"My Mini Desalination Plant"

Objective: Students will build a mini desalination plant powered by the sun while investigating the water cycle

Grade Level
1-5

Time Frame
Approximately 45 minutes to prepare
Observations should take place throughout the day

Learning Objectives	Vocabulary	Science TEKS	Materials
Students will: • Investigate the water cycle • Students will investigate the process of desalination using energy from the sun	• *Desalination* • *Evaporation* • *Condensation* • *Precipitation* • *Brackish*	1.5(A), 1.6(A), 1.7(B), 2.5(B),2.7(B),2.8(C), 3.5(B),(C) 4.5(A),(B),4.8(B), 5.5(A),5.8(B) Scientific investigation and reasoning TEKS	• Flat bottomed plastic dish 15-20 cm deep • Drinking glass • Saucer • Two cups of water with dissolved salt • Sheet of clean, transparent plastic • Masking tape • Small weight (ex. a small stone)

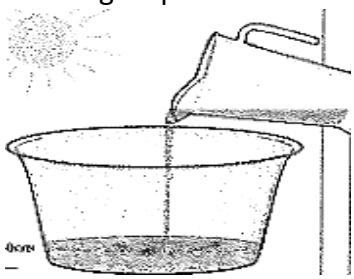
Background
Water resources are being used faster than they can be recharged leading to several water issues. One of these issues is the intrusion of *brackish* water into fresh water systems. Another issue is the reduction of available fresh water sources. A solution to both of these issues is water *desalination.*

Engage
Ask students what they think the word *desalination* means. Ask students why they think having the ability to remove salt from water can be life -saving and important for future drinking water sources.
Have students explain the steps of the water cycle and ask them if they think they can create a project that shows the water cycle with the materials available (show them the material for the activity). Ask students to explain how the water cycle can be used to desalinate water. Explain to student that they will be constructing a mini desalination plant powered by the sun using the materials provided.

Explore

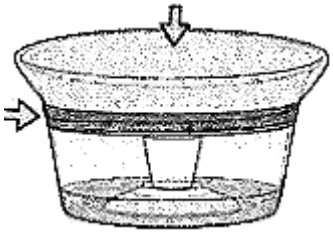
Students will construct their mini solar desalination plant using the following steps:

1. Pour the salt water into the plastic dish and place the plastic dish on a flat surface outside under direct sunlight or a heat lamp.

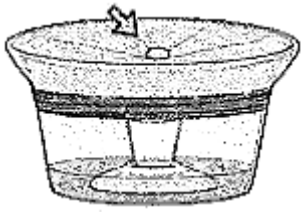


2. Place the saucer upside down in the middle of the salty water and then stand the glass on the saucer.

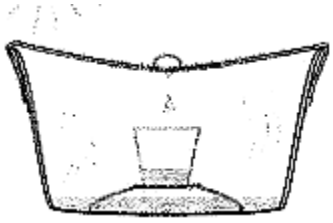
3. Cover the dish with the plastic wrap and tape the plastic wrap around the edge. Do not stretch the plastic wrap too tightly.



4. Place the small weight in the middle of the plastic so that it weighs the plastic down towards the glass.



5. Check on the dish about once every half hour to one hour. Record your observations in your lab notebook.



6. When you can see a good amount of water in the glass, remove the plastic and take out the glass. Wipe the outside of the glass dry. Taste the water. The water should not have a salty taste.

Explain

The plastic covering helps trap the heat from the sun warming the salt water. The water begins to evaporate due to the trapped heat leaving the salt behind. When the water vapor rises and

contacts the plastic covering it begins to *condense.* The condensed vapor gathers and forms liquid droplets. The weight in the middle of the plastic causes these droplets to run down towards the center and drip into the glass mimicking *precipitation.* Clean drinking water is produced from dirty water/ salt water using this concept.

Elaborate (consider drawing the water cycle on the board for the students to visualize this part easier)
This process of water desalination is an example of the water cycle in action. The sun acts as a heat source to cause the water to undergo a phase change. As water changes phases from a liquid to a gas (water vapor) through evaporation it leaves any contaminants, such as salt, behind. The water molecules in the atmosphere are now contaminant free. These molecules will condense forming clouds. These clouds will continue to gather water molecules until they become too heavy and release the water in some form of precipitation (rain, snow, sleet, hail, etc.). You should be able to see salt remnants in the dish where the salt water evaporated away.

Evaluate
Have students develop a story where this technology could come in handy. For example, how would this be helpful if they were stranded on a deserted island? What materials could they find on the island that could be used to build a mini desalination plant?

Vocabulary

- Brackish: Containing a mixture of seawater and fresh water. Brackish water is somewhat salty.
- Desalination: The removal of salt or other chemicals from something, such as seawater or soil.
- Precipitation: rain, snow, sleet, dew, etc., formed by condensation of water vapor in the atmosphere
- Condensation: the process by which atmospheric water vapor liquefies to form fog, clouds, or the like, or solidifies to form snow or hail.
- Evaporation: to change from a liquid or solid state into vapor; pass off in vapor