## MIXTURES

"Mixtures can be defined as a kind of matter which is formed by mixing two or more pure substances (elements and compounds) in any proportion, such that they do not undergo any chemical change and retain their individual properties. Therefore, they are impure substances."

Most of the substances known to us are in the form of mixtures. The substances which form mixtures are called components or constituents of mixtures.

Some common mixtures in our daily use are, air, milk, tap water, honey, ice-cream, etc.

Air is a mixture of oxygen, nitrogen and carbon dioxide gases. It also contains water vapour, dust particles and traces of inert gases.

### Characteristics of mixtures :

- A mixture consists of two or more pure substances that exist together without any chemical combination between them.
- A mixture may be homogeneous or heterogeneous.
- The components of mixtures vary in their proportions.
- Mixtures do not have fixed melting and boiling points, they depend on the proportions of the components present in them.

  *Example :* Boiling point of a salt solution depends upon the amount of salt in it. The more the salt, higher is the boiling point of the solution.
- The components of mixtures can be separated by simple physical methods.
- Usually no energy change takes place during the formation of mixtures.
- Mixtures cannot be represented by any chemical formula.

Mixtures are divided into two main types on the basis of their composition :

1. **Homogeneous mixtures :** In this type of a mixture, the components are uniformly distributed throughout its volume and cannot be seen separately.

*Example :* A salt solution is a homogeneous mixture of salt and water in which you cannot see salt particles separately from water.

Tap water, milk, air, fruit juice, brass, bronze, etc. are some more examples of homogeneous mixtures.

2. **Heterogeneous mixtures :** In this type of a mixture, the components are not uniformly distributed throughout its volume and can be easily seen separately.

It has different composition in different parts of its bulk or mass.

*Example :* Soil is a mixture of many elements and compounds. Its composition varies from place to place, that is why different substances are found in the soil at different places.

Sand and stone, mud and water, kerosene and water, rice and pulses are other examples of heterogeneous mixtures.

Sand and stone

Mud and water

***Fig. 3.2 Some mixtures***

**Table 3.4 : Differences between compounds and mixtures**

| Compound | Mixture |
|---|---|
| 1. A compound is a pure substance. | 1. A mixture is an impure substance. |
| 2. Compounds are always homogeneous. | 2. Mixtures may be homogeneous or heterogeneous. |
| 3. A compound has a fixed composition, *i.e.* it is formed when two or more pure substances chemically combine in a definite ratio by mass. | 3. A mixture has no fixed composition, *i.e.* it is formed by mixing two or more substances in any ratio without any chemical reaction. |
| 4. Formation of a compound involves a change in energy. | 4. Formation of a mixture does not involve any change in energy. |
| 5. Compounds have a specific set of properties. | 5. Mixtures do not have any specific set of properties. |
| 6. Components of compounds can be separated only by complex chemical processes. | 6. Components of mixtures can be separated by simple physical methods of separation. |

## FORMATION OF MIXTURES AND TYPES OF MIXTURES ON THE BASIS OF STATES OF COMPONENTS

Mixtures exist in any three states of matter *i.e.* solid, liquid or gas depending upon the physical state of its components.

## SEPARATION OF COMPONENTS OF MIXTURES

We need many substances to make our life convenient and comfortable but most of these substances are available in the form of mixtures. These mixtures contain unwanted

**Table 3.5 : Different types of mixtures on the basis of their physical states**

| Types of mixtures | Homogeneous | Heterogeneous |
|---|---|---|
| 1. Solid + solid | Alloys of metals, e.g. brass, bronze stainless steel, etc. | Sugar and salt, sand and stone, sodium chloride and calcium carbonate (common salt and chalk). |
| 2 Solid + liquid | Sugar and water, salt and water, sulphur and carbon disulphide, iodine and alcohol. | Sand and water, mud and water, sugar and oil. |
| 3. Liquid + liquid | Water and alcohol, acetone and water. | Oil and water. |
| 4. Liquid + gas | Tap water. Ammonia and water. Carbon dioxide and water. | Soap lather. |
| 5. Gas + gas | Air. | All gases are miscible. |

substances which may be harmful and may degrade the properties of mixtures.

*Example :* Sea water is rich in common salt which is an important ingredient of our food to add taste and nutrients. But sea water cannot be directly used. It is necessary to separate salt from sea water.

The purpose of separating the components of a mixture are :

(i) to remove unwanted and harmful substances.

(ii) to obain pure and useful susbtances.

The principle of separation depends upon,

- types of mixtures and their physical states.
- size, shape and colour of the mixtures.
- their characteristic properties such as boiling point, melting point, density, volatility, solubility, magnetic properties, ability to sublime, etc.

Thus for different types of mixtures different methods are used.

## (A) Separation of solid-solid mixtures

**1. Mechanical removal/hand picking :** This method of separation is used only when the quantity of the mixture is small and the substance to be separated is in less amount in the mixture. The size of particles to be separated should be large and of different colours and shapes so that they could be easily recognised. *For example*, tiny stones and chaff can be separated from rice and pulses by this method.

**2. Magnetic separation :** This method is used when one of the components is magnetic in nature. *Example,* iron, cobalt, nickel, etc.

Mixtures of iron and sulphur, iron and sand can be easily separated by this method as iron gets attracted towards the magnet.

