# Methods of Separation of Mixtures

There are different methods by which components of a mixture can be separated. For understanding it better, let us divide the mixtures into three categories:

1. Mixtures Solids-Solids
2. Mixtures Solid-Liquid
3. Mixtures Liquid-Liquid

## 1.Separating Solid-Solid Mixtures

### (i) Hand picking:

The components of a solid-solid mixture can be separated by picking them with hands. This method is used when components of the mixture are of different colours, shapes or sizes and the quantity of the mixture is small.

Examples of separating the components of a mixture by hand picking are, separating pebbles form rice or dal or Hand bloking separating grass from mint leaves.

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☞ **(ii) Threshing:** This method is generally used by farmers to separate the grains from the stalks after harvesting. The dried stalks are beaten or threshed to separate the grains. However, in large farms threshing is done by using threshing machines.

A farm machine called 'Combine' is used for both harvesting and threshing.
The process of cutting and gathering the ripened crop is called harvesting.

☞ **(iii) Winnowing**

In this method, the mixture is allowed to fall from a height. The lighter components get separated from the heavier ones because of wind or air blow. This method is used to separate lighter husk from heavier grains like wheat.

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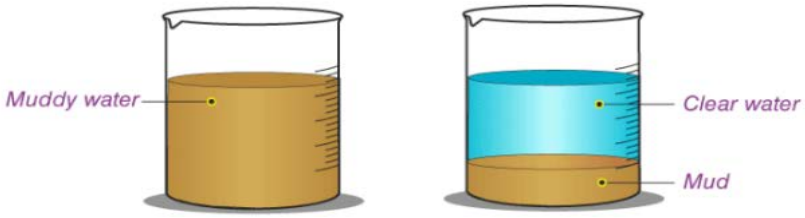
## (iv) Sleving

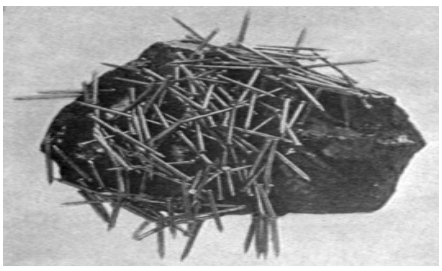
This method of separation is based on the different sizes of the two components to be separated. For sieving, a sieve is used. Sieve is a wire mesh fixed tightly in a frame.

In this technique, the mixture to be separated is taken in a sieve. The particles having small size pass through the holes of the sieve whereas the larger sized particles remain on the sieve. Sieves with different sizes of holes are used for different mixtures. At home, sieving of wheat flour is done to separate finely ground floor particles from the coarse particles. Sieving of sand is done to separata fine sand from gravel and pebbles at construction sites. The sieve used here is much bigger in size and the size of the holes is also big.




## (v) Magnetic Separation

This method of separation is used when one of the components of a mixture is magnetic, that is, it gets attracted towards a magnet. For example, when a magnet is brought near in pins, all pins get clinged to it. This property of attraction of magnetic substances (like Iron) towards magnet is used in this method.



Scrap iron is removed from a heap of waste material (garbage) by using strong magnets fitted to a crane. This iron is then melted and reused.

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## (vi) Sublimation

Generally, solid substances, on heating, change into liquid and on further heating change into vapour form. But some solids change directly into gaseous form on heating.

The process in which a solid change directly into gaseous state on heating is called sublimation. For example, sand and camphor are separated from each other by sublimation.

## 2. Separating Solids-Liquids Mixture

**These can be of two types:**

1. Solids which dissolve in liquids.
2. Solids which do not dissolve in liquids. Separating solids that dissolve in liquids

Same solids dissolve completely in a liquid to form a clear solution. For example Salt or sugar dissolves completely in water. The components of such mixtures can be separated by the following methods:

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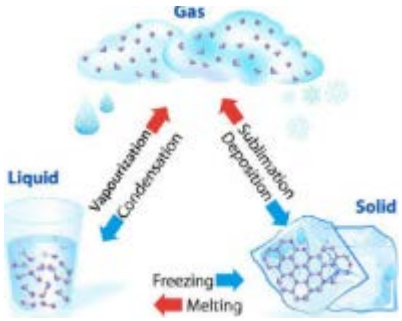
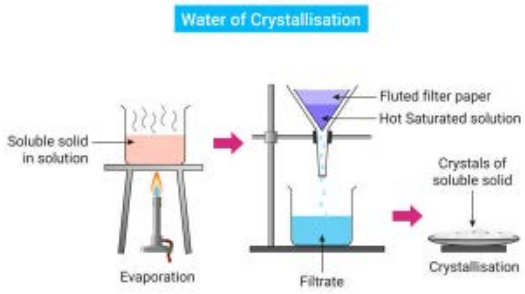
## ☞ Evaporation

Evaporation is a process in which a liquid changes into gaseous form on heating. This method is used to separate soluble solid substances from a liquid. This method is commonly used to obtain common salt (that we use in our food) from sea water. Sea water is collected in shallow beds dug near the sea. The heat of the sun help in evaporating water leaving behind the crystals of salt.




