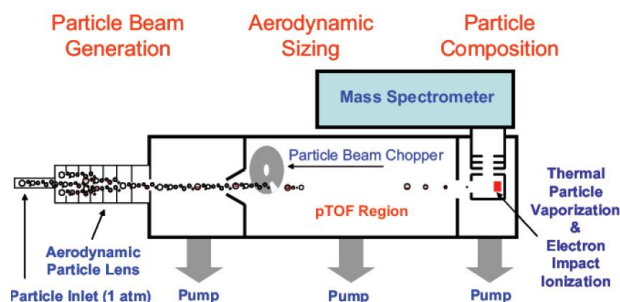




## AMS Aerosol Mass Spectrometer Systems

*Measure real-time, non-refractory, size-resolved particulate chemical composition and mass.*



### APPLICATIONS

- Climate change and air quality research.
- Organic aerosol quantification and analysis.
  - Separation and quantification of organic components including HOA (hydrocarbon-like organic aerosol linked to primary combustion sources) and OOA (oxygenated organic aerosol, linked to secondary aerosol sources).
  - Elemental composition (O:C, H:C).
- Mobile measurements from ship, truck and aircraft platforms

- Fast response plume studies up to 100 Hz.
- Aerosol chamber studies.
- Combustion exhaust monitoring and source characterization.

### ADVANTAGES

- Particle beam source for efficient separation of gas and particle.
- Thermal particle vaporization with electron impact ionization source.
- Direct linear detection of sulfate, nitrate, ammonium, chloride and organic aerosol species.
- Fast response, up to 100 Hz mass spectra.
- Particle aerodynamic diameter determined from particle time-of-flight (velocity) measurements using a particle beam chopping technique.
- Several mass spectrometers to choose from: quadrupole, compact, and high resolution TOF systems.

# Aerosol Mass Spectrometer Systems

## SPECIFICATIONS

Detection Limit (S/N=3) dependent on mass spectrometer option:

Mass Spectrometer System	Detection Limit* (ng/m <sup>3</sup> )	Mass Resolving Power Power (m/Δm)(m/z)	Mass Range
C-TOF-AMS	1.2	800	1-1000
HR-TOF-AMS: (V-mode)	2.9	2500	1-1200
: (W-mode)	32	5000	1-1200

\*Detection limits are for 1-minute integration, 3σ. Detection limits depend on chemical species. Typical values for nitrate are listed (organic DL is ~10x higher, sulfate DL is ~2x higher and ammonium DL is ~20x higher).

Particle Size Range:	40-1000 nm aerodynamic diameter standard or PM 2.5 option
Data Rate:	1-5 minute typical data reporting interval. Maximum mass spectra data rate 100 Hz (ToF MS systems only). Maximum size distribution data rate 150 Hz.
Data Format:	Custom acquisition and analysis software for mass loadings and size distributions. Specialized routines for high resolution data analysis (O:C ratios)
Sample Flow:	0.085 l min <sup>-1</sup>
Available Options::	Black carbon detection module, PM 2.5 lens, beam width probe, efficient particle time-of-flight (ePTOF), aerosol dryer, sample line flow controller
Size/Weight:	41" x 24" x 53", 385 lbs [104.14 cm x 83.82 cm x 134.62 cm, 175 kg]
Electric Power:	600 W; 110VAC/60Hz or 220VAC/50Hz

## REFERENCES

Xu, W., P. Croteau, L. Williams, M. Canagaratna, T. Onasch, E. Cross, X. Zhang, W. Robinson, D. Worsnop and J. Jayne, Laboratory characterization of an Aerosol Chemical Speciation Monitor with PM2.5 measurement capability, *Aerosol Science and Technology* 51(1), 2016.

Jayne, J. T., D. C. Leard, X. Zhang, P. Davidovits, K. A. Smith, C. E. Kolb and D. R. Worsnop, Development of an Aerosol Mass Spectrometer for Size and Composition Analysis of Submicron Particles, *Aerosol Science and Technology* 33, 49-70, 2000.

Jiménez, J. L., J. T. Jayne, Q. Shi, C. E. Kolb, D. R. Worsnop, I. Yourshaw, J. H. Seinfeld, R. C. Flagan, X. Zhang, K. A. Smith, J. Morris and P. Davidovits, Ambient aerosol sampling using the Aerodyne Aerosol Mass Spectrometer, *Journal of Geophysical Research* 108(D7), 8425-8438, 2003.

DeCarlo, P. F., J. R. Kimmel, A. Trimborn, M. J. Northway, J. T. Jayne, A. C. Aiken, M. Gonin, K. Fuhrer, T. Horvath, K. Docherty, D. R. Worsnop and J. L. Jiménez, A Field-Deployable High-Resolution Time-of-Flight Aerosol Mass Spectrometer, *Analytical Chemistry* 78, 8281-8289, 2006.

Canagaratna, M. R., J. T. Jayne, J. L. Jiménez, J. D. Allan, M. R. Alfarra, Q. Zhang, T. B. Onasch, F. Drewnick, H. Coe, A. Middlebrook, A. Delia, L. R. Williams, A. M. Trimborn, M. J. Northway, P. F. DeCarlo, C. E. Kolb, P. Davidovits and D. R. Worsnop, Chemical and Microphysical Characterization of Ambient Aerosols with the Aerodyne Aerosol Mass Spectrometer, *Mass Spectrometry Reviews* 26, 185-222, 2007.

Drewnick, F., S. S. Hings, P. F. DeCarlo, J. T. Jayne, M. Gonin, K. Fuhrer, S. Weimer, J. L. Jiménez, K. L. Demerjian, S. Borrmann and D. R. Worsnop, A New Time-of-Flight Aerosol Mass Spectrometer (ToF-AMS) – Instrument Description and First Field Deployment, *Aerosol Science and Technology* 39, 637-658, 2005.