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Unit 10: Stoichiometry Funsheets

Part A: Balanced Chemical Equations- *Balance the following chemical equations.*

1) _____Al + _____Cl_2 → _____$AlCl_3$
2) _____$Mg(ClO)_2$ → _____$MgCl_2$ + _____O_2
3) _____$FeCl_3$ + _____$LiOH$ → _____$Fe(OH)_3$ + _____$LiCl$
4) _____Na + _____O_2 → _____Na_2O
5) _____KBr + _____F_2 → _____KF + _____Br_2
6) _____Al + _____H_2SO_4 → _____$Al_2(SO_4)_3$ + _____H_2
7) _____$Cr(OH)_3$ → _____Cr_2O_3 + _____H_2O
8) _____Li + _____H_2O → _____$LiOH$ + _____H_2
9) _____$Pb(NO_3)_2$ + _____$NaBr$ → _____$PbBr_2$ + _____$NaNO_3$
10) _____$Fe_2(CO_3)_3$ → _____Fe_2O_3 + _____CO_2
11) _____P + _____Fe_2O_3 → _____P_4O_{10} + _____Fe
12) _____C_4H_8 + _____O_2 → _____CO_2 + _____H_2O
13) _____C_4H_{10} + _____O_2 → _____CO_2 + _____H_2O
14) _____$Ti(OH)_4$ + _____CaS → _____TiS_2 + _____$Ca(OH)_2$
15) _____Mg + _____H_3PO_3 → _____H_2 + _____$Mg_3(PO_3)_2$

Part B: Mass and Moles-

Convert the following to moles

1) 235.0 g $NaNO_3$
2) 130.0 g $Al_2(SO_4)_3$
3) 50.0 g $Fe(OH)_3$
4) 75.0 g $Fe_2(CO_3)_3$
5) 196.0 g H_2SO_4

Convert the following to mass

6) 2.0 moles of C_4H_8
7) 1.5 moles of $Pb(NO_3)_2$
8) 0.25 moles of Fe_2O_3
9) 5.0 moles of $LiCl$
10) 6.1 moles of KBr

Part C: Mole Ratios-

In equation 1 from Part A, what is the mole ratio of…

1) Al to Cl_2
2) Cl_2 to Al
3) Cl_2 to $AlCl_3$
4) Al to $AlCl_3$

In equation 9 from Part A, what is the mole ratio of…

5) $Pb(NO_3)_2$ to $NaBr$
6) $NaBr$ to $PbBr_2$
7) $PbBr_2$ to $NaNO_3$
8) $NaNO_3$ to $Pb(NO_3)_2$

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Part D: Stoichiometry Problems: *(refer to your list of equations in Part A)*

1) In reaction 1, how many moles of $AlCl_3$ can be made from 4.5 mole of Al?

2) In reaction 1, how moles of Cl_2 are needed to produce 3.0 moles of $AlCl_3$?

3) In reaction 1, how moles of Al are needed to react with 7.5 moles of Cl_2?

4) In reaction 4, how many moles of O_2 are needed to react with 5 moles of Na?

5) In reaction 5, how many moles of Br_2 are produced from 8 moles of KBr?

6) In reaction 10, how many moles of CO_2 can be produced if 7.5 moles of Fe_2O_3 are made?

7) In reaction 11, if 5.0 moles of P begin the reaction, how many moles of Fe can be produced?

8) In reaction 11, how many moles of Fe_2O_3 will react if the reaction begins with 0.53 moles of P?

9) In reaction 12, how many moles of O_2 are needed to produce 3.0 moles of CO_2?

10) In reaction 12, if 112.0 grams of C_4H_8 begin the reaction, how many moles of O_2 will be needed to completely react?

11) In reaction 12, if 112.0 grams of C_4H_8 begin the reaction, how many moles of CO_2 will be formed?

12) In reaction 5, if 0.23 moles of KBr are used, how many grams of KF can be made?

13) In reaction 5, if 50.0 moles of KBr are used, how many grams of F_2 will be needed to completely react with KBr?

14) In reaction 8, if 3 moles of Li are used, how many grams of H_2 will be formed?

15) In reaction 8, if 3 moles of Li are used, how many grams of H_2O will also react?

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Part E: Mass to Mass- *Answer the following questions. Include balanced chemical equation and SHOW ALL WORK.*

1) Lithium perchlorate decomposes to produce lithium chloride and oxygen gas. How many grams of oxygen can be produced if 100.0 g of lithium perchlorate decompose at STP?

