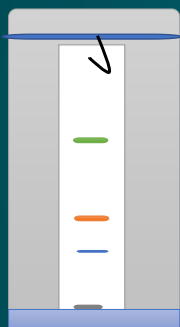


Paper Chromatography



- ✓ Basic Introduction
- ✓ Principle
- ✓ Procedure
- ✓ Application
- ✓ Advantages

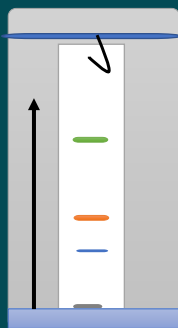
Chromatography
Instrumental Analysis

Paper Chromatography



Introduction

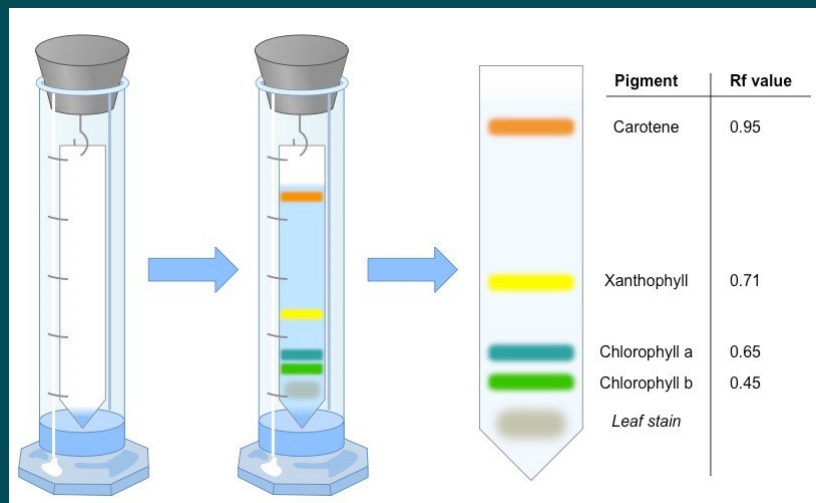
- ❏ Paper chromatography may be defined as the technique in which separation take place by using designed filter paper
- ❏ The separation takes as a result of differences in **partition –coefficients**.
- ❏ It was first introduced by German scientist **Christian Friedrich Schonbein (1865)**.



Paper Chromatography



Introduction & Principle:



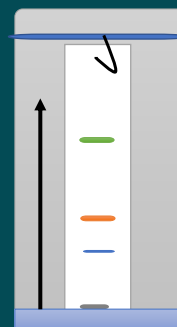
Source: <https://microbenotes.com/paper-chromatography/>

Paper Chromatography



Principle:

- The principle of separation is mainly **partition** rather than adsorption.
- Substances are distributed between a stationary phase (Liquid) and a mobile phase (Liquid).
- Cellulose layers in filter paper contain moisture which acts as a stationary phase.
- Organic solvents/buffers are used as mobile phase.
- Determine the Rf (Retention factor) to analyze the components.

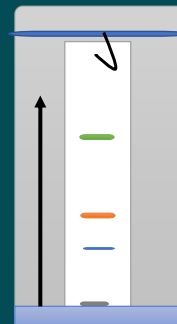


Paper Chromatography



Types:

- **Types of paper chromatography** : There are two main types of paper chromatography based on principle:
- (1) **Paper partition chromatography** : This is a technique in which paper is used as an inert support with one solvent as mobile phase and other as stationary or immobile phase.
- (2) **Paper adsorption chromatography** : In this technique a modified paper (first impregnated with an adsorbent, like silica or alumina) is used as an adsorbent and a single solvent is allowed to flow over the unknown components.



Paper Chromatography



Types:

- **Types of paper chromatography** : There are Four types of paper chromatography based on solvent movement:
- **1. Ascending Paper Chromatography**: When the movement of the mobile phase is in **upward direction**, the development is called **ascending development**.
- **2. Descending Paper Chromatography**: When the movement of the mobile phase is in **downward direction**, the development is called **descending development**.
- **3. Ascending- Descending Paper Chromatography**- Both direction

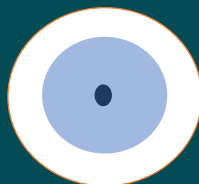


Paper Chromatography

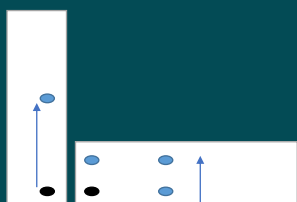


Types:

4. Radial Paper Chromatography:



Two dimensional Paper Chromatography:



Paper Chromatography



Instrumentation:

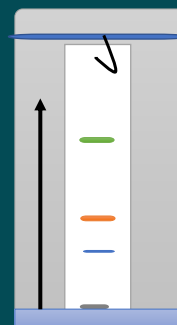
Basic Components.

