

Observations of a Burning Candle

Purpose: To carefully observe and interpret an apparently simple chemical reaction.

1. Define “Qualitative”:
2. Define “Quantitative”:

Data and Observations:

Part A – *Qualitative Observations* (Number your observations)

Un-Lit Candle	Burning Candle

Part B – *Quantitative Observations* (Again, number your observations)

Un-Lit Candle	Burning Candle

Part C – Additional observation activities

1. *Blow out the flame and immediately place a lighted match in the smoke about 2 cm above the wick.*

Results:

2. *Allow the match you were using in Part C to burn down to about 3/4 its length. Place the blackened end of the match into the burning candle flame.*

Results:

3. *Allow the burnt end of the match to come in contact with molten wax and then with the candle flame.*

Results:

4. *Pour a small amount of liquid wax from the bowl of the candle onto a square of aluminum foil and attempt to light the liquid wax with a lighted match.*

Results:

5. *Use of a wooden wick. Extinguish the flame of the candle. While the candle bowl is still soft, press a short section (~1 cm) of wooden splint into the soft wax of the candle bow so the splint is half in and out of the wax. Light the section of splint sticking up from the candle.*

Results:

6. *Lighting a piece of string. Holding a short length of string with a pair of forceps, light one end.*

Results:

7. *Obtain another short length of string and dip it into molten wax. Light one end of the saturated string.*

Results:

8. *Behavior with aluminum foil “shield”. At the midpoint of a square (~5” x 5”) of aluminum foil cut a slit about 3/4 the width of the square. Place the square of aluminum on top of the burning candle so the slit is on either side of the wick. Hold the foil in this position for 1-2 minutes.*

Results:

9. *Using a wire test tube holder, place the bottom a large test tube into the candle flame for a few seconds. Describe the part of the test tube that was in the flame.*

Results:

10. *Using the same test tube, invert the tube over the burning candle and carefully lower it over the candle until the flame is extinguished. Describe any changes that you see occurring inside the tube.*

Results:

11. *Using the same test tube, add about 5 mL of limewater (saturated calcium hydroxide solution) to the tube and another tube the same size that was not used in activities 9 and 10. Shake both test tubes and describe the results.*

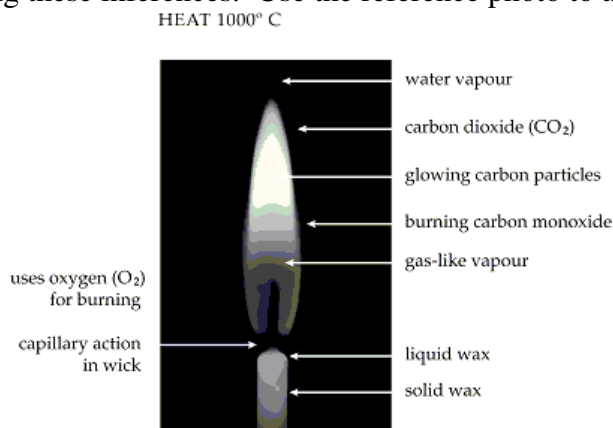
Results:

1. Examine your list of statements for parts A and B. List the numbers of any statements that are **interpretations** rather than **observations**.

Part A:**Part B:**

2. What were some “**conditions that mattered**” (variables) in this activity?
3. Consider the three phases: **solid, liquid, and gas**.
 - a. Which phase(s) is/are present in the unlighted candle?
 - b. Which phase(s) is/are present in the burning candle?
 - c. Which phase(s) appear(s) to take part in the chemical reaction?
4. Consider the role of the wick
 - a. What role does the wick play in the burning of the candle?
 - b. What properties should the wick have?
 - c. Explain the result when the aluminum foil is placed between the flame and the bowl of the candle.

5. Consider the products of the chemical reaction. What substance(s) do you think were evidenced in activities 9 and 10?
6. Was heat **absorbed** or **released** by this chemical reaction? _____
7. The “limewater test” is for carbon dioxide and has been used as a test for it since the late 1700s. The carbon dioxide reacts with calcium and hydroxide ions to produce calcium carbonate (chalk) and water. The cloudy appearance of a positive limewater test is due to the small particles of insoluble chalk that form. *Why did the instructions have you test one tube that was inverted over the flame and another test tube that was not?*
8. From your activities, list the steps in lighting and burning of the candle and write the observations that assist you in making these inferences. Use the reference photo to assist you.



Steps in lighting and burning a candle	Observations