Name________________________________

PROBLEM 3: (3 points) What is the molarity of a solution made by dissolving 0.75 g of C_4H_8O in enough water to make 125-mL of solution?

PROBLEM 7: (7 points) When 29.5 g of methane and 45.0 g of chlorine gas undergo a reaction that has a 85.0% yield, what mass of chloromethane (CH_3Cl) forms? (The second product is $HCl_{(g)}$)

PROBLEM 8: (7 points) Acenaphthoquinone is a molecule based on quinone. It is insoluble in water, but soluble in alcohol. It is used in the manufacturing of dyes, pharmaceuticals, and pesticides. Determine the empirical formula of acenaphthoquinone 79.12% C, 3.32 % H, and 17.57% O by mass.

PROBLEM 11: (10 Points) In a combustion analysis of 23.2g sample of aspartame containing carbon, hydrogen, and oxygen was burned in excess oxygen and yielded 52.8 g of CO_2 and 21.6 g of water. Determine the empirical formula of the compound. A sample of 0.00829 g aspartame contains 0.000 0357 mole of aspartame. What is the molecular formula?

PROBLEM 13: (6 point) A student mixed 200.0 mL of 6.00 M $Al(NO_3)_3$, 400.0 mL of 1.00 M $NaNO_3$, 400.0mL of 0.500M $Ba(NO_3)_2$ and enough water to make 2000.0 mL of solution. What is the molarity of the nitrate ion (NO_3^-) in the final solution?

PROBLEM 14:(6 points) A sulfuric acid solution containing 571.6 g of H_2SO_4 per liter of solution has a density of 1.329 g/cm^3. [MW= 98.086 g/mol]

Calculate the:

a. Mass percentage of H_2SO_4 in this solution
b. The mole fraction of H_2SO_4 in this solution
c. The molarity of H_2SO_4 of this solution

PROBLEM 15: (5 points) Rust stains can be removed by washing a surface of a piece of steel with a dilute solution of oxalic acid ($H_2C_2O_4$).

The reaction is $Fe_2O_{3(s)} + 6\ H_2C_2O_{4(aq)} \rightarrow 2\ Fe(C_2O_4)_3{}^{3-}{}_{(aq)} + 3\ H_2O_{(l)} + 6\ H^+{}_{(aq)}$.

What mass of rust can be removed from the surface of steel by 1.0L of a 1.14M solution of oxalic acid?

PROBLEM 17: (10 points) A precipitate forms when aqueous sodium sulfide is mixed with aqueous copper(II) chloride. Calculate the mass of the precipitate that forms when 75.0 mL of 1.50 M sodium sulfide is mixed with 100.0 mL of 0.500 M copper(II) chloride. Hint: Write the equation for the reaction.