



## CB05 The ABCs of TLC

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**Learning Overview:** After attending this presentation, attendees will understand the basic scientific methodology for the forensic analysis of inks using Thin-Layer Chromatography (TLC). Attendees will have an opportunity to observe and learn analytical steps taken prior to and during the chemical examination of writing inks and printing inks typically found on questioned documents.

**Impact on the Forensic Science Community:** This presentation will impact the forensic science community by demonstrating the importance of robust ink analysis and the limitations and interferences commonly encountered in such analysis. This presentation will provide a brief overview of microscopic and alternate-light source examinations, but will focus on TLC techniques utilized in the comparison and discrimination of inks. This presentation is intended as an introduction to ink analysis and will not address many of the scenarios and limitations commonly encountered in forensic casework.

Analysis of writing inks and printing inks typically involves comparison of inks to a potential source, such as an ink cartridge, to each other, or to a collection of standards. It is a multi-step process, which begins with a non-destructive physical examination before progressing to destructive chemical analyses necessitating sample removal. While the examination may be halted at any step of the process, it is important to consider the level of discrimination that may be achieved if additional analytical methods were to be employed. For example, TLC often does not differentiate pigmented inks; therefore, a technique such as Raman spectroscopy may be considered.

Ink examination also requires a well-developed understanding of limitations of the employed analytical techniques. Even basic light microscopy used to determine writing instrument type may provide inconclusive results when examining “hybrid” inks. The complexity of interfering factors increases with each subsequent analytical step. For example, during TLC analysis, Ultraviolet (UV) components of the substrate may interfere with UV components of the ink, creating overlapping bands on the TLC plate.

Attendees will also learn about several well-established methods available for the dating of inks. While ink dating may provide valuable information, it presents a host of issues, such as availability of reference materials and storage conditions that may affect document aging. This presentation will address some of the overarching concerns that should be evaluated when considering ink dating analysis.

During this presentation, attendees will have an opportunity to observe the non-destructive physical and optical examinations conducted prior to the destructive TLC analysis. Attendees will observe commonly encountered interferences such as sample size limitations, substrate fluorescence and staining, and TLC plate effects. This presentation is intended to provide baseline knowledge of the scientific methodology used in the forensic examination of inks and will assist examiners in determining when chemical analyses would be beneficial for sample discrimination.

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### Ink Analysis, TLC, Thin-Layer Chromatography