

Separating Mixture Techniques

- The production of a chemical does not necessarily produce a pure sample of the chemical. It may contain impurities or start as a mixture of substances. Separation techniques are used to separate the useful product from any impurities or by-products.
- Separation techniques work by using differences in the physical properties of substances in the mixture:
 - an insoluble substance in the solid state may be separated from a substance in the liquid state by filtration
 - Soluble substances in liquid state may be separated by Evaporation and Crystallisation.
 - liquids with different boiling points may be separated by distillation
- Separation processes are not always completely successful the first time. Repeated processes are sometimes needed to achieve acceptable purity.

Filtration and Crystallisation

1- Filtration

➤ Definition:

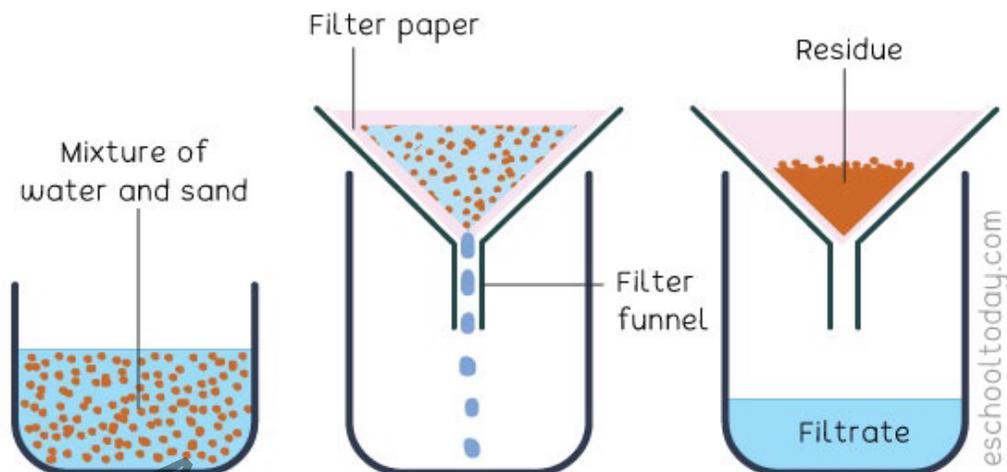
Filtration is a separation technique used to separate insoluble solids from a liquid. For example, separating sand from a mixture of sand and water.

➤ Principal of Filtration:

Filtration works because the **filter paper has tiny holes or pores in it**. These are large enough to let simple molecules and dissolved ions through, but not the much larger particles of undissolved solid.

➤ Method:

1. One beaker contains a mixture of solid and liquid, the other contains a funnel with filter paper
2. The solid and liquid mixture is poured into the filter funnel
3. The liquid drips through the filter paper but the solid particles are caught in the filter paper



Crystallisation

► **Definition:**

Crystallisation is a separation technique used to separate a soluble solid from a liquid. The process works by forming solid crystals from a saturated solution.

► **Principal of Crystallisation:**

Crystallization is based on the principles of solubility: compounds (solutes) tend to be more soluble in hot liquids (solvents) than they are in cold liquids.

First, it is important to understand what a solvent, solute, and solution are.

- **Solute** – Substance that dissolves in the solvent to form a solution
- **Solvent** – The substance in which the solute dissolves to form a solution
- **Solution** – Formed when a solute dissolves in a solvent

