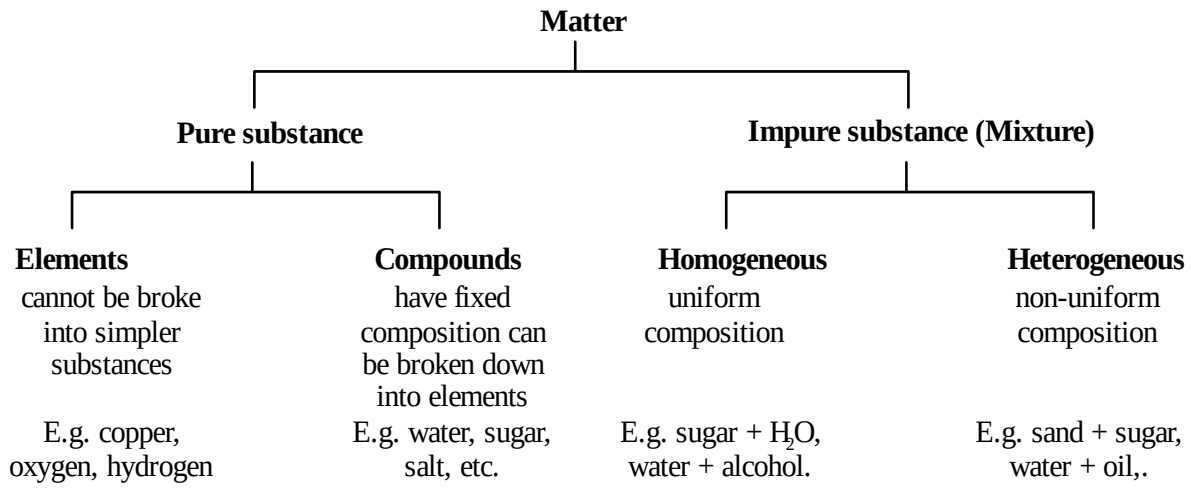
Class 9th

**CHEMISTRY**

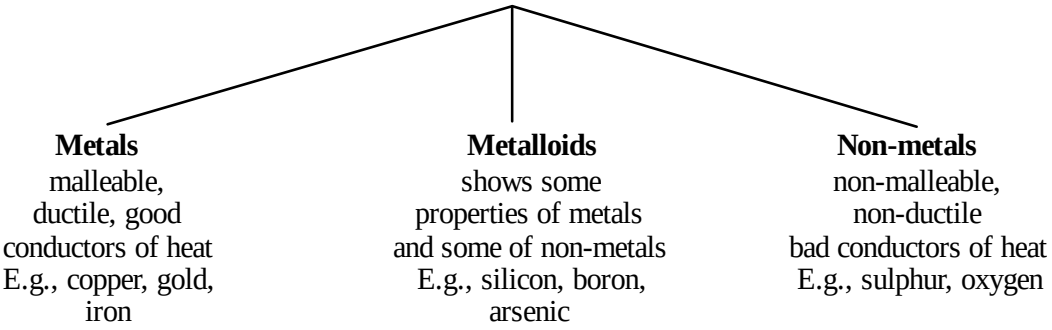
**CHAPTER - 02**

**IS MATTER AROUND US PURE**




**Elements**

It is a pure substance which cannot be split into two or more simpler substances.




**Compounds**

The compound is a pure substance made up of two or more elements combined chemically in a definite ratio.

**Characteristics:**

- The properties of compound differ from those of its constituents.
- Compound has fixed melting point and boiling point.
- Constituent elements can be separated by chemical process.

**Mixtures**

It is made up of two or more elements or compounds mixed in any ratio/proportion.

