

Thin layer chromatography

[Science](#), [Chemistry](#)



The aim of the lab was to separate and analyse analgesic drugs in a drug tablet. The method used to separate the components was Thin Layer Chromatography (TLC) with silica adsorbent as the stationary phase and 0.5% glacial acetic as the mobile phase. In one plate, five known samples were used as the reference, that is: Aspirin; Caffeine; Ibuprofen; and Salicylamide. Aspirin and Salicylamide were the only samples that fluoresced. On a second plate, the tablet sample was developed. The results of the lab showed that the unknown tablet had an R_f value of 0.51 and fluoresced.

This related to Tylenol in the reference plate with an R_f value 0.49. The other analgesics such as Anacin with R_f of 0.13 and Excedrin with R_f of 0.32. This proved that the lab was a success as analgesic drugs in the tablet were able to be separated and analysed. Introduction Chromatography is an analytical separation technique where compounds are separated from their mixtures. There are various types of chromatography techniques but they work using the same principles. They all have a mobile phase—made of a gas or liquid—and a stationary phase—made of a solid or liquid supported on a solid base.

Separation is achieved when the mobile phase travels through the stationary phase carrying the components of the mixture in it (Wall, p. 8).

Chromatographic separation involves an active and rapid equilibrium between the two phases. The equilibrium is influenced by: polarity and size of molecule; polarity of the stationary phase; and polarity of the solvent (wall, p. 11). Therefore by altering the variables using different mobile and stationary phases one can separate any substance from its mixture. Thin

Layer Chromatography (TLC) has a stationary phase of a liquid supported on a solid base with a liquid mobile phase.

Almost all mixtures of solvents can be used as a mobile phase whereas a thin consistent layer of alumina or Silica is used as a stationary phase (wall, p. 13). The polar stationary phase strongly attracts like or polar molecules. This changes the equilibrium as the molecules stay on the stationary phase. Non polar molecules have a lower affinity for the stationary phase hence remain in the mobile phase longer. This is how molecules separate in TLC. The figure below shows common functional groups according to how they elute from silica or alumina adsorbent (wall, p. 36).

Increasing Functional Group Polarity Alkane, Alkyl halides, Alkenes, Dienes, Aromatic hydrocarbons, Aromatic halides, Ethers, Esters, Ketones, Aldehydes, Amines, Alcohols, Phenols, Carboxylic acids, Sulphonic acids

Discussion In carrying out the experiment numerous factors might have resulted in our observation and inferences having errors. The errors might have originated from: using contaminated apparatuses; carrying out the two TLC experiments in different external conditions; the samples having other ingredients apart from the expected compounds; and using concentrated samples.

Deviations came about in methodology where different experimenters carried out the experiment differently resulting in different values. Errors were reduced by allowing the spots to completely dry before running the developing solvent (mobile phase); and observing the chromatogram through UV light first before tacking it in the iodine chamber. The

observations in the lab were that samples containing Salicylamide and Aspirin fluoresced under UV light. Aspirin turned grey with a light blue hue while Salicylamide turned cobalt blue under UV light.

The chromatogram of the second TLC plate showed that Tylenol sample was the only one that fluoresced compared to Excedrin and Anacin samples. The fluorescence of Tylenol was proof that the unknown sample was Tylenol because it fluoresced. Samples fluoresce in UV light because the plate contains a fluoresce material which indicate where the spots of samples reached under UV light. The other sample spots that did not fluoresce had to be taken to the Iodine chamber for further identification.

In the iodine chamber, Iodine sublimes to vapour and gets absorbed into the organic molecule samples. Organic spots on the TLC plate turn brown hence easily detected by the naked eye. Conclusion The experiment was a success as the unknown sample was identified as Tylenol and contained Salicylamide and Aspirin. The unknown components were Anacin with Rf value 0.13, Excedrin with Rf value 0.32, and Tylenol with Rf value 0.49. The unknown tablet was inferred to have Tylenol analgesic as its Rf value was 0.51 which was closer to that of Tylenol of the reference sample.