IPS

Experiment 3.6 The Density of Liquids

Examine two samples of liquid. Smell them and shake them, but don't taste them. Can you tell whether they are the same or different? Perhaps by finding their densities, you can answer the question. You can find the density of a liquid by massing it on a balance and measuring its volume with a graduated cylinder. Or, you can find the ***relative density*** using a *specific gravity* flask. We'll find the density both ways in this experiment and compare them.

Beaker & Cylinder

Use your smallest beaker and your 25-mL graduated cylinder to find the density of each liquid (liquid-A and liquid-B). Discuss with your partner the best procedure for finding both the mass and the volume using the beaker for the mass measurement and the cylinder for the volume measurement. A small amount of liquid will cling to the inside of any container from which you pour it. Therefore, to be certain you mass the volume of the liquid you measure in the graduated cylinder, you must be careful of the order in which you make your measurements of mass and volume.

- Which is more accurate, to mass the liquid in the small container before pouring it into the graduated cylinder, or to determine its volume first?
- What are the densities of the two liquids, A and B?

Specific Gravity flask

Specific gravity is the density of a material compared to that of water at the same temperature. Water's density is defined to be exactly 1.0000 g/mL at 3.98^{o}C. Obtain a 25-mL specific gravity flask. Fill it ½ full with the liquid to be measured. Empty it and fill it again with the same liquid. It should be filled completely. When you place the stopper in the top, it should displace liquid and leave absolutely no air space. Wipe off the liquid from the outside and measure the mass of the flask. Repeat this procedure for each liquid. The same process should be used to find the mass of the flask while containing distilled water.

Calculation:

$$\left(\frac{\text{mass of flask with unknown - mass of flask with water}}{25.00\ \text{mL}}\right) + 1.000 = \textit{Specific Gravity}$$

- What are the specific gravities of the two liquids, A and B?
- How does the specific gravity compare to the density of each liquid?
- Are the two liquids the same or different?
- If you don't get all of the liquid wiped off of the specific gravity flask, how will this affect your relative density determination?
- If the liquid you are measuring is something that evaporates very quickly, how would you accurately find its density?