

Using Spectroscopy and Chemometrics to Extract Chemical Information  
about Mixtures

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At museums, the knowledge of the manufacturing processes and materials utilized for the creation of artifacts is necessary for the understanding of their historical importance. This information is also useful for restoration procedures. Artifacts are typically complex mixtures, and the identification and quantification of molecular species in mixtures can be relatively easy with the use of chromatographic and extraction techniques. However, determination of historical data is complicated by the fact that artifacts may be one of a kind. Since preserving the integrity of the sample is critical, these techniques are not viable, and mixture analysis becomes more challenging.

Raman and infrared spectroscopy can provide fast, chemically specific data on materials without physically sampling or damaging the material. Coupled with chemometrics, these spectroscopic techniques make it possible to nondestructively extract information about complex mixtures. We will present spectroscopic results and chemometric analyses of data from nondestructive measurements of materials.