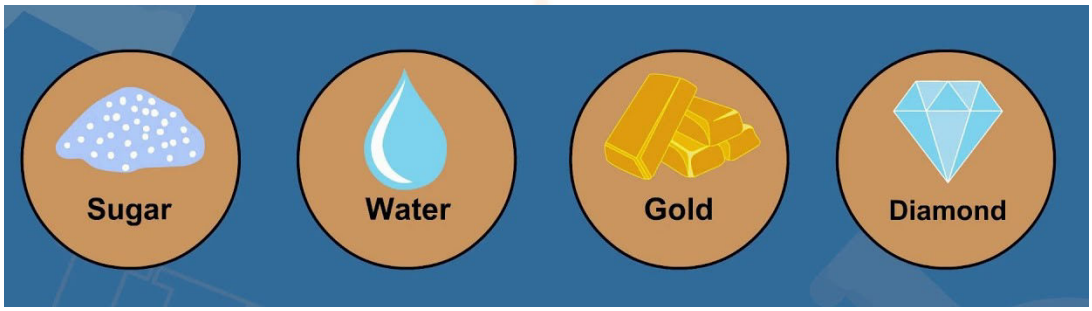
SEPARATION OF SUBSTANCES

- Substances:

A Substance contains more than one type of constituent particles. These particles could be an element or a compound.

Any object around us is a substance or made up of substances.

Examples – Iron, water, sugar, dust, gold etc.



- Mixture:

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

Examples -

a) Tea leaves can be separated from a liquid with a strainer.
b) Milk or curd is churned to separate the butter.

(a)

(b)

PURPOSE OF SEPARATING SUBSTANCES

- To remove non-useful components.
- To remove impurities or harmful components.
- To separate two different, but useful components.

METHODS OF SEPARATION

✗ Hand Picking:

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

Example – Picking stones from grains.

✗ Threshing:

It is the process of loosening the edible (suitable to be eaten) part of grain from the stalks to which it is attached.

Threshing takes place in the following 4 steps:

1. Harvesting the crops
2. Drying crops
3. Beating grain seeds
4. Separating husk from Grains.

✗ Winnowing:

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

Question:
Find out the process by which the dry sand with sawdust (powdery dry leaves) can be separated?

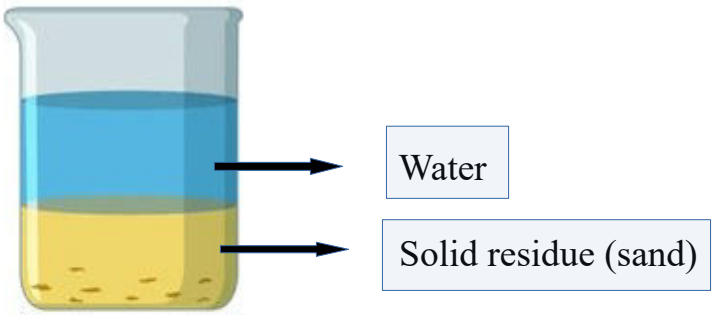
Answer:
Winnowing is the process by which dry sand with sawdust or powdered dry leaves can be separated. We take the mixture to open ground and stand on a raised platform. We will put the mixture on a plate or a sheet of paper. Hold the plate or the sheet of paper containing the mixture, at your shoulder 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 (of light depth) vessel having small holes at the bottom. Sieving is the technique in which two or more components of different sizes are separated from the mixture based on their sizes.

✗ 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.



Question:
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?

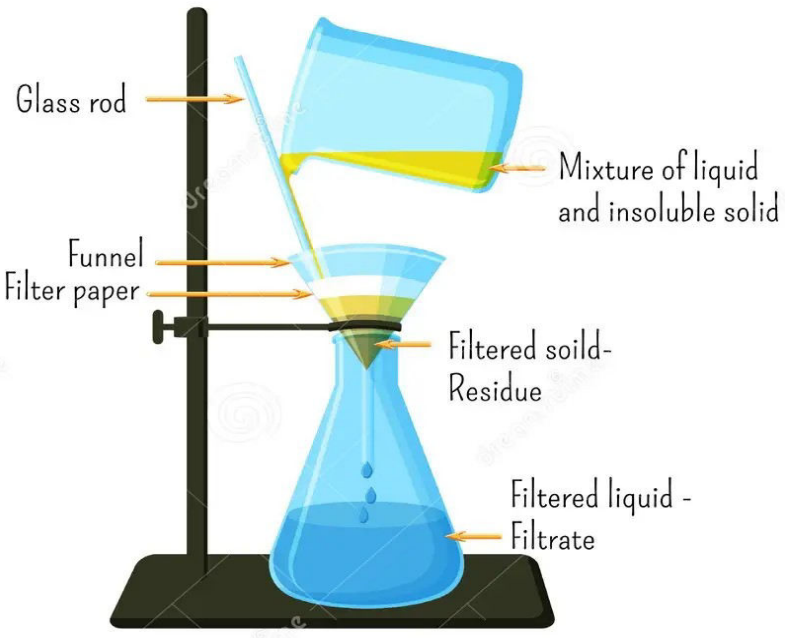
Answer:
Since we have muddy water and we need to keep muddy water overnight to settle down mud which is called the sedimentation process. After that, we need to pour off water slowly without disturbing mud which is at the bottom.

