PRODUCT INFORMATION

Model 240—Personal Micro-environmental Aerosol Speciation Sampler™ (PMASS™)

A compact, 2-channel sampler for evaluation of personal exposure to inorganic and organic compounds in PM2.5 aerosol

INTRODUCTION

The Model 240, Personal Micro-environmental Aerosol Speciation Sampler, or PMASS™, is a compact sampler with a miniaturized, sharp-cut cyclone inlet and two parallel collection channels. Each channel accommodates a denuder and two tandem filters for complete, artifact-free evaluation of the chemical composition of particles below 2.5µm diameter.

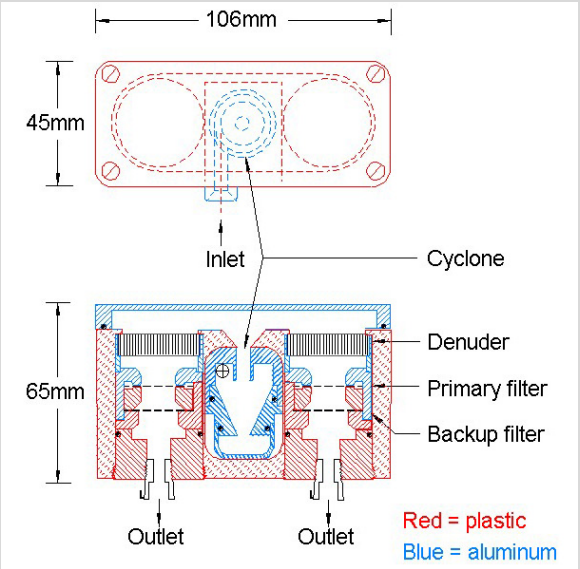
The PMASS™ is light and small enough to be worn by a person. Field tests yield results equivalent to that of conventional samplers. The device may also be used with a desktop sampling station for sampling in a microenvironment.

DESCRIPTION

The PMASS™ is a miniaturized version of field-proven samplers using denuder-filter packs to collect aerosol particles without artifacts from vapor adsorption or particle volatilization.

Air is sampled through the cyclone inlet at a flow rate of 4 L/min. The cyclone is a dry, non-greased collector of particles larger than 2.5 µm. The transmitted PM-2.5 aerosol is split into two parallel channels. This allows simultaneous collection on different types of filter media, as needed for multiple chemical analyses. Typically one channel is used for inorganic and mass analysis and the other for organic carbon analysis. Each channel accommodates a carbon multicell denuder, which removes interfering vapors while transmitting particles to the primary filter. An adsorbing backup filter recovers particulate matter volatilized from the primary filter during sampling.

To minimize weight, the sampler body is constructed of low density polyethylene. To prevent electrostatic losses all surfaces contacted by aerosol upstream of the filter are made of aluminum.



Simplified PMASS™ Diagram

A single, battery-powered pump provides the flow both sampling channels, making the PMASS™ convenient for personal sampling.

The particle transmission efficiency of the inlet/cyclone was evaluated with both liquid and solid laboratory aerosol. It was compared in field tests with collocated PMASS™ and AIHL cyclone-based samplers.

- The measured 50% cutpoint is 2.5 µm and the efficiency curve conforms to the USEPA PM-2.5 criteria.
- Field comparison against the large reference sampler yielded correlation coefficients squared ranging from 0.95 to 1.00 and slopes ranging from 0.85 to 1.06 for sulfate, nitrate, organic carbon, elemental carbon and gravimetric mass.
- The coefficients of variation for collocated measurements were 2% for sulfate, 6% for organic carbon, 12% for nitrate and 3% for gravimetric mass.

FEATURES

- Metal cyclone inlet, no grease or oil.
- Two parallel filter collection channels.
- Each channel accommodates a denuder and one or two filters.
- Flow rate is 2 L/min per channel.
- Total flow rate of 4 L/min is easily supplied by battery-powered personal pump.
- Surfaces upstream of filters are electrically conducting aluminum.
- Total sampler weight is approximately 300g.

APPLICATIONS

- Simultaneous measurement of inorganic and organic aerosols.
- Evaluation of personal exposures to PM2.5 mass, nitrates, sulfates, organic and elemental carbon.
- Evaluation of personal exposure to metal aerosols.
- Studies of personal exposure in various environments.
- Personal sampling and stationary Micro-environmental sampling.

SPECIFICATIONS

Subject to change without notice

Total Flow Rate	4.0 L/min
Flow rate per channel	2.0 L/min
Dimensions	4.2”(W) x 1.8”(D)x 2.6”(H) 106mm (W) x 45mm(D) x 65mm (H)
Weight	11 oz (300 g)

REFERENCE

Susanne Hering, Nathan Kreisberg, and Walter John, A Personal Particle Speciation Sampler, Health Effects Research Institute Report No. 114, February, 2003.

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