

Types of Reactions

Synthesis Reactions

- Formation of new product
- $A + B \rightarrow AB$

Decomposition Reactions

- Break down of a molecule into simpler components
- $AB \rightarrow A + B$

Complete Combustion

- Burning of a hydrocarbon to form only water and carbon dioxide
- $CH_4(g) + O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$
- Other substances undergo complete combustion to form stable oxides.
- $Mg(s) + O_2(g) \rightarrow MgO(s)$

Incomplete Combustion

- Burning of a hydrocarbon to form carbon dioxide, water along with carbon monoxide and carbon (caused by insufficient oxygen).
- $4CH_4(g) + 6O_2(g) \rightarrow C(s) + 2CO(g) + CO_2(g) + 8H_2O(g)$

Single Displacement

- Most involve a metal (A) replacing another metal (B) in a compound
- $A + BX \rightarrow B + AX$

Reactivity of Metals

- A reaction will only occur if the metal (A) is above metal B in the reactivity series.

Reactivity of Halogens

- Halogens can take part in single displacement reactions as well.
- $Cl_{2(g)} + NaI_{(aq)} \rightarrow NaCl_{(aq)} + I_{2(g)}$

Double Displacement

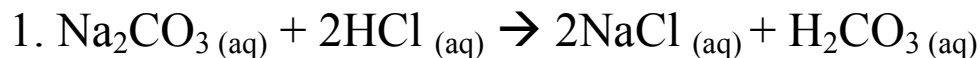
- $AX + BY \rightarrow BX + AY$
- In a double displacement reaction new products must be formed in order for a reaction to have taken place.

Formation of a Precipitate

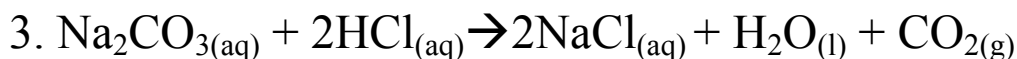
- When two solutions are mixed a solid is formed.
- $BaCl_{2(aq)} + K_2SO_{4(aq)} \rightarrow BaSO_{4(s)} + 2KCl_{(aq)}$

Production of Gas

- In many cases a double displacement forming a gas will take place in two steps, a double displacement followed by decomposition.
- This is called a reaction mechanism



Overall reaction



Formation of Water in Neutralization

- Acids and bases are double displacement reactions forming water.
- $\text{HA} + \text{BOH} \rightarrow \text{AB} + \text{HOH}$