General Science 3200

Predicting Products Note **Name: _________________**

Steps for Predicting Products for Synthesis, Decomposition, and Single Replacement Reactions:

1) Decide what type of reaction it would be. Write down its name.
2) Based on the reaction type, decide what the product would be.
3) Be careful to get the product formulas correct. Remember: writing formulas for ionic compounds, how to write elements (see chart given), and the charge an element will get (positive or negative).
4) Balance the Chemical Equation.

Predict the Product:

Example i) ___ $Al +$ ___ $Cl_2 \rightarrow$

Name of Reaction: _____________________

Steps:

1) Since the reactants are both elements, this must be a **synthesis** reaction.

2)When predicting products for synthesis reacts, the two elements will combine to form an ionic compound. One element will be the positive ion (Al^{3+}) and the other element will be the negative ion (Cl^-).

3) **Thus,** $Al^{3+} Cl^-$ **gives us** $AlCl_3$**.** Don't forget that the ionic compound must be neutral. Therefore we now would have:

___ $Al +$ ___ $Cl_2 \rightarrow$ ___ $AlCl_3$

Name of Reaction: **Synthesis**

4) The only thing left to do is balance the chemical equation:

- aluminum is already balanced, but there are 2 chlorine atoms on the left and 3 chlorine atoms on the right. Make six on both sides as follows:

___ $Al +$ **3** $Cl_2 \rightarrow$ **2** $AlCl_3$

Name of Reaction: **Synthesis**

Next, balance aluminum. There are now 2 on the right and only 1 on the left. Therefore, put a "2" in front of Al on the left.

2 $Al +$ **3** $Cl_2 \rightarrow$ **2** $AlCl_3$

Name of Reaction: **Synthesis** **Correct!!!!**

Example ii) ___ $MgO \rightarrow$

Name of Reaction: _________________

Steps:

1) Since there is only ONE reactant, the type of reaction must be **Decomposition**.
2) When predicting here, the products will **always** be the **elements** that make up reactant.
3) Thus, the element for magnesium is simply Mg and the element for oxygen is O_2.

Therefore, the equation is:

$$\_\_\_ \ MgO \rightarrow \ \_\_\_ \ Mg \ + \_\_\_ \ O_2$$

Name of Reaction: **Decomposition**

4) Balance the Chemical Equation
- the magnesium atoms are balanced (one on each side), but the oxygen atoms are not (one on the left and two on the right). To make two atoms of oxygen on both sides, place a “2" in front of MgO.

$$\mathbf{2} \ MgO \rightarrow \ \_\_\_ \ Mg \ + \_\_\_ \ O_2$$

Name of Reaction: **Decomposition**

Now the magnesium atoms no longer balanced, but the oxygen atoms are. Place a “2" in front of Mg to give two magnesium atoms on both sides of the equation.

$$\mathbf{2} \ MgO \rightarrow \ \mathbf{2} \ Mg \ + \_\_\_ \ O_2$$

Name of Reaction: **Decomposition** **Correct!!!!**

Example iii) $\_\_\_\_ \ Li \ + \_\_\_ \ NaCl \rightarrow$

Name of Reaction: ________________

Steps:
1) Since one reactant is an element and the other is an ionic compound. The reaction must be a **Single Replacement**.
2) In a single replacement reaction, the element on the reactants side switches with one of the elements in the ionic compound. The ones that switch (replace each other) must have the some charge as an ion (positive or negative).
3) Lithium, Li, and sodium, Na, both have a positive charge as an ion so they will switch. Chlorine (negative charged ion) will stay in the ionic compound.

$$\_\_\_\_ \ Li \ + \_\_\_ \ NaCl \rightarrow \ \_\_\_ \ Na \ + \_\_\_ \ Li^{+}Cl^{-}$$

Name of Reaction: **Single Replacement**

***Don’t forget to balance the charges in the ionic compound that is produced (must be neutral). Also, check to see how the element produced exists in the chart.

Thus,

$$\_\_\_\_ \ Li \ + \_\_\_ \ NaCl \rightarrow \ \_\_\_ \ Na \ + \_\_\_ \ LiCl$$

Name of Reaction: **Single Replacement**

4) Balance the Chemical Equation.
- One Li on both sides. One Na on both sides. One [illegible] on both sides. The equation is ALREADY BALANCED!!!

Therefore,

$$\_\_\_\_ \ Li \ + \_\_\_ \ NaCl \rightarrow \ \_\_\_ \ Na \ + \_\_\_ \ LiCl$$

Name of Reaction: **Single Replacement** **Correct!!!**