

Lab - Effective Use of a Burner

Introduction: Often a chemist needs to heat materials. The Bunsen burner is one of the most efficient ways of doing this. Burners come in a variety of designs but most operate on the principle of mixing gas with air to produce a hot flame.

Objectives:

- Become familiar with the operation of a Bunsen burner by lighting and adjusting the burner to obtain the hottest possible flame
- Determine the effect of the adjustment of gas and air flow to the burner
- Use the scientific method to determine the most efficient position for heating (optimum height above the burner)

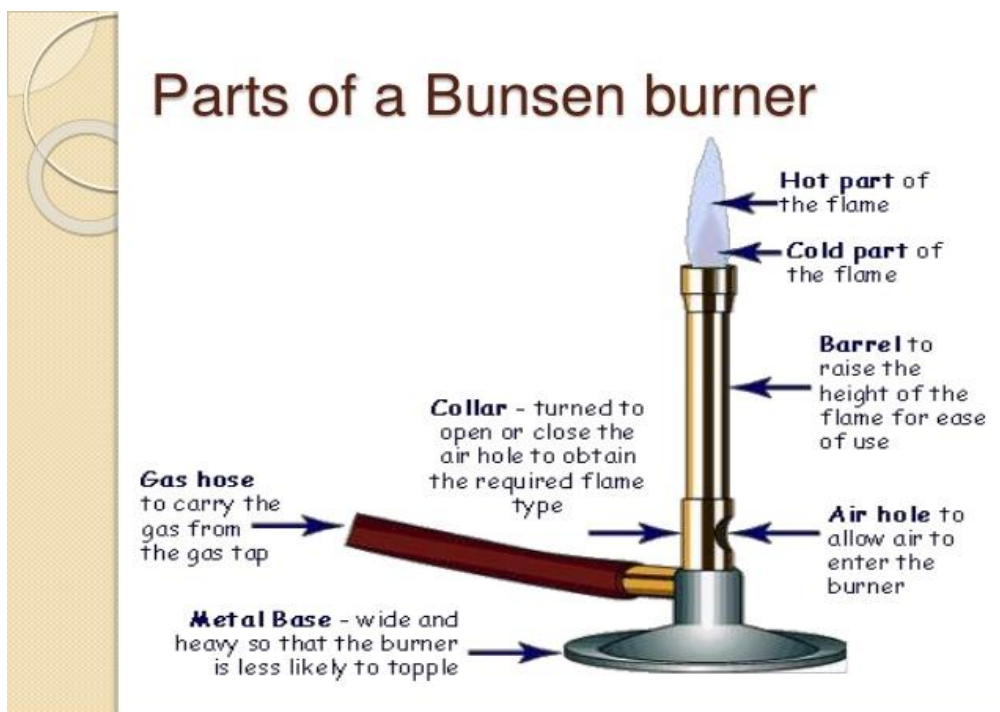
Materials:

100 mL graduated cylinder	Ruler
150 or 250 mL beakers (4)	Stopwatch
Bunsen burner	Distilled water
Striker	Crucible tongs
Thermometer	Beaker tongs
Ring stand	Iron Ring
Wire gauze	

Safety Precautions:

- Always wear safety goggles.
- Assume all glassware is hot and handle with gloves or the appropriate tongs.

Parts of the Bunsen Burner: (Write and Draw illustration)



When turning knobs a general rule is: “righty tighty, lefty loosey”, which means that turning a knob right will usually turn the flow off and turning a knob to the left will usually turn the flow on.

PROCEDURE:

1. LABEL FOUR 250-ML BEAKERS 1, 2, 3, AND 4. USING A GRADUATED CYLINDER, MEASURE 50 mL OF DISTILLED WATER INTO BEAKER 1. MEASURE AND RECORD THE TEMPERATURE OF THE WATER IN DATA TABLE. REPEAT THIS PROCESS THREE MORE TIMES FOR THE REMAINING BEAKERS.

2. SET UP A RING STAND AND ATTACH THE RING TO THE STAND. PLACE THE WIRE GAUZE ON THE RING TO PROVIDE A PLATFORM ON WHICH TO PLACE THE BEAKER OF WATER.

3. USE BURNER CONNECTOR SAFETY TUBING TO CONNECT THE BUNSEN BURNER TO THE GAS INLET. MAKE SURE THE HOSE DOES NOT HAVE ANY CRACKS OR HOLES.

4. LIGHT THE BURNER BY FIRST TURNING ON THE GAS FLOW AND USING THE STRIKER TO IGNITE THE GAS.

5. WHEN THE FLAME IS LIT, **ADJUST THE GAS FLOW AND OXYGEN FLOW SO THAT THE FLAME IS BLUE WITH AN INNER LIGHT-BLUE CONE.** A YELLOW FLAME IS TOO COOL AND NEEDS MORE OXYGEN (DO NOT WANT YELLOW FLAME). SHOW YOUR TEACHER YOUR FLAME BEFORE CONTINUING.

