Desalination

Student Worksheet

Name_____

Overview Prepare to step into history and become like Lewis and Clark, who looked at a huge expanse of ocean and discovered how they could get their precious salt.

What to Learn After today's experiment, you should know how to separate water from salt, and why sodium and chlorine are elements to respect but not be fooled with.

Materials

- Goggles
- Gloves
- Jar or glass
- 90˚ glass tube
- Chemistry stand
- Rubber tubing
- Test tube clamp
- Erlenmeyer flask
- One-hole rubber stopper
- Wire screen
- Alcohol burner
- Lighter
- Test tube
- Water
- Saltwater
- Heating rod

Lab Time

1. Place a mesh wire screen on top of a stand. Put salt water in an Erlenmeyer flask and place it on the wire screen. Place an alcohol burner underneath the wire screen. The Erlenmeyer flask should not move, so use a clamp to attach it to an upright stand.
2. Place a one-hole rubber stopper in the Erlenmeyer flask, and insert hollow tubing into the hole. Attach flexible tubing to the hollow tubing, and 90° glass tubing to the flexible tubing.
3. Slide the end of the 90° glass tubing into a test tube, and place the test tube into a jar of cool water.
4. Light the alcohol burner, and allow the salt water to boil and turn to steam. Observe as the steam turns to a small amount of water in the bottom of the test tube.
5. When finished, put out the flame and lift the 90° glass tubing out of the test tube. There is a difference in pressure between the heated glassware and the water bath. That difference in pressure will cause the water to enter the tubing and cool water will flow into the hot glassware and could cause catastrophic damage to the glassware.
6. Allow the apparatus to cool for 5-10 minutes.

7. Once cool, place a heating rod in the test tube, and use the alcohol burner to boil the water in the test tube. Look for signs of salt, such as crystals. Only burn until the water evaporates, then extinguish the flame. The black coating on the outside of the test tube is soot from the flame, and may be wiped off with a paper towel once the test tube is cool.
8. To compare, put salt water in the test tube and follow the same procedure.
9. **Never…Never!….drink the results of an experiment.** Yeah, I know that plain old water is supposed to be in the test tube, but follow the experiment's safety guidelines. You've had other stuff in that test tube, too.

Cleanup: Clean everything thoroughly after you are finished with the lab. After cleaning with soap and water, rinse thoroughly. Chemists use the rule of "three" in cleaning glassware and tools. After washing, chemists rinse out all visible soap and then rinse three times more.

Storage: Place cleaned tools and glassware in their respective storage places.

Disposal: Liquids can be washed down the drain

Desalination Data Table

Item/Object	Observations When Boiled (Were there any signs of salt?)
Water collected in test tube	
Sample of salt water placed in test tube	

Exercises Answer the questions below:

1. Did this experiment involve a physical change or a chemical change? Explain.

2. Oh, no! The counter is dirty and you have been asked to clean it. Should you use bleach? Why or why not?

3. Why was it necessary to make the water vapor travel through the plastic tubing?

4. Explain what happened when the water vapor traveled into the test tube sitting in a container of cool water.

Exercises

1. Did this experiment involve a physical change or a chemical change? Explain. (A physical change. The water was boiled and then condensed, but it was still plain water. It just changed state and was separated from the salt, not altered into something different.)
2. Oh, no! The counter is dirty and you have been asked to clean it. Should you use bleach? Why or why not? (No, because bleach is made of chlorine, which is a very strong chemical. Let the adults use the bleach if necessary, and kids can stick to good old fashioned soapy water.)
3. Why was it necessary to make the water vapor travel through the plastic tubing? (If not, it would have simply escaped into the air.)
4. Explain what happened when the water vapor traveled into the test tube sitting in a container of cool water. (The cool water caused the water vapor to cool down and condense back into liquid water.)

Closure Before moving on, ask your students if they have any recommendations or unanswered questions that they can work out on their own. Brainstorming extension ideas is a great way to add more science studies to your class time.