Flinking—Neither Floating nor Sinking

Scientific Method Inquiry Lab Activities

Introduction

Don't teach the scientific method—use it! Your students will naturally use the scientific method as they work with common household items such as Styrofoam®, paperclips, buttons, aluminum foil and more to design a unique object.

Concepts

- Scientific method
- Problem solving
- Density

Materials

Aluminum foil
Water, tap
Beaker, 2-L
Buttons
Hex nuts
Paperclips
Styrofoam ball
Washers

Safety Precautions

This laboratory activity is considered nonhazardous. Follow all laboratory safety guidelines.

Procedure

1. Instruct students that the goal of this activity is to produce an object that too dense to float in water but not so dense that it sinks to the bottom of the beaker.
2. Present all the materials that may be used to produce this object and test its properties when placed in water..
3. Allow students to manipulate the materials to create an object that will neither float nor sink.

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. The water used in this activity may be flushed down the sink according to Flinn Suggested Disposal Method #26b.

Discussion

The *scientific method* is a way of solving problems using a systematic approach. A *hypothesis* is formulated based on a series of observations, and then that hypothesis is tested by means of controlled experiments. The results of the experiment either support or invalidate the hypothesis. Based on experimental evidence, a theory is proposed to account for initial observations. If the *theory* lacks the ability to explain further observations, a new hypothesis may be made and tested, leading to a refined theory. In a sense, scientific knowledge is continually changing and becoming more reliable as we gather more information to test and improve a hypothesis.

An organized strategy such as the scientific method is an effective way of approaching a problem. A wide variety of strategies are described in the literature and the following is a list of "typical" steps that scientists may use to solve a problem. Keep in mind, however, that the strategy and the order of steps may vary greatly from problem to problem.

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Typical Steps in the Scientific Method

1. Define a *problem* or ask a question — A clear statement of the problem or question is a crucial step when beginning an investigation.
2. Make *observations* about the problem — All possible information on the problem will be helpful in writing a plausible hypothesis and designing a good experiment.
3. Develop a *hypothesis* — This is a possible answer or tentative explanation to the problem or question. It should be based on facts and observations and should be capable of being tested.
4. Design and carry out an *experiment* — Experimental testing will provide evidence that either supports or contradicts the hypothesis. Several factors must be determined before conducting an experiment.
   Variables: The factors that influence the outcome of an experiment.
   Constants: All other factors, except the one whose effect is being studied, should remain the same throughout an experiment.
   Independent Variable: The variable that is intentionally changed or manipulated by the experimenter. (x-axis)
   Dependent Variable: The variable being measured or watched, sometimes called the outcome or the responding variable. (y-axis)
5. Record and analyze *data* — Data, such as observations and measurements, are recorded and then analyzed. If the data support the hypothesis, then the conclusion would state that the hypothesis is correct. If the data contradict the hypothesis, then a new hypothesis must be made and tested.
6. Draw a *conclusion* — Scientists base their conclusions on observations made during experimentation. When a hypothesis has been tested many times and has proven to be correct, it becomes a theory. However, a theory is still not a law. Continued testing and acceptance by the scientific community leads to the theory becoming a scientific law.

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
Content Standards: Grades 9–12
Content Standard A: Science as Inquiry
Content Standard B: Physical Science, structure and properties of matter

Flinn Scientific—Teaching Chemistry™ eLearning Video Series

A video of the *Flinking—Neither Floating nor Sinking* activity, presented by Peg Convery, is available in *Inquiry Lab Activities* and *Scientific Method Inquiry Lab Activities*, part of the Flinn Scientific—Teaching Chemistry eLearning Video Series.

Materials for *Flinking—Neither Floating nor Sinking* are available from Flinn Scientific, Inc.

Catalog No.	Description
AP4657	Beaker, Polypropylene, 2-L
AP2279	Styrofoam® Balls, 1″

Consult your *Flinn Scientific Catalog/Reference Manual* for current prices.