed real hard breaking the tube. The broken end penetrated the flesh and blood squirted out of the glass tube. Realizing what had happened, the teacher called for the nurse to take her to the emergency center. This happened at 10:30 AM. At 8:30 PM they finally removed the glass tube. (676)

813. As a graduate student I was supervising a freshman, nursing lab. A girl put a glass rod through her hand. She was bleeding badly and was very frightened. School policy required that a security guard drive her to a hospital. She needed support, as this was her first time away from home. She lost the use of her thumb and forefinger for one year. She needed extensive neurosurgery but finally regained their use. (742)

814. In an IPS class a boy pushed a piece of glass tubing into a rubber cork without lubricating it. The tube broke and caused a severe cut. (745)

815. A student was attempting to place a glass tube into a one-hole stopper. He held the stopper in one hand and the glass tube in the other. There was a six-inch gap between the stopper and the hand. The student tried to push the tube into the hole. The glass tube snapped halfway and the jagged end went through his hand that was holding the stopper. (750)

816. In putting glass tubing into the hole of a stopper, Vaseline was not used. The result was a broken tube and a severe cut. (784)

817. In a 1977, during an IPS lab (mass of a gas experiment), brand new pressure bottles were being used. The teacher had visually examined them for defects. One-quarter Alka Seltzer tablet was placed in about 10 cc water. About fifteen seconds later the bottle violently exploded. There was glass over the entire room. A student was hit in the face with a fragment of glass. It just missed his eye. From now on, all students wear goggles. (818)

818. In 1987 my chemical stockroom assistant was inserting a condenser tube into a water jacket through rubber washers. The top part of the condenser tube fractured. Jagged glass edges tore through the protective toweling into two fingers. There was profuse bleeding. He was taken to the emergency room and stitches were required to close the wound. All the slivers were not removed the first time. Several months later he still had swelling in his fingers and had to return to the hospital to have the remainder removed. (824)

819. In 1987, a student was cleaning up at the end of the lab. A beaker started to fall off the bench and the student grabbed for the empty beaker, smashing it against the bench. He cut his hand deeply in two places and may lose some feeling in his fingers. (901)

820. In 1986, Newtown High School, while using the top of ripple tanks, a student leaned on top of the glass and it broke. Luckily only slight scratches occurred. (922)

821. In 1973, an eighth grade general science demonstration involved making a cloud. The apparatus used included: 2000 ml flask, one hole rubber stopper with glass tubing, chalk dust, warm water, pump to create a higher pressure.

Students all gathered around the demonstration table and the flask was connected to the exhaust part of the vacuum pump via a rubber tube. While I was holding the top of the flask with both hands and creating a higher pressure the flask exploded sending glass fragments to all corners of the room. I received multiple cuts on my hands. Only one student received an injury that required medical attention. He needed a stitch for a cut between his eyes. (941)

822. One of our students in Lafayette, LA, was heating and bending glass. He grabbed the bent glass tubing at the bend when it was still hot. This, of course, caused a burn. (953)

823. In Milford, Connecticut during the distillation of alcohol/water mixture, a student was inattentive and allowed the mixture to overheat. It popped the stopper, boiled over and burned. Due to overcrowding of the lab, the resulting commotion caused broken glass and one minor cut. (867)

Other cases include: 542, 649, 714,717, 725, 733, 736, 751, 778, 827, 860, 891, 901, 903, 932, 942, 960, 961, 963, 964, 965, 966, 967, 968, 969, 971, 972, 973, 977, 988, 903

Glove

824. Junior high students invariably burn their fingers while bending glass rods. Gloves would prevent this. (980)

Other cases include: 574, 633, 634, 698, 773

Goggle

825. In an eleventh grade welding shop class, a boy had removed his goggles to remove hot slag from the area. A piece of slag flew in his eye. The shop teacher sent him to me with another student. By the time I saw him, he could barely open his eye. When I tried to use the eyewash on him he became ill, vomited and nearly passed out. Ten minutes later, the shop teacher finally showed up with the principal. By then, I had rinsed his eye twice and had the other student steady him on the chair with a cool compress on his head.

This happened within the first month during my first year of teaching. I was scared to death. (506)

826. I was shaking a can of paint stripper to mix it. I set the can on the workbench and unscrewed the lid. The material erupted and hit my eyes. No goggles were being worn. (547)

827. I was opening a glass container. The top froze momentarily. With increased pull, the top jerked off and the liquid, a test solution for a bacteriological procedure, splashed into my eye. At that time, there was no eyewash. So, I had to hold my eye under a faucet. Fortunately, this was in a medical complex and an eye doctor was available. The eye injury was very painful for several days but no permanent damage was received.

This occurred about 10 years ago and I had never been told about goggles in school. (562)

828. This accident happened to a graduate student who had very sloppy techniques in the lab. He had to make an acid solution. He poured water into the concentrated acid. As a result, the solution blew up and spattered all over him. He was lucky just to have the clothes he was wearing covered with the acid. He was not wearing goggles or an apron. (570)

829. In my college organic lab during preparation of a blue dye, a student down the lab bench was heating her caustic solution in a test tube without proper movement. The solution shot out of the test-tube about 5 feet and hit me in the face. No goggles were required "back in the dark ages." However, my prescription glasses kept the solution out of my eyes. I suffered minor facial burns. (578)

830. In a biology lab, formalin had been injected into a specimen as a preservative. When the student cut open the specimen with his face close to the dissecting pan, fluid under pressure exploded into the student's eyes. (606)

831. A very bright senior high student wanted to make rocket fuel. He asked his teacher if he could melt potassium chlorate and mix powdered sugar in it. The teacher

spent over an hour trying to convince him that there was no way that the experiment could be done safely.

The student was one of the “brightest” students in the school and had permission to work in a room just off the science office. There was a large window between the two rooms. The student tried the experiment and was stirring the sugar into the molten potassium chlorate with a thermometer when it flared up in a huge flame. A teacher from the science office was at his side immediately and walked him to the nurse. He was quickly taken to the hospital and treated for severe burns on his hands and face. Part of his hair was burned off. He had permanent damage to his hand. The only good thing was that he was wearing goggles and suffered no injury to his eyes. (617)

832. At the University of Newcastle Upon Tyne, England in 1975, a fellow undergraduate received injury to her eyes during an experiment. A few of us were in a large lab with long benches with fume hoods around the outside of the lab. One student was doing work in the hood refluxing some chemicals. About fifty feet away, a girl was recrystallizing her product using ether in a watch glass. The dense vapors spread along the bench and a roaring rush of flame spread the full length and hit her in the face. She was not wearing goggles. (815)

833. A tube was being heated with a Bunsen burner while attached to a ring stand. The tube fell and the solution belched out just as a student walked into the line of projection. It hit the student in the upper forehead and on his face. He was wearing goggles but the solution ran down into his eyes and face. (He was wearing the wrong type of goggles.)

The student immediately splashed water over his face and eyes. As a result, his face was stained brown from the protein. He had discolored skin for two to three days. The dead cells sloughed off. Luckily there was no eye damage.

Now, we only use hot water baths on hot plate. This experience proved to be a dramatic scare that reminds incoming students to be even more careful. I will not allow students to use phenol with melons. The parents recognized that we had taught proper response to eye splashes and the student acted immediately. However, the eyewash station was not close enough and the bench water faucet had to be first used. There is an obvious need for a different style goggle. (621)

834. A high school senior was using an eyedropper to stir a strongly basic solution. He pressed on the bulb and splashed the basic solution out of the evaporating dish onto his face. He had slight burns on his face but goggles protected his eyes. (622)

835. A high school junior was experimenting with making some alloys for a science fair project. He wanted to determine the temperature of the molten alloy. He inserted a mercury thermometer in the alloy. It exploded spattering some of the alloy in his eye. Fortunately, it did not affect his vision. He was not wearing safety goggles. He was lucky. (629)

836. In an IPS class, students were using potassium dichromate in a solubility experiment. The lab was over and goggles were off. A student rubbed his eye and he

got a crystal in his eye. We began flushing and called the nurse. She compounded the problem when she insisted on sending the student to the emergency room without a longer flushing period. Student wore an eye patch for a month. (705)

837. I was demonstrating the properties of silicon as a metalloid. To show its brittleness, I hit it with a hammer. I must have come down with extra force and a small piece went flying. It hit a student in the second row. This incident pointed out to me that goggles are necessary even during demonstrations and not just during lab activities. (722)

838. In 1964, seniors were making methane according to lab manual instructions. A student arrived thirty minutes late to the lab. She decided to watch another student's experiment instead of performing it herself. She did not put on goggles or apron.

For some reason (to this day undetermined), pressure built up in the test tube and the cork and all contents exploded from the end of the tube. One of the contents was sodium hydroxide. As the contents splattered around the lab table two girls were splashed lightly in the face with the contents. The student who was watching got the contents full in the face. Her contact lenses saved her face.

Twenty years later she was still having plastic surgery. I was one of those seniors. (767)

839. In 1987, a biology teacher was demonstrating a technique for dissecting a clam for a high school biology class prior to the student’s dissection lab. A piece of tissue from the clam flipped into her eye because she was not wearing goggles. It burned her eye to the point that the ophthalmologist treated and bandaged it for two days. Now, we require all students to wear goggles when dissecting. (794)

840. In 1986, an eighteen-year-old high school student was working part time in a local industrial lab. Her job was to wash dishes. An unmarked, closed plastic container exploded when it was uncapped in dishwater. It blew a strong base into her eyes, on her arm and hand. Even though she had received instruction at school on the necessity of wearing goggles she chose not to wear them because the other workers never wore their goggles and she didn't want to be different.

She had second-degree burns on her arm and hand. Her eye was saved. (796)

841. In 1980, in Smithtown, New York, a high school junior in was doing a chromate/dichromate equilibrium lab. The teacher did not require goggles because the experiment involved only small amount of reagents. They were using Potassium chromate, dichromate, Sodium hydroxide, hydrochloric acid, and Barium nitrate.

The student was holding a 10x100mm test tube in his hand about two feet above the lab counter. The tube probably contained a one-milliliter mixture of the above materials. The test-tube slipped from his hand, hit the lab counter but did not break. Instead the liquid reversed direction and went directly into his eye. The eyewash was used, he was sent to the nurse and to the emergency room at the hospital. There was no injury. (834)

842. In 1975, in a Connecticut public school, an eighth grader applied direct heat to an alcohol thermometer. It exploded and glass flew into his eyes. His goggles were on top of his head. (884)

843. In 1984, I was demonstrating the relationship between the pressure and the boiling point of water. I initially heated the water in a flask with a one-hole stopper with a thermometer in it. Then I cooled the water under a trickle of cool water. There was a small crack in the flask and there was an implosion from the vacuum created. Glass went everywhere. I had my goggles on. The students did not. Fortunately, the students were far enough away. Now, when I run this demonstration, I carefully check the flask for cracks. I tape the flask and all students wear goggles. (887)

844. In 1985 at Wesleyan University in a graduate chemistry lab, a vacuum hose clamp pushed off and flew into a student's eye. (926)

845. In 1956, New Hampshire, in a high school chemistry class, were preparing hydrogen gas by placing mossy zinc in a test tube and then adding dilute hydrochloric acid. The instructor had explained the need to leave the test tube unstoppered. A student stoppered the test tube. The gas pressure increased. The stopper blew out of the tube splashing the student's face with the corrosive mixture.

The response was to wash the face with our eyewash for ten minutes then send the student to the nurse who continued the process. The student was then sent to the hospital where no injuries were discovered. Accident reports were filled out.

No eye protection was used. The rule had been neglected and, complicating the situation, the instructor was not involved. (940)

Other cases include: 706, 714, 716, 727, 728, 733, 734, 746, 747, 748, 758, 775, 776, 817, 918

Hair

846. A high school student came in after school to make up a missed lab. The lab did not require a partner, although his partner was present. The teacher was across the room from her workstation and looked up. He saw the students' hair catch fire unknown to her. The teacher called to the partner who immediately extinguished the fire by brushing her hair.

If partner was not close by, the student might have panicked and freeze. The time it would have taken for the teacher to reach the student was sufficient for flames to have done serious harm. (618)

847. In a biology lab, students were using burners. They were instructed to shut them off as soon as they were finished. Student "X" complied then realized he had to do one more step and relit his burner. He then leaned over it to pick up a piece of apparatus, igniting his hair. The student next to him had the presence of mind to put down his working and bare handed snuffed out the fire. (667)

848. Hair with hair spray caught on fire. It was a puffy bangs hairdo. I put it out with my hand as I was very close. She was ok, so was I, but very frightened. (741)

849. A female university microbiology student with a light, poofey hairspray covered hairdo leaned over the flame of a Bunsen burner. Her hair caught fire. Another student dropped his jacket over her head to extinguish the flames. No skin burns occurred, just a new haircut! (774)

850. My eighth grade students were learning how to use Bunsen burners. A young girl approached me to say that she could not get her burner to ignite. I went to her workplace and adjusted the burner without ever checking the gas jet. I struck a match and a flame leaped out at me. I turned my face to protect it but my waist length hair (that should have been tied back) started to burn. A student smothered the flame in my hair as I reached to turn off the gas jet. (800)

851. In 1971, Coventry, Connecticut, A girl's long hair caught fire while working near a Bunsen burner. She characteristically tossed her head and hair around as she worked. Loose hair went through the flame. She wore goggles. I caught her by the head and put her hair in the nearby running water. There was no severe damage.

I now have high-powered hoses that can "hit" with force anyone in the class. (869)

Other cases include: 515, 523, 527, 532, 613, 642, 691

Heating mantle

852. A graduate student working alone at Georgia Tech was synthesizing an organic compound under a hood. He placed a round bottom flask containing the preparatory mixture in a heating mantle and left the lab. He came back a while later to check the mixture and realized he had heated it too long and too vigorously. While attempting to remove the flask from the mantle, the mixture exploded. Glass flew into his face. He was severely cut and burned. He was in the hospital for a few weeks. Fortunately he was wearing safety glasses and a lab coat. (950)

Hot plate

853. The science class used hot plates to heat water during an experiment. The hot plates were too hot to put away and were left out. Students from the next class came in. One student touched a plate and burned his hand and fingers. (979)

Other cases include: 591, 604, 854

Hot water

854. A student was heating water for a hot water bath on a hot plate. The student turned around, catching the cord and the hot water spilled on her leg causing a bad burn. The teacher pulled down her jeans and put paper towels of cold water on the burn while another student went for ice and the school nurse.

The electric sockets were below the table top, on the side of the table. (512)

855. In 1980, Waterbury, Connecticut High School, a physics student was boiling water for heat transfer experiment. She was rather short and stood on tiptoes to read the thermometer. She pulled the thermometer down against the edge of the beaker and pulled boiling water on herself. Luckily, the damage was limited. (902)

856. In a high school lab, a male student in physics was boiling water in a beaker. The beaker broke and boiling water spilled all over. (963)

Improper behavior

857. During my first year of teaching, I was demonstrating to general science students how to make alcohol from sugar. I discussed the fermentation process as well as identification and purification procedures.

After two weeks on the project, students were to turn in their completed product. One student decided to guzzle down 300cc of nearly 200 proof alcohol instead of turning it in.

I was petrified as I was sure it would kill him. I took him to the water fountain and forced him to vomit until I was sure he was safe. I then made him drink two containers of milk and took him to the principal. (718)

858. In 1984, a company that used a variety of chemicals in order to produce "boards" was expanding and updating its laboratory and storage facilities. Workers who were responsible for renovation had relatively free access to the halls in the lab area. One such worker paid no attention to the "No Smoking" and "No Admittance by Unauthorized Personnel" signs. He walked into a storage area, tossed a lit butt and caused an explosion. It was lunch time so few people were around except for a chemist who grabbed the man away from the fire, shoved him under the nearest shower and ran to pull the fire alarm. Since the construction wasn't finished, the automatic alarms didn't go off. Others heard the chemist's screams and ran in with fire extinguishers until fire department arrived. (851)

859. A biochemistry lab involved, amino acid sequencing of a protein. Students were warned that they were working with toxic reagents and to use care. One of the compounds in use had been premeasured by the lab assistant and placed in small containers. A student was joking and intended to pretend to drink the reagent. Unfortunately, he really drank the reagent. He was sent to the infirmary. The incident apparently did no immediate harm to the student. (857)

860. In Danville, Vermont, a male student was aggressive in his behavior. During counter clean up with a sponge he cleaned so vigorously that he smashed a glass Pyrex beaker against the back of the counter and cut his hand. Students with this type of behavior should not be allowed in lab situations. (896)

861. In Connecticut, Newtown High School, a student was not careful on how she was sitting on a high lab stool. The stool tipped over and the student fell hitting the ground with great force. (910)

862. In May 1975, my eighth grade honors class was having a lab activity that included building electromagnets and determining methods of increasing their strength. One of the students placed one of the D cell batteries in his left hand and a scissors in his right hand. He placed the scissors in the outlet! "Why?" I asked him. He said, “he wanted to recharge the battery!” (958)

863. In the shop department of our school, a boy threw a piece of wood to another whom, when he grabbed for it, cut off two fingers on the table saw. His teacher grabbed the fingers and the boy, threw him into the car and had him at the hospital within five minutes. The boy’s fingers were rejoined. (984)

Improper cleaning

864. In the early evening, smoke started to come from a wall behind the wood stove. The fire department was called. After we put out the smoldering fire, we found that in haste, the outside chimney had never been cleaned out and the soot had built up to the stove pipe. It started to burn the wall. The wall behind the stove was made of wood with a thin layer of paneling. If the fire had started in the middle of the evening, who knows what would have happened. (714)

865. A previous instructor had been working with acids on the lab table and had only partially wiped it up. I sat on the table while lecturing and was unaware of the effects until the seat of my pants decomposed. (971)

Improper disposal

866. I was a college student. During an organic lab, I wanted to get rid of some chlorosulfonic acid. I poured it down the sink and it violently splattered back at me. I still have two scars on my chin from the acid burns. (660)

867. A graduate student collected waste in a common waste container without keeping careful records of what was going into it or without the proper chemical knowledge to worry about it or both. A small explosion and fire occurred. (688)

868. During an eighth grade science lab, I lit a Bunsen burner with a match. I discarded the match into a Styrofoam cup that I thought had water in it. The cup wound up in flames. The cup was empty. Fortunately, it was next to a sink and was quickly extinguished. (737)

869. A woman was getting rid of hair spray from an aerosol can. She sprayed it into the toilet bowl. She did not flush the water and hair spray. Her husband came home, took his newspaper and cigar into the bathroom, sat down, lit his cigar and threw the match into the bowl. He jumped up with the flame falling into the tub and broke his leg. A true story. (744)

870. In 1970, in a college organic chemistry lab, after the instructor left the room a student began doing his own experiment. He combined chemicals to form a very unstable compound. He said he was aware of what he was doing. He inadvertently spilled the liquid compound. Clean up became explosive when it came in contact with anything. Towels were disposed of in the trashcan that resulted in a small explosion that was large enough to cause the instructor to return. (828)

871. Students were in a regular classroom lab using a dropper to dispense minute quantities of concentrated acids. Apparently, one student spilled a small amount of acid and told no one. He did not wipe up the spill. Later on, a girl wearing a blousing with oversized sleeves soaked up some of the spill. The fabric came in contact with her skin and stuck there. The girl thought her sleeve was just wet with water. But, soon a burning sensation alerted her to the problem. Flushing and neutralization along with a visit to the nurse minimized the injury. There was no permanent scarring. (845)

872. Milford, Connecticut, hot potassium chlorate was dumped into the paper trashcan. It burst into flames. Luckily, there was no bodily injury. (866)

873. In 1964, a student put a burned out but hot match into a wastebasket which had a paper towel with Carbon tetrachloride on it. There was a bucket fire. It was easily extinguished. (903)

874. In 1980, Cairo Durham High School, chemicals used to create a volcano were disposed of by pouring them into the school Dumpster. The Dumpster contained paper, fats, etc. from the school kitchen. A fire was produced. (918)

875. In 1978, New Britain General Hospital, the disposal of acid toxic waste was to pour it on the ground. This was done with approval! (928)

876. A Chemistry I, student was lighting his burner. After it was lit, he proceeded to shake the match and toss the extinguished match into a nearby waste can. The can ignited shooting flames to the ceiling. The flame was quickly extinguished by using a wet towel.

The problem was due to improper cleaning of an alcohol spill by a Chemistry II student. The saturated paper towels had been put into the can from the previous period.

After that incident, I check all waste cans after every lab period. (503)

877. There was a large open area, a one gallon can of duplicator fluid was apparently disposed in a waste basket during an IPS class. There were three IPS classes going on at the same time. Someone used matches and dropped the used match into the basket. The explosion that followed was enormous. It rocketed everything up and did great ceiling damage. (566)

Improper Handling

878. In 1986, St. Joseph College, in a General Chemistry lab, students were doing an experiment on gas chromatography. The students actually were building their own simple GC using Tide detergent as the column packing, methane as the carrier gas and a copper coil/flame detector. Small 1cc syringes were used to inject samples of carbon tetrachloride, chloroform, methylene chloride and various Freon. A student was getting a sample from the hood; another student was standing behind him with an uncapped syringe in his hand. He was holding it low. As the front student bent over, he backed into the needle. Ouch! (830)

879. I received a request for copper sulfate from a colleague in the elementary school across the street. This substance was for an experiment to be done by a student under his supervision. This is done as a yearly project. A portion of the chemical was sent in an unmarked bottle. The mother of the student was a school board member. The mother decided to send the chemical excess back to me by means of her older daughter. The daughter, not wanting to detour from her schedule, gave the chemical to a student who had me for class later that day. The student, now in possession of the copper sulfate, was associated with the local drug culture. She passed out the copper sulfate in English class claiming that it was "blue rock candy." Three or four students ingested varying amounts of the chemical. One was sent to the hospital to have his stomach pumped. (863)

880. An organic chemistry student at a college in Pennsylvania spilled a chemical on herself. The chemical quickly dissolved her skirt and burned her skin. (892)

881. A student washing a test tube in the lab sink. He flicked it to shake excess water from it. The tube had a previously unnoticed chip on the upper edge. While flicking it, the student lost control. The tube hit the top of the teacher’s hand and sliced it.

The results of not disposing of chipped tubes and having too many hands in a sink was six stitches for the teacher and a very shaken student. (659)

Improper Instruction

882. In a Junior College, a second year chemistry student was in an organic lab. I don't remember the particulars of the lab. The lab instructions said to slowly add one chemical to another. One student in the class did not read the lab before entering the room and added the chemical all at once. Needless to say, he and several other students wore the results of his action. No one was hurt and a lesson was well learned.

In a lab situation, students must read the whole procedure before beginning. (610)

883. In my first year of teaching, I followed a lab procedure using Drano to show an exothermic reaction to my junior high students. The test became so hot it spilled over. Luckily, no one was hurt. (684)

884. Watch out for seemingly safe equipment and chemicals. In a chemistry book I am currently using, the students are told to heat an empty glass flask to show how air expands when heated.

Through a one holed stopper and tubing the expanded air was lead over to a test tube under water. You are also supposed to let it cool to show how air contracts. However, there is a good chance that some water will go back into the empty hot flask along with the air.

If the water goes into a sill very hot flask, it could be instantly boiled and the steam pressure can blow up the flask too easily. (707)

885. A laboratory assistant in a large university was cleaning storage bottles with diluted acid solution. Proper techniques had been emphasized except for one minor detail. No one told the student not to place a cap on the container being cleaned. After 25 or 30 bottles were cleaned, the assistant placed a cap temporarily on one of the bottles. The bottle exploded. Fortunately, we had baking soda and emergency showers available. The top one third of the broken bottle is now secured above our sink in our prep room as a reminder. (762)

886. On another occasion, the same student did not properly connect water hoses. The lab and students were sprayed. (962)

Improper lab safety

887. In the hood at a company, a small oven spontaneously caught fire behind the control panel. Burning chemicals ran out through the vents, burning the area around the oven.

Spill residues had been allowed to collect for years without being cleaned out. It is believed that a chemical reaction of the residue finally occurred, resulting in spontaneous combustion. (509)

888. Most teachers at my middle school are elementary certified with little or no science background. We have a relatively large number of hazardous chemicals in stock. My

concern is that these teachers are not aware of the potential for problems that exist in their labs. (524)

889. A sixth grader was assigned a science project to do at home. He decided to build a volcano. His father, a music teacher at another school, brought home an explosive combination of chemicals for him to use to simulate an eruption. The mixture exploded and the student lost some fingers. The father sued the school district his son attended. (571)

890. Two students had large splinters enter their thighs by brushing against unprotected wooden lab table edges. (589)

891. We moved to a new school where a stone slab had been placed behind each sink to place glassware to dry. The slab was never attached to the wall. One day after I had finished washing some glassware, the entire slab slipped and crashed to the floor. The slab ripped the faucet off the sink. There wasn't anyone near by or else there could have been some serious injuries. (669)

892. Do not store chemicals alphabetically. All labs should have forty-five square feet per student. (738)

893. With the help of two-graduate student, I was teaching a lab class with 90 students while remodeling was taking place. During class time, an electrician insisted on working on the ceiling. I refused to allow this. He went to the Dean of the College who ordered that he be allowed to proceed. The Dean assumed all responsibility. I felt it unsafe. I moved the students from the area. The electrician slipped off his aluminum ladder, hit his head on the lab top and was unconscious. His ladder flew twenty feet down the aisle and could have seriously injured students. (739)

894. In 1970, a college organic lab student was in the back of the lab when her beaker containing flammable liquids caught on fire. She lost control of her senses, started yelling and waving her hands wildly. The instructor simply walked back and covered the beaker with a watch glass and the fire was out. This taught me to always remain calm and to talk my students through possible accident problems. Basically, the important thing to remember is to keep a cool head during an accident situation. (799)

895. Sometimes people are too used to smelling odors from a chemistry lab. A few years ago, an explosion knocked out a teacher working alone. By the time people paid attention to smoke from the lab, the fire was quite advanced. Worse yet, people were very slow responding to the fire alarm thinking it was another routine drill. (852)

896. In 1986, Durham High School, our school nurse states that the athletic program is the primary source of accidents, the play ground injuries being second, the chemistry

lab third and the shop program last. She blames students are horsing around without thinking or knowledge of the consequences. (920)

897. In an elementary lab, a girl bent down by the lab table. Students in the group were doing an activity with pulleys pulled over a ring stand. She claimed she was hit in the head. It was later claimed that the accident had caused severe damage to the nervous system. The insurance company settled out of court. (960)

898. A safety inspector wearing steel toe shoes was pulled across the concrete floor when the electromagnets for a particle accelerator were activated. He strained his leg muscles trying to resist the forces. (998)

899. In my room, I have a movable demonstration table. I was demonstrating the use of a laser that had a very short electrical cord. I had to move one corner of the table closer to my only electrical outlet. I taught the lesson and everything went well. The next period involved the same lesson. As I was explaining aspects of laser use, I walked over and straightened out the table just to make room. After I finished my remarks, I announced to the class that I would now turn the laser on. As I pulled the cord to plug the laser in, it was yanked off the table and crashed to the floor. The damage was $500. (669)

Improper storage

900. A stock boy left an empty wagon parked across the end of an aisle. The wagon was only visible one foot above floor level. A salesperson walked into the wagon and suffered a leg injury. (615)

901. Biochemistry, post-doctoral student stored endocrine extracts in organic solvents in open 50-milliliter glass tubes in the freezer section of a laboratory refrigerator. It was an ordinary household type.

One morning, about 15 minutes before the rest of the lab staff arrived, one technician about to enter the lab was confronted with an explosion. The door was down off the refrigerator; all the contents blew out and sprayed all over the room. The technician became an emotional wreck. Fortunately, the rest of us had not yet arrived. We spent the day cleaning up. (647)

902. When I graduated from college and went out to interview for a job, one of the interviews took me to a large high school on the coast of Connecticut. When I arrived, I was sent to the science department office. The department chairman and school principal were surveying the damage of a fire that had happened in the lab a few days earlier. As I passed through the lab, I noticed what looked like the molten mess of a telephone. The heat had been so intense that the phone had melted and touched the floor. It had been located about four feet up the wall.

When I asked what had happened, I was told that gallon bottles of concentrated sulfuric acid and ammonium hydroxide were on the floor in the stockroom. When a janitor swept the floor, he knocked a bottle of each together and the ensuring reaction caused the fire. (681)

903. When I was a student teaching, my critic teacher was asked to present a display of his many biological specimens in the school's display case. Because of poor judgment the specimen jars were too heavy for the glass shelves that were holding them. The shelves and display case collapsed spilling formaldehyde all over the school's lobby. The school had to be evacuated during the clean up. Nobody was severely hurt but many of us had upset stomachs because of the fumes. (700)

904. Our custodian stores ditto machine fluid in an outdoor shed. He sometimes filled the empty fluid cans of methanol with gasoline and used it to fill lawn mowers, snow blowers, etc. Somehow when a box of fluid was brought into the school, a refilled can of gasoline was also brought in. Before school, a teacher filled the ditto machine and proceeded to run off a ditto with little luck. As teachers came into the teachers' room, several were smoking. The room started to fill with the very distinct odor of gasoline. Luckily someone yelled out "Don't smoke" and cigarettes were quickly put out. Although I felt that school should have been dismissed, it was not. Many teachers and student got headaches and were nauseated. (706)

905. In 1988 at Middle School, a wooden cabinet with glass front doors was being used to store chemicals. From an unknown cause, the cabinet tipped and the chemicals fell out, mixed and a noxious vapor was formed. There was difficulty in trying to clean the spill and part of the school was closed for more than a day. (825)

906. In 1960 at the Plax Corporation in Connecticut, a custodian was freeing a clogged trap in a drainpipe in a cabinet containing bottles of organic chemicals and inorganic acids. He broke a bottle and many bottles flew out of the cabinet onto the lab floor in a horrible mixture. Fumes, smoke, heat, etc. were instantly generated. (870)

907. While working at Pratt and Whitney in East Hartford in the heat treatment department, we often had to degrease various machined parts. The acid basin was below floor level, guarded by a waist high solid railing. Supposedly, a worker fell over the railing in one of these degreasing stations. His bones were all that was seen of him when fellow workers came to assist. (876)

908. A ninth grade student dared another student to eat lead nitrate for a dollar. He ate several spoonfuls without the teacher noticing. The Lead nitrate had been placed on the counter in a labeled container for lab use that period. The student spent two days in the hospital. (891)

909. In a chemistry lab at college, a light fixture fell on the acid and base bottles during lab class. It happened right at a place where a student was standing. (929)

910. In 1987 at a New Hampshire, Sears Roebuck, a worker was obtaining a case of paint from the storage area, he turned to walk and fell on both knees. He received

severe trauma to his right knee. The cause was plastic strapping material on the floor. The accident could have been prevented by proper maintenance of the area. (938)

Improper Supervision

911. In using a circular saw to make boards of cedar from a log, it was discovered that the cedar had a rotten inner core. Pushing on the log forced the cedar to go through quickly severing the person's thumb and damaging two fingers. (592)

912. A high school student was run over by the propeller of a motorboat while water skiing. It left his face with very obvious scars. (600)

913. I was doing a demonstration on how pure elements are mixed to form compounds. I went to turn on the water valve from underneath the lab bench. While I was under the sink, one of my students turned on the water faucet attached to the sink. There was a rubber hose attached to the faucet. When the water came out of the rubber hose, the hose began to twist and spill water all over the place. Since I didn't know the water faucet was on, I was caught by surprise. In any case, I bumped my head and when I got to the faucet I was very fuzzy and knocked down a graduate cylinder. I sustained several small cuts. (609)

914. A somewhat unstable young man was extremely frustrated at not being able to identify the components of his unknown (lead and mercury ions). He drank his unknown. We identified the contents of the unknown and the amounts. He was sent to the hospital emergency room to have his stomach pumped. (620)

915. Two high school students were interested in fireworks. They purchased the necessary chemicals and worked in one of the student's cellar. In trying to make explosives, they ground some of the material together resulting in an explosion. Fortunately, they were only burned slightly. The parents had to replace a cracked cellar wall. (635)

916. In 1982, during a high school biology lab, we were conducting experiments to identify biochemicals. A student, contrary to directions, decided to mix all the reagents. Toxic fumes were released. Student experienced eye irritation. (790)

917. One Friday morning in 1974, I signed in at 7:18 A.M. and proceeded to the third floor in the old building where I taught General Science. After filling the boards with material the students were suppose to study and copy, in preparation for a quiz to be given on Monday. I set up my demonstrations at the lab table and my work at my desk. The students came trickling in as I went over the materials on the board. I made two demonstrations, one of which involved an Erlenmeyer flask, a balloon and some water. The water was heated causing the balloon to expand and later contract on cooling. In order to heat the system, I used a small tomato paste can with holes punched near the bottom and a small amount of 70% isopropyl alcohol which came out of a yellow one

gallon can. I had intended to add some sand in the bottom to stabilize it but never got around to it. I had knocked the can over on previous occasions but nothing had ever come of it.

The burner provided a nice blue authentic hot flame for the experiment with metallic ions. This experiment I was doing at my desk with individual students when a student approached me and asked to do the experiment. I handed him the matches. The student was egged on to put alcohol in the flask as well as in the burner. Suddenly, I heard a sharp crack and a whoosh with billowing black and yellow smoke. Student screamed and ran for the exit. I grabbed one girl whose vest was on fire and smothered the flames. I reached for the fire extinguisher just as another teacher came in, grabbed my aquarium and doused the remaining flames.

