

USING A BUNSEN BURNER

PROBLEM

How do you use a Bunsen Burner safely?

INTRODUCTION

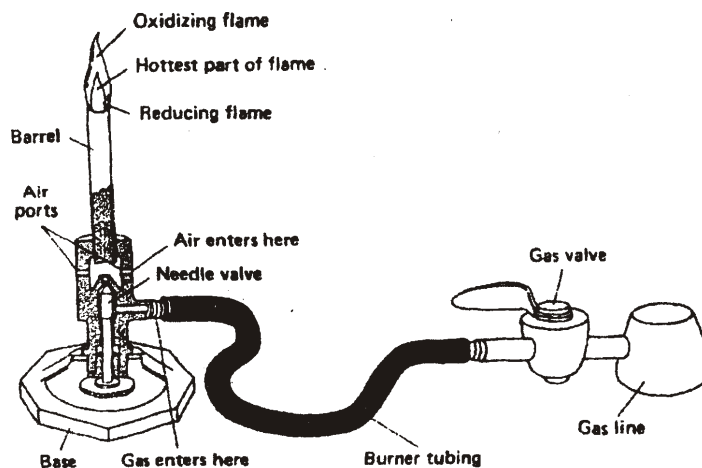
The best way to become familiar with chemical apparatus is to actually handle the pieces yourself in the laboratory. In this experiment you will learn how to adjust the gas burner, and heat a liquid in a test tube. Great emphasis is placed on safety precautions that should be observed whenever you perform an experiment.

MATERIALS (per group)

Blue solution (copper II sulfate); Bunsen burner and tubing; copper wire, 18 gauge; striker; test tube (pyrex); test tube holder; test tube rack; tongs ; watch glass (or evaporating dish); wire gauze

PROCEDURE

1. The Bunsen burner is commonly used as a source of heat in the laboratory. Although the details of construction vary among burners, each has a gas inlet located in the base, a vertical tube or barrel in which the gas is mixed with air, and adjustable openings or ports in the base of the barrel. These ports admit air to the gas stream. The burner may have an adjustable needle valve to regulate the flow of gas. The burner is always turned off at the gas valve, never at the needle valve. Look at the diagram to the right as you examine your burner and locate these parts.

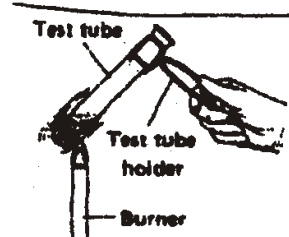


2. Light the Bunsen burner as described below: (Read all instructions and cautions in this step before lighting)

- CAUTION:** Before you light the burner, check to see that you and your partner have taken the following safety precautions: Wear safety goggles. Confine long hair and loose clothing: Tie long hair at the back of the head and away from the front of the face, roll up long sleeves on shirts, blouses, and sweaters. Know the locations of fire extinguishers, fire blankets, safety showers, and sand buckets, and how to use them in case of fire.
- In lighting the burner, partially close the ports at the base of the barrel, turn the gas on full, hold the striker about 5 cm above the top of the burner, and proceed to light. The gas flow may then be regulated by adjusting the needle valve until the flame has the desired height. **CAUTION:** If a very low flame is needed, remember that the ports should be partially closed when the gas pressure is reduced. Otherwise the flame may burn inside the base of the barrel. When improperly burning in this way, the barrel will get very hot, and the flame will produce a poisonous gas, carbon monoxide.
- If the flame is burning inside the base of the barrel, immediately turn off the gas at the gas valve. **CAUTION:** Do not touch the barrel of the burner, as it is extremely hot. Allow the barrel of the burner to cool off and then proceed as follows: Decrease the amount of air admitted to the burner by partly closing the ports. Turn the gas on full and then relight the burner. Control the height of the flame by adjusting the gas valve.

3. Once you have a flame that is burning safely and steadily, you can experiment by completely closing the holes (ports) at the base of the burner. Note the color of the flame. Record your observations in the OBSERVATION section of the lab.

4. Using the tongs, hold a watch glass in the flame for a few minutes. Place the watch glass on a wire gauze, allow it to cool, and then examine its underside. Describe the appearance of the watch glass in the OBSERVATION section of the lab. When it is completely cool, wipe the watch glass with a clean, dry paper towel. Note the appearance of the paper towel.
5. Such a flame, is seldom used in the laboratory. Adjust the burner so your flame is free of the yellow color (nonluminous), Use care not to admit too much air. This will cause a "roaring" sound and may cause the flame to blow out.
6. Regulate the flow of gas to give a flame extending roughly 8 cm above the barrel. Now adjust the supply of air until you have a quiet steady flame with a sharply defined light blue inner cone. This adjustment gives the highest temperature possible with your burner. Using the tongs insert a 10-cm piece of copper wire into the flame just above the barrel. Lift the wire slowly up through the flame. Note when and where the copper wire begins to glow. This will tell you where is the hottest portion of the flame located. Hold the wire in this part of the flame for a few seconds and note the results. Record your observations in the OBSERVATION section of the lab.
7. Slowly pour blue copper II sulfate solution into the a test tube until the test tube is $\frac{1}{4}$ full. Place the test tube and its contents in the test tube rack, and close the reagent bottle
8. Adjust the flame so that it burns with a small double cone flame approximately 3 cm high
9. Using your test tube holder, gently heat the test tube and its contents as demonstrated by your teacher and as shown in the diagram to the right. *CAUTION: Be sure that you do not point the heated test tube at anyone. Never look down into the test tube. Do not heat any one spot on the test tube. Instead, heat the test tube from the upper portions of the tube downward and continuously move the test tube as shown in the diagram to the right.* Heat the test tube until the solution begins to boil and note how it feels. Record your observations in the OBSERVATION section of the lab.
10. Stop heating, and use the test tube holder to place the hot test tube on the test tube rack. After the test tube and its contents have cooled, empty the contents of the test tube in the waste disposal area designated by your teacher. Clean your work station. Return all safety equipment to its original location.



OBSERVATIONS

1. What color is the flame after you close the ports? _____
2. How does the watch glass look after being heated in a luminous flame? _____

3. Describe what happens as you move the copper wire up through the flame? What part of the flame causes it to glow? _____

4. What does it feel like when the water in the test tube begins to boil? _____

CONCLUSIONS

1. Suggest a possible explanation for what happens to an watch glass that is heated in a luminous flame. _____

2. What type of flame is preferred for laboratory work and why? _____

3. Before you light a burner, what safety precautions should always be followed? _____

4. What immediate action should you take when the flame of your burner is burning inside the barrel? _____

5. What are the functions of the parts of the burner setup pictured below.

- A. _____
- B. _____
- C. _____
- D. _____
- E. _____
- F. _____
- G. _____

