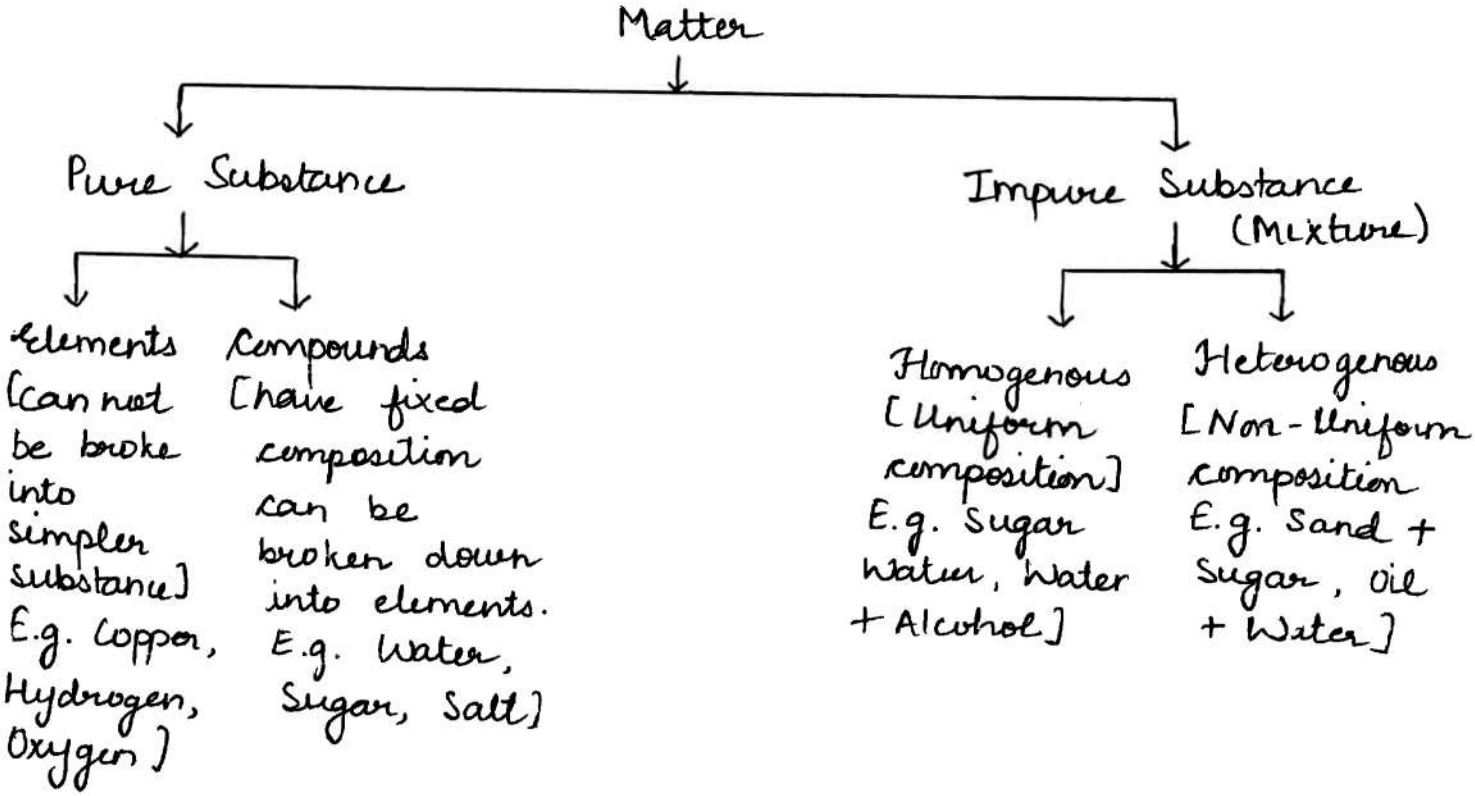
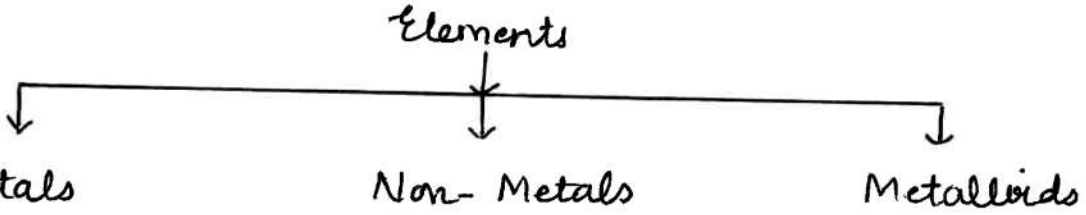
Is Matter around us Pure

Matter can be classified into two types of substance
1. Pure substance
2. Mixture

Pure Substance A pure substance is a type of matter which is made up of only one kind of particles. Example: Iron, hydrogen etc.

