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Abstract Title: Automatic and continuous monitoring of VOCs, sulfur compounds and odor in ambient and industrial air using autoGC analyzers.
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Unpleasant odors are caused by odorant substances such as Volatile Organic Compounds (VOCs) and sulfur compounds that are present in ambient air at very low concentration levels (from ppt to ppb) as well as concentration levels from ppm to %. To detect the source of an odor, the most commonly used methods are conventional electronic nose (e-nose) technologies and gas sensors like Metal Oxide Sensors (MOS). These technologies provide results that can be correlated with dynamic olfactometry sensorial methods (EN 13725 or ASTM 679-E04). However, these solutions do not provide the gas composition. Also, they offer limited sensitivity and they are highly dependent on the process: recalibration is needed after any variation. Therefore, there is a need for online analyzers to perform the speciation of odor constituents with lower sensitivity than the human nose and whose results are not affected by temperature or humidity.

To meet this need, two instruments must be combined. First, an automatic Gas Chromatography analyzer with Flame Ionization Detection and a process Quadrupole Mass Spectrometer (autoGC-FID/MS) is used to ensure the separation and quantification of up to 123 VOCs in ambient air, including volatile PAHs. Unknown compounds are identified by comparing the results obtained with the NIST library. Considering sulfur compounds, an autoGC analyzer with Sulfur Specific Wet Cell Detectors (SSWCD) is needed to allow the speciation of up to 14 sulfur compounds such as H_2S, mercaptans and sulfides in automatic routine mode.

In this presentation, a single dedicated odor monitoring system (vigi e-nose, Chromatotec) will be shown to obtain the chemical fingerprint of odorants: an autoGC with a SSWCD for sulfur compounds speciation and an embedded photoionization detector (PID) for total VOCs quantification. With integrated dispersion modelling software, it evaluates the odor and chemical impact on the neighborhood, according to the concentrations monitored by the analyzer, the topography and climate conditions, and nearby residents' observations. Thanks to this web platform, industrials can anticipate nuisance and treat and prevent odor emissions before they affect nearby neighborhood.

This solution has been deployed in a reference industrial site in the South West of France. This recovery center collects domestic waste and converts it to compost, solid recovered fuel and biogas by utilizing methanization process. Results on the quantification of VOCs and sulfur compounds were validated by internal calibration with a permeation tube of DMS (68.2 ng/min at 45°C). They allowed checking the performance of the charcoal filters and biologic digester respectively. Measurements were correlated with human sensory evaluation to obtain odor concentration. Thus, they could demonstrate that their process was in compliance with the French legislation (5 ouE/m^3 not exceeded more than 175h per year in residential areas).