The can was judged to be unsafe. Three students sued the school board for 1.2 million dollars. They collected. (792)

918. In 1985, in honors level, high school Biology class of sophomores, students were evaporating a nontoxic substance from the surface of a microscope slide. The lab manual illustrated the slide being held in the flame of the Bunsen burner. One student did this instead of passing it through the flames. The slide broke apart into small pieces. The same thing happened with a test tube. It too shattered into fragments. Fortunately, the students only received minor cuts on their hands.

Teachers should always clarify correct evaporation techniques and stress the wearing of goggles. (801)

<u>Improper technique</u>

919. A student used a string type dust mop to absorb a quantity (500ml) of an organic solvent. After wiping up the spill, he leaned the mop handle against the wall and walked away without reporting the incident.

The next morning, the mop handle was found resting on top of a pile of ashes. During the night, the solvent had apparently oxidized rapidly enough to ignite and smolder. Fortunately several cartons of paper in the same room were far enough away not to be ignited. (501)

920. An angular momentum conservation experiment was being performed using a rotating seat on a permanent base. The student had a two-kilogram weight in each of his extended hands. The student was asked to keep his hands high and bring the weights in and out slowly to illustrate conservation of angular momentum as he was made to rotate. Student dropped his hands, in the extended position, and whacked the back of his hand against a nearby bench. (530)

921. In industry, I have witnessed a chemist leave a large reservoir of water under heat and superheat it. The water blew out and hit the overhead florescent lighting and showered me on the other bench with glass and debris. (531)

922. A student in a sewing class put the needle through her finger. The needle broke. None of the needle was protruding from the finger. The student admitted that she looked away while she was sewing. (595)

923. In a junior high class, a student was heating a closed system. The test tube exploded firing the stopper like a missile at the ceiling. (605)

924. In a middle school a student failed to lubricate the tubing. The tube shattered and passed through the palm of the student. (672)

925. Each year, I was in the habit of doing a demonstration involving the depression of the boiling point of water by reducing pressure. About 75 milliliters of water was boiled in an open round bottom flask (250ml). When the water reached boiling, the flask was stoppered and then run under cold water. By decreasing the pressure, the water keeps boiling. But, by decreasing the pressure, the stopper was sucked into the flask. I had always removed the stopper by heating the flask back up and popping it out. I had also always put the apparatus behind safety glass, just in case.

Last year it paid off. When the apparatus was being heated something gave away and the entire apparatus and safety glass shattered. No one was injured. I don't do the demonstration any more.

This demonstration was suggested in a teacher resource book, but did not suggest how to remove the stopper. (664)

926. In a college lab, a girl was wearing glasses. She splashed a few drops of solution on her cheek. She removed her glasses and wiped her cheek with her hand towards the center of her face. She therefore, got some of the chemical in her eye. No permanent damage occurred. But, a trip to the doctor was needed. (611)

927. A student singed off his eyebrows and part of his eye lashes when leaning over to write in his lab book. (637)

928. A janitor wanted to warm a can of beans for lunch. He placed the closed can in an old furnace. Fortunately, he then left the lab. All the students and staff were at lunch when the ensuing explosion occurred. The furnace was embedded in the brick door in the opposite wall. (644)

929. I had a student rub her eye with a chemical. It caused eye irritation. You must constantly watch and remind students not to put their hands near their eyes or mouth. (683)

930. The class was instructed to take bacterial samples from around the classroom. Cultures were incubated and grown. As the teacher made observations of the open plates, she inhaled the spores of fungi resulting in a severe lung infection. (694)

931. I was using a torque wrench to demonstrate how it measurers torque. I did not have an object with a boost to apply torque to. I therefore used a second wrench on the first wrench. This slipped and the large torque wrench flipped up and hit me in the head causing a cut and some dizziness. (695)

932. When demonstrating how to make an acid solution with a particular molarity, a teacher was pouring acid into a glass container partially filled with water. The heat produced cracked the glass in a ring at the bottom. When she picked up the bottle the bottom fell out and acid splattered. (719)

933. Two years ago we were conducting an experiment on the solubility of salts. One student placed a thermometer that was in a beaker of potassium chloride and water, in her mouth not knowing what was in the beaker. (768)

934. In 1970, Connecticut, a high school physics teacher was demonstrating the deformation of material with a hydraulic press as compared to cast iron pieces which can fracture. The piece slipped loose and was hurled the length of the classroom and embedded a piece in the rear wall. It was his first time using the hydraulic press. (907)

935. This is a personal accident that happened when I was growing up. My mom was frying chicken. The fat caught on fire. She screamed and my dad ran in and poured water on the fire. The fire went "swoosh" causing the curtain above the stove to catch on fire. My dad ripped them down and stamped the fire out. My dad had been a volunteer fireman for 19 years when that happened. He forgot what to do in a crisis at home. (968)

936. In January 1985 during a wood working class, one of my students had an accident. He was the only one I ever had in sixteen years. He was cutting a piece of wood on the table saw. He pushed his good piece through, and then he went to push away the waste piece. It kicked back and pulled his fingernail off. (978)

Labeling

937. I found a bottle of acid with the original label gone and a rubber stopper in it. The liquid was brown. I thought it might have been sulfuric acid and the brown color was due to a reaction with the stopper. I moved the bottle to a sink and the stopper blew out with small droplets spraying all over me. The bottle turned out to be decomposed nitric acid under extreme pressure. By sticking my head under the faucet I was able to avoid injury. Over sized glasses prevented eye damage although it took a long time to get all of the soft rubber from the stopper off them. (520)

938. In 1986, Connecticut, during my senior year at Western Connecticut College my partner and I were involved in a protein synthesis lab. We divided our work. I needed some distilled water. My partner got some in a beaker and kept it at our station. She had two beakers, neither had labels. She handed me one and as was my habit I checked to make sure. It was concentrated sulfuric acid that I nearly poured on my hands. Needless to say, my partner wasn't my partner for long. (803)

939. In a chemistry lab in college my lab partner picked up an unmarked beaker. He smelled it to see what the contents were. He took a deep breath and past out. It was ammonia. (831)

940. In 1996, Connecticut, students were testing metal oxides (manganese dioxide, ferric oxide, and zinc oxide) catalysts for decomposition of potassium chlorate. A student couldn't find iron oxide and asked where he could find it. Another student across the room said, "It looks like this" and held up his bottle. The first student then mixed his potassium chlorate with red Phosphorus, which looked like the iron oxide. Upon heating, the test tube it exploded. The student suffered a few facial cuts and fainted, the result of shock. (900)

941. In 1975, a student used the wrong acid (nitric acid) by misreading label or lab manual. An orange gas was inhaled and the student collapsed. (927)

942. In 19611963, at the University of Texas, Austin, when I was a graduate student, my laboratory bench partner made only infrequent visits to our lab. Unwashed, unlabeled glassware tended to accumulate on her side of the bench. One day she appeared, intent upon cleaning her area.

The 500-milliliter round bottom flask contained a reasonable amount of white solid. We later found that the solid had been formed by mixing solutions of one of the borazines and silver perchlorate, and allowing the solvent to evaporate.

My partner was not wearing eye protection when she performed the following experiment. A small amount of the white material on a metal spatula was immersed in a stream of tap water at the sink. The white material exploded violently.

Next, my partner directed a fast flowing stream of tap water into the flask itself. An immediate detonation followed. I was standing, back turned, about six feet away, and was deafened for several minutes. Flying glass shards penetrated all the fluorescent light tubes within a twenty-foot radius darkening the room. The force of the explosion blew the tops off three nearby gallon bottles of organic solvent the liquid line, setting the benzene, acetone and isopropanol on fire.

The ambulance arrived within ten minutes. My partner suffered severe lacerations, particularly in the arm and hand that had held the flask. She also received a number of glass shards, too small to be removed, into one eye. (955)

943. While I was student teaching, we were using microscopes. When one of the students plugged in the microscope, it blew and started a fire in the outlet. Students had destroyed the outlets in the lab tables by putting their pens and pencils in them. No one was injured. (797)

Negligence

944. I was working for a chemical company one summer. I was told that an individual had slashed his hand with a broken beaker. The individual had handled the equipment carelessly. (543)

945. Heating test tubes from base was specifically demonstrated. The instruction was given to check all equipment before starting. Students were given permission to start with one student to watch for problems. One group proceeded to talk while doing lab and forgot to watch how they were heating the tube. The liquid shot out of the tube and splattered on one student. Luckily it never touched the skin and no one was burned and no clothing damage was reported due to safety equipment. It could have been serious due to the close quarters of crowded lab desks. (649)

946. My mother was melting lard in a frying pan to put into a container to store. She left it on and went out of the room. A while later, she returned to find smoke and flames. She put it in the sink and turned on the faucet. Instead of putting out the flames they shot up, within inches of the kitchen curtains. Luckily, the oil burned out and the flame died before setting the curtains on fire. (704)

947. In 1976, Buffalo Airport in Buffalo, New York, November 16, the general foreman's hardhat was blown off and consequently sucked up by a jet. He thought he could just pick up another hat the next day. Tomorrow came and went and he still did not get a new hat. His job was to join the portable walkway to the terminal. He did not listen to instructions. Instead of waiting for the workmen to follow correct instruction, the foreman climbed to the porthole. Connections had not been done and the holding cable was cut. The foreman was pulled out of the porthole to the concrete and iron piling 12 feet below. He was admitted to the hospital with a double fracture of the skull and had broken the entire left side of his body. (841)

948. The accident that has made a lasting impression on me was when I severed the tendon in my left thumb. I was fourteen years old. I knew the rules of handling a knife but I had an attitude problem. I thought accidents only happened to others. It could not happen to me. The result was the loss of the flexion of my left thumb. (864)

949. In the spring of 1987, a mother brought her nine-month-old son to a Bridgeport, Connecticut PTA meeting in a walker. She walked near the coffee pot. The walker caught the electric cord and spilled a large pot of coffee on the child. He had burns over 90% of his body. (914)

950. In 1977, a man was burning brush. As the brush piles burned down the coals were raked into the center until the fire burned out. He didn't put the fire out with water. It jumped the burn area and started a forest fire that burned two acres. (859)

Other cases include: 928

Oil bath

951. While making nitrobenzene, the apparatus was overheated. It was in an oil bath and when the distillation apparatus exploded the oil was spilled onto the student causing severe burns. (764)

Paraffin

952. In 1978, Connecticut, a woman was heating paraffin in a pan on the stove and it ignited. She attempted to pick up the pan and place it in a sink. Hot wax splashed over her hands. She dropped the pan and ignited a small rug. She suffered extensive burns over her hands and arms. Minimal damage to the kitchen resulted from fire and smoke. (874)

953. In January 1976 while preparing dissecting trays I was splashed with liquefied paraffin wax. I was wearing eye protection and a lab coat. Even with the protection, I received second and third degree burns on my right forearm. (967)

Pipet

954. Mouth pipetting of reagent in a university research lab caused no immediate adverse impact and was not reported. As a result the person involved experienced a great deal of anxiety over potential health impacts until it was finally discussed with a faculty member. As it turned out, the reagent involved was non-hazardous but the lack of knowledge of chemical hazards, poor laboratory procedures and lack of communication certainly scared the student involved. (670)

955. In 1982, during an introductory college biochemistry lab, a student mouth pipetted a solution despite a prohibition against such a practice. She sucked some of the solution into her mouth. The seriousness of the situation was compounded by the fact that she did not know which solution she had ingested or whether she had managed to spit it out before swallowing any. Luckily, there was only one potentially toxic solution (diphenylamine) in use at that time and it was assumed that she had been pipetting that solution.

A poison control center was contacted; the maximum dose that the student might have been exposed to was calculated and compared against LD50 data for mice. That was the only available toxicity data. The campus clinic was contacted and the student sent there with a letter explaining the circumstances and relating the information provided by the poison control center. The student was informed of symptoms to look out for and I monitored her for several days.

As a result of this incident, mouth pipetting was even more strongly warned against. The poison control center number was posted in the teaching assistants' notebook. Students were more strenuously required to label chemicals containers and know the nature of materials with which they are working. (850)

Other cases include: 567, 648, 747, 780

Protein

956. In 1982, spring semester, University of New Hampshire, a biochemistry lab was being done on amino acid sequencing of a protein. Students were warned that they were working with toxic reagents and to use care. One of the compounds in use had been measured by the lab assistant and placed in small containers. (It may have been ninhydrin). A student was joking and intended to pretend to drink the reagent. Unfortunately, he really drank the reagent. The student was sent to the infirmary. The incident apparently did no immediate harm to the student. (956)

Other cases include: 938, 859

Radioactivity

957. My first experience with lab accidents occurred during my senior year at the University of Massachusetts. I was in an immunology lab doing an immunoreactive assay. It involves using tetanus toxoid bound to a radioactive material. A classmate was supposed to use a micro pipet to measure the radioactive material. Instead the student used a one-milliliter pipet and tried to mouth pipet. Well, it happened that the student swallowed the tetanus toxoid. (608)

958. In 1961, I was working in a hospital lab on a research grant. The research investigated whether or not brain tumor tissue absorbed more radioactivity than normal tissue. The contaminated glassware used daily was cleaned by soaking in a large ceramic bean pot that was about 3/4 full of concentrated acid. We were given test tube holders to place the glassware into the open pot. One day, as I was placing some contaminated glassware in the pot, the tongs broke. The glassware fell into the pot and the acid splashed back into my right eye. I immediately flooded my eye with water and went to the emergency room for treatment. There was no permanent damage. But, I had a slightly burned cornea. (702)

Refractometer

959. I was a graduate student in chemistry and was working with a refractometer in a physical chemistry lab. The card to the refractometer had a switch on it. When I attempted to flip the switch to use the instrument it literally exploded in my hands and threw me across the aisle to the next lab table. Both of my hands were severely burned. I attributed the accident to defective equipment. I feel that I was in no way responsible for the occurrence. (853)

Rubber stopper

960. An accident occurred to a student who tried to work a piece of glass tubing through a rubber stopper during a lab. The girl held one hand firmly and flatly against the opposite side of the stopper while twisting and pushing with the other hand. The tubing ended up going through her hand. (528)

961. Glass tubing was being inserted into a rubber stopper without using glycerin. The glass went through the flesh. No damage was done to the muscle fibers. (556)

962. Junior High students were doing an experiment where they were required to stopper a test tube to mix a solution and then heat the test tube. A student did not remove the stopper and the test tube exploded. Luckily, no one was injured. (585)

963. A student's hand was cut from broken tubing when trying to push the glass through a rubber stopper. (602)

964. After instructing students on how to insert glass tubing into a rubber stopper a student held a piece of 12 inch glass tubing at the long end and pushed the glass. He applied too much pressure. The glass broke and the momentum carried the jagged glass right up the length of his index finger. He received a cut about two inches long. (624)

965. A student was doing an experiment on solubility. One part involved shaking a stoppered test tube so the chemical didn't touch his fingers.

A later part involved heating the test tube to dissolve more at a higher temperature. This student didn't follow directions and combined the two steps. His test tube exploded showering small bits of glass all over the room. Luckily, no one was injured.

Now, I make a point of telling students to remove the stopper before heating. (651)

966. While making respirators in biology, I had students handle long pieces of glass tubing and subsequently insert the tubing in rubber stoppers. The students were not accustomed to putting such long pieces of glass tubing into stoppers. They were so frustrated with the adjustments that were needed they used excessive force. We sent two to the doctor's office in one day. (765)

967. In a high school chemistry lab, the teacher was doing a demonstration for the class and realized that she needed a one-hole stopper with glass bend for the demonstration. Without thinking, she asked one of the students to prepare the stopper. He inserted the glass bend into the stopper. Needless to say, the glass bend broke and the student got his pinky severely cut. He needed medical attention and was out of activities for several weeks. (823)

968. The most common accident occurs when students try to force a glass tube through a rubber stopper. On several occasions students have badly cut a palm or finger. On one occasion, the student put the broken glass through his hand. (865)

969. While putting glass tubing into the hole of a stopper, the teacher failed to use Vaseline. The result was that the tube broke and the teacher received a severe cut. (932)

970. About 20 years ago at Mount Carmel Academy in New Orleans Louisiana, in a senior high chemistry class while inserting glass tubing into a rubber stopper, the student did not follow directions and she was in too much of a hurry. She needed medical help but was lucky not to have lost the use of one or more of her fingers. (946)

971. Juniors in a Louisiana chemistry class were inserting glass tubing into a rubber stopper. Although they were told to lubricate the tubing and not to push with their palm, one boy did exert enough force to break the glass. It went into the palm of his hand causing a deep enough laceration to require several stitches. (954)

972. Inserting glass tubing into rubber stopper, the glass broke and went through the web of skin between thumb and index finger. Formed a perfect circle, not a drop of blood came out. (983)

973. I was a new teacher teaching students how to put glass tubing through a one-hole rubber stopper. A student tried to do it with out lubrication or hand protection. The tubing broke and went into his hand and the blood came out in spurts. I called for the nurse and put pressure on his hand until she arrived. (988)

Other cases include: 597, 668, 684, 704, 802, 821, 937, 993

Safety glasses

974. A welder had a welder's hood (faceshield) on but did not have his safety glasses on under it. He was welding a stainless steel test rig under a pressure of 24 psi. But, it should have been no greater than a 2 psi., inert gas blanket. The 21-year old welder lifted his shield facemask to inspect the weld he was doing. Instantly, the rig contents of sodium potassium liquid metal shot into his eye. We washed his eye with mineral oil and brushed his hair free of the reacting chemical. His eye burst at the hospital the next day. (529)

975. In an industrial lab, a chemist was preparing a polyester in a four liter glass reaction vessel. The apparatus consisted of an electrical stirrer, thermometer, and a connection to a vacuum pump to remove the water of condensation. The temperature of the reaction mixture was 240 degrees Celsius. During the process, the stirrer became entangled with the thermometer. When the chemist manually tried to free the thermometer and stirrer, the reaction mixture blew out of the vessel and covered his

face and hands. His eyes were protected by safety glasses but the rest of his face had serious second-degree burns. (569)

976. A student was distilling a qualitative analysis. organic unknown. It exploded. Fortunately, he was wearing glasses. He was knocked unconscious. His face was covered with small cuts from the glass. The unknown was diisopropyl ether. (630)

977. I use this example each year to show why you keep your safety glasses on even though you are through.

In a college Intro Chemistry lab, a student was just heating a small quantity of liquid in a small tube. The tube shattered and a shard of glass flew about 25 feet across the lab to land in my outstretched palm. The students standing with me discussing a calculation observed the incident. It hit home to them what it could have done to anyone's eyes. (677)

978. A student completed a lab assignment and cleaned up his area. He removed his apron and his glasses, picked up the ring stand to return it to storage. As he removed it from the desktop, he jerked it off the desktop and the tip of the stand hit him in the eye. He lost two days of school.

Future instructions: the last thing to do in the lab is remove your glasses. (656)

979. A student was heating sugar and three-molar solution of hydrochloric acid and sodium hydroxide in a flask. Somehow, some of the materials splashed up into her eyes. She could not open them for two days. The other students reported she was not wearing safety glasses. (726)

980. In 1987, four students were heating a solution and boiling it. They were going to remove the beaker from the wire mesh using tongs after the boiling was completed. As one girl approached the beaker with the tongs, the beaker seemed to leap off the stand onto the floor. I was close by and none of us remember the tongs touching the beaker. The solution stained one girl's shirt. She changed into another. Fortunately, the beaker broke on the floor away from people so no one was cut. All had on safety glasses. (821)

981. A visitor from the Ferrite Core Manufacturing Operation sustained an eye injury when one of the ferrite cones popped out of the oven door that had been opened to show the process to the visitor. (997)

Other cases include: 549, 608, 669, 675, 739

Scalpel

982. During a frog dissection, a student cut his hand with the scalpel. I washed it out and put a Band-Aid on it. I then sent him to the nurse for antiseptic lotion. (593)

983. In a Middle School Life Science Laboratory, we were doing frog dissection. Because of a deficit of laboratory equipment, I asked the students to bring in manicure scissors or any other instruments available at home that could be substituted for dissection instruments.

One student, whose mother is a nurse, brought in disposable scalpels, one for each lab group. On the second day of dissection, I allowed him to gather the scalpels and distribute them to the group. Instead of handing them out democratically he began to pick and choose who in the group would receive a scalpel. I watched as one student became impatient and yanked a scalpel out of his hand, causing a rather severe injury to one of his fingers. (780)

984. A college biology student was doing a dissection and sliced his finger with a scalpel. The teacher had the student wash the cut off immediately and called for the school nurse who was not in the building at the time. The teacher applied pressure to the finger to try to stop the bleeding and had the student sit down for several minutes. The teacher then sent the student to the office with a fellow classmate. The injured student passed out in the hallway and now in addition to his cut, has a bump on his head. The teacher had the student sit in a chair to wait for the arrival of the nurse. (839)

Shield

985. In an undergraduate organic chemistry lab, a student was nitrating an aromatic molecule. He was working under the hood, but the sash was not pulled down. He was heating the reaction mixture when it ignited. A lab instructor reacted very quickly and put out the fire. (856)

986. Two students were making soap. While heating sodium hydroxide, it splashed on the scalps of three students twelve to fifteen feet away. No shields were being used. (871)

987. During the 1980 Spring semester at the University of New Hampshire, in an undergraduate organic chemistry lab, a student was nitrating an aromatic molecule (toluene?). He was working under the hood, but the sash was not pulled down. He was heating the reaction mixture when it ignited. (I'm not sure what started the fire). A lab instructor reacted very quickly and put out the fire. No one was injured. (934)

Other cases include: 733, 734, 974

Syringe

988. We were doing a GC experiment in general chemistry. Students made a simple GC out of glass tubing and Tide detergent using methane as the carrier gas. The syringes we were using were initially sterile.

After injecting a sample, a student withdrew her syringe and somehow managed to stick herself in the finger.

Another student was waiting behind a student drawing a sample from a bottle in the hood. The student who was waiting did not have the cap on her syringe and was holding it about belt level. The student at the hood backed up and was "stabbed" by the syringe. (574)

Other cases include: 662, 878

Thermometer

989. I repeatedly have had trouble with students trying to insert thermometers into a stopper. Even with lubrication, I would end up with someone jamming it to the point of breakage, cuts, spills and stitches. One remedy was to prepare them ahead of time myself. (505)

990. A student failed to use glycerin on her thermometer while attempting to insert it into a one-hole stopper. The thermometer broke. The jagged end gashed her hand. (598)

991. As a teaching assistant in graduate school, I had a student who was attempting to put a mercury thermometer through a rubber stopper. The student had trouble inserting it and tried adding more glycerin. He then tried pushing with greater force. He not only pushed it through the rubber stopper but into the palm of his hand. He not only had a bad cut but also was sent to the hospital for treatment of possible mercury poisoning. (727)

992. In 1982, during a physics lab, a student was attempting to insert a mercury thermometer into a rubber stopper. He had not been instructed to remove the thermometer in the first place. He did so on his own. He had not been given instruction on how to properly insert the oversized object into the normal sized stopper hole. The thermometer bulb broke off in the stopper causing the jagged end to slip off and penetrate the palm of his hand,. A local hospital treated the wound and an accident report was filed. (778)

993. While trying to push a thermometer through a two-hole rubber stopper, a student pushed too hard. He broke the thermometer and suffered a serious cut on his hand. The situation was further complicated by the fact that mercury was involved and the wound was a puncture that did not bleed very much. (758)

994. In 1980, During an IPS class, a student was inserting a lab thermometer into a two hole stopper. He did not use glycerin although was instructed to do so. When he forced the thermometer it broke and he cut through the end of his middle finger. He had stitches. Seven years later he still has no feeling in the end of this finger. (877)

Other cases include: 657, 658, 835, 842, 943, 855, 933, 975

Thistle tube

995. In the mid-80's, in a high school chemistry lab, students were generating hydrogen with hydrochloric acid and zinc. The student improperly positioned the delivery tube and thistle tube funnel. He left the delivery tube down in the liquid. The released Hydrogen backed up through the thistle tube and splattered the student. (791)

Ventilation

996. A very good friend of mine is a mechanic and while I was getting my car repaired at his place of business, a fire started in the storage room. The storage room contained cases of oil, carburetor cleaners, dry gas, etc. Thank goodness the fire department was just across the street or else the whole station would have been blown up.

Investigations done by the Fire Marshall showed the store room did not have proper ventilation. (563)

997. During a lab, methyl mercaptan was not used under the hood and the room began to fill with the vapor. An advisor came in and put the bottle under the hood but the vapors didn't seem to clear even after the windows were open. It was soon found that the ventilation in the hood wasn't working correctly. (679)

998. In my school, the ventilation is poor at best. Apparently 75% of the air is recycled. I guess this is to save on heating cost. Teachers are always complaining about headaches any time any hazardous chemicals are used in the labs. Some day, we may live to regret this ventilation system. (685)

Wax

999. In 1987, New Hampshire, one of my coworkers was melting wax for dissection pans. He placed the pan across two ring stands with a Bunsen burner underneath. When the wax was melted he tried to remove the pan using two sets of crucible tongs. The pan tipped over spilling the hot wax all over the lab table and the floor. Fortunately, the man received only a few small splatters on his clothing. He had no protective clothing on at the time. (854)

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APPENDIX I. About the Laboratory Safety Institute

The Laboratory Safety Institute is a non-profit organization whose mission is to make health and safety an integral and important part of science education, work, and life. LSI provides training, consultations, publications, audio-visual materials, and responds to requests for information.

LSI was founded in 1978 as The Laboratory Safety Workshop by James A. Kaufman, Ph.D.. His experience working for the Dow Chemical Company convinced him that schools and colleges were not doing enough to encourage health and safety. Studies by LSI and others have shown the accident rate at schools and colleges to be 100 to 1000 times that of Dow and DuPont.

Since 1978, Dr. Kaufman has trained over 35,000 science educators and scientists. His brand of safety training is a unique blend of technical information, practical and inexpensive solutions, humor, and accounts of accidents drawn from a collection of over 3,000 examples.

LSI has produced two lab safety, training audio-visuals: The One-Day Lab Safety Audio Course (5.5 hours) and The Two-Day Lab Safety Video Short Course (eight, 90-minute VHS Cassettes)

LSI publishes a newsletter: "Speaking of Safety".

LSI offers lectures, seminars, short courses, audit and inspections, and regulatory compliance and safety program development consultations throughout the world for academic, industrial, medical, and government laboratories.

LSI operates an Internet discussion list, LABSAFETY-L, and maintains an informative website (http://www.labsafety.org)

LSI is supported by corporate sponsors, agencies, associations, generous individuals, its members. Members receive a newsletter subscription, use of the audio-visual lending library without rental fee, a 10% discount on most LSI publications, a 5% discount on training and consultation services, and use of the Toll Free, 24-hour Lab Safety Information Hotline.

The Journal of Chemical Education called The Laboratory Safety Institute "A national resource for safety conscious science teachers". If you would like to help support the efforts of The Laboratory Safety Institute: (1) Subscribe to "Speaking of Safety", (2) Become a member of LSI (partially tax deductible), and (3) Make a contribution (tax deductible).

Free copies of our “Laboratory Safety Guidelines”, Publications List, Audio-Visual Lending Library List, and Introduction to The Laboratory Safety Institute (containing seminar schedule and membership Information) are available on request. For more information about LSI, contact: The Laboratory Safety Institute, 192 Worcester Road, Natick, MA 01760 508-647-1900; Fax: 508-647-0062, Email: info@labsafetyinstitute.org

APPENDIX II. About the Editors

Dr. Fariba Mojtabai is a former Research Associate at both the Laboratory Safety Institute and the Brigham and Women's Hospital. She is employed by CVS Pharmacy as a Pharmacy Manager. She received her bachelors degree in Pharmacy & Chemistry from Massachusetts College of Pharmacy and her Ph.D. in Pharmacy from the Massachusetts College of Pharmacy.

Dr. James Kaufman is President of The Laboratory Safety Institute, President of Kaufman & Associates and former Professor of Chemistry at Curry College. He received his bachelors degree in chemistry from Tufts University and his doctorate in organic chemistry from WPI.

After two years as a post-doctoral fellow in the WPI Chemical Engineering Department converting garbage into fuel oil, Dr. Kaufman joined the Dow Chemical Company's New England Research Laboratory as a Process Research Chemist. During his four years with Dow, he became increasingly involved in laboratory safety related activities. He authored "Laboratory Safety Guidelines". Originally distributed by Dow, now over two million copies of the widely requested and reprinted brochure are in circulation.

Dr. Kaufman is the founder and president of The Laboratory Safety Institute - a national, non-profit center for safety in science and science education. LSI's lectures and training programs, AV-lending library, Mini-Grants, Internet discussion list, and publications help academic institutions throughout the world. LSI is supported by grants from individuals, foundations, companies and professional societies.

The Laboratory Safety Institute conducts seminars, short courses, audits and inspections for schools, colleges, and companies. They also provide advice on regulatory compliance, safety program development, facilities design and editorial commentary on laboratory texts.

Dr. Kaufman is a former, ten-year member of the American Chemical Society's (ACS) Council Committee on Chemical Safety and is past-chairman of the 2,500-member ACS Division of Chemical Health and Safety. He is the author-narrator of the ACS Audio Course on Laboratory Safety and editor of "Waste Disposal at Academic Institutions" from Lewis Publishers. He recorded and edited the "One-Day Laboratory Safety Audio Seminar" and "Two-Day Lab Safety Video Course." Most recently, he co-authored "Safety Is Elementary: the new standard for safety in the elementary science classroom."

APPENDIX III How You Can Help

The Laboratory Safety Institute gratefully acknowledges the generous support of our sponsors. Since 1980, our major benefactors have been:

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As we expand both the number and scope of our services, we need the voluntary support of those who enjoy and appreciate our efforts. Furthermore, it is vital that our professional and corporate supporters see their commitments to the Laboratory Safety Institute matched by the enthusiastic financial support of individuals. May we invite you to help by becoming a "Friend of the Laboratory Safety Institute."

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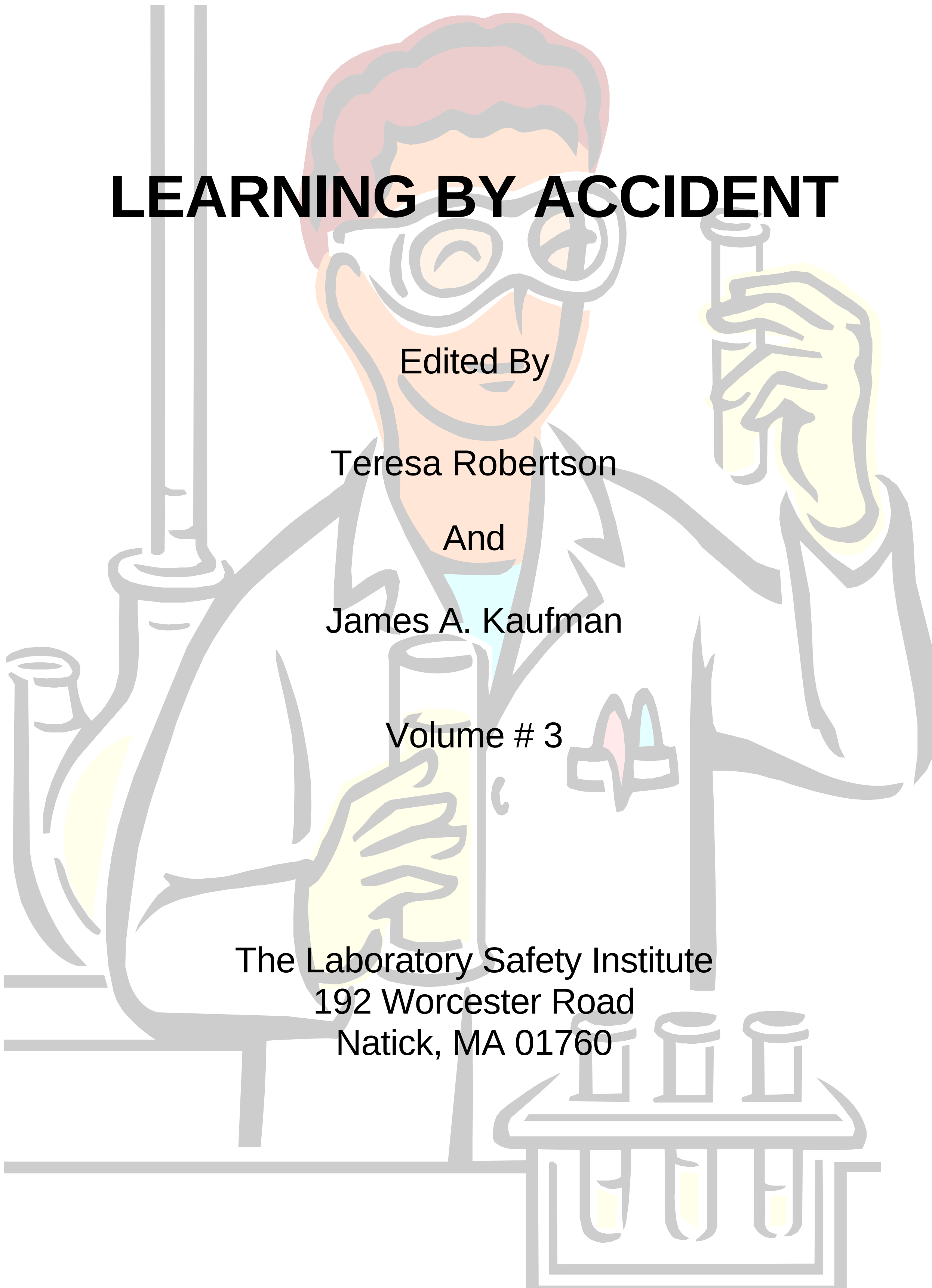

LEARNING BY ACCIDENT

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ACKNOWLEDGEMENTS

We wish to thank the many science teachers who contributed the anecdotes, stories, newspaper articles, and accident reports that are the heart of this book. Thanks to Barbara Jerome for her help with the manuscript typing. And, thanks to Don Dix for introducing me (JAK) to the importance of laboratory safety.

