CLASS SET

Stoichiometry Practice

(Selected Answers are given in bold)

Mole to Mole Problems

1. $N_2 + 3H_2 \rightarrow 2NH_3$
   How many moles of hydrogen are needed to completely react with 2.0 moles of nitrogen?
2. $2KClO_3 \rightarrow 2KCl + 3O_2$
   How many moles of oxygen are produced by the decomposition of 6.0 moles of potassium chlorate?
3. $Zn + 2HCl \rightarrow ZnCl_2 + H_2$
   How many moles of hydrogen are produced from the reaction of 3.0 moles of zinc with an excess of hydrochloric acid? **3 moles**
4. $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$
   How many moles of oxygen are necessary to react completely with 4.0 moles of propane (C_3H_8)?
   $K_3PO_4 + Al(NO_3)_3 \rightarrow 3KNO_3 + AlPO_4$
   How many moles of potassium nitrate are produced when 2.0 moles of potassium phosphate react with two moles of aluminum nitrate? **6 moles**

Mass to Mass Problems

1. $2KClO_3 \rightarrow 2KCl + 3O_2$
   How many grams of potassium chloride are produced if 25g of potassium chlorate decompose? **15 g**
2. $N_2 + 3H_2 \rightarrow 2NH_3$
   How many grams of hydrogen are necessary to react completely with 50.0 g of nitrogen in the above reaction?
3. How many grams of ammonia, NH_3, are produced in the reaction in Problem 2? **60.7 g**
4. $2AgNO_3 + BaCl_2 \rightarrow 2AgCl + Ba(NO_3)_2$
   How many grams of silver chloride are produced from 5.0 g of silver nitrate reacting with barium chloride? **4.3 g**
5. How much barium chloride is necessary to react with the silver nitrate in Problem 4? **3.1 g**

Molarity and Stoichiometry Problems

1. $NaCl + KOH \rightarrow KCl + NaOH$
   How many liters of 0.2 M KOH are required to produce 25 g of KCl? **1.7 L**
2. $2AgNO_3 + CaCl_2 \rightarrow Ca(NO_3)_2 + 2AgCl$
   If 250 mL of 0.5M $AgNO_3$ are added to $CaCl_2$, how many grams of AgCl will be produced? **17.9 g**
3. $3CsBr + Al(OH)_3 \rightarrow AlBr_3 + 3CsOH$
   If 25 g of $AlBr_3$ was produced when 125 mL of a CsBr solution was added, what was the molarity of the CsBr solution? **2.3 M**
4. How many mL of 0.5 M CsBr are required to produce 100 g of CsOH? (Use the balanced equation in problem 3). **1340 mL**

Mixed Stoichiometry Problems

1. How many moles of H_2 would be required to completely react with O_2 to produce 5 moles of water? **5 mol H_2**
2. $H_2SO_4 + NaOH \rightarrow Na_2SO_4 + H_2O$
   a. Balance this equation
   b. What mass of H_2SO_4 would be required to react with 0.75 mol of NaOH? **37g**
3. What mass of NO_2 is formed when NO reacts with 384 g of O_2? **1104g (Balanced equation is: $2NO + O_2 \rightarrow 2NO_2$)**
4. If 30 g of H_2SO_4 reacts with aluminum hydroxide in a double replacement reaction, what mass of water is produced? **11.0g (Balanced equation is: $3H_2SO_4 + 2Al(OH)_3 \rightarrow Al_2(SO_4)_3 + 6H_2O$)**
5. Tin(II) fluoride, SnF_2, is used in some toothpastes. It is made by the reaction of tin with hydrogen fluoride according to the following equation.
   $Sn + 2HF \rightarrow SnF_2 + H_2$
   How many grams of SnF_2 are produced from the reaction of 30 g of HF with Sn? **118 g**
6. In a spacecraft, the carbon dioxide exhaled by astronauts can be removed by its reaction with lithium hydroxide, LiOH, according to the following chemical equation.
   $CO_2(g) + 2LiOH(s) \rightarrow Li_2CO_3(s) + H_2O(l)$
   If 1.20×10^{24} molecules of CO_2 is exhaled, the average amount exhaled by a person each day, how much (in grams) $Li_2CO_3(s)$ is produced? **148g Li_2CO_3**
7. When 9.8g of aluminum oxide decomposes, how many grams of aluminum metal are produced? (Hint: You must criss-cross to get the formula for aluminum oxide.) **5.2 g Al (Balanced equation is: $2Al_2O_3 \rightarrow 4Al + 3O_2$)**
8. How many grams of iodine are produced when 0.72 mol of fluorine react with potassium iodide? (Hints: You must criss-cross to get the formula for potassium iodide. Check to see if iodine and fluorine are diatomic. Iodine is not the only product; you must figure the other product out before balancing this equation.) **182.9 g (Balanced equation is: $2Na + 2H_2O \rightarrow 2NaOH + H_2$)**
9. How many grams of sodium are required to react with water to produce 5.0g of sodium hydroxide? (*Unbalanced* equation is: $Na + H_2O \rightarrow NaOH + H_2$) **2.9 g**
10. How many molecules of H_2 are produced in the reaction in #9? **3.76×10^{22} molecules of H_2**

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