

### Experiment 1.3: Density

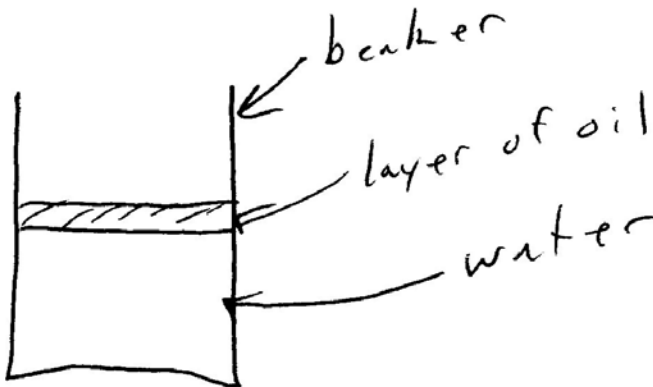
#### Data:

Mass of the graduated cylinder: 29.5 g  
Mass of the graduated cylinder plus water: 79.4 g  
Volume of the water: 50.0 mL  
Mass of the graduated cylinder: 29.5 g  
Mass of the graduated cylinder plus oil: 75.6 g  
Volume of the oil: 50.0 mL

#### Calculations:

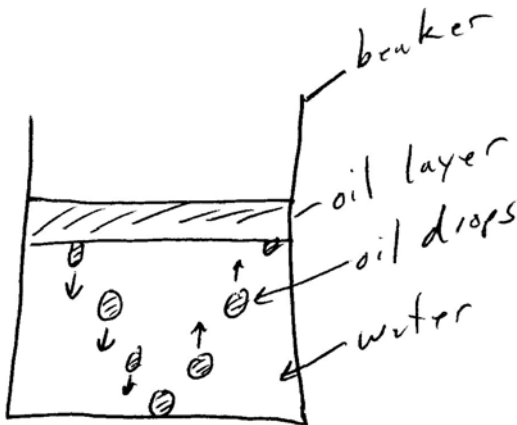
Mass of the water:  $79.4 \text{ g} - 29.5 \text{ g} = 49.9 \text{ g}$   
Density of the water:  $49.9 \text{ g} \div 50.0 \text{ mL} = 0.998 \text{ g/mL}$   
Mass of the oil:  $75.6 \text{ g} - 29.5 \text{ g} = 46.1 \text{ g}$   
Density of the oil:  $0.922 \text{ g/mL}$

What happened when I poured oil into a glass of water:



The oil would not mix with the water. Instead, it formed a layer resting on top of the water.

What happened when I shook salt onto the oil with a saltshaker:



The salt caused drops of oil to sink into the water. When a drop hit the bottom of the beaker, however, it rested on the bottom for a moment and then started to rise. Eventually, it rose all the way back to the oil layer at the top.

### Summary:

In this experiment, I measured the volume of water and oil with a graduated cylinder. I also measured the mass of each. When I divided the mass by the volume, I got the density. The density of the oil (0.922 g/mL) was less than the density of the water (0.998 g/mL). I then put water in a beaker and poured oil into the water. The oil and water didn't mix. Instead, the oil rested in a layer above the water. This is because oil's density is less than water's density. As a result, the oil isn't heavy enough to push its way through the water.

I then shook salt onto the oil layer with a salt shaker. This caused drops of oil to fall down into the water, but when those drops of oil sank to the bottom of the beaker, they sat there for a moment and then rose back up to join the layer of oil. This is because the salt was more dense than the oil. As it pushed its way through the oil, it brought some oil along with it. The combined mass of the salt and the oil surrounding it was enough to make the combination more dense than water. This allowed the oil droplet and salt to sink in the water all the way to the bottom of the beaker. However, once it reached the bottom of the beaker, the salt eventually dissolved in the water. Without the salt's extra mass, the oil was once again less dense than water, so it floated back to the oil layer.