

Laboratory Safety

Be sure that you and your partners practice laboratory safety and follow basic laboratory rules. It is your responsibility, not the instructor's, to play it safe.

This section has guidelines for making laboratory work a safe and meaningful venture.

A. SELF-PROTECTION

1. Safety glasses, goggles, or eye shields are encouraged to be worn at all times to guard against the laboratory accidents of others as well as your own. Safety glasses and gloves **MUST** be worn when handling hazardous chemicals (concentrated acids, bases, etc.)
2. Laboratory coats should be worn at all times to protect clothing.
3. Sandals or open shoes are not advisable. Wear only shoes that shed liquids.
4. Wear old, non-synthetic clothing which is not torn or frayed. Shirts and blouses should not be frilled or flared and the sleeves should be close-fit. Synthetic clothes tend to melt to the skin.
5. When working in the laboratory, secure long hair, and remove neckties and scarves.
6. Always wash your face, hands, and arms before leaving the laboratory. Toxic chemicals may be transferred to the mouth.
7. Whenever your skin (hands, arms, face, etc.) comes into contact with chemicals, wash it quickly and thoroughly with soap and water. Use the tap water to flush chemicals from the eyes and face. Get help immediately. Do not rub the affected area, especially the face or eyes, with your hands before washing.
8. Chemicals spilled over a large part of the body require immediate action. Using the safety shower, flood the affected area for at least 5 minutes. Remove all contaminated clothing if necessary. Use a mild detergent and water only (no salves, creams, lotions, etc.). Get medical attention.
9. In case of accident or injury, even if it is minor, notify your instructor at once.

B. LABORATORY RULES

1. Maintain a wholesome, business-like attitude. Horseplay or other careless acts are prohibited. Do not entertain guests in the laboratory.
2. Unauthorized experiments, including variations of those in the laboratory manual, are forbidden
3. Maintain an orderly, clean laboratory desk and drawer. Immediately clean up all chemicals, paper scraps, and glassware. Keep drawers or cabinets closed while working

and the aisles free of obstruction. Do not place book bags, athletic equipment, etc. on the floor near any lab bench.

4. No smoking, drinking, eating, or chewing is permitted at any time because chemicals may possibly enter the mouth or lungs. Your hands may be contaminated with a toxic chemical.

5. Be aware of your neighbors' activities; you may be a victim of their mistakes. Advise them of improper techniques or unsafe practices. If necessary, tell the instructor.

6. Do not work alone. The laboratory instructor must be present.

7. Do not waste time. Prepare for each experiment by completing the Prelaboratory Assignment and studying the Objectives, Introduction, Techniques, and Experimental Procedure before lab. Always try to understand what you are doing and to think.

8. Believe in your data. A scientist's most priceless possession is integrity. Therefore, be a scientist. An incorrect answer resulting from honest work is infinitely better than a correct one dishonorably obtained.

9. Note beforehand the need for any extra equipment and prepare them all.

10. Prepare with care your Laboratory notes on each experiment. Record the data in ink as you perform the experiment. Data on scraps of paper will be confiscated. Where calculations using data are involved, be orderly for the first set of data. Do not clutter the calculation section with arithmetic details. As you perform the experiment, think through and answer important post-laboratory questions, those intended to give an understanding of the principles on which the procedure is based.

11. Scientists learn much by discussion with one another. Likewise, you may profit by discussion with your laboratory instructor or classmates, not by copying from them. You will also profit by frequent reference to the textbooks. Books are generally more reliable and more complete sources of information than are classmates.

12. For tabular data on the properties of substances, consult the handbook provided by the instructors.

13. At the end of the laboratory period, completely clear the lab bench of equipment, and clean it. Also clean all glassware used in experiment.

