TRACE VOC DETERMINATION IN ENVIRONMENTAL HOT ACIDIC SULPHUROUS HUMID GAS MIXTURES BY SPTD-SPME-CT-GC/MS

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The analysis of trace VOC in hot sulphurous acidic gas emissions such as from waste incinerators, smelters and volcanoes has previously been hampered by two major analytical shortcomings:
a) loss and modification of compounds through photolysis, catalysis, adsorption, oxidation, & reaction due to lack of or insufficient separation of condensate during sampling; b) insufficient chromatographic separation due to the high sulfur, water and mineral acid content of the gas. We recently successfully developed, tested and applied a novel approach to these problems, using *Short-Path Thermal Desorption-Solid Phase Microextraction-Cryotrapping-GC-MS* (SPTD-SPME-CF-GC-MS; Schwandner et al., 2002) as a reliable standard protocol, together with new sampling techniques. This technique meets the required analytical accuracy and precision for reproducible (externally standardized) quantitative sampling and analysis of trace VOC in an adverse matrix. Calibration by standard gas mixtures (e.g., TO-14) was previously limited to the range of 0.1 to 20 ppbv (of the dry insoluble gas fraction). Using modified pre-treatment protocols as well as different adsorbents and mass spectrometric techniques on a VG Autospec™ sector scanning mass spectrometer, the calibrated range was extended in both directions as well as better constrained, leading to improved detection limits and reduced analytical errors. The method has been extensively tested using quiescent volcanic gas emissions on Vulcano Island, Italy, leading to a new assessment of global natural CFC emissions from volcanoes (e.g., Schwandner et al., 2003).

References:

Schwandner, F.M., Gize, A.P., Hall, K., Seward, T.M. & Dietrich, V.J. (2001): Short Path Thermal Desorption - SPME-CT-GC/MS: Analysis of trace organic compounds present in hot volcanic gases with high sulfur, water and acid matrix. Proc. Fall Meeting Swiss Chemical Society, Zürich; *Chimia* **55** (7-8):590.

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