

SIGNS OF ACCELERATED AGING OF RECORDS

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ABSTRACT

An investigation of four distinctive ballpoint pen inks was completed utilizing strategies for HPLC and strong stage miniaturized scale extraction and gas chromatography mass spectrometry. Inks of various ballpoint pen makers two blue ones and two purple ones were decided for the examination. Normally matured ink tests on paper were put away under different conditions, and the similar examples were presented to forceful impact of light, temperature and ozone. Amid the investigation of falsely and normally matured specimens contrasts in concoction piece of ink were recognized conceivable indications of quickened maturing were distinguished in records and marks that were made with blue and purple ballpoint pen inks.

Keywords: Ballpoint ink; 2-phenoxyethanol; Ink maturing; Artificial maturing; HPLC-MS; GC-MS; SPME; Forensic science; Questioned archives.

INTRODUCTION

Attributes of synthesis of ballpoint pen ink on paper are of awesome significance in deciding the age and in a relative investigation of archives in the measurable examination of records and materials. The ink is portrayed by utilizing profiles of colors and the exploration demonstrates that the larger part of inks have comparable profiles. Given the way that the ink piece incorporates dull and unstable aggravates, the utilization of the profile of the colors in the investigation of ink is insufficient. Likewise, without extra research and assessment, dependability and the capacity of different colors to corrupt into different colors undermines the objectivity of the outcomes got just by concentrating on the profile of colors. In this manner, in surveying the ballpoint pen ink, both the underlying profile of the ink and the information on conceivable changes of substances in the ink, which can be brought on by counterfeit maturing of the archive, or affected by natural components, must be utilized. The indications of counterfeit maturing of the

ink can be utilized not generally as a part of evaluating the consequences of the specimen, additionally as proof of forceful physical and substance activity. The adjustments in the recognized profile will make it conceivable to assess the reasons for the progressions – the consequence of compound or physical effect. Probably, the examination results can likewise be utilized as criteria as a part of the evaluation of the specimen amid the assurance of the age of the record. The exploration demonstrates that unstable and non-unpredictable ink mixes can be productively dissected by utilizing the consolidated strategies for chromatography and mass-spectrometry. The point of the exploration was to decide the indications of the fake maturing of ballpoint pen ink by utilizing consolidated chromatographic strategies.

EXPLORATORY METHOD

The examination was done under the accompanying conditions:

SPME-GC/MS: Shimadzu GC-2010 with Shimadzu GCMS-QP 2010 identifier. Injector temperature 270°C, segment Restek RTX® 1MS 30 m × 0.25 mm × 0.25 μm, He (113.7 mL/min, 120.4 kPa). Part for new example 1:50, split for corrupted specimens 1:20.

Actually Aged Samples

The example - 15 cm straight line, performed with ballpoint pen ink using a ruler. Tests were connected to the white office paper (dyed, 80 g/m²) which affect on the maturing procedures was not inspected in this study. Utilizing each of the four pens, three sheets with tests were arranged and kept in the chose conditions:

- In a research facility with daylight get to,
- In a research facility without daylight get to,

Close to an electro photographic gadget (Laser printer Kyocera KM-1635 KX). A 2-year-old Cello Maxritter ink test which was kept in the lab without daylight access (oblivious) was utilized for the examination. Two year old specimens of other ballpoint pens were not accessible for the exploration. Depiction of the Process of Aging Warm corruption in a stove WDB Binder FD-53:

- Sample was steadily warmed at 100°C for 5 days, a normal of 8 h every day,

- Sample was warmed at 160°C for 3 h,
- Sample was warmed at 200°C for 5 min and 40 min.
- The oxidation of the examples : A specimen was treated with ozone in a shut chamber for 3 hr. Ozone was produced utilizing an electrostatic charger establishment of Kjell Carlsson "Vacuum Box-Model IW" (~8000 V).
- Photo-corruption in machine Sun Test CPS +, Atlas MTT GMBH: A specimen was set in a shut chamber for the investigation of photostability and was illuminated for 3 h at room temperature (working mode λ from 320 nm to 800 nm, 2700 kJ/m²);
- An example was put in a shut chamber for the investigation of photostability and was lighted for nine 9 h at room temperature (working mode λ from 320 nm to 800 nm, 8100 kJ/m²).

RESULTS AND DISCUSSIONS

Given the volume of got information and the likeness of the maturing procedure, encourage examination is depicted in light of the exploration of one ballpoint pen ink-Cello Maxritter.

CONCLUSION

The consolidated strategy for strong stage extraction gas chromatography – mass-spectrometry and elite fluid chromatography can be utilized for investigation of unpredictable and non-unstable ink parts to decide a variation from the norm in the standard creation. Despite the distinctions in organization of analyzed inks, propensities of maturing are comparable, which makes it conceivable to institutionalize the portrayed techniques and standards of investigation and utilize them in the investigation of inks. Discovered signs are not dependably to recognize fake and quickened characteristic maturing, yet they may demonstrate that the record has been presented to forceful activity. Such data might be valuable for scientific specialists in record dating, since it gives extra data about the capacity states of the addressed report. Gotten information was not dissected factually as the main four pens were inspected. Be that as it may, the closeness of the outcomes permits us to state that collection of corruption items can happen at moderate maturing, however quickened maturing can bring about additionally maturing of breakdown item. The HPLC-MS

technique seems most reasonable for the study, as it permits investigating substances which deterioration items are not unpredictable and can be identified for measuring anomaly in relations.

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