Chapter 5

Separation of substances

Why Do We Separate Substances?

♦ **Substances:**

A substance contains more than one type of constituent particle. These particles could be an element or a compound. Iron, water, sugar, dust, are some examples of substances. Any object around us is a substance or made up of substances.

♦ **Mixture:**

A mixture is a combination of two or more substances in which each substance retains its individual property.

For example;

(a) Tea leaves can be separated from the liquid with a strainer.

(b) Milk or curd is churned to separate the butter.

Tea leaves getting separated through strainer.

Butter is collected by the churning of milk or curd.

♦ **Purpose of separating substances:**

- To remove non-useful components.
- To remove waste components from the mixture

• To separate two different substances from each other.

Handpicking And Threshing

♦ **Handpicking:**

A method of separation, to take out non-useful substances by hand from the mixture of substances is known as handpicking.

Example: Picking out stones from grains.

♦ **Threshing:**

It is the process of loosening the edible part of grain from the stalks to which it is attached. Threshing takes place in the following four steps:

1. Harvesting the crop

2. Drying crops

3. Beating grain seeds

4. Separating husk from Grains.

Winnowing And Sieving

♦ **Winnowing:**

The method of separating husk from grains with the help of wind is called Winnowing.

* Ques: Find out the process by which the dry sand with sawdust or powdered dry leaves can be separated.

Ans: Winnowing is the process through which dry sand with sawdust or powdered dry leaves can be separated. We take the mixture to open ground and stand on a raised platform. We will put the mixture on a plate or sheet of paper. Hold the plate or the sheet of paper containing the mixture, at our shoulder height. This way lighter components of the mixture will blow away with the air and the heavy particles will fall straight down.

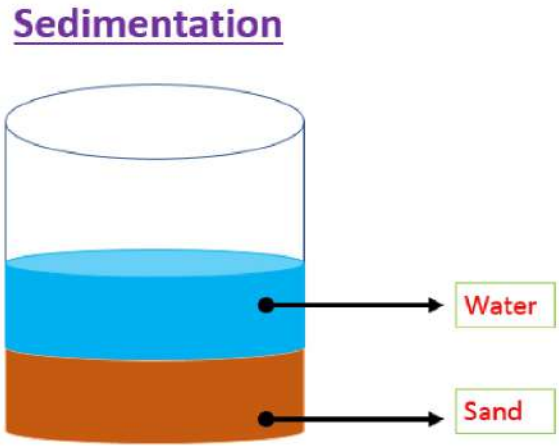
♦ **Sieving:**

A sieve is a shallow vessel having small holes at its bottom. Sieving is the technique n which two or more components of different sizes are separated from the mixture based on their sizes.

Sedimentation, Decantation, And Filtration

♦ Sedimentation:

Sedimentation is the process in which the heavier component settles at the bottom when water is added to it. The solid residues which are heavier settle at the bottom when water is added to them. So, this technique is not suitable for lighter impurities.

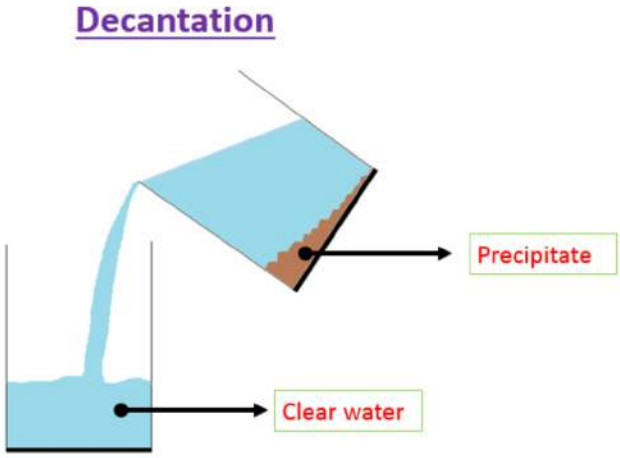


Q) Suppose during the rainy season when the water around us is full of mud, we are facing scarcity of drinking water. Which process should we use to get the drinking water?

A) Since we have muddy water and we need to keep muddy water overnight to settle down mud which is called the sedimentation process. After that, we need to pour off water slowly without disturbing mud which is at the bottom.

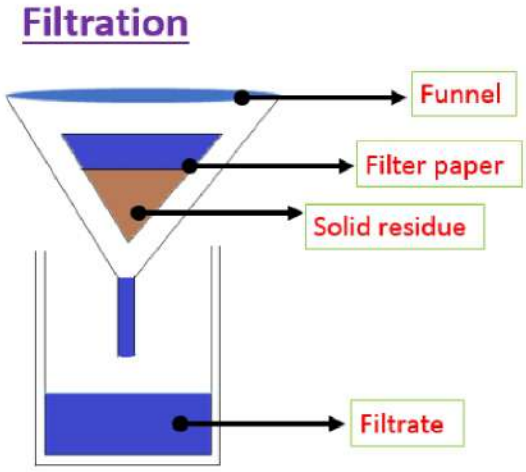
♦ Decantation:

Decantation is the process in which the solid or any immiscible liquid is separated from the liquid by removing the liquid layer at the top of the solid or immiscible liquid layer.



♦ **Filtration:**

The process which is used to separate a solid substance from a liquid by allowing the liquid substance to pass through the filtering medium is called filtration. In the process of filtration, the liquid is allowed to pass through the filter paper attached to a funnel. The liquid will pass through the paper while the solid will remain on the filter paper.



Q) Suppose we want to remove insoluble solid (paneer) from a liquid by using a filter paper is known as_____.

A) Filtration is the process of removing insoluble solid (paneer) from a liquid by using filter paper. It is the process of filtering liquid from insoluble particles using filter paper and the mixture is then poured on the filter paper. Solid particles in the mixture do not pass through it and remain on the filter.

Evaporation And Condensation

♦ **Evaporation:**

The process of conversion of water into vapor is called Evaporation. For example, the separation of salt from water is done by the evaporation of seawater.

♦ **Condensation:**

Condensation is the process in which the gas converts into liquid. For example, the formation of dew on grass occurs because the water vapor gets converted into water droplets. Similarly, the mirror appeared fogged because the water vapor converts into the water which appears as small droplets on the mirror.

Dew on glass

Can Water Dissolve Any Amount Of A Substance?

♦ **Solution:**

A solution is prepared by dissolving the solute substance in a solvent. For example, the solution of sugar and water.

♦ **Solute:**

A solute is a substance that is dissolved in a solution. For example, in a solution of sugar dissolved in water, the sugar is called the solute.

♦ **Solvent:**

It is the liquid in which a solute is dissolved to form a solution. For example, in a solution of salt and water, water is called the solvent.

♦ **Saturated solution:**

When no more salt can be dissolved in the amount of water taken, then the solution is said to be a saturated solution. For example-suppose, we have a glass of water and we start adding salt to it. After some time we found that no more salt can be dissolved. The moment salt stops dissolving in the water the solution becomes a saturated solution.

EFFECT OF TEMPERTURE ON SATURATED SOLUTION

On increasing the temperature of the solution, the solubility of solute increases and more solute can be soluble in the same amount of solvent.

On cooling excess solute will settle down at the bottom of the vessel.