Date:_____ Block:_____ Name:_____

Chemistry 11 - MOLE RATIOS (using the three step method)

Magnesium metal reacts with hydrochloric acid to produce magnesium chloride and hydrogen gas. The chemical equation is given as the following:

$$Mg\ (s) + 2HCl\ (aq) \rightarrow MgCl_2 + H_2\ (g)$$

If 4 moles of HCl is used, how many moles of $MgCl_2$ will be formed in the reaction?

Step (1): What is the mole ratio for HCl to $MgCl_2$?

2 mol HCl : 1 mol $MgCl_2$

Step (2): Write two conversion factors for this mole ratio.

$$\frac{\text{2 mol HCl}}{\text{1 mol } MgCl_2} \quad \text{or} \quad \frac{\text{1 mol } MgCl_2}{\text{2 mol HCl}}$$

Step (3): Calculate the number of moles of $MgCl_2$ formed.

What you want = What you have X Conversion factor

$$\text{Moles } MgCl_2 = 4 \text{ mol HCl} \times \frac{\text{1 mol } MgCl_2}{\text{2 mol HCl}}$$

$$= 2 \text{ mol } MgCl_2$$

_____2_____**mol $MgCl_2$**

Now try these example questions on a separate sheet of paper using the 3-step method!

1. $3CaSi_2 + 2SbCl_3 \rightarrow 6Si + 2Sb + 3CaCl_2$

   a) If 0.65 moles of $CaSi_2$ is used, how many moles of Sb will be formed in the reaction?

   Answer: 0.43 mol Sb

   b) If 1.47 moles of Si is formed in the reaction, how many moles of $SbCl_3$ was used at the start of the reaction?

   Answer: 0.49 mol $SbCl_3$

2. In a Chemistry 11 experiment, John mixes 0.010 moles of calcium chloride together with silver nitrate in a beaker. This results in the formation of silver chloride and calcium nitrate. How many moles of silver chloride are formed in the reaction?

   Answer: 0.020 mol AgCl