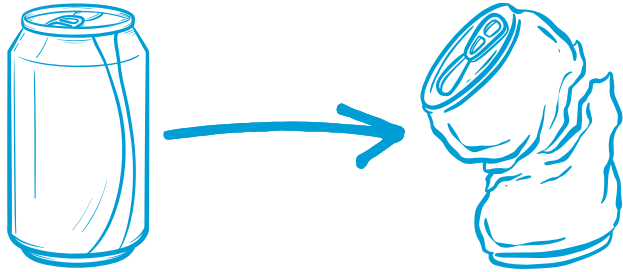


## ACTIVITY 5: CRUSH A SOFT DRINK CAN USING PRESSURE



The purpose of this multi-day experiment is to investigate the effects of different storage methods on the rate of food spoilage, simulating real-world scenarios to understand how proper storage can reduce food waste.

### **Materials:**

- Empty soda can
- Stovetop or hot plate
- Beaker tongs or heat-resistant gloves
- Bowl or container of cold water
- Safety goggles

First, inform students that they will be conducting an experiment to investigate how air pressure, temperature and volume are all related. Have them partner up and get the necessary supplies. (Ahead of time you can the students bring in an empty cleaned out soft drink can to use for this experiment.)

Next, demonstrate the can crush experiment for them so that they know how to do it. (Make sure to put on your safety goggles to protect your eyes during the demonstration; have students do the same when they do the experiment.)

### **Procedure**

- Take an empty soft drink can and make sure it's clean and dry. You don't want any soda residue inside.
- Add a little bit of water to the inside of the can and place the soda can on a hot plate or other heat source, making sure it's stable and won't tip over during heating.
- Turn on the heat source to medium-high heat. Wait for a few minutes to let the can heat up.
- While the can is heating, prepare a container of ice cold water by filling it with ice cubes or adding ice-cold water.

- Once the can has been heated for a few minutes, and steam is seen rising from the inside, use tongs or heat-resistant gloves to carefully pick it up and quickly turn it upside down.
- Immediately place the mouth of the can into the ice water, ensuring that the can mouth is fully submerged.
- Observe the reaction that takes place. You should see the can rapidly collapse or get crushed.

Last, have all the students discuss their results with their partners, and perhaps even drawing before/after particle diagrams to represent the situation. Continue to engage the students in a whole-class discussion about what was going on in the experiment with the can crush. Help them to understand that when the can is placed on the heat source, the air and water molecules inside gain energy and move faster. This increased motion of the air molecules increases the pressure inside the can, because an increase in temperature causes an increase in pressure. When you turn the can upside down and place it into the cold water, the surrounding temperature decreases rapidly. This causes the air and water molecules inside the can to lose energy and move slower. As a result, the pressure inside the can decreases—fast. The pressure inside the can becomes lower than the atmospheric pressure outside the can to the point that the difference in pressure between the inside and outside of the can causes the higher atmospheric pressure to crush or collapse the can.

### **Discussion Questions**

1. What would a particle diagram look like of the inside of the can before/after the change?
2. If you were to repeat the experiment with a larger can, do you think the same crushing effect would occur? Why or why not?
3. How would the can crush demonstration be affected if the can was completely sealed?
4. How does the can crush serve as a model to help us understand what scuba divers experience when diving to and from water depths to explore shipwrecks?