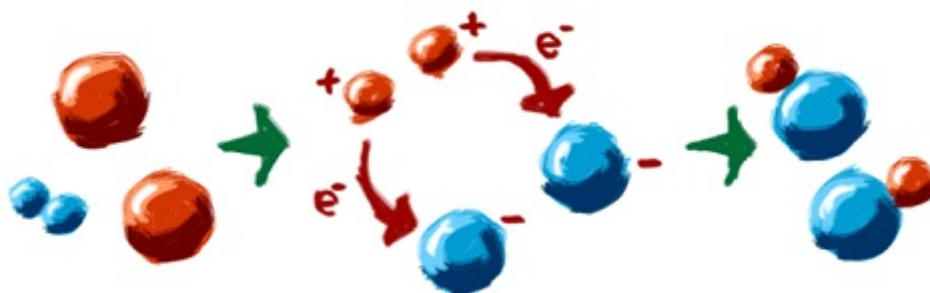


Science 1206
Unit 2: Chemical Reactions
Worksheet 11: Identifying Chemical Reactions



Chemical Reactions occur when two or more molecules interact and the molecules change. Bonds between atoms are broken and created to form new molecules.



All chemical reactions have two parts:

Reactants - the substances you start with
Products- the substances you end up with

The reactants turn into the products.

Example:

All the reactants -----> All the products

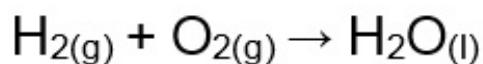
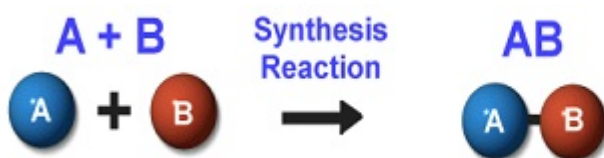
Reactant 1 + Reactant 2 -----> Product 1 + Product 2

Evidence that a chemical reaction has taken place?

1. Colour / Odour Change
2. Formation of a gas or solid
3. Gas Formation(effervescent)
4. Release/Absorption of Energy (heat)
5. Difficult to reverse

There are basically 5 different types of reactions, you must be able to identify the different types:

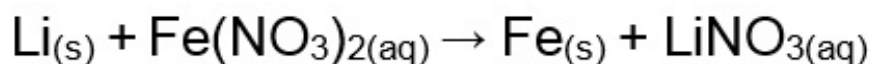
1. **Synthesis Reactions:** involves the joining of two atoms and/or molecules together to form a completely new compound. Synthesis reactions follow this pattern:



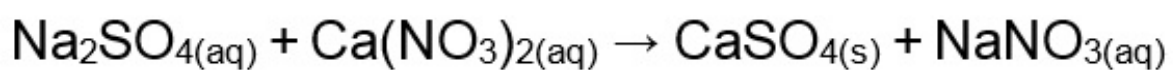
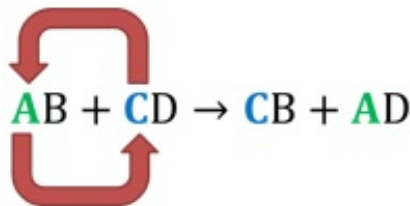
2. **Decomposition reaction,** a larger compound breaks apart into two smaller substances. This is essentially a reversal of what happens in a synthesis reaction.



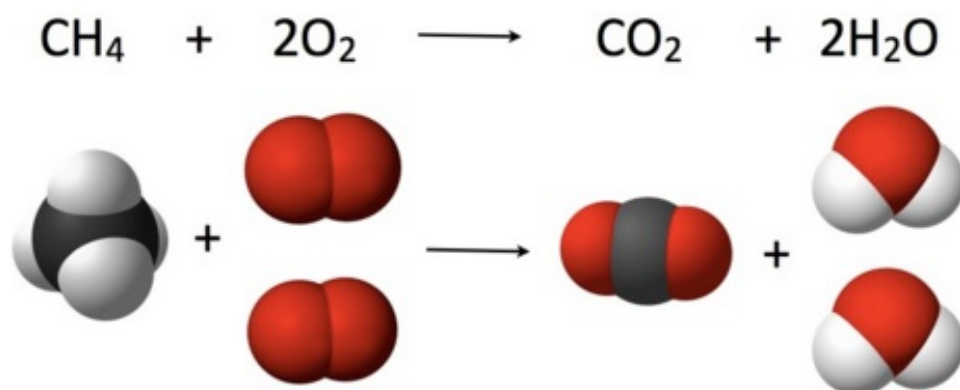
3. **Single replacement reaction,** the cation (usually a metal) in a compound is replaced by another, more reactive metal. Also, called single displacement reaction. They always follow this format:



4. **Double replacement reaction,** the cations of two compounds will switch places, forming two completely different compounds. Also, called double displacement reaction.



