



Metrohm AeRosol Sampler «MARS»

Advanced aerosol to liquid sampling made easy by
Metrohm Process Analytics

HIGHLIGHTS

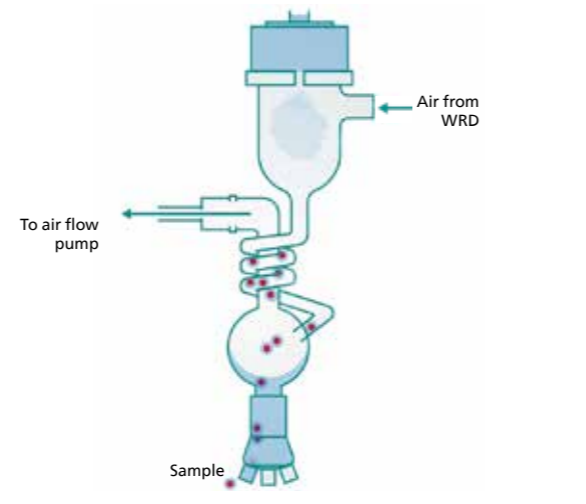
- Professional aerosol collection and subsequent analysis with e.g., ion chromatography
- Contamination-free aerosol collection technique (particles PM_{10} , $PM_{2.5}$ or PM_{10})
- Continuous determination of ions in aerosols with high temporal resolution for diurnal pattern analysis
- No need of dry denuders for gas removal
- Direct on-site sample analysis omitting any sample storage or sample preparation
- Simple connection to bench top analytical instruments (e.g., IC, VA, or other suitable detection techniques)

A simpler solution for aerosols monitoring

The chemical composition of natural and antropogenic pollutants in aerosols is of great interest for scientists, manufacturing companies, and public authorities. Not only the climatic impact of aerosols but also their effect on human health (like lung and heart-problems) is an important subject. Therefore, fast and real-time quantification of the analytes in aerosols is a necessity.

Besides the online air monitoring system 2060 MARGA, which samples and analyzes inorganic species in aerosols and gases in ambient air, the MARS (successor of the well known Particle Into Liquid Sampler «PILS» system) has been designed to sample aerosols only. It dissolves the particles in a small quantity of liquid within a few seconds. Appropriate wet-chemical analysis can analyze the sampled solution such as Ion Chromatography (e.g., Metrohm Compact or Professional IC series), Voltammetry (e.g., Metrohm Professional VA series) or any other suitable analysis technique.

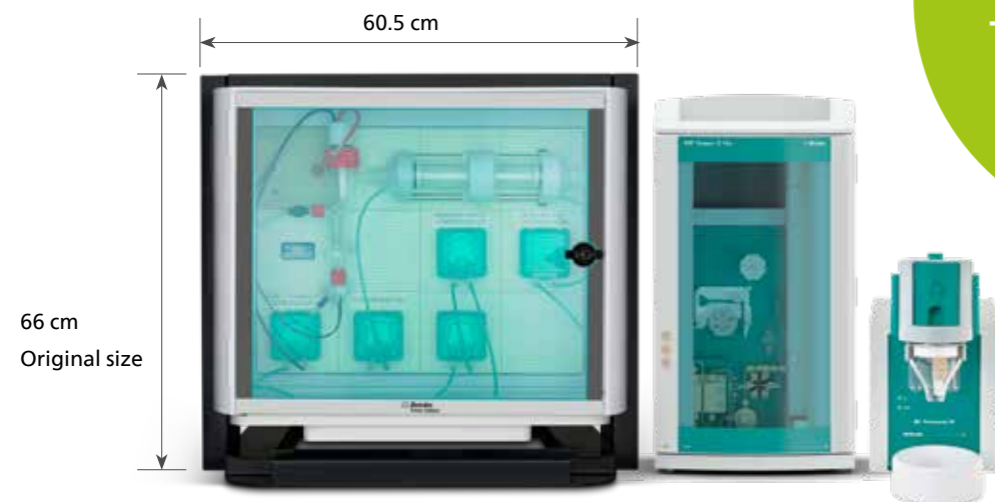
The MARS is a sample preparation module that samples aerosol particles from an air stream and transfers them to the aqueous phase. The principle is simple. Air is continuously entering the MARS through the Wet Rotating Denuder (WRD) to remove the interfering gases. The ambient air, stripped of its gaseous water soluble components, enters the Steam-Jet Aerosol Collector (SJAC). Supersaturated steam is introduced, causing the aerosols to grow into larger, heavier droplets. Further on the air passes through a cyclone, collecting the particles in water by inertial separation. The resulting solution of dissolved ionic aerosol species is continuously sampled at the bottom of the SJAC for analysis by, e.g., ion chromatography.



Steam-Jet Aerosol Collector (SJAC) of the MARS.

