

Evaporation

Objectives:

- Students will see evaporation, condensation, and precipitation of water
- Students will observe that the water cycle is a closed system

Background Information:

There are many components in the water cycle. These components include runoff, evaporation, transpiration, condensation and precipitation. Each of these components plays an important part of the water cycle.

What is evaporation? Evaporation is changing a liquid (water) to a gas (water vapor). Heat from the sun causes water to evaporate into a water vapor, a gas. The warmer air containing the water vapor rises into the atmosphere, and later condenses.

Why is evaporation important? If water did not evaporate what would happen? Water would accumulate in the streams, and rivers and runoff into the ocean. Water would not cycle back up into the atmosphere and it would not rain.

Have you ever heard that cold air can't "hold" as much water vapor as warm air? What does this mean? Everything is made of moving molecules. As the temperature increases, the molecules move around faster. When the temperature decreases, the molecules move slower. How fast the water molecules move determines the phase that the water is in (solid, liquid, or gas). For water, very fast moving molecules would be in the gas phase or water vapor. What phase would very slow moving water molecules be in? Ice. What phase would medium moving water molecules be in? Liquid water. As temperature increases, the water molecules will move faster and faster. Once they are moving fast enough, they will want to change phases. If the water is in the ice phase, it will begin to melt. If the water molecules are in the liquid phase, they will begin to evaporate and form water vapor.

How can you measure evaporation? One way you can measure evaporation is by getting a big metal pan and filling it with water. Place the pan in an open area where it can get direct sunlight. Measure the depth of the water. As the water warms up, it will begin to evaporate. After a few days, go back out and measure the depth of water again. It should decrease (unless it has rained). The change in depth is the amount that evaporated into the air. Subtract your new depth from your original depth. This is the amount that evaporated. For example: If your original depth was 5 inches, and your depth after a few days is 3 inches, 2 inches of water evaporated. In the US evaporation pans typically have 1.22 m diameter (about 4 feet) and are 30 cm deep (about 12 inches).

The amount of evaporation is different for different places. In west Oklahoma the amount of water that evaporates is higher than east Oklahoma. The amount of water that evaporates is 16 inches for west Oklahoma and is about 30 inches for east Oklahoma. Why do you think the amount of evaporation varies with different places? Many different factors effect evaporation. If an area is very shady, and does not receive as much sunlight, not as much water will evaporate. If an area is very open, and receives more direct sunlight, more water will evaporate. The availability of water is another factor. If the soil is bare, or the area is concrete and puddles of water will stay for long periods of time, then more water has a chance to evaporate. If there are

Materials

1. A clear bowl
2. A small cup
3. Plastic wrap
4. Tape
5. Water
6. A small stone or weight

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Evaporation cont.

many plants that use up the water, then the water will not have much of a chance to evaporate. Other factors such as temperature can also effect evaporation.

Activity:

1. Place an empty cup in the middle of the bowl.
2. Pour water into the bowl until it surrounds the cup but doesn't make the cup float.
3. Cover with plastic wrap, allowing it to sag in the middle.
4. Use tape to seal well.
5. Place a small rock or weight on the plastic wrap about the cup.
6. Set the bowl in the sun and wait.

The sun will evaporate the water into water vapor. The water vapor will rise until it reaches the plastic wrap. The water vapor will then condense into water droplets. The water droplets will collect together above the cup (where the weight is located). When the water droplets get too heavy, they will precipitate (or fall) into the cup.

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