Chemistry 021

Assignment # 1

Name *ANSWERS* Student Number _____

1) Caffeine has the chemical formula $C_8H_{10}N_4O_2$. What elements are present in caffeine? How many atoms of each element does one molecule of caffeine contain?

Elements present are Carbon, Hydrogen, Nitrogen and Oxygen.

Each molecule of caffeine contains: *8 Carbon atoms*
10 Hydrogen atoms
4 Nitrogen atoms
2 Oxygen atoms

2) Classify each of the following as either a physical or chemical change.

a) burning of propane in a barbeque *Chemical*

b) evaporation of alcohol *Physical*

c) breaking a plate *Physical*

d) copper metal turning green over a period of time *Chemical*

3) Balance each of the following chemical equations:

a) $2\ SO_2 + O_2 \rightarrow 2\ SO_3$

b) $C_{10}H_{22} + 31/2\ O_2 \rightarrow 10\ CO_2 + 11\ H_2O$

c) $2\ Al + 3\ H_2SO_4 \rightarrow Al_2(SO_4)_3 + 3\ H_2$

4) If the concentration of a certain gas in air is 64.8 ppm, how many molecules of the gas are present in 1,000,000 molecules of air?

64.8 ppm means 64.8 molecules of gas in 1,000,000 molecules; so.....64.8.

How many of the gas molecules would be present in 1,000,000,000 molecules of air?

$$\frac{64.8}{1{,}000{,}000} = \frac{x}{1{,}000{,}000{,}000} \Rightarrow x = 64{,}800$$

What percentage of the air is due to the gas? (ie, how many molecules of gas in 100 molecules of air?)

$$\frac{64.8}{1{,}000{,}000} = \frac{x}{100} \Rightarrow x = 0.00648\ \%$$

5) State the number of protons, neutrons and electrons for the following atoms:

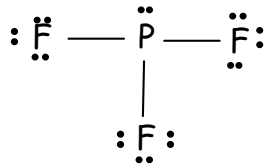
a) Bromine - 81 (^{81}Br) *35 protons, 35 electrons, 46 neutrons*

b) Antimony - 123 (^{123}Sb) *51 protons, 51 electrons, 72 neutrons*

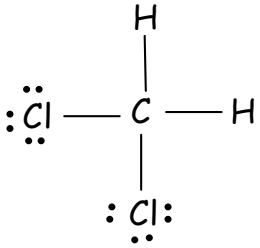
c) Uranium - 238 (^{238}U) *92 protons, 92 electrons, 146 neutrons*

6) Draw Lewis Dot diagrams for the following molecules:

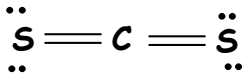
a) PF_3



b) CH_2Cl_2



C) CS_2



This assignment is due on Wednesday, October 6, 2004.