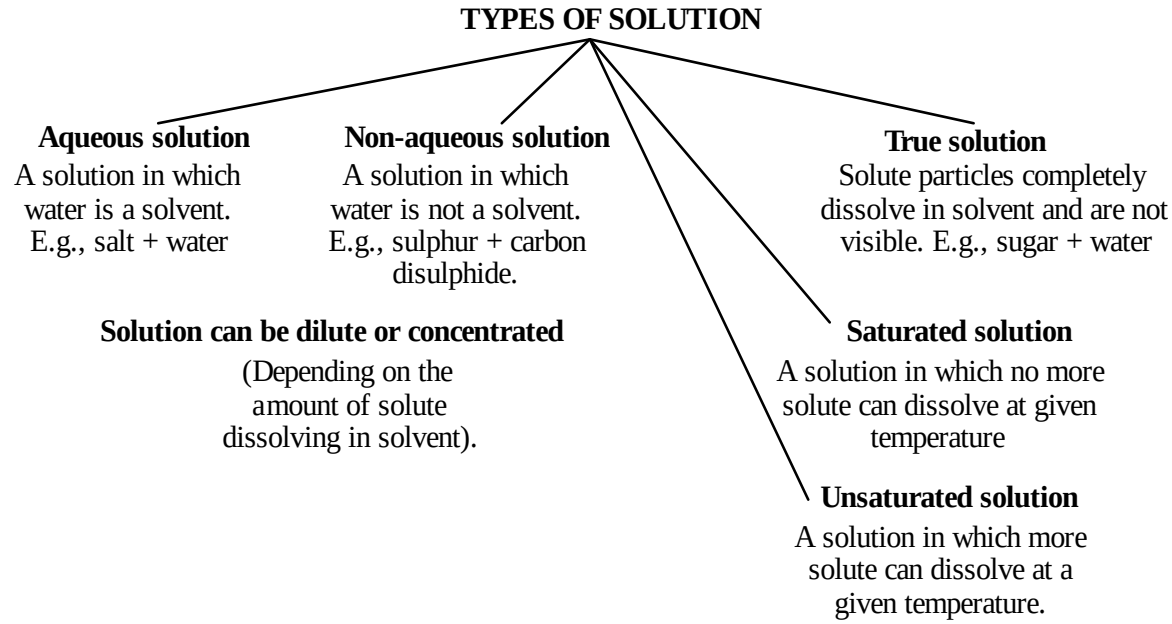
**Properties:**

- The properties of constituent substances are retained.
- No new compound is formed.
- Elements can be separated by simple physical processes.
- It does not have a fixed melting and boiling point.

A **solution** is a homogeneous mixture of two or more substances.

**Properties**

- Its particles are too tiny and have a diameter of less than 1 nm.
- The particles are not visible to the naked eyes.
- Particles do not scatter a beam of light passing through them and hence do not show the Tyndall effect.
- The solute particles never settle down on keeping undisturbed.
- The components of a solution cannot be separated using filtration.




**Alloys:**

Alloys are mixtures of two or more metals or a metal and a non-metal and cannot be separated into their components by physical methods. But still, an alloy is considered as a mixture because it shows the properties of its constituents and can have variable composition. For example, brass is a mixture of approximately 30% zinc and 70% copper.

**The concentration of a solution** is the amount (mass or volume) of solute present in a given amount (mass or volume) of solution.

(i) Mass by mass percentage of a solution

$$= \frac{\text{Mass of solute}}{\text{Mass of solution}} \times 100$$

(ii) Mass by volume percentage of a solution

$$= \frac{\text{Mass of solute}}{\text{Volume of solution}} \times 100$$

(iii) Volume by volume percentage of a solution

$$= \frac{\text{Volume of solute}}{\text{Volume of solution}} \times 100$$

**Solubility and its factors affecting:**

The amount of the solute present in the saturated solution at a given temperature is called its solubility.

- Temperature – Solubility of solid in liquid generally increases with temperature but for gases it decreases.
- Pressure – For the majority of solid and liquid solutes, pressure does not affect solubility. The solubility of gas is directly proportional to the pressure of this gas.

**Suspension and Its Properties**

A **suspension** is a heterogeneous mixture in which the solute particles do not dissolve but remain suspended throughout the bulk of the medium. Example: Chalk or wheat in water etc.

