General Chemistry
Mr. MacGillivray
Dimensional Analysis Practice Problems

Make the following conversions:

1) 4.32×10^{-2} mL to L

$$4.32 \times 10^{-2}\ \text{mL} \times \frac{1\ \text{L}}{1000\ \text{mL}} = 4.32 \times 10^{-5}\ \text{L}$$

2) 0.0655 kg to g

$$0.0655\ \text{kg} \times \frac{10^3\ \text{g}}{1\ \text{kg}} = 65.5\ \text{g} \quad (\text{or } 6.55 \times 10^{1}\ \text{g})$$

3) 4.62×10^{3} cm to km

$$4.62 \times 10^{3}\ \text{cm} \times \frac{1\ \text{m}}{10^2\ \text{cm}} \times \frac{1\ \text{km}}{10^3\ \text{m}} = 4.62 \times 10^{-2}\ \text{km}$$

(or 0.0462 km)

4) 7. 00 g/ml to kg/ml

$$7.00\ \frac{\text{g}}{\text{mL}} \times \frac{1\ \text{kg}}{10^3\ \text{g}} = 7.00 \times 10^{-3}\ \frac{\text{kg}}{\text{mL}}$$

5) 4.09×10^{1} g/ml to g/L

$$4.09 \times 10^{1}\ \frac{\text{g}}{\text{mL}} \times \frac{10^3\ \text{mL}}{1\ \text{L}} = 4.09 \times 10^{4}\ \frac{\text{g}}{\text{L}}$$

6) 3.44 mg/s to kg/hr

$$3.44\ \frac{\text{mg}}{\text{s}} \times \frac{1\ \text{g}}{10^3\ \text{mg}} \times \frac{1\ \text{kg}}{10^3\ \text{g}} \times \frac{60\ \text{s}}{1\ \text{min}} \times \frac{60\ \text{min}}{1\ \text{hr}} = \frac{\text{kg}}{\text{hr}}$$

$$= 0.0124\ \frac{\text{kg}}{\text{hr}}$$

$$1.24 \times 10^{-2}\ \frac{\text{kg}}{\text{hr}}$$

7) 7.58 nm to km (1 billion nm = 1 m)

$$7.58\ nm \times \frac{1\ m}{10^{9}\ nm} \times \frac{1\ km}{10^{3}\ m} = 7.58 \times 10^{-12}\ km$$

8) 7.58 cm to nm

$$7.58\ cm \times \frac{1\ m}{10^{2}\ cm} \times \frac{10^{9}\ nm}{1\ m} = 7.58 \times 10^{7}\ nm$$

9) A scientist measures that a glacier is moving at a speed of 219 nm per day. What is the speed of this glacier in km per decade?

$$\frac{219\ nm}{day} \times \frac{1\ m}{10^{9}\ nm} \times \frac{1\ km}{10^{3}\ m} \times \frac{365\ day}{1\ year} \times \frac{10\ year}{1\ decade} = 7.99 \times 10^{-7}\ \frac{km}{decade}$$

approximate

10) Europe and North America are drifting apart from each other at a rate of 0.438 cm every year. How many years are required for the continents to drift 1.00 meter apart?

given

unknown

start $1.00\ m \times$?? $= \_\_\_\ years$

Strategy: I need a conversion factor that relates time to distance. → USE $\frac{0.438\ cm}{year}$

$$1.00\ m \times \frac{100\ cm}{1\ m} \times \frac{1\ year}{0.438\ cm} = 228\ years$$

or

$2.28 \times 10^{2}\ yrs$