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ANALYSIS OF VOLATILE ORGANIC COMPOUNDS FROM DISPLAY AND STORAGE CASE MATERIALS

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Extended Abstract: It is well documented in the conservation literature that volatile organic compounds (VOC's) emitted from building materials may damage works of art. Sulfides, organic acids and aldehydes are only a few of the many chemical compounds that are known to attack objects. In general, VOC's pose a greater risk inside display and storage cases, where the rate of air exchange is kept intentionally low.

Therefore, much effort has been made to develop methods for testing display and storage materials prior to their use. Methods that have gained wide acceptance include the Oddy test, pH test, and the azide microchemical test for reactive sulfur compounds. The results from these tests provide a means for determining whether or not the material in question may harm objects.

A program of research is currently underway at The Getty Conservation Institute (GCI) which focuses on detection and identification of VOC's emitted by commonly used display and storage materials.

In the first part of the project, a materials survey was distributed to approximately 1600 display professionals and objects conservators. The intent of the survey was threefold: 1) To identify the most commonly used products in display, storage, cleaning and transportation of objects; 2) To discover other test methods; 3) To identify materials that have been suspected of causing harm to objects. The results of the survey will be sent to the National Association for Museum Exhibition (NAME) for publication in their newsletter, The Exhibitionist.

The second phase of the research deals with development of a method for detection and identification of VOC's using thermal desorption-gas chromatography-mass spectrometry (TD-GC-MS). Briefly, TD-GC-MS involves: 1) Pre-concentration of VOC's emitted from a sample by adsorption onto sorbent traps, in this case highly purified carbon; 2) Transfer of adsorbed VOC's from sorbent trap to the GC by thermal desorption; 3) Separation of the VOC mixture by gas chromatography; 4) Detection and identification of individual VOC's by mass spectrometry.

TD-GC-MS has many advantages over other methods. It is

especially useful for analysis of VOC's because it provides positive identification of the compounds emitted by materials. In addition, the technique possesses the very high sensitivity required to detect the low VOC concentrations typically produced by materials. The method can also be used in the collection and analysis of ambient air samples. This feature permits the study of pre-existing display and storage cases, and gallery conditions. Finally, the method can be used to determine the concentration of VOC's, which allows the kinetics of volatile off-gassing to be studied.