Density Worksheet

Density is the mass in a given volume

The units of density are grams per mL or grams per cm³

$$d = \frac{m}{V}$$

1. What is the density if 25.6 g of a metal in a volume of 11.2 cm³?

$$d = \frac{mass}{V} = \frac{25.6\ g}{11.2\ cm^3} = \mathbf{2.29}\ \frac{\boldsymbol{g}}{\boldsymbol{cm^3}}$$

2. How many mL of propanol are needed if 36.2 g are required for an experiment ? The density of propanol is 0.803 g/mL?

$$d = \frac{mass}{V} \quad and \quad V = \frac{mass}{d}$$

$$V = \frac{36.2\ g}{0.803\ \frac{g}{mL}} = \mathbf{45.1\ mL}$$

3. A spherical piece of metal has a mass of 87.6 g. Its diameter is 4.32 in. What is the density of the metal in g/cm³? $V_{sphere} = 4/3\pi r^3$.
   We are given the mass, and we need to find the volume. First determine the radius. r = ½ d = 2.16 in   Next convert in to cm.

$$2.16\ in \times \frac{2.54\ cm}{1\ in} = 5.486\ cm \qquad V = \frac{4}{3}\pi(5.486\ cm)^3 = 691.6\ cm^3$$

$$d = \frac{mass}{V} = \frac{87.6\ g}{691.6\ cm^3} = \mathbf{0.127\ g/cm^3}$$

4. How many grams of lead, Pb, are required if the volume is 28.6 cm³? d_{lead} = 11.3 g/cm³.

$$d = \frac{mass}{V} \quad and \quad mass = d \times V = 11.3\frac{g}{cm^3} \times 28.6\ cm^3 = \mathbf{323\ g}$$

5. A substance has a mass of 18.6 kg and a volume of 100.25 L. Will this substance float or sink in water?
   Convert units to g and mL. Then calculate the density of the substance. The density of water is 1.00 g/mL.

$$d = \frac{mass}{V} = \frac{18600\ g}{100250\ mL} = \mathbf{0.186}\ \frac{\boldsymbol{g}}{\boldsymbol{mL}}$$

   The substance has a density less than water, therefore, it will float.