

## 6<sup>th</sup> - Separation of Substances I



In the day to day life, there are times when one needs to separate a useful substance from a mixture. This is done by using various methods of separation of substance.

**Mixture:** A substance which contains two or more pure substances mixed together in varying proportions. These substances which are mixed to form a mixture are called constituents or components. Air is a mixture of gases. A mixture can be homogenous or heterogenous:

1. Homogenous mixture: it is a mixture in which the constituents are uniformly distributed. E.g. salt dissolves in water to form a homogenous mixture.
2. Heterogenous mixture: it is a mixture in which the constituents do not get mixed uniformly. E.g. sand and sawdust form a Heterogenous mixture.

**Pure Substance:** A substance is called pure when it contains molecules of only one kind. Each particle of the substance has the same unique property. For example; distilled water is pure water as each drop of it contains nothing but water.

**Properties of mixtures:**

1. The constituents of mixture can be in any ratio.
2. They retain their individual properties
3. The constituents can be separated by simple methods.

**Need for separation of substances:** Taking out useful substances from a mixture is usually the main reason for separation of substances. Sometimes, we also need to separate substances when we need to use different components in different ways.

1. To remove harmful substances: separation of from insects from wheat, rice or pulses before using them.
2. To obtain useful constituents: crude petroleum is a mixture of various components such as petrol, diesel, kerosene and petroleum gas. We separate the components of petroleum to obtain useful components.
3. To remove undesirable substances: tea leaves are undesirable components and hence removed using a strainer.
4. Methods of separation: To separate a mixture we have to use such a property that one constituent of the mixture has and the others do not.
5. Separating solid from a mixture of solids: The properties generally used to separate solids from the mixture of solids are colour, size, shape, weight, attraction by magnet or solubility in a liquid such as water
6. Handpicking: it means to take out by hand. It is the simplest method of separation of substances. This method is used only when unwanted material is in small quantity. Moreover, shape, size, or colour of the unwanted material is different from that of the useful materials. For example; pebbles, broken grains and insects are separated from rice, wheat and pulses; by handpicking.
7. Threshing: the process of separating grains from the stalk by heating them on the ground or by a machine is called threshing.
  1. Manual Threshing: When the quantity is small, threshing is done manually. Small bundles of the harvested stalks are thrashed on a hard surface. This helps in separating the grains.
  2. Threshing by Animals: For larger quantities, threshing is done in the traditional way; by using animals. For this, stalks are spread around a pole. Several bullocks are tied to the pole and are made to walk over the harvested stalks. Trampling by hooves of the animals helps in separating grains.
  3. Threshing Machine: Now-a-days, threshing machines are used for the purpose. It can be powered by either a diesel engine or an electric motor. It helps in saving time and labour.

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8. **Winnowing:** the method of separating heavier and lighter components of a mixture by wind or blowing air is called winnowing. Farmers drop the mixture of wheat and husk from a height. The husk is carried by the wind and form a heap at a small distance away. The wheat grains being heavier fall vertically to form a separate heap.
9. **Sieving:** the method of separating the components of a mixture that are of different sizes by using a sieve is called sieving. When the size of particle is too small to be picked by hand or when the quantity is too large, sieving is used for separating substances. A sieve has holes of proper size is used. The bigger particles are retained by the sieve whereas the smaller ones pass through it. For example; this method is used for separating bran from flour, sand from gravel, pearls of different sizes, etc.
10. **Combine Harvester:** Modern farming involves use of a machine; called combine harvester. This machine harvests, threshes and winnows in a single operation. Combine harvesters are used in developed countries; like the USA. In India, such machines can be seen in the farms of Punjab.