14. Discard all chemicals as directed by your laboratory instructor. The sink is not the disposal everything!

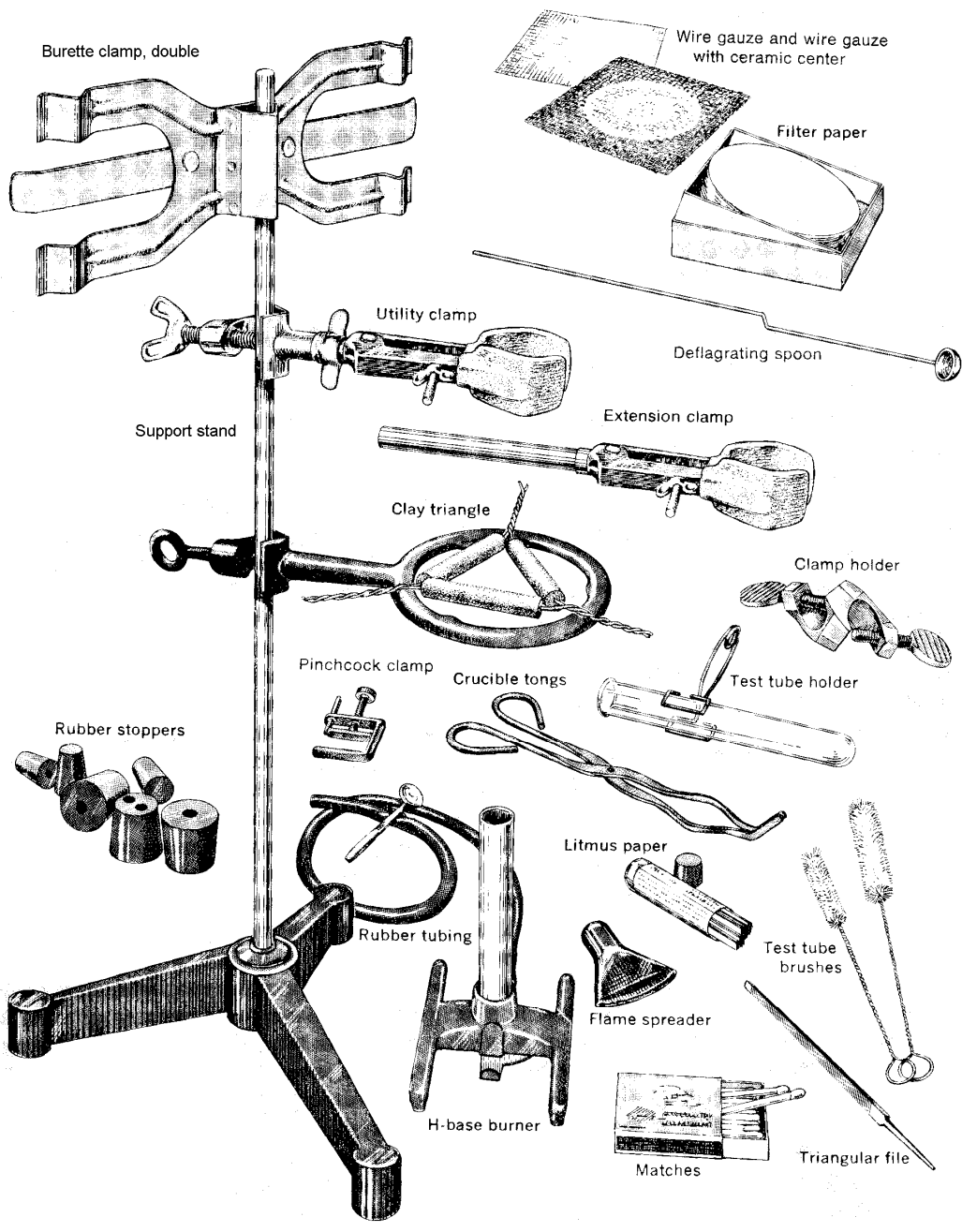
C. HANDLING CHEMICALS AND GLASSWARE

1. Clean all glassware with soap or detergent and warm tap water. Rinse first with tap water and then once or twice with small amounts of distilled (or de-ionized) water. Distilled water should never be used for washing glassware extensively; it is too expensive.

