

Methods of Separation

Why Do We Separate Substances?

The choice of separation depends on the **physical properties** of the constituents like color, size, and texture.

- ✓ To remove harmful or useless components.
- ✓ To obtain useful individual components.
- ✓ To achieve high purity for scientific use.



Total vs. Incomplete Separation



Total Separation

Extraction of pure metals from ores. The goal is to obtain a 100% pure substance by removing all impurities.

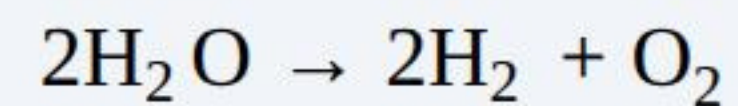


Incomplete Separation

Example: **Oil Refining**. Crude oil is separated into gasoline, kerosene, and wax, but the end products are still mixtures.

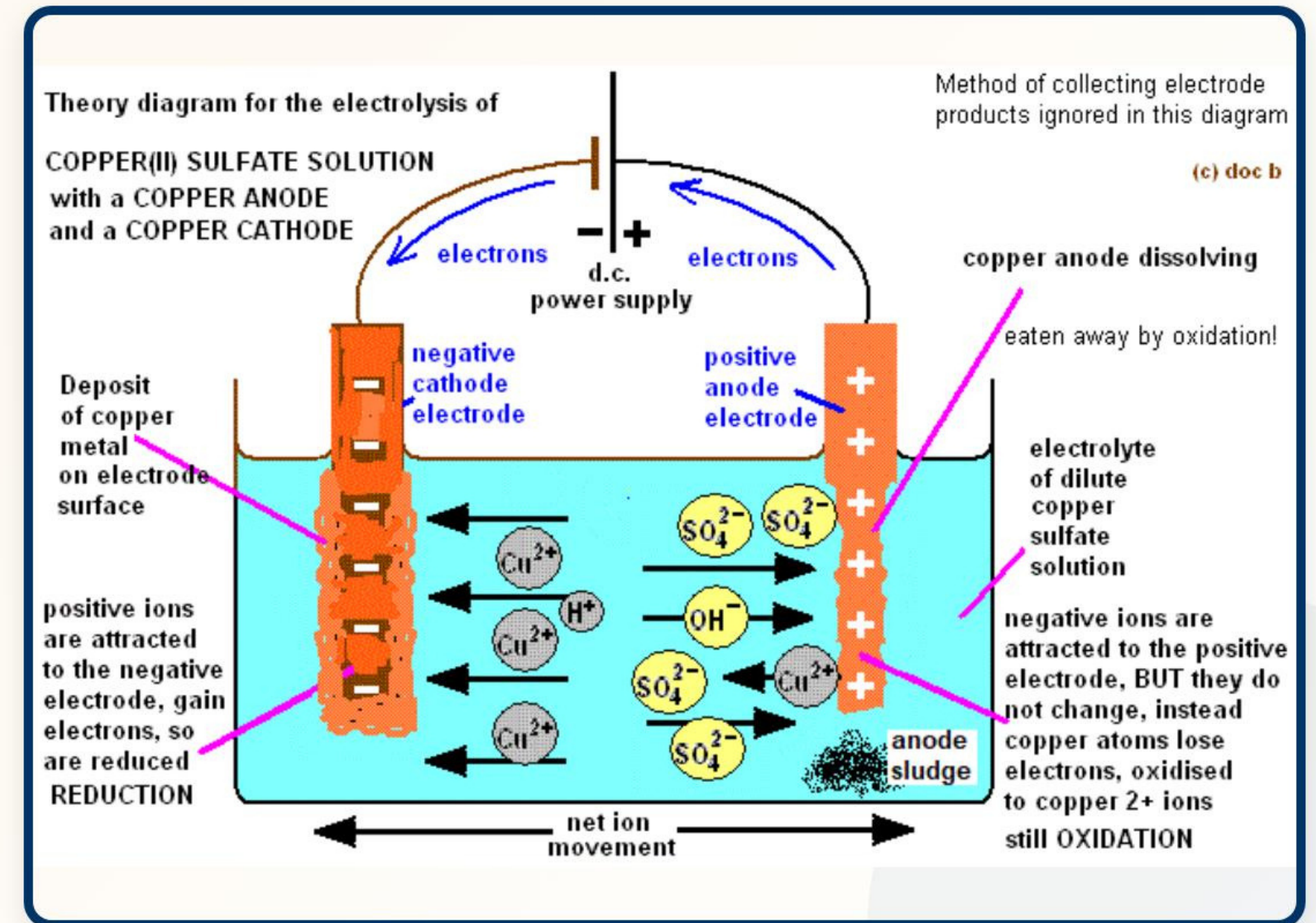
Electrolysis: Breakdown by Electricity

Electrolysis (Electro + Lysis) means using electricity to break down a compound.



Anode (+): Oxygen gas / Impurities collect.

Cathode (-): Hydrogen gas / Pure metal deposits.



