CHAPTER 6: Physical and Chemical Changes

- Changes are constantly occurring in the environment.
- These changes in the surrounding may produce new substances or it may just change the state of a substance from solid to liquid.
- Changes can be of two types:Physical change and Chemical change.

- **PHYSICAL CHANGES:**

1.) Some examples of physical bring about a change in size are piece of paper cut into smaller pieces or chalk broken in smaller pieces.
2.) State of matter is also physical change for example water can changeits state fromsolid to liquid, or from gas to liquid
3.) Physical changes also involve change of color, like when a hack-saw blade is heated, it changes the color.
4.) So, to summarize physical change involves change in properties such as shape, size, color and state of a substance.
5.) Physical change is a reversible process.
6.) In physical process does not involve formation of any new substance.

- **CHEMICAL CHANGES:**

1.) A common example of chemical reaction is rusting of iron.
2.) Rusting: The development of a brownish film on iron is called rusting.
3.) When iron objects are continuously exposed to the atmosphere contentiously, it will get rusted after some time.

- **EXAMPLES OF CHEMICAL CHANGES:**

- **Burning magnesium ribbon:**

1.) When magnesium is burnt in air (oxygen), it produces a powdery ash like substance which looks like magnesium oxide (MgO).
2.) When magnesium oxide (MgO) also know ash is mixed with a small amount of water it forms a new substance known as magnesium hydroxide [$Mg(OH)_2$]
3.) [$Mg(OH)_2$] produced in chemical reaction is basic in nature.

- **Reaction of water with copper sulphate:**

1.) Blue vitriol or Neela are the other names of copper sulphate.
2.) When copper sulphate reacts with water, in presence of dilute sulphuric acid a blue colored solution is formed.
3.) To this solution if a piece of iron for example a nail is added, the color of the solution changes to green after some time.
4.) The green color is a result of chemical reaction which takes place in between copper sulphate and iron.

5.) The product formed is iron sulphate (green) which is a new chemical product. Also, in the same reaction, copper gets deposited on the surface of the iron nail. The iron nail gets a brown color due the deposition of copper on its surface.

- **Reaction of Vinegar with baking soda:**

1.) Vinegar also known as acetic acidreacts with baking soda. it produces Sodium hydrogen carbonate and carbon dioxide which is released in form of bubbles and makes a whistling sound and other substances.
2.) Carbon dioxide reacts with lime water or calcium hydroxide to generates Calcium Carbonate(CaCO3) and Water (H2O).
3.) A standard reaction to test carbon dioxide is present or not is mixing the gas with lime water and checking if it gets milky.

- Changes which generate one or morenew substances are formed is called achemical change.
- These changes are essential for generation of new substances. The other byproducts formed include Heat, light or any other radiation like U.V. rays.
- After from these gases, sounds, different smells or colors may be produced.
- Other examples of chemical change include Burningof coal, wood or leaves etc., Explosion of a firework, food spoilage.
- The process ofneutralization is a chemical change.
- Ozone layer protects the environment from the harmful ultraviolet radiation whichcome from the sun.
- **RUSTING OF IRON:**

1.) Rusting is the common cause of slow destruction of iron articles like bridges, ships, cars, truckbodies etc.
2.) This is not a beneficial process as it causes economic losses.
3.) The process of rusting involves reaction of iron with oxygen in air and water and results in formation of rust or iron oxide ($Fe2O_3$).
4.) Rusting is faster if climate is high in humidity.
5.) To prevent rusting of iron articles, they can be coated with paint, grease or layerof a metal like chromium or zinc on iron.
6.) Galvanisation: The process of preventing rusting by depositing a layer of metal like zincon surface of iron is called galvanization.
7.) Galvanized iron pipes are used in household water caring pipes, outer surface of ships etc.
8.) The outer surface of ships can be paintedto prevent its rusting by coming in contact with salty water.
9.) An alternative is to use stainless steel instead of iron. Stainless steel is composed of iron mixed with carbon, chromium, nickel and manganese which does not rust.

- **CRYSTALLISATION:**

1.) This is a type of physical change.
2.) Common example of naturally occurring crystallization is formation of salt crystals by evaporation of seawater.

3.) Salt crystal obtained is impure and irregular crystals are formed.
4.) Crystallization is a process by which crystals are formed due to the arrangement of atoms or molecules in a particular manner.