Diff Chem/ IB Chem I: Conversions Worksheet Name: Answer key

Answer the following questions. Be sure to show all your work and label your answers according. Specific notice will be given to significant figures.

1. The label on a soft-drink bottle gives the volume in two units: 2.0 L and 67.6 fl oz. Use this information to find a conversion factor between the English and metric units. How many significant figures can you justify including in your conversion factor?

$\frac{2.0\ L}{67.6\ fl\ oz} \Rightarrow \frac{0.030\ L}{1\ fl\ oz}$ or $\frac{34\ fl.oz}{L}$ Can have 2 sig figs due to 2.0 L

2. According to the owners manual, the gas tank of a certain luxury automobile holds 22.3 gal. If the density of gasoline is 0.8206 g/mL, determine the mass in kilograms and pounds of the fuel in a full tank.

$$22.3\ gal \left|\frac{3.7854\ L}{1\ gal}\right| \frac{1000\ mL}{1\ L} \left|\frac{0.8206\ g}{mL}\right| \frac{1\ kg}{1000\ g} \left|\frac{2.2046\ lbs}{1\ kg}\right.$$

$= 69.3\ kg = 153\ lbs$

3. In order to prepare for a laboratory period, a student lab assistant needs to prepare a solution containing 125 g of a compounds and 250 mL of acetone. A bottle containing 0.250 lbs of compound is available along with a can holding 7.5 fl. oz of acetone. Does the lab assistant have enough of each material?

$$0.250\ lbs \left|\frac{16\ oz}{1\ lb}\right| \frac{28.35\ g}{1\ oz} = 113\ g$$ No.

$$7.5\ fl\ oz \left|\frac{29.57\ mL}{1\ fl\ oz}\right. = 220\ mL \rightarrow No$$

The student doesn't have enough of either.

4. A cylindrical glass tube that is 18.5 cm long is filled with distilled water at 4°C. The mass of water needed to fill the tube is found to be 16.0g. Calculate the inner diameter of the tube in millimeters.

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

$V = \pi r^2 l$

$V = \frac{m}{d}$ $r = \sqrt{\frac{m}{d \cdot \pi \cdot l}}$

$$\left(16.0\ g\ H_2O \left|\frac{cm^3}{1.0\ g}\right| \pi \left|(18.5\ cm)^{1/2}\right| 2\right. = 1.05\ cm$$

5. What is the mass in kg of a pure lead sphere that has a radius of 4.12 in.?

$V = \frac{4}{3}\pi r^3$

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

$d_{Pb} = 11.34\ g/mL$

$$g \left|\frac{4}{3}\right| \pi \left|\frac{(4.12\ in)^3}{1\ in^3}\right| \frac{(2.54\ cm)^3}{1\ cm^3} \left|\frac{1\ mL}{1\ mL}\right| \frac{11.34\ g}{1\ mL} \left|\frac{1\ kg}{1000\ g}\right. = 54.4\ kg\ Pb$$

6. Nickel shot has a mass of 5.60 g per shot. How many shot would be required to displace water in a 50 mL graduated cylinder from 24.5 mL to 44.8 mL?

$V = (44.8 - 24.5)\ mL$

$m = V \cdot d$

$$(44.8 - 24.5)\ mL \left|\frac{1\ cm^3}{1\ mL}\right| \frac{8.91\ g}{1\ cm^3} \left|\frac{1\ Ni\ shot}{5.60\ g}\right. = 32.3\ shot = 32\ Ni\ Shot$$