Types of Chemical Reactions

Synthesis Reactions

- Two or more reactants combine to produce a new product.

$2H_2(g) + O_2(g) \longrightarrow 2H_2O(\ell)$

$N_2(g) + O_2(g) \longrightarrow 2NO(g)$

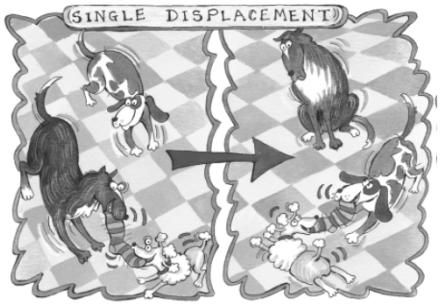
$Zn(s) + S(s) \longrightarrow ZnS(s)$

Decomposition Reactions

- A compound breaks down into two or more simpler compounds or elements.

$H_2CO_3(aq) \longrightarrow CO_2(g) + H_2O(\ell)$

Single Displacement Reactions



$A + BX \longrightarrow AX + B$ OR $AX + Y \longrightarrow AY + X$

Single Replacement Reactions

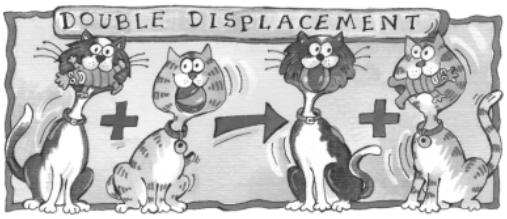
- One element takes the place of (displaces) another element in a compound.

$2Na(s) + 2H_2O(\ell) \longrightarrow 2NaOH(aq) + H_2(g)$

$Mg(s) + 2HCl(aq) \longrightarrow MgCl_2(aq) + H_2(g)$

$2AgNO_3(aq) + Cu(s) \longrightarrow Cu(NO_3)_2(aq) + 2Ag(s)$

Double Displacement Reactions



$WX + YZ \longrightarrow YX + WZ$

Double Replacement Reactions

- The cations of two different compounds exchange places, forming two new compounds.

$Ba(OH)_2(aq) + Na_2SO_4(aq) \longrightarrow BaSO_4(s) + 2NaOH(aq)$

$NaOH(aq) + HCl(aq) \longrightarrow NaCl(aq) + H_2O(\ell)$

Combustion Reaction

- Reaction that occurs when something burns.
- Shown by having oxygen, O_2, as one of the reactants.
- The products will **always** be carbon dioxide, CO_2 and water, H_2O

$$CH_4 + O_2 \rightarrow CO_2 + H_2O$$