



A203 Monitoring Air Quality Using Gas Chromatography/Mass Spectrometry

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After attending this presentation, attendees will recognize the benefits of utilizing gas chromatography/mass spectrometry (GC-MS) for continuous air analysis and the ease with which a mass spectrometer may alert a user to the presence of chemicals of interest.

This presentation will impact the forensic science community by demonstrating the benefits of laboratory-caliber and on-site analysis. Performing on-site analysis eliminates the need for the transport and storage of chemicals and eases the burden of the chemical analysis laboratory allowing them to focus on samples not amenable to field analysis.

A cylindrical ion trap (CIT) enables the manufacture of a smaller mass spectrometer. The smaller mass analyzer is housed in a smaller vacuum manifold and can be used at higher pressure, requiring less stringent vacuum pumping. These characteristics make a fieldable MS system a reality. The Griffin GC-MS system was recently updated to enable continuous air sampling while maintaining standard liquid injection capability.

Detection and identification of drugs of abuse and explosives in the field is important for the forensics market to be able to acquire actionable information quickly. Mass spectrometry is capable of providing analyses of both types of analytes with potentially court-actionable information. By producing a laboratory quality mass spectrometer that has been ruggedized for field use, the forensic scientist can collect the needed information while maintaining a higher level of safety.

In another study, internal and external air was monitored and characteristic signatures for isolated chemicals were obtained. The internal air analysis plotted the relative signal intensities of hexane, cyclohexane, D5 (decamethylcyclopentasiloxane), and limonene. Over the course of twenty four hours, these chemicals provided a chemical map of the staff's activity. The relative signal intensity of D5, a common ingredient in personal care products, began to rise at approximately 6:19 a.m. and ebbed at around 6:32 p.m. Additionally, a limonene signature was present due to a staff member eating an orange prior to entering the laboratory, demonstrating the ability of a GC-MS monitoring human activity in the area. An external air analysis was also conducted, demonstrating the presence of naphthalene, methyl naphthalene, and acenaphthalene. One week prior to this analysis, the parking lot was resurfaced and this activity is likely responsible for the chemicals detected by the GC-MS.

This presentation will show the applicability of this proof-of-principle study to work conducted by forensic scientists, including detecting toxic chemicals, narcotics, explosives, and chemical warfare agents in the field.

Mass Spectrometry, Gas Chromatography, Air Analysis