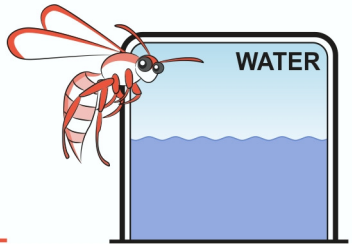


Rate of Evaporation - Teacher notes

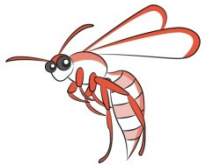
Heat from the Sun provides enough energy to evaporate liquid water from the sea, lakes and wet land surface and turn it into water vapour. Hot air rises carrying vapour upward. The water molecules travel on the wind until they become cooled and condense back into water again forming clouds. Cohesion binds the molecules into raindrops that become heavy enough to fall as rain, sleet or snow.

Between 0 and 4% of the atmosphere is water vapour.
The average period of residence of a water molecule in the atmosphere is 9 days.

Rate of evaporation can be measured by exposing a known volume of water e.g. 50mL for a set time. In cool conditions this activity should be left overnight or longer to be able to easily measure change.

Factors (variables) affecting the rate of evaporation are exposure to:

1. Temperature (higher is faster)
2. Humidity (higher is slower)
3. Wind (higher is faster)
4. Surface area exposed (larger is faster)



Students may relate to the time it takes to dry a wet towel or swimming costume to weather conditions
A towel will dry:

- Faster if the weather is hot
- Slower if the weather is humid
- Faster if there is a wind
- Faster if it is hung up flat rather than left crunched up in a ball or tightly folded

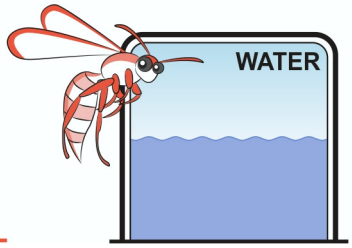
Rate of evaporation activity

Materials required per student or group:

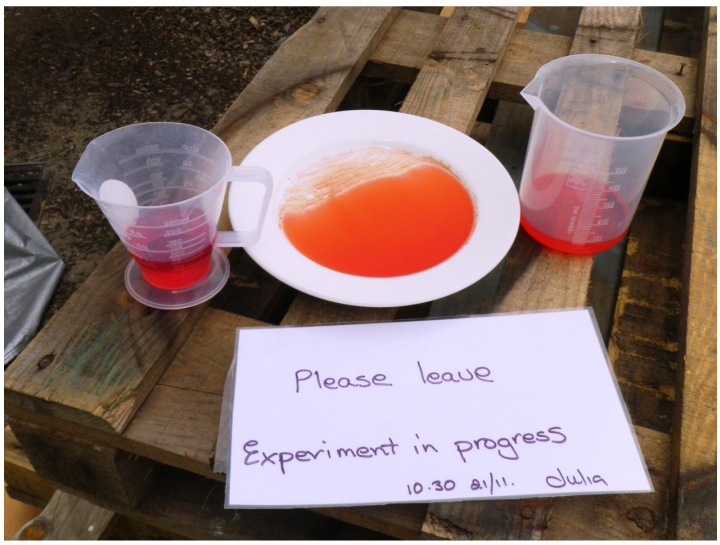
- Water (+ food colouring, optional)
- Measuring cylinder
- Beaker, bowl, cup saucer and plate or other, container for holding water
- Area of flat paving, concrete, asphalt or a hot window sill
- Timer

$$\frac{\text{Original volume of water} - \text{final volume of water}}{\text{Time in minutes}} = \text{rate of evaporation in mL per minute}$$

Using the measuring cylinder, pour the same volume of water into different containers. Expose the containers for a known time. Enter your results in the table provided. Calculate the rate of evaporation using the equation above.
Which variables do we have to keep the same to make this a ***"Fair Test"?*** Same volume of water, same time, same position/location, same exposure to wind, sunlight and sprinklers.
What variable did we change? The container (more specifically the surface area of water in each container)



Rate of Evaporation - Teacher notes



RESULTS **Perth 33°C** **19/11/2012 Exposure over 3 hours**

Container	Original volume of water (mL)	Final volume of water (mL)	Volume evaporated	Time	Rate of evaporation ( )
500mL beaker	100mL	80mL	20mL	3h 180m	6.6mL/h 0.11mL/m
250mL measuring jug	100mL	76mL	24mL	3h	8mL/h
Dinner plate	100mL	25mL	75mL	3h	25mL/h

What variable or factor caused the difference in rates of evaporation? Surface area of water exposed to permit evaporation

Two students needed to dry their towel before packing them to take them home. One laid theirs out flat on the grass. The other student folded theirs neatly into four and laid that on the grass. Which towel would dry first? The towel laid flat on the grass. Explain your answer. The higher the surface area exposed the faster water evaporates.

When reticulation systems sprinkle water onto plants and soil on a hot day, the high surface area per unit volume, due to tiny beads of water, results in a lot of water being lost by evaporation before it penetrates the soil. Drip and seep systems are more efficient. In Western Australia more water returns to the atmosphere through evaporation than penetrates the soil.
Water in our atmosphere is an important part in maintaining the “Greenhouse Effect”. Without clouds, heat radiated from the sun would reflect back into space and Earth would be much cooler. Life would not be as plentiful as it is today. Unfortunately other gases such as methane, carbon dioxide and sulphur dioxide are intensifying this heating effect.