INTRODUCTION

Since the founding of the Laboratory Safety Institute in 1978 as the Laboratory Safety Workshop, I've been involved in offering lab safety training programs for science teachers. One of our activities during these training programs is the sharing of accident experiences. Teachers spend a few minutes writing an accident summary and then describe and discuss these accidents with each other.

Several things invariably happen. Teachers are amazed by both the number and seriousness of the accidents. Many teachers have had similar experiences. Teachers realize that they have been "lucky not to have had a particular accident". And, teachers are glad to have heard these examples to share with their colleagues and students.

That's what this book is all about. A sharing of anecdotal accounts of laboratory accidents. Hopefully, it will be a valuable resource for you to experience vicariously the many ways that people got into trouble in the lab. Hopefully, it will give you real life examples to share with your students.

I should point out that although these accident accounts have been edited for general technical correctness and consistency of style, no attempt has been made to verify the descriptions. Some accidents may, in fact, be described more than once by different teachers.

Somewhere in Tom Peters' In Search of Excellence, I read a story about a computer scientist who asked his computer: "when will you learn to reason like a human being?" The computer spun its tape drives and flashed its lights for a few moments and then spat out a piece of paper. On the paper was the answer, "That reminds me of a story."

That's how we learn best. We remember stories and we extrapolate from them easily. Perhaps, that's why Peters is so successful. It's been said that whenever data competes with folk lore, folk lore wins 21-0!

That's the incredible power and value of these accounts of laboratory accidents. Use them in your science teaching to help you identify potential problems. Use them to help get the message across to your "invincible" students. They'll remember these true stories. Use them so that "Learning is no Accident".

On the next page is a copy of the "Accidents" handout that we use in our science training programs. Please feel free to photocopy this page and use it in your science department for a group activity. And naturally, we would be delighted to receive contributions from you and your colleagues for the next edition of LEARNING BY ACCIDENT.

ACCIDENTS

How often have you heard someone say, "I don't have to worry about that. I've never had an accident." You can see the person's bad habits and the increased probability of disaster striking.

For many people, the "remoteness" of accidents makes them seem unlikely. Yet, each of us is probably familiar with one or more serious accidents with which we have had either direct involvement or intimate knowledge.

The sharing of these experiences heightens our awareness of the dangers in the lab.

Please spend about twenty minutes writing a summary one, two, or three of the most serious laboratory accidents with which you are familiar. Who? What? When? Where? Why?

What were the errors that were made? What might have been done to prevent such an event from occurring?

Then, please take turns reading some of the descriptions of the incidents and allow the others to identify what they believe to have been the errors and what might have been done to prevent the accident.

I would like to collect these written descriptions to include them in a permanent collection for distribution to other science teachers. Please indicate if you wish to place any restriction on use or distribution.

Acetic Acid

1001. During a high school biology class a student teacher spilled glacial acetic acid on the floor. He attempted to wipe it up with some paper towels. He severely burned his lungs and ended up in the hospital. He should have neutralized the acid with base then mopped up the residue. (1341)

Other cases include: 1012

Acetone

1002. A serious accident I witnessed took place in a university organic chemistry lab when a lab demonstrator lit a burner down the desk from a student drying glassware with acetone. A very interesting river of flame formed flowing back to the surprised student holding the acetone bottle. He dropped it and it remained burning until someone had the presence of mind to throw a fire blanket on it. The student was burned quite badly and cut on broken glassware in the process of jumping away from the flame. (1240)

Other cases include: 1031, 1095, 1450

Alcohol Burners

1003. A science teacher in a middle school was using alcohol burners in a non-science room. An explosion occurred when the open burner dropped. Four students were burned. A law suit is still in litigation. The teacher quit because of questioning during investigation. She had complained in writing about safety concern but the department chair said it was part of the state curriculum that that experiment should be done. (1023)

1004. In the early days of IPS when one school was in the midst of a population explosion the program was selected because of adaptability of non-laboratory rooms for a lab centered course. Alcohol lamps, for example, replaced the need for gas service.

A former social studies teacher was "pushed" into teaching the course, which he hated, in an ordinary jr. high class room.

Near the end of a period when students were replacing their hot alcohol lamps on the supply table, one of the students upset an open alcohol supply beaker. The spilled alcohol ignited and cascaded to the floor at the feet of several students who were gathered around the table. They panicked and began to run. Although there was a fire extinguisher in the room, the teacher did not know how to operate it. Finally one of the students figured it out and extinguished the flames. (1045)

1005. In 1982 in an eighth grade IPS class students were using alcohol burners with a rusty top, spilled alcohol on the lab table by turning the burner over. The entire table flamed up. I moved everyone back and let it burn out since the table was flame proof. (1103)

1006. After explaining the proper use of alcohol burner one team of two junior high students decided to relight their burner. While one student was lighting the burner the other was pulling on the wick with a tweezers. In doing this he also pulled up the cork a bit. The fumes ignited and blew the cork off the burner splattering fluid on one of the students shirt. I happened to be standing with my back to them but when I turned around I was able to put out the flames with my hands. (1268)

1007. The students were sitting four to a table while doing a lab experiment. The alcohol lamp was used to heat up some water. At one table one lamp fell over and dropped to the floor. The alcohol spilled out and caught fire spreading along the floor.

The students knew were the bucket of baking soda was and how to use it. The fire was put out quickly with no injury.

I always start the term with the alcohol lamp lit and then take some alcohol and spread it on a table top. I then light a match and set it on fire. It is quite dramatic. I then take a handful of baking soda from the red bucket and throw it on the fire. The fire is out. I have one student do it again. The point is then remembered. (1317)

1008. While working with alcohol burners a student poured some on a wooden table that was the lab area. It caused the student next to him to get his fingers burned. The table was old and probably had many different substances on it. The flame did not go out easily. (1395)

1009. A team of seventh graders was using an alcohol burner in an experiment. When one student attempted to burn the burner off by the knob the lamp was over turned. There were flames all over the table. This happened about fifteen years ago. (1416)

1010. This occurred many years ago in our junior high. A teacher asked a student to move an alcohol burner during a lab. The alcohol somehow got spilled and caught fire. The student was seriously burned. (1484)

Other cases include: 1065

Allergic Reaction

1011. My next-door neighbors were in the process of adding a second floor to their home. One Saturday the father was taking care of the children. During the day the father brought up rolls of insulation to the new addition. The children were in the room as the father worked.

That evening the youngest child, aged three, woke from a sound sleep crying and screaming with pain. The baby sitter was alerted and watched the child for several hours trying to soothe him back to sleep. After the parents finally came home they took him to the hospital when they noticed he was having difficulty breathing.

It was determined the child experienced an allergic reaction to the insulation which the baby sitter never would have anticipated. (1234)

1012. One student was washing a beaker over a sink. Another student emptied some acetic acid from another beaker into the same sink. Some drops from the acetic acid spilled on the first student's hand. The second student immediately informed the teacher who put the student's hand under the tap water and washed the hand thoroughly.

That night the girls father phoned and blasted the teacher. His daughters hand had swollen. She was allergic to acetic acid (vinegar). (1499)

Other cases include: 1145

Ammonia / Ammonium Hydroxide

1013. During the summer we did a program with kids developing blue prints by taking Diazo paper with designs shadowing areas of the paper. When exposed to light the yellow paper turned white, then by exposing the paper to Ammonium Hydroxide it turned blue and the kids could see the designs left by the shadowing. The kids loved it, our staff did not. When traveling with the container of ammonia in a hot car, the fumes often became too much to bear. Our solution was to carry the ammonia in an iced down cooler. (1133)

1014. When I was in high school our chemistry teacher opened a bottle of ammonia and asked a student to put his nose over the bottle and inhale. The student passed out. (1143)

1015. I became ill while making ammonia gas due to a lack of ventilation. This occurred in a chemistry class in 1966. (1384)

Other cases include: 1272, 1336, 1494

Ammonium Dichromate Volcano

1016. This happened at a college during a chemistry department open house in the early 1970's.

A showy, pyrotechnics display of an ammonium dichromate volcano was set up on a bench top with no access barriers to visitors who were circulating freely among several "live" chemistry displays. Without warning the four-inch diameter, two-and-one-half inch high volcano exploded well into the normally smooth pyrotechnic phase of the display. Burning embers struck a woman on the arm causing a second degree burn. The lady was very agreeable, graciously accepting first aid and apologies. She did not charge the college.

The college's authorities were notified and were predictably nervous. No similar experiments were performed as a result. The explanation of the explosion was never satisfactorily reached. I have since run the same demonstration behind proper shields. (1152)

1017. The teacher was demonstrating a volcano eruption using ammonium dichromate. The teacher thought the chemical would not ignite so he poured alcohol on the ammonia dichromate. He relit the chemicals. The volcano exploded with the burning alcohol splattering the students standing around the demonstration table. A number of the students were rather seriously burned. The teacher and the school were sued. The case was settled out of court. (1356)

1018. In an elementary class a teacher was demonstrating how volcanoes explode using ammonium dichromate. Sparks flew up and landed on the dress of a girl sitting in the front row catching the dress on fire. The girl was seriously burned. (1374)

Animals

1019. A child brought a pet squirrel to class. Someone opened the cage, and the squirrel bit a student. Very fortunately no infection. Classes should have no live animals in cages that students have access to. (1127)

1020. In 1954 a college junior was doing research on the life cycle of rattlesnakes. He had a mother and some young snakes in the locked area in the laboratory. One Saturday he wanted to show his girlfriend how the mother snake reacted to movement. He put his hand into the cage toward the mother but a safe distance. He did not notice one of the very young snakes was close to the back of his hand. The young snake bit him.

At the time I was the only student lab assistant in the building. I place a tourniquet on the arm and got him to the hospital. He was there for a week. (1148)

1021. We had a nice piece of undisturbed woods behind the high school on school property. It was ideal for ecological studies. We could take a class out for one or two periods of field work without the hassle of trip permits and buses. One time we were conducting plot assays - counting every plant and its size within a measured area. Suddenly we found ourselves being attacked by yellow jackets who had a ground hive right within one plot. Everyone was stung, one girl had to receive medical attention.
Moral: Carefully check the ground before taking a class out for field study. (1156)

1022. In a rural school in Montana a twelfth grade student brought a live rattlesnake to school for biology class. Rattlesnakes are very common in that area. The teacher put the snake into an empty aquarium, put a lid on the tank and a rock on the lid. After telling all the students to look but not to touch he went to the back of the room to work with a student needing help. A student in the front of the room opened the case, grabbed the snake and was using it to scare some girls.

The snake, which was being held just in back of the head, wiggled free far enough to reach around and strike the thumb of the student holding him. The boy was hospitalized in critical condition for several days. Anti-venom was administered several times. The boy was able to return to school several weeks later.

This was settled out of court with the teacher paying all medical bills. (1159)

1023. During the 1987-88 school year I had a student bitten by gerbils kept in the room. The parent wanted me to pay for the tetanus shot. I had instructed the class as a whole not to touch the gerbils. I have good control of my class all year. Four months after being instructed not to touch the gerbils during the five minutes of switching class the student asked if she could pet the gerbil. I was busy half listening and said yes. She was bitten. I sent her straight to the nurse. No shots were given, not problem from the bite. (1325)

Benzene

1024. In 1983 in West High School, Manchester, NH a chemistry teacher was working in the stock room standing on a stool. Apparently someone had left a container of benzene open. Water leaked through the ceiling from the roof, contacted a light socket producing a spark. The benzene vapor ignited. The teacher was knocked off the stool and rendered unconscious. He came to, crawled out of the room and was found by two other teachers. The fire destroyed the stock room. (1063)

1025. In our college organic lab, a student caused a benzene flash (with a Bunsen burner), leaving blackened strings of organic material floating around the classroom. Personally, I left the room. (1088)

1026. A student heated benzene and hit the flash point. A ball of flame shot up to the ceiling. No injury. (1145)

1027. During my undergraduate days I recall an accident that happened in an organic chemistry laboratory. A female student was cleaning a reaction vessel with benzene. The round bottom flask had a small opening. She was in a hurry to dry the flask in order to go on with the next step of the lab. She inverted the flask over a lit Bunsen burner. The benzene vapor ignited and the flask had the appearance of a rocket engine with flames shooting out. Fortunately the amount of benzene was very small; the fire burned it self out and no one was hurt. (1211)

1028. A college student was carrying a pan of benzene. A burner several feet away set the vapor on fire. His hands were seriously burned. (1445)

Bicycle

1029. A number of years ago the Canadian Youth Hostels Association had an accident occur on one of their cycling trips. Apparently the brakes on a young girls' bicycle had failed. She ran into a tree while negotiating a curve in a road.

She was paralyzed and in the ensuing law suit the Association was found guilty on the grounds that they were negligent in checking her bicycle for mechanical conditions. They did not check that she was fully informed on how to ride a bicycle. (1492)

Blender

1030. A twelfth grade male student in an Advanced Placement Biology lab was preparing a chlorophyll extract using spinach and a Waring Blender. The blender had clogged. The student removed the top of the container, reached in with his hand to stir the contents without turning off the blender. In so doing, the student freed the blades and lost a chunk of his index finger. His lab partners had tried to stop him but he had moved too quickly for them to physically prevent him from putting his hand into the container. (1302)

1031. The instructor was beginning to prepare a spinach extract for a student paper chromatography experiment. This is accomplished by grinding spinach in a blender using acetone to suspend the chloroplasts, then vacuum filtered to obtain the extract.

There were three factors contributing to this accident:

One, the blender in use was the common household "Waring" type with a glass container and a loose fitting, hard plastic lid.

Two, an excessive amount of acetone was added to the blender container at the start of the process.

Three, the high speed switch was pressed. The acetone surged up the inside of the container, splashed out the lid and ran down the outside of the container to the table top.

The acetone vapor traveled under the blender motor base where it was ignited by sparks produced by the rotating electric motor. The flash ignited the liquid on the outside of the container which ignited the acetone inside the container which in turn propelled the lid into the air.

A fire extinguisher was close at hand and the fire was put out quickly, the equipment cleaned up and the experiment was continued without further incident. Needless to say a stainless steel container with a screw top was put on order the next day. (1454)

Bromine

1032. One of my eleventh grade chemistry students wanted to see the vapors from bromine. I told him to take the bottle to the hood and open it. He did, wasn't impressed and put the ground glass stopper back in the bottle. Then he decided to look at the liquid so he rolled the bottle on its side. The stopper came out of the bottle, bromine splashed on his hand and he dropped the bottle in front of the hood. He got scared and someone yelled for me. I told him to wash it off and then I realized I didn't know what else to do so I had to get the poison control number and call them and the fire department.

The bromine caused burns on his hand that left a scar. I am now overly sensitive to students handling any chemical out of curiosity. (1104)

1033. In my college organic lab, bromine was being added to a flask on a hot plate. The bromine was being added from a one-pint bottle which slipped out of the students hand and fell on the hot plate. The room turned orange but luckily all the students escaped safely. When an instructor went to open the windows, I noticed he was quite seriously burned. (1200)

1034. Samples of chemicals were set up in a display in my sophomore high school class. The students were directed to examine the materials but not to open the containers. I specifically indicated that the bromine sample was not to be opened, particularly due to its high vapor pressure. Of course one student opened the container and got some bromine on his leg.

God was on our side because just prior to that week I had read about how quickly bromine can be absorbed from skin by glycerin. The student was directed to rub glycerin into the spot, following it with water. No burns resulted!

I have since removed bromine from my element demonstration. The thought of bromine in a student's eyes was too frightening.

I have also learned that a solution of sodium thiosulfate would also have absorbed the bromine. (1219)

1035. I was a college junior taking Organic Chemistry and the lab for the day was the bromination of an alkaline. Liquid bromine was being added using a dropping funnel to a flask containing cyclohexene. The student working just to my left had failed to grease the stopcock on his dropping funnel before adding the 25 ml of liquid bromine to it.

The experiment was well in progress when this student noticed that liquid bromine was dripping outside the stem of the dropping funnel. He reached up to tighten or adjust the stop cock and the whole glass piece came out in his hand. Apparently the guard was either missing (if metal) or dissolved (if tubing) by the Bromine.

Bromine vapors quickly filled the air as liquid bromine spilled along the bench top and down onto the floor. Realizing the severity of the accident both lab instructors immediately evacuated the lab of all the students, opened all windows and sponged the liquid bromine into the nearby sink.

Both professors were out of work for the next two weeks with severe burns to their hands and nasal passages. None of the students were hurt. (1229)

1036. In a college organic chemistry lab in Hillsdale college I was working on a bromine lab. I was using standard organic chemistry glassware. Red bromine gas escaped from the glassware and burned several of us. (1321)

Other cases include: 1477

Bunsen Burner

1037. In a high school lab a student was "drying" his beaker with gas from the gas jet. He had observed the advanced chemistry students drying glassware with an air jet and gas and air were all the same to him. The gas build up was ignited by a flame from another burner in the room. (1089)

1038. A student was going about lighting a Bunsen burner. Her partner turned on the gas after the match was lit. As she lit the burner flames occurred at the bottom of the burner. (Tubing at the bottom of the burner had been loosened.) She immediately turned off the gas.

Our class motto: "When in doubt, turn off the gas!" This could have been very dangerous. The students should have only lab materials at the lab stations; no pocketbooks, lunches, unnecessary papers. (1117)

1039. In 1980 I was a first year graduate student employed as a teaching assistant, instructing a freshman biology lab. The very first class required the students to use a Bunsen burner in practicing aseptic techniques (sterilizing needles/loops, etc.) and making various slides of micro organisms.

I asked the students to light their Bunsen burners. I had previously placed one burner at each station. I was suddenly made aware of a roaring sound and a stream of fire. One student had ignited the gas outlet valve. He did not know what a burner was. This taught me not to take anything for granted when explaining to students. I now try to be very specific and explain the steps in great detail. (1216)

1040. In a high school chemistry I class around 1980 an experiment of chromatography of chlorophyll pigments was being conducted. One pair of students were working on the chromatography lab and were heating a solution of methanol in which leaf material is placed. They were working near a slightly opened window using a Bunsen burner, ring stand and ring support and water bath set up. Both were wearing goggles and aprons.

About six feet away another pair of students, not wearing goggles, were working on the same lab but were further along in the experiment. Their procedure required the use of several solvents including petroleum ether. They were preparing the solvent chamber and the TLC plate. Apparently the ether was left open. Suddenly a fireball erupted severely burning the students. The ether container and the solvent chamber both burned.

Since this accident Bunsen burners are no longer used to heat alcohol and ether is not used. (1226)

1041. Students were heating a chemical when the gas tube to the Bunsen burner came off. The flame transferred to the gas supply. It happened during a practical exam so everyone was in silence. From the stir this caused the girl in the front row turned, saw what was happening and turned off the gas at the source. (1313)

1042. A student in a chemistry lab was entering data in a lab book. A Bunsen burner was on the lab table burning. The student reached across the table to pick up a piece of equipment and burned his arm in the flame from the burner. (1381)

1043. A student was attempting to light a Bunsen burner in a high school chemistry class. As the gas ignited the flame shot higher than he thought it would and burned his eyebrows and the front of his hair. The student had neglected to regulate the gas flow at the Bunsen burner prior to lightening it. Since the gas flow was at a maximum the resulting flame was dangerously high.

Students should be taught proper lab techniques. (1420)

1044. A Bunsen burner was left on all night. The next day a person turned on the light switch. From it a tiny spark ignited the gas which has built up in the room. (1451)

1045. A student turned on the gas jet and properly lit a Bunsen burner. The gas jet fell off the wall connection (loosened by another student the previous period) and a flame shot out of the wall. The gas shut-off valve was located behind a panel under a desk. A Phillips screwdriver was needed to open the panel. (1455)

1046. While demonstrating a lab that required lighting a Bunsen burner. I adjusted the burner as per safety instructions. I continued to talk to the class as I opened the gas tap and held the lit match to the burner. However, I had opened the wrong tap. Eventually the gas lit and the ball of fire singed my hair. They called me "flash" for the rest of that year. (1491)

Other cases include: 1076, 1102, 1121, 1164, 1169, 1170, 1171, 1211, 1219, 1228, 1233, 1234, 1261, 1264, 1339, 1340, 1395, 1412, 1490

Burns

1047. The problem I have had most often is having students in a microbiology class touch a hot ring stand, test tube or inoculating loop. The students have been warned to avoid touching these things but while doing the experiment sometimes forget. (1307)

1048. In a high school chemistry lab in 1978 while working to turn crystals into liquid I was told to deposit the liquid we made, after heating the crystal, down the sink. Left over water in the sink came in contact with the warm liquid and it flew out on to my arm. It gave me a second degree burn after it burned through my shirt. (1382)

1049. Pouring "ditto fluid" from a one gallon can to a small plastic bottle a fellow teacher had the fumes ignite from a pilot light close by. He was hospitalized for four months with burns over 40% of his body. (1471)

Other cases include: 1001, 1002, 1003, 1010, 1016, 1017, 1018, 1028, 1032, 1035, 1036, 1040, 1042, 1043, 1046, 1055, 1077, 1082, 1097, 1102, 1103, 1106, 1115, 1123, 1127, 1146, 1153, 1154, 1161, 1162, 1163, 1164, 1165, 1166, 1167, 1168, 1169, 1170, 1171, 1175, 1176, 1184, 1189, 1192, 1195, 1196, 1197, 1202, 1208, 1216, 1228, 1230, 1233, 1251, 1255, 1256, 1260, 1265, 1074, 1281, 1304, 1305, 1306, 1307, 1308, 1309, 1313, 1314, 1315, 1316, 1327, 1328, 1329, 1330, 1335, 1360, 1366, 1408, 1409, 1412, 1413, 1420, 1421, 1430, 1433, 1455, 1456, 1458, 1460, 1461, 1462, 1463, 1465, 1466, 1472, 1476

Centrifuge

1050. A centrifuge was being used, which I was operating. I was wearing safety glasses. The students were instructed to stand back after placing tubes in the equipment. When the machine was turned on glass shattered and flew over the room. No injuries.(1285)

Chlorine

1051. In a senior level science class the teacher was preparing chlorine gas and bubbling it through a succession of water filled flasks to dissolve the chlorine. A mistake was made in setting up the delivery tubes in reverse order. As a result pressure built up in the first collection bottle. The stopper lifted and chlorine gas spewed out into the classroom. The situation was quickly corrected by adjusting the glass tubing arrangements.

The teacher should have taken the time to double check the set up before starting the experiment. (1244)

1052. An eleventh grade girl inhaled chlorine gas during a chemistry lab when she leaned over the collecting bottle. She had to be taken to the hospital for some respiration therapy. (1282)

1053. In 1965 during a high school chemistry class a student placed chlorine gas in the sunlight and the glass bottle exploded. There were cuts, and a minor scare to the class. The teacher was out of the room. (1327)

1054. About twenty five years ago students were making chlorine gas. One student pushed his gas bottle under the nose of another and said take a whiff. The student did and immediately passed out. (1333)

1055. I prepared several bottles of chlorine gas for a chemistry class. The bottles were on the front table. A freshman physical science class followed the chemistry class. A freshman student took the stopper out of the bottle and took a good sniff of the curious green gas. He was taken to the hospital with mucous membrane burns to the nose and throat.

This happened between classes when teachers were to be in the halls to monitor. Students in all classes were constantly told not to disturb any materials at the front table or any where else. (1337)

1056. Two students were working on a project and produced chlorine gas. They were not under the hood. (1422)

1057. In the old days when "let's try it" was the way of life and safety was a pair of safety glasses, we convinced a chemistry teacher we should produce chlorine gas and collect it by the downward displacement of water. Twelve or so lab groups produced more than enough gas to fill the collector bottle. Two or so student ended up in the hospital. (1498)

Other cases include: 1223, 1477, 1499

Chlorosulfonic Acid

1058. In a college organic chemistry class in preparation of an antibiotic, chlorosulfonic acid was added to other reagents in a Florence flask. The other reagents had to be dry and were not. As a result the flask burst and sprayed acid on the student. The student was wearing goggles and quickly went to the sink to wash off the acid. No lasting damage. (1350)

Chromatography

1059. In 1982 in a senior chemistry class a student was affixing his paper chromatography strips on a clothesline suspended within the fume hood. He had calculated the Rf values of all the +/- twenty essential acids. The ninhydrin spray solution had been prepared. Prior to spraying the strips he did not notice, nor did I, another student doing work close to him for which a heat source was needed. Upon freely spraying the strips, the aerosol caused the strips to combust within the hood. No injuries. All was contained within the hood. (1094)

Other cases include: 1031, 1040, 1173

Copper Sulfate

1060. A student was weighing 250g of $CuSO_4$ powder on triple beam balance. The powder overflowed and sent into his face. He was using a spoon from the five pound jar.

I should not have had such a short student help me or I should have used a shorter table. The student knew the hazard of swallowing because he got some in his mouth. He was told ahead of time. Thank God he told me immediately what happened. (1385)

Other cases include: 1118

Cuts

1061. In a biology lab the most serious accident was injury done by a scalpel or sharp blade or broken glass. (1362)

Other cases include: 1002, 1053, 1067, 1068, 1069, 1070, 1109, 1129, 1130, 1136, 1138, 1139, 1141, 1142, 1148, 1193, 1194, 1209, 1217, 1244, 1255, 1269, 1324, 1364, 1369, 1372, 1375, 1377, 1378, 1379, 1381, 1384, 1394, 1407, 1436

Discipline Problems

1062. As he was exiting the room in a rage, a discipline problem boy grabbed the fire extinguisher and expelled it into the face of another student, causing eye problems. (1012)

1063. A high school student had taken a chunk of sodium from the laboratory during the lab exercise, wrapped it in a paper towel and put it in her pocket book. I discovered it missing and dealt with it by announcing over the intercom it should be returned to the lab instructor and not further mention would be made of it. (1024)

1064. Student broke a glass tube into his wrist. Student picked up glass off of side counter during laboratory session even though it was not part of experiment. This student had read Safety Rules, First Aid Rules, signed a Safety sheet and taken a quiz. He was, however, frequently absent and disruptive in school and the community. He failed to report it to me immediately and left the room. (1294)

1065. In eighth grade the county superintendent's son threatened to throw a lighted match into an alcohol burner. He was suspended. (1346)

Other cases include: 1400

Dissection

1066. In a ninth grade biology lab, during a dissection, preserving fluid squirted out and hit the student in the eye. The student should have been wearing goggles. (1077)

1067. A student was dissecting a perch in a college biology laboratory. He was using a scalpel to cut into the fish. Another student came by and pulled the scalpel out of his hand seriously cutting the student. Since they were fooling around, they decided not to tell me. After school, the injured student was taken to the hospital where he received three stitches. (1081)

1068. Around 1985, a tenth grade biology prep student was dissecting a cow heart. She had a dissecting pan, a brand new scalpel blade, and was wearing gloves. She attempted to dissect the heart while holding it in her hand. I'm not sure of the details as to how the scalpel came in contact with her hand but it did. It was quite a deep cut that required stitches. (1084)

1069. As a graduate assistant in a freshman biology in 1981 during a lab I witnessed the following accident. At the end of a rat dissection lab, students were cleaning their instruments: forceps, scalpels, needles, etc. One student after washing her scalpel was drying it with a paper towel. Inadvertently she cut her index finger exposing ligaments and what I thought was the bone. I immediately wrapped the cut in a paper towel and told her to apply pressure. Since there were other graduate students assisting I took the student to the infirmary.

As a result of the experience I now caution all students with the following instruction. Scalpels are dangerous instruments, they show no mercy and take no prisoners. So be very cautious in both cleaning and drying. (1108)

1070. In a tenth grade biology class doing a dissection a blade broke. I showed the student how to replace it. As he turned around holding the blade in front of him another student walked by receiving a cut. It was not severe but could have been. (1134)

1071. In May 1986 in a tenth grade general biology class in a suburban Atlanta High School the students were doing the dissection of a fetal pig. They had been working on the project for four days. The instructor had been moving from group to group to review each one for the lab practical test.

Two students were reaching for a scalpel at the same time from opposite sides of the table. A girl picked up the scalpel and stood with it in her hand as the boy across the table stood up and leaned over the pig to get a better look.

The scalpel penetrated his chest on the left side about five cm below his clavicle to a depth of approximately three cm.

The boy did not report the injury. The teacher noticed the boy's pallor and noted the bloody paper towel he was holding to his shirt. We applied direct pressure, called EMT's and took him to the emergency room for stitches. (1149)

1072. In 1987 in a Connecticut high school a student was dissecting a cat. A piece of preserved tissue went into the student's eye. The student was not wearing goggles. (1161)

1073. A tenth grade biology was dissecting through the skull of a frog to expose the brain. While removing some of the bone and muscle a student chipped off a piece of tissue which arced and landed in another student's open mouth. The startled student made a gulp and swallowed the formaldehyde treated piece of frog bone and muscle.

A call to the poison control center assured us the piece was too small to be too concerned about. The student complained of slight pain when swallowing for several days. (1193)

1074. A tenth grade female student was beginning a dissection in a biology class. The class had been directed to lift the skin with forceps and to make a v-shaped incision. This student disregarded the directions and used a wire probe to jab at the specimen. The action caused the formaldehyde (this happened over twenty years ago) to squirt out into her eye.

Students had been told explicitly to ALWAYS wear safety goggles in the lab, regardless of the type of the lab to be done.
The student in question had her goggles hanging around her neck. (1305)

1075. In a senior high school in 1984 while doing frog dissection a student pulled on the frog intestine with forceps. An unseen small perforation in the intestine squirted formalin about two feet into the student's eyes. Well trained students started to flush his eyes before I could get across the room to start first aid. (1323)

Other cases include: 1116, 1370

Distillation

1076. This occurred in college in 1986. Unknown substances were given in test tubes for students to determine what was present. The mixtures were various alcohols, ketones, etc. for an organic chemistry lab. Part of solving what was in your tube was a distillation process. This tall complex apparatus was used with Bunsen burners.

The highly flammable liquids condensed on the outside of the glassware and without obvious warning, in one sudden poof, a huge ball of flames was apparent. Fortunately the flames did not injure anyone but it was difficult to put out the flames and the whole situation was scary. (1062)

1077. A student suffered third degree burns on the fingers of the right hand. This resulted during a fractional distillation procedure from the IPS program. The student unable to regulate the heat, boiled the liquid too fast and the alcohol vapors caught fire, in turn igniting the rubber delivery tube. The student tried to bring the burning tube to the sink which resulted in the burns due to hot rubber sticking to the skin. (1287)

Other cases include: 1160, 1235, 1414, 1449

Distraction

1078. I was a second year teacher at the time. I was conducting a high school chemistry lab with about 20 students present. I was working at one end of the room at one work bench in a group of four students. I did not notice a cheerleader enter the room to speak to a student. The student's partner had just gotten a small amount of sulfuric acid from the stock supply bench. When the student who was distracted turned and picked up the small beaker of sulfuric acid it was hot causing her to drop it and the contents splattered over the bench as well as herself. She screamed. I immediately pulled her under the shower removing her outer skirt and sweater. After a bit I took her to the nurse where she received further showering. No scars. (1080)

Ear Injury

1079. This occurred during a ninth grade homeroom. A carnation sale was being held. One boy received two carnations with the stems cut on a diagonal. He stuck the stems of each into each of his ears. Another ninth grader, sitting behind him, slapped each carnation with his hands. The first student had one of his ear drums punctured. This all occurred during the instant that I turned around to put a short note on the chalkboard. (1488)

Other cases include: 1182, 1225, 1436

Eating in the Lab

1080. While working in a lab I got hungry and made popcorn with beaker, oil, corn seeds but what is popcorn without salt? No problem. Went to the chemical storage area for sodium chloride. I started eating it but it did not taste right. I used sodium perchlorate instead. Never eat in a lab is now my motto. (1015)

Electric Shock

1081. In the fall of 1987 in a senior high school physics class an experiment was being conducted involving a free fall apparatus in order to determine the value of gravity. The apparatus has an electromagnet connected to an AC power supply and a spark timer that imprints a dot on a waxed paper strip. With the circuit closed an object is placed on the electromagnet, the switch is then opened, the object falls, the sparker then produces dots every 1/60 second (later to be measured and calculations made from time and distance.) Simultaneously the switch must be opened and the sparker turned on. A student prematurely hit the switch as the object was being placed on the electromagnet. The instructor became the conducting circuit and received a severe shock. After time and relaxation he was alright. (1191)

Other cases include: 1082, 1084, 1087, 1088, 1089, 1090, 1091, 1092

Electrical Conductivity Apparatus

1082. The worst lab accident of which I have personal knowledge took place in an eighth grade physical science class.

The teacher was demonstrating the electrical conductivity of ionic and non ionic solutions. The teacher apparently grasped across both electrodes when removing the apparatus from the salt solution. Since the apparatus was still plugged in the teacher received sufficient electrical shock to be knocked to the floor. The teacher received burns on the hand and a bump on the head. (1318)

Electrical Outlet

1083. While teaching in Belize, a student in a colleague's class poured a beaker of water into an electrical outlet at his lab table. The electrical outlets were mounted flush on the table tops. Our initial reaction was to turn off all the power in the lab building (instead of seeing which fuse went to the outlets.) (1087)

1084. The ninth grade biology class was performing a lab dealing with solutions, suspensions, and colloids. As a part of the "solutions" portion of the lab students were identifying the properties of electrolytes and non electrolytes. One student had set up his experiment and as he plugged in the electrolyte "light bulb" apparatus sparks flew and he jumped. He received only a mild shock sensation and no burns.

