How Buoyancy and Density are Related

Think back to your density tower. Both water and oil are liquids, but they did not mix together, one sat on top of the other. The buoyant force of a liquid does not depend on physical state, but rather on density. This is also true for buoyancy in gases.

Objects float more easily in 1)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than in 3) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 4) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Seawater (salt water) has a density of 5) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ g/ml and fresh water has a density of 6) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ g/ml. The density of salt water is 7) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than that of fresh water, which means that the particles of salt water are packed together more tightly. Therefore, salt water can support more weight per volume than fresh water. A buoy floating in salt water extends out of the water more than a buoy in fresh water. The next time you have a chance to swim in the ocean, observe how much easier you can float on your back!

The relationship between buoyancy and density is the basis for the hydrometer, an instrument designed to measure liquid density. A hydrometer will extend farther out of a liquid if the liquid has a higher density, for example, water (1 g/ml). A hydrometer will sink lower if the liquid has a lower density, such as vegetable oil (0.9 g/ml). Many different hydrometers are available commercially, all designed for specific uses. Hydrometers are widely used in the food and beverage industries. Although they measure density, these instruments can be used to determine other values indiscreetly. For example, they can be used to determine the sugar content of canned fruit syrup, or the alcohol content of wine.