

# Oceanography

# Testing Salinity



Students will test salinity in a variety of experiments to understand the effects of salt in bodies of water. Students will also investigate the role of density and buoyancy and how this relates to natural ocean processes.

## Materials

- Two glasses/jars/containers
- Container of salt
- 2 eggs
- Index cards
- Food coloring
- Plastic cups

## Safety Considerations

- Students should be cautious not to ingest any materials

## Keywords & Concepts

**Salinity** is the concentration of salt in seawater or ocean water.

**Salination** can result from natural processes, for example natural events like weathering of minerals that contain salt, or from human events like chemicals and salts being added to bodies of water.

**Density** is equal to mass/volume.

- This means that increasing the **mass** of the water by adding salt, increases the density. Salt water is more dense than freshwater, which is less dense.

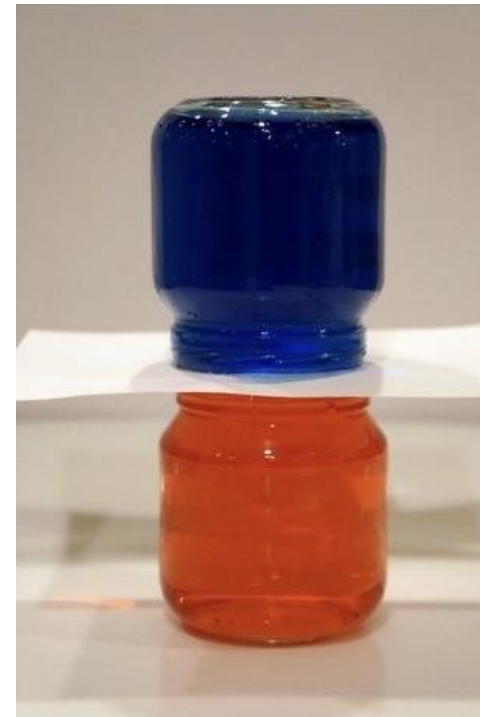
# Testing Salinity

## Experiment 1

- 1) Fill two glasses or containers with water
- 2) Add 6 teaspoons of salt to one of the glasses and mix it up really well so it's all dissolved
- 3) Place an egg into each glass. Which one floats and why?

## Experiment 2

- 1) Using 2 identical jars, fill each with water. One will be regular water (blue) and one will be salt water (red)
  - a) Add 6 teaspoons of salt to the other jar and add red food coloring drops
  - b) Add blue food coloring drops to the regular water
- 2) Place an index card or thick piece of paper on top of the jars. You are going to place one jar on top of another. First place the red on top of the blue.
  - a) To do this, hold the card on top of the jar as you flip it, and place it down on top of the other jar with the card on top.
- 3) Next, slide the cards out slowly so that the water meets.
- 4) What happens - do they mix? What color does the water turn?
- 5) Try this again but with the blue jar on top. What happens now? How does it look different to your first try?



## Experiment 3

- 1) Fill 3 small plastic cups with water.
  - a) Add 3 teaspoons of water to one
  - b) Add 6 teaspoons of water to another
- 2) Place each cup in the freezer. What do you think will happen?
  - a) Write a your hypothesis down for each cup
- 3) After 30 minutes, check the freezer and observe what is happening in each of the cups.
- 4) Are they starting to freeze? Which ones? Why do you think this is?
  - a) Write your observations down and note if they match your hypothesis.
- 5) Place them back into the freezer and check throughout the day to see which cup will freeze over completely first.

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## Making Different Ocean Waters:

### 1) Fresh water

- a) Fresh water has very little traces of salt
- b) To make this, use tap water
- c) Use food coloring to dye this blue

### 2) Brackish water

- a) Brackish water is less salty than saltwater but saltier than fresh water. It contains between 0.5 and 30ppt of dissolved salt (ppt is parts per trillion)
- b) Brackish water is usually found in estuaries or aquifers
- c) Weigh 20 grams of salt and add to a beaker. Add water until the 1,000 grams have been filled.
- d) Use food coloring to dye this yellow

### 3) Salt water

- a) Seawater ranges in salinity depending on the sea or ocean, usually between 33 to 38 ppt.
- b) Weigh 35 grams of salt and add water until 1,000 grams have been filled.
- c) Use food coloring to dye this green

### 4) Hypersaline water

- a) Hypersaline bodies of water have salt levels that are much higher than ocean salinity levels. Usually the salinity ranges around 50 ppt (very salty!)
- b) Hypersaline bodies of water include the lakes like the Dead Sea, haloclines, hypersaline mats, lakes and soils.
- c) Weigh 50 grams of salt and add it to the beaker of fresh water until 1,000 grams have been filled.
- d) Use food coloring to dye this red

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## Making Different Ocean Waters:

- 5) Now that you have made a variety of salinities of bodies of water, it's time to test them! How dense are each of them compared to each other?
- 6) With the following materials, Test the density of your different water samples. Which objects are buoyant and float, and which sink? How different are your samples in their salinity, does this make a big difference?
  - Egg
  - Beads
  - Spoon
  - Wood chip
  - Quarter
  - Plastic cap/lid
- 7) Now, see if you can layer your salinities. Since each type of ocean water has a different density, they should be able to stack on top of each other. In which order will you pour them?
- 8) Using a large basin/container and a pouring cup, slowly pour your ocean waters into the container on the wall (not the middle) so it doesn't get mixed too quickly.
  - Can you make a density tower and keep all the colors intact?

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## Debrief

### Experiment 1

- The egg in the glass with salt in it will float. This is because salt makes water more dense, so the egg will be less dense than the water around it and float!

### Experiment 2

- What did you find when you put the blue jar on top? Since the blue jar contained water that had no salt, it was less dense and didn't want to sink (because it isn't heavy). The red jar was more dense and therefore heavier because it was salty water. This is why when you remove the index cards, the water doesn't mix! The two different salinities made it so that they stay separated.

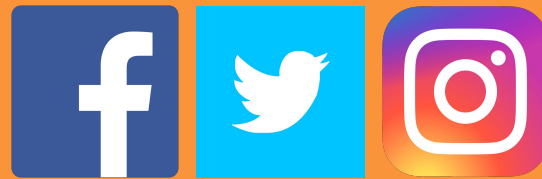
### Experiment 3

- The cup with the most salt will freeze the slowest
  - This is because adding more salt makes the water more dense and lowers the freezing point.

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project or results with us?

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Have a question?

Reach us at  
[svcamp@engr.uvic.ca](mailto:svcamp@engr.uvic.ca)