

Paper Chromatography

1. Define

1. Paper chromatography:

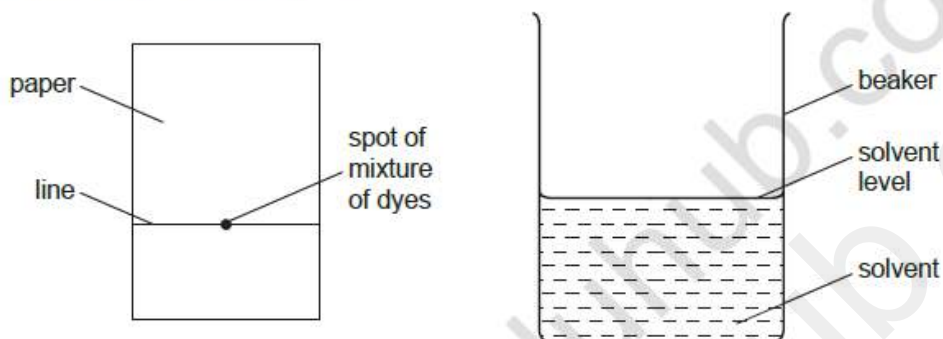
The method of separating pigments (colored substances) using filter paper is paper chromatography.

Key points about chromatography:

1. The colours separate if:

- The pigments have different solubilities in the solvent.
 - The pigments have different degrees of attraction to the filter paper.
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- 2 An experiment is carried out to separate a mixture of two dyes. A line is drawn on a piece of chromatography paper and a spot of the dye mixture placed on it. The paper is dipped into a solvent and left for several minutes.

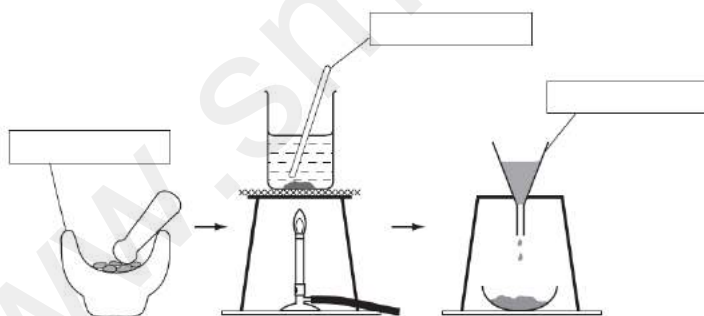


Which statement about this experiment is correct?

- A The dyes must differ in their boiling points.
- B The dyes must differ in their solubilities in the solvent.
- C The line must be drawn in ink.
- D The line must be placed below the level of the solvent.

2. If a mixture of solvents is not soluble in water then other solvents such as ethanol , alcohol ,acetone or propanone can be used.

- 1 The colours present in some blackcurrant sweets can be separated by chromatography. The colours are water-soluble dyes. The diagrams show how the colours can be extracted from the sweets.



(a) Complete the empty boxes to name the pieces of apparatus.

[3]

3. You must know to extract colours from given substances using suitable methods and label the apparatus used

[O/N/2008-P6-Q1]

[M/J/2006-P6-Q2]

2 A sample of orange fruit jam was investigated to check the three colourings present.

Step 1 The jam was boiled with water.

Step 2 The mixture was filtered.

Step 3 The filtrate was concentrated.

Step 4 The concentrate was analysed by chromatography.

Note: Step 1 was done to extract the colour.

4. You must be able to identify the base line (origin) and the solvent front.

5. You must be able to name a locating agent while identifying colourless substances like amino acids.

Note: the locating agent reacts with the chemicals in the colourless spot and a coloured compound is formed.

To detect amino acids a locating agent called as ninhydrin is used.

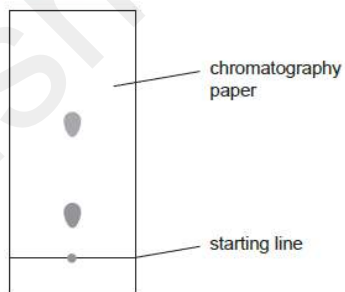
6. You must be able to calculate the R_f values and explain the meaning of R_f values.

7. You must be able to identify the number of dyes

(substances) in a mixture by looking at the chromatogram.

(2 in this case)

3 A coin is dissolved in an acid. Chromatography is used to test the solution formed. The diagram shows the chromatogram obtained.



