Warm-Up: Mole to Mole

Name: _____

Directions: Use your notes from last class to complete this assignment. You may work in small groups to complete this sheet but everyone MUST turn in their own completed sheet.

1. Given the following equation: $2C_4H_{10} + 13O_2 \rightarrow 8CO_2 + 10H_2O$, show what the following molar ratios should be.

   a. C_4H_{10} / O_2 b. C_4H_{10} / CO_2 c. C_4H_{10} / H_2O

2. In order to be successful in stoichiometry, you must ALWAYS start with a/n_____.

   ▯ empirical formula ▯ balanced chemical equation ▯ molecular formula

3. Use dimensional analysis to calculate how many moles of O_2 can be produced from 12.00 moles of $KClO_3$.

$$KClO_3 \rightarrow KCl + O_2$$

4. Use dimensional analysis to calculate how many moles of KCl is produced from 2.50 moles of K and excess Cl_2.

$$K + Cl_2 \rightarrow KCl$$

5. Sodium oxide reacts with water to form sodium hydroxide. Use dimensional analysis to calculate how many moles of water can be produced from 120 moles of sodium oxide.

How many grams of Na_2O are required to produce 1.60 x 102 grams of NaOH?
Moles of Na_2O = 120 g/ 62 g/mol = 1.93 mole x 2/1 = 3.86 moles x 40 g/mol= 154.4 grams NaOH

5. Given the following equation: 8 Fe + S_8 ---> 8 FeS
What mass of iron is needed to react with 16.0 grams of sulfur?

How many grams of FeS are produced?
Moles of S_8 = 16.0 g/ 256 g/mol= .062 moles x 8/1= .496 moles x 56 g/ mol = 28 g Fe

6. Given the following equation: 2 $NaClO_3$ ---> 2 NaCl + 3 O_2 12.00 moles of $NaClO_3$ will produce how many grams of O_2? What volume of O_2 would be produced at STP?
12 moles x 3/2 = 18 moles x 32 g/mol = 576 grams

7. Given the following equation: Cu + 2 $AgNO_3$ ---> $Cu(NO_3)_2$ + 2 Ag
How many moles of Cu are needed to react with 500 ml of 2.00 M $AgNO_3$?

If only 89.5 grams of Ag were produced, how many grams of Cu reacted?
Moles $AgNO_3$ = 2.00 M x 0.5 L = 1.0 moles $AgNO_3$
Moles of Ag= 89.5 g/107 g/mol = .83 mol Ag
Ratio Cu:Ag is 1:2
Therefore moles of Cu = .83 mol Ag x 1 mol Cu/2 mol Ag = .415 mol

8. Molten iron and carbon monoxide are produced in a blast furnace by the reaction of iron(III) oxide and coke (pure carbon). If 25.0 kilograms of pure Fe_2O_3 is used, how many kilograms of iron can be produced?
The reaction is: Fe_2O_3 + 3 C ---> 2 Fe + 3 CO
Kmol Fe_2O_3 = 25 Kg/160 g/mol= .156 kmol
Ratio: .156 kmol Fe_2O_3 x 2/1= .312 kmol Fe
Mass of Fe = .312 kmol Fe x 56 g/mol= 17.5 Kg

9. The average human requires 120.0 grams of glucose ($C_6H_{12}O_6$) per day. How many grams of CO_2 (in the photosynthesis reaction) are required for this amount of glucose? The photosynthetic reaction is: 6 CO_2 + 6 H_2O ---> $C_6H_{12}O_6$ + 6 O_2 This problem is slightly different from those above.

10. Given the reaction: 4 NH_3 (g) + 5 O_2 (g) ---> 4 NO (g) + 6 H_2O (l) When 1.20 mole of ammonia reacts, the total number of moles of products formed is:
a. 1.20
b. 1.50
c. 1.80
d. 3.00
e. 12.0

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a. C_4H_{10} / O_2 2:13
b. O_2 / CO_2 13:8
c. O_2 / H_2O 13:10
d. C_4H_{10} / CO_2 2:8
e. C_4H_{10} / H_2O 2:10

2. Given the following equation: 2 $KClO_3$ ---> 2 KCl + 3 O_2
How many moles of O_2 can be produced by letting 12.00 moles of $KClO_3$ react?
12 mole $KClO_3$ x 3/2 = 18 moles O_2

3. Given the following equation: 2 K + Cl_2 ---> 2 KCl
How many grams of KCl is produced from 2.50 g of K and excess Cl_2.
From 1.00 g of Cl_2 and excess K? Moles of Cl_2 = 1.0 /71 g/mole= .014 moels x 2/1 = .028 moles x 74.5 g/mol = 2.09 grams

4. Given the following equation: Na_2O + H_2O ---> 2 NaOH
How many grams of NaOH is produced from 120 grams of Na_2O?

How many grams of Na_2O are required to produce 1.60 x 102 grams of NaOH?
Moles of Na_2O = 120 g/ 62 g/mol = 1.93 mole x 2/1 = 3.86 moles x 40 g/mol= 154.4 grams NaOH

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