



Figure 1: Paper chromatography

Thin layer chromatography (TLC):

The stationary phase is a thin layer of liquid coated on a glass, plastic or metal foil plate; like aluminium plates.

- TLC and Paper chromatography are practically simple, low cost and ability to separate several test samples simultaneously. It requires a minute sample size and detection is straightforward. Unknown samples are applied to a plate with appropriate standards and the chromatography is developed as a single experiment.
- In both TLC and paper chromatography, the fundamental measurement is that of the **retardation factor (R_f)**. This factor is defined as the ratio of the distance travelled by the solute from the origin to the distance travelled by the solvent from the origin.
- The governing factor of separation mixtures of solutes by using PC & TLC is the **partition between two immiscible phases (stationary & mobile)**.

- If the **Rf** value is **Zero**, it means that the distance travelled by solute is nil and the solute remains in the stationary phase and thus it is immobile.
- If the **Rf** value is **1**, it means that the solute has no affinity with the stationary phase and travels with the solvent front. For example, **Rf values depend on the temperature and solvent** used in the experiment, so same compound can have different **Rf** values in different solvents.

Exp. (1): Determination of retardation factor (Rf) of red ink paper chromatography:

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Procedure & Materials:

- 1) *Prepare a strip of chromatographic paper (filter paper) and mark the origin line approximately 2cm from one end with a pencil.*
- 2) *Place a drop of red ink onto the marked line of the filter paper strip.*
- 3) *Pour about 10 ml of distilled water (D.W.) into a beaker.*
- 4) *Dip one edge of the strip into the beaker of distilled water, ensuring that the top of the beaker is covered with a watch glass.*
- 5) *Allow the strip to remain inside the beaker for a specific period of time.*
- 6) *Measure the distance travelled by the red spot and the solvent line by using ruler, then calculate the Rf for the red ink spot by applying equation (1).*

Exp. (2): Separation of a colourless mixture from lead nitrate & silver nitrate using paper chromatography:

Procedure & Materials:

- 1) *Prepare a strip of filter paper and mark the origin line ($\approx 2\text{cm}$) from one end with a pencil.*
- 2) *Place a drop of a mixture containing two ions, lead and silver, onto the marked line of the filter paper strip.*
- 3) *Pour about 10 ml of distilled water (D.W.) into a beaker.*
- 4) *Dip one edge of the strip into the beaker of D.W., ensuring that the top of the beaker is covered with a watch glass.*