2. Invert clean glassware on a paper towel to dry; do not wipe or air-blow dry because of possible contamination. Never try to dry calibrated glassware - graduated cylinders, volumetric flasks, or bottles – by heating.
3. Avoid direct contact with all chemicals. Hands contaminated with potentially harmful chemicals may cause severe eye or skin irritations. Avoid breathing chemical vapors. Use the fume hood as instructed.
4. Read the label on a reagent bottle twice before removing any chemicals. The wrong chemical can lead to accidents or "unexplainable" results in your experiments.
5. Avoid using excessive amounts of reagents. Never use more than the experiment calls for. Do not return excess chemicals to the reagent bottle.
6. Do not insert your own pipette, medicine dropper, or spatula into reagent bottles.
7. Discard waste or excess chemicals as follows:
 - Sink: non-flammable, non-toxic, water-soluble liquids followed by large amounts of water.
 - Waste jars (properly labeled): water insoluble liquids, solids, and toxic wastes.
 - Waste basket: paper products only, such as litmus paper, filter paper, and matches.
 - Covered containers (properly labeled): volatile liquids or very reactive chemicals.

If there is a question about a chemical's disposal, ask your instructor.

8. Never taste, smell, or touch a chemical or solution unless specifically directed to do so. Poisonous substances are not always labeled.
9. Always add a reagent slowly; never dump it in. While stirring, slowly pour concentrated solutions into water or less concentrated solutions. This is especially true when diluting concentrated (conc.) sulfuric acid.
10. Treat chemical spills as follows
 - Alert your neighbors and the laboratory instructor.
 - Clean up the spill as directed by the laboratory instructor.
 - If the substance is volatile, flammable, or toxic, warn everyone to shut down the laboratory and evacuate.



