

Instruments:

- an empty aluminum soda can
- a pair of tongs
- water bath or pail
- Bunsen burner or other flame source
- water

Experiment:

- Fill a container with enough water to submerge the soda can. Place it next to the burner.
- Add roughly 1 cm of water to the empty soda can and bring it to a boil over the flame, using the tongs to hold the can.
- Quickly invert the can and immediately plunge it (opening downward!) into the water bath using the tongs.

Observations:

Immediately upon contact with the cooler water of the bath, the soda can will implode with a loud crunching sound.

Results:

Boiling the water in the can causes expanding water vapor to push most of the original air in the soda can. The increased pressure can escape through the drinking hole, resulting in less particles in the can, but with much higher energies (velocities) than at cooler temperatures. Plunging the can into the water bath steals the added heat energy from the remaining molecules, which can no longer exert the same pressure on the can walls as the hot water vapor. The pressure drops rapidly, since no air molecules can rush back through the submerged can opening to maintain the pressure. The can thus implodes, since air pressure outside the can remains the same, while the pressure within the can is a fraction of what it just was.

Template can be found online (in German):

<http://portal.tugraz.at/portal/page/portal/Files/i5110/files/Forschung/Thermophysik/DA-RobertSchantl.pdf>