

Making a solar still

» Lesson overview

In the previous lesson, students worked through a learning object about water treatment. At the end of the learning object, students were challenged to design a solar still to provide water while they are shipwrecked on a desert island. In this lesson, students build and modify a solar still.

» Lesson objectives

In this lesson, students:

- explore how drinking water can be extracted using simple technology—distillation
- explain how salt water can be purified for drinking purposes.

With 97% of the earth's water being salt water, this is an obvious potential source of drinking water supply. Desalination is the process of removing dissolved salts and other minerals from a water source, thereby making it suitable for drinking.

» Opportunities for assessment

Students may be assessed for group participation—for example:

- cooperated with fellow members
- contributed positively to group and pair activities
- listened respectfully to the ideas of others
- worked without distracting others.

Student journal entries can also be assessed for elements such as observations recorded and the quality of labelled diagrams.

» Equipment

For each team

- one copy of the work sheet 'Making a solar still' (Resource 5)
- one plate of glass (washed carefully)
- sea water or salty water
- one cardboard box (the size depends on the size of the glass plate)
- scissors
- glue
- black paint (matte and waterproof is better)
- container to catch the salt-free water (washed carefully)

» Lesson steps

1. Review the solar still design ideas that students developed in the previous lesson. Discuss the fact that there are a variety of ways for water to be purified for drinking purposes, even when materials are limited. A sun-powered 'seawater desalinator' offers one solution for harvesting fresh water from sea water.

2. The students, in teams of three or four, construct a solar still following the instructions on the work sheet.

Safety: Make sure that the sheets of glass have no sharp edges. A slit piece of hose, cut to fit the sides of the sheet, can be placed along the glass edges. Students are asked to taste the water that condenses on the glass and collects in the container, so the glass and the container will need to be washed carefully.

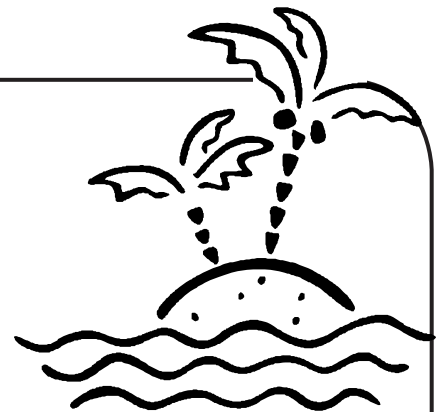
3. This activity allows students to undertake an experiment and to employ elements of design and technology in designing a modification to the original piece of equipment.
4. During or at the end of the activity, ask students to share their ideas about how their 'desalinator' works. Ask students to explain each step of the process in their own words. (The sun heats up the salty water. The water evaporates to form water vapour, leaving the salt behind. When the water vapour hits the colder glass, it condenses, forming droplets of water that move down the glass and into the container.)
5. Ask students to think about why the inside of the box was painted a matte black colour.
6. Students record their ideas in their journal.
7. Revisit the class TWLH chart and add the new ideas that the students learned. Also record any new questions such as what difference the colour of the box would make to the amount of fresh water produced by the still.

Resource 5

❖ Making a solar still

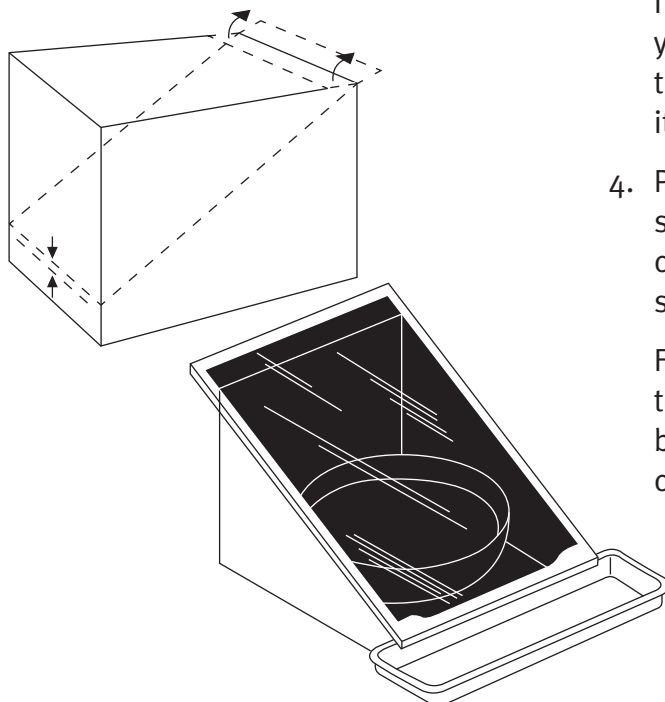
You have been shipwrecked on a desert island!

You and other survivors have searched and discovered that there appears to be no fresh water within walking distance! Luckily for you, a few bits and pieces have washed ashore. Let's see if you can use these materials to make your own 'water desalinator'.



❖ Equipment

- › one plate of glass (carefully washed)
- › sea water or salty water
- › one cardboard box (the size depends on the size of the glass plate)
- › scissors
- › glue
- › black paint (matte and waterproof is better)
- › paint brush
- › container to catch the de-salted water (carefully washed)



❖ Procedure

1. Cut the cardboard box diagonally with the scissors. Leave a flap of cardboard at the top and fold it over so that you can glue the plate of glass to it later.
2. Paint the box black inside and out. If you're using waterproof paint, it would be useful to also paint the container that will sit inside the box.
3. Glue the plate of glass to the top flap and your apparatus is finished!! As a team, predict what you think will happen when you put the apparatus out in the sun; write it below.
4. Put your desalinator out in the full sun with salty water in the inner container. Complete this work sheet.

Food colouring can also be added to the water. The distilled water will be clear. What happened to the colour?

Resource 5 (continued)

a) I predict that:

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b) I observed that:

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c) Is the captured water good enough to drink? Describe the water's taste.

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d) How do you think the water quality could be improved?

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e) Could your desalinator design be improved or modified? Discuss this with your team members and draw your new design below. Remember, new materials have to be easily accessible!!

f) Construct your new desalinator and try the experiment again. What did your group observe? Was your new design successful?

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