24/7 OPERATIONAL

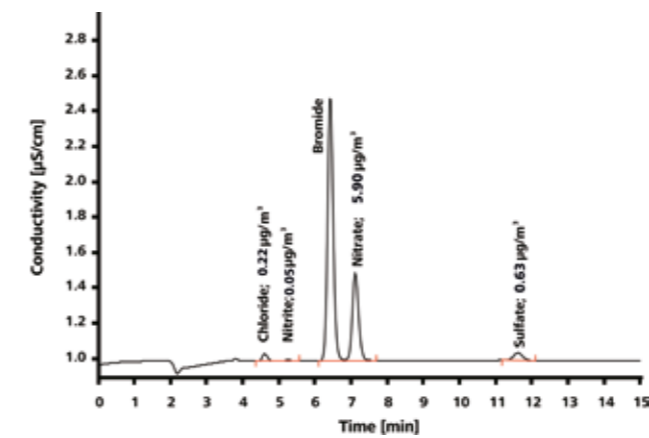
- No sample storage required
- Inline sample analysis
- Uninterrupted sampling – No human interface required



STRAIGHTFORWARD COUPLING WITH DIFFERENT ANALYSIS TECHNIQUES

The MARS can be used as a preconditioning unit for several analytical applications in ambient or industrial environments. An Ion Chromatograph (IC) can be coupled directly to the MARS for analysis of anions and cations in aerosols. When monitoring ambient air particulate matter with MARS-IC, an internal standard can be added. This internal standard contains a known amount of lithium and bromide which ensures a continuous validation of the results. The chromatogram below shows an example for ambient air.

On the other hand, heavy metals in air can also be analyzed by coupling the MARS with a voltammetry instrument, enabling comprehensive analysis of your sample.



Anion and cation chromatogram for ambient air determination of aerosol particles smaller than 2.5 µm (PM_{2.5}). Lithium bromide was used as an internal standard.



Compared to its predecessor «PILS», MARS is much more practical. For secure operation and convenience during analysis, the denuder has been modified to never run dry, which means less wear and less replacement, saving you money. Besides, when MARS is combined with an IC or VA instrument, it can be controlled remotely to evaluate results immediately from MagIC Net or viva, respectively.

In order to analyze the complete gaseous phase as well, we recommend a [2060 MARGA system](#).

Applications for MARS

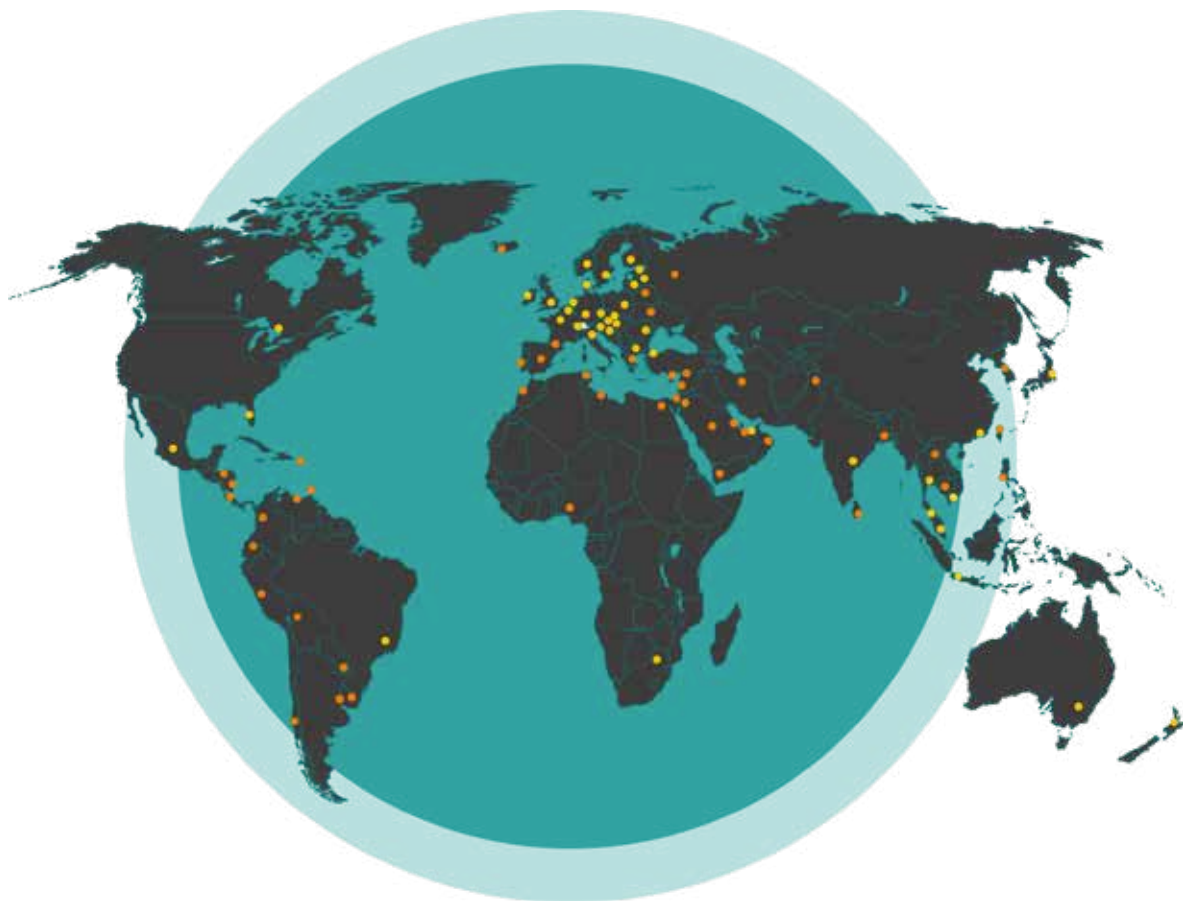
- Monitoring of aerosols inside buildings
- Emission control
- Monitoring of ambient air
- Measurements of tunnel air
- Quality control in clean rooms
- Heavy metal monitoring (e.g., Cr(VI))



BENEFITS OF MARS

- Reliable quantitative sampling of aerosols
- Easy to operate – no need for dry denuders and sample changers
- High sampling resolution
- Simple connection to bench top analytical instruments

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