CHEMISTRY I EXPERIMENT: INTRODUCTION TO THE BURNER and WORKING WITH GLASS TUBING

WHAT TO TURN IN:	Data: 4 sketches— on plain paper, in pencil, labeled Questions #1-10

OBJECTIVES

To familiarizing yourself with the laboratory burner structure and function.
To use your knowledge of the burner to make stirring rods, eye droppers and right angle bends.

CAUTION!

- secure long hair, loose clothing, and long pieces of jewelry
- wear goggles
- stay away from leaning into a lit burner
- always have someone watching a lit burner
- adjust the flame by airflow
- turn burner off at the source (gas valve)
- make sure your gas valve is turned off when you're finished

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GENERAL PROCEDURE

PART 1: GETTING ACQUAINTED

1.) Examine the burner at your lab station. Sketch the burner, showing all parts.

2.) Carefully connect rubber tubing to the gas nozzle and burner so that the burner stands stable.

3.) Adjust the airflow at the bottom of the burner so it is half open. Too much or too little air will not produce a good flame. Too much will blow itself out, and too little will cause a large yellow torch flame.

4.) Obtain a flint striker (sparker). Hold over the top of the burner, slightly at an angle.

5.) Turn on the gas slowly until it hisses. Squeeze the striker until it sparks, lighting the burner. If nothing happens after approximately 15 seconds, turn off the gas, wait a few seconds to clear the air, and begin again.

6.) When the burner is lit, adjust the airflow so the flame contains two regions, an outer light blue area and an inner dark blue cone. There should be as little orange or yellow as possible. The flame should not roar loudly. If the flame "sinks" and begins to burn inside, turn the burner off at the gas valve immediately.

PART 2: CUTTING, FIRE POLISHING, AND BENDING GLASS TUBING

1.) Obtain a file and a large piece of solid and hollow glass tubing. Be careful walking around the room with glass.

2.) Following the instructor's example, place the tubing on a paper towel on the lab counter in the designated area. File in one direction only, in the same place, until a cut can be seen.

The approximate sizes of the pieces you cut should be

SOLID GLASS, for stirring rod: 6 - 8 in. (15 - 20 cm)
HOLLOW GLASS, for right angle bend: 8 - 10 in. (20 - 25 cm)
HOLLOW GLASS, for eye dropper: 8 - 10 in. (20 - 25 cm)

3.) Pick up the tubing and place your thumbs opposite the scratch, breaking the tubing away from you.

4.) **TO MAKE A STIRRING ROD:**

a) Light your burner.

b) Hold a piece of solid glass tubing that you filed with one end in the flame. Hold it at an angle so you won't burn your arm.

c) Twirl the glass rod constantly. Take it out of the flame periodically to examine the end. When the end is rounded and smooth, it will not cut your hand. It is "fire polished."

d) Place the HOT glass rod on a ceramic square or tile to cool before attempting to fire polish the other end. The glass is *not* Pyrex and will crack if you try to cool it in cold water. Remember, *"Hot glass looks cool!"*

5.) **TO MAKE A RIGHT-ANGLE BEND:**

In setting up certain lab experiments, it is sometimes necessary to use bent glass tubing.

a) Light your burner. Hold a piece of hollow glass tubing by both ends over the flame so the middle region of the glass is in the flame. Be careful not to cut yourself on any ends that are not fire polished.

b) Roll the glass tubing in the flame, moving it to the left and right slightly.

c) When the glass begins to sag in the flame, remove it immediately. Quickly and steadily bend the glass to an approximate 90 degree angle, and hold it in position until it hardens. Lay aside on a tile to cool.

6.) **TO MAKE A SET OF EYE DROPPERS:**

a) Place a wing top on the top of the burner. Light your burner. Hold a piece of hollow glass tubing by both ends over the flame so the middle region of the glass is in the flame. Be careful not to cut yourself.

b) Move the glass tubing to the left and right, twirling constantly. Continue to do so until the glass becomes soft *but not distorted.* If the glass begins to sag in the flame, it may be too late. Pull the ends apart gently but not enough to form two pieces.

c) When the ends move apart freely, immediately take the glass out of the flame. Pull the ends apart slowly, until the area in the middle is thin. Set the glass aside to cool.

d) When cool, carefully file in the middle of the thin area of glass tubing. You will be able to form two eye droppers, connected tip to tip, when you snap the tubing.

e) When cool, the tips may be fire polished (carefully, or the small tips will close). Before you clean up, you may want to run some water through your dropper to see if the tip is still open.

f) To allow a rubber bulb to be fitted to the end of your dropper, you must prepare the end by a special technique. (nicknamed "The Push 'n Smush Method")

- Hold the large non-tip end of your dropper in the burner flame for a few seconds, then remove.
- Insert the long end of one of the files into the dropper end, and carefully move it back to the flame. Gently turn the dropper end, pushing outward with the file, creating a lip.
- Remove the dropper from the flame, and quickly press the end down on a flat surface such as a ceramic square.
- Repeat the process, if necessary. Do not wait too long, as the glass will crack with repeated heating and cooling.

DATA: Sketches

All drawings are to be done in pencil on plain white paper.
The drawings should resemble what you made.

