CH1010 Practice Final Exam

1. a. Name all reactants and products in the equation below:



b. Calculate the percent carbon in product C.

c. If you start with 72g of reactant A, calculate the amount of product C you expect.

d. Draw the 3 dimensional structure of product C

2. Write the electronic configuration for the following atoms or ions:

- a. 7N b. 17Cl- c. 13Al
- d. What is the name of the ion that has 1s² 2s² 2p⁶ and a charge of +2?

3. a. CH_3NH_2 is a base. Write the equation for its acid-base reaction with water. Identify all acids and bases.

b. Write the expression for the K_b of CH_3NH_2

c. If the K_b of CH_3NH_2 is $1.32x10^{-5}$ calculate the pK_b.

d. $CH_3NH_3^+$ is an acid. Write the equation for its acid-base reaction with water. Identify all acids and bases.

e. Calculate the K_a of $CH_3NH_3^+$.

4. a. Calculate the molarity of ^{-}OH ions when 0.79g of Mg(OH)₂ is dissolved in 400 mL water.

b. Calculate the H_3O^+ concentration of the above solution.

c. Calculate the pH of the above solution.

5. a. The density of ethanol is 0.79g/mL. What is the w/w% if 6 g of ethanol is dissolved in 50mL of water?

b. Calculate the molarity of the above solution.

c. Ethanol is an alcohol. Draw its extended structure.

6. a. Draw the 3-dimensional structure of chloromethane.

b. Chloromethane is a gas. Calculate the volume of 26.0g of chloromethane at STP.

c. If 200 ml chloromethane has a pressure of 750 torr at 25°C, what will its pressure (in torr) be at 250° C?

7. a. Draw extended structures of all alkenes having the formula C_3H_5CI . b. Name each of the above alkenes.

8. Complete the following equations. Name reactants and products.

a. CH_3 - CH_2 - CH_2 - CH_3 + Br_2 \xrightarrow{hv}

b. $CH_2=CH-CH_2-CH_3 + H_2 \xrightarrow{Ni}$

c.
$$H_2C = C \begin{pmatrix} CH_3 \\ H_2 \end{pmatrix} + Br_2 \longrightarrow CH_3$$

d.
$$H^+$$
 + H_2O H^+

9. Identify the missing components in the nuclear reactions below.

a. ${}_{6}^{0}C \longrightarrow {}_{1}^{0}e + ?$ b. $? + {}_{0}^{0}n \longrightarrow {}_{26}^{59}Fe$

c. Selenium-75 $\longrightarrow \begin{array}{c} 0\\ -1e + ? \end{array}$

d. Gold (Au)-198 decays to mercury-198 with a half-life of 64.8 hr. Write the equation for this nuclear reaction.

e. If you start with a sample of Au-198 weighing 2 ng, calculate the weight of the sample after 24 hrs.

f. Briefly explain how the reaction below can be used to generate energy.

10. The pK_a of $H_2PO_4^-$ is 7.2., 0.72g of NaH₂PO₄ and 0.29 K₂HPO₄ are dissolved in 750 mL water.

- a. Calculate the molarity of H_2PO_4 -
- b. Calculate the molarity of HPO_4^{-2} (pay attention to stoichiometry).
- c. Calculate the pH of the solution (this is a buffer problem).