

(D) Separation of a gas - liquid mixture :

A mixture of gas in liquid can be separated by heating. Dissolved gas escapes from the liquid on heating.

Example : Drinking water contains air dissolved in it. When it is boiled, air escapes and so the boiled water becomes tasteless.

(E) Modern techniques :

Chromatography : This is one of the latest techniques to separate the coloured components of a mixture when all the components are very similar in their properties.

The name “chromatography” means colour writing. It is named so, because earlier it was used to separate mixtures containing coloured components only, but these days this technique is applied to colourless substances too.

The process of separating different dissolved constituents of a mixture by their adsorption on an appropriate material is called chromatography.

The method is based on the difference in rates of adsorption of different components on the surface of a suitable adsorbent.

Common adsorbents used are filter paper, silica gel etc.

Common solvents used are water, ethyl alcohol, acetic acid etc.

Example : Components of ink are separated by this method. Ink is a mixture of different dyes, which are separated by chromatography because some of the dyes are less soluble and some are more soluble in a solvent.

Principle involved in chromatography

Chromatography separates the components of a mixture on the basis of differences between two phases, one of which is stationary while the other is mobile.

The simplest type of chromatography is “Paper chromatography”.

In this method a special type of paper called chromatographic paper (called Whatman filter paper) or ordinary filter paper is taken. A line is drawn with the pencil near the bottom edge of the paper. A drop of the mixture is placed on the filter paper above this line. The paper is then dipped in a solvent, taken in a beaker, so that the line drawn on the paper is above the level of the solvent.

The filter paper acts as “stationary phase” while the solvent acts as “mobile phase”.

As the solvent rises on the paper, it takes along with it the drop of the substances. The component of the drop which is more soluble rises faster and we see various spots on the filter paper, each indicating a component of the mixture. The paper is then removed from the solvent and dried.

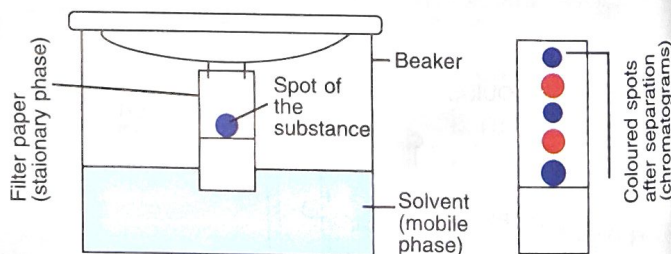


Fig. 3.9 Paper chromatography

Advantages of chromatography

- A very small quantity of the substance can be separated.

- Components with very similar physical and chemical properties can be separated.
- It identifies the different constituents of a mixture.

Use of chromatography

It can be used to separate :

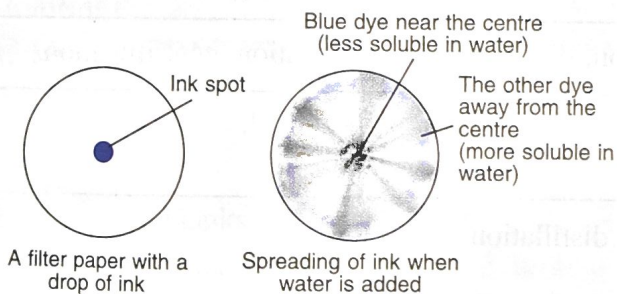
- pigments from natural colours
- drugs from blood (pathological tests)
- colours in a dye.



Activity 11

Take a filter paper. Put a drop of ink on the centre of the paper and then slowly add some drops of water on the same point with the help of a dropper. You will observe that the blot of ink spreads out into different coloured rings. Each ring corresponds to a dye. The more soluble dye moves farthest while less soluble remains near the centre.

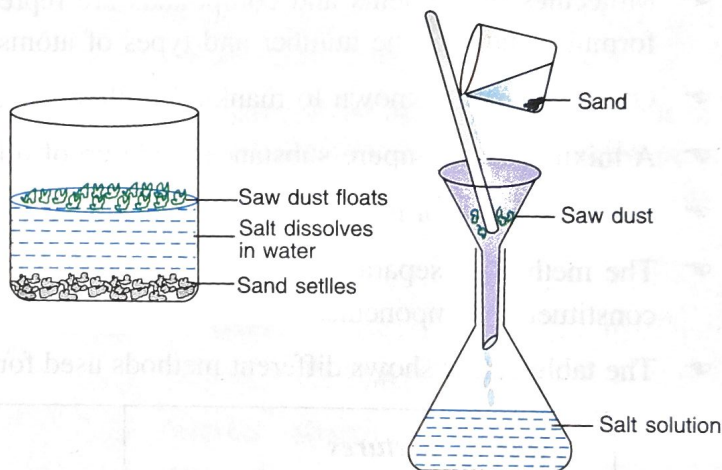
Chemists often use this technique for testing purity and doctors use it for pathological tests.



