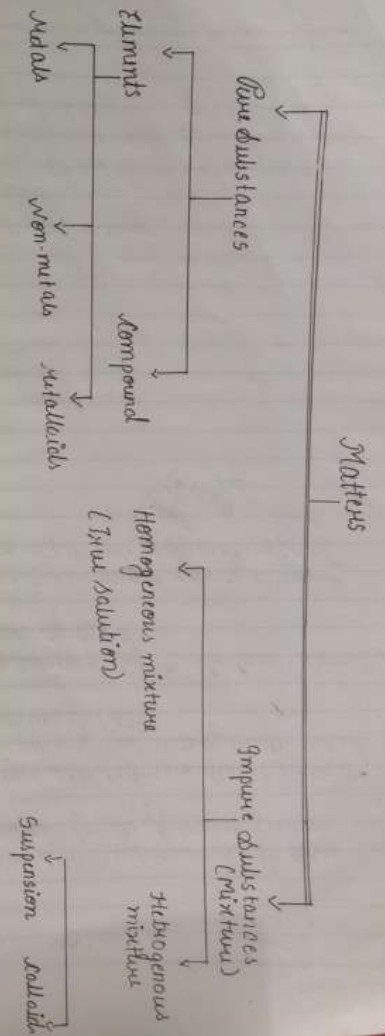




Chapter-2

Q. matter around us pure

Pure substance :-

The substances that are made up of only one kind of particles are known as pure substances

Ex:- Pure water, Pure copper, Pure gold etc.

Characteristic of pure substances :-

They are made up of same kind of particles.

They are homogeneous in nature.

These substances have fixed melting point, boiling point and density.

They cannot be broken into simpler substances.

Types of Pure substances :-

- 1) Element
- 2) Compound

→ Elements :-

Elements are those pure substances which are made up of only same kind of atoms.

The term element was given by "Robert Boyle" in 1661 and defined by "Lavoisier".

Till date, 118 elements have been discovered. Out of them 92 are natural and rest are synthetic. Majority of the elements are metal.

Types of Elements :-

- (i) Metals
- (ii) Non-metals
- (iii) Metalloids

★ Metals :-

An element which is malleable, ductile and good conductor of electricity is known as metal.

Example :- Copper, Gold, Aluminium, Silver, Lead, Zinc, Sodium, Iron etc.

Properties of metals :-

Metals are malleable, they can be hammered into thin malleability.

Metals are ductile, they can be drawn into thin wires except zinc.

"Whenever you look a step forward, you are bound to disturb something" - Indira Gandhi

Metals are Good conductors of heat and electricity.

Metals are generally hard except - Sodium and Potassium - soft metals

Mercury - liquid at room temperature

Metals are lustrous, they have shiny appearance.

Metals are sonorous as they can produce ringing sound.

★ Non-metals :-

An element that is neither malleable nor ductile and doesn't conduct electricity are called Non-metals.

Example -

Hydrogen, Nitrogen, Carbon, Oxygen, Sulphur etc.

Properties of non-metals

Non-metals are non-malleable.

Non-metals are non-ductile and non-sonorous.

Non-metals are poor conductor of heat and electricity except diamond and graphite. Diamond is good conductor of heat and graphite is a good conductor of electricity.

Chitra

Non-metals are non-lustrous, generally they have dull appearance.
Except Iodine and Diamond.

Non-metal exist in gaseous or solid state except
Germine.

Non-metals have low melting point, boiling point and density (except graphite whose melting point is 3700°C).

★ Metalloids:-

The elements which possess some properties of metals and some other properties of non-metals are called metalloids.

They look like metals but are brittle like non-metals.

They are semi conductors.

Example:- Silicon, Boron, Germanium, Arsenic, Antimony, Bismuth, etc.

Note -

Noble gas element:-

Some elements do not take part in chemical reaction. They are chemically stable and non-reactive, such type of elements are called noble gas elements.

Example -

Helium, Neon, Argon, Krypton, Xenon, Radon, etc.

→ Compound :-

Compounds are those ^{pure chemical} substances which are formed by the combination of two or more elements in a fixed proportional by mass.