✗ Decantation:

Decantation is the process in which the solid or any immiscible (Not forming a homogeneous mixture when mixed) liquid is separated from the liquid by removing the liquid layer at the top of the solid or immiscible liquid layer.

✗ Filtration:

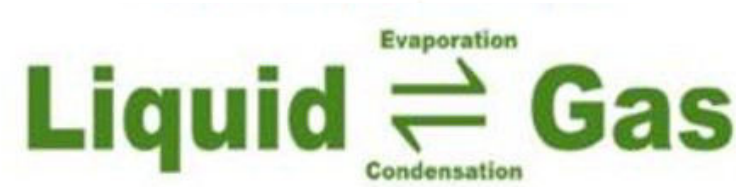
The process which is used to separate a solid substance from a liquid by allowing the liquid substance to pass through the filtration, the liquid is allowed to pass through the filtration medium is called filtration. In the process of filtration, the liquid is allowed to pass through the paper while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



Question:
Suppose we want to remove insoluble solid (paneer) from a liquid by using filter paper is known as _____?

Answer:
Filtration is the process of removing insoluble solid (paneer) from a liquid by using filter paper. It is the process of filtrating liquid from insoluble particles using filter paper and the mixture is then poured on the filter paper. Solid particles in the mixture do no pass through it and remain on the filter.

EVAPORATION AND CONDENSATION



✗ Evaporation:

The process of conversion of water into vapour is called Evaporation.

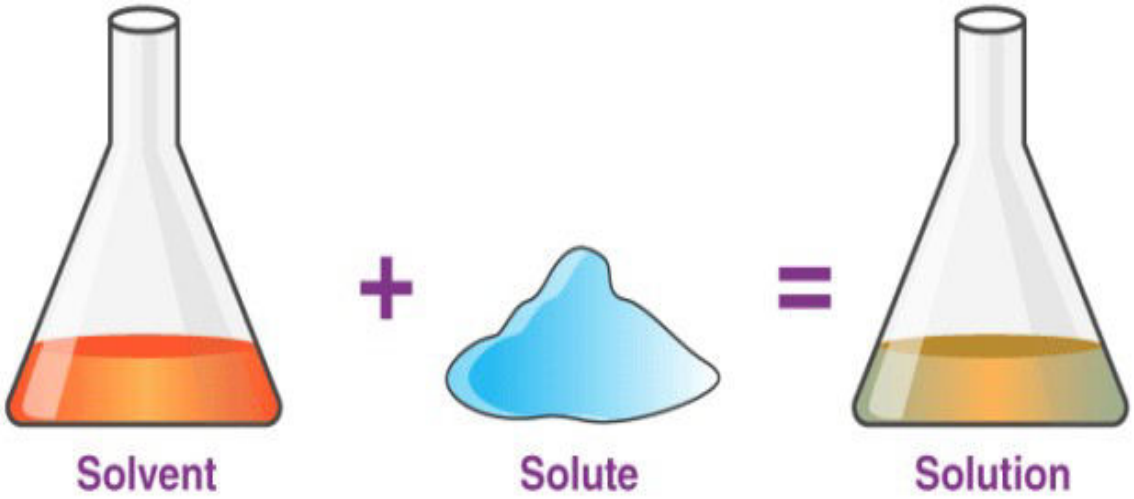
Example – Separation of salt from water is done by the process of evaporation.

✗ Condensation:

Condensation is the process in which the gas converts into liquid.

Example – The formation of dew on glass occurs because the water vapour get converted to water droplets. Similarly, the mirror appeared fogged because the water vapour converts into the water which appears as small droplets on the mirror.

AMOUNT OF SUBSTANCE THAT CAN BE DISSOLVED IN WATER



➢ Solution:

A solution is prepared by dissolving the solute substance in a solvent.

Example – The solution of sugar and water.

➢ Solute:

A solute is a substance that is dissolved in a solution.

Example – In a solution of sugar dissolved in water, sugar is the solute.

➢ Solvent:

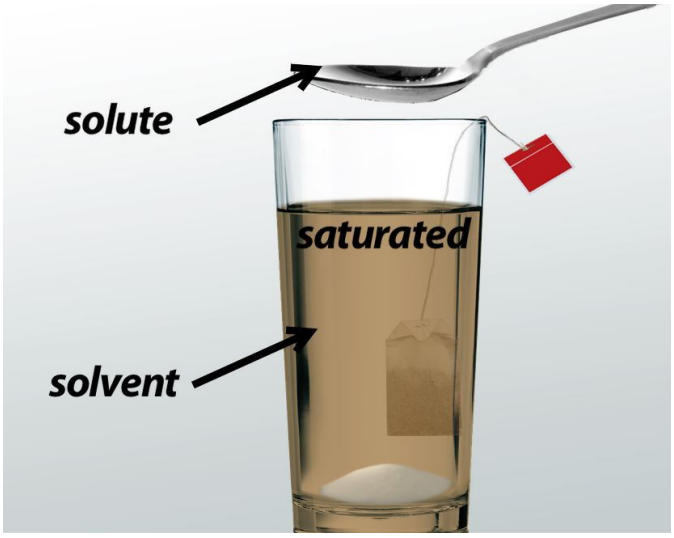
It is the liquid in which a solute is dissolved to form a solution.

Example – In a solution of water and sugar, water is 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.

Example – Suppose, we have a glass of water and we started 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



EFFECTS OF TEMPERATURE ON SATURATED SOLUTION

- On increasing the temperature of the solution, the solubility of the solute increase 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.