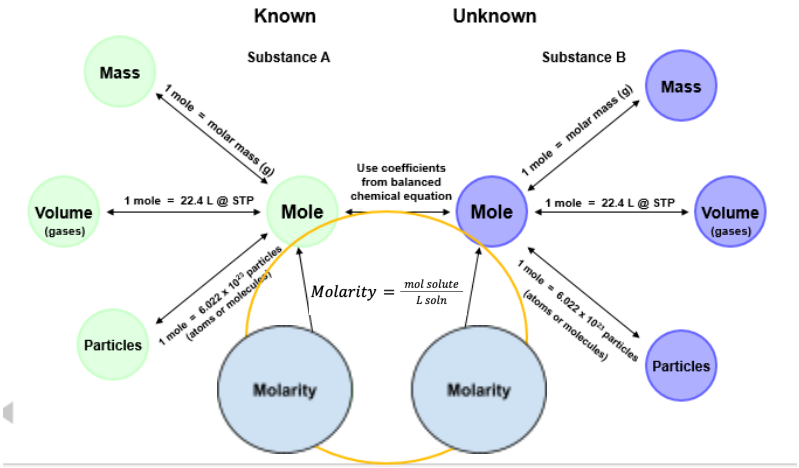
Name _____ Date:_____

## Chapter 14 Solution Stoichiometry

Solve the following solution stoichiometry problems: Remember…..you must get to MOLES! The new twist here is that you will be given the solution molarity and have to get to moles using the Molarity equation to begin the stoichiometry. Then proceed as usual.

**Stoichiometry Map *with Molarity added***




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? (write the reaction first)

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)

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?

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?

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

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

7. What minimum number of grams of oxalic acid monohydrate, $H_2C_2O_4 \cdot H_2O$, 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.

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?

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?

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 $PbI_2$ |