Practice Exam III – Gen Chem ASC Review Session

1. Given the following Unbalanced reaction: $H_{2(g)} + N_{2(g)} \rightarrow NH_{3(g)}$
    a. What is the balanced chemical equation?

    b. If there are 6 g of H_2 and 12 g N_2, how many moles of each reactant are there?

    c. Which is the limiting reagent?

    d. How many grams of NH_3 are produced?

2. Given that you have an aqueous solution of 0.15 M sodium hydroxide, how many mL of this solution do you need to make 20 mL of 0.025 M sodium hydroxide?

3. Write full balanced chemical reactions for the following or specify no reaction. Oxygen is always a gas and water is always a liquid. States of matter not needed for combination or decomposition reactions (3 points each).

a. $MgS_{(aq)} + Fe(NO_3)_{3(aq)} \rightarrow$

b. $HBr_{(aq)} + LiHCO_{3(aq)} \rightarrow$

c. $MnCl_{2(aq)} + Hg(C_2H_3O_2)_{2(aq)} \rightarrow$

d. $Hg_2(C_2H_3O_2)_{2(aq)} + AlCl_{3(aq)} \rightarrow$

e. $Sr_{(s)} + P_{4(s)} \rightarrow$

f. $Na_2SO_{4(s)} + Heat \rightarrow$

4. A 0.1764 g sample of Sodium carbonate (Na_2CO_3) is added to a 140 µL sample of 12 M hydrochloric acid and diluted with water to a total volume of 25.00 mL in a volumetric flask (30 points).

a. Write a balanced reaction that will describe what happens when the Na_2CO_3 is added to the hydrochloric acid. (3 poins)

$Na_2CO_{3(s)} + HCl_{(aq)} \rightarrow NaCl_{(aq)} + H_2O_{(l)} + CO_{2(g)}$

b. What is the concentration of sodium carbonate in the volumetric flask after the water has been added, but before any carbonate has been consumed? (5 points)

c. What is the concentration of hydrochloric acid in the volumetric flask after water has been added, but before any carbonate has been consumed? (5 points)

d. What is the limiting reagent in the reaction? (7 points)

e. If there are 24.4 L/mol of the gas at the temperature the reaction is performed, what is the theoretical yield for the gas in mL? (5 points)

f. If 18.9 mL of gas is collected, what is the % yield? (5 points)

5. Balance the following redox reactions in acidic solution. (10 points).

$Cr_{(s)} + Pb(C_2H_3O_2)_{2(aq)} \rightarrow$

a. Balance the Equation

b. Write the half reactions

c. Indicate which element is oxidized and which is reduced

6. Methane (CH_4) may be able to replace gasoline as a source of fuel for vehicles. 655 g of methane could potentially replace 1 gallon of gasoline. What is the volume of 655 g CH_4 at 25°C and 745 torr?