Burette clamp, double

Wire gauze and wire gauze with ceramic center

Filter paper

Utility clamp

Deflagrating spoon

Support stand

Extension clamp

Clay triangle

Clamp holder

Pinchcock clamp

Crucible tongs

Test tube holder

Rubber stoppers

Litmus paper

Rubber tubing

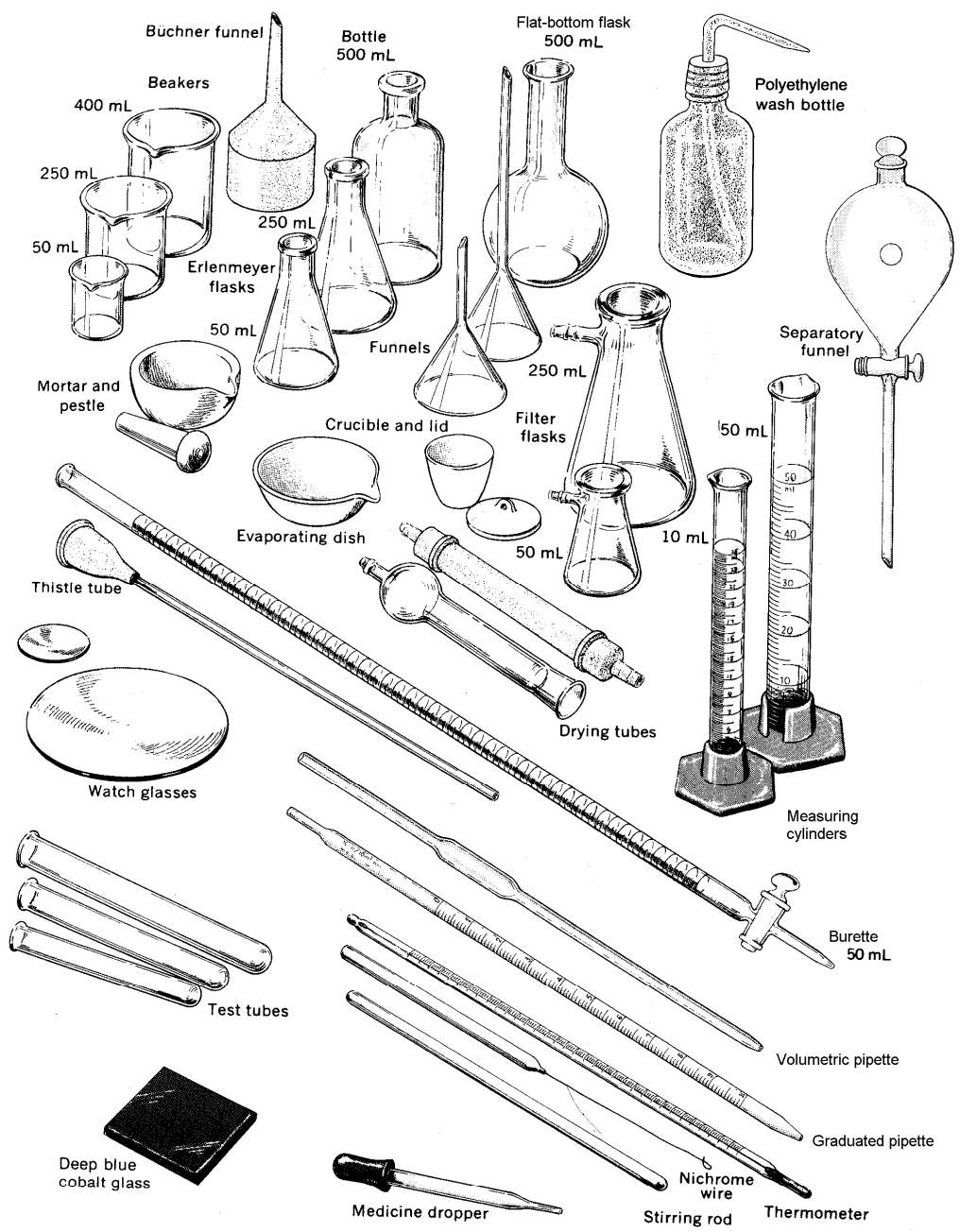
Test tube brushes

Flame spreader

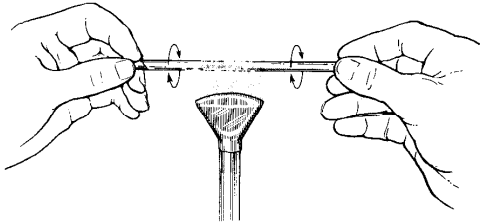
H-base burner

Matches

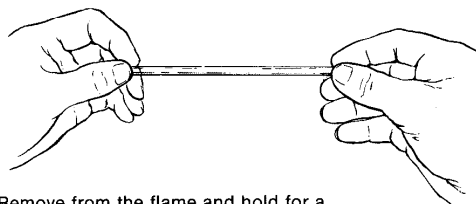
Triangular file



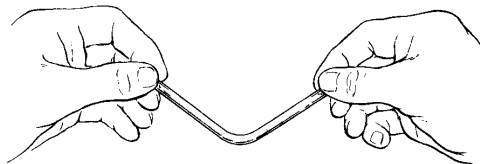
MAKING A BEND



Roll the tube back and forth in the high part of a flat flame until it has become quite soft.



Remove from the flame and hold for a couple of seconds to let the heat become more uniform.



Bend quickly to the desired shape and hold until it hardens.

A good bend



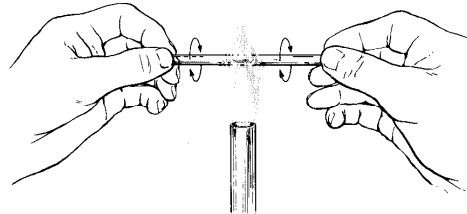
Inadequate heating



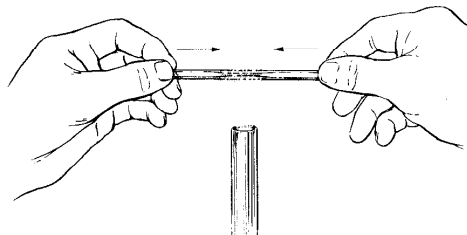
Local overheating



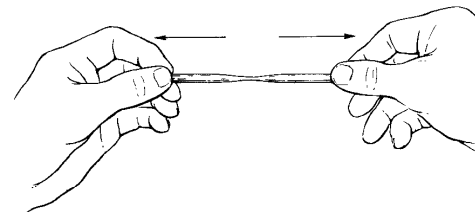
MAKING A CONSTRICTED TIP



Roll the tube in a Bunsen flame until it softens. Don't use a flame spreader.



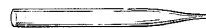
Allow the tube to become shorter as the walls thicken to about twice their original thickness.



Remove from the flame and after a moment pull until the softened region is as small as desired.



Cut to length



Fire polish, or file the tip