Chapter 1

Measurements

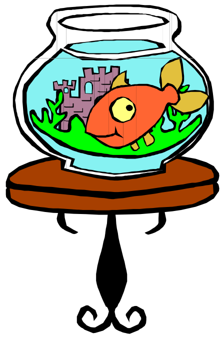
Density

[redacted]

compares the mass of an object to its volume

$$D = \frac{\text{mass}}{\text{volume}} = \frac{g}{mL} \text{ or } \frac{g}{cm^3}$$

Note: 1 mL = 1 cm^3



[redacted]

Osmium is a very dense metal. What is its density in g/cm^3 if 50.00 g of the metal occupies a volume of $2.22 cm^3$?

1) 2.25 g/cm^3
2) 22.5 g/cm^3
3) 111 g/cm^3

[redacted]

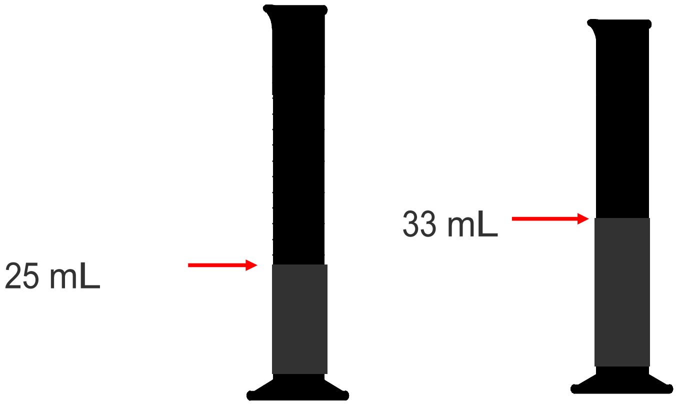
2) Placing the mass and volume of the osmium metal into the density setup, we obtain

$$D = \frac{\text{mass}}{\text{volume}} = \frac{50.00\ g}{2.22\ cm^3} =$$

$$= 22.522522\ g/cm^3 = 22.5\ g/cm^3$$

[redacted]

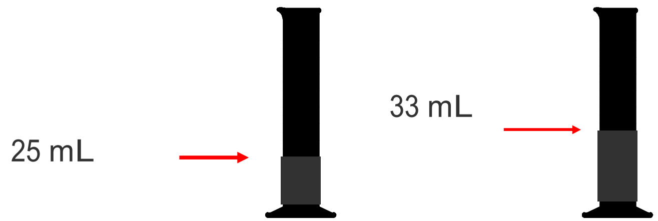
A solid displaces a matching volume of water when the solid is placed in water.



[redacted]

density (g/cm^3) of 48 g of a metal if the metal raises the level of water in a graduated cylinder from 25 mL to 33 mL?

1) 0.2 g/cm^3 2) 6 g/cm^3 3) 252 g/cm^3



[redacted]

2) 6 g/cm^3

Volume (mL) of water displaced

= 33 mL - 25 mL = 8 mL

Volume of metal (cm^3)

$$= 8 \text{ mL} \times \frac{1 \text{ cm}^3}{1 \text{ mL}} = 8 \text{ cm}^3$$

Density of metal =

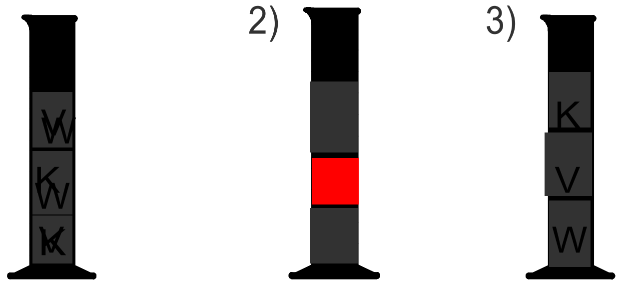
$$\frac{\text{mass}}{\text{volume}} = \frac{48 \text{ g}}{8 \text{ cm}^3} = 6 \text{ g/cm}^3$$

[redacted]

Which diagram represents the liquid layers in the cylinder?

(K) Karo syrup (1.4 g/mL), (V) vegetable oil (0.91 g/mL,) (W) water (1.0 g/mL)

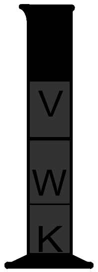
1) 2) 3)



[redacted]

(K) Karo syrup (1.4 g/mL), (V) vegetable oil (0.91 g/mL,) (W) water (1.0 g/mL)

1)



[redacted]

A substance has a density of 3.8 g/mL.

Density = 3.8 g/mL

Equality 3.8 g = 1 mL

Conversion factors.

$\frac{3.8\ g}{1\ mL}$ and $\frac{1\ mL}{3.8\ g}$

[redacted]

[redacted] gasoline, is 0.702 g/mL. What is the mass, in kg, of 875 mL of octane?

1) 0.614 kg

2) 614 kg

3) 1.25 kg

[redacted]

1) 0.614 kg

Unit plan: mL □ g □ kg

Equalities: 1 mL = 0.702 g and 1 kg = 1000 g

Setup:

$$875\text{ mL} \times \frac{0.702\text{ g}}{1\text{ mL}} \times \frac{1\text{ kg}}{1000\text{ g}} = 0.614\text{ kg}$$

density factor | metric factor

[redacted]

If blood has a density of 1.05 g/mL, how many liters of blood are donated if 575 g of blood are given?

1) 0.548 L
2) 1.25 L
3) 1.83 L

[redacted]

1)

Unit Plan: g → mL → L

$$575\text{ g} \times \frac{1\ \cancel{\text{mL}}}{1.05\ \cancel{\text{g}}} \times \frac{1\text{ L}}{1000\ \cancel{\text{mL}}} = 0.548\text{ L}$$

[redacted]

A group of students collected 125 empty aluminum cans to take to the recycling center. If 21 cans make 1.0 pound of aluminum, how many liters of aluminum (D=2.70 g/cm^3) are obtained from the cans?

1) 1.0 L 2) 2.0 L 3) 4.0 L

[redacted]

1) 1.0 L

$$125 \text{ cans} \times \frac{1.0 \text{ lb}}{21 \text{ cans}} \times \frac{454 \text{ g}}{1 \text{ lb}} \times \frac{1 \text{ cm}^3}{2.70 \text{ g}}$$

$$\times \frac{1 \text{ mL}}{1 \text{ cm}^3} \times \frac{1 \text{ L}}{1000 \text{ mL}} = 1.0 \text{ L}$$

[redacted]

3 metal samples. Which one will displace the greatest volume of water?

1	2	3
25 g Al 2.70 g/mL	45 g of gold 19.3 g/mL	[redacted]

Discuss your choice with another student.

[redacted]

1) $25 \text{ g Al} \times \frac{1 \text{ mL}}{2.70 \text{ g}} =$ 9.2 mL

25 g Al
2.70 g/mL