Separating Solids (Handpicking & Threshing)



Handpicking

Used when quantity is small and impurities differ in shape/color (e.g., stones from rice).



Threshing

Separating grains from stalks by beating them against hard surfaces or using machines.



Winnowing and Sieving

Winnowing

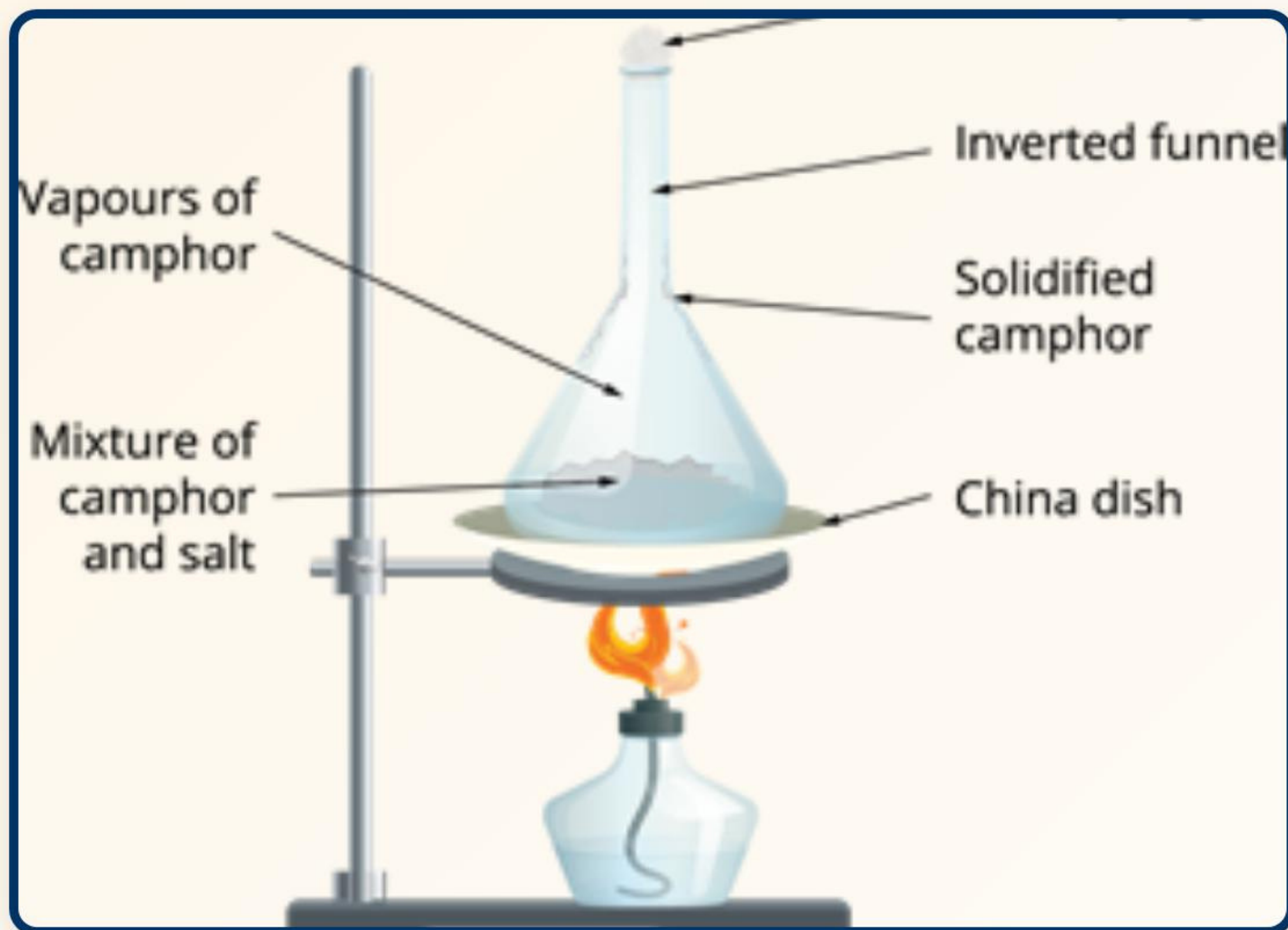
Separates lighter husk from heavier grains using wind force.

Sieving

Separates components of different sizes through a mesh (e.g., flour from bran or sand from pebbles).



Magnetic Separation & Sublimation



Magnetic Separation: Using a magnet to attract ferrous impurities (like iron) from non-magnetic substances.

Sublimation: Solid directly turns to vapor (e.g., Iodine, Camphor, Naphthalene). Reverse is **Deposition**.



Sedimentation and Decantation

Sedimentation

Heavier insoluble particles (Sediment) settle at the bottom. The clear liquid on top is called **Supernatant**.

Decantation

Pouring out the supernatant without disturbing the sediment. Common for washing rice at home.



Filtration & Loading

Filtration: Fine solid particles (Residue) trapped by a filter while clear liquid (Filtrate) passes through.

Loading: Adding **Alum** to speed up sedimentation of very fine clay particles by making them heavy.

