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Key

Mass ←→ Mass Conversion Practice

1. Given the following equation: **$2\ C_4H_{10} + 13\ O_2 \rightarrow 8\ CO_2 + 10\ H_2O$**, show what the following mole ratios should be (reduce when necessary).
   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 → 1 : 4 (reduced)
   e. C_4H_{10} / H_2O 2 : 10 → 1 : 5 (reduced)

2. Given the following equation: **$2\ K + Cl_2 \rightarrow 2\ KCl$**
   a. How many **grams of KCl** is produced from **2.50 g of K** and excess Cl_2.

$$2.5\text{ g K} \left| \frac{1\text{ mol K}}{39\text{ g K}} \right. = 0.064\text{ mol K} \left| \frac{2\text{ mol KCl}}{2\text{ mol K}} \right. = 0.064\text{ mol KCl} \left| \frac{74\text{ g KCl}}{1\text{ mol}} \right. =$$

Step 1: g A → mol A Step 2: mol A → mol B Step 3: Mole B → Gram B

4.74 g KCl

   b. How many **grams of KCl** is produced from **1.00 g of Cl_2** and excess K?

$$1\text{ g } Cl_2 \left| \frac{\text{mol } Cl_2}{70\text{ g } Cl_2} \right. = .0143\text{ mol } Cl_2 \left| \frac{2\text{ mol KCl}}{1\text{ mol } Cl_2} \right. = .0286\text{ mol KCl} \left| \frac{74\text{ g KCl}}{1\text{ mol KCl}} \right. = 2.12\text{ g KCl}$$

Step 1: grams A → mole A Step 2: mole A → mole B Step 3: mole B → grams B

3. Given the following equation: **$Na_2O + H_2O \rightarrow 2\ NaOH$**
   a. How many **grams of NaOH** is produced from **120 grams of Na_2O**?

$$120\text{ g } Na_2O \left| \frac{1\text{ mol } Na_2O}{62\text{ g } Na_2O} \right. = 1.94\text{ mol } Na_2O \left| \frac{2\text{ NaOH}}{1\ Na_2O} \right. = 3.88\text{ mol NaOH} \left| \frac{40\text{ g NaOH}}{1\text{ mol NaOH}} \right. =$$

Molar Mass Na_2O Mole Ratio Molar Mass

155.2 g NaOH

   b. How many **grams of Na_2O** are required to produce **160 grams of NaOH**?

$$160\text{ g NaOH} \left| \frac{\text{mol NaOH}}{40\text{ g NaOH}} \right. = 4\text{ mol NaOH} \left| \frac{1\ Na_2O}{2\text{ NaOH}} \right. = 2\text{ mol } Na_2O \left| \frac{62\text{ g } Na_2O}{1\text{ mol } Na_2O} \right. = 124\text{ g } Na_2O$$

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

$16\ g\ S_8 \left| \frac{1\ mol\ S_8}{256\ g\ S_8} \right. = 0.0625\ mol\ S_8 \left| \frac{8\ mol\ Fe}{1\ mol\ S_8} \right. = .5\ mol\ Fe \left| \frac{56\ g\ Fe}{1\ mol\ Fe} \right. =$ **28 g Fe**

   b. How many **grams of FeS** are produced when **16.0 grams of sulfur** react?

$16\ g\ S_8 \left| \frac{1\ mol\ S_8}{256\ g\ S_8} \right. = 0.0625\ mol\ S_8 \left| \frac{8\ FeS}{1\ mol\ S_8} \right. = .5\ mol\ FeS \left| \frac{88\ g\ FeS}{1\ mol} \right. =$ **44 g FeS**

5. Given the following equation: **2 $NaClO_3$ ---> 2 NaCl + 3 O_2**
   a. How many **grams of NaCl** are produced when **80.0 grams of O_2** are produced?

$80\ g\ O_2 \left| \frac{mol\ O_2}{32\ g\ O_2} \right. = 2.5\ mol\ O_2 \left| \frac{2\ mol\ NaCl}{3\ mol\ O_2} \right. = 1.67\ mol\ NaCl \left| \frac{58\ g\ NaCl}{1\ mol\ NaCl} \right. =$ **96.86 g NaCl**

6. Given the following equation: **Cu + 2 $AgNO_3$ ---> $Cu(NO_3)_2$ + 2 Ag**
   a. If **89.5 grams of Ag** were produced, how many **grams of Cu** reacted?

$89.5\ g\ Ag \left| \frac{1\ mol\ Ag}{108\ g\ Ag} \right. = .83\ mol\ Ag \left| \frac{1\ mol\ Cu}{2\ mol\ Ag} \right. = .42\ mol\ Cu \left| \frac{64\ g\ Cu}{mol} \right. =$ **26.88 g Cu**

7. Molten iron and carbon monoxide are produced in a blast furnace by the reaction of iron(III) oxide and coke (pure carbon). If **25000 grams of Fe_2O_3** is used, how many **grams of iron** can be produced?

Fe_2O_3 + 3 C ---> 2 Fe + 3 CO

$25000\ g\ Fe_2O_3 \left| \frac{1\ mol\ Fe_2O_3}{160\ g\ Fe_2O_3} \right. = 156.25\ mol\ Fe_2O_3 \left| \frac{2\ mol\ Fe}{1\ Fe_2O_3} \right. = 312.5\ mol\ Fe \left| \frac{56\ g}{mol} \right. =$

17500 g Fe