



CHROMATOGRAPHY

Chromatography is a very powerful method of separating many types of mixtures. There are many forms of chromatography, e.g. paper chromatography, thin layer chromatography (TLC), column chromatography, gas chromatography, etc.

In all forms of chromatography there is a stationary phase (the part that does not move) and a mobile phase (the part that moves). In paper chromatography the stationary phase is paper and the mobile phase is the solvent.

In paper chromatography, a starting line is drawn on the paper in pencil (pencil so that it does not dissolve in the solvent and affect the results). Small spots of each sample are placed on the starting line.

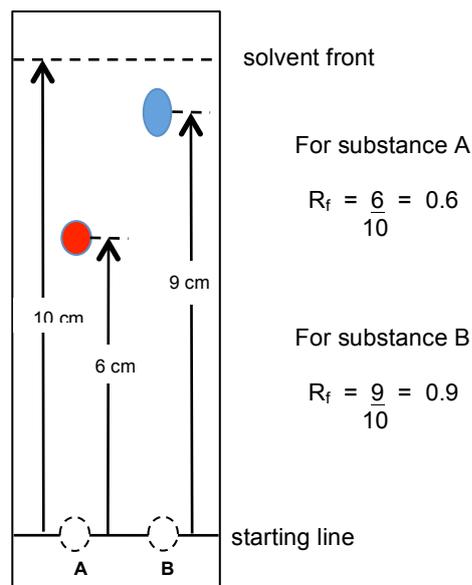
The paper is left vertically in a solvent. The solvent is below the level of the sample spots. The solvent soaks up the paper for a few minutes. Once the solvent is near the top, the paper is taken out of the solvent and the level of the solvent marked on the paper. The paper is left to dry.

Substances in a mixture separate because they have different attractions to the stationary phase (e.g. paper) and mobile phase (e.g. solvent). For example, in paper chromatography, if a substance is more strongly attracted to the solvent than the paper then it will move a long way with the solvent. If a substance is more strongly attracted to the paper than the solvent then it will move a short distance.

The distance each substance moves is measured as its R_f value, where:

$$R_f = \frac{\text{distance travelled by sample}}{\text{distance travelled by solvent}}$$

Substances have different R_f values in different solvents.



Substance S was analysed by paper chromatography.

- How many substances are in sample S?
- Which of substances 1-6 are in S?
- Calculate the R_f values of the substances in S. Give your answers to 2 significant figures.

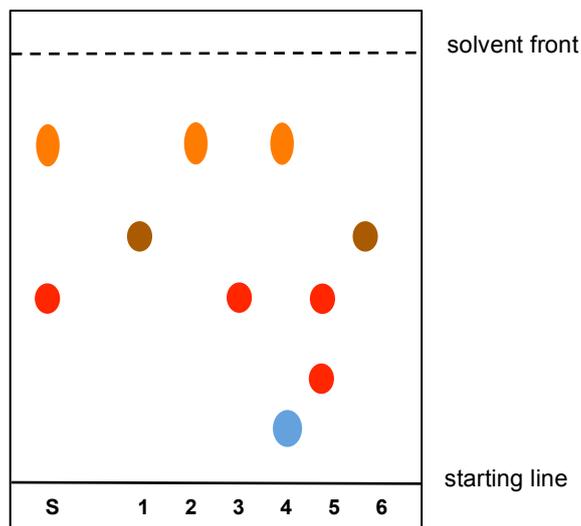
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- Label the spot that has the greatest attraction to the stationary phase. Label this **X**.
- Why must the starting line be drawn in pencil?
- Why must the level of solvent in the beaker be below the level of the spots?