What we discovered was the cover plates on our electrical outlets are metal. As he plugged in the apparatus, he was less than careful. Part of the plug went into the socket, part of the plug made contact with the metal plate.

Since that time, the same situation has occurred about three times. Each time with no serious damage.

I carefully instruct my students in the danger but if students are careless it can occur again. (1093)

1085. A male eighth grade student stuck a plastic barrel ball pen into the electric outlet at his desk. The pen exploded and the ink cartridge extruded to three times its original length. It was shot from the plastic barrel with enough force to penetrate the steel cabinet door behind the students desk. (1304)

1086. While conducting class discussion I noticed one student (a very bright boy and the son of another science teacher) fiddling with his pencil in an electric outlet which was at eye level on the lab bench. I told him that what he was doing was not a good idea and then went on to explain (facetiously I had hoped) that he would more effectively electrocute himself by using a paper clip in the shape of a horseshoe and putting one end in each side of the outlet. This brought a few chuckles and we went on with the class.

Several minutes later from the same area of the room came crackling and popping noises. Soon after, there was the smell of something burning and bright flashes. My young science student was as white as a ghost and luckily unhurt.

He followed my advice but being smarter than most he knew enough to try to insulate himself from the paper clip with a piece of paper folded several thicknesses. Of course the flash was the sparks flying and the paper burning.

The location of the outlet was convenient for labs but not for this. I should not have suggested, even in jest, something which could be dangerous. (1306)

1087. About 1983 a student was using a spring scale and placed the hooked end into an electrical outlet. It caused the circuit to blow. The student received an electrical shock that was only slight. The student was not supposed to be using the electrical outlets. The class had been taught about electrical safety. (1328)

1088. A student put metal forceps into an electrical outlet. He received a shock. It could have been fatal. (1347)

1089. A cover plate from an electric outlet located on the edge of the lab table was missing. A female student with a "chain belt" leaned into the open outlet. Sparks resulted and part of her belt melted. The student claimed heart problems as a result of electric shock. This happened in a biology class about fifteen years ago. (1354)

1090. Outlets were newly placed near the lab sinks. The students were using hot plates. One student incorrectly heated a liquid breaking the beaker. The student received a shock due to the closeness of the sink. (1366)

1091. In the fall of 1986 the two-year-old daughter of a ninth-grade science teacher was playing with car keys in a classroom after school hours. She placed the key into an electrical outlet. Sparks and a "pop" sound scared her and she cried, apparently unhurt. The key was damaged. The socket was blackened.

The child should not be playing with keys. Covers should be on all outlets. Master cut off switch should be in the hall. (1402)

1092. I had a classroom with electric outlets on the floor. One of my students wanted me to look into his microscope which was plugged into the floor socket. I walked over to the table and accidentally kicked his plug out. Without watching what I was doing, I went to plug it back in. I was nearly electrocuted. Our sockets are now in the ceiling on long reel cords. (1479)

Other cases include: 1406

<u>Electricity - Lock Out / Tag Out</u>

1093. In the middle sixties I was working at an E.I. Deposit plant as an electrician. We had a very strict policy on "Locking Out" any circuits that we were working on while installing 440 V. wiring. I asked if the circuit was locked out and received a positive answer from a co-worker. I disconnected the wiring that was to be patched into and turned to pick up a tool. My leather work pouch hit the disconnected wires grounding them to the box. The line WAS NOT DEAD. Wiring and box were welded instantly. (1256)

Embarrassment of Disrobing

1094. In South Hadley High School around 1970 during an IPS lab a female student wearing a very light material dress spilled acid. It covered the young lady and 90% of her dress. The student had to disrobe. There were two male science teachers involved. It was very embarrassing to all involved. (1005)

1095. Summer 1965. US government rebuild center. Civilian workers involved in the disassembly, cleaning, rebuilding, reassembling, calibration and painting of tank fire control systems. Acetone, commonly used as a solvent cleaner was accidentally spilled on the unoccupied stool of a female employee. The young lady returned and sat on the acetone. She immediately noticed the problem and rushed to the lavatory where she washed affected areas. The acetone destroyed nylon clothing and caused minimal dermal irritation and much embarrassment. (1070)

1096. In a college lab a fellow student heated A conc acid solution in the soft glass bottle in which it was stored. The bottle melted, the acid dissolved part of her clothing. She ran back to her dorm without telling anyone of the spill. (1072)

1097. A lab technician, in the lab next to mine, for a private company was filling a column with silica gel when it blew upwards. It flew into her eyes and blinded her. She knocked over the concentrated sulfuric acid in her panic. Her partner stood up and screamed. I rushed over and together we put her under the shower. Because she was a new Chinese immigrant she did not want to take off her clothes which were burning. I just tore them off and to this day she will not speak to me for embarrassing her. (1247)

1098. This accident happened to my daughter sixteen years ago. It occurred during a high school science class in a private girls' school.

My daughter was attempting to put a stopper in a test tube. The stopper would not fit, so she held it next to her side and forced it. The test tube shattered and a piece of glass passed through her clothing and entered her side. She was reluctant to tell the teacher. She was embarrassed and did not want to disrobe. Neither my husband nor I could be reached. The school contacted her doctor and took her to the hospital where she was treated. The glass shard came very close to doing serious damage. (1408)

Emergency Eye Wash

1099. A student testing minerals for carbonate with dilute hydrochloric acid got some in his eye. I had installed an eyewash fixture on one of the prep room faucets which enabled a thorough flushing of the student's eye. This fixture cost $33.00. (1286)

Other cases include: 1075, 1118, 1119, 1120, 1121, 1123, 1124, 1125, 1127, 1128, 1201, 1203, 1218, 1241, 1242, 1257, 1341, 1344, 1346, 1348, 1351, 1356, 1358, 1359, 1360, 1413, 1418, 1419, 1424, 1455, 1460, 1466, 1478

Emergency Room

1100. About 1975 a tenth grade biology student was working at her lab table and absent-mindedly put her finger into the metal receptacle in the table used for placing ring stands. In a short time, her finger became swollen to the point that she could not remove it. Conventional methods proved fruitless so we had to unbolt the ring, take the student to the emergency room where the ring was hack-sawed off. There was concern for three or four days of permanent damage due to the loss of circulation. Luckily no damage. (1095)

1101. Students were making ice cream in regular ice cream freezers. Some were adding cookies and M&M's to the mixture. The ice cream had been eaten before it was noticed there were pieces of pills in it. When it was noticed several students became ill. Paramedics were called. The seven to ten ill students were taken to the local hospital and had a twenty-four hour system cleansing regiment.

Investigation uncovered a student had put Ex-Lax pills into the ice cream. The guilty party had to pay all expenses for the student not covered by their insurance. (1150)

Other cases include: 1011, 1020, 1022, 1049, 1052, 1055, 1057, 1067, 1071, 1098, 1118, 1119, 1120, 1124, 1027, 1039, 1141, 1154, 1176, 1181, 1187, 1198, 1201, 1203, 1207, 1221, 1241, 1262, 1265, 1271, 1291, 1309, 1313, 1324, 1328, 1358, 1390, 1463

Ether

1102. In 1975 in a junior college a chemistry lab student was working with ether. Ether fumes got ignited by the open flame from a Bunsen burner. As the student tried to extinguish the fire both sleeves of his lab coat caught fire. Luckily he was wearing a long sleeved cotton shirt under his lab coat. He was singed on his arms. His partner used his own lab coat to smother the fire. Quick thinking. (1181)

Other cases include: 1108, 1122, 1231, 1276

Explosions

1103. Two science teachers were attempting to assist a drama teacher in providing a "flash" explosion for a play. They were using a commercially patented material for doing this. It did not ignite with an electrical spark. The instructor approached the device closely to examine the electrical connection. It exploded and severely burned the instructor, fortunately only on his hands. (1006)

1104. The heat from the sodium caused hydrogen gas to explode resulting in a large "boom". Glass from the test tube and flask shattering everywhere. One piece of glass pierced a bottle of sulfuric acid which was made of heavy grade glass, gallon size. The sulfuric acid was about three or four feet from the demonstrations area. Luckily no students were reported injured. The teacher was never asked to do another experiment. A letter of reprimand was placed in his file. (1014)

1105. A junior high school student was performing an experiment during a science club meeting. He was attempting to make matches. The ingredients were potassium chlorate, red phosphorus and sulfur. The teacher handed the student a mortar and pestle with the sulfur. Instead of grinding the sulfur only the student mixed the three together and ground them. A tremendous explosion resulted. The teacher found the student on his face behind the lab counter. His thumb was almost blown off, surgery was performed to attach the tendon and nerve. As of a year later the student is playing tennis but complains of stiffness. (1042)

1106. In organic chemistry in college a student was heating an experiment when it exploded. He was wearing goggles but no neck protection. His face and neck and above forehead were badly burned. His screams still echo in my ears. (1047)

1107. In an organic chemistry class, while I was in college in 1982, we were working on the production of trans-stilbene. This was produced as gas and allowed to pass through a glass condensing tube. Steam on the end of the condensing tube covered the fact that the condensed product was clogging the end of the tube. I soon was heating a closed system. An explosion occurred. Forty dollars worth of glassware was broken; the stains ruined my clothes, permanently marked my lab book and left a hole on the ceiling of the University of GA laboratory. No one was injured. (1129)

1108. In a high school in California around 1980 a lab assistant mixed phosphorus and potassium chlorate in a two-ounce gas-collecting bottle with a rubber stopper. He started to shake the bottle. The bottle exploded removing one finger and leaving varying amounts of bone and other tissue of other fingers on the right hand.

Strange bottles and stored glass containers in the storeroom where the accident occurred, were pierced by flying glass. Excelsior was started on fire by flying phosphorus. The excelsior was on the floor under shelving containing organics (ether, gasoline) not in the safety cabinets. A student in the adjoining classroom sprayed the shirt of the assistant with a carbon dioxide fire extinguisher. He was taken to the nurse.

The fire in the storeroom continued to burn for approximately fifteen minutes until the fire department arrived. The building was evacuated.

The victim eventually had all fingers removed on his right hand. The big toe from one foot was grafted onto the thumb position which could press against the pad of the rest of the hand. (1154)

1109. While teaching at a junior high in Utah the head of the department used to do a dehydration demonstration using sugar and sulfuric acid. Since each demonstration practically renders a beaker unusable he decided to use wide mouth baby food jars which are quite disposable and cost free. However, the small construction at the top of the jar created enough pressure to explode the jar sending pieces of glass through out the classroom. The American flag was shredded and one girl received a minor cut.

Since the teacher changed the equipment he should have conducted the demonstration ahead of time with the protection of a Plexiglas shield. The incident was clearly a case of lack of preparation and poor judgment. (1443)

1110. The combining volume of hydrogen and oxygen gas was being demonstrated to a chemistry class. Equal volumes of each gas were mixed in the ignition tube and inverted in a 500-ml graduated cylinder of water. The mixture was sparked. As a result a loud explosion followed by screams and the tinkle of broken glass falling up to twenty feet away. Fortunately everyone escaped the flying fragments. Seeing no one was injured I calmly deposited a handful of glass fragments into the container for broken glass. (1450)

1111. Some years ago at a lab demonstration in a chemistry teachers' club an experiment was in progress. A two-liter round-bottle flask exploded, sending glass shards all over the place. Many teachers were injured. (1474)

1112. About six years ago a colleague was asked to make something that would give a colored smoke effect for the drama club which was putting on a play. Working alone in the chemical supply room he was experimenting with different powders. I can't remember what chemical substance he put into a mortar but it exploded. He was wearing safety equipment. His goggles were deeply pitted. He was rather shaken up. (1485)

1113. Investigation of the effect of a catalyst. No serious accident but the potential was there. Incident occurred during a demonstration. It involved the use of new unopened bottle of potassium chlorate and manganese dioxide. As the reaction got underway there was a sudden acceleration in the reaction rate. The demonstration tube exploded showering glass and hot chemicals around. No cuts or damage to teacher or students. (1493)

1114. Synthesis of water. Eudiometer tube exploded. A student investigation using various mixtures of hydrogen and oxygen gas. No cuts or eye damage. Over the course of three classes two of the eudiometer tubes exploded. (1494)

Other cases include: 1003, 1004, 1016, 1017, 1018, 1053, 1085, 1127, 1179, 1180, 1191, 1199, 1202, 1209, 1210, 1211, 1214, 1223, 1258, 1263, 1267, 1270, 1272, 1273, 1275, 1281, 1282, 1283, 1284, 1287, 1320, 1323, 1324, 1325, 1331, 1333, 1335, 1336, 1337, 1343, 1346, 1348, 1349, 1399, 1413, 1418, 1421, 1424, 1426, 1427, 1429, 1432, 1433, 1436, 1448, 1471, 1473, 1481, 1482, 1484, 1485, 1487, 1494

Extraction of Chlorophyll

1115. At a nearby high school in Connecticut, a science teacher was demonstrating to his students the extraction of chlorophyll from plants using heated methanol. He inadvertently poured methanol into a hot beaker which was still sitting on a hot plate. The methanol ignited and splattered burning the teacher and seven of his students. (1059)

1116. In an advanced biology class in the '70's heated alcohol; was used to extract leaf pigments. Students were instructed to cover flare up with upside down dissection tray. This happened - student calmly reached for the tray but it contained old paraffin. Fire extinguisher and wet cloths put it out. (1258)

Other cases include: 1030, 1040, 1185, 1186

Eye Injuries

1117. A junior girl with a rubber "policeman" on the end of a glass rod, absent mindedly holding the policeman, oscillated the glass rod onto the desk. She got a glass sliver in the eye. (1052)

1118. A high school junior girl who was very concerned with her looks had a difficult time keeping her goggles on. During the "Percent of Water in a Hydrate" lab, she removed her goggles several times only putting them back on when reminded to do so. The "popping" of the copper (II) sulfate crystals was told to the students but apparently this student had the "It can't happen to me" attitude. It did. A crystal got in her eye and generated a significant amount of heat when dissolving in her eye. The teacher got her to the eyewash station, contacted the nurse, the local hospital and the girl's parents. Fortunately her eye was not permanently injured but she was seriously shaken up. She remembered to always wear her goggles for a whole two weeks! (1057)

1119. An eighth grade student in an ISCS in the mid 70's was involved in an experiment in which dilute hydrochloric acid was being used. He was a student who was always extremely careful about using safety goggles but for some reason whipped them off for a better look and in some way got liquid in his eyes. It was washed out quickly. He was taken to the hospital where he sat for nearly half an hour before treatment! No eye damage. (1083)

1120. In 1980 I had a male ninth grade student bring a sample of a dry powdered chemical to class to show me. It was from his sister's chemistry set. I asked him to dispose of it. He blew the chemical in his hand away. It blew into the eyes of a student sitting next to him. We flushed for about fifteen minutes and then transported her to the hospital. She had to wear a patch for a few days and was fine after that. (1118)

1121. In 1981 in a Massachusetts high school students entered the laboratory and began putting on aprons and goggles. As one student reached to get goggles for herself and her partner the partner casually swung the rubber tubing used with Bunsen burners. From a previously run lab by another teacher there was acid in the tubing and it sprayed into the student's eyes. Luckily the teacher responded quickly and the eyes were flushed with water from the eyewash. Sight was impaired for several days but no permanent damage to the eye occurred. (1189)

1122. In a biology lab in 1979 we were doing a fruit fly experiment. The class used test tubes as culture tubes and for etherizing. One student, in trying to free a fly attached to the tube, tapped the tube opening on the table top. The rim of the tube splintered and flew into the students eye. The student was wearing glasses, but not safety glasses.

When the instructor saw what happened he examined the eye and upon observing a piece of glass in the eye, removed it. The eye swelled and the family threatened to begin litigation.

The teacher was saved by the "in loco parentis" statute of Mass. law. Instruction was given to the entire class prior to the lab with specific warnings about fragile glassware. (1208)

1123. Near the end of an eighth grade ISCIS (individualized chemistry class), I noticed a student appeared to be blinking. I asked him if he got something in his eye and he said no. Finally he said his eye was stinging a little. I had him rinse his eye with cold water (this was before the days of eyewash stations, about 1976) and sent him to the nurse. Later I found out he had been treated for a chemical burn.

The student had been working with several salts and wearing glasses. However we figured out that he did not wash his hands and must have put his hands to his eyes. (1220)

1124. I was filling my lawn mower with a gas can that had a flexible rubber spout. When it was nearly filled I was lowering the can to stop the flow. The edge of the spout caught on the lip of the gas tank. The spout was bent and then released from the edge of the gas tank spraying gasoline in both my eyes. While my wife was calling the emergency room I flushed my eyes with the sprayer on the kitchen sink. (1262)

1125. In a laboratory storeroom a technician went to open a five-gallon carboy to get triethylamine. On removing metal cap the ply spout seal needed to be broken. The technician punctured the seal and was squirted in the face with the liquid.

He had failed to pull the spout from the can and gas pressure pushed out the chemical. This can happen with almost any chemical with a low boiling point.

The technician was immediately taken to water and had his eyes flushed. After medical treatment he was required to wear dark glasses for two years. (1269)

1126. A junior girl was mixing or diluting acid and added water to the acid. No eye protection was worn. The young girl lost the sight in her right eye. She did not have on goggles or an apron. This happened in 1963. (1390)

1127. Sometime in 1970, during the early morning in a small graduate student lab at UCI, a third-year organic chemistry graduate student was working. A run involving caustic base in a hood and behind a shield exploded throwing strongly basic solution everywhere.

The graduate student was wearing safety glasses. He was watching the reaction when it exploded. He was alone in the lab. He was knocked to the floor with some of the reaction mixture dripping into his eyes. He was able to get to water right away and irrigate his eyes.

When help arrived he was in extreme pain and his eyes were beet red. He was put in the hospital for two days with his eyes being constantly irrigated. The result: the protective layer over his eyes was completely burned away but he had washed them soon enough to avoid any permanent injury. (1453)

1128. A bright student researched in outside textbooks and found a solvent for her unknown--aqua regia! Praising her for her creativity, the teacher prepared five milliliters of the potent reagent in a test tube in the safety hood. A few grams of unknown were added and it bubbled gently. After a few minutes the student, who had removed her safety goggles while reading, put a stopper in the test tube to carry it across the room to show her lab partner.

The stopper popped off splashing her in the eye. Within two seconds the teacher pulled her a few steps to the eyewash fountain where she flushed her eyes. There were no ill effects except tired eyes the rest of the day. Without the close proximity of the eyewash fountain, and the teachers quick action this could have been a serious permanent injury. (1458)

Other cases include: 1034, 1043, 1062, 1066, 1072, 1074, 1075, 1097, 1099, 1114, 1131, 1156, 1166, 1180, 1194, 1201, 1203, 1209, 1218, 1223, 1226, 1239, 1241, 1242, 1251, 1253, 1257, 1260, 1281, 1325, 1341, 1343, 1344, 1346, 1347, 1348, 1349, 1351, 1356, 1358, 1359, 1360, 1396, 1418, 1419, 1424, 1438, 1455, 1460, 1466, 1473, 1478

Factory Accidents

1129. A worker lost the first section of his index finger on his left hand while working a ninety ton press cutting thirty thicknesses of cloth at a glove factory. His hands were in the machine during the cutting, on the handles of the dye. During the process of moving the dye across the cloth for the next cut, the finger was not on the handle, possibly because of the weight of the dye or in the interest in speed. (1357)

Fainting

1130. Students had been informed that they were about to be involved in performing one of the more hazardous operation required of them in the chemistry lab - inserting glass rods into rubber stoppers.

In spite of pre-lab techniques on safety a student did manage to draw blood. He went to the sink and began cleaning the cut with running water. The sight of his blood led to a faint.

Result - small glass cut on his hand handled with a band aid. A large cut on his head from hitting the corner of the lab bench near the sink - five stitches. (1197)

1131. During the school year 1976-77 on the first day I was doing a lab orientation on safety procedures. A young lady fainted and hit her head a quarter of an inch above her right eye on the corner of the soap stone bench.

Now we sit during lectures. (1214)

1132. A student passed out when taking blood for typing. He hit his head on the side of the lab table as he was falling to the floor. Precaution would be to sit while taking blood and have an ammonia inhalant on hand. (1261)

1133. In biology class a fifteen-year-old girl passed out at the sight of blood. She knocked herself out when she hit the floor. (1322)

1134. A girl passed out at the sight of blood in a blood-typing lab in a sophomore biology class. She fell to the floor hitting her head on a metal stool and the lab table on her way to the floor. (1348)

1135. Blood-typing investigation was being done in a classroom. The teacher was using sterile lancets to puncture the student's fingers to obtain blood samples. This teacher had performed this investigation for several years without incident. All students who were involved were doing it on a voluntary basis with signed permission forms from parents.

A teacher in an adjoining classroom had a student who wanted her blood typed. The teacher doing the investigation volunteered to do the typing of this student. The student came to the front of the room and the teacher pricked her finger. The teacher turned away for a second and the student fainted. She banged her head on the carpeted floor. She sustained a mild concussion. (1380)

1136. A student fainted in class striking her head on the floor. She suffered lacerations to the skull. (1410)

1137. A teacher had students doing blood testing with lancets. He had not instructed the students to sit down. One young man, being sure he would have no problems was standing up. When he saw his blood he passed out. He hit his head on the lab table. (1424)

1138. In a high school biology lab students were taking blood samples for the purpose of making microscope slides. One student, using a lancet, drew a small drop of blood.

Upon observing the blood drop, the student stood up, fainted and fell to the ground. He stuck his head on both the lab table and floor cutting his head.

In prior interviews with the student he informed the instructor that he never demonstrated adverse reaction in previous similar circumstances. Later interview with parents told us that the student had a similar reaction as a child in a hospital. (1482)

Farm Accidents

1139. While working the manure spreader on a farm a fellow worker was trying to force the manure through. It had backed up and he did not turn the spreader off first. His coat got caught and pulled him backwards to the spreader. His back was severely cut. He lost his small finger and he almost bled to death before he reached the hospital. (1393)

Other cases include: 1176

Field Trips

1140. At a geology field camp in Kingfield, ME during the summer of 1968 we were splitting smaller specimens from large rock using a rock hammer. No goggles. The rest of the students were standing around observing. I was hurt by flying chip of metal from the face of the rock hammer. The metal chip penetrated my shirt and undershirt and punctured the skin on my chest. (1075)

1141. During a geology field trip a girl fell and cut her knee. It was not a deep cut and bled little. Being at the knee it did gap open. At the time of the accident we were in a mountainous area and I did not feel that it was serious enough to warrant leaving and returning sixty minutes to school.

The parent became very upset that I did not take her to a hospital and call the parent. She took the student to the doctor who said stitches were not required. The parent was worried about the scar that would be left.

She did not file suit but it was very unpleasant. (1163)

Other cases include: 1021

Fire Polishing

1142. As students were cutting glass and making glass bends one student had a piece of glass that was not yet fire polished on one end. As this glass tubing was being moved another student moved her arm and the two connected. A nasty cut resulted which required stitches. It was especially traumatic for the student because the Junior-Senior dance was that night and she had to wear a bandage. This was in the 60's.

Errors made were glass tubing should have been in shorter sections. At long lab benches students need to be spaced far apart. (1106)

Other cases include: 1371, 1382

First Aid - Choking

1143. During a biology class in a Connecticut school a student of mine in the back of the room began to make choking noises during a lecture. I quickly reached the back of the room and performed the Heimlich maneuver. A small hard candy popped out and the student resumed normal breathing. It happened so fast many students had no idea what was going on. (1186)

Formaldehyde - Formalin

1144. Around 1985 a sixth grade science teacher was in the prep room looking for some equipment. In his haste he dropped a specimen jar that contained formaldehyde. The teacher was alone but managed to escape the room. He notified me and we contained the spill using proper spill pillow technique. The area had to be evacuated because of a common ventilation system in our school. (1230)

Other cases include: 1073, 1074, 1075, 1145, 1344

Fume Hoods

1145. In 1967 as a new teacher teaching chemistry, one of the labs was combining phenol and formaldehyde to produce a new compound. It was in the spring and the windows were open. The students were instructed to use the fume hood while mixing the chemicals. After six periods of this lab, I became very dizzy, nauseous and could hardly walk. I was taken home and for forty-eight hours was extremely ill. To this day I have chronic bronchitis at least six times a year, am allergic to chemical odors and stopped teaching chemistry years ago and will probably contract cancer eventually from this accident.
The errors were several: I should not have been conducting this experiment. If you must do this type of experiment, look for other chemicals. Make sure the hood is working super efficiently. (1022)

Other cases include: 1032, 1056, 1059, 1127, 1128, 1179, 1231, 1232, 1250, 1271, 1282, 1287, 1345, 1353, 1485, 1492, 1497, 1499

Gas Flammable

1146. In a southern high school a cosmetology teacher was working with hair and hair products. The smell of "burning hair" filled the hallways. In the same area, a student was playing with the gas terminals. The student left the gas terminals on when the bell to change classes sounded. Fortunately the teacher was in the habit of checking all the terminals after each class and found the open terminal. (1008)

1147. One day in a basic chemistry lab in 1985 I looked up and saw flames shooting around a student. He had turned on the gas and lit it. His clothing was fire proof. I quickly shut off the gas. Needless to say it made an impression on the class. (1205)

Other cases include: 1004, 1037, 1038, 1039, 1040, 1041, 1042, 1043, 1044, 1045, 1046, 1104, 1110, 1166, 1210, 1211, 1212, 1215, 1219, 1264, 1282, 1405, 1428

Glass Breakage

1148. While doing inventory of stockroom material the bottom of a culture dish cracked, fell off and cut open my index finger. (1009)

1149. In a high school chemistry lab students were instructed to use a rubber policeman to clean a precipitate from a beaker. Some of the rubber policemen in the cabinet had not yet been assembled. When a student tried to put the tip on the glass rod it broke. He required stitches. (1183)

1150. A high school senior in 1983 was working on an independent project for advanced chemistry and advanced biology. In the project he was trying to simulate Miller's research on the origin of life. His attempt was to synthesize amino acids.

The apparatus was set up in one section of a chemistry lab that was also used for other classes. A source of electricity was generated after school hours. As the biology and chemistry teachers were showing the setup to the principal one afternoon after the close of school it shattered. (1228)

1151. A student in the general chemistry lab dropped an Erlenmeyer into the sink. He attempted to stop it, and it broke as he was catching it against the side of the sink. A sliver of glass entered his little finger. He was operated on that night for a severed tendon and recovered completely.

This type of accident seems to happen only to careful and conscientious students. (1299)

Other cases include: 1002, 1050, 1053, 1061, 1064, 1098, 1104, 1107, 1108, 1109, 1110, 1111, 1113, 1117, 1122, 1130, 1234, 1240, 1285, 1286, 1287, 1288, 1289, 1290, 1294, 1320, 1321, 1323, 1325, 1332, 1336, 1369, 1370, 1371, 1372, 1373, 1374, 1375, 1376, 1377, 1378, 1379, 1380, 1381, 1382, 1383, 1384, 1385, 1386, 1387, 1388, 1389, 1390, 1391, 1392, 1393, 1394, 1417, 1426, 1429, 1436, 1449, 1483, 1484, 1485, 1487, 1493, 1498

Glass Failure

1152. Students were collecting an acid in a beaker after which they had to transfer the beaker with the acid to a designated area. The chemistry teacher saw that one beaker seemed exceptionally full so she decided she would transfer it herself. Using tongs she lifted the beaker and as she moved it away from the table the bottom of the beaker give way. She and the group of students at this station were splashed with the acid. The shower in the classroom was used. The students sent to the nurse. All clothes were eaten through. Luckily no serious injuries occurred. (1028)

1153. About ten years ago I had a student using a five pound bottle of nitric acid and the bottom sheared off. Acid went on the student, the floor and me. Having no shower, I had the young man strip down to his shorts and with the help of several students flushed him with water using the largest containers possible. Next I used sodium bicarbonate paste (jak – not recommended) and had a doctor check him out. No burns.

I had burns because I looked after the student first and after he had been taken care of I cared for myself. (1098)

1154. Pace University several years ago. In moving dangerous chemicals from one storeroom to another, one of the custodians was carrying a bottle of nitrous acid. The bottom of the bottle fell out. The custodian was splashed with a body length of acid. He suffered from very serious burns and shock. He was hospitalized. (1487)

Other cases include: 1096, 1217

Gym Class

1155. A student at our school received a detached retina when she was in gym class. Several games of tennis were going on at one time. She was hit by a ball from another court. (1332)

1156. At a recreational facility while liming a field the limer got stuck. In trying to unjam the limer some of the lime got into the worker's eye. He was not wearing eyeglasses or goggles. (1340)

1157. In a private school in 1988. Case is now in litigation. A student was asked to move the faculty volleyball stand. Several students began to move it. In the process the stand fell on a boys foot. The foot was broken and the student was in a cast all summer long. He may have permanent damage to the foot. (1349)

1158. In 1976 a young man acting as football manager was left in the locker room to put out the uniforms. He was not instructed to wash or how to wash the towels and use the towel extractor. He did have access to the laundry area. He decided to wash the towels. He then used the towel extractor. Once running, he jimmied the lid and reached inside. He lost an arm at the elbow. The coach, school administration and the machine manufacturer were sued. (1391)

1159. A Clay High, Oregon, Ohio student was hitting golf balls. He hit the ball underneath a portable electrical display sign. He went to the sign and probed under the sign with his golf club for the ball. He was electrocuted. (1400)

Hair

1160. During a distillation experiment a fellow student in organic chemistry lab leaned over the apparatus. Her long hair went swinging forward and went up like a torch. She never returned to class and I do not know the outcome. (1026)

1161. In a Kent State University lab in 1971-1972, during a qualitative analysis course, I was involved in the process of purifying my second unknown. Another student was working across from me. I was dissolving my unknown in solution. The unknown was an organic compound so I am sure the solvent was flammable. At the same time I was shaking the funnel, which was stoppered to mix the solution, the other student lighted a burner. The fumes ignited and my hair was burned. I smothered the flames with my own sweater. Fortunately I had only minor burns on my face and the hair grew back. (1109)

1162. After a 1987 chemistry lab was completed the students were writing up their results. One student did not turn off the Bunsen burner. Another student leaned over and singed her hair. (1138)

1163. During the late 1950's when girls were wearing elaborate hairdo's, heavy with lacquer we were running a lab in an eighth grade science class requiring the use of Bunsen burner. One girl leaned over the burner and her hair flared. Fortunately she was only singed and the next day came to class wearing a very modest and shorter hairstyle. (1155)

1164. In an introductory microbiology course in college a long haired female student turned her head to talk to her lab partner. The tip of her hair came in contact with the lit Bunsen burner. Her hair singed and it was patted out by her partner. (1194)

1165. A Junior girl came late to class while a lab was in process. She was warned at the beginning of the year to tie back her hair. She did not this time as she felt safe as she was only going to take notes for a four-person group.

Her hair was teased and "poofed". As she bent over her notebook to write, her hair ignited but fortunately was only burnt one side. She got a short cut for the next day. (1227)

1166. As a new eighth grade science teacher in 1967 I was going to demonstrate the equal and opposite force concept by making a rocket out of a milk carton. This demonstration came from the text we were using.

I was to fill the milk carton from the bottom with gas from the jets and then ignite the gas from a pin hole at the top. As we all waited for something to happen, we (I?) grew impatient and lifted the carton. It immediately erupted in flames that singed my eyebrows and shot up the sleeve of my blouse burning the hair off my arm. (1231)

1167. Curl enhancer on student's hair first period Monday morning. The girl leaned near the burner and her hair ignited. It was quickly extinguished. (1293)

1168. A twelfth grade female student in an Advanced Placement Biology lab was performing a bacterial inoculation. The long sleeve on her skirt caught fire as did her long hair.

Students had been told explicitly to tie back long hair and to roll up long sleeves when doing any work in the lab. (1303)

1169. In high school a female student bent over a Bunsen burner. Her hair caught fire. It was extinguished manually by her lab partner. (1403)

1170. A girl with long, fine blond hair (to her waist) was standing with her back to the lab table that had a burning Bunsen burner on it. The convention currents caused her hair to fly into the flame. (1428)

1171. A chemistry teacher in my school was in the lab with his students working with Bunsen burners. One of the female students with long hair reached across the table. Her hair caught fire. She started to run when the teacher reached her and put out the fire with his hands. Her hair had burned and his hands suffered slight burns.

