9701 CAIE Chemistry — Chromatography

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1 Introduction

Notes for chromatography in the 9701 Chemistry course.

Mobile Phase: The solvent.

Stationary Phase: The thing not moving that the mobile phase passes through.

Partition (Coefficient): Separation due to **solubility** of solute between the mobile phase and the stationary phase.

2 Paper Chromatography

The mixture is separated by partition. The difference in solubility of the compound in the mobile and stationary phase leads to the separation.

Consider the R_f: retardation factor

$$R_f = \frac{\text{Distance travelled by solute}}{\text{Total distance from baseline to solvent front}}$$

Different substances would have different R_f values and you can just check your experimental data with known values.

2.1 Two Way Chromatography

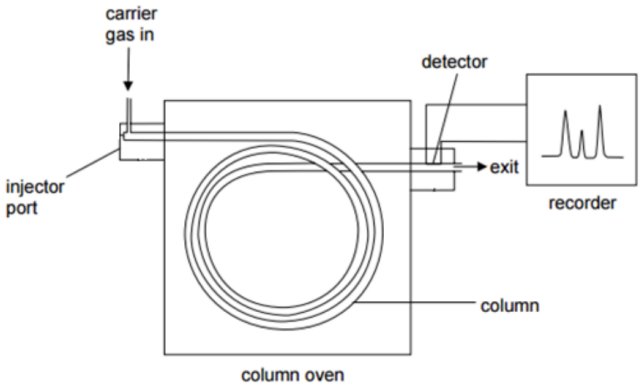
If you go up one way and the solutes aren't that separated, turn the paper 90 degrees and do the thing again with a different solvent.

3 Thin-layer Chromatography (TLC)

Now the stationary phase is not a sheet of paper, but it's a solid. Normally it's Al_2O_3 or SiO_2

The mobile phase passes OVER the stationary phase, and the solid **absorbs** molecules of the compound. So if both the molecule and the solid are polar, they would attract more strongly and so the molecule would travel less.

4 Gas Liquid Chromatography (GLC)



Vaporised sample is carried by an inert gas (mobile phase) over a liquid (stationary phase).

A non-polar stationary phase means that travel time is mainly determined by volatility, a polar stationary phase means polar molecules will be slowed down (so polarity also is a factor).

GLC is used to determine **% composition** of a compound. The percentage is the ratio of a particular triangular peak in relation to the total area of all triangles.

5 Summary

Paper chromatography works by partition.

TLC works by absorption.

GLC works by partition.