- The solute particles settle down when a suspension is left undisturbed.
- They can be separated from the mixture by **filtration.**
- A suspension is a heterogeneous mixture.
- The size of solute particles in a suspension is quite large. It is larger than 100 mm in diameter.
- The particles of a suspension can be seen easily.
- The particles of a suspension do not pass through a filter paper. So a suspension can be separated by filtration.

**Colloidal solution and its properties**

Colloid solution is heterogeneous mixture in which the size of particles lies between the true solutions and suspensions.

**Dispersed Phase**

The solute-like component of the dispersed particles in a colloid form the **dispersed phase.**

**Dispersion Medium**

The component in which the dispersed phase is suspended is known as the **dispersing medium.**

- A colloid is a heterogeneous mixture.
- The size of particles of a colloid is too small to be individually seen by naked eyes.
- Colloids are big enough to scatter a beam of light passing through it and make its path visible.
- They do not settle down when left undisturbed, that is, a colloid is quite stable.
- They cannot be separated from the mixture by the process of filtration. But, a special technique of separation known as centrifugation (perform activity 2.5), can be used to separate the colloidal particles.

**Tyndall effect** is the scattering of light by particles in a colloid or else particles in a very fine suspension.

**Separation of Components of a Mixture**

- Heterogeneous mixtures can be separated into their constituents by simple **physical methods.**
- **Methods include** handpicking, sieving, and filtration.

**Separation of a Mixture of Two Immiscible Liquids**

- The separation of a mixture of two immiscible liquids is done by using a separating funnel.
- **Applications:** To separate a mixture of oil and water in the extraction of iron from its ore.
  Immiscible liquids break out into layers according to their densities, which is the basic idea behind the separation of immiscible liquids using a separating funnel.

**Centrifugation:**

The principle is that the denser particles are forced to the bottom and the lighter particles stay at the top when spun rapidly.

- The mixture is rotated rapidly so that the heavier particles in the mixtures settle down to the bottom.

**Evaporation:**

**Process of evaporation is used** to obtain coloured components from blue/black ink. The process of evaporation is used to separate a substance which is dissolved in water.

- It is based on the fact that liquid vaporises easily than the solid.
- Helps in separating volatile substances from non-volatile substances.
- Used in diagnostic laboratories for blood and urine tests.

**Separating two immiscible liquids**

- The separation of separating two immiscible liquid is carried out by the use of funnel.
- The basic principle involve is the difference between the densities of two liquids form two separate layers.

**Chromatography**

- Used to separate those solutes which dissolve in the same solvent.
- Used for separation of colours.
- The colours which are more soluble in water rises faster and get colours get separated into layers.
- Ammonium chloride, camphor, naphthalene and anthracene are some examples which can sublime.

**Distillation**

- Used for separation of components of a mixture containing two miscible liquids that boil without decomposition and have sufficient difference in their boiling points.
- Mixture of acetone and water is separated by this method.

**Fractional distillation**

- Fractional distillation is used to separate a mixture of two or more miscible liquids for which the difference in boiling points is less than 25 K.
- Air is a homogeneous mixture and can be separated into its components by fractional distillation.
- The air is compressed by increasing the pressure and is then cooled by decreasing the temperature to get liquid air.
- The liquid air is warm-up slowly in a fractional distillation column, where gases get separated at different heights depending upon their boiling points.

**Crystallization**

- Used to remove impurities from solid and purify it.
- It separates a pure solid from mixture in the form of crystals.
- It is better method than evaporation because:
  (i) Solids decompose or some, like sugar, may get charred on heating to dryness.
  (ii)Some impurities may remain dissolved in the solution even after filtration. On evaporation these contaminate the solid.

**Physical and Chemical changes**

- The process which brings about changes in physical properties and no new substances are formed are physical changes. The common physical changes are changes in colour, hardness, rigidity, fluidity, density, melting point, boiling point etc.
- The process in which new substances are formed and chemical properties of substances get changed are chemical changes. Some chemical properties are odour, inflammability etc.