

PRELIMINARY ACTIVITY FOR

Investigating Salinity

Salinity is a measurement of the saltiness or concentration of salt in water. Ocean water contains many different salts, but the most abundant is sodium chloride, also known as table salt. Sodium chloride accounts for about 86% of all the ions present in ocean water. Other salts that can be found in ocean water at significant levels are calcium chloride and magnesium chloride.

While the average salinity of ocean water is 35 ppt (parts per thousand) of salt dissolved in water, there are several factors that can increase or decrease its salinity. At the polar regions, freezing of ocean water increases the salinity of the surrounding water. Evaporation in hot, arid regions also increases the salinity. The Dead Sea, located in Israel, has salinity nearly seven times that of most ocean water. At the ocean's surface, rain, snow, and melting ice are all responsible for decreasing the salinity. As rivers enter the ocean, they carry large volumes of fresh water into the ocean, causing salinity to decrease.

An *estuary* is a coastal wetland in which fresh water from a river (0–0.5 ppt) mixes with salt water from an ocean (20–35 ppt). Thus, estuary salinity can vary from 0 to 35 ppt, depending on the freshwater inflow and the tide. Because they constantly receive fresh nutrients from rivers and from oceans, estuaries are very productive ecosystems.

In the Preliminary Activity, you will gain experience using a Conductivity Probe while determining the salinity of a saltwater sample provided by your teacher.

After completing the Preliminary Activity, you will first use reference sources to find out more about salinity before you choose and investigate a researchable question dealing with that subject. Some topics to consider in your reference search are:

- salinity
- estuary
- tidal river
- brackish marsh
- freshwater marsh
- salt marsh
- ocean salinity
- salt lakes

PROCEDURE

1. Set the switch on the Conductivity Probe to the 0–20000 $\mu\text{S}/\text{cm}$ salinity range.
2. Connect the Conductivity Probe and the data-collection interface.
3. Calibrate the probe, load an appropriate calibration, or manually enter calibration values following instructions from your teacher. **Note:** The range of the Conductivity Probe for this switch setting and calibration is 0–13 ppt.



Experiment 7

4. Collect salinity data.
 - a. Place the tip of the probe into a saltwater sample provided by your teacher. The hole near the tip of the probe should be completely submerged.
 - b. When the reading stabilizes, start data collection.
 - c. Stop data collection after about 15 seconds.
 - d. Use the statistics option to determine the mean salinity value.
 - Record the value if it is less than 13 ppt. If you did a 1/4 dilution of the sample, be sure to multiply the value by 4!
 - If the salinity value is greater than 13 ppt, go to Step 5.
5. If the salinity value is greater than 13, then the sample has a salinity that is beyond the upper range of the Conductivity Probe. You will need to dilute the sample to a salinity that is within the range of the probe. To do this,
 - a. Measure out 100 mL of the sample.
 - b. Add 300 mL of distilled water and mix thoroughly.
 - c. **Important:** The sample has been diluted by a factor of 100/400 or 1/4. Any salinity measurements made on the sample will have to be multiplied by a factor of 4 to account for this dilution.
 - d. Repeat Step 4.

QUESTIONS

1. What is the salinity (in ppt) of the saltwater sample you tested in the Preliminary Activity?
2. How does the salinity value for the saltwater sample in the Preliminary Activity compare to the average salinity of ocean water?
3. Identify the estuary nearest to your school. How far away is it?
4. Identify three factors that might cause salinity values at a location in an estuary to fluctuate.
5. List at least one researchable question for this experiment.