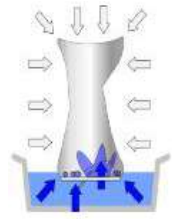




## Imploding Can



### REMEMBER BEFORE YOU START TO

1. Label Laboratory Notebook with the title of experiment & date you perform it
2. Gather all your materials
3. Read the CAUTIONS
4. Read ALL Methods
5. Write **predictions** in your Laboratory Notebook
6. Wear your goggles, gloves, and lab coat

**GOAL:** Learn pressure acts as a force

### Materials

Empty aluminum soft-drink can  
2- or 3-liter (2- or 3-quart) saucepan  
Pair of kitchen tongs

### **CAUTION**

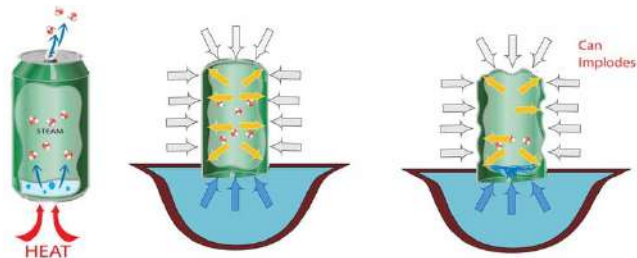
- Do not heat the can over high heat or heat the can when it is empty. This may cause the ink on the can to burn or the aluminum to melt.
- The can will be hot, you will need an adult to help you.

### Methods

1. Fill the saucepan with cold water.
2. Put 1 tablespoon of water into the empty soft-drink can, and place the can on the stove.
3. Heat the can on the kitchen stove to boil the water.
4. When the water boils, a cloud of condensed vapor will escape from the opening in the can. Allow the water to boil for about 30 seconds. **Write down your observations in your laboratory notebook.**
5. Using the tongs, grasp the can and quickly invert it and dip it into the water in the pan. **What do you think will happen to the can? Write down your predictions in your laboratory notebook. What did happen to the can? Write down your observations in your laboratory notebook. Why do you think this happened to the can?**

## What's Happening?

- What caused the can to collapse? A can is crushed when the pressure outside is greater than the pressure inside, and the pressure difference is greater than the can is able to withstand. You can crush an open aluminum can with your hand. When you squeeze on the can, the pressure outside becomes greater than the pressure inside. If you squeeze hard enough the can collapses.
- Usually, air pressure inside an open can is the same as the pressure outside. However, in this experiment, the air was driven out of the can & replaced by water vapor. When the water vapor condensed, the pressure inside the can became much less than the air pressure outside. Then the air outside crushed the can.
- When you heated the can you caused the water in it to boil. The vapor from the boiling water pushed air out of the can - remember heat makes air expand...get bigger. When the can was filled with water vapor, you cooled it suddenly by inverting it in water. Cooling the can caused the water vapor in the can to condense (get smaller), creating a partial vacuum. The extremely low pressure of the partial vacuum inside the can made it possible for the pressure of the air outside the can to crush it.
- When the water vapor inside the can condensed, the can was empty. You may have expected the water in the pan to fill the can through the hole in the can. Some water from the pan may do this. However, the water cannot flow into the can fast enough to fill the can before the air outside crushes it.



## Who Uses This in Real Life?

combine natural sciences and life sciences together with mathematics and economics to produce, transform, and properly use chemicals, materials, and energy. They also design processes and equipment for large-scale safe and sustainable manufacturing of chemicals. Food, fuel, paper, plastics, and chemicals are some of the most common products that chemical engineers design processes for.



In 1947, **Marie Daly** became the first African American woman to earn a Ph.D. in chemistry. The majority of her career was spent as a college professor. In addition to her research, she developed programs to attract and aid minority students in medical and graduate school.