Example :- H_2O

$\text{Ammonia} (\text{NH}_3)$

$\text{Glucose} (\text{C}_6\text{H}_{12}\text{O}_6)$

$\text{Limestone} (\text{CaCO}_3)$

$\text{Copper sulphate} (\text{CuSO}_4)$ etc.

Characteristics of Compound :-

They have fixed composition.

Separation of components of compound can be done by chemical methods.

They are Homogeneous in nature.

The properties of compound are different from its constituent elements.

Pure Substances (Mixture):-

→ A mixture is a form of matter in which 2 or more pure substances are physically mixed in any proportion.

Characteristics of Mixture:-

- # Mixtures have variable compositions.
- # Formation of a mixture is a physical change.
- # Composition of mixture can be separated by physical methods.
- # Mixture shows properties of all its constituent.

Types of Mixture

- i) Homogenous mixture
- ii) Heterogenous

Homogeneous mixture:-

In Homogeneous mixture, we cannot differentiate between the two components as they are completely mixed or another.

Example - Soft drinks, Kerosene, Petrol, diesel, salt solution, sugar solution, Air, winegar etc.

Heterogeneous mixture:-

In Heterogeneous mixture, we can easily distinguish between various constituents of mixture.

Example - fluid, milk of magnesia, petrol in water, sand in water, sand and iron.

Solution:-

A Homogeneous mixture of 2 or more chemically non-reactive substances is called Solution.

Solution is made up of 2 components -

→ Solute

→ Solvent

Definition of a solid

It is a homogeneous substance

It has a definite volume and shape

It is not easily compressed

It has a definite mass

The particles are closely packed

Properties of solids

They are rigid and incompressible

They have a definite shape and volume

They are not easily compressed

Types of solids

Crystalline

Amorphous

Polymers

Composites

Alloys

- Sol :-

Sol is a colloid in which any solid particles are dispersed in a liquid medium.

Ex - Ink, ~~starch~~

- Solid Sol :-

Solid Sol is a colloid in which solid particles are dispersed in a solid medium.

Example - ~~Smoke~~ gem stones like Quartz.

- Aerosol :-

An Aerosol is a colloid in which a solid or liquid is dispersed in a gas including air.

Ex - Smoke, automobile exhaust, hair spray, fog, mist, cloud.

- Emulsion :-

An Emulsion is a colloid in which minute droplets of one liquid are dispersed in another liquid.

Example :- Milk, butter, face cream, etc.

- Foam :-

The Foam is a colloid in which gas is dispersed in a liquid medium.

It is the substance which is mixed
in a mixture it may not possible
to mix it in such a manner
that it is not possible to separate the
substance from the mixture
as there will be a solid state

of the mixture of homogeneous mixture:-

Ex:-
In the process of
separation of mixture by separating
the liquid from which
the solid is removed

Properties of Suspension:-

- The suspension is a heterogeneous mixture.
- The size of solute particles in a suspension is quite large (larger than ~~100 nm~~ nm).
- The particles of suspension can be seen easily.
- Suspensions are unstable.

Separation of Mixture:-

A majority of the substance occur in nature in the form of mixture. It may not be possible to use a mixture as such in homes and industries. So, we have to separate the various mixture into their individual constituent to make them useful in our daily life.

Separation of constituent of heterogeneous mixture:-

- Decantation -

Decantation is the process of the separation of mixture by removing the top layer of liquid from which impurities has settled down.

Example:-

To obtain clear water from muddy water, we need muddy water in a container.

after sometimes, the mud settles and then the clear water is poured into another container.

• Filtration:-

This method is applied to separate the suspended particles from water or mixture of invisible solid in liquid.

Ex-

Sand in water, lime in water, dust in water etc are separated by fine filter paper from the mixture.

• Magnetic Separation:-

~~It used~~ This method is used for separating iron object from impurities.

Example- In factories, scrap iron is separated from the heap of waste materials by using big electromagnets.

• Separation by Sublimation:-

The process of sublimation is used to separate those substances from a mixture which supplying sublime on heating.

Example - Ammonium chloride, Iodine, Camphor, etc can be separated from a mixture by sublimation.

Separation of Camphor from salt and camphor mixture.

Camphor sublime on heating whereas common salt doesnot sublime on heating. So we can separate camphor from common salt by the process of sublimation.

