



Questioned Documents Section – 2011

J12 Development and Utilization of a Mixture of Dyes to be Used as a Standard in the Examination of Writing Inks Via Thin Layer Chromatography

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The goal of this presentation is to illustrate the benefits of using a standard mixture of dyes to evaluate the overall performance of the Thin Layer Chromatography (TLC) system used in the examination and comparison of questioned writing inks.

This presentation will impact the forensic science community by providing a procedure that will aid in quality assurance of TLC examinations of unknown writing inks in casework.

One of the techniques used in the examination of writing inks is TLC. This technique is often used to easily differentiate inks found on a questioned document. In addition, over the years, inks have been collected from ink manufacturers and compiled into an ink library. Inks in the library have been run on TLC plates. The TLC plates are filed based on how the components in the ink formulas separate on the plate. A questioned ink is run on a TLC plate which is then compared to the TLC plates filed in the library (with the hope of finding a matching reference sample with a known manufacturing date/history). When similar inks are found, information about those inks is used to aid in determining the date a particular ink formula was introduced.

Questioned inks that are run today are being compared to the TLC plates of library inks that may have been run many years previously. Without reproducible ink separations, potentially matching inks may be missed and not compared to the questioned ink. Therefore, it is important that the TLC plates are run under consistent conditions to ensure reproducibility from year-to-year.

It is well known that there are many variables that may affect the results of a TLC separation. Some of those variables include environmental factors (such as temperature and humidity); the extraction solvent and solvent system used; the extent of developing chamber saturation; TLC plate uniformity; and plate spotting technique. Development of a standard that has demonstrated a reproducible separation under optimum conditions for TLC could be used to evaluate the quality of a TLC run.

A mixture of known dyes that elute at different R_f values will be developed. Numerous TLC plates of the dye combination will be run under optimum conditions to verify the reproducibility of the separation of the dyes in the standard. This mixture of dyes will be used as a standard to be run with unknown writing inks. In the event that a separation of the standard on a TLC plate is not the same as the separation that was produced under optimum conditions, the examiner may evaluate their procedure and run an additional plate.

Ink Chemistry, Thin Layer Chromatography, Quality Control