



## Applications



- > Ambient air quality:
  - > Real-time VOCs monitoring in buildings, offices, cars and planes

### PROBLEMS WITH INDOOR AIR QUALITY

Volatile Organic Compounds (VOCs) are chemicals that evaporate easily at room temperature. Organic refers to carbon-based molecules. Many of which are known to be harmful to human health. Chemical contamination of indoor air is a contributing factor to the so called "Sick Building Syndrome".

VOCs are emitted by normal household products, construction materials, furniture and many chemicals used in our everyday lives. Some of them come with an odor, whilst others are not perceptible by the human nose.

Indoor air is polluted often stronger than outdoor air. This may result in serious problems for offices, production plants, cars, planes, trains and the construction industry.

### THE SOLUTION

To be able to decrease the VOC contamination in the ambient air, an accurate quantification of the relevant compounds is necessary also for very low concentrations.

The PTR-MS solutions of Ionicon Analytik GmbH allow monitoring VOCs continuously online and with detection limits as low as 5 pptv.

## PTR-MS

- > very low detection limit (ppt-range)
- > real time measurement
- > online monitoring
- > no sample preparation



## MONITORING OF INDOOR AIR WITH PTR-MS

Levels of VOC exposure vary widely depending on the volume of air in the room, the car, the plane, the building etc and may range from sub-pptv levels to percent.

Different Materials used have specific rates of VOC emissions. The ventilation of the room as well as the outdoor air concentration have to be taken into account too.

Some examples of VOCs relevant for the indoor air quality and easily online quantifiable with IONICON® PTR-MS are: Benzene, Toluene, Xylene and Formaldehyde\*.

\*Detection limit of formaldehyde: approx. 1 ppbv (proton affinity close to the one of  $H_3O^+$ ), whilst Benzene, Toluene and Xylene are detectable in concentrations as low as 5 pptv.

## RESULTS

PTR-MS Control, the software package of Ionicon Analytik GmbH, enables the versatile use of PTR-MS instruments. Different operating modes allow scans of one, a few or all masses versus time, or the detection of a whole mass range at a specific time. Variable input parameters of the environment are accounted for.

In order to obtain an overview about the status of the air quality for slowly varying ambient conditions the bar graph, scan as shown in Fig. 1, is the best suitable operating mode.

Multiple ion detection (Fig. 2) allows to measure the time evolution of a single or several molecules. The real-time capabilities of PTR-MS enable short cycle times of down to 10ms.

For an overall indoor air environment scan, several masses can be chosen and recorded simultaneously as a function of time with a detection limit in the single-digit pptv-range.

Fig. 3 shows such an evolution of the overall VOCs concentration in four different environmental situations.

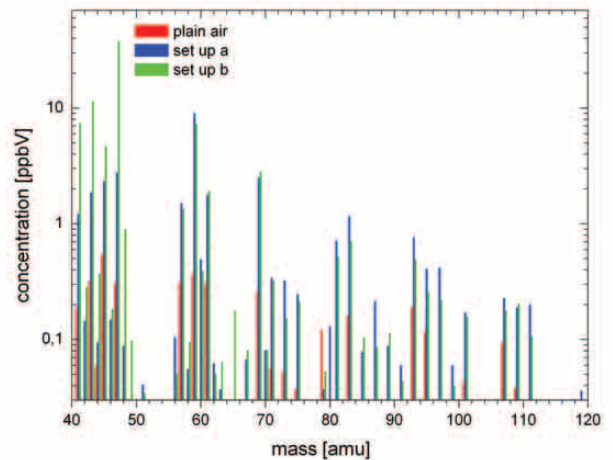


Fig. 1: Scan over a defined mass range.

The detected VOCs are plotted in concentrations of ppbv.

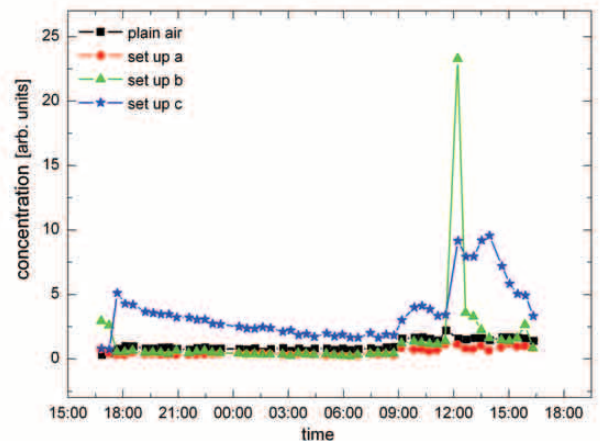


Fig. 2: Measurement of formaldehyde versus time.

Formaldehyde is often present in high concentrations indoors, and detected here on mass 31.

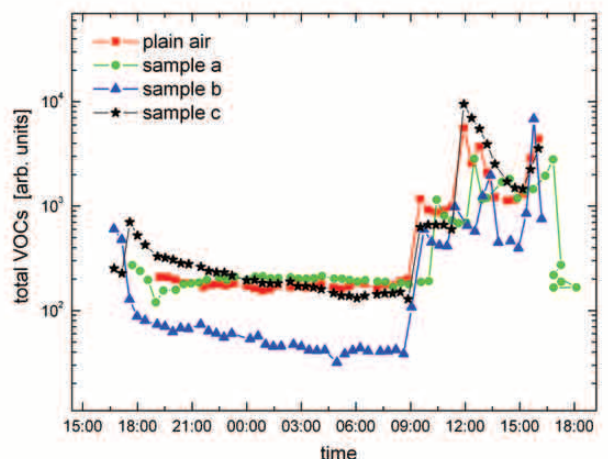


Fig. 3: The time evolution of the overall VOCs concentration measured in high time resolution.