

Types of chemical reactions:

- Synthesis – When two or more substances (elements or compounds) combine chemically to form another, more complex substance (compound)
 - Decomposition – When a relatively complex compound breaks down into two or more simpler substances (compound or elements).
 - Single Displacement – When a reaction takes place between two substances (one element and one compound) and the element replaces an element in the original compound.
 - Double Displacement – When two compounds react in such a way as to switch the locations of two elements.
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- Polyatomic ions behave in reactions as if they were element with the major exception that they cannot be released a free, neutral substances.
 - The substances that are initially present for a reaction are called the reactants.
 - The substances that result from a reaction are called products.
 - When a solid is formed in a reaction, it is called a 'precipitate'.
 - Abbreviations are used to indicate the 'state' of a substance. These abbreviations are given in parentheses.
 - o (g) or ↑ means a gas is released.
 - o (s) or ↓ means a solid or precipitate is formed.
 - o (aq) means that the compound is dissolved in water.
 - In the lab, the synthesis reaction was the oxidation of iron.
 $\text{Fe} + \text{O}_2 \rightarrow \text{FeO}_2$
 - The decomposition reaction was the decomposition of baking soda.
 $2\text{NaHCO}_3 \rightarrow \text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2$
 - The single displacement reaction was the substitution of Iron for copper in copper(II) sulfate.
 $\text{Fe} + \text{CuSO}_4 \rightarrow \text{Cu} + \text{FeSO}_4$
 - There were several double displacement reactions attempted.
If a gas was produced or a precipitate formed, the reaction would continue since at least one of the products was removed from the system thus preventing the reaction from reversing.
 - o $\text{BaCl}_2(\text{aq}) + \text{Na}_2\text{CO}_3(\text{aq}) \rightarrow \text{BaCO}_3(\text{s}) + 2\text{NaCl}(\text{aq})$ Since BaCO_3 precipitates, this is a double displacement reaction.
 - o $\text{Na}_2\text{CO}_3(\text{aq}) + \text{K}_2\text{SO}_4(\text{aq}) \rightarrow \text{Na}_2\text{SO}_4(\text{aq}) + \text{K}_2\text{CO}_3(\text{aq})$ This is just a mixture of ions.
 - o $\text{CuSO}_4(\text{aq}) + \text{NaOH}(\text{aq}) \rightarrow \text{Na}_2\text{SO}_4(\text{aq}) + \text{Cu}(\text{OH})_2(\text{s})$ $\text{Cu}(\text{OH})_2$ precipitates.
 - o $\text{FeCl}_3(\text{aq}) + 3\text{NaOH}(\text{aq}) \rightarrow \text{Fe}(\text{OH})_3(\text{s}) + 3\text{NaCl}(\text{aq})$ $\text{Fe}(\text{OH})_3$ precipitates.
 - o $2\text{NaOH}(\text{aq}) + \text{K}_2\text{SO}_4(\text{aq}) \rightarrow \text{Na}_2\text{SO}_4(\text{aq}) + 2\text{KOH}(\text{aq})$ This is just a mixture of ions.