**VIDEO INSTRUCTION:** [http://www.youtube.com/watch?feature=player\_embedded&v=rwU9O2qwSbw#](http://www.youtube.com/watch?feature=player_embedded&v=rwU9O2qwSbw)!

**CHEMISTRY MATTER CHANGING LAB**

*Adapted from Glencoe’s ChemLab 1 in Chemistry: Concepts and Applications*

Observation of a Candle Names: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***Problem:*** What are the requirements for and characteristics of a candle flame? What are the products of the combustion of a candle?

***Hypothesis:***

***Experiment:***

***Materials:***

large birthday candles matches

shallow metal dish 25-mL limewater solution

(I used disposable miniature loaf pans) 250-mL beaker

500-mL Erlenmeyer flask solid rubber stopper to fit the flask

wire gauze square tongs

***Procedure:***

1. Light a candle and allow a drop or two of liquid wax to fall into the center of the pan.. Press the candle upright onto the melted wax before it can solidify. If the candle burns too low during the following procedures, repeat this step with a new candle.

2. Observe the flame of the burning candle for a few minutes. Try to observe what is burning and where the burning takes place. Observe the different regions of the flame. Make at least eight observations, and record them in the data table below.

3. Light a second candle and hold the flame about 2 cm to 4 cm to the side of the first candle flame. Gently blow out the first candle flame, then quickly move the flame of the second candle into the smoke from the first flame. Record your observations.

4. Relight the standing candle. With tongs, hold the wire gauze over the flame, perpendicular to the candle. Slowly lower the gauze onto the flame. Do allow the gauze to touch the candle wax. If the flame goes out, quickly move the wire gauze off to the side. Record your observations.

5. Fill the 250-mL beaker with cold tap water, dry the outside of the beaker, and hold it about 3 cm to 5 cm above the candle flame. Record your observations.

6. Pour tap water into the pan to a depth of about 1 cm.

7. Quickly lower an Erlenmeyer flask over the lit candle so that the mouth of the flask is below the surface of the water. Allow the flask to remain in place for approximately one minute. Record your observations.

8. Lift the flask out of the water, turn it upright, and add about 25 mL of limewater. Stopper the flask and swirl the solution for approximately one minute. Record your observations. If the solution becomes cloudy or chalky, calcium carbonate was formed, indicating the presence of carbon dioxide in the flask.

***Data:***

|  |  |  |
| --- | --- | --- |
|   | **Procedure Step** | **Observations** |
|   | **2** |   |
|    | **3** |   |
|    | **4** |   |
|    | **5** |   |
|    | **7** |   |
|    | **8** |   |

***Conclusions:***

1. Which changes that you noted in step 2 were physical? Which were chemical?

2. Do your results in step 3 indicate that the candle wax burns as a solid, a liquid, or a vapor? Explain.

3. One requirement for combustion is the presence of fuel. Interpret your results from steps 4 and 7 to determine the other requirements.

4. Based upon your analysis of the observations from steps 5 and 8, what are two products of the combustion of the candle?

5. Sir Humphry Davy invented a safety lamp for miners in which a flame was surrounded by a wire gauze cylinder. Explain the reason why the lamp was constructed this way?

6. What change in water level occurred in procedure 7? Propose an explanation for this change.