5. **Combustion reaction:** Usually reactants are oxygen and a hydrocarbon react to release a huge amount of energy in the form of light and heat. The products are always water and carbon dioxide (although incomplete burning does cause some by-products like carbon monoxide)



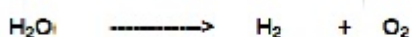
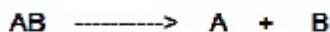
IDENTIFYING CHEMICAL REACTIONS

HOW MANY REACTANTS?

1

2

DECOMPOSITION



HOW MANY PRODUCTS?

2

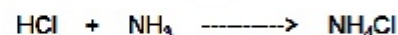
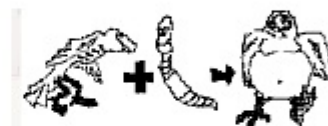
1

ARE BOTH REACTANTS COMPOUNDS?

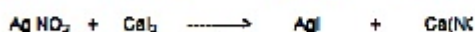
YES

NO

SYNTHESIS



DOUBLE REPLACEMENT



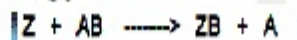
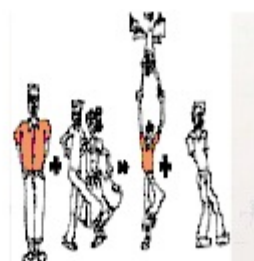
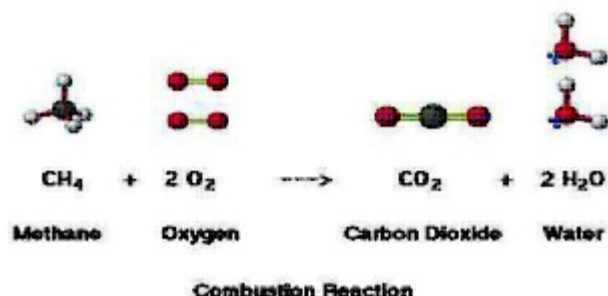
ARE THE PRODUCTS CO₂ AND H₂O?

YES

NO

COMBUSTION

SINGLE REPLACEMENT



1. For each of the following reactions, indicate whether the following is a synthesis, decomposition, single replacement, double replacement or combustion.

- 1) $\text{Na}_3\text{PO}_4 + 3 \text{KOH} \rightarrow 3 \text{NaOH} + \text{K}_3\text{PO}_4$ _____
- 2) $\text{MgCl}_2 + \text{Li}_2\text{CO}_3 \rightarrow \text{MgCO}_3 + 2 \text{LiCl}$ _____
- 3) $\text{C}_6\text{H}_{12} + 9 \text{O}_2 \rightarrow 6 \text{CO}_2 + 6 \text{H}_2\text{O}$ _____
- 4) $\text{Pb} + \text{FeSO}_4 \rightarrow \text{PbSO}_4 + \text{Fe}$ _____
- 5) $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$ _____
- 6) $\text{P}_4 + 3 \text{O}_2 \rightarrow 2 \text{P}_2\text{O}_3$ _____
- 7) $2 \text{RbNO}_3 + \text{BaF}_2 \rightarrow \text{Ba}(\text{NO}_3)_2 + 2 \text{RbF}$ _____
- 8) $2 \text{AgNO}_3 + \text{Cu} \rightarrow \text{Cu}(\text{NO}_3)_2 + 2 \text{Ag}$ _____
- 9) $\text{C}_3\text{H}_8\text{O} + 4 \text{O}_2 \rightarrow 3 \text{CO}_2 + 3 \text{H}_2\text{O}$ _____
- 10) $2 \text{C}_5\text{H}_6 + \text{Fe} \rightarrow \text{Fe}(\text{C}_5\text{H}_5)_2$ _____
- 11) $\text{SeCl}_6 + \text{O}_2 \rightarrow \text{SeO}_2 + 3 \text{Cl}_2$ _____
- 12) $2 \text{MgI}_2 + \text{Mn}(\text{SO}_3)_2 \rightarrow 2 \text{MgSO}_3 + \text{MnI}_4$ _____
- 13) $\text{O}_3 \rightarrow \text{O} + \text{O}_2$ _____
- 14) $2 \text{NO}_2 \rightarrow 2 \text{O}_2 + \text{N}_2$ _____

