Solutions

Each answer shows the steps, then the **result**.

2.1

- $\rho = m/V$

$$\rho = \frac{240\ \text{g}}{30\ \text{cm}^3} = \mathbf{8.0}\ \text{g/cm}^\mathbf{3}$$

2.2

- lower it into water in a measuring cylinder; the rise in water level is its volume

2.3

- 0.79, 0.92, 1.00, 1.26 g/cm^3 from the top down
- the least dense liquid floats on top of the denser ones

2.4

- $\times 1000$ to convert g/cm^3 to kg/m^3

$$2.7\ \text{g/cm}^3 \times 1000 = \mathbf{2700}\ \text{kg/m}^\mathbf{3}$$

3.1 B

- it floats if its density is less than that of water

3.2

(a) $V = 2.0 \times 3.0 \times 5.0 = \mathbf{30}\ \text{cm}^\mathbf{3}$

(b) $\rho = m/V$

$$\rho = \frac{216\ \text{g}}{30\ \text{cm}^3} = \mathbf{7.2}\ \text{g/cm}^\mathbf{3}$$

3.3

- the liquid of density 0.80 g/cm^3 floats
- because its density is less than that of water (1.0 g/cm^3)

3.4

(a) measure the mass of the empty measuring cylinder

- pour in the liquid and read its volume from the scale, at the bottom of the meniscus with the eye level
- measure the mass again and subtract to get the mass of the liquid, then divide mass by volume

(b) mass of liquid = 140.0 g − 76.0 g = 64.0 g

- $\rho = m/V$

$$\rho = \frac{64.0\ \text{g}}{80\ \text{cm}^3} = \mathbf{0.80}\ \text{g/cm}^\mathbf{3}$$

(c) volume of the metal = 105 cm^3 − 80 cm^3 = 25 cm^3

- mass of the metal = 337.5 g − 140.0 g = 197.5 g

$$\rho = \frac{197.5\ \text{g}}{25\ \text{cm}^3} = \mathbf{7.9}\ \text{g/cm}^\mathbf{3}$$

(d) **no**, it sinks

- its density of 7.9 g/cm^3 is far greater than the liquid's 0.80 g/cm^3

(e) sugar dissolves in the liquid, so the level would not give its volume