The errors included long hair not tied back. The student starting to run which increased the rate of burning. (1473)

Other cases include: 1043, 1046, 1175, 1264, 1473

Haste

1172. Some rules don't sink in until you've actually experienced the situation they try to prevent. Preparation for a lab to be given was running late and I was hurrying to finish. Without thinking about the safety rule I measured the amount of concentrated sulfuric acid into a liter graduated cylinder and added water to dilute it to the required molality. As soon as I heard the sizzling sound of boiling water I realized my mistake and jumped back. Fortunately I was spared a shower of hot sulfuric acid. Well almost, my wool jacket developed a series of small holes in the arms and front during the next dry cleaning. I have never again made the same mistake. (1165)

1173. I was teaching a lab on leaf pigment chromatography in a biology lab in 1967. We had the students draw out glass tubing to make micropipettes to draw the lines on the paper.

I was behind my desk talking to a student from another class about her grade. Without looking, I reached for my rank book which was lying next to the tray containing paper. At the same time, a student reached for some paper, without looking, with the same hand holding a pipette.

The tiny sharp end penetrated the palm of my hand leaving three pieces totaling about 1.75 inches inside. Two pieces were easy to recover. The third traveled along a tendon and lodged up by the first knuckle. It was a long and painful experience.

The mistakes made: The paper should have been elsewhere. Everyone should have been looking at what they were doing. The student should not have been carrying the pipette around. (1209)

1174. I overheated the solution while diluting sulfuric acid and broke out bottom of beaker. I didn't have enough prep time and was hurrying. (1295)

Other cases include: 1144, 1357

Hazard Communication

1175. During a first year organic chemistry lab in college a student with very long hair was heating a flammable liquid over a flame instead of a steam bath. The student was unfamiliar with the substance which was poured out of a brown glass bottle that was only labeled by name. The chemical vapors did ignite and burn. Her hair was damaged but she did not suffer any other problems. It was a very thought provoking experience for me since I had carried out the experiment the day before using the same procedure. (1092)

1176. This accident occurred in 1986. My father was doing the annual cleaning of fence row areas around the farm. His usual procedure was to pour diesel fuel and burn. Someone had poured gasoline into the can without relabeling it. The fire ignited his clothing and burned his shoes completely. He suffered second and third degree burns over his legs. He spent thirty-six days in the hospital and suffered much pain. At the time of this accident he was 72 years old. He has problems with the heat bothering the skin grafts. (1125)

1177. A potentially serious accident that did not quite happen involved the mislabeling of reagent bottles. A bottle identified as concentrated sulfuric acid actually contained dilute acid. The addition of more concentrated acid resulted in a remarkably surprised teacher with a bottle of very hot acid on her desk. The bottle shattered from the heat but not until the teacher had placed it in a tray so that no leak occurred. The problem of incorrectly labeling is a constant concern of mine. I suspect that the increased use of chemicals by non-chemists will make the problem more serious. (1239)

1178. An artist friend in his printmaking studio took a drink from a bottle of Perrier and discovered he had a mouthful of acid used in etching. (1273)

1179. A professor at a local L.A. University moved an unlabeled bottle in the hood. It exploded and the professor lost his hand. The unlabeled bottle contained picric acid. (1446)

1180. In a San Bernardino high school during the school year 1987, a teacher was cleaning the lab. He thought the unmarked bottle, similar to a large pickle jar, contained beef tallow or fat used for biology experiments. He dumped the stuff into a sink so he could rinse the jar before throwing it out. But it wasn't tallow. It was volatile sodium metal in an oily liquid. As soon as the water hit, it exploded.

The teacher was taken to the hospital where doctors stitched up the gash in his abdomen and examined his eyes for debris. Something, possibly a metal fragment, injured his eye. His vision is still blurry.

Two days after the explosion, school officials working with county environmental health investigators removed all containers with sodium from the lab. School officials are still not sure how the sodium got there. They speculated the bottle might have been there since the closing of another high school. The material from the school that closed was divided among three other schools.

The gallon jar was a third to a half full of sodium metal. In high schools, sodium is used only in demonstrations in very small quantities to show its strong reaction with water. The explosion caused a small fire and forced the evacuation of nearly 2000 students.

The jar violated one of the principle rules of a chemistry lab--Never have anything in an unmarked container. (1461)

Other cases include: 1208, 1282, 1451, 1500

Hazardous Waste

1181. The most serious safety problem is getting rid of waste produced in experiments. (1301)

Other cases include: 1229, 1426, 1479

Head injuries

1182. Ninth-grade physical science students were performing a density lab using water displacement method. This was in 1985. During the lab a male student decided to call down the drain pipe of the sink located in the middle of his groups lab station. He stuck his head into the small sink. Another boy in his group jabbed him in the ribs. In response to the jab the first boy quickly raised his head and in so doing gashed the back of his ear on the pointed end of the faucet. Five stitches were required. (1432)

1183. October, 1980. Pendulum lab. A female student wearing a lovely white Angora sweater walked into the path of a swinging pendulum and got "bapped" with the bob. Result- minor head injury, lots of blood; colorful sweater.

Because suspension of the bob is most effectively done from the ceiling this may happen again unless a student is assigned from each lab group to be the safety monitor. It is a good idea to have a tennis ball surround any large weights. (1475)

Other cases include: 1082, 1106, 1130, 1131, 1132, 1133, 1134, 1135, 1136, 1137, 1138, 1225, 1433, 1498

Heating Alcohol

1184. A student was heating alcohol at a science fair. The alcohol burst into flames in the middle of the display with paper and card board around three sides of the pan. I grabbed the pan using my handkerchief and place the pan on the floor away from the projects. I then pushed the pan out the door with my feet. I burned my hand but avoided a major fire possibility . This was twenty five years ago when I was a student. (1377)

1185. The experiment was chlorophyll extraction using boiling alcohol in beakers win a water bath on a hot plate. One of the beakers tipped over spilling the alcohol. All the beaker burst into flame. Safety goggles were being worm and the fire was put out by a water bath. (1417)

1186. Extracting chlorophyll from leaves with a double boiler - alcohol in water bath, I poured more alcohol into the mix. A few drops landed on the open coils of the hot plate. The flame jumped into the can and the can blew up sending one-half gallon of flaming alcohol onto the floor. (1467)

Other cases include: 1003, 1004, 1005, 1006, 1007, 1008, 1009, 1010, 1040, 1065, 1076, 1077, 1115, 1116, 1243, 1265, 1277, 1411, 1412

Home Accidents

1187. My daughter was out side with my husband while gardening. She saw a mushroom growing in the yard. Since we eat what we grow she naturally assumed she was free to eat it. When she showed her father what she had eaten he picked a few samples before he took her to the hospital. She was given ipecac while the hospital tried to identify the mushroom with out luck. We had to treat it as though it were poisonous. After treatment we had to watch her for up to a week for symptoms.

We now have a field key as well as telling our child never to eat without telling us. (1172)

1188. A mother drove into her driveway which slanted down towards the garage. She left the car in neutral and got out to open the garage door. The child in the car moved the gear shift and the car rolled. It pinned the mother to the garage door for twenty minutes until help came. (1353)

1189. While cooking, a pan on the stove started to burn. The mother removed the pan to a sink. She was going to put water in the pan. The kitchen curtains caught on fire. They were pulled down and water put on them. The father came in to the room and put a lid on the pan. Mother had minor burns on her hands. (1358)

1190. I left grease in a skillet on my stove at home. Result - $7000 damage. (1370)

1191. A woman came home one winter day and found her oven not working. She lit a match to ignite the oven. It was fueled by propane. The explosion destroyed the house and she lost her leg. (1376)

1192. A student, age fifteen, was home alone with a younger brother. He was cooking hamburgers and a grease fire occurred. The student removed the pan from the fire and dropped it in the sink and turned on the faucet. The grease spattered causing second degree burns on the student. (1383)

1193. The father was mowing the grass while the it was still wet from the morning dew. The lawn mower became plugged with wet grass. Without shutting the engine off the tipped the lawn mower on its side and began to kick at the blade with his shoe. He had been running the engine at a higher speed than normal because of the wet grass. As he kicked the blade it dislodged and threw the grass free. The tip of the shoe as well as the end of his big toe were cut off. (1387)

1194. A child was riding a tricycle which did not have rubber handle grips on the bars. The child fell with his eye against the open end of the metal handlebar. He cut the eyelid and muscles that hold the eyeball in the socket. Fortunately the optic nerve was not severed. The eye ball was hanging from the socket by the nerve. The child's vision was not impaired after surgery reattached the muscle and the eyelids. (1396)

1195. Flares were stored in the trunk of a car. While the father was repairing a tire along the roadway a child found the flares and pulled the strip to ignite it. The child was severely burned. The car caught on fire and was destroyed.

Flares should be kept in a metal container. Non-flammable safety signals should be used. (1406)

Other cases include: 1011, 1198, 1202

Hot Plate

1196. March, 1985. While working with an electric hot plate, two students were burned. The exercise required students to constantly stir and monitor a boiling solution. The students stirred with their elbows on the lab bench. The stirring lasted ten to fifteen minutes. Although nothing was felt during the experiment the burn increased almost like a sunburn. (1344)

1197. A student burned a finger during a lab where water was heated to boiling point on a hot plate. The burn was slight and it was treated with cold water. (1360)

Other cases include: 1033, 1090, 1115, 1185, 1186, 1231, 1338, 1412

***Household Cleaners, etc*.**

1198. About thirty years ago at her home a young girl swallowed lye. The mother had stored the cleaning compound under the sink. The result after a rush trip to the hospital emergency room to be flushed out was permanent damage. She talks with a raspy voice. (1064)

1199. This story was told to me by my brother-in-law, who is a minister, so perhaps it is true. A woman was cleaning her bathroom. She used both ammonium hydroxide and Clorox cleaners. Wishing to do a good job she used both in the toilet. Her husband, a smoker, came in later to use the facility. He dropped a lit cigarette into the toilet bowl. The explosion broke one of his legs. As the paramedics carried him downstairs, they dropped him and broke his other leg. (1192)

1200. Refinishing maple tables in a closed cellar with a "zip strip" type of stripper the fumes made me very light headed with a drugged feeling. (1266)

1201. During the summer of 1986 I was using Easy Off Cleaner, lye, to clean my oven. The instructions said after using to wipe off the spray nozzle before replacing the cap. When I wiped clean the nozzle I sprayed the lye into both eyes. I immediately flushed my eyes with water for twenty minutes before going to the emergency room. (1368)

1202. A man was cleaning car engine parts in the basement with gasoline. There was a fire and explosion. Not only did it set his home on fire but he suffered first and second degree burns. (1375)

1203. An individual was cleaning the bottom of a boat with toilet bowl cleaner. He had no safety goggles on. The cleaner got into his eyes. He flushed them with water and needed emergency care. (1394)

Housekeeping

1204. The serious problem at this time is the middle school wood shop with flammable solvents all over the room and other clutter throughout the lab. The teacher himself is the most acute safety problem with his poor attitude and lack of regard for student safety. I was forced to close his facility last June. (1271)

Hydrochloric Acid

1205. A biology teacher in my school dropped a 2.5-liter bottle of hydrochloric acid. He immediately sent a student next door to the chemistry room. The teacher there, a former analytical chemist, grabbed a large bottle of ammonium hydroxide, rushed to the biology room and poured it onto the hydrochloric acid to neutralize it.

The room immediately filled with an acrid white smoke which then bellowed into the corridor.

At this time I was assistant principal and when I heard of the accident I rushed to the area to check. It was difficult to get into the room because of the smoke. Luckily this occurred at the end of the day so the students had cleared the area. (1031)

1206. When I took an organic chemistry course at St. Cloud, Minn., an instructor dropped a bottle of hydrochloric acid. He tried to clean it up and in the process breathed the fumes. He drowned in fluid secreted by his lungs. (1071)

1207. In a chemistry high school classroom a young lady wearing nylon stockings got some dilute hydrochloric acid on her leg. She either did not notice it or ignored it. A few periods later she noticed her stocking had dissolved and also some skin damage. She went to the nurse and said she had gotten concentrated acid on her leg.

The nurse, by-passing the teacher, immediately contacted the mother. The mother panicked and had the student taken to the hospital immediately. The police were called to transport her, complete with sirens blaring. Eventually the teacher was contacted and set the matter straight.

The result was much panic but little damage. (1232)

Other cases include: 1009, 1119, 1210, 1211, 1218, 1221, 1224, 1227, 1353, 1359, 1360, 1361, 1396, 1438, 1439, 1447, 1448, 1489, 1500

Hydrofluoric Acid

1208. In my first year of teaching I had an eleventh grade general science chemistry lab make Christmas ornaments by etching glass with hydrofluoric acid. The students were wearing goggles and aprons but not required to wear gloves. (It wasn't the practice in our school and I did not know better.) The lab went smoothly with no problems, the ornaments were nice. We cleaned up and all left the room.

Two periods later one of the students came to my room with redness and pain on the insides of both fore arms to the elbows and some on the hands. He was in quite a lot of discomfort. He had gone to the nurse who sent him back to me for help since she needed to know what we were using. It seems the student had an acid burn. I was unaware of the delayed effects of hydrofluoric acid on the skin. I now read all labels and require gloves to be worn. (1158)

Hydrogen Generation

1209. In the late 1970's in an A.P. Chemistry class. The most serious accident that occurred in my class was the explosion of a hydrogen generator. The hydrogen was being produced to use as a reducing agent in the reduction of cupric oxide.

The set up (Masterton et. al.) called for a small jet to burn off excess hydrogen gas. As the student attempted to re-light the jet the flame traveled back to the generator and exploded. Goggles were worn by all students, no eye injuries. The only injuries were small cuts in and around the hands of the two students doing the lab.

This lab procedure is no longer used in the Masterton manual. (1007)

1210. One class period while teaching how to form certain gases using hydrochloric acid acid we started forming hydrogen gas which is explosive. We were using small test tubes trapping the gas under water in an over flow pan. I had four lab tables set. One student decided to use a larger flash and added more zinc metal increasing the hydrogen content and lit it. (1010)

1211. In a high school in Massachusetts around 1969 a lab was being done with twenty-eight students in the room. The students had produced hydrogen from zinc and hydrochloric acid. They would then use the hydrogen to determine its properties.

A student had a lighted Bunsen burner. He picked up a small gas bottle filled with hydrogen and passed directly over the burner flame. Instant explosion. No injuries, all students were wearing goggles.

The class size should have been much smaller. There should have been a gas switch shut off so that no burner would have been able to be used. (1173)

1212. When collecting hydrogen gas the student had one bottle and inserted a burning splint. The bottle shot up to the ceiling and broke. (1312)

1213. In a lab preparation of hydrogen, one student who received a dilute solution of sulfuric acid with a container of mossy zinc, diluted the dilute solution of sulfuric acid to such an extent that no hydrogen was produced. She then half filled the generator with mossy zinc, still no results. She then added sulfuric acid. All at once she obtained hydrogen and exothermic reaction to such an extent that the mixture boiled up out of the generator and produced so much heat that the generator melted into the table top. (1314)

1214. I was going to demonstrate a hydrogen bomb. This is a device to show that hydrogen gas burns and that you get an explosion with the proper proportions. I didn't have the proper container so I took a honey pail. I cut a small hole in the top and a larger one in the lid. I then clamped the can between two retort rings. I generated some hydrogen using zinc and sulfuric acid. I had the correct proportions. When I lit the top the resulting explosion shattered the retort ring into three pieces. (1490)

1215. I was demonstrating the production of hydrogen with a hydrogen generator. The gas was to be lit after one minute. The flask was slammed to the desk. The stopper and tube went to the ceiling. No injuries but there could have been. (1495)

Other cases include: 1282

Improper Behavior

1216. Students in a welding class were spraying each other with compressed oxygen gas. One student was wearing a very loose acrylic sweater. A sparker a third student was using caused the sudden burning of the sweater causing severe burns on the arms of the student. (1061)

1217. About twenty years ago a high school sophomore had a habit of running down the hallway after lunch to go outside. When he kicked the bar on the inside of the door, his foot slipped off the bar and went through the "shatter" proof glass. His arm followed. Nearly cut his arteries. Blood everywhere. (1065)

1218. As my junior high class cleaned up after a lab in which they had placed hydrochloric acid on sea shells, I reminded them to pick up any spills and to rinse all of their equipment before they left. The bell rang and my next class entered. They would be doing the same experiment. I discussed the precautions to be taken with the hydrochloric acid and the importance of cleaning up spills. As they proceeded to the rear of the class a girl picked up an air piston, filled it with water and proceeded to use it as if it were a water pistol. She squirted one of the students in the eye with what she thought was pure water. Great joke until he ran to the faucet to rinse his eyes. He was not seriously injured but it was a little scary. (1066)

1219. A group of chemistry students were using Bunsen burners. They had all used the burners before, and had been instructed on their use. One pair of students had been having difficulty igniting their burner, and as it turns out, had been lax in shutting off the gas between attempts. Also their connection between the tube and burner was not tight.

When I arrived with a different starter the spark caused an area fire as the cloud of gas went up and the Bunsen burner shot across the room. I grabbed the tube and held it while I calmly instructed a student to turn off the gas.

No one was injured. I now inspect all apparatus before giving the go ahead. (1068)

1220. An alternative education teacher at school borrowed chemicals and glassware to do an acid-base neutralization lab with one of his students. Having been told that the product was salt and water the student drank some of the liquid. To support (!!) the student the teacher then drank some too. Neither suffered any apparent ill effect fortunately. (1069)

1221. In 1980 in a high school chemistry lab doing a lab using 6M hydrochloric acid. The acid was in dropper bottles and clearly marked. Two large boys decided to "accidentally" squirt each other. They did not tell the teacher, probably because they were playing. They did not say anything until after they started to hurt.

We had no shower and only the week before one sink was equipped with a dishwasher sprayer attachment to use as a temporary shower. Both boys removed their shirts and leaned into the sink. We rinsed for 20 to 30 minutes until their parents arrived to drive them to the hospital. One of the boys was scarred from the accident. The doctors supported what the teachers had done. (1114)

1222. During a grade ten general science lab a student threw acid onto another student. This was in 1973. The teacher was a physics teacher who did not want the class. It was in Charlotte, North Carolina during integration. This was a basic class filled with students who had been bused in. The teacher had a hands off attitude. Fortunately the student was not hurt. (1204)

1223. "Youth Strikes Back". Youth was mucking about with some aluminum powder. I can't remember now exactly why. Anyhow, it seemed like a good idea at the time. Youth decided to do a spot of unofficial experimentation on its own. Found out you can get lovely sparks if you put heated tongs into the open top of a can of aluminum powder. Found out belatedly that you can set fire to the entire contents of the can by putting heated tongs into the top of it.

Fortunately the “oohs and ahs” of nearby students alerted me to what was going on. I got to the scene just in time to prevent youth from pouring a beaker full of water into the can to put the fire out.

I placed a heatproof mat over the top of the can in an attempt to stop air from getting in. It took about 20 minutes for the fire to go out. By this time several teachers had looked in with various suggestions about how to deal with the problem. It took us all some time to realize the bench under the can was smoldering and we had to get that put out too.

Nobody thought of using sand. The moral of course is to grow eyes in the back of your head. I still haven't learned my lesson. Only a week after the aluminum incident I just managed to stop a kid from picking a piece of calcium out of its container with a pair of hot tongs.

Then there's the time a kid was heating potassium chlorate (V) in order to convert it into chlorate (VII) plus chloride. It exploded in a spectacular orange flash of chlorine heptoxide. The crucible he was using was dirty. (1253)

1224. In a junior high eighth grade earth science class the students were testing for carbonate minerals with hydrochloric acid. After viewing the reaction a student decided to test the ring on his finger for the same reaction. Acid was dilute enough so that the student was not hurt.

My question: Why would anyone after seeing the chemical reaction want that same reaction to happen on his skin? (1263)

1225. I was riding my bike and a passenger in a car coming from behind me threw a full can of coke and hit me on the side of the head. Luckily it hit me square and not on an edge. It hit the outer ear lobe protecting me from more serious damage than a bruised cheek. (1267)

1226. A friend's sixteen-year-old daughter was standing on the street corner waiting for the school bus. A gang of boys came driving by with straws and peas. They shot their shooter into the crowd. One hit her in the eye. She lost the sight in that eye. (1331)

1227. In 1985 in Bellarmine College during an organic lab my classmates and I were instructed to clean up the lab. One student asked to use a sponge from another student who tossed the sponge to him. The sponge knocked over a bottle of hydrochloric acid which splashed all over the student. He ripped his shirt off and flooded his chest with water. While there were no injuries we all should have been wearing lab coats and goggles during clean up. (1440)

Improper Disposal

1228. In the fall of 1964 at Broward County Community College in Florida a trough fire in general chemistry class occurred when one student threw a match in the trough after lighting his Bunsen burner. A student at the opposite end of the long chemistry work table poured a flammable liquid down the trough without flushing with water. The result was a table length raging fire. There was moderate damage and minor burn injuries. (1035)

1229. As a high school junior in chemistry class I was working with an eighteen-inch thermometer. The teacher was at her desk while the experiment was taking place. There was no instruction in the use of the thermometer. The thermometer broke as I was shaking it down. The teacher instructed me to pick up all the pieces, including the mercury, and deposit them in the waste basket. (1414)

Improper Equipment

1230. During my first year of teaching, a freshman in my general science class was heating test tubes inside a beaker of boiling water using a lab burner under a ring stand.

Fortunately the student had done everything correctly with one small exception. He had selected a ring stand with a small round base. The student was adjusting the test tubes when he jarred the stand. This knocked the entire apparatus off balance and as it began to fall forward he instinctively tried to catch it. He succeeded in catching it but just for an instant. He suffered minor burns on his fingers but his apron caught all of the boiling water and hot glass.

This accident would have been difficult to prevent since the actual cause was his reflex reaction. However, I did become aware of the instability of these antique ring stands and no longer use them. (1177)

1231. At the Alpha Dairy, Red Deer, Alberta, ether was being evaporated from a flask using a homemade steam bath that consisted of a hot plate with a metal dish on top. This dish held the water as well as the flasks. This steam bath was then positioned under the fume hood which was a kitchen range fan. On the day of the accident one of the lab employees set up the steam bath but neglected to turn on the fan. Ether vapors quickly accumulated and the heat from the hot plate was soon hot enough to ignite the vapors. The fire was contained using an available fire extinguisher but the room suffered considerable damage.

Errors were using an unsafe steam bath, using a range hood instead of an approved fume hood.

A proper fume hood would have contained a fire better and the employee should have checked that the fan was on. (1248)

1232. In a college lab in 1973 the rubber end of a pipette did not fit well. It fell into a bottle of acid. The student moved the acid to the hood to prevent any further damage. (1324)

1233. This happened at a college in Connecticut in September, 1988 in a general chemistry lab. Students were producing potassium aluminum sulfate (alum) by recycling an aluminum can. The first step is to cut a piece of the can into small pieces, add 50 ml of 1.4M potassium hydroxide and warm gently with a Bunsen burner.

One student had set her 250-ml beaker with 50 ml of 1.4M potassium hydroxide on a wire gauge on top of an extension clamp instead of a ring clamp. Both clamps were provided, as the extension clamp was needed later on. The extension clamp melted causing the beaker and contents to fall, bounce once on the lab bench, once on the student's leg and shatter on the floor.

Luckily the student was wearing pants. I told her to go to her dorm room immediately, get out of her pants and thoroughly clean her leg with lots of water. After that to rinse and let her pants soak. She came back later with a small reddish area but no pain or serious damage.

The extension clamp is a Fisher product and has "cast alloy" stamped on it, which obviously will melt at Bunsen burner flame temperatures. This caused the beaker to fall.

My lesson was learned--be sure students know the names of all apparatus they will be using. (1462)

Improper Equipment Setup

1234. In a college lab a large apparatus was set up to boil liquid. The teacher left to assist another student, the apparatus fell the glass and liquid ended up on the table, floor and another student's arm. (1363)

Improper Procedure

1235. In college, working with steam distillation of flammable organic material, one of the students began the lab using an open flame. Some of the material caught on fire. He panicked and knocked over the distilling flask and set the counter on fire.
He had not been paying attention to the reminder from the lab instructor, nor had he been terribly well prepared by pre-reading the lab procedure. The lab was evacuated for twenty minutes while the fire was dealt with. (1003)

1236. Student tasted an unknown acid by placing her finger in the beaker and on her tongue. (1011)

1237. A biology major taking organic chemistry was performing an experiment. In the procedure he had to prepare a solution of sulfuric acid. Not mixing the acid and water in the proper fashion resulted in the acid flashing back onto his chest. The concentrated acid ate through his lab coat and ruined his sweater. Fortunately he was not injured. The cause may be attributed to his carelessness in rushing to catch up. In a college lab supervision is often minimal. (1033)

1238. This happened in 1982, the first year I taught chemistry. Being a biology major and having previously taught at the Jr. College level I was not thinking ahead enough to realize that eleventh grade students don't always hear instructions or remember them.

We were doing the element mixture and compound lab with iron filings and sulfur, where the elements are mixed and combined. The mixture and new compound were to be mixed with carbon disulfide, which was to evaporate near windowsill, leaving the sulfur or iron sulfide.

Some more thoughtful students wanted to speed up the rate of evaporation so they decided to heat the carbon disulfide in its evaporating dish. It quickly caught on fire, someone screamed and threw the burning liquid and evaporating dish across the room. The room quickly filled with smoke. We had to be evacuated.

The story now gets told and retold every year but I also omit that part of the lab because of the dangers of carbon disulfide. (1102)

1239. During a laboratory activity in Qualitative Analysis a student in the class was given an unknown solution to identify. The student was a party animal and spent as little time as possible in the lab. The time for handing in the laboratory write up and identification of the unknown substance was fast approaching. To avoid doing all the tests for the unknown the student decided to use the sniff test. I might add he did not use it correctly. He stuck his nose too many bottles. One of these chemicals blinded his left eye.

I use this true story in my lecture as I teach safety techniques during the beginning of the year. It gets the students attention and helps to illustrate the importance of using safety procedures in the laboratory. (1110)

1240. In an eleventh grade chemistry advanced class around 1982, a student picked up a full liter of 1M sodium hydroxide. The solution was in a fleaker bottle. The top of the fleaker just pops on and off. They do not screw on. The student picked up the sodium hydroxide by the top. The bottom dropped. Glass and sodium hydroxide went everywhere. The student was wearing apron and goggles. (1113)

1241. In a high school chemistry lab in 1986, after the students were instructed on lab procedure and safety precaution for the lab, they went to the supply table for the chemicals. One student picked up a dropper bottle of NH3 and water by the dropper. The bottle fell away from the dropper; the student bent down to catch the bottle and reached it as it hit the floor. The chemical splashed and hit her in the face.

She immediately went to the eyewash and flushed. We then sent her to the hospital to be checked. (1116)

1242. An eleventh grade girl removed her goggles as she was cleaning up. Dilute acid was splashed in her eyes. Eyewash used, no damage. (1175)

1243. In a small school in central New York in February of 1988 an eleventh grade general chemistry class was doing an oxidation of alcohols lab. They were at the second stage and investigating strong oxidation of ethanol. The experiment calls for one gram of potassium dichromate in the bottom of a test tube, five mls of water and three drops of sulfuric acid. This is to be gently heated to about 65 degrees C to make an oxidizing solution into which ethanol is added drop by drop. The directions call for boiling stones in the test tubes and these were out and available with the other reagents on a centrally located lab bench.

One student forgot to add the boiling stones. He was also very careless about heating the test tube over the flame. Since the test tube was not stirred well before heating some of the potassium dichromate was in the bottom of the tube. On strong heating the test tube in effect became a blowgun. The entire contents ended up on the ceiling and caused quite a commotion. No injuries resulted, goggles were worn; shirt sleeves were stained. (1188)

1244. An instructor cut off his little finger on the table saw. This took place in June, 1984 as he was ripping a piece of lumber. This particular instructor is very reckless with tools. He does not follow proper procedure in the use of power tools. The accident was the result of carelessness and a rush to get the task done. Even after the trauma of that accident his work habits remain the same. (1272)

1245. In high school a student stuck pennies in concentrated acid. They inhaled the vapors and went to the nurse after for headaches. (1336)

1246. Around 1972 in a college laboratory a student directly smelled a liquid and then passed out. The chemical spilled on her upper body and face. It left scars. (1345)

Other cases include: 1372, 1404

Incompatibility

1247. A non-science teacher in 1979 was sharing with his students exciting occurrences that happen when chemicals are mixed. One example involved the pouring of alcohol into a beaker containing sulfuric acid. Later in the week two of the students were able to enter the laboratory and poured an unknown quantity of concentrated sulfuric acid into a beaker followed by ethanol

Fortunately the fire was contained in a sink and the students were not injured. (1124)

1248. In 1965 when I was a senior in high school some students stockpiled chemicals in their lab pit. One day near the end of the year they mixed them together in a sink. Concentrated lye and concentrate acid splattered. Luckily there were no injuries. (1369)

Other cases include: 1172

Inhalation Exposure

1249. A student was transferring a powdered reagent from glazed paper to a test tube. Some of the powder stuck to the paper. Student tried to blow the powder off and in doing so inhaled the reagent into his mouth. (1176)

1250. In 1969 I was trying to impress on a general science class the problem of air pollutants and decided to prepare some of the more common types. After preparing the gases in a hood I asked student volunteers to sample the gas and describe the smell. I took pains to describe the proper method for bringing small amounts of gas to the nose. Everything worked well until the last gas which was a common pollutant but one I had never had occasion to make in the lab. Sulfur dioxide had some properties which I wasn't aware of and as the generator bubbled away I had the student pass her hand over the flask to sample the gas. After three attempts to do it the right way the student exclaimed to the class the gases weren't that bad and she proceeded to put her nose over the flask and inhale just as the dense Soxygen gas reached the top. She turned paper white and fell. I caught the generator. She recovered but was slow to volunteer again. (1206)

Other cases include: 1011, 1014, 1052, 1132, 1206, 1245, 1271, 1353, 1401, 1447, 1475, 1497

Iodine

1251. A ninth grade class of low reading level students in physical science was examining different metallic properties. The lab called for heating a small amount of iodine. Each student was given a tiny bit of three or four crystals to heat in a beaker. When the reaction was observed one boy decided he liked the purple vapors and while I was working with another student took a larger amount and heated it. It caused vapors to fill the room. Two boys were excused complaining of headaches. Several others had eye irritation, throat burning and other minor problems. It gave me a scare. They were wearing safety goggles. (1144)

1252. During a biology lab iodine stain was set out on the lab bench for staining onion epithelial cells. The teacher neglected to pour it into smaller beakers for easier handling. The iodine stain tipped over onto the lab bench where there is still some permanent staining. Her clothes had to be trashed as she was not wearing a lab coat or apron. (1195)

1253. We were working on an introductory lab staining onion with iodine. During the course of the lab a student placed drops of iodine on the eyepiece of a microscope. Needless to say a student then used that scope. (1489)

Other cases include: 1346

Iron Ring

1254. At Fitchburg (Massachusetts) High School in 1983 while working in the Physics lab we were doing a standard lab on transformation of potential to kinetic energy using a large spring and steel mass. Iron rings from a ring stand were used as distance markers. Student noticed that one of the rings was slightly bent so he proceeded to push it up to straighten it out. As a result the iron ring snapped off and his lower forearm received a six-inch gash with profuse bleeding. I was standing two feet away working with another student. I turned around when I heard the snap and saw the student with his arm covered with blood. (1259)

1255. Most of the accidents I have had in over twenty-five years as a chemistry teacher have been cut fingers or burns from hot rings. We have a vigorous safety program but the program is only as good as the people who are involved.

I have had very cooperative students and good fortune. (1292)

Other cases include: 1040, 1047, 1099, 1230, 1233, 1310, 1366, 1367, 1395

Lack of Attention

1256. An experienced science teacher, while teaching from the laboratory table at the front of the room, feels a burning sensation on her forearm. She absent-mindedly puts the burning area in her mouth and discovers a very sour taste. (1277)

1257. Students also forget that they might have gotten some chemicals on their fingers during an experiment. They rub their eyes afterward and panic sets in. Eye washes have been available for these problems but perhaps it means goggles should be worn for all experiments where irritant chemicals are being used. (1308)

1258. In 1959, I was student teaching. A student neglected his own experiment when he started watching an exciting step in an other experiment being done near by. His own experiment exploded injuring about twelve students. (1367)

1259. During a college laboratory in chemistry, I somehow got acid on my jeans. I was not aware of this until the jeans were washed and I had some large holes. (1392)

1260. During the 1984-85 school year a student, wearing goggles, put his finger in his eye to itch it. His fingers must have had some dirt on them. Soon his eye started to burn. I have learned to warn students about this. (1423)

1261. A teacher put away a portable Bunsen burner with the flame still going. The paint on the metal shelves burned. (1468)

Lack of Emergency Equipment

1262. A Junior chemistry student was doing a lab experiment in a class of about 15. Using acid which was heated the student dropped and broke the container spilling hot acid on himself. He had on goggles and an apron which protected him for the most part. Another student informed me and I immediately took him to the back room, took off his shoes and socks and place his legs and feet in the sink. No shower was available. I flushed him with water, sent for the nurse who sent him to the hospital. No damage. (1036)

Lack of Information

1263. In the classroom where an experiment was being done, a piece of burning paper was near a flammable liquid, kerosene. There was no water near. An explosion could have happened. If a pan of water had been near the paper could have been tossed in the pan extinguishing the fire. (1413)

Lack of Instruction

1264. During a chemistry lab this past September, 1987, a student of mine, in an attempt to turn off her Bunsen burner, turned on the gas jet in the adjacent lab station. Since her burner was placed close to the jet, the escaping gas ignited and sent a two-foot horizontal stream of flame toward the student. The student froze so the gas was not turned off for several seconds until I could reach the lab area. Fortunately singed hair on the top of her hand was the only damage which occurred. The student started school one week late and I had failed to update her on lab safety procedure which the rest of the class had experience during the first week of school. (1017)

Other cases include: 1327

Lack of Supervision

1265. The science teacher working in the classroom next to me opened his storage room door to get a can of alcohol. He was using an alcohol burner to show students that hot air expands a balloon. A student sneaked behind his back and grabbed another can, called two friends to see what was going to happen when he dropped a lighted match into the can. All three were hospitalized. The school board was sued. (1013)

1266. In South Carroll High School during the homeroom period early in the day, a non-science teacher was on duty in a chemistry room. Two male students horsing around at a lab station splashed water at each other. One student picked up an unlabeled beaker with 6M sulfuric acid and threw it on the other students face. The results were scarring, sight loss, and a legal decision that has taken over eight years. It was settled out of court. (1037)

1267. In 1987 in a twelfth grade chemistry II class, students were working independently on Qualitative Analysis. They had access to the stockroom. One student was trying to make gunpowder and mixed potassium chlorate and sulfur in a mortar and pestle. It exploded.