2) Hydrogen gas and chlorine gas combine for form hydrochloric acid. If 43g of hydrochloric acid are produced, how many grams of hydrogen gas was used?

3) When 0.46 g of antimony (III) oxide reacts with carbon to produce antimony metal and carbon monoxide gas, determine the mass of antimony metal produced.

4) How many grams of carbon monoxide must react with oxygen to produce 10.0g of carbon dioxide?

5) When hydrogen peroxide decomposes, it produces liquid water and oxygen gas. What mass of hydrogen peroxide must decompose to produce 0.77g of liquid water?

6) When lithium nitride reacts with water, lithium hydroxide and ammonia gas (NH_3) are produced. Determine the mass of lithium hydroxide produced when 0.38 g of lithium nitride reacts with water.

7) Sodium iodide reacts with chlorine gas to produce Iodine gas and sodium chloride in a single replacement reaction. What mass of sodium chloride is produced from 0.29 g of sodium iodide?

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Part F: Limiting Reactant- *Answer the following questions. Include a balanced chemical equation and SHOW ALL WORK.*

1) Identify the limiting reactant when 1.22g of oxygen gas reacts with 1.05g of hydrogen gas to produce liquid water. ____O_2 + ___H_2 → ___H_2O

2) Identify the limiting reactant when 5.87g of magnesium hydroxide reacts with 12.84g of hydrosulfuric acid to produce liquid water and magnesium sulfate.
___$Mg(OH)_2$ + ___H_2SO_4 → ___H_2O + ____$MgSO_4$

3) Identify the limiting reactant when 7.81g of hydrochloric acid reacts with 5.24g of sodium hydroxide and produces liquid water and sodium chloride.
___HCl + ___NaOH → ___H_2O + ___NaCl

4) Identify the limiting reactant when 43.25g of calcium carbide (CaC_2) reacts with 33.71g of liquid water to produce calcium hydroxide and acetylene (C_2H_2).
___CaC_2 + ___H_2O → ____$Ca(OH)_2$ + ___C_2H_2

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5) Identify the limiting reactant when 4.687g of sulfur tetrafluoride reacts with 6.281g of diiodine pentoxide to produce iodine pentafluoride and sulfur dioxide.

___SF_4 + ___I_2O_5 → ___IF_5 + ____SO_2

6) Identify the limiting reactant when 19.9 g of CuO are exposed to 2.02 g of H_2 to produce copper metal and water. ___CuO + ___H_2 → ___Cu + ___H_2O

7) If 41.6g of dinitrogen tetraoxide reacts with 20.8g of dinitrogen tetrahydride, the products will be nitrogen gas and water. What mass of water will be produced?

____N_2O_4 + ____N_2H_4 → ___N_2 + ___H_2O

8) If 16.8g of carbon monoxide is mixed under high pressure with 1.78g of hydrogen, CH_3OH (methanol) will be produced? How many grams of methanol will be produced?

____CO + ____H_2 → ____CH_3OH

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Part G: Percent Yield- *Determine the percent yield in the following reactions. Show all work and include a balanced chemical equation.*

1) 3.74 g of sodium metal reacts with oxygen to produce 5.34g of sodium peroxide.

2) Potassium metal reacts with 5.60 moles of oxygen gas to produce 0.230 moles of potassium oxide.

3) 4.0 moles of rubidium metal reacts with 2.7 moles oxygen to produce 0.88 moles of rubidium oxide.

4) 3.44g of Cesium metal reacts with of oxygen to produce 2.83g of cesium oxide.

5) Tetraantimony hexoxide reacts with 27.1g carbon to produce 173g of antimony and carbon monoxide (the other product).

6) 45.9g of sodium bromide reacts with chlorine gas to produce 12.8g of sodium chloride and bromine gas (other product).

7) 15.0 moles of ammonia gas reacts with oxygen gas to produce 8.90 moles of nitrogen monoxide gas and water (other product).

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Part H: Vocabulary

1) What is a mole?

2) What is stoichiometry?

3) What is the first step to all stoichiometry problems?

4) What is the mole ratio?

5) Where does the mole ration come from?

6) Why are **balanced** chemical equations important in stoichiometry?

7) What is a limiting reactant?

8) What is an excess reactant?

9) How do you determine the limiting reactant?

10) What is theoretical yield?

11) How is the theoretical yield determined?

12) What is actual yield?

13) How is actual yield determined?

14) What is percent yield?

15) What is the formula for percent yield?