

Experiment (5)

Plate chromatography

The theoretical part

In this method, the stationary phase is either a liquid carried on a sheet of paper or cellulose on a glass plate or an effective solid material coated with a glass or cellulose plate. Because the stationary phase is carried on a plate so this technical called plate chromatography.

Plate chromatography can be divided into:

1- Thin Layer Chromatography

The method is defined as one of the methods of separation. Thin-layer chromatography (TLC) has been largely replaced paper chromatography because it is faster, and more sensitive. The resolution in TLC is greater because the particles on the plate are smaller and more regular than paper fibres. The advantages of thin layer chromatography are the high sample throughput, the low cost, the possibility to analyze several samples and standards simultaneously, minimal sample preparation is necessary, and the plate may be stored for later identification and quantification.

2- Chromatographic Paper

At paper chromatography (partition chromatography) the stationary phase and the mobile phase are both liquid. The paper generally serves as a support for the liquid stationary phase. The sample is applied as a small spot or streak one and the half, two cm from the edge of a strip or square of filter paper, which then is allowed to dry. The dry strip is suspended in a closed container in which the atmosphere is

saturated with the developing solvent (mobile phase), and the paper chromatogram that is developed. When the front solvent travel the length of the paper, the strip is removed from the developing chamber and the separated zones are detected. The stationary phase in paper partition chromatography is in most cases is water. After the chromatographic procedure, the components of the analysed material are characterized by their relative mobility (R_f-value)

$$R_f = \frac{\text{Distance traveled by separated material (a)}}{\text{The distance traveled by the solvent (b)}}$$

Materials

- 1- Filter paper.
- 2- Diluted ammonia.
- 3- Sample (orange methyl, red methyl, blue methyl).

Procedure

1. Put in the cylinder (1) ml of NH₃.
2. Draw a line by pen on the sheet 2 cm from the edge of the sheet.
3. Put a spot of the sample in the middle of the line.
- 4 - Put the sheet in the cylinder for 1/4 hr, until the components of the sample are separated
5. Extract the sheet from the cylinder until it dries, and then calculate the R_f value for each them.

Discussion Questions

- 1 – What are the advantages of the value of R_F ?**
- 2. Has the experiment been used for qualitative or quantitative detection purposes?**
- 3. What is the stationary phase and the mobile phase used in the experiment?**