1. Stationary phase & papers used
2. Mobile phase
3. Developing Chamber
4. Detecting or Visualizing agents

1. Stationary Phase

🔊 **Paper** : The basic material of the paper used in paper chromatography is **α -cellulose (98.99%)**. In addition to this other materials include β -cellulose, ammonia, nitrogen like compounds etc.

🔊 **Whatmann filter paper** is widely used in paper chromatography (different grades like No.1, No.2, No.3, No.4, No.20, No.40, No.42 etc).



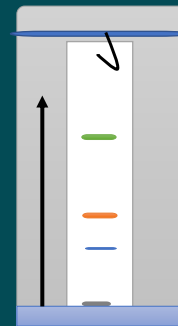
Paper Chromatography



Instrumentation:

Other modified papers

- Acid or base washed filter paper
- Glass fiber type paper.
- Hydrophilic Papers – Papers modified with methanol, formamide, glycol, glycerol etc.
- Hydrophobic papers – acetylation of OH groups leads to hydrophobic nature, hence can be used for reverse phase chromatography.
- Impregnation of silica, alumina, or ion exchange resins can also be made.



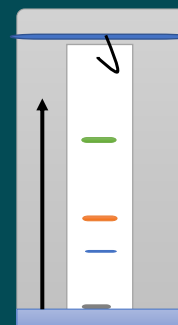
Paper Chromatography



Instrumentation:

2. Mobile Phase:

- Selection based on the nature of analyte similar as TLC. Pure solvents, buffer solutions or mixture of solvents can be used.
- Hydrophilic Mobile Phase
 - (a) Isopropanol – ammonia – water (9 : 1 : 2)
 - (b) n-Butanol – acetic acid – water (4 : 1 : 5)
 - (c) Water – phenol etc.
 - Methanol : water 4:1
- Hydrophobic mobile phases
 - dimethyl ether: cyclohexane kerosene : 70% isopropanol



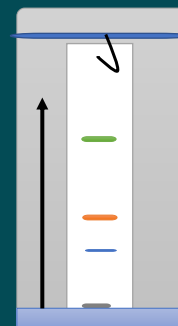
Paper Chromatography



Instrumentation:

3. Chromatographic chamber

- The chromatographic chambers are made up of many materials like glass, plastic or stainless steel. Glass tanks are preferred most.
- They are available in various dimensional size depending upon paper length and development type.
- The chamber atmosphere should be saturated with solvent vapor.



Detection

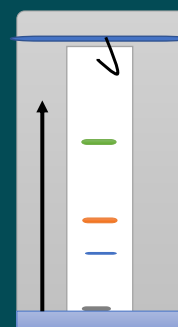
- Colorless analytes were detected by staining with reagents such as iodine vapor, ninhydrin, etc.
- Radiolabeled and fluorescently labeled analytes were detected by measuring radioactivity and fluorescence respectively.

Paper Chromatography



Application:

- Applications of Paper Chromatography
- To check the control of purity of pharmaceuticals,
- For detection of adulterants,
- Detect the contaminants in foods and drinks,
- In the study of ripening and fermentation,
- For the detection of drugs and dopes in animals & humans
- In analysis of cosmetics
- Analysis of the reaction mixtures in biochemical labs.

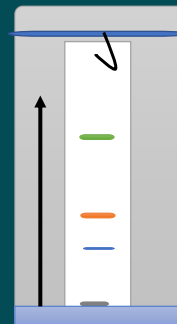


Paper Chromatography



Advantages:

- The main advantages that paper chromatography offers are
- simplicity,
- low cost,
- hassle-free operation.
- It can be run in various modes, and quantitation may be achieved without the use of expensive instrumentation.



Thanks for Watching



Subscribe my **YouTube**
Channel

