Predicting Products Practice Worksheet

When predicting products:

1. You must first decide what type of reaction it is based on the reactants. I will only ask you to predict the products of three types of reactions:

Combustion: A hydrocarbon and oxygen
Example: $C_2H_6 + O_2 \rightarrow$
Single Replacement: A compound and an element (the element is either a metal or a halogen)
Example: $Mg + HCl \rightarrow$ -or- $KF + Cl_2 \rightarrow$
Double Replacement: Two separate compounds
Example: $Pb(NO_3)_2 + KI \rightarrow$ -or- $NaCl + CaCO_3 \rightarrow$

2. To predict the products, rearrange the elements according to what you know about the reactions:

Combustion: The products are ALWAYS CO_2 and H_2O!
Example: $C_2H_6 + O_2 \rightarrow CO_2 + H_2O$
Single Replacement: Switch the element with the corresponding element in the compound (If the element is a metal, replace the metal in the compound. If the element is a halogen, replace the halogen in the compound.)
Example: $Mg + HCl \rightarrow MgCl_2 + H_2$ -or- $KF + Cl_2 \rightarrow KCl + F_2$
Double Replacement: Switch the first members of each compound.
Example: $Pb(NO_3)_2 + KI \rightarrow KNO_3 + PbI_2$ -or- $NaCl + CaCO_3 \rightarrow CaCl_2 + Na_2CO_3$
NOTE: When rearranging elements, make sure that your products are written correctly (meaning that the overall charge of the compound is zero).

3. Balance the equations!
Example: $2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$
Example: $Mg + 2HCl \rightarrow MgCl_2 + H_2$ -or- $2KF + Cl_2 \rightarrow 2KCl + F_2$
Example: $Pb(NO_3)_2 + 2KI \rightarrow 2KNO_3 + PbI_2$-or- $2NaCl + CaCO_3 \rightarrow CaCl_2 + Na_2CO_3$

4. Determine if the reaction will happen or not. If it will not happen, write NR (no reaction).
Single Replacement: Use the Activity Series (the higher element of the table will end up in a compound). If the element if lower than the corresponding element in the compound, the reaction **WILL NOT** happen.
Example: $Mg + 2HCl \rightarrow MgCl_2 + H_2$ **(Will Happen)** -or- $2KF + Cl_2 \rightarrow 2KCl + F_2$ **(NR)**
Double Replacement: Use the Solubility Table. If both products are soluble (S or D), the reaction **WILL NOT** happen. If ANY of the products are insoluble (I), the reaction **WILL** happen.
Example: $Pb(NO_3)_2 + 2KI \rightarrow 2KNO_3 + \underline{PbI_2}$ **(Will Happen)** -or-$2NaCl + CaCO_3 \rightarrow CaCl_2 + Na_2CO_3$ **(NR)**

Practice Problems:

	Reactants	**Products**	**Type of Reaction**	**Will it Happen?**
1.	$NaBr + Cl_2 \rightarrow$			
2.	$Na_3PO_4 + MgSO_4 \rightarrow$			
3.	$NH_4OH + BaCl_2 \rightarrow$			
4.	$C_3H_8 + O_2 \rightarrow$			XXXXXXX
5.	$C_2H_2 + O_2 \rightarrow$			XXXXXXX
6.	Potassium chloride and sulfuric acid →			
7.	Calcium metal and hydrochloric acid →			
8.	Aluminum metal and iron (III) oxide →			

Word to Formula Practice Worksheet

When given a word equation, you must use your knowledge of bonding and naming compounds to correctly write a balanced chemical reaction. Follow the following rules:

1. Decide whether the bond is ionic or covalent. If the name has prefixes (i.e. mono-, di-, tri-, etc.), the compound is covalent.
2. Use the appropriate rules to correctly write the formulas.
    a. For ionic compounds, use the criss-cross method. See examples below:

Example 1: Write the formula for aluminum oxide.

Write down the Al^{3+} and O^{2-} right next to each other, as in this image:

Move the positive charge (dropping the sign) to the subscript position of the anion:

Move the negative charge (dropping the sign) to the subscript position of the cation:

The result of all this moving is:

Notice that there is no fifth image in this problem. The Al_2O_3 is at a minimum set of subscripts, so no reducing is necessary. Not so in this next example.

Example 2: Write the formula for barium oxide.

Write down the Ba^{2+} and O^{2-} right next to each other, as in this image:

Move the positive charge (dropping the sign) to the subscript position of the anion:

Move the negative charge (dropping the sign) to the subscript position of the cation:

The result of all this moving is:

Since both subscripts have a common factor of two, we are not at a minimum set of subscripts. After reducing, the final answer is:

    b. For covalent compounds, just write what the name tells you (i.e. di- = 2 or tri = 3)
3. Balance the equation!

Practice Problems:

1) When dissolved beryllium chloride reacts with dissolved silver nitrate (silver's charge is +1), aqueous beryllium nitrate and silver chloride powder are made.
2) When isopropanol (C_3H_8O) burns in oxygen, carbon dioxide, water, and heat are produced.
3) When dissolved sodium hydroxide reacts with sulfuric acid (H_2SO_4), aqueous sodium sulfate, water, and heat are formed.
4) When fluorine gas is put into contact with calcium metal at high temperatures, calcium fluoride powder is created.
5) When sodium metal reacts with iron (II) chloride, iron metal and sodium chloride are formed.