There was a major loss of blood, loss of the middle finger and possible loss of use in left hand. The student was not wearing safety goggles or protective clothing. (1097)

1268. In Louisville, KY some students had gotten together in a chemistry lab and decided to make a large container of hydrogen gas. They had made a small test tube in their regular lab earlier. They supposedly used a battery jar to collect the hydrogen gas and conducted a splint test. The corner of the lab was blown out and two students were killed. Why they were in the lab unsupervised no one knew. (1100)

1269. In 1969 my husband and I were building a cabin on Lake Sinclair in middle Georgia. The porch had been laid out about five feet off the ground and the joists were up but there was no flooring down. Our two-year-old daughter fell off the structure striking her foot on a piece of sheet metal that was stored under the porch. Six stitches were required to seal the cut.

The metal of course should have been stored in a safer place and probably a two-year-old should not have been unsupervised around a construction site. (1131)

1270. When I was in high school one of my friends was very interested in chemistry and spent time helping the chemistry teacher. He was a very intelligent, very curious student. One afternoon he went into the lab and, without the teacher's knowledge, got some phosphorus from the stockroom and planned to experiments with it. He didn't get far. There was a loud explosion. We heard it on the soccer field with the coach who was also the chemistry teacher.

My friend has many small scars on his face and neck and probably would have been blinded except that he wore glasses. He lost parts of two fingers on his left hand. (1164)

1271. An undergraduate student at Central Connecticut State University in New Britain synthesized a toxic gas in the lab which leaked out into the hall on the fourth floor. It was reported on the evening news as phosgene gas (although it seems to me that I had heard it was similar to this but not actually phosgene). The building was not overly crowded but was evacuated. One or two students had to be brought to the emergency room for mild inhalation effects.

It is my understanding that the experiment was unsupervised and the side product was not anticipated. This occurrence shed light on the rather faulty venting and hood system installed. (1296)

1272. In 1964 a seventh grade science student was asked to take a make up test in the storage room. The student finished the test early and began to explore the materials in the room. He took bottles and smelled each until he took a good strong sniff of ammonia. (1326)

1273. In 1980 a substitute chemistry teacher allowed two students to work alone in the lab. The students made gunpowder. One student had made a small cannon in metal shop using soft white metal. The students set off the cannon which exploded and blew off one of the boys hands. (1334)

1274. A student was amazed by the experiment on oxygen production from potassium chlorate and manganese dioxide. He asked permission to repeat the experiment after school. He secretly mixed potassium chlorate, manganese dioxide, sulfur and phosphorous in a beaker. He dropped in a lighted match. The flame produced burned the back of his hand. The skin came off. He had plastic surgery and his hand finally recovered. Fortunately the parents blamed their son and there was no law suit. The experiment has been dropped from the course. (1361)

1275. High school students were mixing chemicals at random. The result was an explosion, injuries and death. (1397)

1276. We were working with fruit flies for genetics. While working with ether on their own time, one of the students became ill. There was no supervision and not enough instruction about the use of ether. (1412)

1277. There is a lab in biology in which alcohol is heated in a water bath in order to extract pigments from freshly crushed leaves. The lab specifically states to put the alcohol into a beaker with the crushed leaves. Then to place the beaker into a water bath and then to heat the bath gently raising the temperature of the alcohol so that the pigments could be extracted. A warning is written into the lab stating the fire danger.

A high school student placed the alcohol directly into the bath and heated it. In the process of pouring the alcohol into the bath a few drops dripped onto the table top. The vaporized alcohol soon ignited setting a fire the alcohol on the table.

The student attempted to extinguish the small fire by beating it with a towel. Due to an inaccurate swing, the entire contents of the bath were spilled, thus adding fuel to the fire.

The flames were extinguished with a conventional ABC extinguisher. Lack of proper supervision and a disregard for directions were responsible for this accident. (1452)

Ladder

1278. A man painting a high cement wall on the school grounds was using an extra long ladder to reach the top of the wall. Rather than climb down the ladder he tried to jump it to the next part of the wall that needed to be painted. (1260)

1279. I was cleaning gutters around the house on a stepladder. The small legs of the ladder sunk quickly in soft ground. I ended up upside down on an evergreen plant. Luckily I was not hurt. (1405)

Lead

1280. Professor Gerald Walker, Professor of Physics at Cleveland State University is famous for his demonstrations. Recently, he has been on the NBC nightly news with Tom Brokaw and on the Tonight Show with Johnny Carson.

One experiment he does is to dip his wetted hand into a pot of molten lead. When he did it on TV he apparently managed to splash molten lead onto his clothes creating a fire hazard.

I did not see the program but it was shown on the air. (1235)

1281. My son heated lead in a pan to a molten condition. He was going to pour it into a hole in a front porch concrete hole to seal an iron post in place. When the molten lead hit the cool concrete it exploded from the hole into his face. He was not wearing goggles and received burns on his hands and face but did not lose his eye sight. (1359)

Lithium

1282. During my graduate days I once had to synthesize a methyl lithium solution in tetrahydrofuran. The procedure for making this solution called for reacting lithium wire with methyl iodide in tetrahydrofuran. The reaction proceeded smoothly and the resulting methyl lithium solution was removed from the reaction flask using pressurized nitrogen and a cannula leaving behind about five grams of unreacted lithium wire.

The procedure for taking care of the excess lithium called for reacting it with ethanol to form the ethoxide which was then reacted with water and dilute acid to produce an innocuous aqueous solution.

Blindly grabbing a laboratory squirt bottle labeled "Ethanol", I started the quenching reaction only to notice flames developing and an obviously rapid reaction starting.

I was able to pull down the sash of the hood just in time. This violent reaction coated the inside of the hood with lithium oxide powder, vaporized the Teflon off the magnetic stir bar inside the reaction flask and melted the bottom of the three necked reaction flask fusing it to the ceramic top of the magnetic stirrer unit.

It turned out the squirt bottle labeled ethanol contained water. This proceeded to react with the lithium producing lithium hydroxide, hydrogen gas and considerable heat. The heat ignited the residual tetrahydrofuran and the explosion occurred.

Obviously correct labeling could have avoided this accident. Reuse of containers for other materials should not take place. (1444)

Magnesium

1283. In an experiment in which magnesium metal combines with oxygen gas to form magnesium oxide, one of my students had a crucible explode. Pieces of porcelain flew in all directions burning a hole in our wooden cabinet and getting the linoleum floor on fire. The fire was extinguished with the fire extinguisher. Luckily no students were burnt or injured. (1279)

1284. I heard that at NSTA conference in Saint Louis a demonstrator was showing the dry ice block reaction with magnesium. Shakable's manual advises using magnesium dust and potassium chlorate to ignite the magnesium. There was an explosion and they carried the demonstrator out on a stretcher. (1465)

Other cases include: 1321, 1476

Melting Point Apparatus

1285. The heater on a melting point apparatus was not turned off. The oil bath became so hot that the bulb of the thermometer burst. Mercury droplets were everywhere due to the force when the glass broke. (1251)

Other cases include: 1331

Mercury

1286. A college student spilled mercury on the lab floor and attempted to clean up with a vacuum cleaner. The heat from the motor vaporized the mercury. He should have spread sulfur on the floor and swept up the compound. (1342)

Other cases include: 1295, 1397

Mercury Thermometers

1287. In a low-average ability eighth grade glass while demonstrating the effect of salt on boiling water a student touched the mercury thermometer to the hot tripod. The bulb exploded scattering Hg. This was not done under a fume hood. Students were removed from the area. The teacher should have used alcohol thermometers. (1046)

1288. January 1988 one of my students dropped a mercury-filled thermometer onto his lab station. When the thermometer broke it scattered glass and mercury onto the tabletop. The lab partner told him and others not to touch it.

I, the instructor, cleaned the table and the floor with wet paper towels. Then place all the towels in the trashcan.

If I had been more knowledgeable I would not have used mercury filled thermometers, but alcohol-filled instead, and I would have known how to properly dispose of it. (1086)

1289. The most common accident in labs is mercury spills due to thermometers breaking. (1249)

1290. A student leaned over to check the lab manual and at the same time knocked off a mercury thermometer. The thermometer broke and contaminated the lab with mercury. (1418)

Other cases include: 1229, 1285

Microbiology

1291. A sophomore college level microbiology class was instructed by a graduate student. During the lab we were to collect several different types of microorganisms to put on Petri dishes, allow to incubate and then identify them during the next lab session. The procedure was to put wire loop into the bacterium medium and spread it across the dish. A student during the lab, not realizing what was happening, would put the wire loop into her mouth after dipping it in each solution. The graduate student did not notice her actions until she had inoculated herself with two different types of bacterium.

She became very ill and never returned to the lab. We learned later that she had spent some time in the hospital.

The next lab session we had was spent exclusively on safety procedures, with the department head conducting the class. (1082)

1292. In Biology lab when we were studying bacteria a student reached across the lab table and spilled the bacterial fusion. Clean up was messy but no one was hurt. (1439)

Other cases include: 1039, 1047, 1092, 1138, 1164, 1253, 1293, 1294, 1407

Microscope

1293. My first year at Fitchburg, 1967-68, a biology sophomore student focused a microscope (mirror type) in the direct sun light. He screamed and I took him to the nurse. No permanent damage but the grasshoppers legs were burned to a crisp.

I tell this to all the students to date even though we have artificial light built into all our microscopes. (1270)

Other cases include: 1092, 1253

Microscope Slides

1294. The worst accidents I've encountered have been broken glass slides. I find it best to have the slide at assigned microscopes and not allow the students to walk with them. (1265)

Other cases include: 1138

Mouth - Aspirating or Pipeting by

1295. In Montville School in September, 1975 a first year Physics teacher was in the process of having his students make a J tube type of manometer. The students were to aspirate a small amount of mercury into the tube by mouth. A young lady placed one end of the J tube in her mouth and the other end, which was attached to a rubber hose, into a pool of mercury and sucked mercury into her mouth. I was department chairman at the time and had advised the teacher not to perform this activity. I was across the hall at the time and when I was informed of the accident I directed the student the nurse. (1018)

1296. A fellow student in an undergraduate chemistry laboratory in college sucked a small portion of concentrated sulfuric acid into his mouth while using a pipit. He immediately spat out the acid, rinsed his mouth with copious amounts of tap water, then held small amounts of bicarbonate of soda in his mouth for a period of time. He went to the health center for an examination. Fortunately there was little damage. (1043)

1297. A junior pipetted 6M sodium hydroxide into her mouth. (1054)

1298. While working at a clinical laboratory a fellow employee was pipeting a dilute chemical solution and it ended up in her mouth. She should not have been pipeting by mouth. Always use pipette bulbs. (1067)

1299. As an undergraduate student in a college quantitative analysis course in 1964 I had an accident with a pipet. I was using a 6M solution of sodium hydroxide in a titration experiment. In transferring the sodium hydroxide I used a pipet. There were no rubber bulbs in the lab and I used suction by mouth technique to fill the pipet. I happened to over fill the pipet and got the 6M sodium hydroxide solution into my mouth. I rushed to the nearest sink and rinsed with water. Mouth tissue was lost in the process.
I have not used the mouth to fill a pipet since. (1107)

1300. While working at the Medical College of Georgia my boss, who had his MD and PhD, mouth pipetted concentrated sodium hydroxide. Some got into his mouth. He set speed records getting to the sink. (1112)

1301. In 1973 while working at the Medical College of Georgia a friend was mouth pipeting radioactive material and swallowed some. (1139)

1302. In a college chemistry lab my lab partner pipetted concentrated acid into his mouth. He tried to neutralize it, in his mouth, with lye. Severe oral damage. (1371)

1303. A friend in the University used a pipette to transfer sodium hydroxide. He used his mouth rather than a bulb to draw in the liquid. He swallowed a mouthful of the sodium hydroxide. (1500)

Other cases include: 1362

Nitric Acid

1304. Twenty years ago my supervisor put a two and a half liter bottle of concentrated nitric acid on a lab table. He did everything with a flourish and consequently put the bottle down a bit hard. When he picked up the jar later the bottom seam was damaged and acid poured all over his lower body dissolving his clothes and shoes. He received severe burns and the scars remain today. (1050)

1305. In a quantitative analysis lab with juniors in college around 1970 one person in the lab was severely burned when a beaker of nitric acid spilled and got onto her hands. She panicked and did not know what to do. Considerable time elapsed before she put her hands under water. The result was third degree burns.

Prevention should have included better knowledge of safety; the graduate assistant could have come to her aid faster. There was water nearby but members in the class did not respond quickly. (1085)

1306. In undergraduate college, a student was given a collection of chemicals. Special notice was given to the fact that concentrated nitric acid was part of that collection. She was a loud talker. Either she was not paying attention to the warning, or was talking and not paying attention to what she was doing. The acid was knocked off to the floor and broke. It splashed onto her legs. She was taken to the nearby showers. She has scars that resulted from the burns. (1091)

1307. In an organic chemistry lab in Auburn University in 1983, a student was handling concentrated nitric acid during a synthesis reaction. Apparently some of the acid had dripped on the outside of the reagent bottle. After an hour the students hands started itching severely. She placed her hands under water and experiencing severe pain and burns. She suffered second degree burns on both her hands. This required her hands to be wrapped and treated for two weeks. (1120)

1308. After a couple of years of teaching chemistry and becoming almost fanatical on the issue of safety I was made aware of the over kill results one morning. The second year chemistry class was conducting the quantitative analytical scheme and had arrived at the copper - arsenic group. One very careful and conscientious student was wearing long sleeves which slipped up over his wrist and exposed a very serious burn. When I commented about it, he confessed to spilling 16M nitric acid on his wrist and it was trapped under his watchband. He wouldn't tell me about the spill because he thought I would be mad. (1121)

1309. A teacher reached up on a shelf on which there was a leaking box. The box broke covering him with a large amount of concentrated nitric acid. By the time he reached the restroom his suit was nearly gone.

No shower was available. He was sent to the hospital with third degree burns. (1146)

1310. This happened about fifteen years ago while pipeting nitric acid using sodium nitrate and sulfuric acid. A glass retort containing sodium nitrate and concentrated sulfuric acid had been heating. The collecting of the nitric acid occurred in the test tube in the second ring stand.

The reaction had ceased or waiting to go. I was assisting the group to separate the apparatus.

I had the stand with the test tube and nitric acid. I asked the student to my right to move away and to separate the two apparatuses.

I moved to the left and an eruption occurred. She apparently moved to the left with me and sealed the end of the retort at the bottom of the test tube building up pressure which when released blasted the nitric acid out of the test tube.

We were wearing goggles and aprons. My sleeves were rolled up. The student did not get any on her skin but I got some on my face and right arm.

I immediately went to the sink and rinsed it off. One drop was big enough that the scar is four inches long.

I know make sure the students understand instructions. I ask them to repeat the instruction. (1207)

1311. In an eighth grade ISCS chemistry class about ten years ago a young woman was using concentrated nitric acid as part of an experiment. The teacher followed all safety precautions. The students were constantly made aware of safety and safety was an integral part of the class. In this experiment the nitric acid was in a special box with its own dropper apparatus.

The young lady was holding the bottle of nitric acid as she was adding the acid to the solution. She was so excited by the reaction and its results that she panicked and jumped. The nitric acid splashed down her blouse and settled in her bra. She was wearing goggles and rubber gloves. (1218)

1312. A 2.5-liter bottle of fuming nitric acid was stored in the Styrofoam containers used for shipping acids. On a hot summer day one of the bottles broke. The oxidizing nitric acid ignited the Styrofoam. The fire caused some damage to the lab. Luckily someone heard the bottle crack and the fire was extinguished quickly. (1242)

1313. In 1976 in a Fitchburg, Massachusetts junior high a grade nine pair of students working in an I.S.C.S. lab. learned the caustic effects of nitric acid. After reviewing the safety rules of using an acid in the introduction of the lab, the class was working in teams at their own pace. One team finished the lab early and decided that my comments on the effects of the acid were overly stated. They used the medicine droppers to write their initials on the knee area of their blue jeans. In a few minutes they left for the next class without anyone being aware of the potential problems.

A phone call from the office forty minutes later revealed they were feeling a burning sensation on their legs. On checking the students each had severe third degree leg burns from the knee to the ankle that needed emergency room attention. Permanent scars were present in each case. The jeans fell apart in the next wash. (1264)

1314. A splash of concentrated nitric acid into the face of a student in an eighth grade ISCS classroom. The student was wearing goggles but the face around the area was burned. Safety instruction had been given. Goggles and aprons were being worn however several safety procedures were not followed.

The small dropper bottle was picked up and subsequently dropped. A face shield was not worn. The safety shower was marginally adequate. The lab was very over crowded. This experiment should be eliminated in grade eight. (1386)

1315. When I was an undergraduate at a small private university in 1970 a fellow student was working as a lab assistant. The weather was warm and she was wearing shorts and tennis shoes with no socks. As she carried two five-pint bottles of concentrated nitric acid up a flight of concrete steps she tripped and fell. Both bottles of acid broke and she landed in a pool of acid slipping back down the stairs. She went to the lab on the same floor to use the safety shower but the door was locked. She then ran up the stairs through the puddle and finally located an unlocked lab with a safety shower. By now two male students had arrived and were assisting her. She spent about ten minutes in the shower but her modesty prevented her from removing her acid soaked under clothes until arriving at the hospital. She suffered third degree burns on her thighs, buttocks and feet. She spent six weeks in the hospital with skin grafts.

Safety showers need to always be accessible; installed in some hallways. All clothing should be removed in the shower. Never carry two bottles of caustic liquid at one time. (1419)

1316. A young female student was carrying five-ml concentrated nitric acid in a graduated cylinder to her lab table. She was talking to someone as she walked. The base of the cylinder hit the lab table tipping the cylinder. The acid spilled onto the back of her hand. She walked to the front of the room to ask what to do even though all students were instructed as to what to do in case of spills. As a result she had third degree burns on the back of her hand and needed skin grafts to repair the damage. (1426)

1317. A seventh grade girl picked up a dropper bottle of nitric acid by the dropper. The bottle fell to the floor and the dropper remained in her hand. When the bottle broke some acid splashed on her leg. I sent her to the nurse. At this time neither the girl nor I knew that the acid was on her leg. When her leg started to itch that evening she went to the hospital. (1476)

Other cases include: 1153, 1154, 1349, 1437

Overcrowding in Schools

1318. Due to space restriction at our school, the elementary grades 7&8 share the laboratory space with the art room. Several minor incidents of fire have happened in the past few years because combustible materials are readily available to ignite whenever burners are used for experiments. Young people have a difficult time resisting temptation to burn the paper scraps which surround them. This is a serious fire hazard. The art teacher does his best to leave the room tidy but there are always treasures left behind in the sinks, drawers and cupboards. (1243)

1319. Our chemistry lab is designed for twenty-four students. The local administration sees no problem of placing thirty to thirty three students in a lab class. I have managed to hold the classes to twenty-four by promising to shut the lab down before permitting thirty students in at once. This is a ridiculous battle and I am tired of fighting it. (1430)

Other cases include: 1314

Oxygen Production

1320. During my third year of teaching chemistry at Cathedral High School in 1972, using a standard published lab experiment I had a rather explosive experience. The experiment involved the production of oxygen, using potassium chlorate and manganese dioxide. I had repeatedly warned the students about the need for clean glassware, but two students began heating their mixture in a dirty test tube. The test tube exploded showering them and at least four others with glass. Fortunately all were wearing aprons, goggles, and long sleeved shirts. No one got hurt and I had an experience to share with all my classes from that time on. (1001)

1321. My first year of teaching I had an accident which taught me a lot about lab safety. My chemistry class was making oxygen gas using potassium chlorate and manganese dioxide. Another part of the lab involved using magnesium to show burning in oxygen gas. A group of students put magnesium instead of manganese dioxide with potassium chlorate. Glass everywhere, bright white light. Student's explanation, "I didn't know it mattered, they look almost the same." Never overestimate your students. (1016)

1322. One of my high school chemistry classes was doing the old preparation of oxygen gas by decomposing potassium chlorate with manganese dioxide in a test tube and then collecting the oxygen gas by displacement of water experiment. A student allowed the test tube to tilt forward so the molten mixture blocked the one-hole stopper. When the pressure inside the tube built up the stopper shot out with some of the molten mixture attached. No injuries. (1041)

1323. During the mid-seventies, a certified but not knowledgeable Jr. High Science Teacher was demonstrating the production of oxygen and the use of the manganese dioxide catalyst from potassium chlorate.

Either through ignorance or carelessness powdered charcoal was substituted for the manganese dioxide. One can probably imagine the force of the exploding test tube when the mixture was heated. This action resulted in the embedding of glass in the facial area of several students. (1048)

1324. About eight years ago in a community college in eastern Massachusetts a potentially dangerous situation occurred in the chemistry lab. Students were following direction to generate oxygen from potassium chlorate and manganese dioxide.

Fortunately the instructor has always been a zealot for safety practices in the lab. Each lab period he makes them stand at attention, don goggles and put on aprons. He also has them prepare data books for the experiment to be done, carefully outlining procedures to be carried out in the course of the exercise.

In the course of carrying out the experiment one student's test tube exploded and the pieces hit him squarely in the goggles. Other pieces hit him in the chest. Minor cuts occurred on the face and on his side. He was treated at the emergency room for minor abrasions. (1166)

1325. About twenty years ago, prior to eye glasses, etc. in the lab I gave a new science teacher a mixture of potassium chlorate and manganese dioxide so that she could demonstrate the preparation of oxygen. She also requested red phosphorus and sulfur to show how they reacted with oxygen. I told the teacher to keep it locked in her storeroom until she was ready to use it.

When she heated the mixture it exploded. The glass test tube vaporized and the force of the explosion hit her in the face. I feel her contact lenses saved her eyes.

Between the time I gave her the materials and the time she used them she left them on a table top and a student added some phosphorus to the mixture to see what would happen.

Fortunately no visible scars occurred and a lesson was certainly learned. (1225)

Para-Dichlorobenzene

1326. The experiment was to heat para-dichlorobenzene to show physical change. The student did not remove the stopper from it. He heated it strongly when the directions said to heat gently. He pointed it at the desk behind not at the wall. There was a blast of flame twenty feet long to the corner of the room. The student was saved because he was going to the front of the room to get something. (1236)

Pentane

1327. An undergraduate student was seriously burned in a fire in an organic chemistry teaching laboratory. The student was pouring pentane from a beaker into a flask at the time. The pentane vapors were ignited by a nearby heat source. The student, in an attempt to set down the beaker, accidentally poured the pentane on her blouse which caught fire.

The Teaching Assistant panicked and ran screaming from the lab. A post-doc in an adjoining room, along with a student assistant ran in and found the girl on the floor in flames. The entire bench top was on fire. The remaining students were terrified and hysterical. The student assistant extinguished the burning girl while the post-doc, using a fire extinguisher, put out the bench fire.

This accident involved three severe errors and violations of safety laws: first, the use of a flammable substance near a heat source; second, the desertion of the TA whose irresponsibility contributed to the extent of the injury; third the students' lack of safety training in important issues such as how to use a fire extinguisher. (1437)

Phenol

1328. In a biochemistry lab, a woman took dilute phenol from the freezer and put it in a warm water bath to warm the solution. After a few minutes in the bath the woman with the phenol bottle proceeded across the lab. The bottle bottom broke spilling the chemical on her lower abdomen and upper thighs. She quickly took off her skirt while standing under the safety shower.

She went to the emergency room to seek treatment only to find that the medical staff did not have knowledge of medical procedure for phenol burns. After calling the poison center for information they found that using ethylene glycol would prevent further spreading of the burn. She did end up with second degree burns. (1171)

1329. Chemical poisoning in our laboratories is not a major problem but the potential exists. On March 28, 1988 during a regularly scheduled second year organic lab, a student spilled approximately 10 ml of a phenol solution over her right hand. The class had received individual pre-weighed 8-gram samples to which 2 ml of water was added to obtain a solution for nitration. Her hand was immediately flushed with cold water for a period of fifteen minutes. The area Industrial First Aid attendant was notified. Upon examination of the injury a further fifteen minute flushing was done. Due to the toxicity and caustic properties of phenol this was advisable.

Disposable gloves were available but their use was not mandatory as would have been the case had students been weighing the initial samples. Successive labs used gloves without further incidence.

An error in judgment and lack of foresight on the part of the instructors was the primary factor in this accident. I am happy to report that the student suffered no ill effects and the burn was kept to first degree. (1237)

Other cases include: 1145

Phosphorus

1330. Around 1981, in a first year chemistry class of mostly junior students of above average ability, we were doing a lab generating and studying properties of oxygen. This lab was done in connection with studies about gas laws and properties of gas. Oxygen was collected through the decomposition of potassium chlorate. The students had completed the collection of gas and were doing an activity studying the properties of oxygen. Various chemicals were lowered into the gas bottle of oxygen via deflagration spoon. While using red phosphorous, the student tilted the spoon while removing it. Excess unreacted phosphorus spilled on the lab table and burned. The student attempted to put out the flame by patting it with his hand. He received third degree burns. (1101)

1331. As a high school student my instructor gave my lab partner and me a special project. We were asked to identify an unknown substance by performing various tests. A melting point might give some valuable information so we decided to melt this waxy yellow substance. It suddenly flared up and exploded - as yellow phosphorus usually does. Fortunately no injuries resulted. (1169)

Other cases include: 1108, 1270, 1325

Pipet Bulb

1332. The most serious accident I have witnessed occurred in my fourth year of college teaching. I have been teaching eighteen years at the college level, mostly analytical chemistry and instrumental methods of analysis.

In a sophomore level analytical chemistry lab a student was inserting a glass volumetric pipette into the constricted opening of a rubber pipette bulb. She was holding the pipette around the bottom of its enlarged portion. At the same time she was carrying on a conversation with her colleagues. The pipette splintered in her right hand. A large glass shard punctured her hand. A very large gash resulted. As the bleeding became intense she went into shock but did not loose consciousness. The gash was rinsed with cold water and covered with a clean white gauze. She was taken to the hospital where she received 40 stitches. (1311)

Other cases include: 1232

Potassium

1333. As part of a history report a student wanted to do a demonstration involving potassium metal and water. When the student added the potassium to water the resulting explosion spread the potassium over the carpeting in the history classroom. The fires started in the rug were extinguished.

The teacher did not properly instruct the student nor provide for safety procedures. The teacher did not check the room's facilities. Luckily no one was injured. (1290)

1334. A potentially dangerous demonstration is using Na or K with water. The reaction is very unpredictable depending mostly on the size of the piece you take and the surface of water in contact with it. To get a "better reaction" I will use a slightly larger piece. Sometimes sparks will jump out. I had one occasion where a student's book was burned. (1310)

Other cases include: 1427

Potassium Chlorate

1335. A ninth grade boy doing an IPS experiment using potassium chlorate had the contents of the evaporating dish explode. The student did what the teacher told the class not to do. As a result there was severe damage to the boy's finger, a deep burn.

The doctor was afraid of nerve damage. The lab ceiling was also damaged. This is what happens when students do not follow directions. (1281)

Other cases include: 1223, 1284, 1324, 1330

Pressure

1336. In a college lab a student watching crystal formation was deluged with glass and ammonia when the Erlenmeyer flask exploded. Gas pressure built up in the flask because of the reaction. (1073)

Other cases include: 1034, 1051, 1109, 1125, 1310, 1322, 1337, 1338, 1397, 1404, 1448, 1484, 1500

Pressure Cooker

1337. During my first year of high school teaching I was teaching a general science class when suddenly a terrific exploding sound occurred. It sounded as if a gun were fired. A pressure cooker had exploded sending large metal fragments and caustic solution all around the room next door. Students were making paper and were heating a mixture containing sodium hydroxide in the pressure cooker. The sodium hydroxide reacted with the aluminum resulting in the increased pressure. The safety valve did not function, and it blew up. No serious injuries. (1168)

1338. In a small school in central Massachusetts a senior student was working on his independent science fair project after school. His general area of interest was growing bacteria and he was sterilizing some agar medium in 500 ml Erlenmeyer flasks plugged with cotton. The sterilizing instrument was a pressure cooker being heated on a hot plate. The student erroneously left the room leaving the pressure cooker on and forgot it. When the water boiled away the safety plug blew out sounding like a shotgun blast. The plug wedged in the ceiling and the room was filled with cotton fibers floating in the air. If anyone had been in the vicinity of the cooker there is no doubt serious injury, if not death, would have occurred. (1190)

Propane

1339. A group of ninth graders were using propane torches because we did not have Bunsen burners. One boy turned the torch as high as it would go and began turning around. The room was very small so I said in my most commanding voice "Stop moving." A potential disaster was prevented. (1442)

1340. While using propane cans with adaptor tops as "make do" Bunsen burners, one student knocked one over. A six-foot long yellow flame shot out along the bench. There was a moment of panic as those close by realized what was happening. The panic quickly ended when a student just reached over and righted the can.

I use this to teach the idea that the most important safety equipment is your head and good common sense. (1478)

Other cases include: 1191

Protective Equipment - Improper

1341. During my first year teaching I had an eighth grade top level student splash herself in the eyes with chemicals being heated. The student was wearing her personal glasses rather than safety goggles. She was heating the material in a stoppered test tube contrary to specific cautions of the lab manual. In her great panic she rubbed her eyes with a wet paper towel and that aggravated the problem. Unable to see temporarily, she was sent to a local hospital and had her eye flushed. She returned to school two days later with no permanent damage. (1027)

Protective Equipment - Lack of

1342. Twenty years ago a student was using concentrated sulfuric acid in a ninth grade physical science class. He was seated and not using protective clothing. The acid spilled on his leg. He was taken to the hospital after much water had been applied to dilute the chemical. No law suits. (1029)

1343. A teacher was demonstrating the reaction of sodium and water. He wanted more dramatics so he used a larger sample than normal. The resulting explosion covered the twelve-foot high ceiling with residue. The first row of tables and students were also showered with debris.

The teacher had no chemistry background. He never measured quantities. No eye protection was used. No shield set up was used. He did not move the students away from the demonstration table and did not record the demonstration in his plan book so the supervisor could be forewarned. (1044)

1344. One of our biology instructors was stuffing a small bird. He was using a needle to inject formaldehyde and was not wearing goggles. He struck something hard and the solution popped out into his eye. This was many years ago when only the chemistry labs had portable plastic eyewashes. He came running and yelling into my class. We got him cleaned up and he had no problem with his eye. (1178)

1345. In a senior high school in rural Pennsylvania a student lab assistant was preparing dilute sulfuric acid for a chemistry lab. With the teacher present the student assistant carried the concentrated sulfuric from the prep room to the fume hood. In transit the bottle struck the edge of a lab table shattering and spilling the contents. The student jumped out of the way with minimal damage and splashing. Water via a hose, no shower present at the time, was used to flush for fifteen minutes. No suit resulted but there was damage to the floor and ceiling. Today we have an acid shower and use rubber acid carriers. (1179)

1346. About six years ago three students were mixing aluminum and iodine. The lab was on the study of elements, mixtures and compounds. The students placed the two elements in a wet test tube and noticed a reaction starting to happen. They had cooked the test tube. Holding the test tube between them, they watched the reaction. The chemicals exploded, spraying hot aluminum and iodine into their faces. No goggles were worn. I had problems getting the three students to the eyewash because they all needed immediate attention. The amount of damage done, besides the speckled tan look, was one student had blurred vision for one day. (1203)

1347. It was my first year teaching chemistry at a new school. Lab aprons were not ordered. I attempted to order some but was informed there was no more money for this year.

We were doing a lab with 6M sodium hydroxide and a student was sitting down when he spilled it right on his lap. This student leaped in the air and in a very bow-legged fashion was rushed to the school nurse.

The next day I received a form from the nurse asking how this could have been prevented. I replied, "lab aprons." The next day my superintendent sent me a letter to order lab aprons on a rush basis. Money was no longer a problem. (1210)

1348. A student brought in a goose egg for the class to open and observe the embryo. Two students volunteered to do the demonstration. When the egg was punctured it exploded with a vile substance spewing into the face of the young man involved in the demonstration. The eyewash was inoperable so we splashed water on him and escorted him to the nurse. The gas that had been released with the rotten substance was also quite noxious so we opened all the windows to alleviate the odor.

