Problem Set Chapter 1 & 2

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August 27, 2020

1. Convert the following:
   (a) SKIP
   (b) $800[\text{g}\,\text{L}^{-1}] \rightarrow [\text{lb}\,\text{in}^{-3}]$

$$1[\text{g}] = .002205[\text{lb}]$$
$$1[\text{L}] = 61.0237$$
$$\frac{800[\not{g}]}{1[\not{L}]} \cdot \frac{.002205[\text{lb}]}{1[\not{g}]} \cdot \frac{1[\not{L}]}{61.0237[\text{in}^3]} = .0289 \left[\frac{\text{lb}}{\text{in}^2}\right]$$

2. SKIP
3. Name the following:
   (a) $LiOH \rightarrow$ Lithium Hydroxide
   (b) $CaF_2 \rightarrow$ Calcium Fluoride
   (c) $FeCO_3 \rightarrow$ Iron (II) Carbonate
   (d) $S_4N_2 \rightarrow$ Tetrasulfur Dinitride
   (e) $Zn(NO_3)_2 \rightarrow$ Zinc Nitrate
   (f) $K_2SO_4 \rightarrow$ Potassium Sulfate
   (g) $NO \rightarrow$ Nitrogen Monoxide
   (h) $FeCl_2 \rightarrow$ Iron (II) Chloride
   (i) $Na_2O \rightarrow$ Sodium Oxide
   (j) $K_2S \rightarrow$ Potassium Sulfide
   (k) $Cr_2(SO_4)_3 \rightarrow$ Chromium (III) Sulfate
   (l) $Cu(OH)_2 \rightarrow$ Copper (II) Hydroxide
   (m) $KOH \rightarrow$ Potassium Hydroxide

(n) $CuI \rightarrow$ Copper (I) Iodide

4. Write the formula for the following compound:

   (a) Diselenium Diiodide $\rightarrow Se_2I_2$
   (b) Tin (II) Phosphate $\rightarrow Sn_3(PO_4)_2$
   (c) Potassium Dichromate $\rightarrow K_2Cr_2O_7$
   (d) Gold (I) Sulfide $\rightarrow Au_2S$
   (e) Barium Hydroxide $\rightarrow Ba(OH)_2$
   (f) Ammonium Phosphate $\rightarrow (NH_4)_3PO_4$
   (g) Potassium Sulfate $\rightarrow K_2SO_4$
   (h) Calcium Nitrate $\rightarrow Ca(NO_3)_2$
   (i) Iron (II) Carbonate $\rightarrow FeCO_3$
   (j) Ammonium Dichromate $\rightarrow (NH_4)_2Cr_2O_7$
   (k) Potassium Sulfide $\rightarrow K_2S$
   (l) Cobalt (II) Nitrate $\rightarrow Co(NO_3)_2$

5. Calculate the mass (in grams) of nitric acid that is contained in a 3.5 liter mixture of 69.8% by weight of nitric acid. Density of mixture is $1.42[\mathrm{g\,cm^{-3}}]$

$$1[\mathrm{cm^3}] = .001[\mathrm{L}]$$
$$\rho = \frac{m}{V}$$
$$\rho V = m \rightarrow \frac{1.42[\mathrm{g}]}{1[\cancel{\mathrm{cm^3}}]} \cdot \frac{1000[\cancel{\mathrm{cm^3}}]}{1[\cancel{L}]} \cdot 3.5[\cancel{L}] \cdot .698 = 3.47 \cdot 10^3[\mathrm{g}]$$

6. The density of a piece of silver is $10.5[\mathrm{g\,mL^{-1}}]$. This piece is placed in a graduated cylinder containing 11.2[mL] of water, and then the water rises to 11.7[mL]. What is the mass (in grams) of the piece of silver?

$$V_{Ag} = 11.7 - 11.2 = .5[\mathrm{mL}]$$
$$m = \rho V \rightarrow m = .5[\cancel{\mathrm{mL}}] \cdot \frac{10.5[\mathrm{g}]}{1[\cancel{\mathrm{mL}}]} = 5.25[\mathrm{g}]$$

7. How long is a cylindrical bar with base area of $1.5[\mathrm{cm^2}]$, if it is made of 898[kg] of iron with a density of $7.76[\mathrm{g\,cm^{-3}}]$.

$$898[\mathrm{kg}] = 898000[\mathrm{g}]$$
$$\rho = \frac{m}{V} \rightarrow \frac{\rho}{m} = \frac{1}{1.5l} \rightarrow l = \frac{m}{1.5\rho}$$
$$l = \frac{898000}{1.5 \cdot 7.76} = 7.7 \cdot 10^4[\mathrm{cm}]$$

8. A square of foil with density $2.7[\mathrm{g\,mL^{-1}}]$ is $5.1[\mathrm{cm}]$ on a side and has a mass of $1.762[\mathrm{g}]$. Calculate the thickness of the foil.

$$\rho = \frac{m}{V} \to V = \frac{m}{\rho} \to l = \frac{m}{A\rho}$$
$$l = \frac{1.762}{5.1 \cdot 5.1 \cdot 2.7} = .025[\mathrm{cm}]$$

9. A certain material has a density of $12.8[\mathrm{kg\,m^{-3}}]$. How many grams of this material are needed to fill a volume of $2[ft^3]$?

$$2[ft^3] = .056634[\mathrm{m^3}]$$
$$\rho = \frac{m}{V} \to m = \rho V$$
$$m = \frac{12.8[\cancel{\mathrm{kg}}]}{1[\cancel{\mathrm{m^3}}]} \cdot .055634[\cancel{\mathrm{m^3}}] \cdot \frac{1000[\mathrm{g}]}{1[\cancel{\mathrm{kg}}]} = 712[\mathrm{g}]$$