C2: Atomic Structure

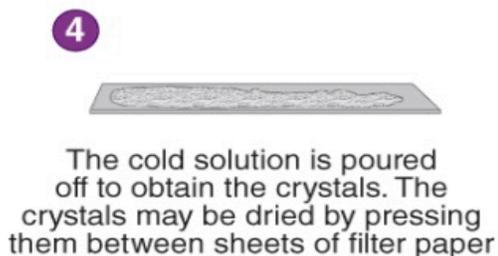
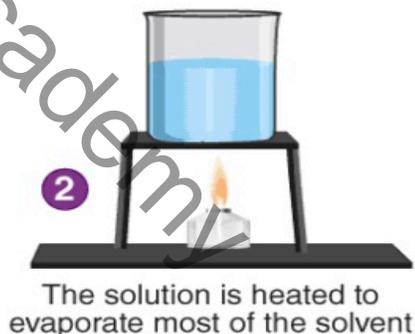
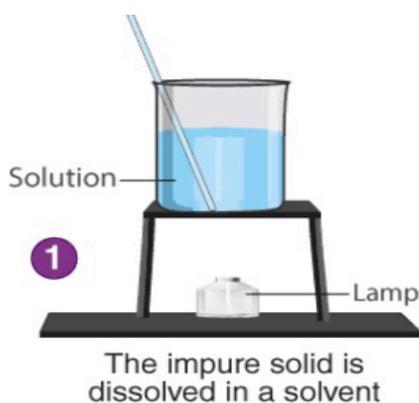
And Periodic Table

ASM Tuition Academy

► Method

The process of filtration involves the following steps:

1. The solution is gently heated in an evaporating basin, which will evaporate some of the solvent, leaving behind a more concentrated solution.
2. As more of the solvent **evaporates**, you will see crystals start to form along the edge of the basin.
3. Stop heating the solution before all of the solvent evaporates, then leave the solution to cool
 - Some chemicals will break down when we heat them, so ensure that the heating process will not affect the chemical that you aim to crystallise. It may be better to heat the solution in a water bath or leave it to evaporate on its own.
4. As the solution begins to cool, more crystals will start to form, because solutes are more concentrated in cooler temperatures.
5. Filter out the crystals from the remaining solution using filter paper and a funnel.
6. Leave the crystals somewhere warm so they can dry.



Separation of Rock Salt by filtration and crystallisation

► What is Rock salt

Rock salt is a mixture of sand and salt. It is also sometimes called grit salt and is used on roads during winter. The sand and salt compounds have different properties and so they can be separated.

Method:

Step 1: Grinding: Carefully grind up the rock salt in the pestle and mortar.

Step 2: Dissolving: Stir the ground rock salt into a beaker of water to dissolve it.

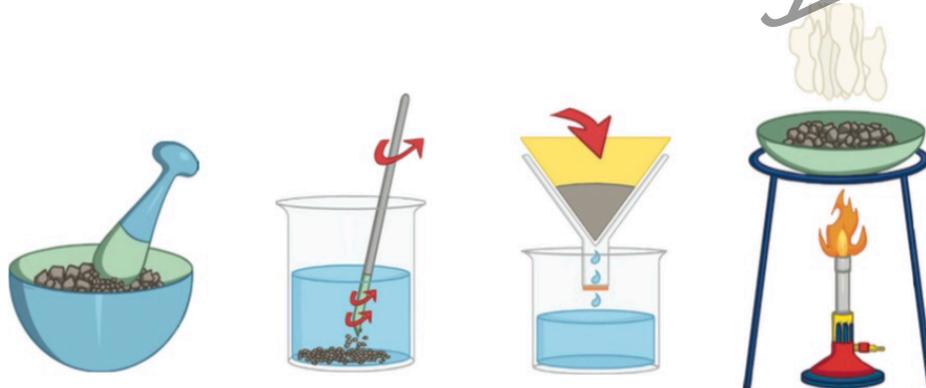
Step 3: Filtration: Carefully filter the solution through the filter paper in the funnel, into the second beaker.

Step 4: Transfer approximately 10ml of the filtered solution into the evaporating basin and set on the tripod over the Bunsen burner.

Step 5: Evaporation: Heat the water until it is gently boiling and the water begins to evaporate off.

Step 6: Crystallisation: When crystals begin to form on the sides of the basin, turn off the Bunsen burner – you now have a saturated solution.

Step 7: Leave the equipment to cool and then move the basin to a warm place to evaporate more slowly



ASM Tuition Academy