

Thin-Layer Chromatography TLC

Experiment : 7

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Introduction

Chromatography:

- Is a process for separating components of a mixture. To get the process started, the mixture is dissolved in a substance called the mobile phase, which carries it through a second substance called the stationary phase.
- The different components of the mixture travel through the stationary phase at different speeds, causing them to separate from one another.
- These different travel times are termed retention time.

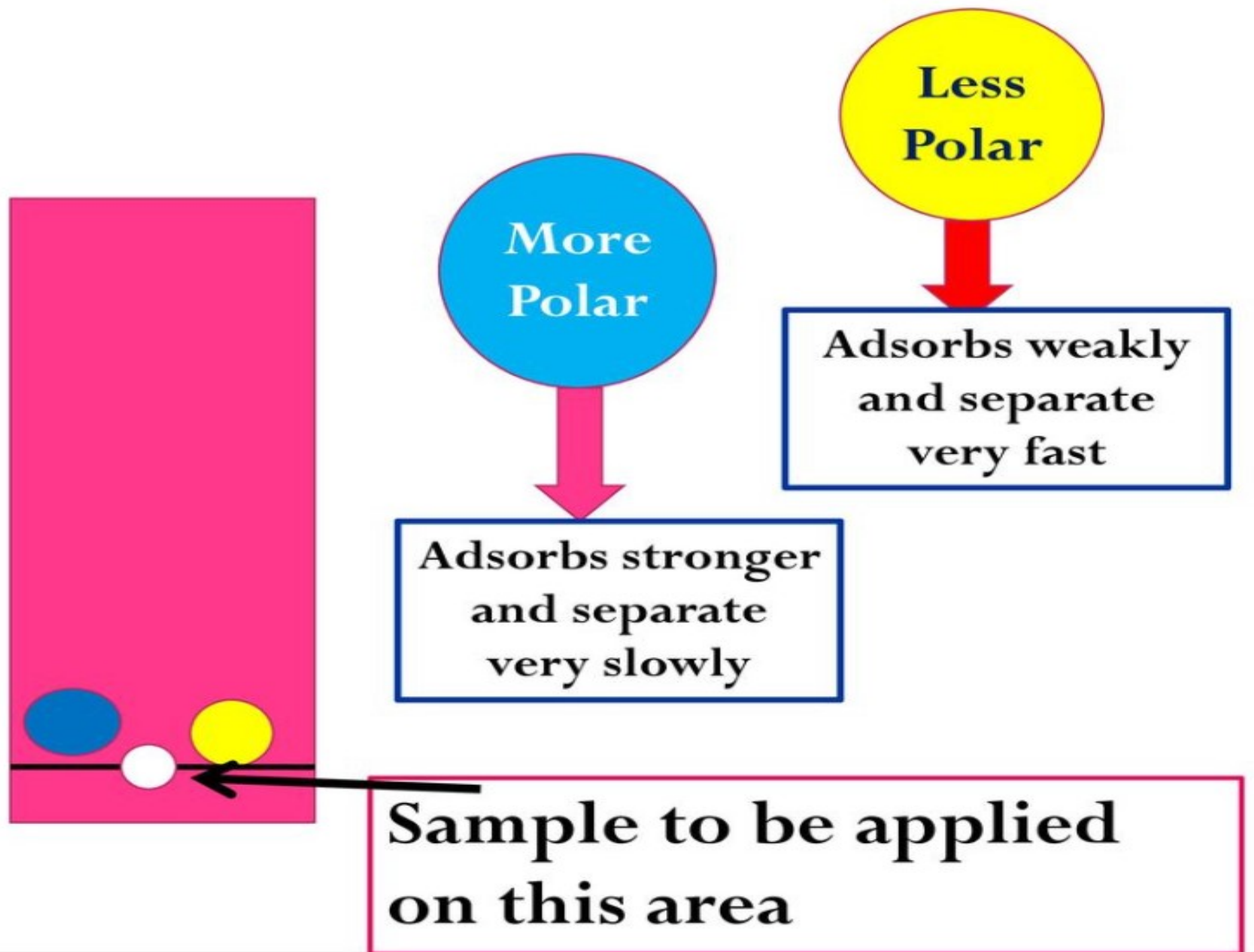


Thin-Layer Chromatography (TLC)

