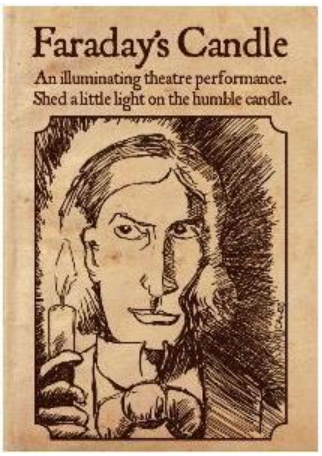
Lab 2.1a
Observation of a Candle

BACKGROUND



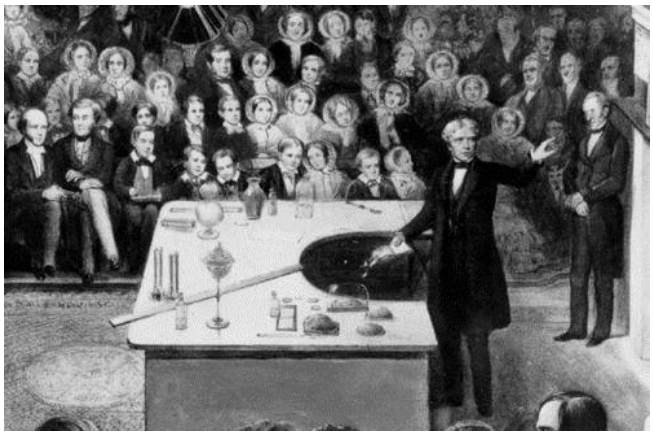
In 1848 Michael Faraday presented a six-part lecture series on *The Chemical History of the Candle* as a part of the Royal Institution (of Great Britain)'s annual Christmas Lectures. The lectures were later published in 1861. His purpose in delivering the lecture series was to illustrate how the topics of physics and chemistry can be studied thoroughly even in the most mundane of objects if one just examines the object correctly.

The purpose of this lab is to look beyond the obvious and learn to treat a relatively well-known and unspectacular object as a scientific curiosity. It requires the student to learn basic lab procedures and methods, as well as to think like a scientist. Observations of various types will be recorded and evaluated for their usefulness in a scientific setting. While students will be tempted to make observations on their current knowledge of the object, they must remove their preconceived ideas and base their data only on direct observation of the object before them.

Observations may include qualitative descriptions (shape, color, odor, etc.) or quantitative observations (length, mass, diameter, etc.), but should not include any inferences, assumptions, or observational fallacies. The candle will be observed before lighting, while burning, and after being extinguished. For each phase, a separate list of detailed observations should be made for the "object". Correct observational statements should include statements such as, "the object is blue", for example. Simply writing "blue" is not descriptive and does communicate to what the observation refers. An observant student will be able to make over 100 observations of the unlighted candle. Any lab equipment available in the equipment drawers may be used and the student may ask for other equipment from the instructor if needed.

Measurements in this lab must be made using only SI units of measurement and should be recorded with units.

If the student plans of making comparisons of the "object" before and after any particular process, they should plan to control any variable that may affect their ability to make a direct comparison.



Safety

- Standard fire precautions should be taken (hair tied back, loose clothing secured or removed, etc.)
- Wear appropriate personal safety equipment (goggles, aprons, gloves, etc.)
- Nothing should be placed in the flame without consulting the instructor.
- Wash hands with soap and water before leaving the laboratory.

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Observation of a Candle

Chemistry I/H

I. PURPOSE

To learn how to make and record valid laboratory observations.

II. MATERIALS

1. candle
2. card stock
3. matches
4. any other equipment needed for observations

III. PROCEDURES

1. For about 10 minutes observe the unlighted candle and list observations in the data table under the heading "Observations of an Unlighted Candle". Use any equipment from your lab drawer and any other equipment the instructor is willing to provide.
2. When instructed to light the candle, place it on a card stock base, light the wick and begin a new list observations in the data table under the heading "Observations of a Lighted Candle".
3. When instructed to extinguish the candle, blow it out gently and begin a new list observations in the data table under the heading "Observations of the Extinguished Candle".

IV. PRE-LAB QUESTIONS

1. What is an inference?
2. What is the difference between qualitative observations and quantitative observations?
3. What is the purpose of the card stock base?
4. What is the reason for making observations after the candle has been blown out?

V. DATA & CALCULATIONS

A. DATA

Create a numbered list for each set of observations. Make only one column of data. When the bottom margin is reached, continue the list onto the next page.

B. CALCULATIONS

None

VI. POST-LAB QUESTIONS

1. Explain any errors that occurred in lab and how they affected the data collected.
2. List 3 qualitative observations from the data. Explain the strengths and weaknesses of qualitative observations.
3. List 3 quantitative observations from the data. Explain the strengths and weaknesses of quantitative observations.
4. Based on the strengths and weaknesses of each type of observation, which is better for describing objects? Explain your rationale.
5. Were any of the observations not true observations (i.e., inferences, assumptions, etc.)? Explain.
6. What factors may have affected the mass of the object between the beginning of the lab and the end of the lab?

VII. CONCLUSION