



# Solar Water Purifier

Can you use the power of the Sun to purify water?! Explore how to harness solar energy to turn undrinkable, salty water into clean and clear water!

## TEKS:

SCI K.7 B: The student is expected to observe and describe physical properties of natural sources of water, including color and clarity.

SCI 3.8 B: The student is expected to describe and illustrate the Sun as a star composed of gases that provides light and thermal energy.

SCI 4.8 B: The student is expected to describe and illustrate the continuous movement of water above and on the surface of Earth through the water cycle and explain the role of the Sun as a major source of energy in this process.

SCI 7.9 A: The student is expected to analyze the characteristics of objects in our Solar System that allow life to exist such as the proximity of the Sun, presence of water, and composition of the atmosphere.

SCI 8.8 B: The student is expected to recognize that the Sun is a medium-sized star located in a spiral arm of the Milky Way galaxy and that the Sun is many thousands of times closer to Earth than any other star.

## Materials:

- Coins or a small rock
- Food coloring
- Large bowl
- Plastic wrap
- Salt (~ ½ cup)
- Small, heavy cup (shorter than the large bowl)
- Spoon
- Sunshine
- Water

## How To:

1. Fill the large bowl about halfway with water.

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2. Stir in half a cup of salt until it is dissolved. If you want, give the water a tiny taste (only a small drop). It should taste super salty.
3. Next, add 5-10 drops of food coloring to the water and stir to combine. Your “contaminated water” is ready to go!
4. Place the small, heavy cup in the middle of your big bowl. Make sure that no contaminated water gets in!
5. Cover the entire bowl with plastic wrap (try to use just one piece) and make sure the edges are sealed as tightly as possible.
6. Place a coin or small rock on top of the plastic wrap, directly above the small cup.



7. Now, set this bowl in a very sunny location and observe what happens over the next few hours (or even days). Read the STEM Connection below for a sneak peek about what you might discover!

### **STEM Explanation:**

Here's a quick trivia question for you: How many stars are in our Solar System? You may say thousands, or even millions. However, the answer is actually just one. There are billions of stars in the Milky Way galaxy, but only one star—the Sun—calls Earth's Solar System home.

Our Sun is 93 million miles away, 5 billion years old, and so large that it takes up 99% of the matter in our Solar System! The Sun is powerful. In fact, without the Sun, we would not exist. It is the source of energy for all life on Earth. The core of the Sun is 27 million degrees Fahrenheit! In the core, the Sun converts hydrogen to helium, which releases a giant amount of energy that powers the Sun. The Sun's gravitational pull holds all of the Solar System's planets in orbit, and it radiates light and solar energy which makes it possible for life to exist on Earth. Plants need sunlight to grow. Animals, including humans, need plants for food and the oxygen that plants produce. Without heat from the Sun, Earth would freeze, and there would be no wind, ocean currents, or clouds to transport water. Solar power can be used to harness the Sun's energy to do everything from heating water to powering sports stadiums!

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This lesson harnessed the power of the Sun to purify water. Rays of sunlight traveled through the plastic wrap of the solar water purifier into the colorful, salty water. Energy from this sunlight caused the contaminated water to heat up and evaporate, or, turn from a liquid into a gas. Here's the catch: water is much lighter than salt or food coloring, so only pure, clear water evaporated, leaving the heavier salt and food coloring behind. Then, this evaporated water could not completely escape from the solar water purifier because of the plastic wrap! This caused the evaporated water to collect into little droplets on the cooler plastic wrap, a process called condensation. Once the condensed water droplets got heavy enough, gravity pulled them down the slope of the plastic wrap, and they dripped into the smaller cup. This same process is what causes evaporation, condensation, and precipitation on our planet through the water cycle!

### **Career Connection:**

*Solar energy engineers* study and design systems to maximize the energy potential of our Sun. They suggest ways to improve the heating, ventilating, and air conditioning systems in solar energy buildings, and attempt to reduce greenhouse gas emissions of solar energy production.

### **Resources:**

<https://theresjustonemommy.com/simple-summer-science-solar-still/>

<https://kitchenpantryscientist.com/solar-water-purification/>

<https://nineplanets.org/kids/sun/>

<https://www.clearwaycommunitysolar.com/blog/science-center-home-experiments-for-kids/science-center-creating-clean-water/>

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