Mixtures: A mixture is made up of two or more different chemical substances which are not combined chemically. Example: Lemonade etc.





Classification of Pure Substances

Pure substances are further classified into two types:

1. Elements
2. Compounds

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

Example: Copper, Iron, Hydrogen.

Classification of Elements:

A. On the basis of physical states:

(i) **Solid Elements:** Those elements which can exist as solid at room temperature are known as solid elements.

Example: Copper, Gold etc.

(ii) **Liquid Elements:** Those elements which can exist as liquid at room temperature are known as liquid elements.

Example: Bromine, Mercury etc.

(iii) **Gaseous Elements:** Those elements which can exist as gas at room temperature are known as gaseous elements.

Example: Oxygen, Nitrogen etc.

B. On the basis of their properties:

(i) **Metals:** A metal is an element that is ductile, malleable and conducts electricity.

Example: Iron, Gold etc.

(ii) **Non-Metals:** A non-metal is a substance which is neither ductile nor malleable, and it does not conduct electricity.

Example: Oxygen.

(iii) Metalloid: Metalloid are the elements which have properties in between those of metals and non-metals.
Example: Silicon, Boron etc.

2. Compound: A compound is a pure substance which is composed of two or more elements that have been combined chemically in a fixed ratio by mass.
Example: Methane, Water etc.

Characteristics of Compounds:

- The properties of compounds differs from those of its constituents
- Compound has fixed melting and boiling point.
- Constituent element can be seperated by chemical process.

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

Properties of Mixture

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

Classification of Mixtures

Mixture is classified into two types:

1) Homogenous Mixture
2) Heterogenous Mixture

Homogenous Mixture: Homogenous mixtures are the mixtures in which different components are mixed together uniformly.
Example: Salt solution, Aerated drinks etc.

Heterogenous Mixture: Heterogenous mixtures are the mixtures in which different components are not mixed uniformly.
Example: Mixture of salt and sand.

Solution: A solution is a homogenous mixture of two or more substances.

Properties:
- Its particles are too tiny and have a diameter of less than 1nm.
- The particles are not visible to naked eyes.
- Particles do not scatter a beam of light passing through them and hence do not show Tyndall effect.
- The solute particles do not settle down on keeping undisturbed.
- The components of a solution can not be seperated using filteration.

Components of solution

Solvent: The component of the solution that dissolves the other component in it is called solvent

Solute: The component of the solution that is dissolved in the solvent is called solute.

Concentration of solution: The concentration of a solution is defined as the amount of solute present in a given amount (mass or volume) of solution.

Concentration of solution = $\frac{\text{Amount of solute}}{\text{Amount of solution}}$

'Percentage method' is most common method of expressing the concentration of solution.

(i) Mass by mass percentage of solution (w/w)

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

(ii) Mass by volume percentage of solution (w/v)

$$= \frac{\text{Mass of solute (g)}}{\text{Volume of solution (ml)}} \times 100$$

(iii) Volume by volume percentage of solution (v/v)

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

Solubility: The amount of the solute present in the saturated solution at a specified temperature is called solubility.

Factors affecting solubility:

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

Alloys: Alloys are mixtures of two or more metals or a metal and a non-metal. It can not be separated into their components by physical methods.

It can have variable composition. For example, brass is a mixture of approximately 30% zinc and 70% copper.

Suspension: A suspension is a heterogenous mixture in which the solute particles do not dissolve but remain suspended throughout the bulk of the medium. Example: Chalk or Wheat in water.

Properties:

- The solute particles settles down when a suspension is left undisturbed.
- They can be seperated from mixture by filteration
- It is a heterogenous mixture
- The size of suspension particles (solute) is quite large.
- The particles of solute can be seen easily.
- The particles can be seprated by filteration.

Colloidal Solution:

Colloidal solution is heterogenous mixture in which the size of particles lies in between the true solution and suspension.

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.

Properties:

- A colloid is heterogenous 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.

Tyndall effect: Tyndall effect is the scattering of light by particles in a colloid

Physical Change: The process which brings about changes in physical properties and no new substances are formed are called physical changes. The common physical changes are change in colour, hardness, rigidity, fluidity, density, melting point, boiling point etc.

Chemical Changes: The process in which new substances are formed and chemical properties of a substance get changed are called chemical changes. Some chemical properties are odour, inflammability etc.