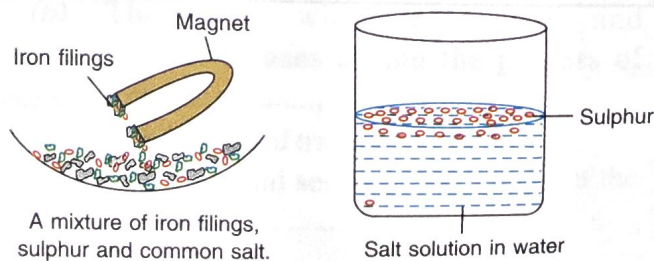
Separation of constituents of the mixtures with more than two constituents :

(a) **Sand, saw dust and salt** : The mixture is taken in a glass beaker and water is added to it. Salt dissolves in water, forming a salt solution, because it is soluble in water. Saw dust being lighter

floats on the surface of water while sand being heavier settles down. Now salt solution along with saw dust is poured slowly on the filter paper fixed in a funnel. Solution passes through the filter paper while saw dust remains on it. Sand is left in the beaker as sediment. The salt solution is evaporated to get salt from water. In this way all the components get separated.



(b) **Iron filings, sulphur and common salt** : To separate the constituents of this mixture, first a magnet is brought near it. Iron filings get attracted and separated. Now water is added to the mixture. Common salt dissolves in it leaving behind sulphur. The mixture is filtered. Sulphur collects on filter paper as residue while salt solution passes through the filter paper as filtrate. It is then evaporated to get salt from water.



RECAPITULATION

- ☛ Pure substances are broadly classified into elements and compounds. Mixtures are impure substances.
- ☛ Elements are made up of same kind of atoms.
- ☛ Compounds are made up of different kinds of atoms combined chemically together in a fixed ratio.
- ☛ Atoms are the smallest units of elements and may or may not be capable of independent existence.
- ☛ Molecules are the smallest units of an element or compound capable of independent existence.
- ☛ Atoms of six known noble gases exist independently.
- ☛ Atoms of elements are represented by symbols.
- ☛ Molecules of elements and compounds are represented by formulae formed by symbols of atoms. The formulae indicate the number and types of atoms present in the molecules.
- ☛ Of 118 elements known to mankind millions of compounds have been formed.
- ☛ A mixture is an impure substance made up of different kinds of elements and compounds held loosely.
- ☛ The constituents of mixtures retain their individual properties and can be separated easily by physical methods.
- ☛ The method of separation of constituents of a mixture depends upon the characteristic properties of its constituent components.
- ☛ The table below shows different methods used for separation :

<i>Types of mixtures</i>	<i>Methods of separation</i>
Solid-Solid (Heterogeneous)	Hand-picking, winnowing, sieving, sublimation, magnetic separation, gravitation, solvent extraction method.
Solid-Liquid (Heterogeneous)	Sedimentation and decantation, loading, filtration.
Solid-Liquid (Homogeneous)	Evaporation, distillation, crystallisation, centrifugation.
Liquid-Liquid (Immiscible) (Heterogeneous)	Decantation, using a separating funnel.
Liquid-Liquid (Miscible) (Homogeneous)	Fractional distillation.
Liquid-Gas (Homogeneous)	Boiling.

08

2020 SEPTEMBER

DAY 252 · 114 WEEK 37

TUESDAY

09	September 2020						
Wk	M	T	W	T	F	S	S
36		1	2	3	4	5	6
37	7	8	9	10	11	12	13
38	14	15	16	17	18	19	20
39	21	22	23	24	25	26	27
40	28	29	30				

APPOINTMENT / MEETING

Class - VII

Subject - Chemistry

Chapter - 9 Elements, Compounds and mixtures, part-6 Date - 18.6.20

- ① What is Chromatography?
- ② Give eg. of Chromatography.
- ③ Name some common absorbents and solvents used in Chromatography.
- ④ Give the principle involved in Chromatography.
- ⑤ What is the simplest type of Chromatography?
- ⑥ Which is act as stationary and mobile phase in paper chromatography?
- ⑦ Give the advantages and disadvantages of Chromatography.
- ⑧ How can you separate the mixture of sand, sugar, salt and salt?

NOTES

- ⑨ How can you separate the mixture of Iron fillings, Sulphur and common salt?

P.S. 18.6.20