This is done as follows -

- The mixture of common salt and camphor is taken in a china dish on a tripod stand. The china dish is covered with inverted glass funnel.
- A cotton plug is put in the upper open end of the funnel to prevent camphor vapour from escaping into the atmosphere.
- On heating the mixture, camphor changes into vapour and rise up and get converted into solid camphor on coming contact with inner walls of glass funnel.
- In this way pure camphor can be removed from salt and salt remains behind in the china dish.

Separation of a mixture of a solid and a liquid

★ Separation by Centrifugation

Centrifugation is a method for separating the suspended particles of a substance from a liquid in which the mixture is rotated at a high speed.

Example - Separation of cream from milk.

- The process of centrifuging is used in dairies to separate cream from milk.
- The milk is put in a closed container in a high speed centrifuge machine when the centrifuge machine is switched on the milk rotates at very high speed in container.

Due to this the milk separates into cream and skimmed milk.

★ Separation by Evaporation

Evaporation process is used to separate solid substance that has dissolved in water or other liquid.

Example - The common salt dissolved in water can be separated by process of evaporation. The process of evaporation is used on a large scale to obtain common salt.

from sea water.

★ Purification by crystallisation:-

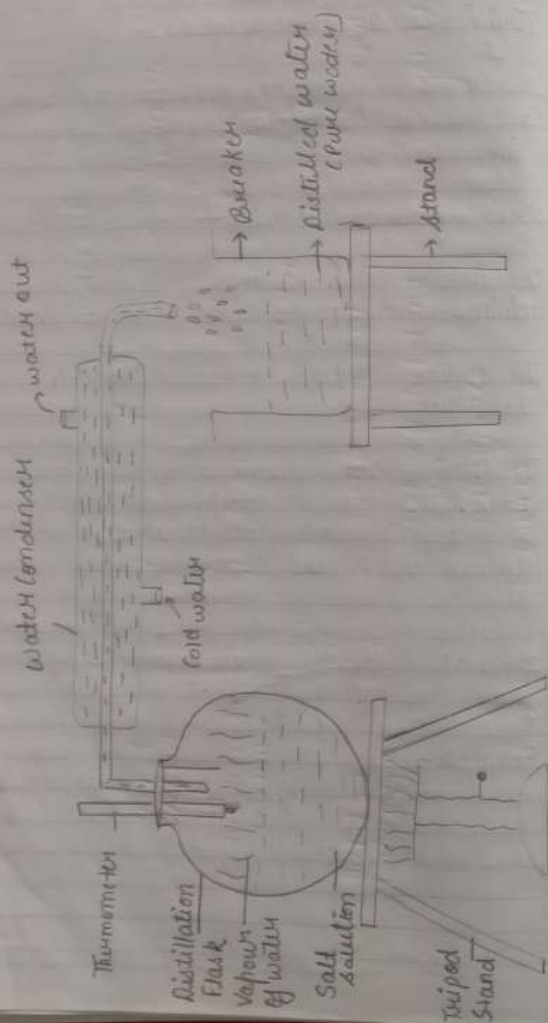
The process of cooling a hot, concentrated solution of a substance to obtain crystal is called Crystallisation.

Process of Crystallization —

- The impure solid substance is dissolved in the minimum amount of water to form a solution.
- The solution is filtered to remove insoluble impurities.
- The clean solution is heated gently on a water bath till a saturated solution is obtained. When solution becomes saturated then stop heating and allows it to cool.
- Crystals of pure solid are formed. Impurities remain dissolved in solution. Separate pure crystals by filtration.

Example -

Purification of salt is done by crystallisation.



Process of distillation

* Separation by distillation:-

Distillation is the process of heating a liquid to form vapour and then cooling vapour to get liquid.

