Lab #10 Candle Observation Lab

Safety:
Portions of the candle flame are 1400 °C and can cause serious burns. In addition, the flame can catch other materials on fire including paper and clothes. 1.) Your lab area should be clear of everything but your laboratory materials and lab handout. 2.) The candle should be left on the lab table at all times. 3.) The lime water is caustic and the teacher will be pouring this solution into flasks for lab groups. 4.) Gloves must be worn when handling the cobalt chloride paper. 5) Individuals and groups not adhering to the safety rules will not be allowed to proceed with the experiment and will be given an alternative textbook lesson. Keep yourself and others safe by following the rules and focusing on your experiment.

Purpose- To investigate the combustion (burning) process using a candle and explain the process of burning in terms of the necessary reactants and the resultant combustion products.

Materials-
• Candle
• Matches
• 2 Beakers
• Cobalt chloride paper
• Flask
• Lime water solution
• Drinking straw
• Wooden splint
• Plastic cup for disposing of matches

Guiding Questions:
a) What does a burning candle produce?

b) How does a candle work?
Procedure: After each step, write your observations in Data Table 1 on page 5.

Step 1
a) Light the candle, blow out the match, and put the match in the waste cup.
b) Lower a clean, dry beaker (right side up) into the candle flame so that the bottom of the beaker is touching the flame and hold it there for 5 seconds. The candle flame should just touch the bottom of the beaker.
c) Record (write) your observations in Data Table 1, page 5.

Diagram Step 1

Step 2
a) Hold a clean cool beaker upside down over the burning candle.
b) Locate the flame just inside the mouth of the beaker so that it will continue to burn.
c) Hold the beaker at this height for a few seconds, and note the appearance of the foggy material which collects on the sides of the beaker. Remove beaker from flame. **PUT ON YOUR GLOVES**, and wipe the material inside the beaker with a small piece of cobalt chloride paper and record any color change in Data Table 1. *It may be necessary to place the paper against a white piece of paper as a background; look at the edges of the spot on the paper from the beaker material. Afterwards, put a small drop of water on the paper and record your observations.*
d) Record all observations in Data Table 1.

Diagram Step 2
**Step 3**

a) Hold a clean flask upside down so that the mouth is just above the candle flame.
b) Hold it in this position for **30 seconds** or more, and then place it upright on the table.
CAAUTION!! The neck of the flask will be very hot!
c) Obtain just enough limewater from the teacher to **just cover the bottom of the flask!!!!!!**
d) From the teacher obtain the same amount of limewater to a beaker, which will be used as a control.
e) Swirl the solution in both the flask and the beaker (at the same time) until a change occurs in one of the containers.
f) Record your observations in Data Table 1.

**Diagram Step 3**

![Flask neck will be HOT!! Handle from the bottom only.](image)

**Step 4**

a) Save the beaker of limewater from step #3.
b) **WEARING YOUR GOGGLES,** use a clean straw to blow your breath into the limewater solution.
c) Record your observations in Data Table 1.
Step 5
a) Light a candle, and allow it to burn for 1 minute.
b) Hold a wood splint in the candle flame until it catches on fire, then hold the burning splint away from the candle.
c) Blow out the candle with a short gentle puff of breath and immediately hold the burning splint about ¼ inch from the candle wick in what appears to be smoke rising from the candle.
d) If there is no apparent result, try again. (The windows and the front door should be closed to prevent drafts)
e) Write observations.

Diagram Step 5
# Data Table 1-Observations of Each Step in Candle Lab

<table>
<thead>
<tr>
<th>Step</th>
<th>Observations</th>
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Some useful reaction information:
*Lime water Ca(OH)$_2$ reacts with carbon dioxide (CO$_2$) to form a cloudy precipitate in the solution. Ca(OH)$_2$ + CO$_2$ $\rightarrow$ CaCO$_3$ + H$_2$O

*Blue cobalt II chloride (CoCl$_2$) paper reacts with water (H$_2$O) changing the color to pink. CoCl$_2$ + 5 H$_2$O(blue color) $\rightarrow$ CoCl$_2$·5H$_2$O (pink color)

Post-Lab Questions:

1. Name four things a burning candle produces (the products) and state your experimental evidence for each product from Data Table #1 and the results of the cobalt chloride and lime water tests. (Hint, one product you didn’t test for but is closely related to the unit concept we are currently exploring.)

2. List at least two things that are required (the reactants) for a candle to burn after it is lit.

3. From your answers to post-lab questions #1 and #2 write a word equation representing the combustion reaction of a candle.