Separation of Substance

Introduction

You must have seen that we clean/separate different substances - we **filter tea powder** while making tea, we **clean rice** with water before using it for cooking and so on. These are the processes we use commonly to separate substances. In this chapter, we will study some methods used to **separate substances.**

Handpicking : -

- Manually separating stones, dust, husk from grain, rice and wheat is referred to as handpicking.

Advantages

- It is used to remove bigger particles of dust from smaller grains.

Disadvantages

- It is a very time-consuming process .
- It cannot be used when the dust and stone particles are small in size.

Threshing : -

Threshing (Manual)

Threshing (Machines)

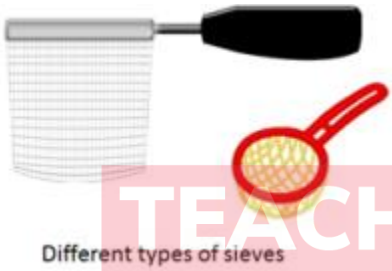
- Stalks of grains are dried in the sun.
- Then once they are dry, they are manually beaten hard to free the grains from the stalks. This is referred to **Threshing.**
- Sometimes, **bullocks or machines** are used.

Winnowing : -

Winnowing

- This is a very common method to **separate heavier grain particles from lighter dust particles.**
- The mixture containing the grain and dust is held high (approximately at shoulder or chest height).
- It is slightly tilted and given a gentle movement such that the lighter particles like husk fall out. This is called Threshing.

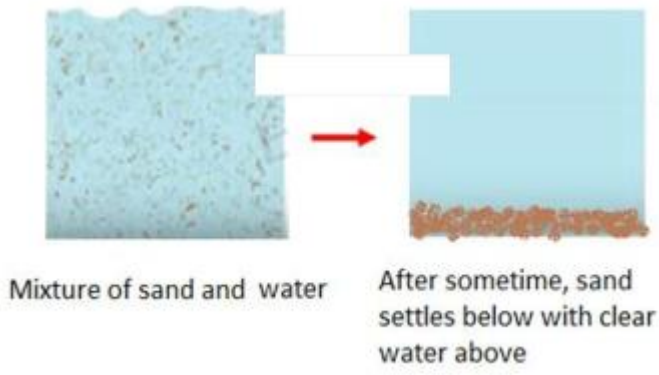
Sieving : -



Different types of sieves

- A **sieve** is used to **filter** out the dust particles.
- It is very commonly used for **cleaning flour.**
- In Sieving, fine flour particles are allowed to pass through the holes of the sieve while the bigger impurities remain on the sieve.

Sedimentation and Decantation : -



Mixture of sand and water

After sometime, sand settles below with clear water above

- After all the processes used above, there could be still some small particles left in the rice we buy.
- In such cases, we wash the rice with water just before cooking. The rice is heavy and it settles down. This process of **separation of heavier components by adding water to it**, such that the heavier particles settles down is called **Sedimentation.**

- The lighter dust particles float. The water along with dust particles is discarded. This process of **removal of water (or any other solute) along with lighter dust particles** is called **Decantation**.
- Oil and water are separated similarly. Water is lighter than oil and it settles down. The oil is then separated.

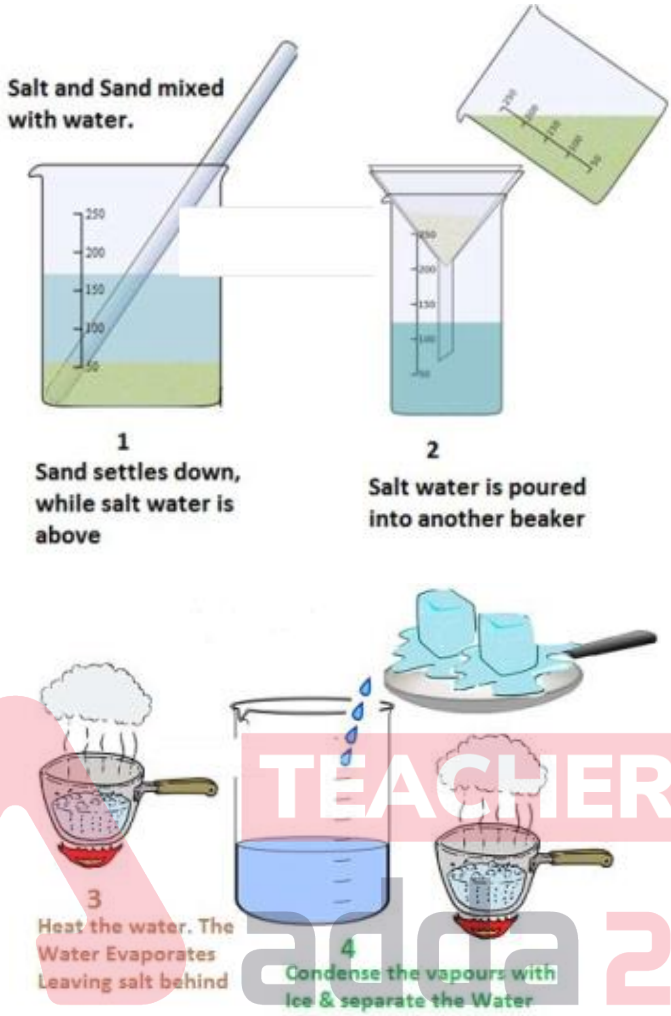
Filtration : -

- Separating using a filter like in case of tea filter is referred as **Filtration.**
- **Filtration** is the process of separating solid particles from a liquid by passing through a filter or pores of filter paper
- **Fruit and vegetable juices** are also filtered like this.
- Sometimes, filter paper can also be used for filtration of certain substances.

Evaporation : -

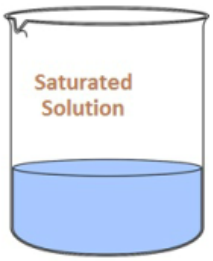
- When salt is mixed with water (seawater), the water is heated until all the water becomes vapor and only the salt is left behind.
- This process of conversion of a liquid into its vapor is called **Evaporation**
- This is how salt is separated from seawater.

Salt-Sand mixture : -



- Sometimes, it might be necessary to use more than 1 method to separate substances. Let us consider a **mixture of sand, salt.**
- Mix the **salt and sand mixture with water.**
- The **salt will dissolve** in water whereas the **sand won't dissolve**.
- After sometime, the sand would settle down. This is **Sedimentation.**
- The water mixture which contains salt can be now poured out. This is **Decantation.**
- Then heat the water such that it vaporizes. **(Evaporation).** Salt is left behind in the bowl.
- Then cool down the water vapor using a **plate of ice** (as shown in the figure). The vapour condenses to form water **(Condensation)** and can be collected in another beaker.

Saturated Solution : -



- When you keep adding a **solute** (the substances that dissolves in a liquid) in a **solvent** (liquid that is used to dissolve the solute), it initially begins to dissolve.
- When more and more solute is added, the solute **does not dissolve.** The solute remains undissolved and this means that the solvent has reached. its **'Saturating point'** and no more solute can be dissolved.
- The **Saturation point** of a solvent depends on
  - **Temperature** of the solvent
  - **Pressure** of the solvent
  - **Nature of the solvent and solute**.