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Instrumental Thin-Layer Chromatography (Planar Chromatography)

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I. INTRODUCTION

The purpose of this chapter is to present the state of the art in instrumentation for thin-layer chromatography (TLC), particularly its high-performance version (HPTLC). For each step of the TLC process, the benefits of proper instrumentation are illustrated and guidance is provided for choosing the right instrument for a given task. In addition, a novel concept of an all-inclusive TLC software is presented.

With that in mind one should not ignore the fact that even today most TLC is still done at a level that was introduced by Stahl more than 40 years ago, yet the results seem to be sufficient. In such cases instrumentation could possibly replace manual labor and make the task easier to complete, but the expenditure would hardly be justified.

This chapter is written for the TLC user who has arrived at the point where the results of the classical approach no longer meet the expectation of analytical quality. It will clearly answer the questions about how planar chromatography should be done to significantly improve its result. Neither historical aspects nor instruments that are no longer available on the market are covered. A detailed discussion is given in Ref. 1. Also not discussed are overpressured layer chromatography (OPLC) and hyphenated techniques. The reader is referred to the appropriate chapters of this book for these topics.

A. Scope of the Chapter

Although many advantages of TLC can be utilized with very simple or no instruments, it is the availability of modern, usually computer-controlled, equipment that has unlocked the full power of the method and opened new fields for qualitative and quantitative applications of planar chromatography. Work in a regulated environment and demanding issues of quality control for routine analyses have changed TLC from "quick and dirty" to a dependable, sophisticated, and good manufacturing practice (GMP)-compliant analytical technique that has its established place in almost any modern laboratory. Today's instruments, such as automatic application devices, sophisticated developing devices, scanning densitometers, and video documentation systems, have complemented the inherent advantages of TLC with increased reliability, better sensitivity, and improved precision and accuracy of the analytical result. The serious analyst can select instruments with different levels of automation without sacrificing the quality of the analysis or losing the immense flexibility of the method.

B. HPTLC—Instrumental TLC

Originally, the term high-performance thin-layer chromatography (HPTLC) referred mainly to the use of special HPTLC plates as outlined in Chapter 4. Soon it became clear that the potential of