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Analytical Procedure of Thin Layer Chromatography Technique

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Opinion Article

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DESCRIPTION

Thin-layer chromatography is a technique for separating non-volatile mixtures. A thin stationary phase supported by an inert backing is used in the chromatographic process known as Thin Layer Chromatography (TLC) to separate the components of a mixture. It can be done on an analytical scale to monitor the progress of a reaction, or it can be done on a preparative scale to purify small amounts of a compound. TLC is a well-liked analytical tool because of how simple, inexpensive, sensitive, and quick it is to perform. TLC works on the same principle as all chromatography compounds' affinity for the mobile and stationary phases affects the rate at which it migrates.

The stationary phase's characteristics are distinct from those of the mobile phase. Non-polar mobile phases, such heptane, are utilized, for instance, with the extremely polar material silica gel. The possibility of a combination in the mobile phase gives chemists more control over the material's bulk properties. TLC plates are typically available commercially, with standard particle size ranges to improve reproducibility. They are made by combining an adsorbent, such as silica gel, with an inert binder, such as calcium sulphate, and water. This solution is applied as thick slurry to an unreactive carrier sheet, which is typically glass, thick aluminum foil, or plastic. The finished plate is activated and dried in a 110°C oven for 30 minutes. The absorbent layer is typically 0.1 mm-0.25 mm thick for analytical purposes and 0.5 mm-2.0 mm thick for preparative purposes.

The procedure is comparable to paper chromatography, but it has the advantages of quicker runs, greater separations, and the flexibility of using various stationary phases. Due to its simplicity and speed, TLC is frequently employed for the observation of chemical processes and the qualitative characterization of reaction products. Plates can be labeled before or after the chromatography process with a pencil or other non-interfering or reactive implement. To run a thin layer chromatography plate, the following procedure is carried using a capillary tube, a small spot of solution containing the sample is applied to a plate, about 1.5 cm from the bottom edge. To prevent it from interfering with the sample's interactions with the mobile phase in the following step, the solvent is allowed to totally evaporate off. A vacuum chamber must be utilized to dry the plate if a non-volatile solvent was used to apply the sample. This step is frequently repeated to ensure that there is enough analyte at the start of the plate to produce a visible result. Each sample will move in its own adjacent lane from its own starting point if it is placed in a row of places that are all spaced the same distance from the bottom edge.

A small amount of an appropriate solvent is poured to a depth of less than 1 cm in a glass beaker or other suitable transparent container. A strip of filter paper is placed in the chamber so that its bottom touches the solvent and the paper lies on the chamber wall and almost reaches the top of the container. Close the container with a cover glass or any other lid and leave it for a few minutes to allow the solvent vapours to ascend the filter paper and saturate the air in the chamber.

The TLC plate is then placed in the chamber so that the sample spots do not come into contact with the eluent surface and the lid is closed. By capillary action, the solvent moves up the plate meet the sample mixture and carries it up the plate. The solvent front or the furthest extent of solvent up the plate is immediately marked.

The plate is depicted. Because some plates are pre-coated with a phosphor such as zinc sulphide which allows many compounds to be visualized using ultraviolet light, dark spots appear where the compounds prevent the UV light from striking the plate. Plates can also be sprayed or immersed in chemicals after elution. To produce visible results, various visualizing agents react with the spots. TLC is used in organic chemistry to qualitatively monitor processes. On the plate, capillary tube samples of the starting material, the reaction mixture and a cross-spot with both are placed. It takes a few minutes to run a small TLC plate. TLC was used in one study to screen organic reactions, such as the fine-tuning of BINAP synthesis from 2-naphthoThe alcohol and catalyst solution (chloride) are placed separately on the baseline, reacted, and then instantly analysed in this method. TLC has a unique application in radiolabeled compound characterization, where it is used to determine radiochemical purity.