CHEM FAX!
P.O. Box 219 • Batavia, IL 60510
(800) 452-1261 • Fax (866) 452-1436
www.flinnsci.com • E-mail: flinn@flinnsci.com
FLINN SCIENTIFIC, INC
"Your Safer Source for Science Supplies"
Catalog No. AP4695
Publication No. 4695

Collapsing Can Demonstration

Introduction

Here's a pressure-packed demonstration that will convince students that air exerts significant pressure!

Concepts

- Pressure differential
- Atmospheric pressure

Materials

Metal can with screw top lid*
Hot plate
**Materials included in kit.*
Tap water, 50 mL
Water bath
Zetex™ gloves, for high and low temperatures

Safety Precautions

Be careful of the hot can and the steam created by heating the water in the can. Wear goggles and protective gloves during the demonstration.

Procedure

1. Locate a metal can with an airtight screw top lid.
2. Remove the lid from the metal can. Be sure the can is clean and free of chemicals—a new, unused can is preferred.
3. Add approximately 50 mL of tap water to the metal can. This should be enough to cover the bottom of the can to a depth of approximately 1 cm.
4. Place the can on a hot plate and heat it until the water boils and steam flows out of the uncapped hole.
5. Using protective gloves, remove the steaming can from the hot plate. Place the can where it can be easily viewed.
6. Immediately place the cap on the can and close tightly.
7. The can will be dramatically crushed and it will likely do so in a loud fashion. For a quick crush, place the sealed can into an ice–water bath to cool the can rapidly.

Tips

- It is important that the cover on the can has an airtight seal. Be sure to get the lid placed tightly on the can before the cooling process begins.
- The collapsed can and an identical un-crushed can make a nice exhibit in a classroom display case.
- If a cap to the can is not available, try a rubber stopper. Be sure the rubber stopper fits snugly in the can opening.
- For a more impressive implosion, immerse the can into a sink of cold water.

Discussion

The tremendous pressure required to "crush" the can comes from the differential in pressure that exists between the outside of the can (normal air pressure) and the partial vacuum created inside the can by the condensing steam. The pressure differential is caused by the condensation of the steam inside the closed system as the can cools. The pressure on the outside of the can remains at atmospheric pressure (14.7 lb/in^2) while the pressure inside the can is significantly reduced as the steam condenses. Remember that the can is not "sucked in"—it is the greater pressure on the outside of the can that pushes in on the can and "crushes" it. The total pressure exerted on the outside of the can may be calculated by determining the surface area of the outside of the can and multiplying this area by atmospheric pressure per unit area.

Connecting to the National Standards

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

Unifying Concepts and Process: Grades K–12
Evidence, models, and exploration

Content Standards: Grades 5–8
Content Standard B: Physical Science, properties and changes of properties in matter, understanding of motions and forces

Content Standards: Grades 9–12
Content Standard B: Physical Science, structure and properties of matter, motions and forces

The *Collapsing Can Demonstration* is available from Flinn Scientific, Inc.

Catalog No.	Description
AP4695	Collapsing Can Demonstration

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