CHROMATOGRAPHY

Chromatography is for components of a
All types of chromatography have a phase, which is a substance in a fixed position, and another substance that moves over it called the phase.

Thin-layer chromatography has a phase which is a thin layer of silica spread thinly over a glass or plastic plate and dried onto it.

A spot of is placed on the TLC plate near one end. The plate is placed with that end just dipping into a , which is the phase, and which slowly soaks up into a thin-layer.

Separation occurs by of components of the onto the surface of the thin-layer. Components which are less strongly move upwards on the plate more or further.

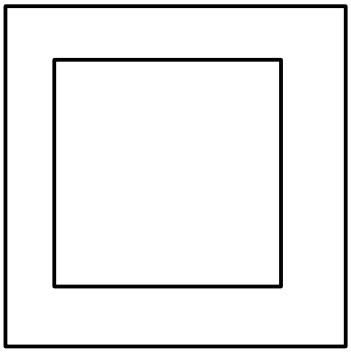
A lid is usually placed on the to stop the solvent from .

A is often used in TLC for easy comparison.

The chromatogram is complete when the gets close to the of the plate.

The number of separated components is equal to the number of which can be seen. If the components are coloured they are easily seen, colourless components, such as amino acids can be located by spraying with a suitable chemical, such as ninhydrin.

The $\mathbf{R_f}$ value (retardation factor) of each can be found by:



$\mathbf{R_f}$ = distance moved by component/distance moved by

It may be possible to identify components using a of R_f values. If different components are to each other, they are likely to have R_f values so they may not and cannot be distinguished. Compounds with similar structures such as are very difficult to distinguish for this reason.

(GC) is used to separate mixtures of more components. It uses a long-coiled tube inside an oven. The inside surface of the tubes is usually coated with an oily, viscous (usually an). This is the phase. The phase is an unreactive or inert gas such as .

A mixture is injected into the tube near the one end, and different components take different times to pass through to the other end. This depends on their in the viscous .This is sometimes referred to as the .The more they are, the more to pass through the tube.
The is the time taken for a component of a mixture to pass through the gas chromatography column.

Sometimes the phase is a solid the method of separation would then be .

Gas chromatography has similar limitations to TLC as similar compounds will have similar times. Therefore, it may be difficult to distinguish them.

There is a detector that records the appearance of components at the far end of the tube. It plots peaks on a graph, called a chromatogram. The peak areas are related to the of the components. The time taken for a component to pass through the tube is called the retention time. This depends on the gas that is used how rapidly it flows as well as the temperature of the oven.

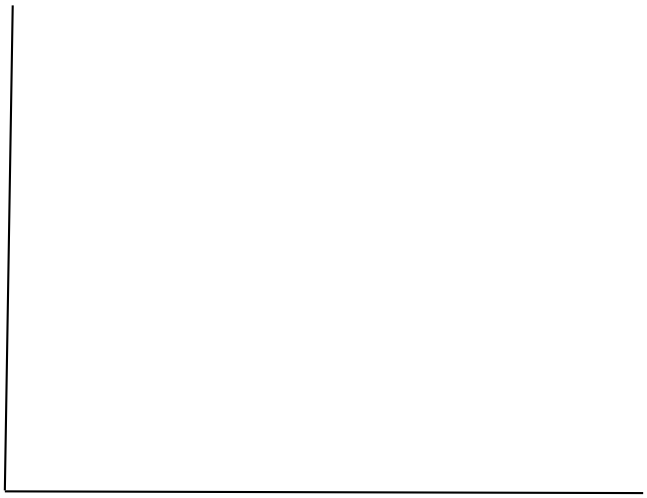
To calculate the relative amounts of a component in the sample the following formula is used:

Area =

Separated components can be passed into a (Gas Chromatogrpahy–Mass spectrometry/ GC-MS) which record their spectra. Components may then be identified from their values and patterns, or by using a computer to compare their spectra with those in a

GC-MS is used for security and in science and science, e.g. testing athletes for banned substances.

The GC detector will plot the results to produce a . A typical chromatogram is shown below:



Remember:

Type	Stationary phase	Mobile phase	Method of separation