



Solar Stills

Water is one of the most important elements to human survival on earth, but much of it on our planet is not safe to drink. There are 326 quintillion gallons of water on Earth. However, only about 2.5 percent of this water is fresh and safe to drink. The rest is salt water.

What makes salt water so dangerous for us to drink? Our kidneys maintain a healthy sodium level by both expelling excess salt through our urine and also by retaining water to dilute salt levels in our bodies. Our cells also retain and release water through their walls to even out the salt to water ration in our bloodstreams. For these processes to work well, though, we must be well hydrated! Water is so important for transporting salt around and out of our systems. When we ingest too much salt with not enough water to dilute it, it's possible for our cells to get dangerously dehydrated. So while salt water is technically water, it's also far saltier than it is hydrating.

For coastal areas where there is a scarcity of safe drinking water, the ability to remove salt from sea water can be very important. Constructing a solar still is a simple way to remove salt from water on your own.

What You'll Need:

- 2 disposable salad bowls
- 2 5oz cups
- 2 plastic bowl covers
- 8 salinity test strips
- 2 glue dots
- Test strip color chart
- Salt

What To Do:

You're going to make two stills—one with regular tap water as a control, and one with salt water to see how well distilling works as a desalination method.

- First, use glue dots to attach the bottoms of the small cups to the inside of the bowls, as close to the center as you possibly can. These will be the collection cups for our distilled water samples.
- Fill a container with 300 milliliters of really hot tap water.
- Now, you're going to measure the salinity of your tap water to compare it to the salt water and—later—to compare it to the distilled water the experiment produces. The test strips in your kit measure the amount of sodium chloride (or salt) is in your water.
- Dip the colored end of the strip into the water for one second and once it's dry, compare the color it turns to the chart indicating different amounts of chloride in parts per million. For each reading, complete two test strips. This is important because determining the repeatability of a reading will help ensure the accuracy of your measurements.
- Be sure to write down the chloride content of your beginning tap water so you can compare it throughout this process!
- After you've tested it, pour half of your very hot water into the first still. Cover the collection cup while you pour to make sure you don't get any water in it, **but be sure to remove the cover after!**
- Fit the plastic cover over your bowl and place the marble in the center of the plastic. You'll want to make sure it creates a noticeable funnel shape in the plastic over the cup, so poke it down a little if need be. Label this bowl **CONTROL**.
- Now you're going to repeat the process for the second still, but you're going to add a teaspoon of salt to the rest of your very hot tap water. Test is for chloride twice just as you did before adding the sale, and record your measurements. Make note of how different this reading is from your control reading.
- Cover your salt water still and add the marble just like before. Label this bowl **SALTWATER**
- Set your stills in a sunny window or under a light bulb that gives off some heat, and check on them throughout the next few days. When you have enough water in the cups to test, use another chloride strip to measure how well the solar still desalinated your water.

How different are the readings between your original salt water and the water collected after desalination?

Is there a difference between the original plain tap water and how it turned out after the same process?

What's Happening Here?

The heat from the sun or lamp coming through the clear plastic will heat the air inside the bowl. Think of how greenhouses are made of transparent material to trap heat and keep plants warm. The warmed air inside the bowl will cause the water to evaporate, leaving the salt behind. Because it can't escape the solar still, though, it will condensate on the plastic, run down to the lowest point created by the marble, and then drip off into the cup.