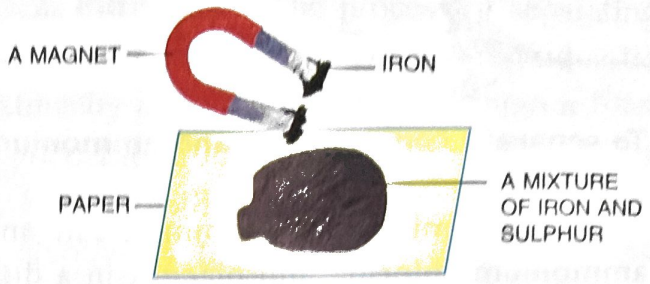



*Fig. 3.3 Separation by a magnet*

**3. Gravitational method :** This method is used only when one of the components is much heavier than water and the other component is much lighter than water.

*Example :* If a mixture of sand and saw-dust is put in water, saw dust being lighter floats while sand settles down. Decant the water to separate the sand and filter to remove the saw-dust.

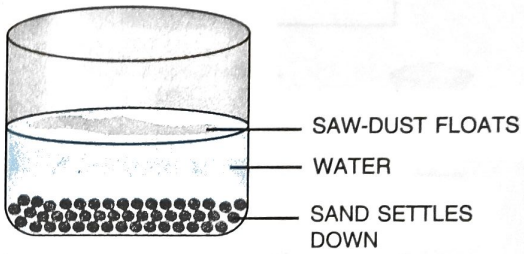



*Fig. 3.4 Separation by gravitational method*

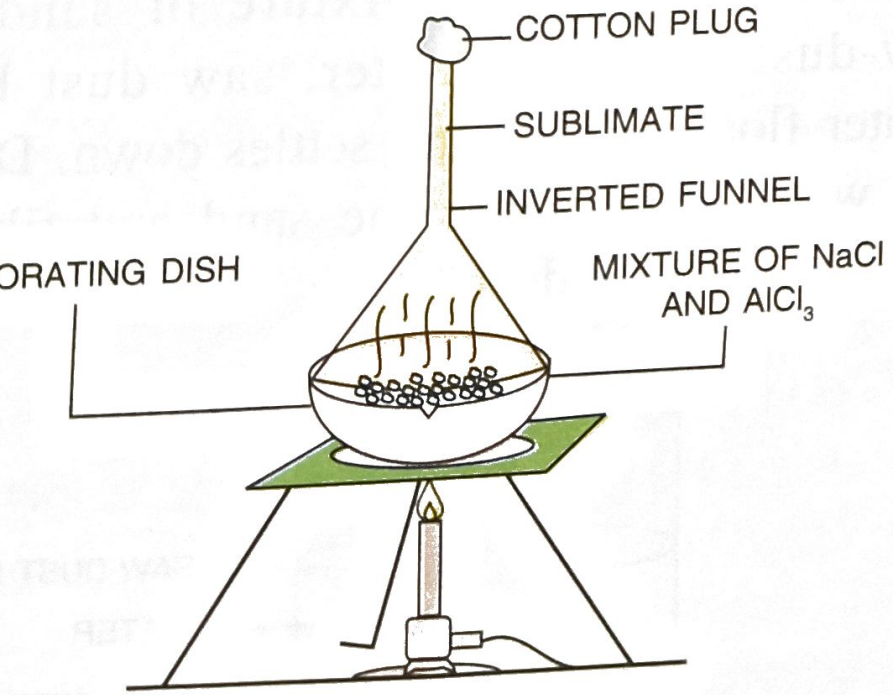
**4. Sublimation :** *The process in which a solid changes directly into its vapours on heating and on cooling, the vapour formed again turns into a solid is called* ***sublimation****. e.g. camphor, naphthalene, iodine, and ammonium chloride undergo sublimation.*

This method is used for solid mixtures in which one of the components can *sublime* on heating. The solid which sublimes escapes as vapours, while the other one is left behind.

Mixture of sand and iodine, common salt and ammonium chloride, *etc.* are separated by sublimation.

**separate common salt and ammo-**
**oride.**

Take a mixture of common salt and monium chloride and place it in a dish cover it with an inverted funnel as shown ow and heat it. On heating, ammonium ride changes into vapour, which condenses a solid in the neck of the funnel (from where ay be scraped off), whereas common salt is ehind in the dish.




***Sublimation : Separating a mixture of common salt and ammonium chloride***

09 2020 JULY
DAY 191 - 175 WEEK 28
THURSDAY

07 July 2020

| Wk | M | T | W | T | F | S | S |
|---|---|---|---|---|---|---|---|
| 27 | | | 1 | 2 | 3 | 4 | 5 |
| 28 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 29 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 30 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 31 | 27 | 28 | 29 | 30 | 31 | | |

APPOINTMENT / MEETING

Class - VIII Date - 2-6-20

Chapter-3 Element, Compound, mixture

Part - 2

Subject - Chemistry

(1) Cehat is Mixture? Give an eg.

(2) Give the characteristics of mixture.

(3) Cehat is homogeneous mixture? Give an eg.

(4) Cehat is heterogeneous mixture? Give an eg.

(5) Give the differences between Compound and mixture.

(6) Give eg. of the following mixture

(a) Solid + Solid

(b) Solid + liquid

(c) Liquid + liquid

(d) Liquid + gas

(e) Gas + Gas

NOTES

APPOINTMENT / MEETING

(7) What are the purposes for the separation of the components of the mixture?

(8) What is the principal of hand picking? Give an eg.

(9) What is gravitational method? Give an eg.

(10) What is sublimation? Give an eg.

(11) How can you use sublimation for the separation of mixture?

P. S.
2.6.20

NOTES