Drawing #1: sketch of burner, showing all labeled parts
Drawing #2: sketch of cut end vs. fire polished end
Drawing #3: sketch of eye droppers, before and after separation
Drawing #4: sketch of right angle bend

QUESTIONS

1.) What are some safety precautions that must be observed when working with a laboratory burner?
2.) Why is adjustment of the burner airflow needed?
3.) If a flame is no longer needed, it is proper to turn the burner off at the valve instead of closing the airflow and stifling the flames. Why?
4.) Did you or your partner(s) have any difficulties with the burner? If so, what was the problem?
5.) Why is a flint striker (sparker) safer to use than a match?
6.) What are three of the many important points to remember when working with glass?
7.) Why do you think is it necessary to learn how to manipulate glass tubing?
8.) How does a wing top make it easier to heat glass evenly?
9.) Why is fire polishing a key step in working with glass tubing?
10.) Why do you think we needed to do an introductory lab like this?

ADJUSTING THE FLAME ON A LABORATORY BURNER

Most laboratory burners are constructed similarly. There is an inlet for gas and a vent or valve for the adjustment of air which is mixed with the gas, as shown in Figure C. For maximum heat, the air-gas mixture must be correct, and the object to be heated should be placed just above the pale blue part of the flame.

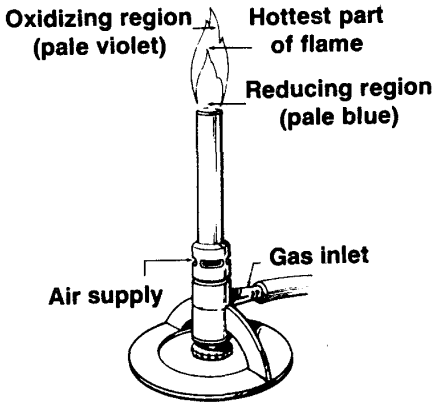


FIGURE C. Adjust the flame from the gas inlet and control the air supply until the flame is nonluminous.

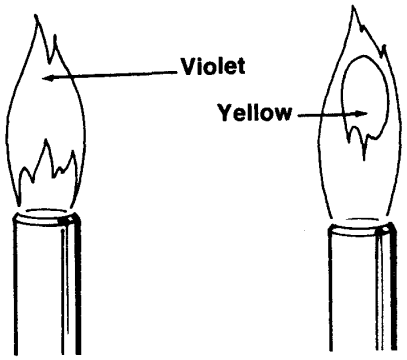
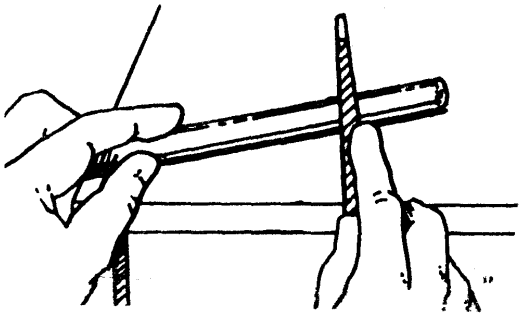


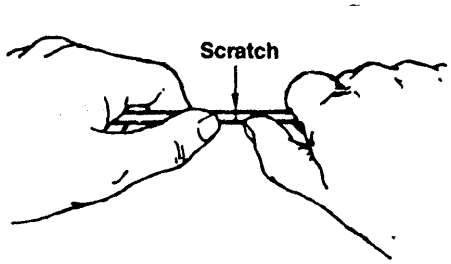
FIGURE D. If the flame rises from the barrel of the burner, turn down the gas. If the flame is yellow, open the air regulator.

To light the burner, hold a striker or a lighted match next to the barrel of the burner and then turn on the gas. After lighting the burner, adjust the air vent until a light blue cone appears in the center of the flame. If the flame rises from the burner or appears to blow out after lighting, reduce the supply of gas.

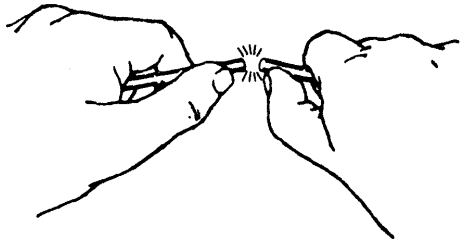
Cutting Glass Tubing



Score the tube once with a triangular file.

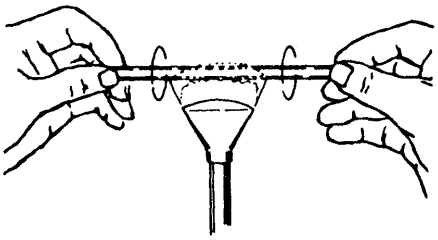


Place your thumbs opposite the scratch.

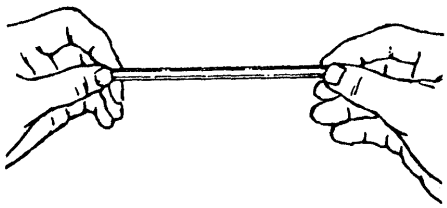


Apply pressure and snap the tubing with a quick motion.

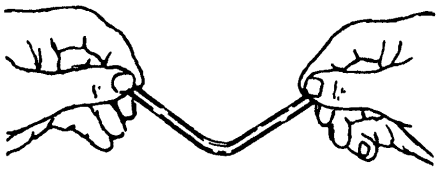
Bending Glass Tubing



Use a flame spreader on the laboratory burner. Roll the tube back and forth in the flame until the glass becomes soft.



Remove from the flame and hold for a few seconds until the heat is evenly distributed.



Bend quickly and hold until the glass hardens.