Note Taking Guide: Episode 801

Name *Answer Key*

Stoichiometry

- study of the __math__ relationships in a __chemical reaction__
- based on __balanced__ equations
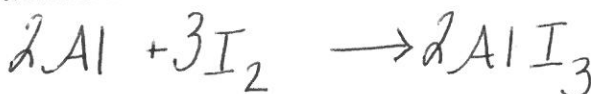
$$2\ Mg + O_2 \rightarrow 2\ MgO$$
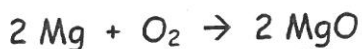
Two magnesium atoms react with a molecule of oxygen gas to produce two formula units of magnesium oxide.

The __Coefficient__ in a __balanced equation__ give the __mole__ __Ratio__ for the __substances__ involved in the __chemical reaction__.

Ex. Problem:
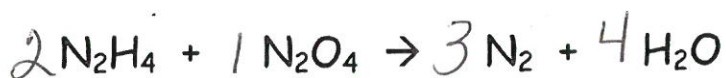When elemental aluminum reacts with elemental iodine, aluminum iodide is produced. $2\ Al + 3\ I_2 \longrightarrow 2\ AlI_3$

mole ratios:

$\underline{\quad 2 \quad}$ Al: $\underline{\quad 3 \quad}$ I_2

$\underline{\quad 2 \quad}$ Al: $\underline{\quad 2 \quad}$ AlI_3

$\underline{\quad 3 \quad}$ I_2: $\underline{\quad 2 \quad}$ AlI_3

If you start with 4 moles of Al, how many moles of AlI_3 will be produced?

$$4\ mol\ Al\left(\frac{2\ mol\ AlI_3}{2\ mol\ Al}\right) = 4\ mol\ AlI_3$$

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<u>Problem Set One</u> $2 N_2H_4 + 1 N_2O_4 \rightarrow 3 N_2 + 4 H_2O$

BE SURE TO BALANCE THE EQUATION FIRST!!

A) ? moles N_2O_4 = 2.72 moles N_2H_4

$$2.72 \; N_2H_4 \left(\frac{1 \, mol \; N_2O_4}{2 \, mol. \; N_2H_4} \right) = 1.36 \, mol \; N_2O_4$$

B) ? moles N_2 = 2.72 moles N_2H_4

$$2.72 \, mol \; N_2H_4 \left(\frac{3 \, mol \; N_2}{2 \, moles \; N_2H_4} \right) = 4.08 \, mol \; N_2$$

How many moles of water will be produced when __8.0__ grams of hydrogen gas react with the oxygen in the air?

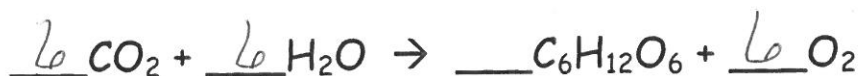$$2 H_{2 (g)} + O_{2 (g)} \longrightarrow 2 H_2O_{(l)}$$
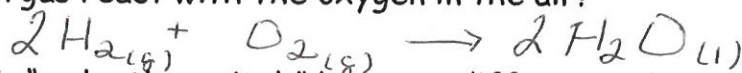
(Hint: To "make the switch" between different substances in a reaction, use the __mole__ ratio from the __balanced__ equation.)

$$8.0 \, grams \; H_2 \left(\frac{1 \, mol \, H_2}{2.02 g \; H_2} \right) \left(\frac{2 \, mol \, H_2O}{2 \, mol \, H_2} \right) = 3.96 \, mol \; of \; H_2O$$

<u>Problem Set Two</u>

In photosynthesis, carbon dioxide and water react to form glucose, $C_6H_{12}O_6$ and oxygen gas.

$$\underline{6}\ CO_2 + \underline{6}\ H_2O \rightarrow \underline{}\ C_6H_{12}O_6 + \underline{6}\ O_2$$

BE SURE TO BALANCE THE EQUATION FIRST!!

If 15.6 grams of carbon dioxide react, how many moles of glucose will be produced?

$$15.6g\ CO_2 \left(\frac{1\ mol\ CO_2}{44.01\ g} \right) \left(\frac{1\ mol\ C_6H_{12}O_6}{6\ mol\ CO_2} \right) = 0.0591\ mol\ \&\ C_6H_{12}O_6$$

How many grams of carbon dioxide must react to produce 0.25 moles of glucose?

$$0.25\ mol\ C_6H_{12}O_6 \left(\frac{6\ mol\ CO_2}{1\ mol\ C_6H_{12}O_6} \right) \left(\frac{44.01\ g}{1\ mol\ CO_2} \right) = 66.02g\ CO_2$$

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The Chemistry Quiz

CR1.   CR2.   1.   2.

          3.   4.   5.