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and analyzed using micro-ATR/FTIR spectroscopy. IR spectra were compared using a Pearson correlation coefficient after standardization. After then, a modified correlation coefficients was calculated to assist in evaluation of variations observed between models from a selected brand. **Results:** Variations between models within a particular brand were varied according to brand. In addition, inter-batch variations were found insignificant. Subsequently, few measures have been suggested to increase the discrimination power of the technique to differentiate between models of the same brand. In **Conclusion:** Micro-ATR FTIR spectroscopy is reproducible and could achieve discrimination power as high as those obtained via destructive techniques if the measures suggested in this study were applied in analysis.

Oral: 1523. Ultra-violet and visible (UV-Vis) spectroscopy and chemometrics techniques in forensic ball point pen analysis: A preliminary studies

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Ink analysis is one of the areas in forensic questioned document (QD) aims at identifying and characterising ink obtained from writing instrument used to write on a document. Ink from a writing instrument becomes an important forensic evidence when it is written on a document suspected to be associated with criminal activities such as threatening letters, insurance frauds and etc. Despite the popular use of photocopiers and printers, writing instruments particularly ballpoint pens are still the method of choice to write on documents. Current practise in forensic science in identification and characterisation of ballpoint pen inks involves both chromatographic and spectroscopic techniques. The latter either employs direct in-situ analysis using highly expensive Surface Enhanced Resonance Raman Spectroscopy (SERRS) or the more conventional, low-cost ultra-violet and visible (UV-Vis) spectroscopy. Both techniques produce qualitative and quantitative information where the former is in the form of spectra whilst the latter showing absorbance ranging over few hundred of wavenumbers. Presenting the qualitative information seem to be the common practise in the court of law. The problem associated with qualitative information is that it is subjective and the success of presenting such information is entirely depend on the experience and the extent of knowledge of the forensic scientist. This preliminary study introduces effective technique that can objectively identify and characterise ballpoint pen inks of different colours and brands. The analytical technique used was the UV-Vis spectroscopy. The resultant UV-Vis spectra generated were subjected to chemometrics techniques of principal component analysis (PCA) and hierarchical cluster analysis (HCA). The results found from this study indicates that chemometrics techniques can be successfully employed to objectively identify and characterise ballpoint pen inks of different colours and brands. It also indicates that conventional and low cost instrumental technique when coupled with chemometrics techniques can become a powerful analytical tool.

Oral: 1321. Examination of Tool Marks on Bone Preserved in Microbicidal Solutions

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Objective: The purpose of this study was to identify an effective microbicidal solution for the storage of bone sections with tool marks. Various implements can leave tool marks on bone in dismemberment cases and the long-term storage of bones is prone to shrinkage that may distort the tool marks. In this study, porcine bone was used as a human simulant for the tool marks. Micrographs were made of the tool marks on the bone sections before storage in microbicidal solutions. One bone section was fixed in 10% formalin for 12 days and then transferred to ethyl alcohol. The other bone sections were stored individually in the following solutions: buffered 10% formalin, 5% acetic acid, 70% isopropyl alcohol, 93% ethyl alcohol, 5% iodine solution, 10% iodine solution, 6% sodium hypochlorite, 10% sodium chloride with iodine, 10% sodium chloride with no iodine, 20% sodium chloride with iodine, 20% sodium chloride with no iodine, 26.4% sodium chloride with iodine and 26.4% sodium chloride with no iodine. After being stored for 6 months, the tool marks were examined and micrographs taken for comparison. The micrographs were evaluated using a scale of +1 to +3 depending on the quality of striations. A +1 evaluation indicated poor quality or no striations present, +2 indicated some striations but not enough for a positive identification and +3 evaluation indicated there were sufficient striations for a match. Of 14 tool mark samples, 2 (14%) yielded +1 data and 12 (86%) had +3 tool marks. **Conclusion:** After a 6-month period of storage, 5 of the 14 solutions tested were evaluated as effective microbicidal solutions. The solutions evaluated as ineffective included: 6 solutions with filamentous fungi and bacteria, 1 solution with crystals on bone and 2 solutions due to the quality of the tool mark striations.