Math Review • **Chemistry 210**

1. Carry out the following conversions by ***DIMENSIONAL ANALYSIS.*** Express the answers to the correct number of significant figures. *(Use the back cover of the book for some conversion factors.)*

A) 5.202 x 10^6 µm → in

$5.202\times10^{6}\,\mu m \left|\frac{1\,m}{1\times10^{6}\,\mu m}\right|\frac{100\,cm}{1\,m}\left|\frac{1\,in}{2.54\,cm}\right. = 204.8\,in$

B) 0.00233 dm^3 → cm^3

$0.00233\,dm^3 \left|\frac{1000\,cm^3}{1\,dm^3}\right. = 2.33\,cm^3$

C) 500. ng → mg

$5.00\times10^{-4}\,mg$

D) 750 kHz → Hz

$750,000\,Hz$

E) 3.25 x 10^{12} dm^3 → km^3

$3.25\,km^3$

F) 75 mi/hr → m/s

$\frac{75\,mi}{1\,hr}\left|\frac{1\,hr}{60\,min}\right|\frac{1\,min}{60\,s}\left|\frac{1609\,m}{1\,mi}\right. = 33.5\,m/s$

G) 45,000 pm → µm

$0.045\,\mu m$

H) 9.55x10^7 Hz → MHz

$95.5\,MHz$

I) 0.221 mL → fl. oz.

Note: 32 fl oz = 1 qt.

0.00747 fl. oz

J) 5.52 gal → mL

$20,900\,mL$

K) 6000 revolutions/min → revolutions/hour

$360,000\,rev/hr$ (400,000 w/ sig figs)

L) conv. factor: L) 18.7 g/cm^3 → oz/in^3

$\left(\frac{1\,in}{2.54\,cm}\right)^3 = \frac{1\,in^3}{16.39\,cm^3}$

$\frac{18.7\,g}{cm^3}\left|\frac{16.39\,cm^3}{1\,in^3}\right|\frac{16\,oz}{453.59\,g} = 10.8\,oz/in^3$

2. Express the following numbers in proper scientific notation.

A) 555,000,000 → 5.55×10^{8}

B) 0.0008600 → 8.600×10^{-4}

C) 378.4 x 10^{15} → 3.78×10^{17}

D) 0.00987 → 9.87×10^{-3}

E) 34.5 → 3.45×10^{1}

F) 15.120 → 1.5120×10^{1}

G) 0.000785 x 10^{-5} → 7.85×10^{-9}

H) 3250 → 3.25×10^{3}

I) 23,000,000,000 → 2.3×10^{10}

J) 4^{12} → 1.68×10^{7}

3 Simplify the following expressions to single powers of 10 (without a calculator!):

A) $\frac{10^{-8}\cdot10^{3}}{10^{-12}} = 10^{7}$

B) $\frac{10^{4}\cdot10^{12}}{10^{7}\cdot10^{-1}} = 10^{10}$

C) $\frac{(10^{4})^2}{10^{5}} = 10^{3}$

4. A chemistry teacher has a height of 70.0 inches. What is the height of that teacher in meters?

$70.0\,in\left|\frac{2.54\,cm}{1\,in}\right|\frac{1\,m}{100\,cm} = 1.78\,m$

5. What is the mass of a gold bar (in kilograms) with a weight of 100. oz. ?

$100.\,oz\left|\frac{1\,lb}{16\,oz}\right|\frac{1\,kg}{2.205\,lb} = 2.83\,kg$

(6) What is the density of a piece of wood if it has a mass of 1.55x10^6 g and a volume 1.74 m^3?

$D = ?$

$m = 1.55\times10^{6}\,g$

$V = 1.74\,m^3 \times \frac{1\times10^{6}\,cm^3}{1\,m^3} = 1.74\times10^{6}\,cm^3$

$D = \frac{m}{V} = \frac{1.55\times10^{6}\,g}{1.74\times10^{6}\,cm^3} = 0.891\,g/cm^3$

(7) What is the volume of a piece of lead that is 73.7 kg? (D_{lead} = 11.4 g/cm^3)

$m = 73.7\,kg = 73,700\,g$

$V = ?$

$D = 11.4\,g/cm^3$

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

$V = \frac{m}{D} = \frac{73,700\,g}{11.4\,g/cm^3} = 6,460\,cm^3$

(8) What mass of gasoline are you putting in your car if fill up with 45 L ? ($D_{gasoline}$ = 0.671 g/mL)

$m = ?$

$V = 45\,L = 45,000\,mL$

$D = 0.671\,g/mL$

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

$m = D\cdot V = (0.671\,g/mL)(45,000\,mL)$

$m = 30,000\,g = 3.0\times10^{4}\,g = 30\,kg$

Math Review 2 Answers

9 How many significant figures are in each of the following numbers?

A) 1.00100 6

B) 0.00023 2

C) 1.2500×10^{-7} 5

D) 320,000 2

E) 450,000. 6

F) 95,000 5

G) 0.0090090 5

H) 5 cars infinite (counting #)

10 Express the answers to the following problems in scientific notation with the correct number of sig figs:

A. $3.25 \times 10^{5} \times 1.79 \times 10^{-20}$

$= 5.82 \times 10^{-15}$

B. 45.83 + 7.170

$= 5.300 \times 10^{1}$

C. 40.00 x 12.591

$= 5.036 \times 10^{2}$

D. 320,000 x 8.51

2.7×10^{6}

E. 0.00359 – 0.0000912

3.50×10^{-3}

F. $4.55 \times 10^{25} + 3.22 \times 10^{26}$

3.68×10^{26}

G. 300. x 500.

1.50×10^{5}

H. 40 x 12.591

5×10^{2}

I. 1200 + 32,000

3.3×10^{4}

J. $\frac{325 - 65}{42.48}$

6.12×10^{0}