

# The Potato Candle

## Observation Skills



### Introduction

Test your students' observation skills and have some fun at the start of a new school year by burning and then eating an edible candle.

### Concepts

- Observations vs. interpretations
- Quantitative vs. qualitative data

### Background

Careful observation and the collection of data are the foundation of any experimental science. On the first day of school, discuss observations versus interpretations and quantitative versus qualitative data. Observations can be quantitative (measurable, e.g., 4.0 cm) or qualitative (descriptive, e.g., blue) and should be reproducible. Interpretations are explanations or assumptions of what is observed—these are conclusions and may change as more data is collected.

After a discussion of the importance of careful observation and data collection, test the students' understanding by performing the potato candle demonstration. Ask students to share their observations during the demonstration. Some students will likely report seeing the wax melt, a braided wick, and the evolution of  $\text{CO}_2$ . Challenge students to identify the observation as quantitative or qualitative, or if it is an interpretation of an observation (e.g., obviously, they cannot see the  $\text{CO}_2$  produced and until the gases are analyzed, it is merely speculation or an interpretation based on previous knowledge of combustion).

The day after the demonstration, ask students if the last observation (eating the candle) changed some of their earlier observations. Some students may have heard the candle crunch when it was eaten. Explain how important it is to make accurate observations and collect accurate and precise data. Also explain how new observations constantly lead to changes in science—science is in a constant state of flux.

### Materials

Potato, white Idaho baking type works best	Knife or single-edge razor blade
Large cork borer or apple corer (must be sterilized)	Matches
Brazil nut	Watch glass

### Safety Precautions

*Clean the potato, cork borer, knife, and watch glass thoroughly before use. If using a laboratory cork borer, clean and sanitize before use. It is best to prepare the candle in a sanitary area. After the demonstration, remind students that materials found in lab should never be eaten. This, however, was a carefully controlled demonstration. Although the materials in this demonstration are not considered hazardous, follow all normal laboratory safety guidelines.*

### Preparation

1. Clean all materials before use.
2. Use the cork borer or apple corer to cut a cylindrical "candle" out of the potato.
3. Cut a small amount off the top and bottom of the potato candle so it sits flat and all traces of the peel are gone.
4. Cut the Brazil nut to create a thin "wick," about 2–3 cm long.
5. Cut a small "X" in the top of the potato candle and insert the nut wick into the middle of the "X".
6. Place the potato candle on a clean watch glass.

### Procedure

1. After a discussion of the importance of careful observation and data collection, explain to your students that the following demonstration will allow them to work on their observation skills.
2. Bring out the potato candle.
3. Darken the room by turning off some of the lights.
4. Light the potato candle.
5. Ask your students to record as many observations as possible.
6. Before the nut wick is completely burned, blow out the candle.
7. Ask your students to read their observations aloud and classify them as quantitative observation, qualitative observation, or an interpretation.
8. As the class bell rings, announce there is one more observation to make: Pick up the candle and eat it. Do not tell the students that the candle was anything other than a candle.

### Tips

- Do not allow students to get too close to the candle—they may notice that it is not an actual candle.
- The Brazil nut wick should burn for about 3–5 minutes.
- If the potato sits for a while, it may start to brown. Soak the potato candle in lemon juice or fruit preservative to prevent yellowing.
- Some teachers have had success with apples, bananas, or other white fruit. Keeping the fruit or vegetable from turning brown is the key to this demonstration. Again, soaking in lemon juice or fruit preservative may reduce oxidation and the browning of the fruit. Fruit will taste better than raw potatoes.
- Brazil nuts are the large nut found in many commercially available cans of mixed nuts. The Brazil nut is a three-sided nut with a very white meat that contains 70% fat and 17% protein. It is this very high fat content that allows the Brazil nut to burn like a miniature candle when lit. The oil extracted from Brazil nuts is used as a lamp oil and contains mainly palmitic, oleic, and linoleic and alpha linoleic acids

### Connecting to the National Standards

This laboratory activity relates to the following National Science Education Standards (1996):

***Unifying Concepts and Processes: Grades K–12***

Evidence, models, and explanation

***Content Standards: Grades 5–8***

Content Standard A: Science as Inquiry

Content Standard G: History and Nature of Science, science as a human endeavor, nature of science

***Content Standards: Grades 9–12***

Content Standard A: Science as Inquiry

Content Standard G: History and Nature of Science, science as a human endeavor, nature of scientific knowledge

### Flinn Scientific—Teaching Chemistry™ eLearning Video Series

A video of *The Potato Candle* activity, presented by Lee Marek, is available in *Observation Skills* and in *Discrepant Event—Classroom Lessons*, part of the Flinn Scientific—Teaching Chemistry eLearning Video Series.