B56 Identification of Benzimidazolone Organic Pigments in Automotive Coatings Using Pyrolysis Gas ChromatographyMass Spectrometry

Vincent J. Desiderio, BS, and David Gardner, BS, New Jersey State Police Office of Forensic Sciences, Central Laboratory, 1200 Negron Road, Hamilton, New Jersey 08691*

This presentation will impact the forensic community and/or humanity by presenting a proposal for an alternate means of identifying benzimidazolone organic pigments in automotive coatings.

Automotive coatings frequently play an important role in investigations of vehicular accidents, including "hit and run" incidents. When an automobile hits an individual, another vehicle, or an inanimate object, some portion of the vehicle's paint is often left behind. This evidence can serve two purposes: 1) If a suspect vehicle is located, a comparison of any questioned paint from the scene or victim to the known paint from the vehicle can be performed; and 2) If a suspect vehicle is not available, any paint left at the scene or on the victim may be useful for developing investigative leads. Of the two possibilities listed above, this paper is primarily concerned with the latter.

In order to provide investigative leads, the questioned paint must be examined physically and chemically. Chemical analysis of the paint evidence should be carried out in such a way so that as many of its individual components may be characterized as possible. The results should then be compared to a comprehensive database to determine whether a possible make, model, and year of suspect vehicle can be ascertained. The collaborative efforts of the Royal Canadian Mounted Police (RCMP) and FBI (FBI) have provided the forensic science community with such a database in the form of the Paint Data Query (PDQ).

The PDQ is based on the input of data obtained from visual, elemental and spectroscopic analysis of questioned samples. Generally, as more components of questioned paints are identified, the discrimination potential of such evidence increases. With recent shifts away from inorganic pigments, which often contain heavy metals such as Pb and Cd, organic pigments have become more prevalent in automotive coatings. Therefore the identification of organic pigments would be advantageous in generating a shorter list of possible suspect vehicles.

In its current state, the PDQ does not include organic pigments in its identification scheme. This absence may be due in part to a lack of research in this area. It has recently been shown that organic pigments can be identified in automotive paints using Fourier Transform Infrared Spectroscopy (FTIR). However, in certain instances the relatively low concentrations of organic pigments typically found in automotive coatings may make it difficult to make an identification using FTIR alone. In addition to the problem of low concentrations of organic pigments, automotive coatings frequently contain inorganic pigments, flakes and fillers that tend to obscure the presence of the lower levels of organic pigments when using FTIR.

To address this problem, this research was undertaken to evaluate the use of Pyrolysis-Gas Chromatography-Mass Spectrometry (Py-GCMS) as a compliment to FTIR for the identification of organic pigments. PyGCMS can provide lower detection limits so that certain problematic organic pigments may be conclusively identified. This technique also provides for a cleaner separation of the contributions of the organic components from those of the inorganic components, thus offsetting the spectral overlap issues that occur when using FTIR. Py-GCMS also provides information about the polymeric binder or film former.

Organic Paint Pigments, Automotive Coatings, Pyrolysis Gas Chromatography-Mass Spectrometry

Copyright 2005 by the AAFS. Unless stated otherwise, noncommercial *photocopying* of editorial published in this periodical is permitted by AAFS. Permission to reprint, publish, or otherwise reproduce such material in any form other than photocopying must be obtained by AAFS. ** Presenting Author*