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Convection Currents Lab

Convection currents can be seen in many of the Earth’s systems. You will be investigating these currents and the factors that drive them. There are three parts to this lab: Density investigation, temperature investigation, and independent study where you will be using what you learned to create your own lab and run it.

You will be creating seawater of different concentrations since this is the easiest way to vary the density of water in a lab setting. In order to do this you will be using the weight/volume% formula.



To find the grams of salt needed to create a solution, you may use the following equation:

g of solute = (w/v% solution) x (mL of water)

 (100-w/v% solution)

For example…

 You want to create a 10% seawater solution in 100 mL of water but don’t know how many grams of salt to use. You would perform the following calculation:

g of NaCl = (10) x (100) = 11.1g of NaCl

 (100-10)

Part 1. Temperature Test

* Create 3000mL of 3.5% seawater solution and pour into large clear tub.
* Create 500mL of 3.5% seawater solution and place on hotplate to create hot seawater
* Create 500mL of 3.5% seawater solution and chill in ice bath for 10-15 minutes.

**Q1.** *While the solutions are changing temperature, predict which temperature of the water will rise or sink when gently poured into the room-temperature seawater solution and record your prediction. Make sure to back up your prediction.*

* Once the hot and cold solutions have reached the desired temperature, add a few drops of different colored food coloring to each solution. Try to use colors that correspond to the temperatures.
* Gently pour the hot and cold solutions into the opposite ends of your tub. Allow time for the solutions to settle.

**CAUTION: If the beakers are poured into the tub too quickly the solutions will mix!!**

**Q2.** *Draw a colored diagram showing the layering that occurs, make sure to label your diagram, and write a brief statement comparing what actually happened to your original predictions. Make sure to take a picture as well for later use!!*

* Once you have finished observing the layering, discard the solutions in the drain and rinse your tub for the next test

Part 2. Density(Salinity) Test

* Create 3000mL of 3.5% seawater solution and pour into large clear tub.
* Create 500mL of .875% seawater solution. This is your hypotonic solution. Add a few drops of food coloring to this solution.
* Create 500mL of 14% seawater solution. This is your hypertonic solution. Add a few drops of food coloring to this solution.

**Q3.** *Record what color your hypotonic and hypertonic solutions are.*

**Q4.** *Make predictions about what will happen when the hypotonic and hypertonic solutions are carefully poured into the normal saltwater solution. Make sure to back up your prediction.*

* Carefully pour the hypotonic and hypertonic solutions into opposite ends of your saltwater tub and observe.

**Q5.** *Draw a colored diagram showing the layering that occurs, make sure to label your diagram, and write a brief statement comparing what actually happened to your original predictions. Make sure to take a picture as well for later use!*

Part 3. Independent Study

**Q7.** *Predict which is more important to layering: temperature or salinity. Make sure to back up your prediction.*

**Q8.** You will be creating and executing a simple experiment that attempts to show which of the factors, temperature or salinity, has more impact on ocean layering. This experiment MUST be approved by Mullins before completed!!

What you will be turning in:

1. Answer sheet to this lab (done on your OWN sheet of paper!)
2. Typed up mini lab report. This should include the following:
	1. Title
	2. One paragraph explaining your temperature study (include your pic)
	3. One paragraph explaining your density study (include your pic)
	4. Procedures for your independent study
	5. Results of your study (in paragraph form with your picture)
	6. Choose one earth system and write a brief paragraph explaining how the convection currents work within. Make sure the focus of your paragraph includes density and temperature.