CLASSIFY the following reactions

- 1) $4 \text{Fe(s)} + 3 \text{O}_2\text{(g)} \rightarrow 2 \text{Fe}_2\text{O}_3\text{(s)}$
- 2) $\text{NaOH(aq)} + \text{HCl(aq)} \rightarrow \text{NaCl(aq)} + \text{H}_2\text{O(l)}$
- 3) $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
- 4) $\text{MgO(s)} + 2 \text{HCl(aq)} \rightarrow \text{MgCl}_2\text{(aq)} + \text{H}_2\text{O(l)}$
- 5) $\text{CaO(s)} + \text{H}_2\text{O(l)} \rightarrow \text{Ca(OH)}_2\text{(s)}$
- 6) $\text{S(s)} + 3 \text{F}_2\text{(g)} \rightarrow \text{SF}_6\text{(g)}$
- 7) $\text{ZnS(s)} + 2 \text{O}_2\text{(g)} \rightarrow \text{ZnSO}_4\text{(s)}$
- 8) $\text{SO}_2\text{(g)} + \text{Cl}_2\text{(g)} \rightarrow \text{SO}_2\text{Cl}_2\text{(g)}$
- 9) $(\text{CuSO}_4 \cdot 5\text{H}_2\text{O})\text{(s)} \rightarrow \text{CuSO}_4\text{(s)} + 5 \text{H}_2\text{O(g)}$
- 10) $\text{C}_5\text{H}_{12} + 8\text{O}_2 \rightarrow 5\text{CO}_2 + 6\text{H}_2\text{O}$
- 11) $\text{NH}_4\text{NO}_2\text{(s)} \rightarrow \text{N}_2\text{(g)} + 2 \text{H}_2\text{O(g)}$
- 12) $(\text{NH}_4)_2\text{Cr}_2\text{O}_7\text{(s)} \rightarrow \text{N}_2\text{(g)} + \text{Cr}_2\text{O}_3\text{(s)} + 4 \text{H}_2\text{O(g)}$
- 13) $2 \text{Al(s)} + \text{Fe}_2\text{O}_3\text{(s)} \rightarrow 2 \text{Fe(s)} + \text{Al}_2\text{O}_3\text{(s)}$
- 14) $2 \text{NaI(aq)} + \text{Br}_2\text{(aq)} \rightarrow 2 \text{NaBr(aq)} + \text{I}_2\text{(aq)}$
- 15) $2\text{C}_6\text{H}_6 + 15\text{O}_2 \rightarrow 12\text{CO}_2 + 6\text{H}_2\text{O} :$
- 16) $2 \text{Na(s)} + \text{Cl}_2\text{(g)} \rightarrow 2 \text{NaCl(s)}$
- 17) $\text{SO}_3\text{(g)} + \text{CaO(s)} \rightarrow \text{CaSO}_4\text{(s)} :$
- 18) $\text{SO}_2\text{(g)} + \text{H}_2\text{O(l)} \rightarrow \text{H}_2\text{SO}_3\text{(aq)}$
- 19) $\text{NH}_4\text{HCO}_3\text{(s)} \rightarrow \text{NH}_3\text{(g)} + \text{CO}_2\text{(g)} + \text{H}_2\text{O(g)}$
- 20) $\text{NH}_4\text{NO}_2\text{(s)} \rightarrow \text{N}_2\text{(g)} + 2 \text{H}_2\text{O(g)}$
- 21) $\text{CaCO}_3\text{(s)} \rightarrow \text{CaO(s)} + \text{CO}_2\text{(g)}$
- 22) $\text{C}_2\text{H}_4 + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 2\text{H}_2\text{O}$

