

Crush Can

Recommended for Chapter(s): 5

Demo #019

Materials NOT in box

1. Safety goggles.
2. Water.
3. Ice (ice machine locate in alcove where the chemistry building meets PSBN).
4. Grey tub (general cabinet).
5. Hot plate (general cabinet).

Procedure

1. (Prep) Fill the grey tube with ice and water.
2. (Prep) Fill a chemical can with about an inch of water
3. (Prep) At the being of class put the can on the hot plate. In order for the demo to work the water has to be boiling.
4. Use the hot mitt to pick up the chemical can and turn it over so that the ice water seals the hole.
5. Almost immediately the can will crush.

Safety

1. Wear safety goggles.
2. Be careful not to burn yourself on the can.

Clean Up

1. Return the materials to the cart in the demonstration library room.

Stockroom Notes

1. Pour the water down the drain.
2. Throw away old chemical can.
3. Put a new chemical can into the box
4. Return all items to demonstration tub.
5. Return tub to the demonstration library.
 - a. The goggles go in the goggle box.
 - b. The grey tub and hot plate go in the general cabinet.

Discussion

When the can is on the hot plate the water in the bottom of the can boils. This fills the can with hot water vapor. The can is then turned upside down into the ice cold water. Because the inlet of the valve is now under water gas molecules cannot escape. The can crushes because the pressure on the inside and outside of the can must be equal. Therefore, what causes the change in pressure on the inside of the can? First, the cold water cools the gas inside of the can down. When gas is cooled down, in order for it to maintain the same pressure, the volume must be decreased. This factor turns out to only play a minor role in the crushing of the can. This statement can be verified by putting a can without water in it and heating it up. When this can is turned over into the water it will not crush it will contract a little but not crush. The role of the water is to provide a gas that can be condensed by the cold water. When the can is turned over in the cold water the water vapor condenses to water liquid this reduces the number of moles of gas in the can and in order for the can to have the same pressure inside and outside the can must reduce its volume by crushing

This link is to a video of the same phenomena happening to a train car
http://www.youtube.com/watch?v=Zz95_VvTxZM

Materials for demo 019

1. Empty ethyl alcohol can
2. Orange heat gloves