Match Cloud!

Description:
Students make a cloud in a bottle

Learning Objectives:
Students will learn about cloud formation and precipitation

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MATERIALS

You will need:
• A wide-mouth glass jar, about one gallon (large pickle jars or water jugs work well)
• A rubber or latex cleaning or dishwashing glove
• A book of matches
• A few tablespoons of water
Procedure:
• Pour a bit of water into the jar, so that the bottom is just covered.
• Place the glove so that its fingers are inside the jar, then stretch the open end over the jar’s opening.
• Reach into the glove and pull it in and out several times (keeping it stretched over the mouth of the jar) to show that there is no visible change.
• Remove the glove, drop a lit match into the jar then replace the glove. The match will burn out.
• When you pull the glove out, it will fill the jar with fog. The fog will disperse when you release the glove back into the jar.

Explanation:
The jar is filled with a small amount of invisible water vapor. When the glove is pulled outward, the volume increases and the air inside expands. Expansion uses up some thermal energy and slows down the molecules moving inside the jar, cooling the air. This causes the water vapor to condense. The small amount of smoke from the match gives the vapor tiny particles to condense on, creating visible fog. Pushing the glove back in decreases the volume and increases the temperature, causing the water droplets to evaporate and become invisible again.
Cool It!

Ever wonder why people sweat? It makes us sticky and smelly, but sweat helps us maintain a constant body temperature by cooling us off when we overheat. Sweat does this through **evaporation**.

**Evaporation** is the process of a liquid turning into a gas. The opposite of evaporation is **condensation**, the process of a gas turning into a liquid.

In nature, evaporation and condensation are key parts of the water cycle. Water evaporates into the atmosphere from all of the oceans, rivers, and lakes around the world. The vapor then condenses into clouds and rain and returns to oceans, rivers, and lakes to continue the process.
Evaporation depends on several factors: surface area, temperature, humidity, and wind.

- A greater surface area means there are more water molecules able to escape into the air. A wide, shallow puddle will evaporate faster than the same amount of water in a narrow, deep puddle.
- High temperatures mean molecules have more energy, so evaporation occurs more quickly.
- Humidity is the measure of water already in the air. If the air is already saturated with moisture, there is no room for more to evaporate.
- Wind or moving air keeps the humidity low and allows more evaporation.

Most mammals, including people, use **perspiration**, or sweat, to help keep the right body temperature. This is how we cool down when we are hot or have exercised. If an animal has sweat glands, the skin will produce sweat if the animal’s temperature rises above normal. The sweat evaporates, cooling the animal. It takes energy to change a liquid into a gas. The energy is in the form of heat. During evaporation, the molecules at the surface “bounce away” into the leaving the skin a little cooler. This process is called **evaporative cooling**. Even animals that don’t sweat can use evaporative cooling by getting wet. Animals that don’t sweat can get wet by going into a swamp or a river. Some animals hang their wet tongue out of their mouth to help them cool down.