

Chemistry 112
First Hour Exam

Name: _____
(4 points)

Please show all work for partial credit

All problems worth 12 points

1. Below are 4 calculations and answers. Express these answers with the correct number of significant figures

A.

$$54 \times 65 = 3510.00$$

$$\underline{3500}$$

B.

$$54 + 6.5 = 60.50$$

$$\underline{60.}$$

C.

$$5.4 \times 10^{-1} - 6.5 \times 10^{-2} = 0.4750$$

$$\underline{.48}$$

D.

$$(5.4 \times 10^{-1} - 6.5 \times 10^{-2}) / (54 + 6.5) = 7.8124 \times 10^{-3}$$

$$\underline{7.8 \times 10^{-2}}$$

2. Perform the following unit conversions

A 500 yards to meters

$$500 \text{ yds} \times \frac{1 \text{ m}}{1.0936 \text{ yds}} = 457 \text{ m}$$

B 500 km to nm

$$500 \text{ km} \times \frac{1000 \text{ m}}{1 \text{ km}} \times \frac{1 \text{ nm}}{1 \times 10^{-9} \text{ m}} = 5 \times 10^{14} \text{ nm}$$

C 11.35 g/cm³ (the density of lead) to lbs/ft³

$$\frac{11.35 \text{ g}}{1 \text{ cm}^3} \times \frac{1 \text{ kg}}{1000 \text{ g}} \times \frac{2.2046 \text{ lbs}}{1 \text{ kg}} \times \left(\frac{2.54 \text{ cm}}{1 \text{ in}}\right)^3 \times \left(\frac{12 \text{ in}}{1 \text{ ft}}\right)^3 = 708 \text{ lbs/ft}^3$$

D 2.5 Barrels to liters

You may need these additional conversion factors

1 barrel = 3.281 bushels

1 bushel = 8 gallons

$$2.5 \text{ barrels} \times \frac{3.281 \text{ bushels}}{1 \text{ barrel}} \times \frac{8 \text{ gallon}}{1 \text{ bushel}} \times \frac{4 \text{ qts}}{1 \text{ gallon}} \times \frac{1 \text{ liter}}{1.0567 \text{ qts}} = 248 \text{ liters}$$

3. Circle one or more descriptive terms from each list that properly describes each substance.

Ketchup is:

heterogeneous mixture -- **Homogeneous mixture** -- Pure Substance

Water is:

Homogeneous mixture -- **Pure Substance** -- Element

Copper wire is:

Homogeneous mixture -- **Pure Substance** -- Element

Paint is:

Heterogenous mixture -- **Solution** -- Pure substance

4. Fill in the blanks in the statements below:

(Note that **None** or **Not defined** or **Any** may be legitimate answers!)

(A) Name any two alkali metals: **Li, Na, K, Rb, Cs, Fr**

In an ionic compound alkali metal ions will have what charge? **+1**

(B) Name any two transition metals: **Any from middle**

In an ionic compound transition metals ion will have what charge? **Any positive**

(C) Name any two halides: **F, Cl, Br, I, Ar**

In an ionic compound a halide ion will have what charge? **-1**

(D) Name one non-metal in the third period: **Si, P, S, Cl, Ar**

Give the charge of this non-metal in an ionic compound. **Cl: -1, S: -2, P: -3, Si: -4**

Give the charge of this non-metal in a covalent compound. **Not defined**

5. Name the following compounds:

Na_2SO_2 Sodium ? Opps -My bad- should have been SO_3 or SO_4

CoCl_4 Cobalt(IV) chloride

N_2H_4 Dinitrogen tetrahydride

Hbr(aq) Hydrobromic Acid

6 Give the correct molecular formula for the following compounds:

Sulfurous Acid H_2SO_3

Iron(III) hydroxide Fe(OH)_3

Potassium sulfide K_2S

Phosphorous pentafluoride PF_5

7.

A. What is the molecular formula of Calcium chloride?



B. What is the molar mass of this compound?

$$40.08 + 2(35.45) = 110.98 \text{ g/mol}$$

C. How many moles are in 1 gram of this compound?

$$1 \text{ g} \times \frac{1 \text{ mol}}{110.98 \text{ g}} = .009 \text{ mol}$$

D. What is the % composition for each element in this compound?

$$\% \text{Ca} = \frac{40.08 \text{ g/mol}}{110.98 \text{ g/mol}} \times 100\% = 36\% \text{Ca}; \quad \% \text{Cl} = \frac{2 \times 35.45 \text{ g/mol}}{110.98 \text{ g/mol}} \times 100\% = 64\% \text{Cl}$$

8. Joe Cheapo gave his girl an engagement ring with a diamond so small it could only be seen with a microscope. This diamond had a cubic shape, with each edge of the cube having a length of $0.20 \mu\text{m}$.

A. What is the total volume of this diamond in cm^3 ?

Volume of cube = length x width x height = $.20\mu\text{m} \times .20\mu\text{m} \times .20 \mu\text{m} = .0080\mu\text{m}^3$

$$.008 \mu\text{m}^3 \times \frac{1 \times 10^{-6} \text{ m}}{1 \mu\text{m}} \times \frac{1 \text{ cm}}{1 \times 10^{-2} \text{ m}} \times \frac{1 \times 10^{-6} \text{ m}}{1 \mu\text{m}} \times \frac{1 \text{ cm}}{1 \times 10^{-2} \text{ m}} \times \frac{1 \times 10^{-6} \text{ m}}{1 \mu\text{m}} \times \frac{1 \text{ cm}}{1 \times 10^{-2} \text{ m}} = 8 \times 10^{-15} \text{ cm}^3$$

B. If the density of a diamond is 3.51 g/cm^3 what is the mass of this diamond?

Density = Mass/Volume; Density x Volume = Mass

$$3.51 \text{ g/cm}^3 \times 8 \times 10^{-15} \text{ cm}^3 = 2.8 \times 10^{-14} \text{ g}$$

C. How many atoms of C are in this diamond?

(Record this number with the proper number of significant figures)

$$2.81 \times 10^{-14} \text{ g} \times \frac{1 \text{ mole C}}{12.01 \text{ g C}} \times \frac{6.022 \times 10^{23} \text{ atom C}}{1 \text{ mole C}} = 1.4 \times 10^9 \text{ atoms C}$$