

Learning Activity for Atmosphere-Ocean Interaction

National Weather Service, Shreveport, LA



Objective:

The students will discover that as the salinity increases, the density also increases.

Overview:

Fresh eggs, which are less dense than saltwater, will float, but will sink in freshwater.

Total Time:

Three minutes as a demonstration, 10 minutes if students perform the demonstration.

Supplies:

Three fresh eggs, three beakers (each around 1-1.5 liters, quart jars may also be used), one 26-oz. container of salt.

Procedure:

1. Fill each beaker with approximately one liter of tap water (or fill each quart jar with about one pint of tap water).
2. Add (approximately) three ounces of salt to one beaker and six ounces (or more) of salt to the second beaker. No salt is added to the third beaker.
3. Ask the students to speculate which water solution will float the eggs.
4. Place an egg in each solution and observe in which solution it floats.

Discussion:

Fresh eggs are more dense than fresh water and therefore will sink. However, as the salt content increases in water, the water becomes more dense. The egg will float in the two beakers with the added salt. This happens because the added salt makes the water heavier than the egg causing the egg to float.

The solution with approximately three ounces of salt could represent the salinity of the oceans. The solution with six ounces of salt could represent the Dead Sea. As salinity increases, the density increases as well. The egg in the beaker with the most salt should float higher than that in the other salty solution.

The increased density of the salty water actually increased the weight of the water. An egg will be buoyant (float) if the weight of the egg is *less* than the weight of the water displaced. The egg sinks if it weighs *more* than the weight of the water that was displaced.

The size (or weight) of a ship is determined by the weight of water that is displaced when fully loaded (reported in tons). The following are sizes of large ships.

| Year | Ship | Type | Owner | Length (ft.) | Width (ft.) | Weight (T.) |
|------|----------------------------|------------------|-----------------|--------------|-------------|-------------|
| 1912 | <i>Titanic</i> | Liner | White Star Line | 883 | 92 | 46,328 |
| 1934 | <i>Queen Mary</i> | Liner | Cunard | 1,019 | 119 | 81,237 |
| 1939 | <i>Bismarck</i> | Battleship | Germany | 880 | 120 | 50,000 |
| 1944 | <i>Missouri</i> | Battleship | United States | 887 | 108 | 58,000 |
| 1962 | <i>Enterprise</i> | Aircraft Carrier | United States | 1,101 | 133 | 89,600 |
| 1976 | <i>Jahre Viking</i> | Supertanker | Jordan Jahre | 1,504 | 226 | 647,955 |
| 2003 | <i>Ronald Reagan</i> | Aircraft Carrier | United States | 1,092 | 134 | 97,000 |
| 2004 | <i>Queen Mary 2</i> | Liner | Cunard | 1,132 | 148 | 150,000 |
| 2006 | <i>Freedom of the Seas</i> | Liner | Royal Caribbean | 1,112 | 184 | 160,000 |