6. AFTER YOU ADJUST THE FLAME, MOVE THE BURNER TO THE RING STAND AND OBSERVE THE HEIGHT OF THE WIRE GAUZE ABOVE THE FLAME. ADJUST THE HEIGHT SO THE WIRE GAUZE IS APPROXIMATELY HALFWAY UP THE INNER BLUE CONE. REFER TO FIGURE ON WHITEBOARD FROM TEACHER, BEAKER 1 HEIGHT. ESTIMATE THE DISTANCE FROM THE TOP OF THE BURNER TO THE WIRE GAUZE WITH A RULER AND RECORD THIS DISTANCE AS BEAKER 1 IN DATA TABLE. THIS WILL BE YOUR STARTING DISTANCE.

7. PLACE BEAKER 1 ON THE WIRE GAUZE. AS SOON AS YOU PLACE BEAKER ON WIRE GAUZE START THE TIME. MEASURE THE TIME (IN SECONDS) EVERY 15 SECONDS FOR A TOTAL OF 2 MINUTES. RECORD THESE TIMES IN DATA TABLE. **WORK TOGETHER!!! (ONE PERSON WATCH TEMP, ONE PERSON WATCH TIME, ONE PERSON RECORD DATA, ETC)**

8. TURN OFF THE FLAME AND USING BEAKER TONGS, CAREFULLY REMOVE THE HOT BEAKER OF WATER FROM THE WIRE GAUZE AND PLACE IT ON A SECOND WIRE GAUZE ON YOUR LAB BENCH TO COOL DOWN.

9. TURN ON THE FLAME AND ADJUST THE HEIGHT SO THE WIRE GAUZE IS NOW AT THE TOP OF THE INNER BLUE CONE. REFER TO WHITEBOARD, TEST 2 HEIGHT. ESTIMATE THE DISTANCE FROM THE TOP OF THE BURNER TO THE WIRE GAUZE WITH THE RULER AND RECORD THIS DISTANCE IN DATA TABLE.

10. REPEAT STEPS 6–8 USING BEAKER 2.

11. TURN ON THE FLAME AND ADJUST THE HEIGHT SO THE WIRE GAUZE IS NOW POSITIONED THE SAME DISTANCE FROM THE TOP OF THE INNER BLUE CONE AS THE TOP WAS POSITIONED FROM THE STARTING DISTANCE, HALFWAY UP THE INNER BLUE CONE. REFER TO WHITEBOARD, TEST 3 HEIGHT. FOR EXAMPLE, IF THE STARTING DISTANCE WAS 3 CM AND THE TOP OF THE INNER BLUE CONE IS 6 CM, THEN THE NEW POSITION WILL BE 9 CM ABOVE THE BURNER TOP. ESTIMATE THE DISTANCE FROM THE TOP OF THE BURNER TO THE WIRE GAUZE WITH THE RULER AND RECORD THIS DISTANCE IN DATA TABLE. TURN OFF THE FLAME.

12. REPEAT STEPS 6–8 USING BEAKER 3.

13. TURN ON THE FLAME AND ADJUST THE HEIGHT SO THE WIRE GAUZE IS MOVED TO A NEW POSITION THAT IS THE SAME DISTANCE INCREMENT AS BEFORE. REFER TO WHITEBOARD, TEST 4 HEIGHT. FOR EXAMPLE, IF THE STARTING POSITION WAS 3 CM, THE HEIGHT FOR TEST NUMBER 2 WAS 6 CM AND THE HEIGHT FOR TEST NUMBER 3 WAS 9 CM, THEN THE HEIGHT FOR TEST 4 WILL BE 12 CM. ESTIMATE THE DISTANCE FROM THE TOP OF THE BURNER TO THE WIRE GAUZE WITH THE RULER AND RECORD THIS DISTANCE IN DATA TABLE. THIS WILL BE YOUR STARTING DISTANCE. TURN OFF THE FLAME.

14. (IF TIME) REPEAT STEPS 6–8 USING BEAKER 4.

15. WHEN THE BEAKERS ARE COOL, EMPTY THE WATER IN THE SINK AND DRY THE GLASSWARE.

CLEANUP AND DISPOSAL:

1. CLEAN AND DRY ALL GLASSWARE.

2. RETURN ALL LAB EQUIPMENT TO ITS PROPER PLACE.

3. CLEAN UP YOUR WORK AREA.

DATA TABLE:

Record the temperature for each time interval. Remember to be precise and record at least one sig fig after the decimal.

Beaker	Height of wire gauze above Bunsen burner (cm)	Starting Temp (C)	15 Sec	30 Sec	45 Sec	60 Sec	75 Sec (1:15 min)	90 Sec (1:30 min)	105 Sec (1:45 min)	120 Sec (2:00 min)
1										
2										
3										
4										

GRAPH: (TEACHER WILL GIVE YOU GRAPH PAPER AND YOU WILL GRAPH IN CLASS ONCE WE COLLECT DATA)

1. Using pencil, graph your data points for all 4 beakers.
2. Draw **the best fit line for each beaker.**
3. Label each line. (can use different color pens/highlighters)

POST-LAB QUESTIONS:

1. What observed differences did you note among the results of the four tests? Be specific, **using data** from your data table/graph.
2. For which beaker (1, 2, 3, 4) did the water heat the quickest?
3. Why did the water heat quicker at this position?
4. What are some possible sources of error in this experiment? State at least two AND explain how they might affect the results. (4 pts)