WKS **Name** _____
Solution Stoichiometry 2 **Period** _____

1. What volume of 0.325 M Na_3PO_4 would be needed to precipitate 25.00 g $Ba_3(PO_4)_2$ with excess $BaCl_2$ by the following balanced reaction?

$$2Na_3PO_4(aq) + 3BaCl_2(aq) \rightarrow 6NaCl(aq) + Ba_3(PO_4)_2(s)$$

2. How many grams of CaO are required for complete reaction with the HCl in 275 mL of a 0.523 M HCl solution? The balanced equation for the reaction is:

$$CaO(s) + 2\ HCl(aq) \rightarrow CaCl_2(aq) + H_2O(l)$$

3. When 53.0 mL of 0.750 M cobalt (III) nitrate are added to a sodium sulfate solution, how many grams of cobalt (III) sulfate can be precipitated? Balance the equation first.

$$\_\_\_\ Co(NO_3)_3\ (aq) + \_\_\_\ Na_2SO_4\ (aq) \rightarrow \_\_\_\ Co_2(SO_4)_3\ (s) + \_\_\_\ NaNO_3\ (aq)$$

4. 34.57 mL of $HC_2H_3O_2$ (acetic acid) solution of unknown concentration is used to neutralize 25.19 mL of NaOH (sodium hydroxide) with concentration 0.4295 M according to the following balanced equation:

$$HC_2H_3O_2(aq) + NaOH(aq) \rightarrow NaC_2H_3O_2(aq) + H_2O(l)$$

   a. How many moles of acetic acid are used?

   b. What is the concentration of the acetic acid solution, in M?

[Over]

5. When 321 mL of HCl (hydrochloric acid) solution of unknown concentration reacts with Na_2CO_3 (sodium carbonate), it forms NaCl (sodium chloride), water, and 11.1 g of CO_2 (carbon dioxide):

$$2HCl(aq) + Na_2CO_3(aq) \rightarrow 2NaCl(aq) + H_2O(l) + CO_2(g).$$

   a. How many moles of HCl are used in the reaction?

   b. What was the concentration of the HCl solution, in M?

6. Gravimetric analysis is a method of determining the concentration of a compound in solution by measuring the mass of a precipitate. In one experiment, 1.18 g AgCl precipitates when 25.0 mL of $AgNO_3$ solution reacts with excess NaCl solution in the following reaction:

$$\_\_\_ AgNO_3\ (aq) + \_\_\_ NaCl\ (aq) \rightarrow \_\_\_ NaNO_3\ (aq) + \_\_\_ AgCl\ (s)$$

   a. Balance the equation.
   b. How many moles of $AgNO_3$ were reacted?

   c. What is the concentration of $AgNO_3$ solution, in M?

Answers: 1) 0.256 L (256 mL) Na_3PO_4 soln; 2) 4.03 g CaO; 3) 8.07 g $Co_2(SO_4)_3$; 4a) 0.0108 mol $HC_2H_3O_2$; 4b) 0.3130 M $HC_2H_3O_2$; 5a) 0.504 mol HCl; 5b) 1.57 M HCl; 6a) 1,1,1,1; 6b) 8.23×10^{-3} mol $AgNO_3$; 6c) 0.329 M $AgNO_3$