



Questioned Documents Section – 2004

J8 The Analysis of Volatile Organic Compounds in Ballpoint Inks Using Gas Chromatography/Mass Spectrometry

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After attending this presentation, attendees will understand the GC/MS procedure for the analysis of ballpoint inks.

This presentation will impact the forensic community and/or humanity by showing that GC/MS is a valid analytical tool for the analysis of ballpoint inks. With such a large population of inks, this study may help reveal class characteristics with respect to certain ballpoint ink manufacturers.

The United States Secret Services and the Internal Revenue Service maintain the largest known collection of writing inks in the world. The reference collection consists of over 8000 samples of ink dating back to the 1920s and is often utilized to determine the date a questioned ink(s) was first commercially available. This information can be used to determine if a document was produced on the purported date. Since there are a variety of writing ink manufacturers, and ink formulations are occasionally changed within the same manufacturer, oftentimes there are inherent differences in the dye composition and solvents used in the vehicle portion. Thin layer chromatography (TLC) is the preferred method of analysis for databasing because its efficient and provides an effective profile of the colorant components present in writing inks. Gas chromatography coupled with mass spectrometry (GC/MS) is a suitable analytical tool for the analysis of volatile organic compounds (VOC) that are used by various manufacturers.

A study was previously conducted by this group of authors on 633 ballpoint inks to examine the occurrence of 2-phenoxyethanol (PE), a common (VOC) found in ballpoint inks that has been proven to evaporate as ink ages. A total of 279 and 354 black and blue ballpoint inks, respectively were examined and the results have been reported. PE was identified in 85% of the black and 83% of the blue ballpoint inks. During the PE study, GC/MS profiles were generated for each of the ballpoint inks. This new study will examine other VOCs that are present in ballpoint inks as a means to aid in the identification of inks when two or more inks cannot be further differentiated. Furthermore, GC/MS profiles will be compared to determine if there are differences in the types of VOCs used by various manufacturers, and/or if the same manufacturer has changed their formulation over time with respect to the vehicle portion.

Ballpoint Inks, Volatile Organic Compounds, Phenoxyethanol