STEM IN THE LAB

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Idaho National Laboratory

EXPERIMENT WITH INSTANT ICE!

Science is super cool — especially when ice and salt are involved. Supercool water to below its freezing point and then discover how to make ice on demand in this ice experiment!

The main material needed in this experiment is water! Water is a staple that people use every single day. At Idaho National Laboratory, the Water Security Test Bed (WSTB) was built to focus on improving America's ability to safeguard our water systems, and to respond to contamination incidents and to natural disasters. Research at the WSTB will help develop methods for decontaminating pipes and equipment and designing a better, more resilient infrastructure.

GRADE LEVELS: K-8

VOCABULARY

Supercool- *cool (a liquid) below its freezing point without solidification or crystallization.*

Chemistry- *the branch of science that deals with the identification of the substances of which matter is composed; the investigation of their properties and the ways in which they interact, combine, and change; and the use of these processes to form new substances.*

Ice- *frozen water, a brittle transparent crystalline solid.*

Freezing- *occurs when the temperature of air falls below the freezing point of water (0 °C, 32 °F, 273.15 K).*

MATERIALS

- *Glass, very clean*
- *Ice cubes (made from tap water)*
- *Mixing bowl, large*
- *Salt (1/4 cup)*
- *Thermometer (optional)*
- *Water, purified or distilled*

PROCEDURE

1 . Fill a mixing bowl with ice.

2. Pour a couple tablespoons of purified or distilled water into a clean glass.

3. Nestle the glass with water into the center of the bowl of ice so that the ice is higher than the level of water in the glass. Be very careful not to spill any ice into the glass of water.

4. Generously and carefully sprinkle the salt onto the ice. DO NOT get any of the salt in the glass of water.

5. Wait approximately 15 minutes for the water to cool below freezing (known as supercool). Optionally, you can carefully insert a thermometer into the glass of water to confirm if it is supercooled (less than 32 degrees Fahrenheit).

6. Place a fresh ice cube or frozen ice pack on a small plate or other dry surface.

7. Carefully remove the glass of supercooled water and slowly pour the water directly onto the ice and watch it freeze instantly on the ice.

THE SCIENCE BEHIND IT

Purified water can be chilled below freezing temperature and still remain in liquid form. This is possible because ice crystals need surfaces to grow upon. With purified water, however, there are not enough impurities in the liquid for ice crystals to form. When purified water is supercooled and then carefully poured onto a fresh ice cube or frozen ice pack, the cube or pack serves as the surface upon which the ice crystals are able to form. Try making ice on demand with supercooled water!

RESOURCES

- *https://inl.gov/article/idaho-test-bed-focuses-on-municipal-water-security/*
- *Invent.org/blog*

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