B66   The Evidentiary Significance of Automotive Paints From the Northeast: A Study of Red Paint

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After attending this presentation, attendees will understand the significance of population studies specifically pertaining to automotive paints.

This presentation will impact the forensic science community by providing physical and chemical population data on automotive paints in the Northeast, thus informing criminalists about the significance of automotive paint characteristics.

This research was completed to provide data relating to the significance of automotive paint chips found in a specific population. Research has previously been conducted regarding Midwestern automotive paint populations as well as populations regarding the layer chemistry of the paints.[1,2] But to date, no research has been conducted on automotive paints from the Northeast. This research looked at paint samples from the Northeastern portion of the United States and uses common techniques in addition to emerging techniques for automotive paint analysis.

The populations of automotive paints are constantly changing and, thus, need to be thoroughly monitored. By investigating these populations, forensic scientists can begin to understand what significance each individual automotive paint may hold. In order to do this, the physical appearance, layer structure, and layer chemistry can be analyzed to provide a forensic examiner with more detail that can be used to give strength to a conclusion made during an automotive paint examination.

This population study involved the discrimination of red automotive paints using a comparative analysis approach and data analysis. The red samples were chosen as a target group from a larger automotive paint population based on popularity among consumers and manufacturers. The first portion of the analysis used stereomicroscopy, brightfield, and polarized light microscopy to analyze all samples collected in the population. This study analyzed the paint samples from approximately 200 automobiles ranging from 1989 to 2017. The macroscopic and microscopic characteristics of each sample analyzed included: relative surface color, presence of effect pigments, relative size of effect pigments, number of different pigments, number of layers, layer color, layer texture, and relative thickness of the layers. The population data obtained varied from the previously released reports from a Midwestern and North American automotive paint populations.[1,3] The Midwestern study analyzed 300 samples and the North American study was conducted on a much larger scale, but each demonstrates the importance of doing this type of study. For example, the present research had a 20% gray-colored frequency which differed from the less then 10% obtained in the Midwestern study and 16% in the North American study. The target color of red had a 13% frequency in the current study, as compared to the 15% in the Midwestern and 10% in North American studies.

Next, only the red automotive paints were further analyzed using a comprehensive sequence. This helped to determine the differentiating power of the analytical sequence as well as analyze the chemical properties of similarly colored paints. Current laboratory methods were used to analyze the red automotive paints, and included Ultraviolet/Visible Microspectrophotometry (UV/Vis MSP), Scanning Electron Microscopy with Electron Dispersive X-ray Spectroscopy (SEM/EDX), and Fourier Transform Infrared (FTIR) microspectroscopy. In addition, this research used Raman microspectroscopy, an emerging technique for automotive paint analysis that has been demonstrated to provide valuable pigment information.[1]

This study was conducted to highlight the significance of automotive paint comparisons and the characteristics each sample possesses. The frequency data and the degree of differentiation is important information as it can provide a foundation for determining the significance of indistinguishable samples.

Reference(s):

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3. *Global Automotive 2016 Color Popularity Report.* Axalta. (n.d.). Retrieved from http://www.axaltacs.com/content/dam/New%20Axalta%20Corporate%20Website/Documents/Brochures/Axalta%202016%20Color%20Popularity%20Report.pdf.

Paint, Population Study, Analytical Sequence