Ch 4/Worksheet-5 Solution Stoichiometry   Name: _____

Write the equation and balance it where necessary. **Show all work.**

Gravimetric Analysis/Precipitation Reactions

1. A solution containing water soluble salt of radioactive element thorium can be titrated with oxalic acid solution to form insoluble thorium (IV) oxalate. If 25.00 mL of Thorium (IV) ions requires 19.63 mL of 0.02500 M $H_2C_2O_4$ (Oxalic acid) for complete precipitation (equation given below), then what is the molar concentration of Th^{4+}? (*Ans: 9.815 x 10^{-3}M*)

$$Th^{4+} \quad + \quad 2H_2C_2O_4 \quad \longrightarrow \quad Th(HC_2O_4)_2 \quad + 2H^+$$

2. A sample of NaCl weighing 1.4477 g is dissolved in water and diluted to 250.0 mL what volume of this solution will be required to titrate 25.00 mL of 0.1000 M $AgNO_3$? (*Ans: .02526 L*)

Acid – Base Titration

3. How many mL of 0.0195 M hydrochloric acid are required to titrate 25.00 mL of 0.036 M potassium hydroxide? (*Ans: 46.2 mL*)

4. How many mL of 0.0195 M hydrochloric acid are required to titrate 10.00 mL of 0.0116 M calcium hydroxide? (*11.9mL*)

5. A solution of 0.336 g of KHP, made in water, is titrated and neutralized with 19.67 mL of an unknown concentration of sodium hydroxide solution. What is the molarity of a sodium hydroxide? (Molecular Weight of KHP = 204.23 g/mol and mol ratio of KHP and sodium hydroxide is 1:1). (*Ans: 0.0836 M*)

6. How many grams of potassium hydrogen phthalate (KHP) are needed to neutralize 22.36 mL of a 0.1205 M solution of sodium hydroxide? (Molecular Weight of KHP = 204.23 g/mol and mol ratio of KHP and sodium hydroxide is 1:1). (*Ans: 0.550g*)

7. In a reaction like neutralization of stomach acid, 175 mL of 1.55 M sodium hydrogen carbonate is added to 235 mL of 1.22 M hydrochloric acid. A) How much carbon dioxide is liberated? B) What is the molarity of sodium chloride produced? (assume that the volumes are additive) (*Ans: 11.9g CO_2, 0.662M*)