

The Laboratory Safety Challenge

A Fun Exercise in Observation



Introduction

Laboratory safety and proper techniques are of key importance when performing a demonstration. Challenge your students to notice as many laboratory safety errors as possible. Students can then generate their own list of safety rules for the lab!

Concept

- Laboratory safety

Safety Precautions

This demonstration is meant to be a fun and engaging way to help students generate their own list of laboratory safety rules. Do not actually use any harmful chemicals or hazardous laboratory techniques. Choose a demonstration with an extremely safe procedure.

Preparation

Before class, prepare your “unsafe” laboratory attire and demonstration. Set up the demonstration table with all necessary materials, making it look very cluttered and unorganized. Before class, designate a student (or another teacher) to be the *introducer*. The *introducer* will explain to the class that you (the teacher) are unavailable today and a *guest demonstrator* will be filling in. The *introducer* will tell the students that their assignment is to evaluate the safety of the *guest demonstrator* since the administration has been concerned with a few of his/her safety practices. The students must make a list of any and all safety problems so these can be reported to the proper authorities.

Sample Demonstration — *The Reaction of Sodium Bicarbonate with Vinegar*

Note: Use any or all of the suggestions provided below. Be creative, add your own ideas and have FUN! Notice that the safety error is listed with the corresponding laboratory safety rule in boldface type.

Improper Dress — Students should write down what is wrong with your “laboratory attire.”

- Goggles on forehead or around neck [**Wear safety eyewear at all times in the laboratory.**]
- No lab coat—bring one in as you enter and set it down [**Wear a laboratory apron to protect skin and clothing.**]
- Long messy hair, not tied back—an out-of-control wig works great [**Tie back long hair, especially in the vicinity of open flames.**]
- Shorts and open-toed sandals [**Do not wear shorts or open sandals; they do not protect skin from spills.**]
- Long, baggy sleeves [**Do not wear clothing that presents a safety hazard in the lab.**]
- Long necklace and dangly bracelets [**Do not wear jewelry that presents a safety hazard in the lab.**]

Improper Lab Technique — Students should write down all of your improper lab techniques.

Note: You may perform a “Silent Demonstration” so there is no talking and only acting. Or you may read aloud steps of your lab procedure and talk to yourself as you perform the demonstration. For example, “The lab says I need 25 grams of baking soda. But I accidentally weighed 35 grams here. I’ll pour a little back into the bottle. Now I have 28 grams. Oh, that is close enough.”

- Take a drink from a can of soda that you have setting on the demonstration table. [**No drinking in the lab.**] Or drink water or soda out of a beaker. *Caution:* Be sure the beaker is a brand new one and it is actually water or soda. [**Never drink out of lab glassware.**]
- Blow big bubbles of gum during the demonstration. [**No eating or gum chewing in the lab.**]
- During the demonstration, fumble around through the many chemical bottles that are sitting on the table, looking for the right ones to use; have a very cluttered and unorganized table. [**Keep work area clean and tidy at all times.**]
- Weigh out too much sodium bicarbonate into the beaker; pour the excess right back into the bottle. [**To prevent**

contamination, do not return unused chemicals to reagent bottles.]

- Add water to the beaker and, while stirring vigorously, spill the beaker of sodium bicarbonate solution all over the table; do not clean up the spill. **[Clean up all spills immediately.]**
- Start over with the weighing but this time, weigh the sodium bicarbonate directly on the balance pan. Then pick up the balance pan and pour the baking soda into the spilled “dirty” beaker. **[Do not weigh directly on the balance pan.]** Add water to the beaker and stir, splashing everywhere.
- Set up a Bunsen burner (but don’t actually hook it up to the gas); pretend that you first turn on the gas jet and *THEN* start looking for matches to light it. **[Do not turn on the gas jet until you are immediately ready to light the burner.]**
- Pretend to heat the beaker by holding it at the top rim with your fingers—nearly dropping it, saying “ouch”. **[Always use the appropriate instrument for handling apparatus or equipment.]**
- Then set up a ring stand so you can set the beaker on wire gauze; put a thermometer in the beaker to measure temperature; then stir the solution with the thermometer. **[Do not use a thermometer as a stirring rod to avoid breakage.]**
- While waiting for the solution to heat up, pull out a candy bar from your pocket and take a bite. **[No eating in the lab.]**
- Also while waiting, fumble through a purse and pull out a mirror and hair spray. Fix your hair (wig) by spraying hair spray on your hair. **[Keep all combustible materials away from open flames.]**
- Pick up an unlabeled bottle of vinegar and try to determine what it is. **[Always label all chemical bottles; do not use those bottles that are unlabeled.]** Smell the vinegar in the bottle by putting your nose directly over the bottle mouth. **[Do not smell a chemical directly. When testing for odors, use a wafting motion to direct the odors to your nose.]**
- Measure the vinegar into a graduated cylinder by holding the cylinder up at eye level near your face and messily pouring. **[When transferring chemical reagents from one container to another, hold the containers away from your body or set the graduated cylinder level on the table before pouring.]**
- Add the food coloring and/or dishwashing detergent, if desired, and then pour the sodium bicarbonate solution into the vinegar in the cylinder. It will erupt out of the cylinder and overflow all over the table—be ready for this to occur—but act surprised as if you didn’t know this would occur. **[Always practice a demonstration before presenting it; know what to expect.]**
- After the demonstration, say thanks and that you are finished and walk out. **[Clean and wipe up all work surfaces thoroughly after the demonstration or lab.]**

Tips

- This safety challenge exercise is a great way to begin the teaching of laboratory safety, which can then be reinforced throughout the entire year. Rather than reading aloud a long list of safety rules to your students, this activity allows students to generate their own list of safety rules. The list should be similar to the “official” safety rules; be sure to add any missing rules.
- Have students write down a list of what is wrong with your laboratory attire and techniques as you perform the demonstration. Afterwards, have students get into small groups and combine their lists to generate a list of *Laboratory Safety Rules*. Each group can share their list with the class and come up with a consensus for a class list of laboratory safety rules.

Disposal

Please consult your current *Flinn Scientific Catalog/Reference Manual* for general guidelines and specific procedures, and review all federal, state and local regulations that may apply, before proceeding.