**Olympiad Bite: Rain acts as a natural loading agent for dust in the air.*

Separating Soluble Solids: Evaporation



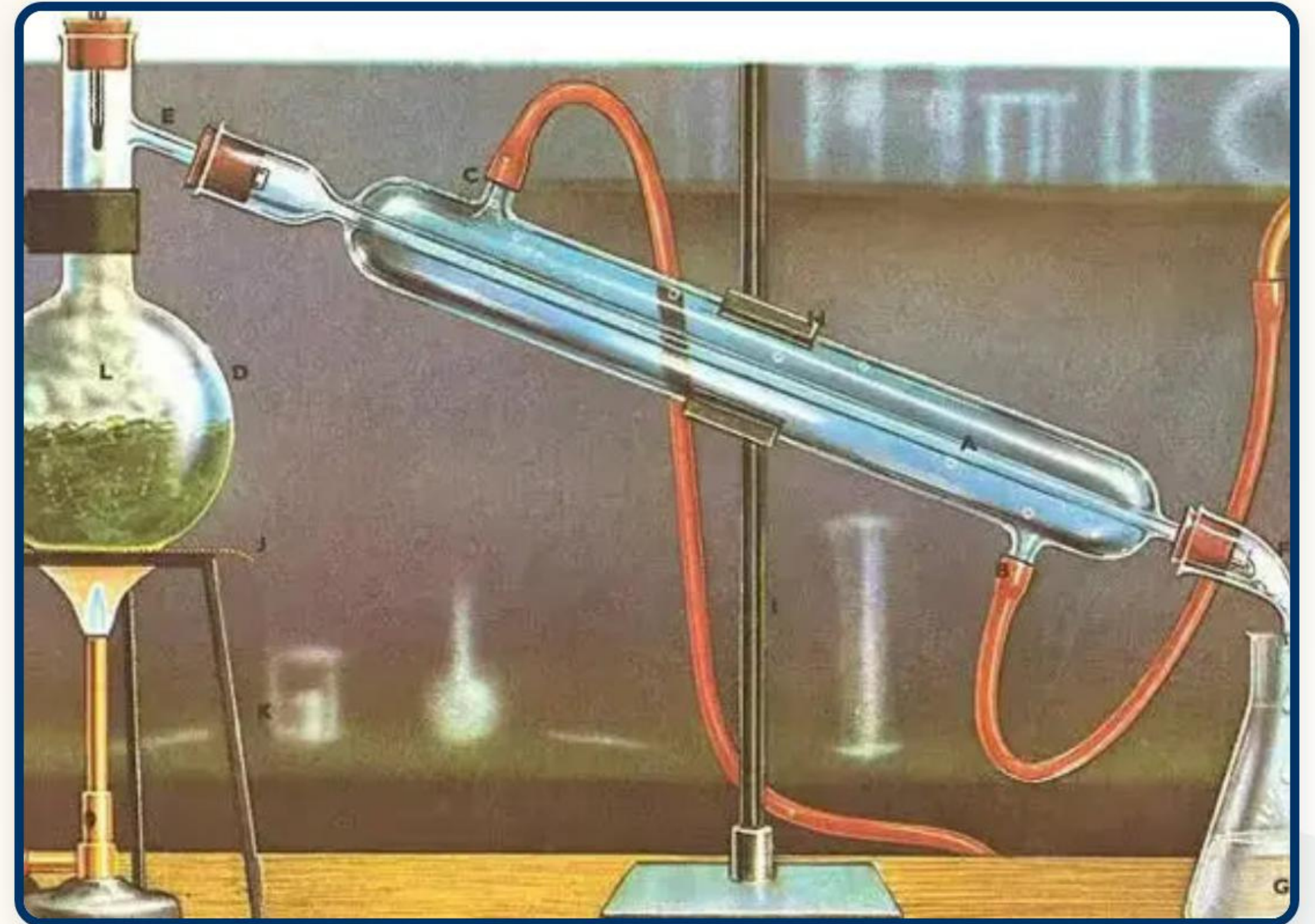
Used to obtain solids dissolved in liquids. The liquid turns into vapor, leaving the solid behind.

- ☀ Obtaining salt from sea water.
- 🔧↑ Rate increases with temperature.

Centrifugation & Distillation

Centrifugation: Rotating mixtures at high speeds to separate lighter suspended particles (e.g., butter from curd).

Distillation: To obtain pure liquid (Distilled water) using a **Liebig Condenser**.



Separating Immiscible Liquids

A **Separating Funnel** is used for liquids that don't mix (Immiscible).

Layers form based on **Density**.

Heavier liquid (water) is at the bottom.

Lighter liquid (oil) is on top.



Self-Test: Knowledge Check

Question	Correct Answer
Method used to separate butter from milk?	Churning / Centrifugation
One constituent of a magnetic mixture must be?	Ferrous (Iron)
Process to clear muddy water quickly?	Loading (using Alum)
Obtaining pure water from salt solution?	Distillation