



SALTY OCEAN

This lesson plan developed by:



Overview:

Salinity is the saltiness or amount of salt dissolved in a body of water. Salinity is usually measured in parts per thousand (ppt). The average salinity of the ocean is 35ppt, which means that in every kilogram (1000 grams) of seawater, 35 grams are salt. The average river water salinity is 0.5ppt or less. An estuary is a partially enclosed body of water with one or more rivers flowing into it that connects to the open ocean. Estuaries are a mix of both fresh and ocean water, so the salinity in most estuaries is less than the open ocean.

Key Concepts:

- The ocean is salty with a salinity higher than freshwater lakes, rivers and estuaries.
- Saltwater is denser than freshwater, which allows freshwater to “float” on top.

Materials:

For instructor (needed for demonstration and discussion purposes):

- Bucket of tap water
- Bucket of surface water
- Bucket of bottom water (if possible to collect)
- Hydrometer

Per group of students:

- Bucket of tap water
- 4 baby food jars
- Red and blue food dye
- Salt
- Tablespoon
- Measuring cup

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- Wooden stick or spoon to stir
- Index cards
- Pencil and paper to record results

Duration:

1 hour

Physical Activity:

Low

Activity:

Part 1: Introduction

1. Ask the whole group the following questions:
 - What is salinity?
 - Which body of water has the highest salinity (ocean, freshwater lake, river, estuary)?
2. Discuss why the ocean is salty. When rain falls to the Earth, the water runs over land, breaking up rocks and transporting minerals to the ocean – causing the ocean to become saltier. Rain replenishes freshwater in rivers and streams, so they are not salty. The water in the ocean collects all the salt and minerals from all of the rivers that flow into it.
3. If you are near a body of water, discuss whether it is salty or not.
4. Ask if anyone has swum in the ocean and a body of freshwater. Is it easier to swim in saltwater or freshwater? Why?

Part 2: Saltwater is Denser than Freshwater

When salt is dissolved in water, like ocean water, that dissolved salt adds to the mass of the water and makes the water denser than it would be without salt. Objects or liquids that are less dense than the saltwater (i.e. freshwater) will float on top of the saltwater.

1. Have the students break into groups. With a measuring cup, pour a cup of water into the four jars, until it almost fills to the top.
2. In two of the jars, add 5 drops of blue food dye, and gently stir. These two jars are “freshwater”.
3. In two other jars, add ½ tablespoon of salt and 5 drops of red food dye, and gently stir. These two jars are “saltwater”.
4. Place an index card on top of one of the freshwater jars, and flip it upside down, and place it on top of one of the saltwater jars. Then place an index card on the other saltwater jar, and flip it upside down, and place it on top of the other freshwater jar.
5. Have the students predict what will happen when the index cards get pulled away.
6. Gently pull the index cards out from both sets of jars and have the students discuss their observations.



Salty Ocean (cont.)



BEFORE



AFTER

Part 3: Density Discussion

1. What happened to the set of jars with the freshwater on top? What happened to the set of jars with the saltwater on top? Discuss why this happened.
2. Where would you find saltier water, at the surface or near the bottom? Why?

Part 4: Measuring Salinity

There are several methods to measure salinity, with the simplest being a hydrometer. The units that we will be using to measure salinity is ppt or parts per thousand.

1. Have the students predict the salinity of tap water, surface water and bottom water.
2. Measure the salinity of tap water with the hydrometer.
3. Collect surface water with bucket, and measure salinity with the hydrometer.
4. If able to collect bottom water with a bucket or other device, measure the salinity with the hydrometer.
5. Record all measurements.

Part 5: Salinity Discussion

1. Based on where the water was collected (ocean, estuary, river, pond, etc.), do the measurements for salinity make sense?
2. Would you find saltier water if you were closer to the ocean or near rivers?
3. Does rain impact the salinity of water? If it rained a lot and you lived near saltwater, which would have higher salinity: surface water or bottom water?

Additional Resources:

To learn more about the activity, check out our [Salty Ocean “how to” video](https://www.sailorsforthesea.org/KELP).

Salty Ocean (cont.)

Ocean Literacy Principles:

Ocean literacy is an understanding of the ocean's influence on us, and our impact on the ocean. There are seven [Ocean Literacy Essential Principles](#) that all people of our blue planet should have an opportunity to learn and understand. This activity touches upon the following Essential Principles:

1. The Earth has one big ocean with many features
5. The ocean supports a great diversity of life and ecosystems

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