INVESTIGATING DENSITY CURRENTS

What makes water "subside"?...or How to initiate a density current.

Materials:

20 g salt
Water
6 – 250mL Erlenmeyer flasks
7 – 100mL graduated cylinders
Blue and red food coloring

Procedure:

- Prepare 1000 mL of room temperature water with 20 drops of red dye (food coloring).
- Into each of six 250mL Erlenmeyer flasks prepare 100 mL of 0% to 5% salt water solution with blue dye. You can do this by using the following "recipe":

Erlenmeyer flask	Mass of salt	+ drops of blue dye
1	0g	5
2	1	5
3	2	5
4	3	5
5	4	5
6	5	5

- Then in each case, add enough water to reach a total volume of 100 mL.
- Stir thoroughly.
- Obtain 6 - 100mL graduated cylinders and transfer 50mL of the "red water" into each.
- Transfer 20mL of each "blue solution", one at a time into a 100mL (or 50mL) graduated cylinder.
- Pour the 20mL of blue solution, beginning with flask #1 into a graduated cylinder containing the "red solution" and observe what happens. For those solutions where the blue solution sinks to the bottom of the graduated cylinder, time how long it takes any blue

solution to reach the bottom of the cylinder. Repeat trials if time permits to confirm results.

- Graph your results on a "Concentration vs. Time to sink" graph.

Analysis:

1. According to your graph, describe the relationship between the concentration of the salt (blue) water solution and its behavior when added to the pure (red) water.

2. Explain why the relationship you identified in question #1 exists.

3. Let's apply the phenomenon explored in this investigation to the environment in the Arctic. You have learned that Arctic winters are fiercely cold with air temperatures averaging 35 degrees below zero! Seawater readily freezes at these temperatures. When seawater freezes however, the resulting ice is pure water. The remaining water (under the ice) must become more saline (saltier). Now apply your findings from this experiment, as the water becomes more saline, what will the seawater begin to do? What is this essentially creating within the ocean?