



# Techniques for Separating Mixtures

## Introduction

Separation of mixtures is essential in daily life and scientific processes. Mixtures consist of two or more substances that can be separated based on physical properties. Techniques include filtration, evaporation, distillation, sieving, etc. Used in households, industries, laboratories, and environmental conservation.

## Separation of Insoluble Solids from Liquids

### 1. Sedimentation and Decantation

Used when solid particles are heavier than the liquid and do not dissolve.

#### Process:

**Sedimentation:** Solid particles settle at the bottom due to gravity.

**Example:** Sand settling in water.

**Decantation:** Pouring off the clear liquid without disturbing the sediment.

**Example:** Pouring water off after sedimentation.

### 2. Filtration

Used for finer solid particles that do not settle easily.

#### Process:

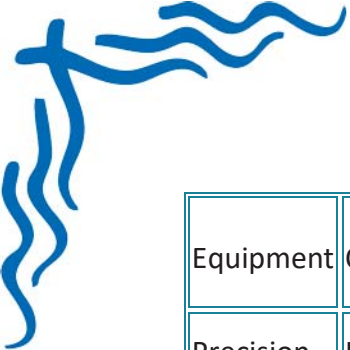
- Mixture is passed through a filter medium (filter paper, glass wool, etc.).
- The liquid passes through, leaving the solid residue behind.

#### Examples:

- Straining tea leaves from tea.
- Removing pulp from juice.
- Cleaning muddy water.
- Filtering coffee.

## Comparison of Sedimentation, Decantation, and Filtration

Aspect	Sedimentation	Decantation	Filtration
Principle	Uses gravity to settle solids	Uses density differences	Uses a filter medium



Equipment	Containers	Containers	Filter paper, glass wool, etc.
Precision	Less precise	Less precise	More precise
Example	Sand settling in water	Pouring water off sand	Separating tea leaves

## Separation of Solid from Other Solids

### 1. Handpicking

- Physically picking out unwanted materials.
- Used for small quantities with easily distinguishable components.

#### Examples:

- Removing stones from rice.
- Sorting vegetables from a mixed basket.

### 2. Threshing

Used to separate grains from stalks after harvesting.

#### Methods:

- Manual beating.
- Using animals like bullocks.
- Machines in large-scale farming.

**Example:** Separating wheat grains from stalks.

### 3. Winnowing

Used to separate lighter materials from heavier ones using wind.

#### Process:

- The mixture is dropped from a height while wind blows.
- Lighter husk particles are carried away, while heavier grains fall to the ground.

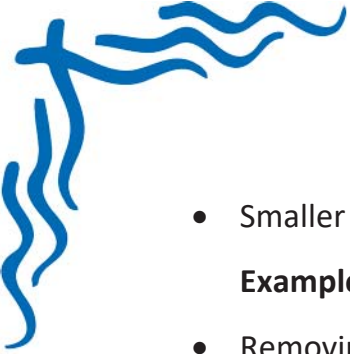
**Example:** Separating husk from harvested grains.

### 4. Sieving

Separates solids based on particle size.

#### Process:

- Mixture is passed through a sieve with holes of a specific size.



- Smaller particles pass through, while larger ones remain.

**Examples:**

- Removing stones from sand at construction sites.
- Filtering wheat flour at home.

## 5. Magnetic Separation

Used when one component is magnetic (e.g., iron).

**Process:**

A magnet attracts the magnetic material, leaving non-magnetic substances behind.

**Example:** Separating iron filings from sulfur powder.

## Separation of Soluble Solids from Liquids

### 1. Evaporation

Separates soluble solids from liquids by converting the liquid into vapor.

**Process:**

The mixture is heated until the liquid evaporates, leaving the solid behind.

**Example:** Extracting salt from seawater.

### 2. Churning

Used in dairy to separate butter from curd based on density.

**Process:**

Curd is churned, causing butter (lighter) to float and buttermilk (heavier) to remain at the bottom.

**Example:** Extracting butter from curd.

### 3. Condensation

- Converts water vapor or gas back into liquid form.
- Opposite of evaporation.

**Process:**

Vapor rises and condenses on a cool surface, converting back to liquid.

**Example:** Steam condensing back into water when covered with a plate.