

# Hail in a Test Tube

**Overview:** Students are introduced to supercooled water.

**Essential Questions:** What conditions must exist for hail to form?

**National Science Standards:**

Content Standard A: Science as Inquiry Abilities necessary to do science inquiry.

Content Standard B: □ Students should develop an understanding of properties and changes of properties in matter.

Content Standard D: Students should develop an understanding of the structure of the earth's system

**Materials:** large, clean test tube, water, crushed ice, salt, beaker, alcohol, thermometers

**Vocabulary:** supercooled, seed crystal, nucleus

**Safety Reminders:** freezing water

**Procedure:**

**Engage:** Discuss students' experiences with hail. Ask if they know how hail forms.

**Explore:** Direct the students to set up the investigation. Each group of students need the following:

- Clean test tube. TEACHER HINT: Thoroughly wash the test tube and then rise and dry with rubbing alcohol.
- Fill the test tube  $\frac{1}{2}$  to  $\frac{3}{4}$  full of water
- Prepare an ice bath in the beaker using the crushed ice, water and salt
- Insert the test tube of water into the ice bath and leave it for 10 minutes
- Measure the temperature of the ice bath
- At the end of 10 minutes, remove the test tube and drop a small piece of crushed ice into the test tube
- Students should see the crystallization of water/ice occur in the test tube.

**Explain:** Lead a discussion of the observations the students made. The discussion should include the following:

- the relative temperature of the water in the ice bath
- the relative temperature of the water in the test tube
- the reason the water remained liquid BEFORE the chunk of ice was added
- supercooled water
- how hail needs a crystal seed of nucleus in order to form
- that supercooled water exists in clouds

Use websites such as these to familiarize yourself with the concepts before introducing them to students:

[http://www.nssl.noaa.gov/primer/hail/hail\\_basics.html](http://www.nssl.noaa.gov/primer/hail/hail_basics.html)

<http://www.lsbu.ac.uk/water/explan.html>

There are also some great clips on YouTube showing other supercooling investigations

**Extend:** Encourage students to continue using their observations skills by repeating the investigation or further researching hail and other precipitation forms

**Evaluate:** Assess students' ability and accuracy in recording observations, sharing results, and/or writing a conclusion.

John Graves, 2007