Goggles should have been worn and the eyewash should have been working properly. (1212)

1349. One of our chemistry teachers had a heart attack in the middle of the year. He was unable to return and subsequently retired. At the time I was teaching seventh grade science. As a physics major turned middle school science teacher I was the only person who could be found on short notice to teach chemistry. I took over a level one chemistry assignment mid year.

No lab curriculum was in place that I could easily pick up and go with so I used what other teachers were doing. At one point I found a "neat" lab and decided to innovate. The lab required dilution of nitric acid and making up a 1M solution of potassium dichromate. The students were to prepare the dilutions.

In the lab was a special needs student. Since the students worked in groups of one or two the special needs student got the chemicals and another student mixed them. Concentrated nitric acid was poured over potassium dichromate. The students did not have on goggles. The student mixing the chemicals must have sensed trouble as he turned away as the beaker exploded. Purple stuff was all over the place. A great stain was on the ceiling. The student was rushed the shower, washed thoroughly and taken to the nurse. An eye exam showed no eye or face injury. (1222)

1350. About six years ago my advanced chemistry class was in the process of preparing esters. One of the young ladies in the class who was not wearing glasses and had been wearing a protective apron had the following incident happen.

The liquid had been heated and all preliminary precautions taken but one; the direction that she waft the aroma produced. As she was wafting, the liquid bumped suddenly resulting in the fluid hitting her in the face, especially around the nose area. I immediately took her to the water fountain which was directly outside the lab room. Although she was very frightened she did not get any severe injury. We now require protective shields in all experiments. (1223)

1351. In an advanced high school biology class in 1987 in Massachusetts, the teacher asked a student to remove a preserved lamprey from jar and rinse it in sink. Tongs were provided but not safety goggles. Specimens were tossed into sink with a flourish. Another student got a bit of the solution in his eye and under his contact lens. We flushed the eye with tap water; the nurse drove him to the hospital. All was well. More goggles were furnished. (1257)

1352. A student in a high school lab wearing shorts splashed 0.1 M acid on her legs from a large carboy that we were using to distribute the solutions for a titration. (1276)

1353. A teacher was diluting hydrochloric acid. In the absence of a fume hood, the teacher was preparing the dilute solution in an open room. A sudden draft blew the hydrochloric acid gas toward the teacher's face. The resulting gasping for air resulted in more inhalation of hydrochloric acid. The result was severe irritation of the bronchi. The disturbing part of this accident was the general attitude that the expense of a fume hood was not warranted since these accidents don't happen that often. (1288)

1354. An eighth grade student was doing a demonstration of her science fair project. It involved using matches. As she lit the match it caught her sweater on fire. The judge with her was able to get the flames out. Other than a big scare the student was not hurt.

She should have been wearing a lab apron and goggles. (1364)

1355. It has been twenty-five years but the memory is still vivid. In a chemistry lab, a beaker of concentrated acid tipped forward over a classmate. Her apron was not around her neck; her dress was longer than her apron. I remember the appearance of her dress. It was eaten to shreds and her nylons disappeared. The teacher had to stand her in a small sink and splash water from the faucet. A shower would have been much more efficient. The teacher was lax in the wearing of the apron. I don't recall if any of us knew what to do. We all panicked. (1388)

1356. In Ohio around 1961-62, a student in a freshman general science class set a bottle of ammonium hydroxide down on the lab table after he opened it. He set it down harder than he anticipated and a drop or two splashed into his eye. There were no goggles available in that school for any classes and the only water in the room was one deep sink with a goose neck type faucet. The teacher immediately took the student to that faucet and held his head down over the sink running water over his eye. While this was being done a student was sent to the office to have the office call an ophthalmologist. No damage was detected upon examination.

The biggest problem was that no goggles were provided for the class. (1435)

1357. During the summer of 1985, I had been called to school to move chemicals so they could begin work on the new laboratory. I was working by myself and was in a hurry to finish. In my haste I was carrying two bottles at a time by the thumb rings. When I turned from the shelf to walk out of the storeroom, the bottles hit together. It knocked a small hole in the bottom and spilled down my leg.

We had no safety shower at that time so I stood still and ran through possible courses of action. I decided I must get help to wash off so I slowly crept toward the door and called for help.

Fortunately the custodians were working down the hall. They helped me to the custodian closet where I was able to slowly step on a chair using the unaffected leg and down into the sink. I washed the remaining clothing, most had dissolved by this time, and my leg with plenty of water. The fire department's chemical spill unit came to clean up the storage area.

Serious injury was avoided only because my pants leg absorbed most of the acid and kept it from my leg. I tried to keep calm and not run down the hall. And I was lucky. (1436)

1358. In a second semester college chemistry lab a student was not wearing goggles while heating a basic solution. She was very near sighted and had her face almost on top of the solution. Somehow the solution splashed and got into her eyes. Her eyes were flushed with water and she was rushed to an emergency room. There was no permanent damage. (1447)

1359. In 1980 in a chemistry lab some hydrochloric acid was splattered into the eyes of a student who was not wearing goggles. We flushed his eyes with plenty of water. (1477)

Protective Equipment - Lack of Maintenance

1360. In a general chemistry lab about five years ago I noticed a student rubbing his eye at the end of a lab. We had been using 1M hydrochloric acid and I had instructed the students in how to handle and pour acids. I told them to wipe the bottle with a wet paper towel and rinse their hands afterward. However in questioning this student I found out he had not washed his hands and after the lab he rubbed his eye casually. This must have deposited some acid in his eye.

When I spotted him his eye was quite red and itchy. As our eyewash bath squirts out rusty water we rinsed his eye as best we could and I sent him to the nurse. He went to the hospital where they flushed his eye. Luckily he only suffered minor burns.

I tell my students this story every time they are handling acids or other possibly irritating chemicals. (1224)

1361. Chemistry students were doing a lab experiment using dilute hydrochloric acid. A student spilled some acid on the arm of another student. The safety shower was near so the teacher told the student to wash the arm in the shower. The shower valves had corroded and it did not work. The teacher used water from the lavatory sink to dilute it. It was fortunate the acid was dilute. Another good thing was that it was winter and the student had a long sleeved shirt which was quickly and easily removed. (1283)

Radioactive

1362. In graduate school I was doing a tissue culture experiment using tritiated thymidine, HeLa cells and pipettes. While mouth pipeting from a canister with supposedly only 10-ml pipettes one 1.0- ml pipette was packed in with the others and when drawing up the fluid with the small pipette the "safety" stopper of cotton, fetal calf serum, HeLa cells, and thymidine went to my mouth.

I immediately spit out the materials, wiped my tongue and rinsed my mouth. I then scrubbed my tongue and had a radioactive assay of my tongue. It proved negative. I had no instruction regarding the technique. (1074)

1363. During the time period between 1964 and 1988 over sixty people received unnecessary exposure to twenty millicuries of radium. It was stored unmarked and not inventoried in a university chemistry lab. (1404)

Other cases include: 1301

Razor Blade

1364. A left-handed honors student, who thought he knew more than the teachers, always cut with a single edged razor blade towards him. He had been told repeatedly not to do so. One day, after telling him again not to do so, he sliced his finger and bled profusely. I had demonstrated the right procedure to the whole class. I had given three quizzes on lab safety and procedures.

Even so, I was written up by the principal and it was put in my file. (1320)

Refluxing

1365. An experience which illustrated the value of protective eyewear occurred during an organic chemistry lab. I am not sure what the actual chemicals were but the procedure did involve refluxing for a long period. The apparatus of the student across from me broke showering both of us with hot chemicals. An apron protected my clothing to a degree and I was not too concerned until I removed my eye protection and found them spotted with chemical. The value of something I had looked upon as an annoyance was very much impressed on me. (1233)

Ring Stand

1366. In the early 80's, while cleaning up at the end of a lab, a student hurriedly put away a hot ring from a ring stand in a designated drawer using tongs. When the next class came in a student assigned to the same drawer grabbed the hot ring and burned his hand. Fortunately the damage was not extensive.

After the incident, it became a lab safety policy that all hot metals be rinsed off with tap water prior to being put away.

It would be ideal for students to not share equipment but this is not always possible. (1105)

1367. A student turned over a beaker of hot water that was used for a water bath. The hot water was spilled down the clothes and raised blisters on the stomach. The students, who were fifteen-years-old, went to remove the beaker from a ring stand on which it had heated. They used beaker tongs but caught the edge of the beaker and it slipped. The students were rushed to the bathroom (we did not have safety showers) stripped and cool water applied. No aprons at our lab were provided by the school or county. (1119)

Other cases include: 1040, 1047, 1100, 1230, 1254, 1310, 1395

Rocket

1368. During a science project demonstration a model rocket did not go up straight because only one engine went off. This wasn't too bad except the class was observing from underneath an overhang because it was raining. The rocket went over everyone's head into the school and was going in circles around the hallways. (1411)

Other cases include: 1166, 1437

Rubber Stoppers and Insertion of Glass, Thermometers, or Thistle Tubes

1369. A student was putting a thermometer through a rubber stopper. The thermometer met with resistance in spite of the water applied. The thermometer slipped, snapped in half and cut the palm of the student's hand. The nurse was contacted. Fortunately the cut was not too severe. (1004)

1370. In 1987 the third-grade gifted class from a local elementary school visited the science classes at my high school. One biology class dissected a sheep brain. The children were very excited about this. Another biology class showed them a variety of animals. My AP chemistry class planned to show the student a variety of demonstrations. Each pair of high school students planned, prepared the equipment and discussion to follow. As the elementary students were entering the room one AP student was completing his set up. He was inserting glass tubing through a rubber stopper. He was using wet paper towels. He held the tubing too far back, it slipped and the jagged end went through his hand into the part between two of his fingers. Blood shot out into the class room and into the hall. The AP student was in a "semi-shocked" condition. I attempted to stop the flow of blood using pressure. He was taken to the doctor and received stitches on both sides of his hand.

In retrospect I believe monitoring high school students is as much responsibility as one teacher should take on. I am not in favor of having "little" visitors any more. (1130)

1371. In a freshman college chemistry lab in 1979 the class was fire polishing ends and inserting glass tubing into stoppers for later use. After a demonstration and 15 - 20 minutes of directions and cautions the students got started.

I was helping one set of students when another student from across the room walked up to me with a piece of tubing through his hand. (1132)

1372. Ninth grade physical science students have cut themselves after improperly inserting thermometers into stoppers. Students simply just don't listen carefully enough. (1136)

1373. In 1968 when I was an eleventh grade high school chemistry student a friend of mine was putting thistle tubing into a stopper. It broke and it went into her hand. She has recovered full use of her hand. (1137)

1374. In an eleventh grade chemistry class a student neglected to put on protective gloves. He attempted to insert glass tubing in a rubber stopper. The glass broke and the shattered end drove into his hand. He was sent to the nurse and then to the doctor for several stitches. No legal action taken. (1174)

1375. In a chemistry lab in high school in the early 1980's a young man was attempting to put a thermometer through a rubber stopper. He had lubricated with glycerin but since there were no towels available was not protecting his hands. There had been no problem with soft rubber stoppers. This boy's stopper was abnormally rigid, he pushed too hard, the thermometer broke, and cut into the palm of his hand. The cut required stitches.

Since then I have insisted the students wear gloves. I will not permit them to do that procedure without protection. (1185)

1376. In 1986, my second year of high school teaching, the starting wide receiver on the football team twice in one period stabbed himself in the same hand with two different thermometers that broke when trying to insert through a rubber stopper. The student was using a hydrocarbon lubricant and a towel to wrap around the stopper. He still "got" himself. Needless to say the coaches were rather upset. The cork borer/bullet system does seem to be a good method to avoid this situation. (1217)

1377. A student broke an alcohol thermometer while inserting it in a rubber stopper. The student had been shown an acceptable way this could safely be accomplished. Rubber shields and glycerol were both available.

The student used the glycerol but did not use a shield and was pushing the thermometer in from the end. It broke and she suffered rather deep cuts to one hand which required 2 or 3 stitches to close.

I expect this could have been prevented by inserting all the thermometers for all the students myself prior to the lab. I suspect that this is unnecessary with a senior class. (1238)

1378. A ninth grade student tried to move a glass bend to a different position in a two-hole rubber stopper, although the class was repeatedly warned not to move the glass bend themselves but to ask the teacher for assistance. The glass piece broke and the student was cut on the hand. The teacher applied direct pressure to stop bleeding and called the school nurse. (1278)

1379. Students were instructed to use glycerol to insert glass rods into rubber tubing. One student did not follow instructions and tried to force the tube. The glass went into the palm of his hand with great force. As a result he suffered a severe cut to the hand. He also kept repeating he wished he had listened. (1284)

1380. In a college chemistry class in 1964 a student, attempting to insert a piece of glass tubing through a rubber stopper, placed the stopper in the palm of his hand. His hand slipped, the glass broke and the broken end went entirely through the palm of his hand. (1329)

1381. A student received a cut on the palm of the hand when he tried to force a glass bend through a stopper. The student used no lubrication. He did not follow directions about how to do this safely. (1335)

1382. In a 1982 chemistry class I gave a demonstration to the class on the techniques of working with glass tubing. I impressed upon the class that the sharp edges of the glass be polished, and to use glycerin as a lubricant when inserting the glass tube through a rubber stopper.

The student never polished the glass tube and as a result he shoved the tube through his hand. (1338)

1383. A student broke a thermometer in his hand by forcing it into a two-hole rubber stopper. He started doing this before the instructions on how to proceed were given. He sliced the tip of his finger. It healed with the first aid given. (1365)

1384. During my first year teaching one of my students received four stitches in her hand when the glass tubing she was trying to put in a stopper snapped and cut her. I had mentioned in other classes to use glycerol as a lubricant but somehow I had forgotten to mention it to this class. When you teach three or more classes of the same subject sometimes you forget what you told each class. Now I write down more in my lesson plan book noting where I am in each class. (1372)

1385. In a junior high science class students were collecting oxygen gas by water displacement. They had to put glass tubing through a hard rubber stopper. One student was forcing the glass without proper wetting. The glass broke in his hand and pierced his hand. (1373)

1386. A student trying to push glass tubing through a one-hole stopper broke the tubing. Sharp glass went into his hand. (1389)

1387. A glass thistle tube being put into a rubber stopper broke and the tube passed through the student's hand. This happened in a college chemistry laboratory in 1965. (1399)

1388. A high school chemistry student tried to insert a right-angle glass tube into a rubber stopper. Even though a demonstration of the proper method was described and shown just fifteen minutes earlier a sixteen year old boy walked up to me to show that the tubing had broken off, went through the palm of his hand and out the back side of the hand. I left the glass in position and got him to the school nurse, then to a hospital.

This star basketball player missed two months of playing while the hand slowly healed. (1407)

1389. In a high school chemistry lab in 1960 a student was not listening to the instruction on how to insert a thistle tube into a rubber stopper. When the student presented himself to the teacher with the broken tube through his hand the teacher was very nonchalant about the injury. The teacher did little until the student was very worried then first aid was administered. (1415)

1390. When I was a high school student another student was inserting a thermometer in a rubber stopper. The thermometer broke and punctured her palm. She had to be rushed to the emergency room for stitches. The accident could have been prevented if the student had used a lubricant and had been holding the thermometer and stopper with rags. (1438)

1391. My first year of teaching chemistry was in a small high school in Kentucky in 1960-61. We were using a set up with long-stemmed funnel. I had instructed and demonstrated how to put them through rubber stoppers. One young man, 17-years old, ignored the instructions and tried to hold the tube by the funnel and shove it through. The tube broke and went all the way through his hand. We sent him to the doctor to have the glass removed. Thank goodness it was the thin fleshy part of his hand. He only needed a few stitches and was able to come back to school the next day. (1441)

1392. A student put a thistle tube through a rubber stopper without sufficient lubricant. The tube broke and went into his hand. The result - the student was fine but I no longer use glass thistle tubes nor do I let the students put glass rods or thermometers through rubber stoppers. (1463)

1393. Inserting glass tubing, a student drove tubing through the webbing of his hand between his thumb and his pointer finger. (1466)

1394. A student, impervious to teacher directions, tried to force a non-lubricated glass tube into a rubber stopper. The tube broke cutting his hand. Stitches were required. (1483)

Safety Shower

1395. An eleventh grade chemistry student was heating a beaker of solution containing a weak acid. Heating was done on a ring stand over a Bunsen burner. The student left the stirring rod in the beaker and accidentally hit the rod knocking over the beaker. Contents spilled over the table, floor and students legs.

The teacher immediately washed the student using the safety shower. (1096)

Other cases include: 1314, 1315, 1328, 1357, 1361, 1367, 1413, 1455, 1464

Security

1396. In a high school general chemistry class in 1988 two laboratory carts were set up in the back of the room for labs for two other classes. The passing bell rang, one student picked up a dropper which was in a very dilute hydrochloric acid and squirted it into two other students' eyes.

Prevention: have a separate prep room where you can lock up chemicals when not in use. (1162)

1397. A patient examination room in the admissions building of a Psychiatric hospital was left unlocked. The building was new and the lock did not function properly. The examination room was really intended to be an office and had wall-to-wall carpeting. Someone entered the room and tampered with a wall-mounted sphygmomanometer that was used with a blood pressure cuff. The mercury in the sphygmomanometer sprayed all over the carpet. About 20-30 ml of mercury was sprayed. A professional removal company had to remove the contaminated carpet. (1180)

1398. At a high school in Knoxville, Tennessee two students stole a one-pound container of sodium metal from an unlocked storeroom. They went to a bathroom and emptied the contents into a toilet. When they flushed it several were blown off the wall. The students claimed ignorance as to what the consequences of their action might have been. (1184)

1399. Our school is "open-concept" in structure and as such there are no doors in the science area. The problem is the various lab equipment and chemicals are all well within easy reach of anyone who desires to take them. (1429)

1400. A visiting youth group with supervisors, renting the school one week end, opened the chemistry lab without permission with the common master key. They removed five pound stock bottles of potassium nitrate and sulfur and a two-pound bottle of charcoal. These were all reagents used in freshman physical science and in chemistry.

The chemistry teacher immediately reported the "robbery" on Monday morning and the huge danger potential of the substances when mixed. The youth directors paid $35 for replacing the chemicals, there were no reports of explosions. The administration changed the keys to the two science rooms so that now only the science teachers and administrators have access to those rooms. There have been no further problems with vandalism or robbery. (1459)

1401. October, 1988 a student managed to remove reagent bottles of aluminum chloride and ammonium nitrate from the chemistry supply lab. He carefully mixed the two in a 2000-ml round-bottomed flask in the stairwell. Heavy amounts of smoke were released along with large amounts of ammonium chloride. Several teachers and students inhaled large volumes of the irritating gas. The school was evacuated and the fire department summoned. (1464)

Separatory Funnel

1402. In college in 1957 I was neutralizing butyric acid with sodium bicarbonate in a separatory funnel. I placed the stopper on the funnel and shook it rapidly four or five times. I wound up wearing butyric acid for several days on my skin. It came right out of my clothes. (1201)

1403. A student in an elementary organic lab was using a separatory funnel to wash a reaction product. This particular wash was being done with concentrated sulfuric acid. The teaching assistant took the funnel to help the student. The funnel broke and the acid was sprayed all over the TA. He was quickly and thoroughly washed, bicarbonate was applied and after his outer clothing had been removed he was taken to the Health Service. There similar treatment was continued and he suffered no damage.

The cause of this accident is uncertain. The experiment was a standard one. It had been done many times and this was the first and only time that such an accident occurred.

The only cure that I am able to devise is to cut the scale of all experiments in an organic lab. The adoption of semi-micro techniques would save money for both the chemicals and disposal. It would cut the risks of such an accident occurring again. (1298)

1404. An organic student improperly used concentrated sulfuric acid to dry a liquid in a separatory funnel. By shaking the funnel violently the contents became foamy and hot. The pressure build up caused the stopper to be blown out. The acidic, hot contents were sprayed all over a student across the bench. Luckily the damage was limited to a scar in the student's scalp.

The guilty student refused to follow lab instructions. All the other students recognized him as a danger but we could not exclude him from the lab. (1449)

Other cases include: 1161

Shut-Off Valves

1405. A teacher at our school had a gas jet break and burst into flame. The controls for shutting off the gas were outside the building and were rusted tight. Janitors had to be called with big wrenches to turn the valve. This happened before I came and yet nothing was different when I arrived. We still need a janitor to turn off the gas. (1020)

1406. One day a student came running into my chemistry class and told me I was needed in the biology lab because a water pipe had broken. When I arrived I noticed one of the faucets on A lab table had been broken off just below where the valve had been.

There was a stream of water shooting straight up and saturating a fluorescent light fixture. It also caused a large volume of water to flow off the lab table into two live electrical outlets. There was already approximately four inches of water on the floor.

The teacher in charge of the class was trying to shut off the water but he could not find the water shut off valve. I finally located it inside a sealed compartment on the lab table. The only way to gain access was to lay down in the water and to smash the side of the lab table with forceful kicks.

The major problem was the poor design of a laboratory table that requires someone to lay on the floor and then reach around water, gas and electrical lines. All the tables in our science department are the same. We are working on the administration to replace all the tables. (1434)

Skin Injuries

1407. In 1982 in a ninth grade accelerated biology class I had a trained lab aid cleaning test tubes from a microbiology class. He dropped one into the sink breaking it. Large pieces of it were in the depressed drain so he tried to remove them. Of course he cut himself. (1126)

1408. A student at the University of Georgia in organic chemistry was conducting an experiment using concentrated sulfuric acid and a reagent. The student combined the chemicals in a test tube and used her thumb to close the test tube. The burn was so intense she passed out. (1135)

1409. During a chemistry lab activity involving the use of concentrated sodium hydroxide a student spilled a quantity on the lab table. He didn't tell the teacher but wiped it up with a paper towel, leaving some on the counter. The next class came in and a student sat down on the counter. The chemical soaked into his pants and burned him. The teacher recognized the problem only when the student reported pain. He had to be treated at the hospital. He missed a day of school and could not sit down without pain for a week. (1142)

Other cases include: see index for Burns and Injuries

Smoking

1410. In January, 1985 in a Newark, New Jersey hospital, an AIDS patient had been cautioned not to smoke. He was on oxygen via nose tubes. He disobeyed and tried smoking causing a fire down the tube to his clothes and linen. Thank goodness a nurse happened in and shut off the oxygen bottle before the flames reach it. The patient died due to the fire and the disease. (1352)

Soap Making

1411. A senior girl using ethyl alcohol in soap making. It heated and caught on fire. It spilled on the girl's apron. No serious physical damage. (1053)

1412. During a soap-making lesson, while heating alcohol in a water bath, a student did not place the alcohol in the outside beaker. The alcohol boiled over and down onto the Bunsen burner. The student received a burn on the left hand.

The reason for this accident was not listening. The beaker for alcohol was unmarked. There was too much socializing at the lab area. There was a failure to dye the water and a lack of hot plates. (1076)

1413. In the spring of 1969, my first year as a teacher, I had my class make soap (saponification). This was a regents-level class that contained mostly very bright students. Some students were using fat and others were making their own fat from stearic acid and glycerol, using sulfuric acid as a catalyst (esterification). The fatty layer was then decanted off to remove the remaining sulfuric acid.

One rather bright student had mixed his fat with sodium hydroxide (concentrated) but nothing much was happening. Nothing speeds up a reaction like a catalyst and in utter disregard for the directions, and apparently in confusion between esterification and saponification, he added concentrated sulfuric acid to the fat and base mixture. The resulting explosion sent the fat, base, soap, acid mixture all over his body except for his face. He was wearing goggles.

He went quickly to the science office/prep room where the department chairwoman and I stripped him and covered him with baking soda. He was ok since most of the splattering was absorbed by his clothes. He did have some chemical burns on his arms but those healed.

Our school learned the hard way but we now have five pounds of baking soda, eyewash stations and safety showers in the chemistry labs. We are getting a new high school in 1990 and hopefully every science room will have a shower and a permanent eyewash station.

I am not sure how this accident could have been prevented short of not allowing the students to make their own fat, hence removing the sulfuric acid from the room. Clear, concise directions were given in writing as well as verbally. I think it was just one of those cases where a student suffered from a temporary loss of "think power." (1315)

Sodium

1414. I was working as a graduate student distilling a needed solvent that had been prepared with sodium metal. I threw the residue down the sink and of course, the Na reacted accordingly. In my panic, I poured water onto the fire, only to aggravate the reaction. Fortunately the harm was only to my ego and I suffered embarrassment but no injuries. (1025)

1415. A first year teacher at a high school was demonstrating how violently sodium reacts with water. He used a 50-ml or 100-ml beaker about half full of water and dropped in a piece of sodium. The reaction shot violently up and out of the beaker, landed on his grade book, burned a hole through it. No one else was close at the time. (1032)

1416. A general science teacher was demonstrating the reaction of sodium with water. The teacher used a large chunk of sodium. The reaction became vigorous. There was a loud "Bang" and the beaker shattered. Fortunately no one was injured. (1040)

1417. Twenty-five years ago at a community college a chemistry professor left the prep room carrying glass jar with a block of sodium in kerosene. A leaky faucet at the demonstration table left a puddle near the deck at the front of the room. The professor slipped in the puddle, the jar fell showering the professor with kerosene, the sodium hit the water and the reaction ignited the front of the classroom. The professor died. The students escaped out the windows of the class. The room was totally destroyed. (1049)

1418. Sodium-water reaction demonstration. This reaction was demonstrated for a number of years to high school and junior high chemistry classes. It was done out doors with a plastic bucket, a cube of sodium about the size of a quarter and the students 20 feet away. This particular day a gust of wind came up just as the sodium exploded. A small piece of sodium hydroxide landed in a student's eye. There was minor irritation after washing. (1078)

1419. In the spring of 1985 in a chemistry II class, students were doing demonstration for projects. One student was going to cut off a little sodium and drop it into water. He did not have on goggles. Some of the sodium popped out and into his eye. He and the teacher ran into my room to the eyewash. As the first water hit his eye it actually sparked visibly to me and most of my students. The boy went to the hospital and had to wear an eye patch for a few days. He was lucky and not permanent damage was done. (1115)

1420. This accident occurred during a twelfth grade chemistry class in 1962 when I was a student. A male student place a thumb-sized pellet of sodium metal in his back pocket to carry out of the chemistry lab. He received a severe burn and was unable to come to school for about ten days. The teacher was sued by the parents and had to pay all the medical bills. (1122)

1421. When working with the reactivity of group I & II A metals in a high school chemistry class in 1986 the element sodium was used. The first period there were no problems. The metal was place in a sink and water added to cause a reaction. However on standing out the sodium began to dry out and the next period the metal was explosive. A student was burned as a result of the fire and sodium hydroxide that was produced. Fortunately he was wearing safety goggles. (1128)

1422. A work-study student at a private college was hired to wash chemistry glassware. The student was not a chemistry student.

On the day of the accident he was not wearing goggles. As he began to wash, he filled each piece of glassware with water. One of the pieces contained some solid sodium. The container burst into flames and the young freshman student was blinded for life.

He should have been instructed in the proper safety procedures, goggles and aprons required at all times. (1147)

1423. In a ninth grade physical science lab around 1975 a first-year biology-major teacher was teaching laboratory safety. He was showing the class how certain hazardous chemicals were so reactive that they had to be stored under liquid. In demonstrating this, the teacher showed the container that the chemical was in (sodium?) so the students could see the liquid. He then took the chemical out of the liquid with forceps and held it up for all to see. It reacted with the water in the air and he dropped it to the floor. I was teaching next door when I noticed a wall of smoke coming under the door that joined our rooms. The smoke continued up the side of my classroom wall, across the ceiling and out the large windows that were opened at the top. (1160)

1424. In 1978 in a chemistry lab in Maine eleventh grade students known for errant behavior were doing a lab involving the use of sodium metal reacting with water. The teacher distributed pea sized amounts to the students for their work. It was a lab of some twenty-four students. Several of the students decided to concentrate their sodium. They also decided to cover the dish where the reaction took place. They used a watch glass. This was done while the teacher was involved with helping other students.

A small explosion took place and sodium hydroxide was splattered around. Several students got some splashed in their faces. All went immediately to the eyewash to flush. (1170)

1425. A friend, roommate and classmate, in organic chemistry class in college was reacting sodium in alcohol. Before the sodium was completely consumed he emptied the test tube contents into the sink. The sodium on contact with water in the sink reacted more vigorously igniting the alcohol. The fire was contained; no real damage. (1196)

1426. In our chemistry laboratory a student placed sodium residues in a waste solutions bottle. A small explosion occurred causing a glass funnel to fly off the container and smash on the floor. This could have been avoided had the student followed instructions to give sodium residues to the teacher for disposal. Since then the glass funnel on our disposal container has been replaced by a plastic one. Students are still urged to give residues such as sodium to the teacher. (1245)

1427. A tip on how to survive Friday afternoon with Grade 9's without murdering one of the little brutes. You have to do party tricks.

One fine Friday I decided my "trick of the week" was going to be the reaction of sodium and potassium with water. I set up the lab. Two large bowls of water. A safety screen. The kids all in a row, two benches back. Me wearing goggles. All according to the book.

The sodium worked but the kids were bored. No flames, no flash. Well, I didn't want to disappoint the little darlings. So I tried the potassium trick again. This time with a piece that wasn't the regulation grain of rice size. This was more like the size of a small pea.

This worked. I got the best "purple waterfall" effect I have ever seen. Some of the sparks jumped over the safety screen towards the kids. Most of the kids got out of the way. One kid wasn't looking. He was the one that got hit on the side of the face. He was immediately put in the shower and flushed for a long time.

By the end of the afternoon the side of his face looked a bit flushed. He had little pin pricks where the potassium had hit him. By Monday morning the pin pricks had turned into craters. He is pock marked to this day.

My lucky break is that this was in England so the parents did not sue. Actually they didn't even complain. They couldn't speak English so I couldn't tell them I was sorry.

The moral of this is of course, don't do party tricks, don't bore kids, don't teach or possibly, don't infringe the safety rules on little bit. The moral I actually thought of at the time was none of the above. I decided from then on I would avoid potassium like the plague.

The next time a party trick was due, with another class, I simply told them I wasn't going to do potassium, because I had had an accident with it. I gave them all the gory details which is almost as good as a party trick as far as the kids are concerned.

I did the trick itself with sodium only. Unfortunately we were getting rather low on sodium. It was a very poor school. The chemistry budget was $1.00 per year per child. I felt I ought to economize and use up the last little bit of sodium in the bottle. I squished up all the little pieces, under oil, to get one rather big lump, about 1 cm 3 in size. I sliced just a tiny bit off that.

Safety set up all according to the book (just as before). Totally unworried, I dropped the sodium into the water. It exploded. I suppose hydrogen had got trapped in the tiny spaces between the squished up bits of sodium.

This time no one got hurt. Fortunately.

My "memento more" is simply a crater in the ceiling of the Junior Chemistry Lab.

The moral of the tale? Don't do any party trick, don't teach, don't economize, don't squish up sodium. (1252)

1428. In 1962 during my second year of teaching at a Junior High School in the Boston area, I was demonstrating the reaction of sodium with water to my class. The demonstration bench was at the side of the room so when the class turned to face the bench the students in the row closest to the bench were only a few feet away. A spark from the reaction ignited the hydrogen gas and the solution splattered and hit the face of one of the students. I flushed the student's face with a lot of water and saw that he received proper medical attention.

When I do this demonstration now I make sure that everyone is a safe distance away and that a wire gauze is placed over the reaction chamber. (1255)

1429. A teacher doing a demonstration of sodium in water in a large tank containing phenolphthalein. All would have been fine but the teacher inverted a large glass beaker over the reacting sodium which instantly exploded sending Na and glass shards in all directions. Fortunately the instructor was wearing a lab coat and ordinary glasses. No injury was sustained. (1274)

1430. A fellow student was injured during an experiment showing the volatility of Na when placed in water. The experiment was done in the open and a piece of the Na was thrown onto him and burned him severely. (1339)

1431. In 1986 in a physical science lab, sodium was added to water in an excessive amount. The beaker broke and smoke filled the room because improper ventilation was used. The sodium splattered onto the floor and also hit a student. It burnt small holes in his shirt. (1351)

1432. In college a student discarded unused sodium into the sink. There was an explosion and large flames shot up. The dangers of sodium reacting with water were not covered in the instructions. (1421)

1433. During a lab that contained thirty-plus students, a student managed to get some Na metal. He put the metal into a beaker of water on his lab bench. The resulting explosion sent pieces of hot sodium flying around the room. One piece hit a student on the forehead causing a severe burn.

The primary error was in not recognizing that in a large class it is impossible for the teacher to keep an eye on everyone. Secondly materials like Na must be watched especially closely. (1480)

Other cases include: 1063, 1104, 1180, 1343, 1398, 1447

Sodium Hydroxide

1434. A student in junior high, not wanting to take the time to find a glass stirring rod, stirred a sodium hydroxide solution with a pencil. He then laid the pencil on the table. When his lab partner returned to the table, the partner picked up the pencil to start answering questions. While thinking about the answer to a question the partner ran the eraser over his lips. He proceeded to wet them with sodium hydroxide. (1427)

Other cases include: 1337

Sodium Peroxide

1435. A student was weighing out some sodium peroxide on a sheet of wax paper. The student sneezed and the paper caught on fire because of the strong oxidizing agent. I immediately put out the fire. No one was hurt but I have not used sodium peroxide since. This accident occurred about 1980. The student was an eleventh grade girl. (1140)

1436. A college prep chemistry class was performing the lab in preparation and properties of acids. This took place around 11:30 A.M. in April of 1980. A generating flask exploded. Materials in the flask, sodium peroxide (a vigorous oxidizing agent) and water, plus glass from the flask were forced across the room.

