

DENSITY WORKSHEET

Directions: Answer the following problems. Be sure to show all work. Always include units.
Remember: A number without a unit has no meaning.

1. Solve this equation, $D=M/V$, for M. (show your work)

$$(v) D = \frac{m}{v} \quad m = v \times D$$

2. Solve this equation, $D=M/V$, for V. (show your work)

$$(v) D = \frac{m}{v} \quad \frac{v \times D}{D} = \frac{m}{D} \quad v = \frac{m}{D}$$

3. What is mass?

a measure of the amount of matter in an object

4. What is volume?

the amount of space an object takes up.

5. What is Density?

The ratio of mass to volume of an object. $Density = \frac{mass}{volume}$

1. A sample of seawater weighs 158 grams and has a volume of 156 ml. What is the density?

$$m = 158g \quad v = 156ml \quad D = \frac{m}{v} \quad D = \frac{158g}{156ml} \quad \boxed{D = 1.01g/ml}$$

$D = ?$

1s.f.

2. A cylindrical box with a volume of 200 cm³ holds 432 g of sodium chloride. Calculate the density of the salt.

$$v = 200cm^3 \quad m = 432g \quad D = \frac{m}{v} \quad D = \frac{432g}{200cm^3} = 2.16g/cm^3$$

$D = ?$

$\boxed{2g/cm^3}$

1s.f.

3. What is the weight of ethyl alcohol that fills a 200 ml container? The density of ethyl alcohol is 0.789 g/ml.

$$m = ? \quad v = 200ml \quad D = 0.789g/ml \quad (v) D = \frac{m}{v} \quad m = v \times D$$

$$m = (200ml)(0.789g/ml) = 157.8g$$

$\boxed{200g}$

$$\frac{1.59 \text{ g}}{1 \text{ mL}} \times \frac{1000 \text{ mL}}{1 \text{ L}} = \boxed{\frac{1590 \text{ g}}{\text{L}}}$$

4. A flask that weighs 345.8 g is filled with 225 ml of carbon tetrachloride. The weight of the flask and carbon tetrachloride is found to be 703.55 g. Calculate the density in g/ml and g/L.

$$\begin{aligned} m &= 345.8 \text{ g} \\ m &= 703.55 \text{ g} \\ m &= 703.55 \text{ g} - 345.8 \text{ g} \\ m &= 357.75 \text{ g} \\ V &= 225 \text{ mL} \end{aligned}$$

$$\begin{aligned} D &= \frac{m}{V} \\ D &= \frac{357.75 \text{ g}}{225 \text{ mL}} = \boxed{1.59 \text{ g/mL}} \end{aligned}$$

5. A block of lead has dimensions of 4.5 cm by 5.2 cm by 6.0 cm. The block weighs 1587 g. From this information, calculate the density.

$$\begin{aligned} V &= l \times w \times h \\ V &= 4.5 \text{ cm} \times 5.2 \text{ cm} \times 6.0 \text{ cm} \\ V &= 140.4 \text{ cm}^3 \\ m &= 1587 \text{ g} \\ D &= ? \end{aligned}$$

$$\begin{aligned} D &= \frac{m}{V} \\ D &= \frac{1587 \text{ g}}{140.4 \text{ cm}^3} = \boxed{11.3 \text{ g/cm}^3} \end{aligned}$$

6. 28.5 g of iron shot is added to a graduated cylinder containing 45.5 ml of water. The water level rises to the 49.1 ml mark. Calculate the density.

$$\begin{aligned} V &= 49.1 \text{ mL} - 45.5 \text{ mL} \\ V &= 3.6 \text{ mL} \\ m &= 28.5 \text{ g} \\ D &= ? \end{aligned}$$

$$\begin{aligned} D &= \frac{m}{V} \\ D &= \frac{28.5 \text{ g}}{3.6 \text{ mL}} = \boxed{7.92 \text{ g/mL}} \end{aligned}$$

7. A cylindrical tube of length 27.75 cm and radius 2.00 cm is filled with argon gas. The empty tube weighs 188.25 g. The tube filled with argon weighs 188.87 g. Calculate the density.

$$\begin{aligned} V &= \pi r^2 h \quad r = 2.00 \text{ cm}, h = 27.75 \text{ cm} \\ V &= \pi (2.00 \text{ cm})^2 (27.75 \text{ cm}) = 348.7 \text{ cm}^3 \\ m &= 188.87 \text{ g} - 188.25 \text{ g} = 0.62 \text{ g} \\ D &= ? \end{aligned}$$

$$\begin{aligned} D &= \frac{m}{V} \\ D &= \frac{0.62 \text{ g}}{348.7 \text{ cm}^3} = \boxed{0.00178 \text{ g/cm}^3} \end{aligned}$$

8. The hydrogen stored inside a large weather balloon weighs 13.558 g. What is the volume of this balloon if the density of hydrogen is 0.089 g/L?

$$\begin{aligned} m &= 13.558 \text{ g} \\ D &= 0.089 \text{ g/L} \\ V &= ? \end{aligned}$$

$$\begin{aligned} (V) D &= \frac{m}{V} (V) \\ \frac{V \times D}{D} &= \frac{m}{D} \end{aligned}$$

$$\begin{aligned} V &= \frac{m}{D} \\ V &= \frac{13.558 \text{ g}}{0.089 \text{ g/L}} = \boxed{152.337 \text{ L}} \\ &= \boxed{150 \text{ L}} \end{aligned}$$