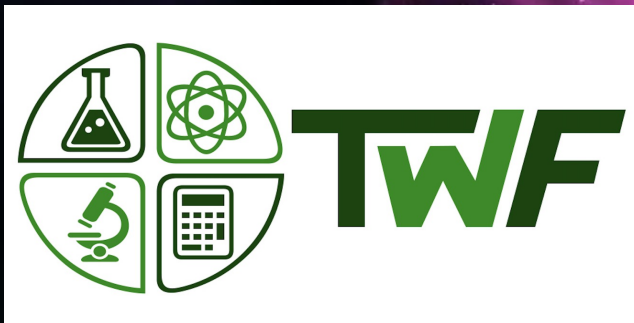


Pure Substances and Mixtures

5E Lesson

The 5E model is a scientifically proven method to improve student engagement and learning in your classroom

- ✓ Engagement
- ✓ Exploration
- ✓ Explanation
- ✓ Elaborate
- ✓ Evaluate



Pure Substances and Mixtures

5E Lesson

Pure Substances and Mixtures – 5E L

- All videos can be accessed directly from the PowerPoint. To retrieve them, click on the video icon while in slideshow mode and it will automatically open for you. If they don't open, right-click the image and select Edit Hyperlink or something similar.
- I've created a video walkthrough if needed. It can be accessed here - <https://youtu.be/oCkIP9SaQdQ>
- I have also enclosed a PDF version of both the teacher and student versions.

- It's sometimes best to have the students peer evaluate
- Placing students in small groups and having them exchange papers to mark will accomplish two things
 - 1) Provide immediate feedback on the questions they just completed
 - 2) Significantly reduce your marking time
- Peer evaluation is not needed, only suggested when appropriate

☐ Students are given the opportunity to demonstrate their understanding and evaluate their own progress

☐ Students are able to connect the content presented to previous experiences

Each phase is clearly described

A Complete Lesson

Classification of Matter

- Three states

- Solid

- Substance keeps its shape and doesn't flow



- Liquid

- Substance takes on the shape of its container and flows



- Gas

- Substance fills a container of any size/shape



← Make sure your students are on track

Student copies with blanks
Videos embedded right into
your slideshow

Classification of Matter

- Three states

- Solid

- _____



- Liquid

- Substance takes on the shape of its container and flows



- Gas

- _____

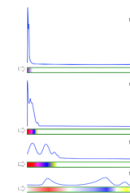


Mixtures

- Separation methods

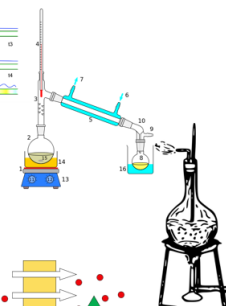
- Chromatography

- Separation by relative amounts between mobile and stationary phase



- Distillation

- Conversion to a vapor and back to a liquid

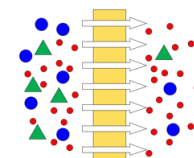


- Evaporation

- Addition of energy until liquid enters gaseous state

- Filtration

- Solid particles filtered out of liquid or gas because fluid can pass through filter



Interactive and Engaging Activities

Desalination for Drinking Water

Scientific Reading Comprehension Article and Extension Activity

Desalination for Drinking Water

Global Water Crisis

Millions of 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 salt 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 seawater, the salt draws water out of 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 to a process called osmosis. To save our cells from shriveling up and dying, 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 drink. This leads to dehydration, organ failure, and eventual death.

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

Salt Water

Salt water is a substance known as a **solute** in chemistry as a **solution**. A solution is a combination of particles that are not chemically bonded. This is known as 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 salt dissolved in ocean water (as well as other solutions) make it a **solute**. Molecules can be separated into their components more easily than one pure substance. In fact, salt water is separated into its components naturally within our atmosphere as part of the water cycle. The sun heats up the ocean, 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

There are two primary methods of salt water desalination: one is today. Both are based on natural processes. One, as mentioned, mimics the water cycle. This method is called **multi-stage flash** desalination. The other bears similarities to the process our cells use to balance. The difference is that it's backwards. This second method is called **reverse osmosis**.

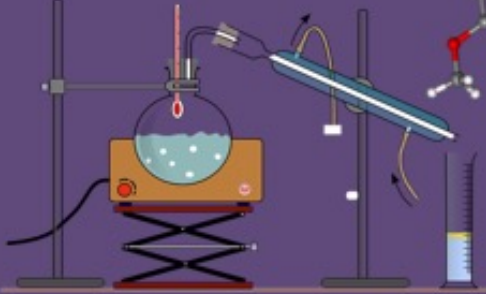
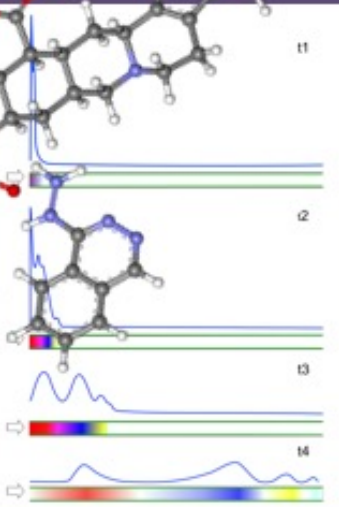
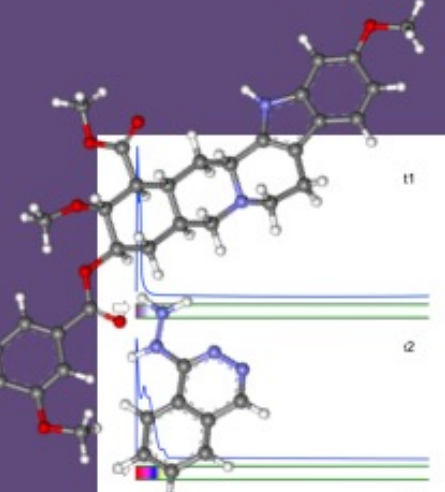
In the 4th century BC, the Greek philosopher Aristotle observed that salt and sandiness, the resulting water is no longer salty. So early as also boiling seawater without state ships and collecting the steam for distillation. Today, such devices can be built on a large scale as he was able to carry around with you. Large-scale desalination is generally enough heat to cause evaporation, while the small-scale one. The term **multi-stage flash** refers to a repeated process of rapid boiling. Desalination cell and is flash boiled in successive stages. At each stage, seawater is preheated by the hot water from the previous stage, and then flash boiled.

The Water Cycle



Improve your students' **Literacy** and **Analysis Skills**, use as an **Emergency Substitute Plan**, or create **Applicability** in your classroom

Pure Substances and Mixtures Lab Station Activity



7 Lab Station Activities to get your kids out of their seats and engaged in their learning

Get away from tired practices and unengaged students



Provide a Scientifically-Proven means of instruction



Incorporate Technology and Increase Collaboration

