

## Adsorption Chromatography

Adsorption chromatography is the oldest types of chromatography technique. It makes use of a mobile phase which is either in liquid or gaseous form. The mobile phase is adsorbed onto the surface of a stationary solid phase.

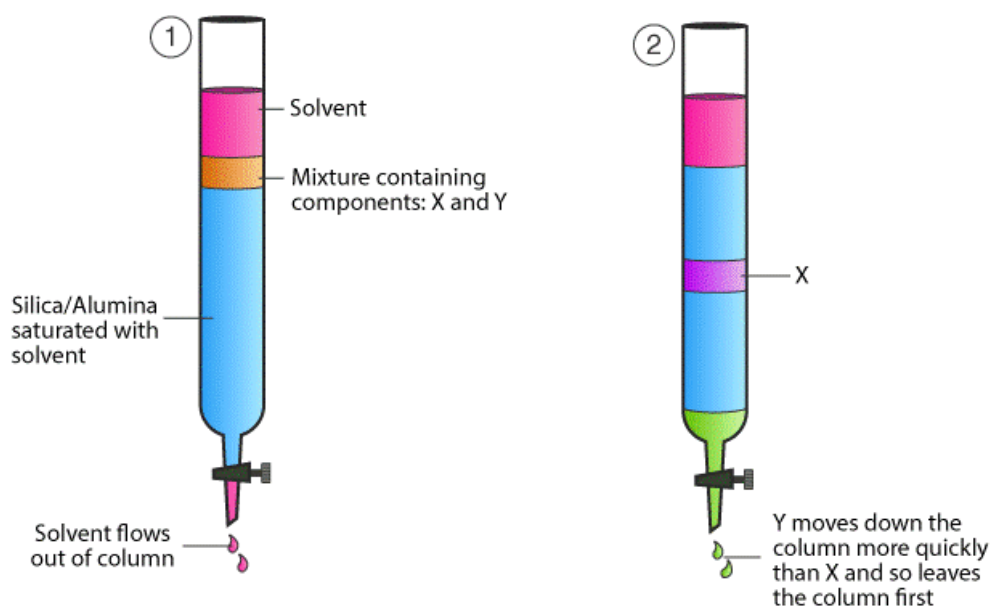
### Adsorption Chromatography Principle

Adsorption Chromatography involves the analytical separation of a chemical mixture based on the interaction of the adsorbate with the adsorbent. The mixture of gas or liquid gets separated when it passes over the adsorbent bed that adsorbs different compounds at different rates.

Adsorbent – A substance which is generally porous in nature with a high surface area to adsorb substances on its surface by [intermolecular forces](#) is called adsorbent. Some commonly used adsorbents are Silica gel H, silica gel G, silica gel N, silica gel S, hydrated gel silica, cellulose microcrystalline, alumina, modified silica gel, etc.

### Adsorption Chromatography Diagram

#### ADSORPTION CHROMATOGRAPHY



### Adsorption Chromatography Procedure

Before starting with the adsorption chromatography Experiment let us understand the two types of phases and the types of forces involved during the [mixture separation](#) process.

- Stationary phase – Adsorbent is the stationary phase in adsorption chromatography. The forces involved help to remove solutes from the adsorbent so that they can move with the mobile phase.
- Mobile phase – Either a liquid or a gas is used as a mobile phase in adsorption chromatography. Forces involved help to remove solutes from the adsorbent so that they can move with the mobile phase. When a liquid is used as a mobile phase it is called

LSC (Liquid-Solid Chromatography). When a gas is used as a mobile phase it is called GSC (Gas-Solid Chromatography).

Apparatus –

Chromatography jar – The glass jar has a lid. It helps to maintain a proper environment during separation.

Thin layer chromatography plate – Borosilicate glass plate with size 20\*20 cm, 20\*5 cm, 20\*10.

Capillary tube – Sample mixture is applied to TLC with the help of this tube.

Mobile phase – Liquid or gas

Stationary phase – Adsorbents

## Adsorption Chromatography Experiment (TLC)

- Take a clean and dry chromatographic jar.
- To make sure that the environment in the jar is saturated with solvent vapors, a paper soaked in the mobile phase is applied to the walls.
- Add the mobile phase to the jar and close it.
- Maintain equilibrium
- Mark the baseline on the adsorbent.
- Apply sample to TLC plate with the help of a capillary tube and allow it to dry.
- Put the plates in the jar and close it.
- Wait until the solvent moves from the baseline.
- Take out the TLC plate and dry it.

## Adsorption Chromatography Applications

- Adsorption chromatography is used for separation of amino acids.
- It is used in the isolation of antibiotics.
- It is used in the identification of carbohydrates.
- It is used to separate and identify fats and fatty acids.
- It is used to isolate and determine the peptides and proteins.

## Types of Adsorption Chromatography:

1. Thin Layer Chromatography – It is a chromatography technique where the mobile phase moves over an adsorbent. The adsorbent is a thin layer which is applied to a solid support for the separation of components. The separation takes place through differential migration which occurs when the solvent moves along the powder spread on the glass plates.
2. Mobile phase – This phase in TLC can either be a single liquid or mixture of liquids. Some commonly used liquids are Ethanol, [acetone](#), methanol, chloroform. Stationary phase – Adsorbents
3. Column chromatography – the technique in which the solutes of a solution are entitled to travel down a column where the individual components are adsorbed by the stationary phase. Based on the affinity towards adsorbent the components take positions on the column. The most strongly adsorbed component is seen at the top of the column.
4. Gas-Solid chromatography – The principle of separation in GSC is adsorption. It is used for solutes which have less solubility in the stationary phase. This type of

chromatography technique has a very limited number of stationary phases available and therefore GSC is not used widely.