

Laboratory Techniques

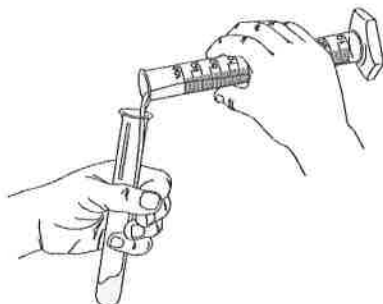


Figure A

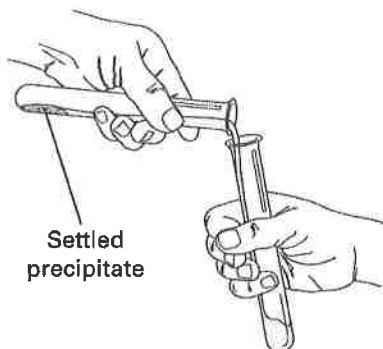


Figure B



Figure C

HOW TO DECANT AND TRANSFER LIQUIDS

1. The safest way to transfer a liquid from a graduated cylinder to a test tube is shown in **Figure A**. The liquid is transferred at arm's length, with the elbows slightly bent. This position enables you to see what you are doing while maintaining steady control of the equipment.
2. Sometimes, liquids contain particles of insoluble solids that sink to the bottom of a test tube or beaker. Use one of the methods shown above to separate a supernatant (the clear fluid) from insoluble solids.
 - a. **Figure B** shows the proper method of decanting a supernatant liquid from a test tube.
 - b. **Figure C** shows the proper method of decanting a supernatant liquid from a beaker by using a stirring rod. The rod should touch the wall of the receiving container. Hold the stirring rod against the lip of the beaker containing the supernatant. As you pour, the liquid will run down the rod and fall into the beaker resting below. When you use this method, the liquid will not run down the side of the beaker from which you are pouring.

Laboratory Techniques continued

HOW TO HEAT SUBSTANCES AND EVAPORATE SOLUTIONS

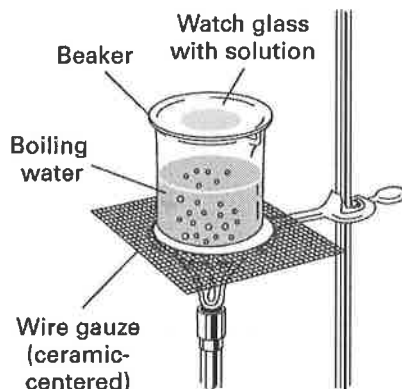


FIGURE D

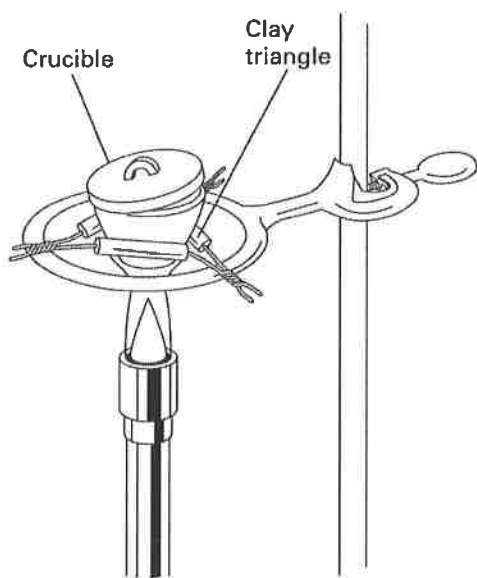


FIGURE E

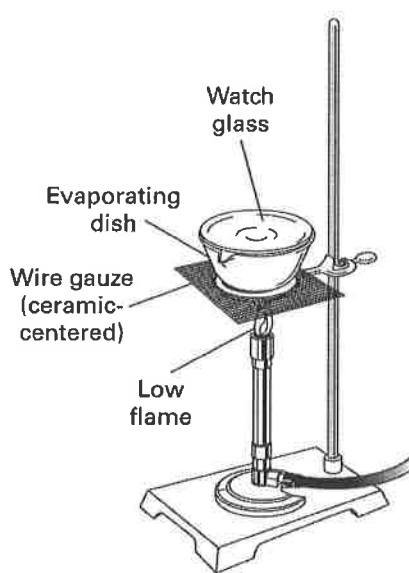
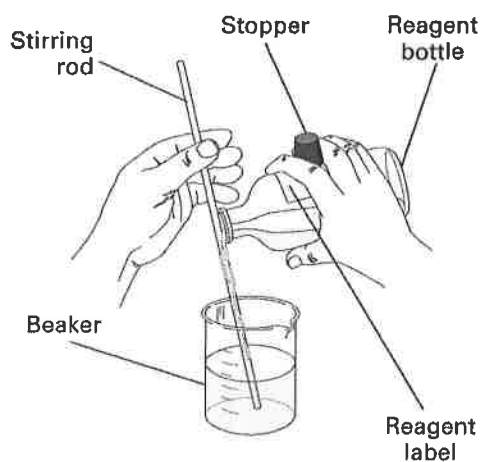


FIGURE F

1. Use care in selecting glassware for high-temperature heating. The glassware should be heat resistant.
2. When heating glassware by using a gas flame, use a ceramic-centered wire gauze to protect glassware from direct contact with the flame. Wire gauzes can withstand extremely high temperatures and will help prevent glassware from breaking. **Figure D** shows the proper setup for evaporating a solution over a water bath.
3. In some experiments, you are required to heat a substance to high temperatures in a porcelain crucible. **Figure E** shows the proper apparatus setup used to accomplish this task.
4. **Figure F** shows the proper setup for evaporating a solution in a porcelain evaporating dish with a watch glass cover that prevents spattering.

