



Mobile Air Quality Monitoring

Track air pollution where and when it matters with PTR-TOF

IONICON real-time VOC monitors are frequently operated in mobile measurement labs, contributing to local air quality networks and public safety.

Introduction and Background

[PTR-MS](#) is the benchmark method for fast, quantitative and ultra-sensitive monitoring of volatile organic compounds. IONICON's robust PTR-MS technology easily withstands the harsh conditions of vibrations and shocks aboard mobile platforms. Therefore, IONICON instruments are frequently operated aboard aircraft, measurement vans and ships for [environmental monitoring applications](#). With the introduction of IONICON's compact and modular PTR-TOF QB series, PTR-MS can now be operated on even smaller mobile platforms like passenger cars. With sensitivities at ppbV level and limits of detection of single-digit pptV levels and below, the [PTR-TOF QB](#) monitors VOCs at highest spatio-temporal resolutions and best precision.

Application Example

Supported by IONICON, researchers of the University of Oslo (UiO) installed a [PTR-TOF 1000 QB](#) together with additional analytical instrumentation into a compact SUV sized plug-in hybrid electric vehicle. All instrumentation was powered by the plug-in hybrid's internal 230 V power supply that can support up to 1500 W. This is sufficient to support the approximately 500 W required to operate the PTR-TOF 1000 QB. Given the compact volume of the analyzer, UiO researchers had two options for installing the modular [PTR-TOF 1000 QB](#) into the compact SUV: sideways next to each other only using the trunk area or po-



IONICON's PTR-TOF 1000 QB aboard UiO's mobile measurement vehicle.

Image by A. Håland, University of Oslo (UiO)

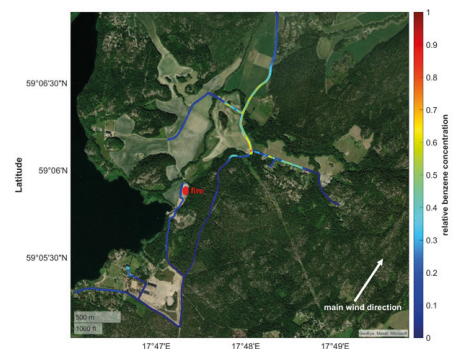
sitioned in a row to utilize the full cargo space. They decided to choose the second option to maintain highest flexibility and space for additional instrumentation and pumps. UiO installed a compact VOC inlet on top of the vehicle to measure the air quality outside the boundary layer of the moving car and still matching all European legal requirements. With a battery capacity of around 14 kWh, the plug-in hybrid can support measurements for an extended period without polluting the local sample air.

UiO researchers have applied this compact mobile lab for two applications

- Monitoring and mapping of hazardous air pollutants in smoke plumes
- Real-life emission studies of vehicles in urban environments



UiO's staff chasing a landfill fire plume, tracking toxic organic gases with their mobile PTR-TOF lab. Image by A. Håland, University of Oslo (UiO).



Real-time PTR-TOF data of increased benzene concentrations, downwind of the burning garbage site. Image by University of Oslo.

Mobile VOC Monitor PTR-TOF QB deployed to map smoke plume

Landfill fires occur frequently and toxic emissions from such fires often constitute a major public health concern. In the outskirts of Stockholm, a 100,000-ton landfill was on fire in 2020, with dense smoke spreading to nearby residential areas and more distant urban settlements. Stockholm's Environment and Health Administration observed high particle levels in the most severely impacted communities, but toxic organic gases are more difficult to measure, especially when the source is near and concentrations change rapidly within the moving plume.

When being contacted by their Swedish colleagues, researchers from the University of Oslo (UiO) in Norway offered rapid help, deploying their new mobile PTR-MS laboratory to Swe-



den. On two consecutive days, the IONICON [PTR-TOF QB](#) real-time VOC analyzer aboard the hybrid SUV mapped air pollution levels in the immediate vicinity of the fire and in the nearby villages, thereby determining what type of toxic organic gases are predominantly released from the landfill fire and what concentration levels the fire response team and the population are exposed to.

Measurements revealed high concentrations of benzene, styrene, and other substituted aromatic and polyaromatic compounds. Most importantly, IONICON PTR-MS detected formaldehyde in real-time, enabling precise monitoring of this hazardous air pollutant. In addition, the system identified organic cyanides and other toxic substances in the landfill fire plume.

With IONICON's support, the mobile PTR-MS laboratory was crucial in addressing a major environmental emergency in Sweden.

Visit www.ionicon.com!