

**Topics:** States of Matter, Phase Change, Pressure, Volume

## Materials List

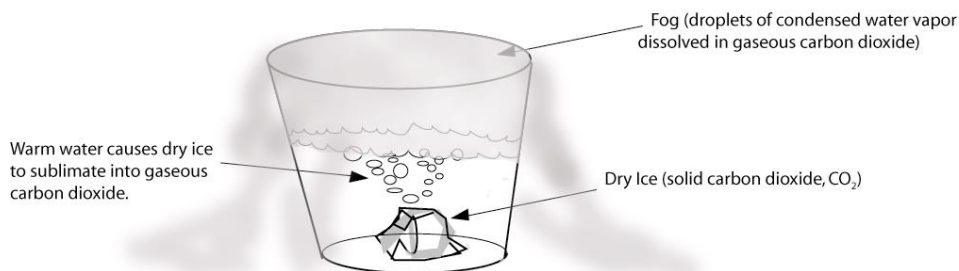
- ✓ Dry Ice (see Yellow Pages under "ice")
- ✓ Transparent Plastic Cups
- ✓ Safety Goggles
- ✓ Oven Mitts and/or Tongs
- ✓ Warm Water
- ✓ Hammer
- ✓ Towels or Rag (to clean up water spills)
- ✓ Ice Chest (to transport and store dry ice)

This activity can be used to teach:  
Next Generation Science Standards:

- Structure of matter (Grade 5, Physical Science 1-1)
- Properties of materials (Grade 5, Physical Science 1-3)
- Changes of state (Middle School, Physical Science 1-4)
- Chemical reactions (Middle School, Physical Science 1-2; High School, Physical Science 1-2)

# Bubbling Potions

This states of matter activity with Dry Ice is totally cool!



Students observe dramatic changes in the states of matter in this activity.

## To Do and Notice

**Safety Note:** Dry ice is  $-78.5^{\circ}\text{C}$  ( $-109.3^{\circ}\text{F}$ ), cold enough to cause **frostbite**. Practice safe lab procedures during this activity:

- **Avoid contact with bare skin and wear goggles.**
  - **Do not put dry ice in closed containers or glass containers** (other than film canisters).
  - Do dry ice activities in a **well-ventilated area**.
1. If necessary, use a hammer to break off small pieces of dry ice. Use tongs or an oven mitt to put cubes of dry ice in the cups.
  2. Have students blow on the dry ice to produce fog.
  3. Add warm water to the cups to produce bubbles and fog.
  4. Have the students make observations of the dry ice over time (amount of fog produced; temperature of the water; size of the cube dry ice; & buoyancy of the dry ice).
  5. **Clean Up:** Make sure all the pieces of dry ice are put back in the ice chest at the end of the activity. Store the ice chest in a secure location for a day or so and the dry ice will warm up and become atmospheric carbon dioxide. (Do not pour dry ice down the drain...it could lead to costly repairs).

## The Science Behind the Activity

Dry ice is identical on a molecular level to other forms of carbon dioxide ( $\text{CO}_2$ ) such as the gas bubbles in carbonated beverages. As dry ice gets warm, it sublimates, changing from a solid directly to a gas. When dry ice is placed in warm water, both carbon dioxide gas (which is invisible) and white fog are produced. The fog is water vapor that has condensed into clouds within the  $\text{CO}_2$  gas. The fog will tend to sink to the floor because  $\text{CO}_2$  gas is more dense than most of the gases in the atmosphere. Once the dry ice cools the water to  $0^{\circ}\text{C}$  ( $32^{\circ}\text{F}$ ) the water will start to freeze around the dry ice. Eventually, the dry ice can completely sublimate into atmospheric carbon dioxide, leaving a hollow egg of water ice.

**Web Resources** (Visit [www.raft.net/raft-idea?isid=11](http://www.raft.net/raft-idea?isid=11) for more resources!)

More classroom activities and information on safe handling procedures can be found at: <http://www.dryiceinfo.com/science.htm>