

## Introduction

Observation is an important part of science, but is often misunderstood by beginners. Many students believe that “observing” is the same as “seeing.” For example, at the scene of an accident different witnesses will often give different testimony after “seeing” what they saw. The witnesses all saw the same thing, but some are more observant than others. In this lab you will work with a simple candle. Undoubtedly you have all seen a burning candle, but this time you will be guided to observe the candle.

From your *observations* you will make *summary* statements. It is important that you do NOT make *interpretations* while you are writing summary statements. Simply state a summary of the facts, do not attempt to explain why you think the facts are presenting the way that they are.

Lastly you will make some attempts at explanations from your summary statements. Explanations should be concise interpretations as to why the data is behaving the way it is. An explanation is a model which can help you to predict future behaviors.

## Materials – Work in a clear area with no other combustibles nearby

- 2 or 3 candles (birthday candles, dinner candles, Menorah candles, etc) and matches (or lighter)
- aluminum foil covering some nonflammable surface
- damp paper towel or wash cloth – to be on hand for safety to smother any flames if necessary
- transparent drinking glass or jar that is at least (if not more) 3 or 4 inches taller than the candle
- a stop watch or clock with a second hand

## Procedure and Data/Observations – Read completely through each part before proceeding.

**The purpose of this LAD is NOT to test the combustion of everything or anything that you can hold in your candle. Please spend your time on task investigating the candle, NOT other combustibles.**

### Part 1

1. See if your candle will stand up on its own onto a piece of foil. If not, use some clay, play-do, crumpled aluminum foil, or gum to secure it (Alternatively, you could light the candle and drip some hot wax onto a the foil and then stick the candle upright.)
2. Light the candle and observe it for a few minutes.
  - Write down a few specific *observations*.

### Part 2 – Requirements for keeping the candle burning.

3. Prepare the timer. Place the glass down over the lit candle. (Do this quickly. Do not hold the glass over the candle for any length of time before placing down.) Watch the candle carefully to time until it goes out. Lift the glass up QUICKLY and place it IMMEDIATELY mouth side down back onto the table. Record the time it took for the candle to go out.
4. Relight the candle and prepare the timer again. QUICKLY lift the face-down glass and place it QUICKLY back down over the candle. Record the time that it takes this time for the candle to go completely out.
  - Compare the length of the two times. Propose any explanations for any differences in your observations.
  - Can you repeat the experiment and reproduce the same times? Report what you need to do to repeat your longer time.
  - Try experimenting. Record your observations.
  - Analyze your data, make a *summary* statement(s) and then propose an *explanation*(s).

### Part 3 – Parts of the candle.

5. Try to light the candle at the bottom end where there is no wick. It doesn't want to light, does it?
6. Spend some time looking closely at the wick. Relight the candle at the very end of the wick and observe carefully.
7. As the candle burns, observe the bowl of melted wax carefully.
  - Write down a few specific *observations*.

### Part 4 - What goes into and comes out of the candle?

8. When you were putting the glass over the candle did you observe anything materials deposit on the glass?
  - Write down specific *observation*(s).
9. Unwind a paper clip then stick it in the flame varying its location in the flame. (It may get hot at the end you are holding. If so, wrap it in a damp paper towel. Look for black residue forming on the paper clip. Pull out the clip and allow it to cool, and then observe the material on the clip.
  - Write down specific *observation*(s). Propose what this black material might be.
10. Blow out the candle and observe the white “smoke stream” that comes off the wick. Be ready with a lit match and quickly hold it to the stream. The stream of “smoke” should light and transfer the flame down to the wick to relight the candle. Test different ways to extinguish the candle in an attempt to produce a different/better white “smoke stream.” How far away can you hold the match and still light the wick?
  - Write down specific *observations*. Propose what this white smoke might be.

### Part 5 – Temperature of the flame.

11. Unwind another paper clip then stick it in the flame. This time try to get the clip red-hot. Put the clip in different parts of the flame to use this as a method to compare the temperature of various parts of the flame.
  - Write down specific observations about the various temperatures (hot, hotter, hottest) in the various parts of the flame. Make *summary* statement.
  - Perhaps you could make a “map” of the candle flame’s various temperatures.