TLC is a fast, simple, and inexpensive analytical technique used to determine or monitor:

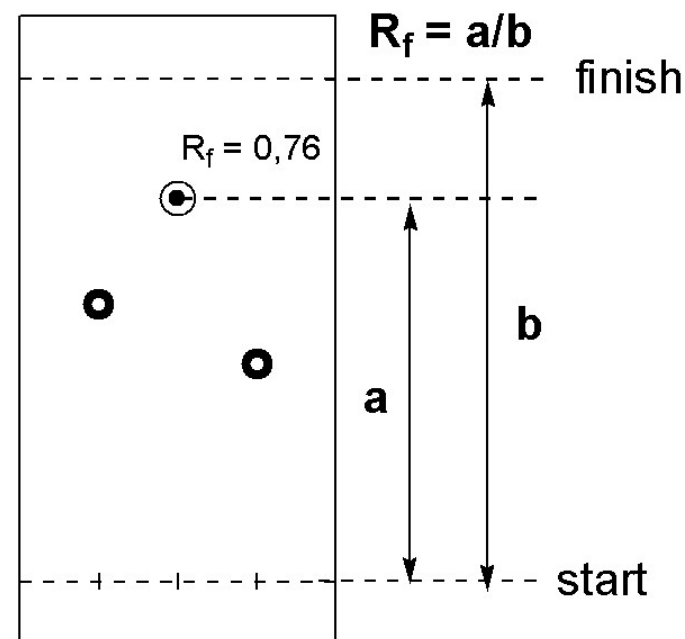
- The #of components in a mixture.
- The identity of two substances.
- The effectiveness of a purification.
- The appropriate conditions for chromatographic separation.
- The progress of a reaction.
- Column chromatography effectiveness.

- TLC involves spotting a dilute solution (1%) of sample on one end of a small sheet that has been coated with silica gel (SiO_2) or alumina (Al_2O_3), known as the stationary adsorbent phase.
- The sheet is placed upright inside a jar in a small pool of solvent. As the solvent rises up the sheet by capillary action, the components travel at different rates based on competing interactions with the mobile (solvent) and adsorbent phases.
- A polar solvent will carry a polar compound farther while a non-polar solvent will carry a non-polar compound farther.
- SiO_2 is used for separation of more polar compounds while Al_2O_3 is used in the separation of non-polar compounds.



The Rf Value

- Given compound will always travel a fixed distance relative to the distance the solvent travels this ration is called the Rf value.
- This ration is called the Rf value and is calculated in the following:



Distance traveled by substance

Distance traveled by solvent front

Materials used in TLC



The diagram illustrates the materials used in Thin Layer Chromatography (TLC). On the left is a large, empty rectangular box with a magenta border, labeled 'Glass Plate'. In the center is a blue 3D rectangular object with a small tab on top, labeled 'Hooper' with an arrow pointing to it. Below the hooper is a text box describing it as 'A device for applying the adsorbent layer'. To the right is a 3D rectangular box representing a 'Developing chamber'. Inside this chamber, at the bottom, is a blue horizontal layer labeled 'Mobile phase' with a downward arrow pointing to it.

**Glass
Plate**

Hooper
A device for applying
the adsorbent layer

Mobile
phase

Developing chamber

MOBILE PHASE

- **TLC Solvents or Solvent Systems.**
- A single solvent or mixture of two solvents can work as mobile phase in TLC .Ex. petroleum ether, carbon tetrachloride, chloroform, ethyl acetate, hexane can used as mobile phase.
- The ability of mobile phase to move up is depend on the polarity itself
- *Volatile organic solvents is preferably used as mobile phase.*



Let's Start
Experimenting