

Matter:



Can You Stand the Pressure?

Primary Audience: 3rd – 5th

Description: Learn about density and pressure by quickly cooling water vapor in an aluminum can.

Key Words: Pressure, Matter

Materials:

- 1 undamaged, pre-rinsed, empty soda can
- Large bowl of cool tap water
- Stove in a kitchen
- Potholder
- Frying pan or hot plate

Instructions:

1. With the supervision of an adult, place the frying pan on a burner near the front of the stove.
2. Turn the handle towards the inside so it won't get caught on anything. Set the heat to the low or medium-low setting.
3. Place 2 tablespoons of water in the soda can. Set the can on the frying pan to heat the water inside. While the can is heating, fill the bowl two-thirds full with tap water and set it on your work area.
4. When you see steam coming out of the soda can, you are ready to perform the experiment. (BE CAREFUL!) Wearing the oven mitts carefully set the frying pan on the potholder next to the bowl of water.
5. Quickly pick up the soda can and turn it upside down into the bowl of water. What happens? Lift the can out of the water. What do you notice?

What's going on?

Matter is all around us. It is anything that takes up space and has mass (that means weight). Normally matter exists in one of four forms called states or phases of matter. They are: solid, liquid, gas, and plasma. When you bring the water in the frying pan to a boil, you are changing the water from a liquid state to a gaseous state. As a gas, the water takes up more space, filling the can with water vapor, and pushing the air out of the can. When you turn the soda can upside down in the cold water, the lower temperature forces the water vapor in the can to turn back into a liquid state. Since the liquid water takes up less space

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than the gaseous water, much of the can is now empty of matter — creating a vacuum. Air (and water from the bowl) rush in to fill the space, crushing the can.

Relevant Ohio Science Content Standards:

Physical Science: 4.1, 4.4, 4.5

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