

WATER DESALINATION

MIDDLE SCHOOL LEVEL 1

Salt water makes up the majority of water on the planet. Imagine if there were a way to convert that salt water to drinkable water. Well, there is! Salt water is often desalinated to produce water for human consumption and irrigation. In this project, students will explore the properties of salt water while learning how to remove the salt, leaving drinkable water behind.

EDUCATIONAL STANDARDS:

NGSS CONNECTION:

MS-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

COMMON CORE CONNECTION: ELA/Literacy

RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

Mathematics

MP.2 Reason abstractly and quantitatively.

6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems.

6.SP.B.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots.

6.SP.B.5 Summarize numerical data sets in relation to their context.

6.NS.C.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0.

DOK:

Level 2: Concept

Level 3: Strategic Thinking

MATERIALS NEEDED:

- Bowl
- Large pot
- Salt
- Spoon
- Water
- Coffee mug
- Tin foil
- Ice
- Stove



DIRECTIONS:

1. Fill a bowl with warm water and stir in salt until the salt starts to settle on the bottom of the bowl and will no longer dissolve.
2. Pour the salt water into the pot.



3. Put the coffee mug in the the middle of the saltwater pot, being sure the salt water doesn't pour inside.
4. Cover the top of the pot with tinfoil. Leave enough slack in the foil for ice cubes to rest on it without sliding off.
5. Place two ice cubes in the center lowered point of the tinfoil.
6. Turn on the stove and bring the salt water to a boil. Once it has reached a boil, set the heat to low.
7. Let the water simmer for roughly ten minutes, until the ice cubes have melted.
8. Turn off the stove and let it sit untouched for 25 minutes.
9. Remove the tinfoil. Be careful not to spill the water from the melted ice.

Inside the pot, you will notice that the coffee mug now has water in it, and there is much less water in the saltwater area. Ask your students to dip a finger in their water from the mug and taste, then do the same with the salt water. The water in the mug has been desalinated through the process of evaporation. The clean water condenses on the tinfoil and rains back down into the mug.

OBJECTIVE:

Students will be able to construct scientific explanations of photosynthesis and its role in cycling matter and energy.

ESSENTIAL QUESTIONS:

- How might plants cycle energy and matter?
- What role do plants play in converting energy?
- What is photosynthesis and how does it work?

ENGAGE / EXPLORE

1. Students conduct the experiment by mixing salt in water
2. Conclude whether or not a new substance is formed or if it is a physical change
 - a. Reason from observations
3. Conduct the reverse process, re-salinating the water.
 - a. Is the process reversible?
 - b. Is it a chemical or physical change?
4. Evaluate
 - a. Students experimental process
 - b. Interpretation of data
 - c. Reasoning from evidence

EXPLAIN:

1. Since the activity above is a physical change
 - a. Students should produce a model (NGSS use of "model") of the molecular components to explain what happens when mixing salt and water and/or desalination
2. Students use the PhET simulation
 - a. <https://phet.colorado.edu/en/simulation/legacy/soluble-salts>

ELABORATE:

1. Students revise their model based on the PhET simulation
2. Evaluate
 - a. Interpretation of data
 - b. Model of explanation of salt and water