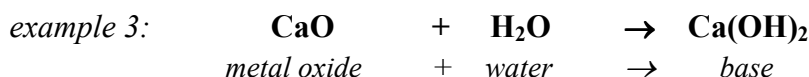
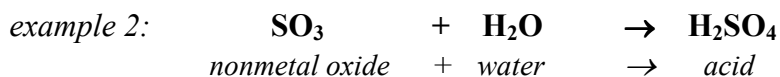
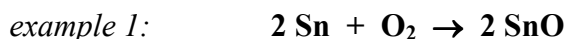


Determining the Type of Chemical Reaction

- 1) **Combination** – two or more reactants **combine to form a single product**.



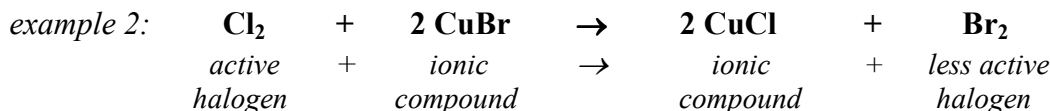
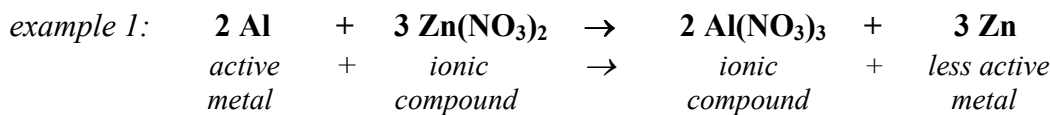
Honors Chemistry
*You must know
 these definitions!*

- 2) **Decomposition** – **one reactant decomposes** to form 2 or more products.



- 3) **Single Replacement** – **one single element reacts with a compound** (cation and anion) to form a new compound and a new single element.

**This reaction only occurs when the single element reactant is more “active” than the ion it is replacing in the compound. *Check the metal activity series or the halogen group on the periodic table to determine element “activity”.*



- 4) **Double Replacement** – **two ionic compound reactants switch cations** to form two new ionic compound products.



- 5) **Combustion** – hydrocarbon reacts with oxygen to form carbon dioxide and water.



Predicting and Writing Balanced Reaction Equations

The steps for predicting and writing balanced reaction equations include:

1 – Determine the type of chemical reaction.

- Combination – two or more reactants (elements for General Chemistry students) *combine to form a single product.*
- Decomposition – one reactant decomposes to form 2 or more products.
- Single Replacement – one single element reacts with a compound (cation and anion) to form a new compound and a new single element.
- Double Replacement – two ionic compound reactants switch cations to form two new ionic compound products.
- Combustion – hydrocarbon reacts with oxygen to form carbon dioxide and water.

2 – Determine the product combinations.

- Products (elements, molecules or ionic compounds) are dependent upon the chemical reaction type.
*** Careful, do not automatically carry over subscripts from the reactants to the products unless they are a part of a polyatomic ion.*
- If a single element is a product, add a subscript “2” to all “H-O-F-Br-I-N-Cl” elements. All other single elements DO NOT HAVE a subscript.

3 – Check to make sure that all ionic compounds formed are neutral.

- Write only ONE of each element or polyatomic, then
- Determine the cation charge and the anion charge. You can often *uncross-cross* the reactants to find the charges.
- Use the criss-cross method to balance the compound to a neutral charge.
Remember chapter 9? It's baaaaaack!

4 – Balance the elements on each side of the reaction equation.

- Use the Reactant/Products table method to assist with balancing the equation.

5 – Determine the physical state of each reactant and product.

- Place the correct physical state symbol in parenthesis behind each reactant and product. Physical states include:
solid (*s*) liquid (*l*) gas (*g*) aqueous (*aq*)

6 – Include the symbol for the catalyst (if needed).

Place the catalyst symbol above or below the “reacts to form” arrow.

