

Paper Chromatographic Separation of Plant Pigments a New Approach by using Akshya-Swagatika Solvent and Mobile Chromatogram Detection System (MCDS)

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ABSTRACT

Chromatography is a term that refers to a group of laboratory techniques for separating mixtures. Chromatography works on the premise of solute partitioning between two phases or solvents. The technique of paper chromatography is commonly used to separate plant pigments based on their molecular weight. Plant pigments include chlorophyll-b, chlorophyll-a, carotenoid, and xanthophyll, which all have various molecular weights, colours, and absorption maxima. In this study, an attempt was made to see how a new solvent (Akshya-Swagatika solvent) can be used to separate plant pigments using paper chromatography, as well as a new detection method developed by us known as Mobile chromatogram detection system (MCDS) that can be used for compound identification and photographing. As shown in the table and photograph, pigments are separated by molecular weight and band colour, with carotenoid having the highest RF value and chlorophyll-b having the lowest. It was obvious that the Akshya-Swagatika solution could be used to separate plant pigments in paper chromatography. Photograph taken with a mobile chromatogram detection system that is much clearer than normal one. In developing countries, both solvent and detection systems are useful in explaining paper chromatography in a cost-effective manner. The MCDS detection system is cost-effective fast method which replaces traditional sophisticated detection procedures.

Keywords- Plant pigments, Paper Chromatography, Akshya-Swagatika solvent, Mobile chromatogram detection system (MCDS).

I. INTRODUCTION

Chromatography is a term that refers to a group of laboratory techniques for separating mixtures. Chromatography works on the premise of solute partitioning between two phases or solvents. The technique of paper chromatography is commonly used to separate plant pigments based on their molecular weight. Plant pigments include chlorophyll-b, chlorophyll-a, carotenoid, and xanthophyll, which all have various

molecular weights, colours, and absorption maxima. A number of scientists are working on paper chromatography. Using paper chromatography, Wender and Gage (1949) isolated flavonoid pigments. Lind et al. (1953) used paper chromatography to extract plastid pigment. Gaga et al. (1951) use filter paper chromatography to identify flavonoid compounds.

In this study, an attempt was made to see how a new solvent (Akshya Swagatika solvent) can be used to separate plant pigments using paper chromatography, as well as a new detection method developed by us known as Mobile chromatogram detection system (MCDS) that can be used for compound identification and photographing. Using Akshya-Swagatika solvent and Mobile Chromatogram Detection system, provide a new way to paper chromatographic separation of plant pigments.

II. MATERIAL AND METHODS

Preparation

Tagetes erecta leaves were used as a sample for pigment separation. To make an acetone extract of leaf pigment, we used a mortar and pestle to ground some fresh green leaves with 5 ml of acetone. A narrow strip of Whatman No 1 filter paper was taken and cut into a narrow notch on one end. The pigment extract was then applied to the paper strip at the notch using a capillary tube. As mobile phase, we used 5 mL of novel chromatography solvent Akshya-Swagatika, which is made up of Acetone, Ethyl alcohol, and Isopropyl alcohol at a ratio of 1:4:5. Then, in a wide, long test-tube, 5ml of Akshya-Swagatika solvent was added. With the help of a split cork, suspend the pigment extract-loaded chromatographic strip in the test tube so that the loading site is about 1cm above the solvent level. Then, when the solvent has risen about 75 percent of the strip, make the cork airtight and leave the test-tube undisturbed for 10-15 minutes. After that, the chromatographic paper was removed from the chamber and allowed to dry.

Detection

We developed a new low-cost quick detection approach called **Mobile Chromatogram Detection System for clear band detection (MCDS)**. The dry chromatography paper was placed on a smartphone with a clean black background and the brightness set to maximum. With the use of a separate mobile phone, a photo was shot that shows varied pigment colours (fig-1).

The following formula can be used to calculate the Rf value of each pigment isolated.

