Abstract submission

Development and validation of two on-line auto-GC systems for the continuous monitoring of trace level VOCs and OVOCs.

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Area of interest: Photochemical Assessment Monitoring

Atmospheric air pollution stands as a main environmental concern, exerting important impacts on air quality, climate dynamics and human health. Volatile Organic Compounds (VOCs) are particularly important atmospheric gaseous pollutants, which are released into the atmosphere from both anthropogenic and natural sources. Oxygenated VOCs (OVOCs) are an important fraction of VOCs. They are also of particular interest especially because of their significant role in atmospheric chemistry. Identification and quantification of OVOCs is a challenge because of their polarity, their affinity for water and their reactivity (Roukos et al., 2009). Moreover, quantifying light OVOCs is particularly difficult because of the potential interferences (Bachelier et al., 2022). Various techniques have been implemented for the measurement of VOCs and/or OVOCs in ambient air including on-line Gas Chromatographs (GC) coupled to Flame Ionization Detectors (FID) and or Mass spectrometer (MS), Proton Transfer Reaction – Mass spectrometry (PTR-MS) (Kang et al, 2022) or even passive sampling followed by off-line analysis (McClenny et al., 2005).

Considering all of these challenges, there is a need for an automated and continuous monitoring system for the characterization of VOCs including some light OVOCs. The following study aims to compare two techniques for the automatic identification and quantification of VOCs and some light OVOCs. The performances of an automatic gas chromatograph (auto-GC) coupled to a mass spectrometer were studied under both controlled laboratory conditions and field environments and were compared to three auto-GC/FID. One of the three GC was specifically designed for the identification and quantification of light OVOCs. This research seeks to contribute valuable insights toward enhancing auto-GC systems to monitor automatically and continuously atmospheric pollutants.

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Kang S., Kim J., Lee M., Park J., Jeon E., Shim M., Shin Y., 2022, An analysis of the temporal variability in volatile organic compounds (VOCs) within megacity Seoul and an identification of their sources, Atmospheric Pollution Research, Volume 13

McClenny, W., Oliver, K., Jacumin, H., Jr, Daughtrey, E., Jr, & Whitaker, D., 2005, 24 h diffusive sampling of toxic VOCs in air onto Carbopack X solid adsorbent followed by thermal desorption/GC/MS analysis-laboratory studies, Journal of environmental monitoring, 7(3), 248–256.