

CHEMISTRY STUDY MATERIALS FOR CLASS 10

(NCERT Based: Revision of Chapter -01)

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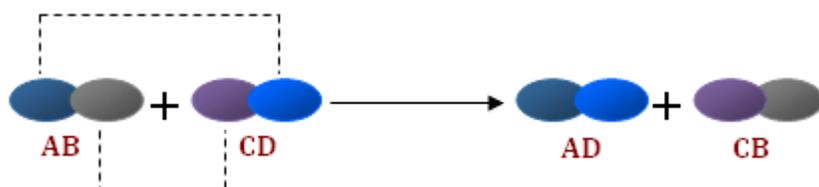
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Chemical Reactions and Equations

The Theory

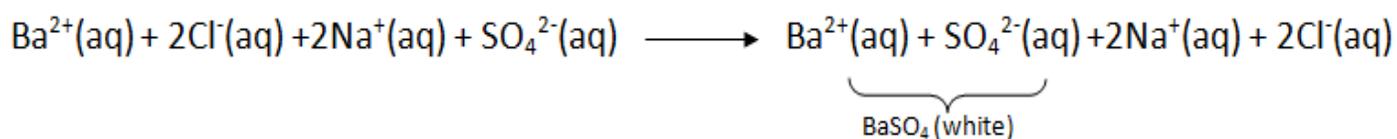
Double displacement reactions may be defined as the chemical reactions in which one component each of both the reacting molecules is exchanged to form the products. During this reaction, the cations and anions of two different compounds switch places, forming two entirely different compounds.

The general equation which represents a double displacement reaction can be written as:



Double displacement reactions generally take place in aqueous solutions in which the ions precipitate and there is an exchange of ions.

For example, on mixing a solution of barium chloride with sodium sulphate, a white precipitate of barium sulphate is immediately formed. These reactions are ionic in nature. The reactants change into ions when dissolved in water and there is an exchange of ions in solution. This results in the formation of product molecule.

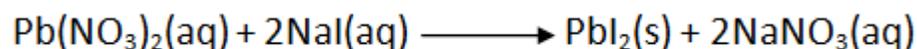


Double displacement reactions can be further classified as neutralization, precipitation and gas formation reactions.

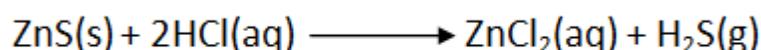
Neutralization reactions are a specific kind of double displacement reaction. An acid-base reaction occurs, when an acid reacts with equal quantity of base. The acid base reaction results in the formation of salt (neutral in nature) and water.



Precipitation is the formation of a solid in a solution or inside another solid during a chemical reaction. This process usually takes place when the concentration of dissolved ions in the solution exceeds the solubility product.



A double displacement reaction should also occur if an insoluble gas is formed. Gases such as HCl and NH₃ are soluble in water, but some other gases, such as H₂S, are not soluble in water.



1. Neutralization Reactions

On mixing an aqueous solution of hydrochloric acid with an aqueous solution of sodium hydroxide, sodium chloride and water are formed.

2. Precipitation Reactions

- On mixing aqueous solutions of silver nitrate and sodium chloride, a white curdy precipitate of silver chloride is formed.
- On mixing an aqueous solution of barium chloride with that of copper sulphate, a white precipitate of barium sulphate is formed.
- On mixing an aqueous solution of lead nitrate with sodium sulphate, a white precipitate of lead sulphate is formed.
- On passing hydrogen sulphide gas through copper sulphate solution, a black precipitate of copper sulphide is formed.
- On adding a solution of lead nitrate to sodium iodide solution, a yellow precipitate of lead iodide is formed.
- Cobalt (II) chloride reacts with sodium carbonate to form pink/red coloured precipitate of cobalt (II) carbonate and sodium chloride.
- On adding aluminium sulphate solution to calcium chloride solution, a precipitate of calcium sulphate is formed.
- Lead acetate solution is treated with dilute hydrochloric acid to form lead chloride and acetic acid solution.

3. Gas Formation Reactions

- Many sulfide salts will react with acids to form gaseous hydrogen sulphide.
- Insoluble gases are often formed by the breakdown of unstable double displacement reaction products. For example, marble chips (CaCO_3) react with dilute hydrochloric acid to form calcium chloride and carbonic acid. Carbonic acid is unstable and readily decomposes to form carbon dioxide and water.

