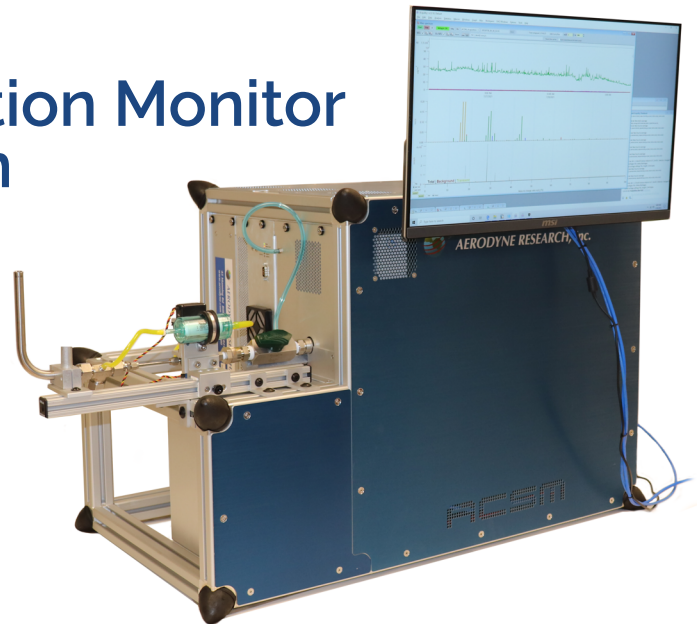


TOF-ACSM-X

Time-of-Flight Aerosol Chemical Speciation Monitor with eXtended Resolution

Real-time, continuous monitoring of aerosol chemical composition with improved mass resolution for better H:C, O:C, and NH₄⁺ quantification



Applications

- Continuous on-line measurement of ambient aerosol mass concentrations and chemical composition including ammonium, nitrate, chloride, sulfate, and organic species
- Routine air quality monitoring
- Field measurements of aerosol chemical composition from high pollution at urban sites to pristine background at remote locations
- Aerosol chamber studies
- Mobile laboratory measurements
- Optical/CCN closure
- Source characterization
- Industrial process monitoring

Advantages

- Improved elemental analysis (O:C, H:C) and NH₄⁺ compared to standard Q- and TOF-ACSM
- Aerodynamic particle lens for efficient gas-particle separation
- Mass spectrometric analysis (0-400 amu)
- Automated zeroing (filter)
- Minimal maintenance; remote control ready
- Direct linear detection of sulfate, nitrate, ammonium, chloride and organic aerosol species through two-step thermal vaporization (~600 C) and electron impact ionization process

TOF-ACSM-X

Specifications

Detection Limits ($\mu\text{g m}^{-3}$, 10 minute, 3σ)

Organics:	0.14
Sulfate:	0.0087
Nitrate:	0.016
Chloride:	0.010
Ammonium:	0.0045

Mass Resolution

- Up to 2000 $m/\Delta m$

Mass Range

- Adjustable, typically 1-400 m/z

Data Rate

- Adjustable, typically 10 minutes

Data Format

- HDF5 mass spectral data, delimited text for mass loadings
- Custom acquisition and analysis software

Software

- Specialized routines for high resolution data analysis (O:C ratios)

Sample Flow

- 85 cc min^{-1} (volumetric flow)

Aerosol Size Range

- 70-700 nm vacuum aerodynamic diameter (standard lens)
- 110-3500 nm (PM2.5 lens option)

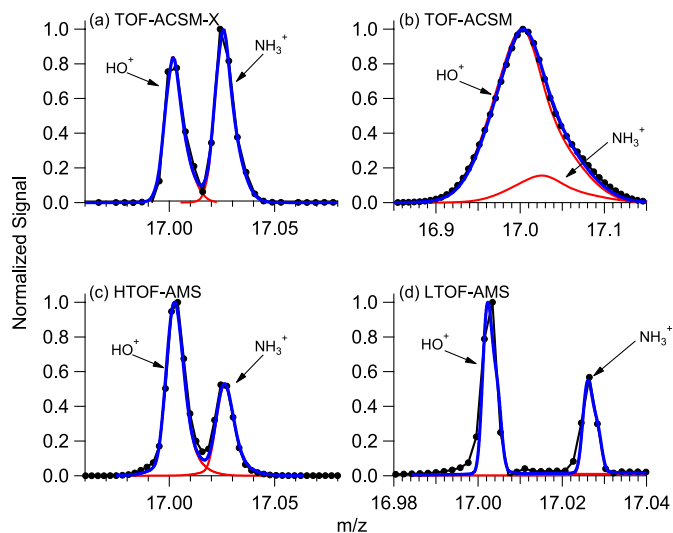
Size/Weight

- Benchtop 26 in x 20 in x 24 in; 210 lbs [65 cm x 51 cm x 60 cm; 95 kg]

Electrical

- 600 W max, 350 W typical
- 90-260 VAC, 50-60 Hz

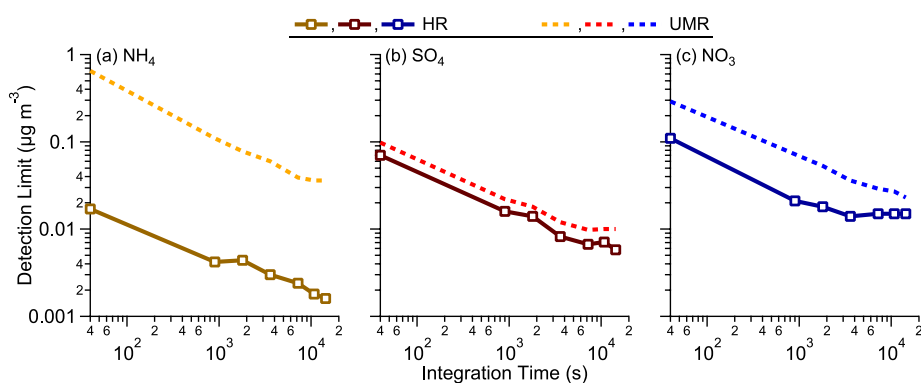
* Specifications depend on instrument settings and are subject to change without notice.



Comparison of higher resolution TOF-ACSM-X ion fitting compared to the lower resolution fitting of the TOF-ACSM and the high-resolution AMS and LTOF-AMS.

The higher resolution fitting of the TOF-ACSM-X provides improved signal-to-noise reporting for ammonium, nitrate, and sulfate species, as well as the ability to perform elemental analysis and unconstrained source apportionment with PMF.

The spectra above are a 10-minute data average and show how NH₄⁺ can be separated from other interfering ions using the peak-fitting algorithm.



Comparison of the detection limit for NH₄, SO₄, and NO₃ for the TOF-ACSM-X in both high-resolution (HR) and unit mass resolution (UMR). The UMR is similar to the detection limits observed on the TOF-ACSM. The better detection limits are due to the increased resolution and ability to separate interfering ions.