CH1010   Exam 1   Name_____Key_____

September 27, 2000 SSN_____Seat No_____

In solving problems, you must show all work. Little or no credit will be given for a correct answer with no work shown.

1. Write the electronic configuration for the following atoms or ions. The atomic number of the element is given by the subscript preceding the symbol (9%).

a. $_{15}P$ $1s^2, 2s^2, 2p^{6,} 3s^2, 3p_x{}^1, 3p_y{}^1, 3p_z{}^1$

b. $_5B$ $1s^2, 2s^2, 2p_x{}^1$

c. $_{20}Ca^{+2}$ $1s^2, 2s^2, 2p^6, 3s^2, 3p^6$

2. An ion with a +1 charge has the electronic configuration $1s^2, 2s^2, 2p^{6,} 3s^2, 3p^6$ What is the ion? (3%)

                K+

3. a) The formula of acetone is C_3H_6O. How many grams are there in 2.6 mol acetone? (8%)
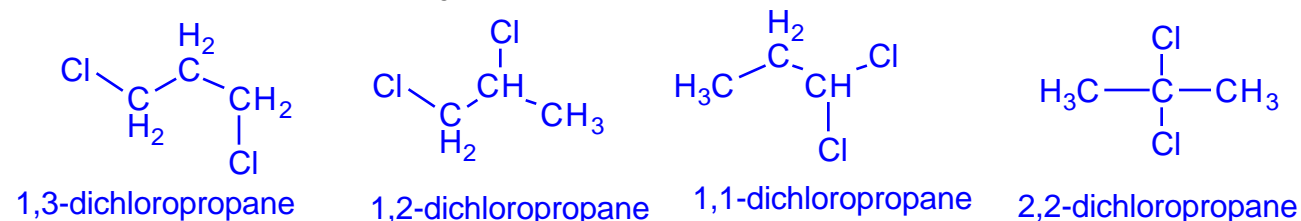Formula mass = (6x1)+(3x12)+16 = 58 g/mol

58 g/mol x 2.6 mol = 150.8 g

b) The density of acetone is 0.79 g/ml. What is the volume of the above 2.6 mol of acetone in ml? (8%)
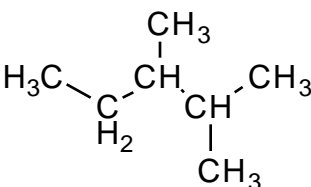
150.8 g/0.79 g/ml = 190.9 ml

4. Draw the extended structures of 4 isomers having the formula $C_3H_6Cl_2$. Name each of the isomers you have drawn. (12%)


1,3-dichloropropane   1,2-dichloropropane   1,1-dichloropropane   2,2-dichloropropane

5. Name the following substances. (9%)

a) CaF_2 Calcium Fluoride

b) C_3O_2 Tricarbon dioxide

c)
$$H_3C\diagdown\underset{H_2}{C}\diagup\underset{|\ CH_3}{\overset{|\ CH_3}{CH}}\diagdown\underset{|\ CH_3}{CH}\diagup CH_3$$ 2,3-Dimethylpentane

6. Calculate how many grams of CO_2 are generated when 150 g of octanol $(C_8H_{18}O)$ are burned in oxygen. Combustion of octanol in oxygen produces CO_2 and water. (20%)

$C_8H_{18}O$ + $12O_2$ --> $8CO_2$ + $9H_2O$
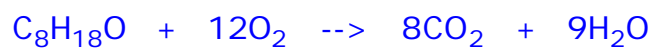
Formula mass = (18x1)+(8x12)+16 = 130 g/mol

150 g/130 g/mol = 1.15 mol octanol

1.15 mol octanol x 8 mol CO_2/mol octanol = 9.2 mol CO_2

9.2 mol CO_2 x 44 g CO_2/mol = 404.8 g CO_2

7. A common compound contains 12% carbon, 48% oxygen, and 40% Ca. What is its empirical formula? (15%) (Show your work)
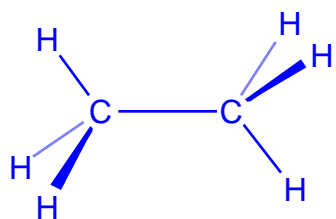
Mol Carbon = 12/12 = 1

Mol Calcium = 40/40 = 1

Mol Oxygen = 48/16 = 3

Calcium:Carbon:Oxygen 1:1:3

empirical formula is $CaCO_3$

8. Draw the three dimensional structure of staggered ethane (C_2H_6) (5%)

9. a. Auburn is 105 miles from Atlanta. What is this distance in meters? In cm? Use scientific notation in your answer. (1 mile = 1.609 km). (5%)

105 mi x 1.609 km/mi = 168.9 km

168.9 km x 10^3 m/km = 1.68×10^5 m

1.68×10^5 m x 10^2 cm/m = 1.68×10^7 CM

b. The density of ethyl alcohol is 0.79 g/ml. What is the weight of 5 gal ethyl alcohol in g? (1 gal = 3.78 liter) (6%)

5 gal x 3.78 l/gal = 18.9 liter

18.9 liter x 10^3 ml/liter = 1.89×10^4 ml

1.89×10^4 ml x 0.79g/ml = 1.49×10^4 g