

## 10.1 Collapsing Can

**Subjects:** Gaseous properties, ideal gas law

**Description:** A small amount of water is heated to boiling in a metal can (aluminum soda can or large 20 L solvent drum) filling it with water vapor. The can is removed from heat and sealed. The can will collapse quickly and dramatically.

**Materials:**

For Procedure A:	For Procedure B
Soda can ~5-10 ml water (from tap) Meeker burner* Matches tongs 600 ml beaker or shallow dish with water  ◇ Get ice from Gen Chem lab immediately before class. Get solvent can from O-chem labs or loading dock beforehand.	Empty 20 L solvent container, ready for disposal ◇ Stopper to fit mouth of container ~100 mL water Meeker burner* Matches Tripod, with wire gauze 400 mL Beaker with ice ◇ Insulating gloves  *The Meeker burner is located in top drawer opposite the storage shelves.

**Procedure A:**

1. Place the water in the can.
2. Light the burner.
3. Holding the can with the tongs, heat the water in the can until it fills with water vapor.
4. Remove the can from heat and invert it with the opening in a shallow dish or beaker of water. The can will collapse immediately.

**Procedure B:**

1. Add water to the can.
2. Set the can on top of the wire gauze on the tripod.
3. Light the burner and place beneath the can.
4. Heat the water in the can for several minutes until water vapor escapes from the opening.
5. Using the gloves, remove the can from the heat and add the ice to the can and stopper it. The can will collapse dramatically.

**Discussion:**

After removing the can from heat and either adding ice or placing it open-side-down in a water bath, the can cools. As the can cools, the water vapor in the can also cools and condenses causing a decrease in pressure within the can. Because of the rapid

decrease in pressure in the inside and because the can is sealed, the pressure on the outside of the can pushes in and causes the cans to collapse.

**Safety:** Be sure to use tongs and heat-resistant gloves to avoid burns from the burner or hot cans and water.

**Disposal:** The used cans should be recycled.

**References:**

1. L. Summerlin, C. Borgford, J. Ealy; *Chemical Demonstrations: A Sourcebook for Teachers*; 1987; Volume 2; P.89
2. B.Z. Shakhashiri. *Chemical Demonstrations: A Handbook for Teachers of Chemistry*; Wisconsin; 1985; Volume 2; p. 6-8