Rainbow Salt
An Investigation in Density

Purpose:

To make various saline solutions and layer them according to their respective densities.

Materials:

Scale/Balance
1 – 50 mL Graduated Cylinder
2 – 150 mL Beakers
Pipette
Sheet of background paper, white
kosher Salt
Food Coloring
Water

Methods:

Prepare each solution by adding salt, water, and food coloring in the following amounts:

Solution Number	Salt (g)	Water (mL)	Food Coloring (drops)
1	16.0	60	2 – Blue
2	11.7	60	2 – Green
3	7.2	60	2 – Yellow
4	3.4	60	1 – Yellow 1 – Red
5	0.0	60	2 – Red

NOTE: Stir until ALL salt is dissolved

Using your pipette, slowly draw up the solution. Place 20mL in the 150 mL beaker. For the second, third, fourth, and fifth solutions, place the pipette along the inside of the beaker near the previous layer of solution, but not touching it. Drop the next solution drop-by-drop, gently allowing it to roll down the side.

Rinse the pipette thoroughly between solutions with clear, clean water.

Repeat with all four secondary solutions.

Draw and label a picture of your results.

Calculations:

Calculate the density of each salt solution using the example below. Make a data table under your drawing. Include Solution Number, Mass of Solution, Volume of Solution, and Density of Solution. Use correct units, carrying calculations to the hundredths place (2 decimal places).

Example: Solution #1

mass = 16.0 g of salt + 60.0 g of water = 76.0 g of salt solution

volume = 60 mL of water (ignoring the 2 drops of food coloring)

$$\textbf{density} = \frac{\text{mass}}{\text{volume}} = \frac{76.0\text{g}}{60\text{mL}} = \mathbf{1.27}\frac{\text{g}}{\text{mL}}$$

Solution Number	Mass of salt	Mass water	Mass of Solution	Volume of Solution	Density of Solution
1	16.0 g	60.0g	76.0 g	60.0 mL	1.27 g/mL
2					
3					
4					
5					

Analysis:

Make a graph with Mass of Solution along the X-axis (scaled 0 to 100 g in increments of 5g or so) and Volume along the Y-axis (scaled 0 to 100 mL in increments of 5 mL or so).

Lab Reporting:

Use the blank Lab Report form to write a complete lab report. In the Conclusion, answer the following questions in complete sentences:

1) If all of the solutions were made with just salt and water, why did they form different layers?

2) The ocean contains water with different salinities. Where do you think the saltiest layers would be found? Why?