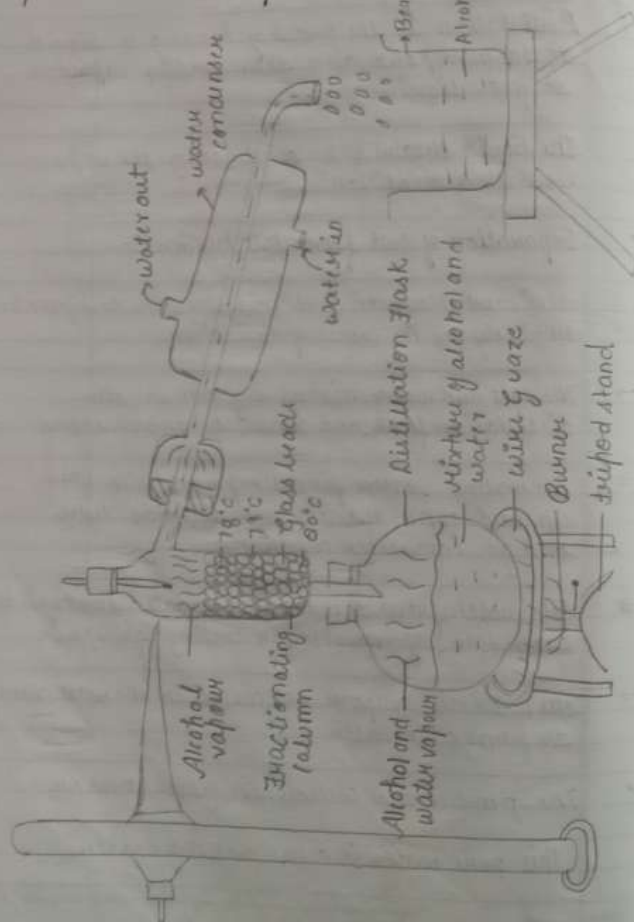
The liquid obtained by condensing the vapour is called distillate.

• Separation of salt from salt solution -

A mixture of common salt and water can be separated completely by the process of distillation.

- The salt and water mixture is taken in the distillation flask and heated on tripled stand.
 - On heating, water forms vapour which rises up and comes out through the side tube and goes into water condenser.
 - Cold water from the top is circulated through the outer tube of condenser for cooling the vapour.
 - The hot water vapour gets cooled in the water condenser to form cold water.
 - The pure water collects in glass beaker.
- This pure water is called distilled water.

To separate a mixture of Alcohol and water :-



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Since the salt is not volatile, so it remains behind in the flask.

Separation by fraction distillation
(separation of two liquids) :-

- (i) Fractional distillation
- (ii) By using separating funnel.

Separate

Fractional distillation is the process of separating two or more miscible liquids by distillation, the distillate being collected in fractions boiling at different temperatures.

1 To separate a mixture of alcohol and water -

- The mixture of alcohol and water is heated in a distillation flask fitted with a fractionating column when the mixture is heated both alcohol and water form vapour at their boiling point.
- The alcohol and water vapours rise up in the fractionating column.
- The upper part of the fractionating column is cooled, so vapours get cooled, condensed and trickle back into the flask.

Chhs

"It is my absolute belief that pictures have a tremendous power, I hope we shall stand our capabilities." - Rembrandt Harmenszoon van Rijn

• As the experiment goes on, the fractionating column warms up when the temperature at the top of fractionating column reaches 78°C , then the alcohol ~~and~~ vapour passes into the condenser and gets cool and collect in a beaker.

• Having collected alcohol fraction, the flask is heated more strongly. When the temperature of top of the fractionating column is goes upto 100°C , the vapour of water passes into condenser and gets cool and condensed. The pure water is collected in another beaker.

Applications of fractional distillation

(i) This method is used to separate mixture of alcohol water, mixture of acetone and water, etc.

(ii) This process is used to separate petroleum into useful fractions such as kerosene, Petrol, etc.

Separation by fractional distillation)

Separation by separating funnel :-

- A mixture of two immiscible liquids can be separated by using a separating funnel. A separating funnel is a special type of funnel which has a stop-cock in its stem.
- The separation of 2 immiscible liquid by a separating funnel depends on the difference in their densities.

Separation of oil and water mixture by separating funnel.

- The mixture of two immiscible liquids is put in a separating funnel and allow to stand for sometime.
- The mixture separated into 2 layers according to the densities of the liquid in it.
- The heavier liquid (water) forms the lower layer whereas the lighter liquid (oil) forms the upper layer.
- On opening the stop cock of separating funnel, the lower layer of heavier liquid comes out first and collect in a beaker. When heavier liquid completely comes out, the stop cock is closed.

The lighter liquid is also collected in another beaker by opening the stopcock again.

Application:-

A mixture of water and Kerosene can be separated by separating funnel.

A mixture of petrol and water can be separated by separating funnel.