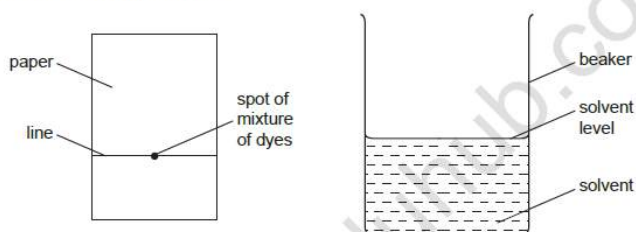
What is the coin made from?

- A a metal element
- B a non-metal element
- C a mixture of metals
- D a mixture of non-metals

8. The reliability of the results of a chromatogram can be checked by: either repeating the experiment/measuring the R_f values.

9. You must know that the base line must be always drawn with a pencil.

- 2 An experiment is carried out to separate a mixture of two dyes. A line is drawn on a piece of chromatography paper and a spot of the dye mixture placed on it. The paper is dipped into a solvent and left for several minutes.



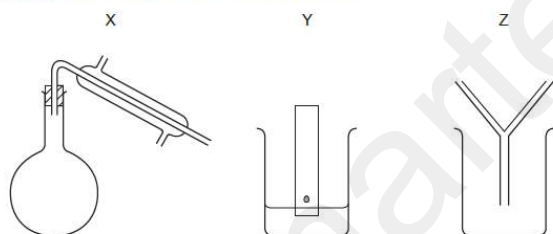
As the pencil line does not interfere with the chromatography results since it does not dissolve in the solvent.

[O/N/2008-P1]

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- 3 The outline diagrams show three methods of separation.



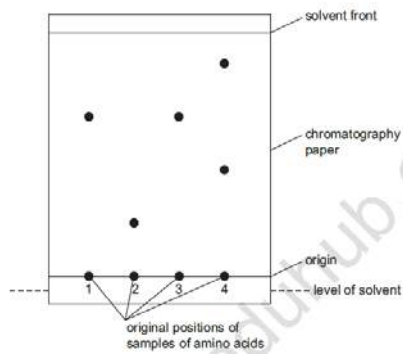
What are the three methods called?

	X	Y	Z
A	chromatography	distillation	filtration
B	distillation	chromatography	filtration
C	distillation	filtration	chromatography
D	filtration	chromatography	distillation

10. You must be able to look at the apparatus and identify the name of the experiment

[O/N/2007-P1]

11. You must know that the number of spots that the sample breaks into tells us the number of substances present in the mixture being tested.

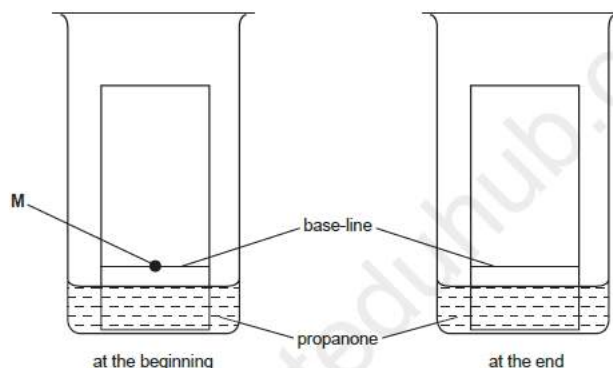


This the following chromatogram shows 2 amino acids being present in a protein sample being tested.



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12. You must know that the level of the solvent should be below the base line.



The reason is that if the solvent is above the base line, the dyes would get washed off in the solvent (or in other words, they would dissolve in the solvent)

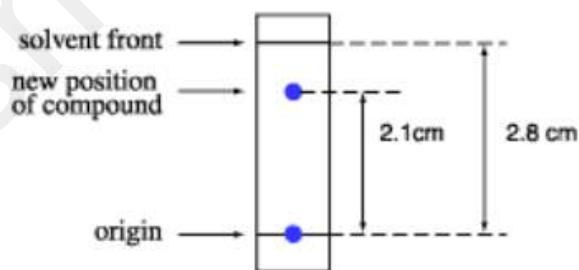
13. Sometimes a cover may be placed on the beaker to prevent the loss of solvent.

14. The chromatography paper must only be removed when the solvent is near the top of the paper.

15. Once the process of chromatography is over, the products can be verified in 2 ways.

- By calculating the R_f values.
- By comparing the results with known samples.

16. Measuring R_f value: (no units)-Calculation



$$R_f = \frac{2.1}{2.8} = 0.75$$

The R_f value of a sample = $\frac{\text{distance travelled by sample}}{\text{distance travelled by solvent front}}$