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## **MIXTURES AND COMPOUNDS**

- Depending upon the chemical composition, matter is classified into elements, compounds and mixtures.
- A mixture contains more than one substance mixed in any proportion.
- Air is a mixture of nitrogen, oxygen, carbon dioxide, water vapour and other gases. Soil is a mixture of clay, sand and various salts.
- Milk, ice cream, rock salt, tea, smoke, wood, sea water, blood, tooth paste and paint are some other examples of mixtures.
- Alloys are mixtures of metals.
- Mixtures can be separated into pure substances using appropriate separation techniques.

### **Types of Mixtures**

- Homogeneous mixture
- Heterogeneous mixture

#### **Homogeneous Mixture**

- A mixture in which the components cannot be seen separately is called a homogeneous mixture.
- It has a uniform composition and every part of the mixture has the same properties.
- Tap water, milk, air, ice cream, sugar syrup, ink, steel, bronze and salt solutions are homogeneous mixtures.

#### **Heterogeneous Mixture**

- A mixture in which the components can be seen separately is called a heterogeneous mixture.
- It does not have a uniform composition and properties.
- Soil, a mixture of iodine and common salt, a mixture of sugar and sand, a mixture of oil and water, a mixture of sulphur and iron filings and a mixture of milk and cereals are heterogeneous mixture.

### **Solutions**

- A solution is a homogeneous mixture of two or more substances. You come across various types of solutions in your daily life. Lemonade, soda water, etc.
- We can also have solid solutions (alloys) and gaseous solutions (air)
- The particles of a solution are smaller than 1 nm ( $10^{-9}$  metre) in diameter. So, they cannot be seen by naked eyes.
- Because of very small particle size, they do not scatter a beam of light passing through the solution. So, the path of light is not visible in a solution.
- Solution has a solvent and a solute as its components.

## Suspension

- Suspension is a heterogeneous mixture in which the solute particles do not dissolve, but rather remain suspended throughout the bulk of the medium.
- The particles of a suspension scatter a beam of light passing through it and make its path visible.
- The particles of a suspension can be seen by the naked eye.
- The solute particles can be separated from the mixture by the simple process of filtration.

## Colloids

- 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.
- Colloid particles cannot be separated from the mixture by the simple process of filtration.
- The special filtration technique i.e., **centrifugation**, can be used to separate the colloidal particles.

## Examples Of Colloids

Dispersed phase	Dispersing Medium	Type	Example
Liquid	Gas	<b>Aerosol</b>	Fog, clouds, mist
Solid	Gas	<b>Aerosol</b>	Smoke, automobile exhaust
Gas	Liquid	<b>Foam</b>	Shaving cream
Liquid	Liquid	<b>Emulsion</b>	Milk, face cream
Gas	Solid	<b>Foam</b>	Foam, rubber, sponge, pumice
Solid	Liquid	<b>Sol</b>	Milk of magnesia, mud
Liquid	Solid	<b>Gel</b>	Jelly, cheese, butter
Solid	Solid	<b>Solid Sol</b>	Coloured gemstone, milky glass

## Separating The Components of a Mixture

- Separate the volatile component (solvent) from its non-volatile solute by the method of **evaporation**.
  - **Application:** Ink is a mixture of a dye in water.
- **Centrifugation** is the process by which fine insoluble solids from a solid-liquid mixture can be separated in a machine called a centrifuge. A centrifuge rotates at a very high speed. On being rotated by centrifugal force, the heavier solid particles move down and the lighter liquid remains at the top. Its applications include:
  - Used in diagnostic laboratories for blood and urine tests.
  - Used in dairies and home to separate butter from cream.

- Used in washing machines to squeeze out water from wet clothes.
- Separation of components of a mixture containing two miscible liquids that boil without decomposition and have sufficient difference in their boiling points this method is called **distillation**.
  - **Application:** Salt water turned to fresh water using distillation process.
- The **crystallization** method is used to purify solids. Its applications include:
  - Purification of salt that we get from sea water.
  - Separation of crystals of alum from impure samples.
- **Chromatography** is a separation technique. It is used to separate different components of a mixture based on their different solubilities in the same solvent. Its applications include:
  - To separate colours in a dye.
  - To separate pigments from natural colours.
  - To separate drugs from blood.

## Homogeneous & Heterogeneous Mixture

Homogeneous mixture	Heterogeneous mixture
Consists of single phase	Consists of two or more phases
Has the same uniform appearance and composition	Has different non uniform appearance and composition
Components are unrecognizable	Components are recognizable
Examples: Air, saline solution and bitumen	Example: Sand, oil and water



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