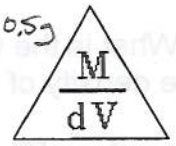
Chemistry
Name_____

$\frac{1\text{ g}}{1000\text{ mg}} \mid \frac{500\text{ mg}}{} = 0.5\text{ g}$



Density Calculations Worksheet I

density = $\frac{\text{mass}}{\text{volume}}$

UNITS OF DENSITY
solids (g/cm^3) liquids (g/mL)

$\frac{1000\text{ mL}}{1\text{ L}} \mid \frac{1.2\text{ L}}{} = 1260\text{ mL}$ $\frac{1000\text{ g}}{1\text{ Kg}} \mid \frac{1.5\text{ Kg}}{} = 1500\text{ g}$

1. Find the unknown quantity:

a) d = 3 g/mL
V = 100 mL
M = ?
$d = \frac{M}{V}$
$M = d \cdot V$
$= 3\frac{g}{mL} \cdot 100\text{ mL}$
M = 300 g

b) d = ?
V = 950 mL
M = 95 g
$d = \frac{M}{V}$
$= \frac{95\text{g}}{950\text{mL}}$
d = 0.10 g/mL

c) d = 0.5 g/cm³
V = ?
M = 20 g
$d = \frac{M}{V}$
$V = \frac{M}{d} = \frac{20\text{g}}{0.5\text{ g/cm}^3}$
V = 40 cm³

2. Find the unknown quantity (CONVERT FIRST to g or mL)

a) d = 24 g/mL
V = 1.2 L = 1,200 mL
M = ?
$d = \frac{M}{V}$
$M = d \cdot V$
$= 24\frac{g}{mL} \cdot 1200\text{mL}$
M = 29,000 g = 2.9×10^4 g

b) d = ?
V = 100 mL
M = 1.5 kg = 1,500 g
$d = \frac{M}{V}$
$= \frac{1500\text{g}}{100\text{ mL}}$
d = 15 g/mL → **20 g/mL**

c) d =
V = 0.52 L = 520 mL
M = 500 mg = .5 g
$d = \frac{M}{V}$
$= \frac{0.5\text{g}}{520\text{mL}}$
d = .001 g/mL

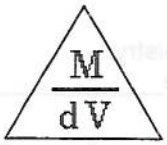
WORD PROBLEMS

1. A block of aluminum occupies a volume of 15.0 mL and weighs 40.5 g. What is its density?

$d = \frac{m}{V} = \frac{40.5\text{g}}{15.0\text{mL}} =$ **2.70 g/mL**

2. Mercury metal is poured into a graduated cylinder that holds exactly 22.5 mL. The mercury used to fill the cylinder weighs 306.0 g. From this information, calculate the density of mercury.

$d = \frac{m}{V} = \frac{306.0\text{g}}{22.5\text{mL}} =$ **13.6 g/mL**



3. What is the weight of the ethanol that exactly fills a 200.0 mL container? The density of ethanol is 0.789 g/mL.

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

$= 0.789 \frac{g}{mL} \cdot 200.0 mL = \boxed{158 g = m}$

4. A rectangular block of copper metal weighs 1896 g. The dimensions of the block are 8.4 cm by 5.5 cm by 4.6 cm. From this data, what is the density of copper? (hint: find the volume of a block first)

$d = \frac{m}{V} = \frac{1896 g}{210 cm^3} = \boxed{9.0 g/cm^3 = d}$

$V = 8.4 \times 5.5 \times 4.6$

$= 212.52$

$= 210 cm^3$

5. What volume of silver metal will weigh exactly 2500.0 g. The density of silver is 10.5 g/cm^3.

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

$V = \frac{m}{d} = \frac{2500.0 g}{10.5 g/cm^3} = \boxed{238 cm^3 = V}$ or $\boxed{2.38 \times 10^2 cm^3}$

6. Find the mass of 250.0 mL of benzene. The density of benzene is 0.8765 g/mL.

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

$m = d \cdot V \quad 0.8765 \frac{g}{mL} \cdot 250.0 mL = \boxed{219.1 g = M}$

or $\boxed{2.191 \times 10^2 g}$

7. A block of lead has dimensions of 4.50 cm by 5.20 cm by 6.00 cm. The block weighs 1587 g. From this information, calculate the density of lead.

$V = 4.50 \times 5.20 \times 6.00 = 140.4 cm^3$

$D = \frac{M}{V} = \frac{1587 g}{140.4 cm^3} = \boxed{11.3 g/cm^3}$

8. 28.5 g of iron shot is added to a graduated cylinder containing 45.50 mL of water. The water level rises to the 49.10 mL mark, From this information, calculate the density of iron.

$V = 49.10 mL - 45.50 mL = 3.6 mL$

$d = \frac{m}{V} = \frac{28.5 g}{3.6 mL} = \boxed{7.92 g/mL}$