## A186 An Evaluation of Pyrolysis Gas Chromatography/Mass Spectrometry and Summed Ion Profile Library Matching for the Classification and Identification of Wood Samples

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After attending this presentation, attendees will have an understanding of the advantages and disadvantages of using pyrolysis gas chromatography/mass spectrometry for the characterization of various types of wood.

This presentation will impact the forensic community by providing some initial insight into a new method for the analysis of wood samples. As this is a preliminary attempt at using this technique in this fashion, it is hoped that others will pick up where this project leaves off and pursue additional research.

Wood, briefly defined, is the solid fibrous material found under the bark of trees. It is a natural material that has a multitude of uses making it a fairly ubiquitous substance within any environment. It should therefore be no surprise that wood, in any of its various forms, is routinely encountered during trace evidentiary examinations. Whether it is submitted as large fragments from structures, splinters from fragmentations, or sawdust, it has the potential for being a very informative type of evidence. In all of the forms encountered, the identification of the specific kind of wood from which the samples originated can be utilized to provide important investigative and/or comparative information to assist with casework.

Traditional means for classification and identification of types of wood rely heavily upon visual and microscopic analysis whereby identifications are made based upon recognition and comparison of physical and structural characteristics that are imparted to the wood during growth. This is usually carried out by a skilled analyst who possesses a large amount of knowledge and training pertaining to the recognition of various characteristics of different types of wood. In any case, analysis by such means is by far the best course of action to take when attempting to identify wood. However, such examinations are best carried out with relatively large samples, which may or may not be available during the average case. In such a circumstance it may be important to substantiate any potential identification with some additional data.

Wood is not only physically/morphologically complex, it is also quite rich in chemical content. In addition to the primary chemical constituents of wood (e.g., cellulose), various additional compounds are known to be present in smaller amounts. As an example, it is well known that soft woods often contain a variety of terpenes including but not limited to a-pinene, b-pinene, and limonene. It was the objective of this study to investigate the possibility of classifying and identifying various different types of woods according to potential differences in their chemical composition.

For the purpose of this project duplicate samples of 54 common woods at a size of approximately 0.5mm x 0.5mm were placed in quartz sample tubes and analyzed using pyrolysis gas chromatography-mass spectrometry. A thirty-minute run time was used with pyrolysis occurring at 700°C for 20 seconds and oven conditions beginning at 40°C and peaking at 300°C at a ramp of 12° per minute. This process separated the pyrolyzed chemical components of the very small samples of wood enabling the identification some of these components. The resulting pyrograms were compared for overlapping patterns and examined for specific chemical content. In order to achieve these analyses extracted ion profiling was performed for various classes of compounds and an in- house library was prepared for sample comparison via summed ion profiles.

The project produced some promising results and it appears that the methods employed may be useful for the identification of wood samples. Sample preparation is simple, analysis times are short, and a large amount of information can be obtained from a relatively small sample. Based on these attributes, this method could be very useful in the identification of wood in forensic casework. However, it should be noted that there is currently no substitution for visual and microscopic means of wood identification. The results of this study would best be utilized to support information provided by more traditional types of analysis.

**Trace Evidence, Wood, Pyrolysis Gas Chromatography/Mass Spectrometry**

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