- **Types of Chemical Reactions**
  - all chemical reactions involve a change in substances and an change in energy
  - can be classified into 5 types:

1) Synthesis Reaction

= 2 or more substances combine to make a larger compound

- this could be elements, compounds **or** an elements & a compounds

$A + B \rightarrow AB$

: example- magnesium + oxygen → magnesium oxide

$Mg + O_2 \rightarrow MgO$

$2Mg + O_2 \rightarrow 2MgO$

2) Decomposition Reaction

= larger compound is broken down into 2 or more smaller substances

- is the reverse of a synthesis reaction

$ABC \xrightarrow{+\text{heat often}} A + B + C$

: example- $6H_2O_2 \rightarrow 6H_2O + 3O_2$ ✗ $2H_2O_2 \rightarrow 2H_2O + O_2$

3) Single Displacement Reaction

= single element replaces another element (cations replace cations, anions replace anions)

- involves either metal replacement or halide replacement

$A + BC \rightarrow AC + B$

: example- $Zn + 2HCl \rightarrow ZnCl_2 + H_2$

4) Double Displacement Reaction

= elements exchange with each other (cations replace cations, anions replace anions)

- always involves 2 **ionic** compounds in aqueous solution
- usually results in the formation of a precipitate, a gas, or water

$AB + CD \rightarrow AC + BD$

:example- $Pb(NO_3)_2 + 2KI \rightarrow PbI_2 + 2KNO_3$

5) Combustion Reaction

= oxygen is added to a hydrocarbon (C_xH_y) to produce CO_2 + heat + H_2O

- combustion = burning which requires **oxygen** gas

$AB + O_2 \rightarrow CO_2 + H_2O$

:example- $2CH_3OH$ (methanol) $+ 3O_2 \rightarrow 2CO_2 + 4H_2O$

review endo vs exo