Laboratory Techniques continued

5. Glassware, porcelain, and iron rings that have been heated may look cool after they are removed from a heat source, but these items can still burn your skin even after several minutes of cooling. Use tongs, test-tube holders, or heat-resistant mitts and pads whenever you handle these pieces of apparatus.
6. You can test the temperature of beakers, ring stands, wire gauzes, or other pieces of apparatus that have been heated by holding the back of your hand close to their surfaces before grasping them. You will be able to feel any energy as heat generated from the hot surfaces. **DO NOT TOUCH THE APPARATUS.** Allow plenty of time for the apparatus to cool before handling.

**FIGURE G****HOW TO POUR LIQUID FROM A REAGENT BOTTLE**

1. Read the label at least three times before using the contents of a reagent bottle.
2. Never lay the stopper of a reagent bottle on the lab table.
3. When pouring a caustic or corrosive liquid into a beaker, use a stirring rod to avoid drips and spills. Hold the stirring rod against the lip of the reagent bottle. Estimate the amount of liquid you need, and pour this amount along the rod, into the beaker. See **Figure G**.
4. Extra precaution should be taken when handling a bottle of acid. Remember the following important rules: Never add water to any concentrated acid, particularly sulfuric acid, because the mixture can splash and will generate a lot of energy as heat. To dilute any acid, add the acid to water in small quantities while stirring slowly. Remember the “triple A’s”—*Always Add Acid* to water.
5. Examine the outside of the reagent bottle for any liquid that has dripped down the bottle or spilled on the counter top. Your teacher will show you the proper procedures for cleaning up a chemical spill.
6. Never pour reagents back into stock bottles. At the end of the experiment, your teacher will tell you how to dispose of any excess chemicals.

*Laboratory Techniques continued***HOW TO HEAT MATERIAL IN A TEST TUBE**

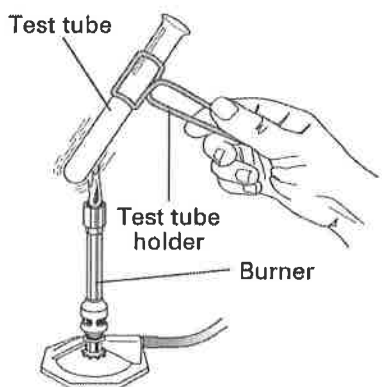
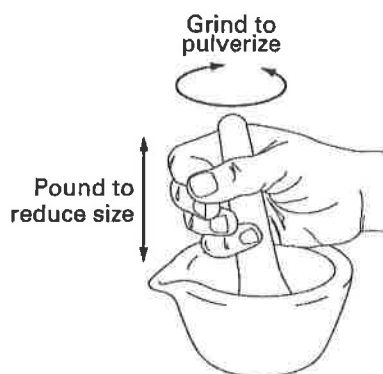
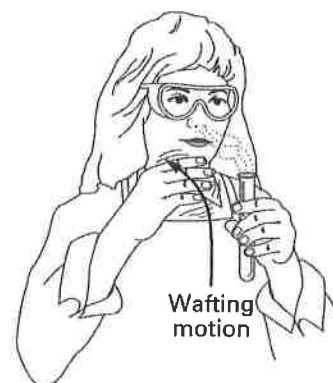
1. Check to see that the test tube is heat resistant.
2. Always use a test tube holder or clamp when heating a test tube.
3. Never point a heated test tube at anyone, because the liquid may splash out of the test tube.
4. Never look down into the test tube while heating it.
5. Heat the test tube from the upper portions of the tube downward, and continuously move the test tube, as shown in **Figure H**. Do not heat any one spot on the test tube. Otherwise, a pressure buildup may cause the bottom of the tube to blow out.

HOW TO USE A MORTAR AND PESTLE

1. A mortar and pestle should be used for grinding only one substance at a time. See **Figure I**.
2. Never use a mortar and pestle for simultaneously mixing different substances.
3. Place the substance to be broken up into the mortar.
4. Pound the substance with the pestle, and grind to pulverize.
5. Remove the powdered substance with a porcelain spoon.

HOW TO DETECT ODORS SAFELY

1. Test for the odor of gases by wafting your hand over the test tube and cautiously sniffing the fumes as shown in **Figure J**.
2. Do not inhale any fumes directly.
3. Use a fume hood whenever poisonous or irritating fumes are present. **DO NOT** waft and sniff poisonous or irritating fumes.

**FIGURE H****FIGURE I****FIGURE J**