## ☞ Crystallization

This method is used to obtain pure solids from a solution. For example the Salt we get from sea water can have many impurities in it. To remove these Impurities, the process of crystallization is used. Crystallization is a process which separates pure solid in the form of its crystals from a saturated solution. This method is used for purification of salt we get from sea. With the help of this process we can separate the crystals of alum (Phitkari), salt, blue vitriol (neela thotha )from impure samples.



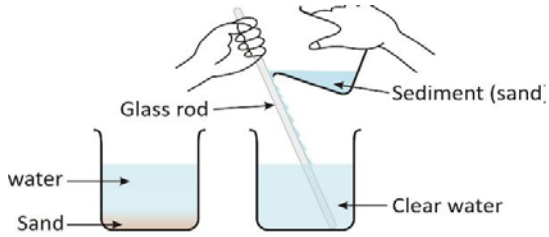
# Methods of Separation of Mixtures

Some solids do not dissolve in a liquid. For example, tea leaves, chalk powder, sawdust, pulses are insoluble in water.

The components of such mixtures can be separated by the following methods:

## (i) Sedimentation and Decantation

Sedimentation is the process by which the insoluble, heavy solid particles settle down on their own in a solution. In order to separate the two, the liquid has to be gently poured into another container without disturbing the sediments. This process of obtaining clear liquid by pouring it into another container without disturbing the sediments is called decantation.




Sedimentation and Decantation

**(ii) Loading**: Sedimentation is a slow process and the finer particles take time to settle down. In order to speed up this process, we take the help of loading. Loading speeds up sedimentation. The activity given below will explain it further. It has been seen that it is difficult to breathe after a strong wind and storm. This is due to the presence of fine suspended dust particles in the air. However, a rainfall after storm removes these dust particles and air becomes clear and fresh. The dust particles in the air get loaded with water and settle down. Thus, loading helps cleaning the air. Shopkeepers often sprinkle water around their shops if the area is not cemented. Even before sweeping a dusty room, water is sprinkled. In these situations, water is used to load the dust particles so that they don't float in the air.

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## (iii) Filtration

In order to make tap water fit for drink we often filter it. In the process, the insoluble solid impurities are separated from the water making it fit for drinking. So, filtration is a process of separating insoluble solids (like mud, tea leaves etc.) from a liquid using fine pores of the filter.

### Experiment

Take muddy water in a beaker

Cut filter paper into a circular shape. Fold it and form a cone.

Fit the cone into the funnel and hold it with your thumb. Moist the cone with water. The wet filter paper will stick to the walls of the funnel. Place the funnel on the funnel stand. Place a clean beaker below the funnel. The tip of the funnel should be inside of the beaker.

Now, slowly pour muddy water along a glass rod into the funnel. Clean water passes through the pores of the filter paper and gets collected in another beaker. This is called the filtrate. The mud (solid Impurities) remains on the top of the filter paper. This is called the residue.


Filtration

This method is used to separate out tea leaves from tea. We use a sleve for it. This method is also used by Water Works Department to purify water. They use layers of gravel and sand to filter huge quantities of water.

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## (iv) Centrifugation

Centrifugation is the method used to separate the fine particles suspended in a liquid by rotating the mixture at high speed. It is done with the help of a machine called centrifuge. The heavier particles settle down at the bottom of the container and the lighter ones stay at the top. Separating cream from milk by churning it is an example of centrifugation commonly used in many household. This method is widely used in dairies and at home to separate butter from cream. Butter being lighter floats at the top.

## 3. Separating liquid -liquid method

Separating immiscible liquids:

What happens when oil mixed with water? It forms a separate upper layer. The lower layer is of water. Such liquids are called immiscible liquids. It is a mixture of two liquids which do not mix with each other and form two separate layers. To separate these layers, a separating funnel is used.

# Methods of Separation of Mixtures

## Combined methods of Separation

Till now we have discussed different methods of separation in Isolation but actually if the mixture contains a number of substances, their separation involves a combination of different methods. The selection of the method depends upon the properties of different components present in it.

Let us perform the following activities to understand this:

## Experiment

To separate sugar, sand and iron from a mixture.

Steps:

**Magnetic Separation** - Iron nails are separated by using magnet. Sand and sugar are left behind.

**Filtration** - Put the mixture of sugar and sand in a beaker containing water. Stir till sugar gets dissolved. Filter the solution. Sand get collected on filter paper.

Sugar dissolved in water is left behind as the filtrate.

**Evaporation** - Heat the sugar solution all the evaporates. Sugar crystals will be left behind.

## Experiment

To separate salt, ammonium chloride and sand. Steps:

**Sublimation**- Put the mixture in a china dish with an Inverted funnel covering it. Heat the mixture on a wire gauge. Ammonium chloride sublimes and forms vapours which get condensed on the walls of the funnel. Thus, ammonium print Filtration Dissolve the rest of the mixture, that is, sand and salt in water. Salt dissolves in water, while sand does not. Filter this mixture. Sand is left on the the filtrate paper and filtrate contains Salt.

**Evaporation** - Heat the filtrate in a china dish to evaporate water so that the salt is left behind.