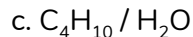
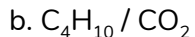
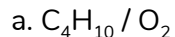


Warm-Up: Mole to Mole

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: $2\text{C}_4\text{H}_{10} + 13\text{O}_2 \rightarrow 8\text{CO}_2 + 10\text{H}_2\text{O}$, show what the following molar ratios should be.



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

☐ empirical formula

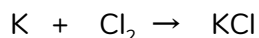
☐ balanced chemical equation

☐ molecular formula

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



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



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 Na₂O are required to produce 1.60 × 10² grams of NaOH?

Moles of Na₂O = 120 g / 62 g/mol = 1.93 mole × 2/1 = 3.86 moles × 40 g/mol = 154.4 grams NaOH

5. Given the following equation: 8 Fe + S₈ → 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 S₈ = 16.0 g / 256 g/mol = .062 moles × 8/1 = .496 moles × 56 g/mol = 28 g Fe

6. Given the following equation: 2 NaClO₃ → 2 NaCl + 3 O₂ 12.00 moles of NaClO₃ will produce how many grams of O₂? What volume of O₂ would be produced at STP?

12 moles × 3/2 = 18 moles × 32 g/mol = 576 grams

7. Given the following equation: Cu + 2 AgNO₃ → Cu(NO₃)₂ + 2 Ag

How many moles of Cu are needed to react with 500 ml of 2.00 M AgNO₃?

If only 89.5 grams of Ag were produced, how many grams of Cu reacted?

Moles AgNO₃ = 2.00 M × 0.5 L = 1.0 moles AgNO₃

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 × 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 Fe₂O₃ is used, how many kilograms of iron can be produced?

The reaction is: Fe₂O₃ + 3 C → 2 Fe + 3 CO

Kmol Fe₂O₃ = 25 Kg / 160 g/mol = .156 kmol

Ratio: .156 kmol Fe₂O₃ × 2/1 = .312 kmol Fe

Mass of Fe = .312 kmol Fe × 56 g/mol = 17.5 Kg

9. The average human requires 120.0 grams of glucose (C₆H₁₂O₆) per day. How many grams of CO₂ (in the photosynthesis reaction) are required for this amount of glucose? The photosynthetic reaction is: 6 CO₂ + 6 H₂O → C₆H₁₂O₆ + 6 O₂ This problem is slightly different from those above.

10. Given the reaction: 4 NH₃ (g) + 5 O₂ (g) → 4 NO (g) + 6 H₂O (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

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: $2 \text{C}_4\text{H}_{10} + 13 \text{O}_2 \rightarrow 8 \text{CO}_2 + 10 \text{H}_2\text{O}$, show what the following molar ratios should be.

- a. $\text{C}_4\text{H}_{10} / \text{O}_2$ 2:13
- b. O_2 / CO_2 13:8
- c. $\text{O}_2 / \text{H}_2\text{O}$ 13:10
- d. $\text{C}_4\text{H}_{10} / \text{CO}_2$ 2:8
- e. $\text{C}_4\text{H}_{10} / \text{H}_2\text{O}$ 2:10

2. Given the following equation: $2 \text{KClO}_3 \rightarrow 2 \text{KCl} + 3 \text{O}_2$

How many moles of O_2 can be produced by letting 12.00 moles of KClO_3 react?

$$12 \text{ mole } \text{KClO}_3 \times \frac{3}{2} = 18 \text{ moles } \text{O}_2$$

3. Given the following equation: $2 \text{K} + \text{Cl}_2 \rightarrow 2 \text{KCl}$

How many grams of KCl is produced from 2.50 g of K and excess Cl_2 .

$$\begin{aligned} \text{From } 1.00 \text{ g of } \text{Cl}_2 \text{ and excess } \text{K? Moles of } \text{Cl}_2 &= 1.0 / 71 \text{ g/mole} = .014 \text{ moles} \times \frac{2}{1} = .028 \text{ moles} \times 74.5 \text{ g/mol} \\ &= 2.09 \text{ grams} \end{aligned}$$

4. Given the following equation: $\text{Na}_2\text{O} + \text{H}_2\text{O} \rightarrow 2 \text{NaOH}$

How many grams of NaOH is produced from 120 grams of Na_2O ?

How many grams of Na_2O are required to produce 1.60×10^2 grams of NaOH ?

$$\text{Moles of } \text{Na}_2\text{O} = 120 \text{ g} / 62 \text{ g/mol} = 1.93 \text{ mole} \times \frac{2}{1} = 3.86 \text{ moles} \times 40 \text{ g/mol} = 154.4 \text{ grams } \text{NaOH}$$

5. Given the following equation: $8 \text{Fe} + \text{S}_8 \rightarrow 8 \text{FeS}$

What mass of iron is needed to react with 16.0 grams of sulfur?

How many grams of FeS are produced?

$$\text{Moles of } \text{S}_8 = 16.0 \text{ g} / 256 \text{ g/mol} = .062 \text{ moles} \times \frac{8}{1} = .496 \text{ moles} \times 56 \text{ g/mol} = 28 \text{ g } \text{Fe}$$

6. Given the following equation: $2 \text{NaClO}_3 \rightarrow 2 \text{NaCl} + 3 \text{O}_2$ 12.00 moles of NaClO_3 will produce how many grams of O_2 ? What volume of O_2 would be produced at STP?

$$12 \text{ moles} \times \frac{3}{2} = 18 \text{ moles} \times 32 \text{ g/mol} = 576 \text{ grams}$$

7. Given the following equation: $\text{Cu} + 2 \text{AgNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + 2 \text{Ag}$

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?

$$\text{Moles } \text{AgNO}_3 = 2.00 \text{ M} \times 0.5 \text{ L} = 1.0 \text{ moles } \text{AgNO}_3$$

$$\text{Moles of } \text{Ag} = 89.5 \text{ g} / 107 \text{ g/mol} = .83 \text{ mol } \text{Ag}$$

Ratio $\text{Cu}:\text{Ag}$ is 1:2

$$\text{Therefore moles of } \text{Cu} = .83 \text{ mol } \text{Ag} \times \frac{1 \text{ mol } \text{Cu}}{2 \text{ mol } \text{Ag}} = .415 \text{ mol}$$

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?

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Kmol $\text{Fe}_2\text{O}_3 = 25 \text{ Kg} / 160 \text{ g/mol} = .156 \text{ kmol}$

Ratio: $.156 \text{ kmol Fe}_2\text{O}_3 \times 2/1 = .312 \text{ kmol Fe}$

Mass of Fe = $.312 \text{ kmol Fe} \times 56 \text{ g/mol} = 17.5 \text{ Kg}$

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