

A review on paper chromatography

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ABSTRACT

Chromatography is a meaning of separating mixture by distribution of the components between stationary phase and a mobile phase. Chromatography is a method used by scientists for separating organic and inorganic compounds so that they can be analyzed and studied. By analyzing a compound, a scientist can figure out what makes up that compound. Chromatography is a great physical method for observing mixtures and solvents. Chroma, Latin word means colour and graphy means of separation.

Keywords: stationary phase, mobile phase

INTRODUCTION

There are many type of chromatography. The Different Types of Chromatography are:

- Liquid Chromatography – separates liquid samples with a liquid solvent (mobile phase) and a column composed of solid beads (stationary phase)
- Gas Chromatography – separates vaporized samples with a carrier gas (mobile phase) and a

column composed of a liquid or of solid beads (stationary phase)

- Paper Chromatography – separates dried liquid samples with a liquid solvent (mobile phase) and a paper strip (stationary phase)
- Thin-Layer Chromatography – separates dried liquid samples with a liquid solvent (mobile phase) and a glass plate covered with a thin layer of alumina or silica gel (stationary phase)

Table 1:

Technique	Stationary phase	Mobile phase	Principle involved	Uses
Paper	adsorbed water on paper	liquid	partition cum adsorption	identification
Column	adsorbed water on silica gel	liquid	adsorption	purification & separation of compound
Thin layer	adsorbed water	liquid	adsorption	identification & separation of compound
Gas-liquid	non-volatile solvent absorbed on powder	N ₂ , Cr, He, gases	partition	identification
Gas solid	surface of powder	inert gas	partition	identification
Ion-exchange	ionic sites on resins	aqueous	partition	softening of hard water

Paper chromatography

Paper chromatography is a method of separating mixtures by using a piece of absorbent paper and a solvent. In this process, the mixture to be separated is placed on a piece of dry filter paper. The paper is the stationary phase. The solvent, or mobile phase, is allowed to travel across the paper by capillary action. As the solvent front moves, the components of the

mixture separate. Due to the difference in relative attraction which each component in the mixture has to the paper and to the solvent, the parts of the mixture separate as each travels a different distance up the paper. The components of the mixture which are most attracted to the solvent travel farthest with the solvent.

The **retention factor, R_f**, is a quantitative indication of how far a particular compound travels in a particular solvent. The R_f value is a good indicator of whether an unknown compound and a known compound are similar, if not identical. If the R_f value for the unknown compound is close or the same as the R_f value for the known compound then the two compounds are most likely similar or identical. The retention factor, R_f, is defined as

R_f = distance the solute (D1) moves divided by the distance traveled by the solvent front (D2)

$$R_f = \frac{\text{distance travelled by a compound}}{\text{distance travelled by solvent}}$$

$$R_f = D_1 / D_2$$

Where D1 = distance that color traveled, measured from center of the band of color to the point where the food color was applied D2 = total distance that solvent traveled.

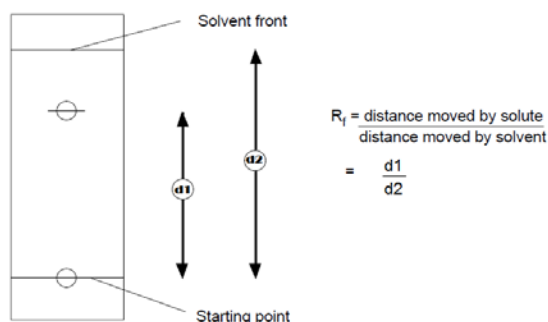


Figure 1:

There are 3 different type of paper chromatography

1. Ascending techniques
2. Descending techniques
3. Two-dimensional chromatography

1) ASCENDING TECHNIQUES:

The arrangement is contained in an airtight tank lined with paper saturated with the solvent to provide a constant atmosphere and separations are carried out in a constant temperature room. Thus, the solvent will ascend into the paper this process is, therefore, termed “Ascending Chromatography”

2) DESCENDING TECHNIQUES:

The end of the filter paper may be put into the solvent mixture contained in a narrow trough mounted near the top of the container. In this chromatography, the solvent will descend into the

paper and this process is then termed “Descending Chromatography”.

3) TWO DIMENSIONAL CHROMATOGRAPHY:

The mixture is separated then the first solvent, which should be volatile: then after drying, the paper is turned through 90° and separation is carried out in the second solvent.

After locating the migrated unknown sample along with standard known sample, a map is obtained and comparing their position with a map of known compounds can identify compounds.

Preparing the Chromatography Strips

- Cut a strip of filter paper
- Draw a line 1 cm above the bottom edge of the strip with the pencil
- Use pencil to label each strip for its corresponding pen
- Place a spot from each pen on your starting line
- Thread the paper strips onto the skewer.
- Place the skewer so the strips hang into the water in the beaker making sure the ink dots are above the waterline.
- Let strips process for several minutes.

APPARATUS:

The apparatus required for paper chromatography are

- Support for paper
- Solvent trough
- Airtight chamber
- Whattmann filter paper number 1
- Capillary tubes
- Samples – Amino acids (or) Pigments
- Solvents
- Platinum loop

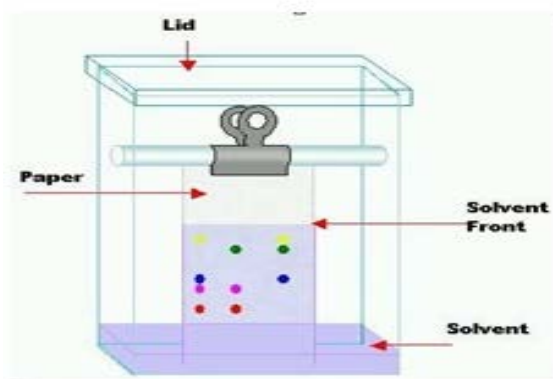


Figure 2:

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