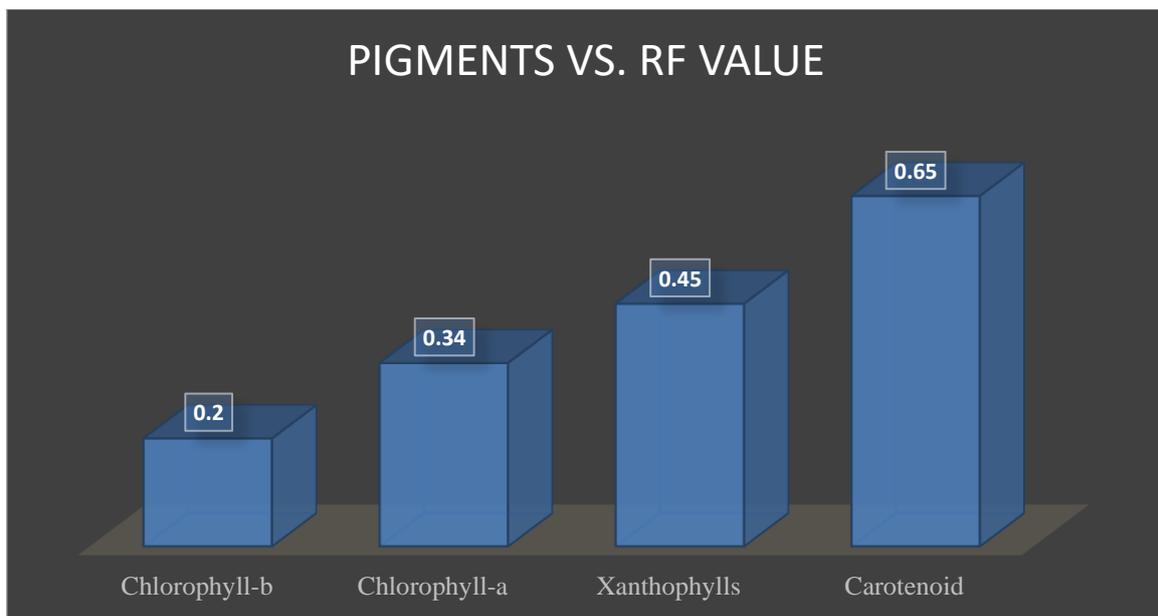
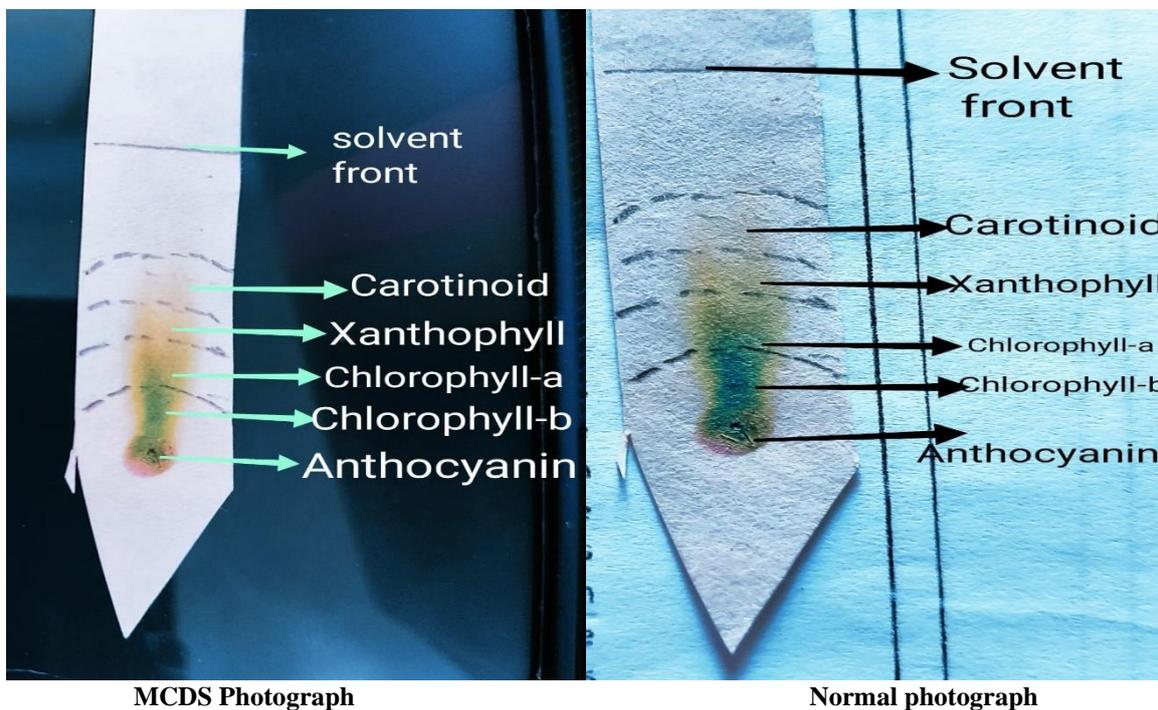
Rf = The compound's distance travelled vs. the solvent front's distance travelled.

III. RESULT

The Rf value and colour of different pigment reflected on table No-1

Table No. 1

Pigment	Rf value	Color of pigment
Chlorophyll-b	0.20	Dark green
Chlorophyll-a	0.34	Light green
Xanthophylls	0.45	Greenish yellow
Carotenoid	0.65	Yellowish orange



IV. CONCLUSION

As shown in the table and photograph, pigments are separated by molecular weight and band colour with carotenoid having the highest RF value and chlorophyll-b having the lowest. It was obvious that the **Akshya-Swagatika** solution could be used to separate plant pigments in paper chromatography.

Figure 1 shows a photograph taken with a mobile chromatogram detection system that is much clearer than normal one. In developing countries, both solvent and detection systems are useful in explaining paper chromatography in a cost-effective manner. The MCDS detection system is cost-effective fast method which replaces traditional sophisticated detection procedures.

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