

The Jumping Flame



Introduction

A typical chemical reaction takes place when a candle burns. The wax, by reacting with the oxygen in the air, forms water vapor and carbon dioxide. If two burning candles are available and one is blown out, it can be reignited by bringing the second burning candle close to the smoke.

Concepts

- Combustion reaction
- Phase changes

Materials

Candles, large enough to hold easily, 2

Butane safety lighter or matches

Wax paper

Safety Precautions

Remove all combustible materials from the demonstration area. Wear gloves to prevent hot wax from burning hands. Wear chemical splash goggles and a chemical-resistant apron. Wash hands thoroughly with soap and water before leaving the laboratory. Follow all laboratory safety guidelines.

Procedure

1. Spread out a sheet of wax paper to catch the candle wax as it drips.
2. Light both of the candles; hold one of them in each hand.
3. When both flames are burning strongly, turn the candles sideways so they are burning near each other.
4. Blow out the flame of one candle while quickly moving it about 3 cm below the other, still burning, candle.

The column of smoke from the unlit candle will rise to meet the flame. The flame quickly travels down the smoke causing the unlit candle to reignite. Since it moves very rapidly, the flame appears to have jumped down to the wick below it.

Disposal

Please consult your current *Flinn Scientific Catalog/Reference Manual* for general guidelines and specific procedures, and review all federal, state and local regulations that may apply, before proceeding. Be sure candles are completely cool before storing or disposal. Candles may be disposed of in the regular trash according to Flinn Suggested Disposal Method #26a.

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

Constancy, change, and measurement

Content Standards: Grades 5–8

Content Standard A: Science as Inquiry

Content Standard B: Physical Science, properties and changes of properties in matter, transfer of energy

Content Standards: Grades 9–12

Content Standard A: Science as Inquiry

Content Standard B: Physical Science, structure and properties of matter, chemical reactions, interactions of energy and matter

Discussion

Candles are made of paraffin wax, a long-chain hydrocarbon. Paraffin does not burn well in the solid or liquid state, so candles are designed to melt and then evaporate the wax. As the combustion reaction occurs, the heat released continues to

melt and evaporate more wax, and the candle continues to burn. As the burning candle is brought above the blown out candle, the flame appears to jump down to reignite the candle. This “magic trick” is simple to explain. As the first candle is blown out, some of the hot wax leaves the candle as smoke. This wax vapor is hot enough to burn when the flame is brought close to it. The Jumping Flame travels down the column of hot wax vapor to reignite the candle. In Equation 1 below, the “CH” represents the paraffin wax hydrocarbon.



Materials for *The Jumping Flame* are available from Flinn Scientific, Inc.

Catalog No.	Description
C0192	Candles, Plumber’s, pkg. of 4
C0229	Candles, Plumber’s, pkg. of 20
AP8960	Butane Safety Lighter

Consult the [Flinn Scientific website](#) for current prices.