EXPERIMENT

Aim

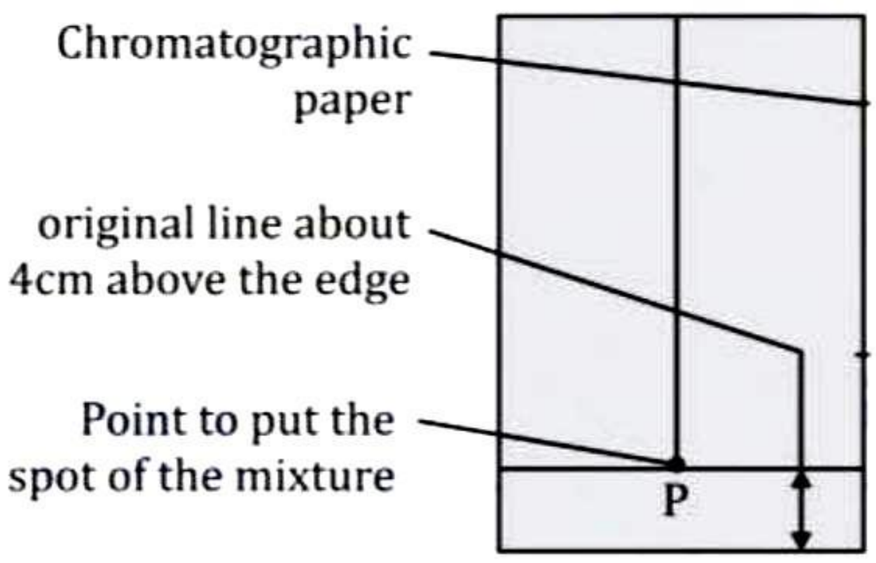
Separate the coloured components present in the mixture of Red and Blue Inks by ascending paper chromatography and find their R_f values.

Material Required

Gas jar, glass rod, filter paper strip (Whatman 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 × 2cm) and draw a line with pencil above 4 cm from one end. Draw another line lengthwise from the centre of the paper as shown in Fig.1.
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 2cm 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 center of the blue and red spots.



Spotting the mixture

Fig.1

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:

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

Observations and Calculations

Table.1.

Substance	Distance travelled by different components	Distance travelled by solvent	R_f value
Red ink + Blue ink	A cm (Red Ink)	X cm	A/X
Red ink + Blue ink	B cm (Blue Ink)	X cm	B/X

Precautions

1. Use 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 to be curled.
7. Do not allow the spot to dip in the solvent.

VIVA VOCE

Q 1. What is paper chromatography?

Ans. Paper chromatography is a technique used to separate and analyse mixtures of substances based on their differential movement through a stationary phase (paper) and a mobile phase (solvent).

Q 2. What is the principle behind paper chromatography?

Ans. Paper chromatography works on the principle of differential partitioning, where the components of a mixture distribute themselves between a stationary phase (paper) and a moving solvent phase based on their solubility and affinity for the phases.

Q 3. Why is ascending paper chromatography chosen for separating coloured components in this experiment?

Ans. Ascending paper chromatography is chosen because it allows for better separation of components and produces clearer chromatograms compared to descending chromatography.

Q 4. How do you prepare the paper for chromatography?

Ans. The paper is cut into strips and a pencil line is drawn near the bottom. The sample is then spotted onto the line using a capillary tube or micropipette.

Q 5. What is the mobile phase in paper chromatography?

Ans. The mobile phase is the solvent that moves through the paper, carrying the components of the mixture with it.