

Physical and Chemical Changes

- Changes can broadly be classified into two types – physical and chemical.
 - The characteristics of physical and chemical changes

Physical Change	Chemical Change
1. The chemical composition of a substance does not change. 2. Most changes are reversible. 3. No new substances are formed. For example, Ice → Water → Steam	1. The chemical composition of a substance changes. 2. Most changes are irreversible. 3. New substances are formed. For example, Paper → Ashes

- Burning a candle is a combination of physical and chemical change.

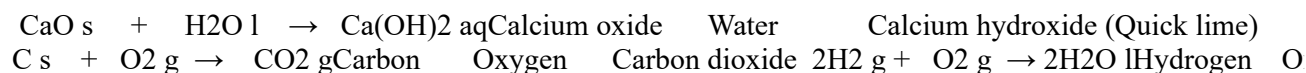
- Catalysis** is the process in which the rate of a chemical reaction is either increased or decreased by a chemical substance known as a **catalyst**.
Negative catalyst or inhibitor is a substance that slows down the rate of reaction. It retards the efficiency of a catalyst.
- Photochemical reactions are the reactions that proceed with absorption of light energy. Example-**Photosynthesis**
- Some chemical reactions proceed only when the reactant molecules are brought together in close contact with each other. The intimate contact can be brought by**

- grinding the reactants together**
- dissolving the reactants in water

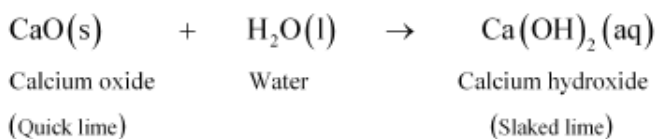
- Certain chemical reactions proceed only when an electric current is passed through reactants in fused state or in aqueous solution.
 Example: Acidulated water decomposes into hydrogen and oxygen only when electric current is passed.
- Certain chemical reactions proceed only when reactants are heated together while certain chemical reactions proceed when reactants are exposed to sunlight or diffused sunlight or when reactants are subjected to a pressure higher than atmospheric pressure.

Types of reactions

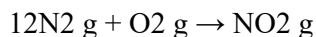
- Combination reaction**
 - Two or more reactants combine to form one single product.
 - Examples**



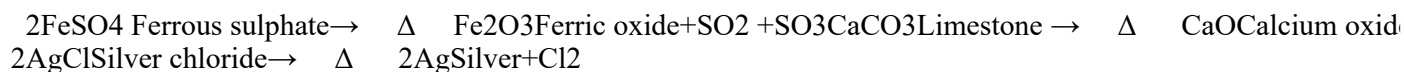
- **Exothermic reaction** – Heat gets released in the reaction. Most combination reactions are exothermic. For example,



- **Endothermic reaction** – Heat is absorbed in the reaction. Very few combination reactions are endothermic. For example,



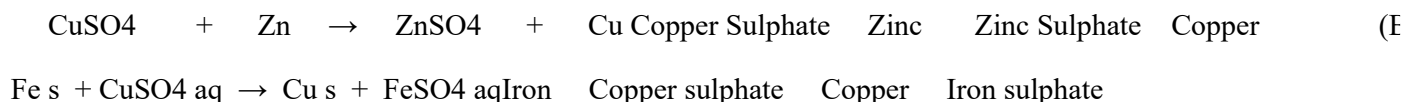
- **Decomposition reaction**
 - A single reactant breaks into several simple products.
 - **Examples**



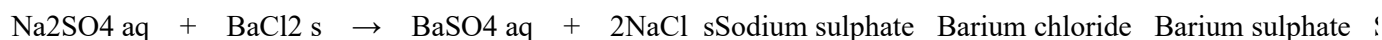
- - All decomposition reactions are **endothermic [they absorb heat]**.

- **Displacement reactions:**
 - In displacement reactions, a more reactive metal can displace a less reactive metal from their compounds in aqueous solutions. (However, a less reactive metal cannot displace a more reactive metal.)

Example:



- **Double displacement reaction**
 - Exchange of ions occurs between two compounds.
 - Example



- When the aqueous solution of two compounds react by exchanging their respective ions, such that one of the products formed is insoluble salt and appears in the form of a precipitate, then the reaction is said to be **precipitation reaction**.
- When an acid solution reacts with a base and the two exchange their respective ions, such that only salt and water are products, then the reaction is called **neutralisation reaction**.
- When two compounds react with each other and displace their ions, in such a manner that one of the product formed either decomposes into gaseous compounds or is formed in gaseous state, then the reaction is called **gas-forming reaction**.
- **Combustion**
 - It is a chemical process in which a substance reacts with oxygen to give off heat and light.
 - Oxygen (in air) is essential for combustion.

- Substances that burn in air are called combustible substances (also called **fuels**) and those that do not burn in air are non-combustible substances.
- **Ignition temperature**
 - It is the lowest temperature at which a substance catches fire.
- **Inflammable substances**
 - They have very low ignition temperature and can easily catch fire with flame.
- **Supporter of combustion**
 - The gaseous environment that supports combustion of a combustible substance is called supporter of combustion.
 - Smaller the size of combustible particles, faster is the rate of combustion.
 - Nature of combustible substances: Inflammable substances burn faster as compared to substances such as wood.