Name _____

Solution Stoichiometry Worksheet

Solve the following solutions Stoichiometry problems:

1. How many grams of silver chromate will precipitate when 150. mL of 0.500 M silver nitrate are added to 100. mL of 0.400 M potassium chromate?

$$0.150\ \text{L } AgNO_3 \times \frac{0.500\ \text{moles } AgNO_3}{1\ \text{L}} \times \frac{1\ \text{moles } Ag_2CrO_4}{2\ \text{moles } AgNO_3} \times \frac{331.74\ \text{g } Ag_2CrO_4}{1\ \text{moles } Ag_2CrO_4} = 12.4\ \text{g } Ag_2CrO_4$$

$$0.100\ \text{L } K_2CrO_4 \times \frac{0.400\ \text{moles } K_2CrO_4}{1\ \text{L}} \times \frac{1\ \text{moles } Ag_2CrO_4}{1\ \text{moles } K_2CrO_4} \times \frac{331.74\ \text{g } Ag_2CrO_4}{1\ \text{moles } Ag_2CrO_4} = 13.3\ \text{g } Ag_2CrO_4$$

2. How many mL of 0.280 M barium nitrate are required to precipitate as barium sulfate all the sulfate ions from 25.0 mL of 0.350 M aluminum sulfate? **(93.8 mL barium nitrate)**

$$0.0250\ \text{L } Al_2(SO_4)_3 \times \frac{0.350\ \text{moles } Al_2(SO_4)_3}{1\ \text{L}} \times \frac{3\ \text{moles } Ba(NO_3)_2}{1\ \text{moles } Al_2(SO_4)_3} \times \frac{1\ \text{L}}{0.280\ \text{moles } Ba(NO_3)_2} = 0.0938\ \text{L } Ba(NO_3)_2$$

3. 25.0 mL of 0.350 M NaOH are added to 45.0 mL of 0.125 M copper (II) sulfate. How many grams of copper (II) hydroxide will precipitate?

$$0.0250\ \text{L NaOH} \times \frac{0.350\ \text{moles NaOH}}{1\ \text{L NaOH}} \times \frac{1\ \text{moles } Cu(OH)_2}{2\ \text{moles NaOH}} \times \frac{97.57\ \text{g } Cu(OH)_2}{1\ \text{mole } Cu(OH)_2} = 0.427\ \text{g } Cu(OH)_2$$

$$0.0450\ \text{L } CuSO_4 \times \frac{0.125\ \text{moles } CuSO_4}{1\ \text{L NaOH}} \times \frac{1\ \text{moles } Cu(OH)_2}{1\ \text{moles } CuSO_4} \times \frac{97.57\ \text{g } Cu(OH)_2}{1\ \text{mole } Cu(OH)_2} = 0.549\ \text{g } Cu(OH)_2$$

4. What volume of 0.415 M silver nitrate will be required to precipitate as silver bromide all the bromide ion in 35.0 mL of 0.128 M calcium bromide?

$$0.0350\ \text{L } CaBr_2 \times \frac{0.128\ \text{moles } CaBr_2}{1\ \text{L } CaBr_2} \times \frac{2\ \text{moles } AgNO_3}{1\ \text{moles } CaBr_2} \times \frac{1\ \text{L } AgNO_3}{0.415\ \text{mole } AgNO_3} = 0.0216\ \text{L } AgNO_3$$

5. What volume of 0.496 M HCl is required to neutralize 20.0 mL of 0.809 M sodium hydroxide?

$$0.0200\ \text{L NaOH} \times \frac{0.809\ \text{mole NaOH}}{1\ \text{L NaOH}} \times \frac{1\ \text{mole HCl}}{1\ \text{mole NaOH}} \times \frac{1\ \text{L HCl}}{0.496\ \text{mole HCl}} = 0.0326\ \text{L HCl}$$

6. How many mL of 0.715 M HCl is required to neutralize 1.25 grams of sodium carbonate? (producing carbonic acid)

$$2\ HCl_{(aq)} + Na_2CO_{3(s)} \rightarrow 2\ NaCl_{(aq)} + H_2CO_{3(aq)}$$

1.25 g Na_2CO_3	1 mole Na_2CO_3 / 105.99 g Na_2CO_3	2 mole HCl / 1 mole Na_2CO_3	1 L HCl / 0.715 mole HCl	= 0.0330 L HCl

7. What minimum number of grams of oxalic acid monohydrate, $H_2C_2O_4 \bullet H_2O$, would you specify for a titration of no fewer than 15.0 mL of 0.100 M NaOH? Both of the hydrogen's from oxalic acid are replaceable in this reaction.

$$H_2C_2O_4 \bullet H_2O(aq) + 2\ NaOH(aq) \rightarrow Na_2C_2O_4 \bullet H_2O(aq) + 2\ H(OH)(l)$$

0.0150 L NaOH	0.100 mole NaOH / 1 L NaOH	1 mole $H_2C_2O_4 \bullet H_2O$ / 2 mole NaOH	108.06 g $H_2C_2O_4 \bullet H_2O$ / 1 mole $H_2C_2O_4 \bullet H_2O$	= 0.0810 g $H_2C_2O_4 \bullet H_2O$

8. How many grams of magnesium hydroxide will precipitate if 25.0 mL of 0.235 M magnesium nitrate are combined with 30.0 mL of 0.260 M potassium hydroxide?

$$Mg(NO_3)_{2(aq)} + 2\ KOH \rightarrow 2\ KNO_{3(aq)} + Mg(OH)_{2(s)}$$

0.0250 L $Mg(NO_3)_2$	0.235 mole $Mg(NO_3)_2$ / 1 L $Mg(NO_3)_2$	1 mole $Mg(OH)_2$ / 1 mole $Mg(NO_3)_2$	58.33 g $Mg(OH)_2$ / 1 mole $Mg(OH)_2$	= 0.343 $Mg(OH)_2$

0.0300 L KOH	0.260 mole KOH / 1 L KOH	1 mole $Mg(OH)_2$ / 2 mole KOH	58.33 g $Mg(OH)_2$ / 1 mole $Mg(OH)_2$	= 0.227 g $Mg(OH)_2$

9. 60.0 mL of 0.322 M potassium iodide are combined with 20.0 mL of 0.530 M lead (II) nitrate. How many grams of lead (II) iodide will precipitate?

$$2\ KI_{(aq)} + Pb(NO_3)_{2(aq)} \rightarrow 2\ KNO_{3(aq)} + PbI_{2(s)}$$

0.0600 L KI	0.322 mole KI / 1 L KI	1 mole PbI_2 / 2 mole KI	461.00 g PbI_2 / 1 mole PbI_2	= 4.45 g PbI_2

0.0200 L $Pb(NO_3)_2$	0.530 mole $Pb(NO_3)_2$ / 1 L $Pb(NO_3)2$	1 mole PbI_2 / 1 mole $Pb(NO_3)2$	461.00 g PbI_2 / 1 mole PbI_2	= 4.89 g PbI_2