

## Types of Reactions

- synthesis (combination) reactions
- decomposition reactions
- single displacement reactions
- double displacement reactions

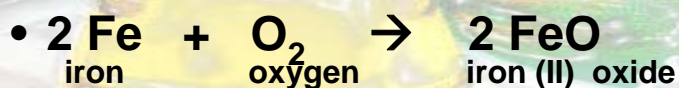
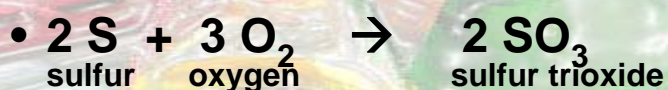
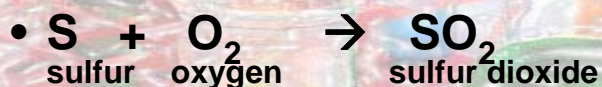
(note: sometimes displacement is called replacement)

## General Reaction Patterns:

- Combination or synthesis  $A + B \rightarrow AB$
- Decomposition  $AB \rightarrow A + B$
- Single Displacement  $A + BC \rightarrow B + AC$
- Double Displacement  $AB + CD \rightarrow AD + CB$

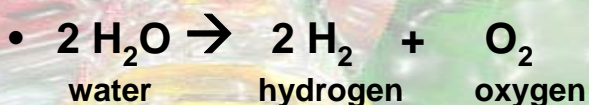
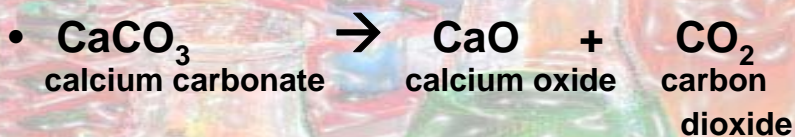
## Combination / Synthesis Reactions

- Two or more (relatively simple) reactants unite to form a single (relatively complex) product.



## Decomposition Reactions

- A single (relatively complex) reactant is decomposed or broken down into two or more (relatively simple) products





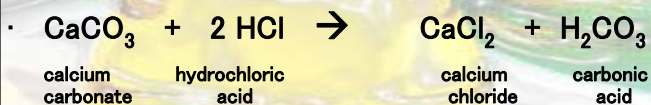
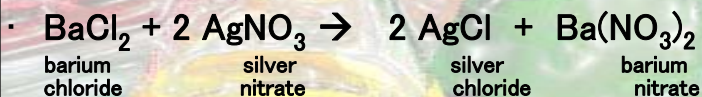
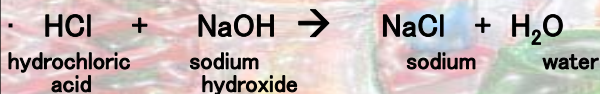
## Single Displacement Reactions

- A single *free* element replaces or is substituted for a similar element *in a compound*.



## Double Displacement Reactions

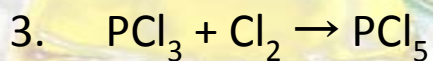
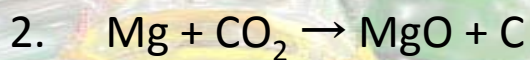
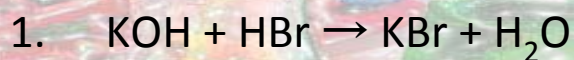
- You can think of it like the positive ions in two reactant compounds are trading partners
- For ionic compounds, the positive ion in the first compound combines with the negative ion in the second compound, and the positive ion in the second compound combines with the negative ion in the first compound.





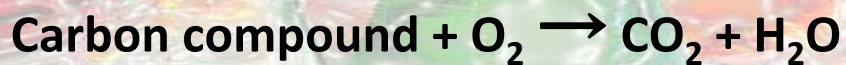
## *Types of Reactions Practice*

Identify the following unbalanced reactions as synthesis, decomposition, single displacement, or double displacement. **EXPLAIN YOUR CHOICE.**



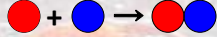



## *Combustion Reaction*

In a **combustion reaction** (*burning*), a carbon compound combines with oxygen and releases a large amount of energy in the form of light and heat.



The products of a combustion reaction  
are **ALWAYS**  $\text{CO}_2 + \text{H}_2\text{O}$



Type of Reaction	Identifying the type...	General Equation
Synthesis	two or more reactants combine to produce <b>ONE</b> compound	$A + B \rightarrow AB$ 
Decomposition	<b>ONE</b> compound is broken down to produce <b>two or more</b> compounds	$AB \rightarrow A + B$ 
Single Displacement	<b>element + compound</b> produces <b>element + compound</b>	$A + BX \rightarrow AX + B$ 
Double Displacement	<b>two compounds</b> produce <b>two compounds</b>	$AB + CD \rightarrow AD + BC$ 
Combustion	burning - carbon compound combines with oxygen to release heat/energy	<b>Carbon compound + O<sub>2</sub></b> $\rightarrow \text{CO}_2 + \text{H}_2\text{O}$ <b>ALWAYS THE PRODUCTS!</b>

## Types of Reaction Examples

**Synthesis:**  

$$\text{Mg} + \text{O}_2 \rightarrow \text{MgO}$$

**Decomposition:**  

$$\text{KBrO}_3 \rightarrow \text{KBr} + \text{O}_2$$

**Single Displacement:**  

$$\text{Fe} + \text{CuSO}_4 \rightarrow \text{Cu} + \text{FeSO}_4$$

**Double Displacement:**  

$$\text{NaCl} + \text{AgNO}_3 \rightarrow \text{AgCl} + \text{NaNO}_3$$

**Combustion:**  

$$\text{C}_6\text{H}_{14} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$$