



## Station 1 – Make it rain

Students are challenged to reflect on the basic processes of the water cycle i.e. evaporation & condensation as they make a cloud and attempt to harvest precipitation. They use a fog machine, a variety of containers and cold surfaces e.g. mirrors & ice.



### Key concepts

Precipitation is water released from clouds in the form of rain, snow or hail. Most precipitation falls as rain. The clouds contain water vapour and cloud droplets, which are small drops of condensed water. These droplets are way too small to fall as precipitation, but they are large enough to form visible clouds. Most of the condensed water in clouds does not fall as precipitation because their fall speed is not large enough to overcome updrafts which support the clouds. For precipitation to happen, first tiny water droplets must condense on even tinier dust, salt or smoke particles, which act as a nucleus. Water droplets may grow as a result of additional condensation of water vapour when the particles collide. If enough collisions occur to produce a droplet with a fall velocity which exceeds the cloud updraft speed, then it will fall out of the cloud as precipitation. Millions of cloud droplets are required to produce a single raindrop. <http://water.usgs.gov>

Evaporation occurs when molecules in a liquid gain enough energy that they overcome attractions from other molecules and break away to become a gas. Adding energy increases the rate of evaporation. Evaporation is a type of vapourisation of a liquid that occurs only on the surface of a liquid. The other type of vapourisation is boiling which occurs on the entire mass of the liquid.

To evaporate the thermal motion of water molecule must be sufficient to overcome the surface tension. Since only a small proportion of the molecules are located near the surface and are moving in the proper direction to escape at any given instant, the rate of evaporation is limited. Also as the faster-moving molecules escape, the remaining molecules have lower average kinetic energy and the temperature of the liquid decreases. This phenomenon is also called evaporative cooling and this is the reason that evaporating sweat cools the human body. Reference: [www.sciencedaily.com](http://www.sciencedaily.com)

Condensation is the process by which water vapour in the air is changed into liquid water. Condensation is crucial to the water cycle because it is responsible for the formation of clouds. Condensation is the opposite of evaporation. Even though clouds are absent in a crystal clear blue sky, water is still present in the form of water vapour and droplets which are too small to be seen. Depending on weather conditions, water molecules will combine with tiny particles of dust, salt and smoke in the air to form cloud droplets, which grow and develop into clouds, a form of water we can see. Cloud droplets can vary greatly in size, from 10 microns (millionths of a meter) to 1 millimetre and even as large as 5 mm. This process occurs higher in the sky where the air is cooler and more condensation occurs relative to evaporation. As water droplets combine with each other and grow in size, clouds not only develop, but precipitation may also occur. <http://water.usgs.gov>



### Images

<http://www.kidsgeo.com> drip

<http://www.intellicast.com> rain

<http://en.wikipedia.org> bottle

<http://hqdesktop.net> web dew

<http://www.smithsonianmag.com> rain

<http://www.newscientist.com> raindrop shape

## Water literacy list

**Condensation:** The process by which water vapour in the air is changed into liquid water.

**Energy:** In physical science, energy means the ability to do work. Work means a change in position, speed, state, or form of matter. Therefore energy is the capacity to change matter. Energy can produce motion, heat or light.

<http://www.energyeducation.tx.gov>

**Evaporation:** Occurs when molecules in a liquid gain enough energy that they overcome attractions from other molecules and break away to become a gas.

**Precipitation:** Water in its liquid or solid form falling from the base of a cloud. <http://water.usgs.gov>

**Water vapour:** Water in a gaseous state that we cannot see.

**Water cycle:** There is no new water. The water in our world moves through time and space in a never ending water cycle. Processes in the cycle include: evaporation, condensation, precipitation, runoff, infiltration and transpiration.

## Teacher reference

*A beginner's guide to the chemistry of water. Teaching Australian Curriculum: Science Chemical Science for primary and middle years.* Mary Rolland Aqius Education, 2013. [Link to pdf](#)

## Link to our local water supply and sustainable water use

Rous Water recognises the challenges ahead relating to climate change on a local/regional, national, international and global level. The projected effects of climate change are greater uncertainty and variability of weather conditions. Our water sources are dams and rivers; these are both highly depended on rainfall. Rous Water is considering how climate change will affect our region and water supply operations and what it is doing to address climate change issues. To find out more visit the Rous Water, How is Rous Water addressing Climate Change section on the website. [http://www.rouswater.nsw.gov.au/cp\\_themes/default/page.asp?p=DOC-HOH-70-03-38](http://www.rouswater.nsw.gov.au/cp_themes/default/page.asp?p=DOC-HOH-70-03-38)

## Kids section

1. *Water cycle Boogie*

<http://www.youtube.com/watch?v=nWgpwldu8QU>

2. Animated video with a Student narrator explains evaporation, condensation & precipitation.

<https://www.youtube.com/watch?v=U80LVjVX75k&feature=youtu.be>

3. Primary aged US child doing experiment demonstrating how to make a water cycle in a bowl, (gladwrap, ice, hot water)

[https://www.youtube.com/watch?v=2rwFK5\\_Viqo](https://www.youtube.com/watch?v=2rwFK5_Viqo)

**Science scenarios** - Research and design an experiment that will show each statement to be correct:

- Some home air conditioners work by using evaporation.
- There is water all around us, we just can't see it.
- There is water in our bodies.
- The reverse process of evaporation is condensation.

## Experiment

*Make a rain gauge*

What you need: A plastic bottle, some stones, tape, marker pen and a ruler.

What you do:

1. Cut the top off the bottle.
2. Place some stones in the bottom of the bottle. Turn the top upside down and tape it to the bottle.
3. Use a ruler and marker pen to make a scale on the bottle.
4. Pour water into the bottle until it reaches the bottom strip on the scale.
5. Put your rain gauge outside where it can collect water when it starts raining. After a rain shower has finished, check to see how far up the scale the water has risen.

<http://www.sciencekids.co.nz>

*PREDICT, OBSERVE & EXPLAIN.*