

Years 6 and 7 science

Solar still activity

Australian Curriculum links: Year 6 – Changes to materials can be reversible or irreversible (ACSSU095)

Year 7 – Some of Earth's resources are renewable, including water that cycles through the environment, but others are non-renewable (ACSSU116)

In this activity², students create a solar still and use a predict-observe-explain strategy to investigate how coloured salty water transforms into clear unsalted water.

Different versions of a solar still can be used to desalinate seawater, in desert survival kits and for home water purification. There is a modern desalination plant in Tugun at the Gold Coast. This plant uses membrane technology to purify seawater and is much more energy-efficient than thermal desalination plants that use evaporation and condensation to purify water. It even recovers energy during the water purification process.

This activity is very useful for exploring changes of state (evaporation and condensation) and water cycles.

Equipment

For the class

- large plastic jug with hot water
- food dye
- salt
- tablespoon
- Optional: a salinity or electrical conductivity (EC) meter or datalogger probe

For each group

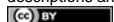
- one 2-litre plastic ice cream container
- small, shallow plastic cup or shot cup (clean)
- Blu-Tack (or similar)
- cling film (a piece wider than the bowl)
- large rubber band
- pebble
- salt
- Optional: disposable drinking straws

For each student

- a copy of **Solar still Predict-Observe-Explain** student worksheet (Resource 2)

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² Adapted from a resource developed by Dr Tony Wright (School of Education, University of Queensland). Used with permission.



Preparation

You will need a sunny day to do this activity! Find a safe place where the solar stills can sit undisturbed in the sun for at least half an hour (the longer the better).

This activity could be run as a group task or class demonstration.

Complete an appropriate risk assessment for this task. The main hazard in this activity is that the water in the small cup in the solar still could be contaminated with pathogens. To minimise this risk, make sure that the small cups are either disposable or very clean. The students should be careful not to touch the inside of the small cup. Students can taste the water in the small cup using a disposable straw. Alternatively, students could test the water with a salinity or electrical conductivity (EC) meter or datalogger probe.

Activity steps

1. Mix a plastic jug of hot water with the food colouring and a couple of tablespoons of salt in front of the class. Make enough solution to fill each ice cream container to a depth of about 1 cm.
2. Divide the class into groups of three. Demonstrate how to make a solar still using the instructions (Resource 1).
3. Ask students to predict what will happen to the solar still if it sits in the sun for a while. What do you think will happen? What will you get in the small cup in the middle of the solar still? Students record their ideas in the 'predict' section of their 'Solar still predict-observe-explain' worksheet (Resource 2).
4. Take the students (with hats) and equipment out to a sunny, level place. Warn the students that they will need to be very careful not to contaminate the inside of the small plastic cup with salty water.
5. Students build their solar stills and leave them in the sun for the prescribed time (Steps 1–6).
6. After the prescribed time, students make their observations and complete steps 8–10, the 'observe' and 'explain' sections of the 'Solar still predict-observe-explain' worksheet (Resource 2).
7. Discuss the results with the class and highlight the key ideas that you want the class to understand.

Resource 1 Solar still group instructions

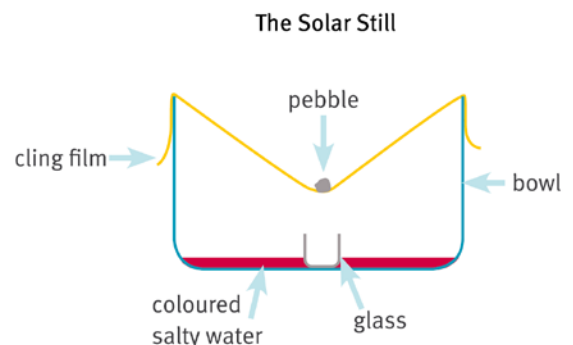
The solar still is a type of desalination device that uses solar energy to remove salt and other contaminants from water. Similar devices can be used to desalinate seawater, to survive in the desert or for home water purification. However, these days most desalination devices and plants use membrane technology that is much more energy-efficient than using heat.

It is very easy to splash salty water into the small cup in the middle of the solar still so be very careful!

Equipment

For each group

- one 2-litre plastic ice cream container
- small, shallow plastic cup or shot cup (clean)
- Blu-Tack (or similar)
- cling film (a piece wider than the bowl)
- large rubber band
- pebble
- Optional: disposable drinking straws



Activity steps

1. Collect the equipment your group needs for this activity.
2. Place a small piece of Blu-Tack on the bottom of the small cup so that it will stick to the bottom of the ice cream container.
3. Ask your teacher to pour 1 cm of the coloured salty water into your ice cream container.
4. Carefully place the plastic cup in the middle of the ice cream container, making sure no salty water splashes into the small plastic cup.
5. Cover loosely with cling film so that it sags slightly in the middle. Seal the film to the rim of the ice cream container with a large rubber band.
6. Place the pebble in the middle of the film above the cup.
7. Leave the still for at least half an hour (the longer the better).
8. Remove the cling film and take out the cup without splashing any water into or out of the cup.
9. Record your observations about the water in the plastic cup on the Solar still Predict-Observe-Explain worksheet. Is it coloured? Does the salinity meter indicate that it is salty water? What does it taste like? Students could taste the water using a straw.
10. Complete the worksheet by explaining why you think you got those results.

Resource 2 Solar still predict-observe-explain activity

Student worksheet

» Predict

I think that _____

because _____

» Observe

Our group found that _____

» Explain

I think that _____

Use the following words
in your explanation:

- evaporate
- liquid
- vapour
- condense
- molecules.