Two girls, partners in the lab, were working with the apparatus at the time of the explosion. Both were affected by the force of the explosion. One complained of a hearing loss and both were cut by the flying glass. Both were sent to a near by hospital.

Another boy in the class also complained of a partial hearing loss in one ear.

Having run this lab over a period of ten years, several times per class, no reason for the explosion has been found. No extra caution is given in lab direction.

The girls had already collected two bottles of oxygen when the explosion occurred. (1151)

Spill Response

1437. As a working physicist in the 60's I was involved in the spill of several hundred gallons of red fuming nitric acid from a sounding rocket on a launch pad. We were prepared and were able to pressurize the block hose and wash down the tower. No one was hurt. (1055)

1438. In 1986 a teacher attempted to neutralize a hydrochloric acid spill with spill toner without reading the instructions. She put full strength neutralizer onto concentrated acid. There was a violent reaction causing respiratory and eye irritation. (1056)

1439. There were two honors chemistry classes being taught by two teachers. There was a lab aide who was instructed to get together a lab that used 6M hydrochloric acid. The acid was placed in a 2-L flask, stoppered and placed on a cart. The students used the 6M hydrochloric acid from a brown dropper bottle holding only 100 ml of the acid. The other teacher performed the lab without incident. I was the other teacher.

At the end of the lab exercise when the students were all finished I was placing some containers next to the 2-L flask of 6M hydrochloric acid. I accidentally touched the flask with another bottle and broke the flask containing the 2-L 6M hydrochloric solution. I dismissed the students. I went to our acid spill kit and put on sodium bicarbonate. I then got a janitor to help clean up the mess. (1058)

1440. One not so serious but impressive incident that occurred in my lab was a perfect example of the domino theory in action. A student bumped another. The student in turn knocked his apparatus over causing his neighbor to be splashed. That made him jump and knock into the person behind him. This continued down the room resulting in a series of spills and accidents none of which became serious but the potential was there. (1079)

1441. In 1955 at a tank repair facility in Germany we were forced to prepare a solution of sulfuric acid suitable for use in batteries (electrolyte) from concentrated acid purchased from local sources. We were unable to get a supply of regular electrolyte through our normal channels. The thick syrupy concentrate was supplied in approximately twenty-five gallon glass jugs. We had to mix it with water.

A truck backed into the mixing area knocking over two of the jugs smashing them and spilling the acid. A worker mixing the acid attempted to stop the truck but was unsuccessful. When he saw the unavoidable, he ran to a near by building.

No one was hurt. The area was washed with water, the solution went down the drain. New materials were purchased so the operations could continue. The area was blocked off to vehicles. (1167)

Other cases include: 1001, 1004, 1005, 1007, 1010, 1012, 1036, 1094, 1095, 1096, 1144, 1185, 1218, 1246, 1262, 1277, 1286, 1289, 1292, 1305, 1308, 1316, 1328, 1329, 1330, 1342, 1345, 1347, 1357, 1361, 1367, 1395, 1409, 1411, 1442, 1447, 1458, 1461, 1462, 1463, 1464, 1465, 1475

Stopcock

1442. A shipment of burettes and their matching Teflon stopcocks with pipette ends arrived, unbroken, in September 1987. After visual inspection the teachers put them away. A month later, the pipettes were taken out to be set up around the room to disperse solutions for ninth grade physical science classes.

In the process of assembling the stopcocks and burettes, the teachers found that the stopcocks didn't fit the first two burettes. They broke.
The remaining burettes were set up for use. The next day a student went to take dilute acid from a burette. Unexpectedly, the stopcock fell out, spilling acid on the students hand. (1090)

Other cases include: 1035

Storage

1443. About 1975 a high school chemistry stockroom was being inventoried. One shelf of chemicals became unbalanced. All the bottles on the shelf fell. Several broke. Fortunately no bad reactions occurred. (1111)

1444. In 1986 in a high school chemistry lab a large bottle of ammonium hydroxide had been moved from the stockroom to the classroom. The ammonium hydroxide was to be used in a lab exercise on acids, bases and salts. The bottle was sitting on the demonstration table. A student moved the bottle from the table to the floor directly in front of the demonstration table. Another student accidentally kicked the bottle over. The bottle broke and the lab had to be evacuated. (1141)

1445. A beaker of petroleum ether was placed in an ordinary refrigerator. During the night a spark that occurred when the refrigerator compressor turned on ignited the vapor. The refrigerator and some of the laboratory were damaged by the fire. Luckily the fire was spotted and extinguished before it caused a lot of damage. The error was not using the proper type of refrigerator. (1241)

1446. There was a fire in a lab stockroom. We do not know the cause. Several things contributed. Chemicals of mixed nature were stored haphazardly on wood shelves. Solid chemicals locked away with no hazard marking in a wooden cabinet. No files were kept to identify what was in the stockroom

Several weeks later and the state science consultant still does not know how it happened. (1291)

1447. A teacher finds an unsafe condition in the stockroom located between two adjoining classrooms. Sodium and other water-reactive chemicals are being stored beneath the drain pipe to a working sink. After reporting the condition to administration a safety cabinet is purchased.

The teacher is not given any release time to correct the condition. In an attempt to move the material between classes, a bottle of phosphorus trichloride is dripped on the floor. The floor had sustained a water still overrun the previous day. The tiles were still damp under the linoleum.

The phosphorus trichoride reacted with the water producing a cloud of hydrochloric acid gas. Both classroom and stockroom has to be evacuated. The teacher was taken to the hospital for inhalation therapy. The fireman cleaning up the spill dissolved his shoes. About fifteen squares of linoleum were also lost. (1456)

Other cases include: 1080, 1096, 1108, 1195, 1198, 1269, 1312, 1357, 1363, 1423, 1479

Substitution of Reagent

1448. While student teaching the supervising teacher was doing a routine demonstration on fire extinguishers using vinegar and baking soda. After performing the demonstration for a few periods he ran low on vinegar. He clearly understood the reaction as being simply an acid reacting and evolving carbon dioxide gas and providing pressure to propel the solution towards the fire. When the vinegar was gone he simply substituted dilute hydrochloric acid for the vinegar. His definition of dilute was 50% hydrochloric acid 50% water.

As the reaction began the flash exploded in the teacher's face. He was taken to the hospital, I took over the class. (1051)

1449. IPS has a neat experiment, destructive distilling of wood. Fifteen years ago I modified that lab for the destructive distillation of tobacco. One of our teachers had his students do the lab with loose tobacco he had brought. The test tube containing the tobacco blew up and one student suffered glass injury.

The cause of the accident was that the tobacco was packed in the test tube instead of being loose. The result was that on heating the plug of tobacco slowly from the bottom the plug held the stopper connection at the top. Also the teacher did not do the experiment before trying it in class. (1497)

Other cases include: 1450, 1451, 1452, 1453, 1454, 1455, 1456, 1457, 1458, 1459

Substitution by Accident

1450. In high school, I substituted acetone for a reagent by accident and took some ceiling tiles out. In college, I got mildly sick from some bacteria experiments. (1019)

1451. A student was working in the storage room handing out equipment. A request was made by another student for some ammonium hydroxide. This is kept in eye droppers with labels and is extremely dilute. All eye droppers were empty so the student looked in all the cabinets for more. The room has 75 students doing various labs and class work, and three teachers.

The student discovered a gallon bottle of ammonium hydroxide concentrated and was about to pour directly from the gallon bottle to the eyedropper when I saw what was happening and stopped him. (1030)

1452. During my student teaching days my cooperating teacher was preparing a solution but mistakenly used the anhydrous form of the compound. When the compound was poured in the solution there was a violent reaction resulting in damage to the ceiling. The teacher was not injured. (1060)

1453. Students were instructed to place small (match head size) amounts of various oxides, carbonates, etc. in 3% hydrogen peroxide to see which ones were effective catalysts. The teacher left the bottle of 30% hydrogen peroxide he used for the dilution on his desk. One of the students used that. Manganese dioxide in the thirty percent solution yielded a highly exothermic reaction that shot to the ceiling. Several students were sprayed with the reaction mix. The ready availability of the acid was the major problem. (1198)

1454. A teacher was doing a calorimetry lag with 1N sodium hydroxide and 1N sulfuric acid. One student put 50 ml of sodium hydroxide pellets in a graduate and was about to pour it into 50 ml of concentrated sulfuric acid when the teacher stopped him. The teacher never should have left the concentrated acid or the hydroxide pellets to be accessible to the students. (1199)

1455. Directions for testing liquids for flammability in ninth grade IPS Physical Science: "Take a 10-cm square of paper towel, twisted; place tip into solution being tested. Light the tip with a wooden splint, holding it over a bucket of water"

The student took a 10-inch square of paper towel, loosely folded and poured the unknown solution, which was isopropanol, over the towel. She lit it directly from the micro burner with no water bucket and the sink blocked by IPS 1 x 2 foot peg board.

A vigorous high flame developed instantly. The student was startled and reached over the pegboard to drop the burning paper in the sink, igniting her polyester blouse en route. After a moment of chest slapping and wet paper brought by a student across the table the fire was extinguished and the student calmed down. The charred blouse, filled with holes, went into the trash and her gym blouse was worn home. A safety shower and eyewash were installed the next month. (1457)

Other cases include: 1323

Sulfuric Acid

1456. In a high school stockroom in 1987, a student lab assistant was helping with clean up and she carelessly poured some concentrated sulfuric acid into a sink. Some acid splashed on her face. She was wearing goggles and she used the shower immediately. Nevertheless, her face was seriously burned. (1182)

1457. In 1969 in a college chemistry class was using 25 ml graduate cylinders to measure 5ml of sulfuric acid concentrate. Charlie made a quick arm movement and the 5ml of sulfuric acid went flying out, spraying three young ladies. I looked up to see one of the young ladies run out of the room to the girls' room.

On the first day we had a lab on safety. They did recall it and remembered to wash. Why did they run to the girls room and not
the use the wash? The lab was designed in 1917 and safety considerations were not in vogue then. (1213)

1458. In 1978 a student in a second year chemistry class was transporting a high concentration of sulfuric acid to his work station. Another student bumped into him spilling the contents on both of them. Both were wearing aprons and face masks. The apron only covered to the knees. Both were placed under the shower diluting as well as possible. The girl was wearing nylon stocking which disintegrated. They were difficult to remove and continued to burn.

For a few years after that I was able to hold up a pair of the boy's jeans to show what remained. Each year there was less and less to hold up and show the class. (1215)

1459. The heating of concentrated sulfuric acid in a new beaker. The sulfuric acid superheated and erupted on the student. This happened in the lab at Queen's University in Kingston, Ontario, Canada. (1246)

1460. The injured was a sixteen-year-old male, a junior in an AP chemistry class. He was spattered with concentrated sulfuric acid when he dropped a 250-ml glass stoppered bottle onto the lab bench top. The bottle did not break. Acid was bumped from the bottle neck on impact with the bench top striking the youngster in the face and eyes with droplets of the liquid. Several other youngsters nearby received droplets on their clothes but were physically uninjured.

The teacher removed the victim to the emergency eyewash fountain within an estimated five to ten seconds after the event. Flushing was begun and continued. The school nurse and the department chairman were summoned. The student was removed to a local hospital for further treatment by the volunteer ambulance corps. The student returned to school several days later without suffering eye damage but with a few superficial acid burns. All students in the qualitative analysis lab were wearing chemical splash goggles. (1316)

1461. A sulfuric acid burn on the forearm of a student. The student was an eighth grader taking the I.S.C.S. level two course.

There was acid spill which was not immediately cleaned up. The lad rested his arm unknowingly in the spill and reacted when it began to burn.

The area was washed thoroughly with water. A paste of sodium bicarbonate was applied to the affected area. The student was sent with another boy to the nurse's office.

The teacher had to reemphasize the importance of immediate clean up of all spills including water. (1319)

1462. In a high school chemistry class in 1977 a girl knocked over a graduate cylinder containing sulfuric acid. Some of the acid spilled on her arm and hand. She was wearing short sleeves.

She quickly began to run water on the burn and while she did this she leaned into the puddle of acid on the desktop and laid her good arm into it.

She retuned to school with bandages on both forearms. (1330)

1463. Around 1976, we were doing a lab experiment dealing with comparing the reactions of concentrated sulfuric acid with dilute sulfuric acid. The students had been warned about the hazards and were told to follow these rules: 1) Place the concentrated sulfuric acid containers toward the back of the lab bar so it would not spill or fall off. 2) Wear long lab aprons and goggles. 3) Wash any area well with water that the sulfuric acid, either the dilute or concentrated, might have splashed on. 4) Point out the availability of paste of sodium bicarbonate to put on skin or clothing if the sulfuric acid gets on it. 5) Advise the instructor immediately of any spilled sulfuric acid.

The student had 25-ml graduated cylinder with 15-20 ml of concentrated sulfuric acid in it near the front edge of the lab bar. She knocked it over onto herself, burning her skirt, legs and ankles. We diluted the burns with water, took off her hose and shoes and put on a paste of sodium bicarbonate. She was taken by the emergency squad to the hospital for treatment. Fortunately just a few small blisters formed with no permanent scarring. (1355)

1464. As a college chemistry student, the student at the lab station next to mine spilled the sulfuric acid we were each using in individual experiments, on the floor. She knocked over the container. The acid splashed on her foot and lower leg as the container hit the floor.

Fortunately she was wearing heavy slacks and snow boots so the acid only lightly touched her skin. I recall her immediately going to and using the lab safety shower so we must have received good instructions about safety procedures.

As I look back on the incident I wonder if the instructor realized how awkward this student was as she was physically impaired and had only limited movement of her left arm. (1401)

1465. When I was in high school we were doing an experiment that involved using small amounts of concentrated sulfuric acid. To get my beaker out of the way to protect it from spillage, I stuck it in the deep sink. Unfortunately I forgot it was there and only minutes later I turned on the water to rinse something off. SPLAT, acid sprayed over me, my clothing and my books. I received only minor burns since I washed immediately. I did ruin a nice pair of slacks. (1409)

1466. In the mid 1960's a female chemistry student suddenly screamed during the lab experiment. It was a scream of pain, not ecstasy. She had her hands over her eyes. I grabbed her arm and pulled her to the eyebath about ten feet away and began flushing her eyes.

A boy working across the table from the victim had lifted the bottle of concentrated sulfuric acid from the acid base tray instead of removing a dropper-full as directed. The bottle dropped, broke and splashed acid into the victim's eye. The district had not furnished goggles for science classes at that time.

Fortunately no permanent damage resulted. (1448)

1467. While I was an undergraduate student as a chemical education major, a part of my methodology course required that I perform a chemistry demonstration in front of the class. The demonstration, that I elected to do, required 200ml of concentrated sulfuric acid.

The method instructor informed me that the chemistry department would supply me with the chemical. When I approached the chemistry department they claimed to be unaware of this arrangement. I returned to my teacher who re-sent me to the department.

The shuffle continued for several days along with the assignment deadline coming closer. So, armed with the ignorance of an undergraduate and the fear of the red pen I placed a 250ml Erlenmeyer flask containing conc. sulfuric acid in my coat pocket. While I was leaving the lab a friend called to me. As I turned to recognize him, my coat hit against the doorknob and the bottle shattered. Thanks to the wonders of water I was not injured but my clothing - all of it--promptly disintegrated. It was a cold walk home.

Note: I changed to a different demonstration! (1469)

1468. A student tested concentrated sulfuric acid with litmus paper. Since there was no change he assumed there was no danger. He threw the litmus paper with concentrated sulfuric acid at another student. The paper hit her on the chest and burned a hole in her shirt. By then I was drowning the area with plenty of water. (Student A is a neurosurgeon today!)

Error: Student not understanding that indicators only indicate when sulfuric acid is dilute. Care is now made to ensure that students now understand this before handling acids. (1481)

Other cases include: 1109, 1172, 1174, 1177, 1213, 1214, 1237, 1243, 1248, 1296, 1345, 1403, 1441, 1469, 1475, 1500

Test Tube Heating

1469. In a chemistry lab in 1969 a boy was heating sulfuric acid in a small test tube. He kept heating it and finally the acid was propelled out of the tube onto the back of the girl at the next table. There were small spots on her back right through her blouse. (1202)

1470. In 1982 in a ninth grade advanced science class we were decomposing sodium bicarbonate. We were heating the chemical in a large bore test tube with delivery tubes. There was bubbling carbon dioxide gas produced through limewater. During heating about 80% of test tubes shattered within two minutes of each other.

Luckily all the students were wearing goggles and no one was hurt. Now I test the integrity of the test tubes prior to each lab. (1250)

1471. We run a special course for kids aiming to get on the International Chemistry Olympiad. Big prestige thing for the very best of chemically minded Youth. First lab session: Safety; how to heat a test tube containing water. There's this kid who manages to explode even that. And the fragments jump over five benches and hit the lab technician who is standing at the far end of the room in the back of the neck.

Does anyone know anyone, anyone at all, who will insure Chemistry Teachers? (1254)

1472. In a high school chemistry lab before goggles were used to any extent, and prior to any instruction in any course about hazardous materials and techniques, a student making an ester using an alcohol, an organic acid and concentrated sulfuric acid. He chose to smell the product. The contents of the test tube boiled up into his face. Fortunately injury was minimal. (1379)

1473. A student heated a test tube with fluids in it. The result was an explosion of the liquid in his face. He had his goggles perched on his hair. The copper sulfate splashed around his eyes but not in them. Fortunately he was not hurt but he and the other students got the point. ALWAYS wear your goggles and listen to safety requirements.

This happened in April 1988 in a high school chemistry class. (1425)

1474. The student next to me had potassium perchlorate in a test tube, added concentrated sulfuric acid, and heated it holding the tube at an angle. I was showered with the debris. My lab notebook and lab coat never were the same. He did not read the directions. (1470)

1475. Seventh grade students were heating a test tube containing iron and sulfur to observe the chemical change. The test tube cracked spilling the smoldering contents on the floor. Water was poured on the smoldering mass forming sulfuric acid vapors which we all inhaled.

Anticipation about the possibility of such an accident would have prevented the error and resulted in a safer clean up. (1472)

Thermite

1476. In an upstate New York school around 1978 a substitute chemistry teacher authorized a student to perform a thermite experiment. The student was told to do it outside.

The student went outside to a grassy area, poured out the thermite mixture with thermite starter on top. A twisted magnesium ribbon was placed in the center of the cone.

The student was not wearing goggles, protective outerwear or gloves.

He bent down to light the magnesium with a match and it would not ignite. After several tries it appeared to start then stop. The student bent down to relight it and inspect it. The cone erupted splattering his face, chest and arms. No adult supervision was around. When water was doused on him he continued to scream as magnesium burned on his skin.

Although the hospital was next door and the ambulance came quickly permanent damage was done and much time was needed for recovery. (1153)

Thermostat Failure

1477. Bakelite screw cap test tubes were being sterilized in an oven when the thermostat failed and overheated. The Bakelite was glowing like charcoal when the oven was opened and burst into flames when the air entered. A Halon fire extinguisher, the only one in the lab, was used. Immediately the room was filled with a suffocating gas smelling like bromine or chlorine or phosgene. The room had to be evacuated and smelled for days thereafter. (1460)

Titration

1478. In a biology classroom students were titrating dilute sodium hydroxide into a mixture of water which had carbon dioxide gas bubbled into it. One of the students claimed that the sodium hydroxide splattered into her eye. The teacher immediately had her rinse her eye with an eyewash and then sent the student to the nurse for further observation. (1289)

Other cases include: 1299, 1352

Transportation by Cart

1479. As a lab technician I was preparing to empty the waste collection bottles from each lab into larger waste containers stored outside in a waste cabinet. The bottles for toxic waste were on a cart. When I pushed the cart across an uneven stone foyer floor one of the bottles fell off the cart landing on the corner of the lid, breaking it. The contents were splattered everywhere making clean up difficult. (1187)

1480. Science teachers often need to run from room to room and carrying materials on carts. A student was running around a corner and ran into the cart knocking over and breaking three jars of chemicals. Fortunately all were relatively unreactive with each other but what if they had been! (1486)

Unauthorized Procedure

1481. An organic teacher had, during a lecture, mentioned the preparation of "torch powder." A student working as a lab assistant decided to try to make some without permission and without the recommended concentrations and amounts. While trying to scrape the drying powder together off the filter paper, the powder exploded spewing particles all over the lab and into the face of the student. (1039)

Vacuum

1482. In a biology lab, a student was asked to hold a rubber hose from a vacuum attachment down the drain so water would not splash. The student pinched the rubber hose, which exploded and burst with a loud report. No great damage was done other than fright and getting the student wet. (1099)

1483. In a ninth grade Physical Science class in 1987 a teacher, who had taught for thirteen years, used a bell jar in a vacuum demonstration as she usually did. The difference this year was the jar had a hairline crack, which she had seen. As she held the jar up to begin the demonstration, the glass shattered causing the need for stitches in three places. (1123)

1484. I was evacuating a 3L vacuum flask using an aspirator hooked to a lab sink. Even though the vacuum could be no less than vapor pressure of water this very thick flask imploded and sent glass flying in all directions. Fortunately I was not hit.

The problem was the shape and size of the flask. I had a false sense of security in the thickness of the glass. Flask should have been contained with tape or some plastic holder.

Implosions are as bad as explosions. (1275)

1485. A sealed glass tube containing isoprene (2-methylbutadiene) exploded and pieces of glass were imbedded in my face. They were picked out in the hospital and no permanent damage resulted. I was wearing safety glasses.

The cause of this accident was that in sealing the glass tube, which was done by cooling the tube and contents in liquid nitrogen while pumping to remove air and then sealing with a torch, a pinhole was left. Air entered and was subsequently sealed in the tube. When the tube warmed up to room temperature the liquid air vaporized, expanded and the tube broke.

It could have been prevented by taking more care when dealing with substances under vacuum. Use a hood when handling such substances. (1297)

1486. While working from the N.Y.C. curriculum guide "Science Grade 9-Reactions of Metals". The problem was "How can metals be extracted from carbonate ores?" Part of the directions were:

1. Heat some copper (II) carbonate (10-25 grams) in a Pyrex test tube equipped with a one-hole rubber stopper and delivery tube.

2. Pass the formed carbon dioxide gas into an eight-inch test tube which has been one third filled with lime water.

On completion of the experiment the test tube shattered. Fortunately, no one got hurt.

Looking back I realized that as the experiment cooled down a vacuum was created with the limewater going up the delivery tube. The Science Bureau was contacted to issue a caution on this particular experiment. To my knowledge it stands as is. (1309)

1487. I was using an Erlenmeyer flask. The vacuum that formed imploded the flask with glass flying everywhere. I should have used an explosion shield, goggles and a heavy Florence flask to with stand the vacuum. (1496)

Other cases include: 1031, 1286

Ventilation and Indoor Air Quality

1488. I wonder about what we don't see; the poisoning and cancer that results slowly over time and is not measurable. Our school is almost unvented. Between the shop, the art room, the science room and the janitors burning the garbage, the indoor air is poison. It is not accidents, it is slow poison. (1021)

1489. Small bottles of ammonium hydroxide and hydrochloric acid were given to students along with two cotton balls and a 4-cm diameter by 100-cm long clear plastic tube. Each group was to apply chemicals to cotton balls, place into the ends of the plastic tube, stopper it and watch formation of NH_4Cl cloud ring at some point between tube ends. The students were slow in inserting the cotton balls into the tubes and an ammonium chloride cloud slowly formed within the room. Ventilation was not adequate to remove the cloud. The lab was aborted at this point and the students deposited the cotton balls into a water bath. As they did even more ammonium chloride was evolved. The classroom was unusable until the cloud could diffuse out the window. I wonder about the health effects of ammonium chloride? (1034)

1490. Ventilation, or the lack of it, is our most serious health problem. The sections of window open as a unit. The lower section allows the breeze to blow directly on the working stations. It is almost impossible to have the windows open while Bunsen burners are being used. (1280)

1491. The biggest problem is our ventilation system. Rather, the lack of an efficient one. There are numerous days of the year when the blower doesn't work. The administration and maintenance personnel say we don't need the air exchanged. I have contacted the state OSHA agency about this but they did not or could not get the situation corrected. (1431)

1492. The most serious problem I have is a total lack of ventilation in the science labs. There is one fume hood in the lab which will remove air from only the extreme rear of the work area. There is no front shield to prevent outside air currents from forcing generated gases out of the hood. The fan motor, when it is working, pulls a sufficient volume of air but without the front shield it just does not work well. The only preventative maintenance occurs when I inform the maintenance department that the fan is not working. (1433)

Other cases include: 1015, 1032, 1056, 1059, 1086, 1127, 1128, 1144, 1145, 1146, 1179, 1231, 1232, 1246, 1250, 1271, 1272, 1282, 1287, 1345, 1348, 1353, 1431, 1472, 1477, 1485, 1497, 1499

Washing Glassware

1493. September, 1988. Students were cleaning their lab kits. One student left a broken piece of test tube in the bucket of hot soapy water. Another student reached in the water thus puncturing her middle finger. All safety procedures of first aid were followed. The student's finger bled for about four hours before it stopped even after applying direct pressure the entire time. It was recommended she go to the hospital but she refused. (1343)

Other cases include: 1012, 1027, 1223, 1320, 1407, 1422

Water Reactive

1494. In 1963 a high school chemistry class was working on the preparation of ammonia from heating ammonium chloride and calcium hydroxide in a large test tube with a glass bend in a rubber stopper.

The glass bend was put in water while the test tube was heated. Water went into the test tube and caused an explosion. (1002)

Other cases include: 1063, 1104, 1172, 1174, 1177, 1180, 1213, 1237, 1282, 1333, 1334, 1343, 1398, 1414, 1415, 1416, 1417, 1418, 1419, 1420, 1421, 1422, 1423, 1424, 1425, 1426, 1427, 1428, 1429, 1430, 1431, 1432, 1433, 1447, 1465

Wood Shop

1495. In a wood shop class a student lost a finger in a saw incident. There was a law suit which was lost by the student based on the fact that the correct technique was demonstrated to the student by the teacher. This happened in the fall of 1986. (1398)

Other cases include: 1204

Wood Splints

1496. The students were doing an experiment where they were identifying the properties of oxygen. They were using wood splints. After testing to see whether oxygen was combustible one student threw his wood splint into a garbage can full of paper towels. The paper towels went up in flames. A student who was near knocked over the garbage can and threw a pail of water into it. He stomped out the fire. The fire alarm went off. (1300)

Other cases include: 1455

Working Alone

1497. A research student was working on a project in the lab late one afternoon and didn't show up at a meeting with a friend. When the friend went to look for the student she found him lying on the floor in the lab. The student had been working in a fume hood but with the shield up so that they could add chemicals while the reaction was proceeding. The toxic gases generated during the procedure had been inhaled by the student. Fortunately he was found soon enough to prevent serious permanent damage. (1038)

1498. We had installed steel shelving in our prep room to hold glassware and equipment. It was full. One summer I decided to rearrange the shelving to achieve better traffic flow. I proceeded to move units without removing the contents. I was also working alone. Suddenly a ten gallon aquarium crashed down on my head. It was on the top shelf. I nearly lost consciousness and suffered a fairly deep scalp wound. Some six months later I pulled a piece of glass from the healed wound. (1157)

1499. During the 1987-88 school year an honors chemistry student was working alone in the high school chemistry lab performing a qualitative analysis experiment. He purposefully generated some chlorine gas to use in a test. He did this under the hood but used too much reactant and became alarmed at the amount coming off. The hood was not exhausting fast enough and some gas was escaping into the room. He notified two teacher in a nearby office who enclosed the apparatus and quickly moved it outside where the gas stopped being generated in about twenty minutes. (1221)

1500. A teacher was refilling a bottle of concentrated acid he thought was sulfuric but was instead hydrochloric. The resulting pressure and heat generated sprayed acid into the face of the teacher. Bottles had been moved over the summer by the custodian while cleaning. The teacher did not check the labels. He was not wearing goggles and was working alone. (1378)

Other cases include: 1112, 1127, 1144, 1192, 1273

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APPENDIX I About the Editors

Teresa R. Robertson, currently providing instructional support to the Department of Natural Sciences and Mathematics at the California State University in Bakersfield, also served as the first Chemical Hygiene Officer for the campus, from 1996 to 2002.

For two decades prior to her employment in academia, Teresa was a quality assurance supervisor and chemical hygiene officer in the petroleum and agricultural industries of Kern County at the southern end of the San Joaquin Valley, and an analytical chemist for a state-certified testing laboratory.

The quest for self-improvement lead to seminars given by the American Chemical Society, which in turn lead to certification by the National Registry of Certified Chemists as a Chemical Hygiene Officer and membership in the National Association of Chemical Hygiene Officers. Teresa is also a member of the National Association of Scientific Materials Managers.

Dr. James Kaufman is President of The Laboratory Safety Institute, President of Kaufman & Associates and former Professor of Chemistry at Curry College. He received his bachelors' degree in chemistry from Tufts University and his doctorate in organic chemistry from WPI.

After two years as a post-doctoral fellow in the WPI Chemical Engineering Department converting garbage into fuel oil, Dr. Kaufman joined in the Dow Chemical Company's New England Research Laboratory as a Process Research Chemist. During his four years with Dow, he became increasingly involved in laboratory safety related activities. He authored "Laboratory Safety Guidelines." Originally distributed by Dow, now over two million copies of the widely requested and reprinted brochure are in circulation.

Dr. Kaufman is the founder and president of The Laboratory Safety Institute - a national, non-profit center for safety in science and science education. LSI's lectures and training programs, AV-lending library, Mini-Grants, Internet discussion list, and publications help academic institutions throughout the world. LSI is supported by grants from individuals, foundations, companies and professional societies.

The Laboratory Safety Institute conducts seminars, short courses, audits and inspections for schools, colleges, and companies. They also provide advice on regulatory compliance, safety program development, facilities design and editorial commentary on laboratory texts.

Dr. Kaufman is a former, ten-year member of the American Chemical Society's (ACS) Council Committee on Chemical Safety and is past-chairman of the 2,500-member ACS Division of Chemical Health and Safety. He is the author-narrator of the ACS Audio Course on Laboratory Safety and editor of "Waste Disposal at Academic Institutions" from Lewis Publishers. He recorded and edited the "One-Day Laboratory Safety Audio Seminar" and "Two-Day Lab Safety Video Course." Most recently he co-authored "Safety is Elementary: The New Standard For Safety In The Elementary Science Classroom."

APPENDIX II About the Laboratory Safety Institute

The Laboratory Safety Institute is a non-profit organization whose mission is to make health and safety an integral and important part of science education, work, and life. LSI provides training, consultations, publications, audio-visual materials, and responds to requests for information.

LSI was founded in 1978 as The Laboratory Safety Workshop by James A. Kaufman, Ph.D.. His experience working for the Dow Chemical Company convinced him that schools and colleges were not doing enough to encourage health and safety. Studies by LSI and others have shown the accident rate at schools and colleges to be 100 to 1000 times that of Dow and DuPont.

Since 1978, Dr. Kaufman has trained over 50,000 science educators and scientists. His brand of safety training is a unique blend of technical information, practical and inexpensive solutions, humor, and accounts of accidents drawn from a collection of over 4,000 examples.

LSI has produced two lab safety, training audio-visuals: “The One-Day Lab Safety Audio Course” (5.5 hours) and “The Two-day Lab Safety Video Short Course” (eight, 90-minute VHS Cassettes)

LSI publishes a newsletter: "Speaking of Safety".

LSI offers lectures, seminars, short courses, audit and inspections, and regulatory compliance and safety program development consultations throughout the world for academic, industrial, medical, and government laboratories.

LSI operates an Internet discussion list, LABSAFETY-L, and maintains an informative website (http://www.labsafety.org)

LSI is supported by corporate sponsors, agencies, associations, generous individuals, its members. Members receive a newsletter subscription, use of the audio-visual lending library without rental fee, a 10% discount on most LSI publications, a 5% discount on training and consultation services, and use of the Toll Free, 24-hour Lab Safety Information Hotline.

The Journal of Chemical Education called The Laboratory Safety Institute "A national resource for safety conscious science teachers". If you would like to help support the efforts of The Laboratory Safety Institute: (1) Subscribe to "Speaking of Safety", (2) Become a member of LSI (partially tax deductible), and (3) Make a contribution (tax deductible).

Free copies of our “Laboratory Safety Guidelines”, Publications List, Audio-Visual Lending Library List, and Introduction to The Laboratory Safety Institute (containing seminar schedule and membership information) are available on request. For more information about LSI, contact: The Laboratory Safety Institute, 192 Worcester Road, Natick, MA 01760 508-647-1900; Fax: 508-647-0062, Email: jim@LabSafetyInstitute.org.

APPENDIX III How You Can Help

The Laboratory Safety Institute gratefully acknowledges the generous support of our sponsors. Since 1978, our major benefactors have been:

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