



## **ChemMatters October 1986 Page 11**

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# **Lab Safety**

I had often thought, “Come on baby, light my fire” —but I didn’t mean literally!

“My girlfriend would sometimes visit me in the college chemistry lab. One day when she walked in, I was using a Bunsen burner that was sitting close to the edge of the lab counter. The faint blue flame was practically invisible.

She came over to where I was working, placed one elbow on the lab counter, and casually leaned back. As we were talking, I suddenly saw flames shooting up behind her head. I pulled her toward me and turned her around to find the back of her trench coat on fire.

We quickly removed her coat and put out the fire. Her hair, miraculously, did not catch fire. Because the weather was cool, she was wearing a lined trench coat that burned slowly. A fluffy sweater or thin blouse could have produced severe burns. Fortunately, the only damage was a hole in her coat. I have always been grateful the accident was minor...she is now my wife!”

—P.E. Miller

“It was the last day of school, and I was in a hurry to begin my summer with a long bicycle trip with some friends, fellow college freshmen. I jogged over to the chemistry building to quickly clean off my laboratory bench before hitting the road.

After emptying my drawer of notebooks and papers, I tackled the lab equipment and a few bottles of leftover reagents. A beautiful, sunny day beckoned. There was no way I was going to stay in that stuffy building one minute longer than necessary. I began dumping stuff into the sink.

The concentrated hydrochloric acid and sodium hydroxide mixed on the way down the sink. The violence of their reaction blasted the material out of the drain into my face.

I knew I was in big trouble when—a second later—I felt the acid burning into my eyes. Though my vision was starting to blur, somehow I made it across the room to the eye wash. While I was rinsing my eyes, I shouted for help. Fortunately, one faculty member was still in the building. He rushed in to prepare a solution of sodium bicarbonate to further wash my eyes and to neutralize the acid. After the attack of acid, gallons of water, and the soda solution, my eyes burned and were useless for anything other than distinguishing light from dark.

After 15 minutes (it seemed like an eternity), I was rushed to the nearest hospital where an eye doctor was on call. There, about an hour after the accident, the doctor determined that my eyes were seriously damaged but not beyond repair. By this time, the real pain was setting in. It felt as if eight-inch nails were being driven through my eyes and deep into my skull.

Next came a week in bandages. Total darkness, total helplessness. Constant low-level, throbbing pain punctuated by sharp excruciating pain whenever my eyeballs moved. (Think of closing your eyelids after glass splinters had been placed on your eyeballs, then moving your eyes back and forth.)

After a couple of weeks, my vision returned to my left eye, but the right was still damaged. I was able to go on the postponed bicycle trip, but with a patch over one eye. I looked like a pirate on wheels. Although my head ached, my eyes still burned, and I had to put drops in my eyes several times a day, I knew that I had to go on that bicycle trip. I had to escape the place that reminded me of the pain and agony of the past two weeks.”

—Anonymous

*(The author told Chem Matters, “Because this was such a careless thing to do, I don’t want my name associated with this story!”)*

“Recently I poured some concentrated sulfuric acid ( $\text{H}_2\text{SO}_4$ ) into a graduated cylinder that had been rinsed but still had a little water in the bottom. The cylinder cracked and about 30 mL of acid spilled onto the counter. I was not injured, and the acid was quickly contained and cleaned up.

When the concentrated  $\text{H}_2\text{SO}_4$  came into contact with the water, the energy liberated by dilution heated the glass enough to break the cylinder. The accident could have been even more serious with a larger

cylinder containing more acid. Now I make sure the cylinder is *dry* when I use concentrated  $\text{H}_2\text{SO}_4$ .”

—Thomas Earler

“My task that day was to make a dilute sulfuric acid solution. I found a stock bottle marked *concentrated sulfuric acid* and opened it carefully. Vapors rose from the bottle—a warning that this was not the sulfuric acid I was accustomed to. I carefully put one drop into a beaker of water. It hissed and spit when it touched the water. I looked at the bottle again and saw on the label, in *very small print*, the word ‘fuming.’ Fuming sulfuric acid is concentrated sulfuric acid with excess  $\text{SO}_3$  dissolved in it, making it an even more potent acid and a much stronger oxidizing agent than ordinary concentrated sulfuric acid. I relabeled the bottle with a strong caution.”

—Janice Lane

“A student was preparing to generate some hydrogen gas in a buret, a tall glass tube. Some hydrochloric acid (HCl) was poured into the bottom of the buret; then a layer of water was poured on top of the acid. As instructed, the student placed some magnesium ribbon wrapped in copper wire into the top of the buret. Normally, the reaction starts when the buret is inverted and the denser acid migrates down through the water to the magnesium. Before the buret could be inverted, the coil and magnesium slipped to the bottom of the upright buret. A vigorous reaction with the HCl in the bottom of the buret began, generating large bubbles of hydrogen gas. These bubbles blew the acid up and out of the tube, producing a shower as far as three meters away. Fortunately, the shower contained more water than acid and no one was hurt.”

—Bruce Bush

How can you avoid similar accidents? *Always* wear goggles in the laboratory, even when just cleaning up. Remember that some flames are invisible, and pour acids only into clean, dry containers. Finally, read and understand the entire label before using any chemical.

How can you avoid other kinds of accidents? Read the booklet “Safety in Academic Chemistry Laboratories.” Single copies are free from the American Chemical Society. Additional copies are \$1 (bulk rates available). Order from: Committee on Chemical Safety, American Chemical Society, 1155 16th St., N.W., Washington, D.C. 20036.