

strainer. Seeds are separated from fruits (like apple, orange, etc.) while eating. Your mother separates large lumps from flour. Gardeners sift stones from the soil. Stones and husk are removed from rice before cooking. Have you noticed somebody churning milk to obtain butter?



Fig. 5.1 Tea granules are separated by using a strainer.

Need for separation

The components of a mixture are separated for the following reasons:

- ❖ To obtain two different but useful components of a mixture (e.g., butter is a useful component which is separated from milk by churning).
- ❖ To remove harmful components or impurities of a mixture (e.g., small pieces of stones and husk are separated from rice or dal before cooking).
- ❖ To remove useless components of a mixture (e.g., tea granules are separated from tea).

Activity 1

List a few instances where you have noticed substances being separated from a mixture.

Instances	Substances being separated from a mixture

METHODS OF SEPARATION



What are the things that we should keep in mind while separating a mixture? Can we separate the components of different mixtures by the same method?

To separate components from mixtures, we make use of the properties of components. We cannot separate components of different mixtures using the same method.



Let us now study different methods used to separate various mixtures.

Handpicking

Let us do this activity.

Activity 2

Bring about one tablespoon each of different dals (yellow, green, black, pink, etc.) to the class. Mix them in a bowl. Now, try to separate these different dals. Were you able to separate them? How did you do that?



We can separate a mixture of different coloured dals by hand. What property did you use to separate this mixture?

The method of separating a mixture into its components by hand is called **handpicking**.

Stones and husk can also be separated from rice by using the method of handpicking. What property is used to separate this mixture?

So, we can conclude that the method of handpicking can be used to separate only those mixtures in which the components:

- ❖ are mixed in small quantities,

- ❖ can be easily picked by hand, or
- ❖ have different sizes, shapes or colours.

Threshing

When a farmer harvests his wheat or paddy crop, he gets a large number of stalks mixed with grains. Many grain seeds are attached to the stalk. These grain seeds have to be separated from the stalks. In order to separate grain seeds from stalks, the stalks are threshed on a wooden board. Machines and bullocks are also used to separate the grains. The process used to separate grain seeds from stalks is called **threshing**.



Fig. 5.2 Threshing of paddy crop

Winnowing

The grain seeds obtained after threshing contain husk. To separate husk from grains, a method called **winnowing** is used by farmers. Winnowing is the method of separating husk from grains with the help of wind.



Fig. 5.3 Farmers winnowing grains

In this method of separation, the mixture of grains and husk is taken in a winnowing basket. The farmer stands on a raised platform and holds the winnowing basket at his/her shoulder height. He/she then tilts the basket allowing the mixture of grains and husk to fall down slowly, shaking the basket continuously. The lighter husk particles get carried away by wind, whereas the heavier grain particles fall down vertically on the ground forming a heap.

Carry out the following activity, which uses the method of winnowing, to separate a mixture of dry sand and bits of paper.

Activity 3

Carry out this activity in an open ground.

Mix some bits of waste paper with dry sand. Place this mixture on a cardboard.

Now, stand at a higher level from the ground and allow the mixture to fall down from the height. Keep shaking the cardboard continuously.

What do you notice?

- Do the bits of paper and dry sand fall at the same place?
- Which component gets carried away by wind?
- Which component falls down vertically and forms a heap?



Sieving

The method of separating a mixture of various sized particles by passing them through a suitable sieve is called **sieving**.

Look at the following figures:



(a) Sieving flour



(b) Sieving sand

Fig. 5.4 The process of sieving

In the Fig. 5.4(a), bran and impurities present in the flour are being separated using a sieve while pebbles are being separated from sand using a larger sieve at a construction site in the Fig. 5.4(b).

Could we use this method, if the size of the pebbles and sand was the same? Why? Both the pebbles and sand would pass through the sieve. Thus, we can use sieving as a method of

separation only if the components of a mixture are of different sizes.

Check POINT 1

1. Give reasons.

- Tea granules are separated from tea.
- Small stones and husk are separated from rice or rice before cooking.
- Pebbles are separated from sand.

2. Name the method of separation used to separate a mixture of:

- uncooked dal and rice.
- grain seeds and stalks.
- husk and grains.
- pebbles and sand at construction sites.

Sedimentation, decantation and filtration

Let's do an activity.

Activity 4

Take three test tubes and make these mixtures.

- Mixture of sand in water (Test tube A)
- Mixture of rice in water (Test tube B)
- Mixture of dal in water (Test tube C)

What is common in all the above mixtures? These are the mixtures of **insoluble solids in liquid**. Now observe whether sand, rice and dal have settled down in the respective test tubes.

The substance that settles at the bottom of a liquid is called a **sediment**. The process of settling down of a solid at the bottom of a liquid is called **sedimentation**. Now, try to separate the sand from water by slowly tilting the test tube and pouring the water into another test tube, without disturbing the sand. This process of pouring out the liquid (water) is called **decantation**.

So, you have successfully separated sand from water by the method of sedimentation and decantation. Can you now guess how you will separate rice and dal from their mixtures in water.

Observe the water that you obtained by separating the mixture of sand and water. Is it absolutely clear? Do you still find small particles of sand floating in water? Sometimes, you cannot completely separate the insoluble solid components from the mixture.