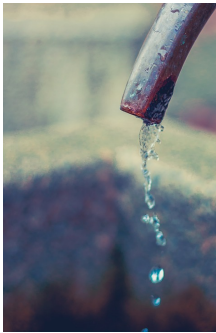


Desalination for Drinking Water



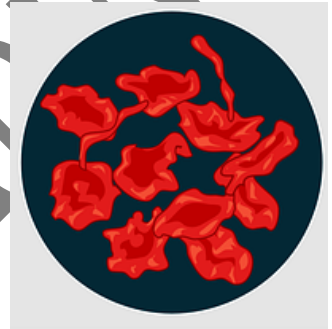
Fresh water is a precious resource to which many people don't have easy access.

Global Water Crisis

Worldwide, people in many countries suffer from water scarcity. Even though our planet is 70% water, most of that (97%) is locked in the salty ocean. Humans cannot safely drink seawater.

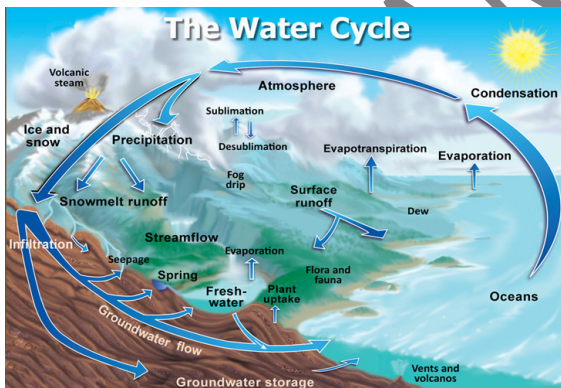
We have a set concentration of salt in our blood: 9 parts per thousand (ppt). This means that for every 1000 grams of water in our blood, there are 9 grams of salt. Our bodies work to keep that balance. Sea water has a salt concentration of 35 ppt. When we drink saltwater, the salt stays outside our cells. This is because we have a semi-permeable cell membrane that doesn't let salt pass through freely.

Water, however, can pass through freely. In order to maintain the salt balance within and outside the cells, water flows out of cells in a process called **osmosis**. To save our cells from shriveling up and drying out, our bodies try to get rid of the salt. However, to do this, we have to lose water. Our kidneys, which are responsible for expelling waste in the form of urine, need water to produce that urine. They produce a liquid that is less salty than sea water, so more water is required to expel the salt than we actually drank. This leads to dehydration, organ failure, and eventual death.



When water leaves our cells, they become shriveled.

Because of this danger, we must take salt out of salt water to make it safe to drink. The process of salt removal is called **desalination**.



The Sun causes desalination as part of the water cycle.

Salt Water

Salt water is a substance known in chemistry as a **mixture**. A mixture is a combination of particles that are not chemically bonded. This is in contrast to a **pure substance**, which is either a pure element or a combination of chemically bonded particles. Pure water, H_2O , is a pure substance. The salts dissolved in ocean water (as well as other molecules) make it a mixture. Mixtures can be separated into their components more easily than can pure substances. In

fact, salt water is separated into its components constantly within our atmosphere as part of the water cycle. The Sun heats up the oceans, causing water to evaporate and leave the salt behind. This water rises high into the atmosphere, where it cools, condenses into clouds, and falls back to the Earth as rain. One of our methods of desalination is based on this natural process.

How We Desalinate Water

Reading Sample



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TWF SH

common means of disposing of desalination brine. There are a few ways to minimize the impact. In some cases, brine is mixed with wastewater to dilute it. To reduce the chances of settlement, some plants release brine into strong currents to help it mix in with seawater. Other plants dig designated evaporation ponds for dumping brine. Brine also has two applications of its own. When sprayed on roadways, it can either draw down dust in dry climates or de-ice roads in winter. These mitigation efforts carry their own potential for pollution, but the goal of each is to spread that potential over a wider area than is affected by simply dumping brine back into the ocean.

In 2016, Farid Benyahia, a chemical engineer at Qatar University, developed a means of generating baking soda and calcium chloride from desalination brine. Baking soda has many household uses, while calcium chloride is used to preserve food and tan leather. In addition, his process requires the use of CO₂, potentially alleviating two environmental problems in one: excess CO₂ emissions and brine pollution.

Can Desalination Solve the Global Water Crisis?

Ecobottle Sample



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You can make yourself a glass of water.

Try it Yourself!

Want to see desalination for yourself? Fill a large bowl with salt water and put an empty glass in the middle of the bowl. Cover the bowl with plastic wrap and poke a small hole in the center of the plastic wrap. Set the covered bowl in direct sunlight. You've made your own solar still. As the sun heats up the water under the plastic wrap, it will start to condense on

the inside and drip into the glass.

Reading Comprehension Questions

1. What percent
2. Why can't we drink seawater?
3. What
4. What are the two methods of desalination?
5. How
6. How does
7. How is brine dangerous for sea life?
8. What
9. Why is multistage flash more expensive than reverse osmosis?

Extension Questions

10. Are there any desalination plants near you? If so, where is it located? Which method does it use? What is its capacity?
11. What is another
12. Make
13. Create an infographic explaining

Ecobottle Sample



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