

EXPERIMENT

Aim

Separate the coloured components present in the given grass/flower by ascending paper chromatography and determine their R_f values.

Theory

The extract of flowers and leaves contains a number of coloured components as chlorophyll, Xanthophyll and carotene etc. These pigment travel with different speeds with the mobile phase and hence can be separated using chromatography.

Material Required

Gas jar, glass rod, filter paper strip (Whatman's No. 1 filter paper), jar cover, fine capillary tube. A mixture of red and blue inks, alcohol, and distilled water.

Procedure

1. Take a Whatman filter paper strip (20×2 cm) and draw a line with pencil above 4 cm from one end. Draw another line lengthwise from the centre of the paper.
2. With the help of fine capillary tube, put a drop of the mixture of red and blue inks at the point P. Let it dry in air. Put another drop on the same spot and dry again. Repeat 2-3 times, so that the spot is rich in mixture.
3. Suspend the filter paper vertically in a gas jar containing the solvent (eluent) with the help of a glass rod in such a way that the pencil line (and the spot) remains about 2 cm above the solvent level (50% alcohol + distilled water).
4. Cover the jar and keep it undisturbed. Notice the rising solvent along with the mixture of red and blue inks. After the solvent has risen about 15 cm you will notice two different spots of blue and red colours on the filter paper.
5. Take the filter paper out of the jar and mark the distance that the solvent has risen on the paper with a pencil. This is called the solvent front.
6. Dry the paper. Put pencil marks in the centre of the blue and red spots.
7. Measure the distance of the two spots from the original line and the distance of the solvent from the original line.
8. Calculate the R_f values of the blue and red inks by using the formula:

$$R_f = \frac{\text{Distance travelled by the blue or red ink from the point of application}}{\text{Distance travelled by the solvent from the original line}}$$

Observations and Calculations

Table.1.

Colour of the spot	Distance travelled by the spot from the original line	Distance travelled by the solvent from the original line	R _f Values
Green (Chlorophyll)	A cm	X cm	A/X
Yellow (Xanthophyll)	B cm	X cm	B/X
Red (Carotene)	C cm	X cm	C/X

Note: In the above experiment, crush fresh flowers or grass in a mortar and extract the juice with acetone. Use this juice for making the spot.

Precautions

1. Use a good quality pencil for drawing the reference line so that the mark does not dissolve in the solvent in which the chromatography is carried out.
2. Always make use of a fine capillary tube.
3. Keep the jar undisturbed and covered during the experiment.
4. A spot should be small and rich in mixture.
5. Allow the spot to dry before putting the strip in the jar.
6. Keep the strip erect. Do not let it curl.
7. Do not allow the spot to dip in the solvent.

VIVA VOCE

Q 1. What is the aim of the experiment you conducted?

Ans. The aim of the experiment is to separate the coloured components present in the given grass/flower extract using ascending paper chromatography and determine their values R_f.

Q 2. Explain the principle of paper chromatography.

Ans. Paper chromatography relies on the principle of differential partitioning of components between a stationary phase (paper) and a mobile phase (solvent). Components with higher affinity for the mobile phase move faster, while those with higher affinity for the stationary phase move slower.

Q 3. Why is it important to use an ascending chromatography technique in this experiment?

Ans. Ascending chromatography ensures that the solvent moves in the direction opposite to gravity, allowing for better separation and resolution of components on the paper strip.

Q 4. What factors influence the choice of solvent in paper chromatography?

Ans. Factors include the polarity of the components being separated, the solubility of the components in the solvent, and the interaction between the solvent and the stationary phase (paper).

Q 5. How does the polarity of the solvent affect the separation in paper chromatography?

Ans. A solvent with a polarity similar to the components being separated will result in better separation because it can effectively solvate and transport the components along the paper strip.