AEROSOL
MAGEE SCIENTIFIC

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Pacwill Environmental

ONLINE SPECIATION OF CARBONACEOUS AEROSOLS

CASS

CARBONACEOUS AEROSOL SPECIATION SYSTEM

Continuous analysis of Carbonaceous Aerosols

KEY FEATURES

- Online determination of OC/EC
- Online determination of TC, BC, BrC, %BB
- Sampling time 20 min to 24 hours
- Uses ambient air as carrier gas
- Rugged, all-steel construction
- Unattended operation of 1 month minimum

APPLICATIONS

- Air Quality monitoring
- Health Effects, Climate Change research
- Field measurement projects
- Emissions testing

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PRODUCT SPECIFICATIONS

CARBONACEOUS AEROSOL SPECIATION SYSTEM CASS

BASIC DESCRIPTION
Real time/online TC/BC/EC/OC and BrC analysis with the Carbonaceous Aerosol Speciation System - CASS.

The Magee Scientific CASS is a revolutionary scientific instrument that measures TC/BC/EC/OC and BrC in near-Real-Time.
The equipment contains no fragile glassware and requires no special gas supplies.
In contrast to existing methods, the CASS offers greater reliability, greater flexibility, and very substantial operational cost savings for aerosol analysis.

MEASUREMENT PRINCIPLE
Optical Analysis of BC with continuous collection of aerosol on filter and simultaneous measurement of attenuation of transmitted light at wavelengths 370, 470, 520, 590, 660, 880 and 950 nm.
Thermal Analysis of TC with flash-heating of sample collected on a quartz filter to convert all Carbon to CO_2.

The mathematical principle is simple:
Total Carbon (TC) =
Black (or Elemental) Carbon (BC, EC) + Organic Carbon (OC).

Measure TC with the TCA08;

Measure BC/EC with the AE33 Aethalometer®;
Derive OC immediately in near-Real Time by subtraction:
OC = TC - EC.

The AE33 Aethalometer® also identifies 'Brown Carbon' (BrC) by multi-wavelength optical analysis, to separate Biomass Smoke from Diesel Emissions.

AE33 DUALSPOT™ TECHNOLOGY
Simultaneous analysis of light absorption by aerosol deposits collected on 2 spots in parallel at different loading rates. Mathematical combination of data yields Black Carbon result independent of "spot loading effects" and provides additional information about aerosol composition.

SOURCE APPORTIONMENT
Discrimination of Black Carbon from fossil fuel versus biomass combustion possible with built-in analysis by a two-component model in Aethalometer AE33.

SPECIFIED PERFORMANCE OF AE33
Analytical sensitivity of BC - proportional to time-base and sample flow rate settings: ≈ 0.03 µg/m ^{3} @ 1 min, 5 LPM (or 0.015 µg/m ^{3} in HS mode)
Detection limit of BC (1 hour) <0,005 µg/m ^{3}
Detection range of BC: <0.01 to >100 µg/m ^{3}

SPECIFIED PERFORMANCE OF TCA08
Analytical sensitivity of TC: <0.5 µg C
Detection limit of TC: <0.1 µg C/m^3 for 1-h timebase, 16.7 SLPM flow
Detection range of TC: <0.03 µg/m ^{3} to > 300 µg/m ^{3}
Total Carbon

SAMPLING FLOW RATES
AE33 sampling flow rate of BC/EC adjustable from 2 to 5 LPM, provided by closed-loop stabilized internal pump and two mass flow sensors.
Sampling flow rate for TC of 16.7 SLPM (1 m ^{3}/h), provided by closed-loop stabilized internal pump.

OPERATOR INTERFACE
Display
8.4" color touch-screens with status indicator LED's. Graphical User Interface with basic data display and control, advanced screens for detailed reporting and parameter setup. Network ready for remote management and data transfer.

DATA OUTPUT & STORAGE
• Output
Digital data via RS-232 COM port and Ethernet. Network ready for remote management and data transfer.
• Timebase
BC/EC: 1-second (1 Hz) or 1 minute
TC/OC: 20 minutes to 24 hours
• Storage
Data are written to internal memory once every time-base period. Stored data may be transferred over a network or to a manually inserted USB drive .

QUALITY CONTROL AND ASSURANCE
Automatic or manual sample flowrate calibration using anexternally-attached calibrator. Validation of optical performance using kit of neutral density filters. Pre-programmed built-in zero air test - clean air test for TC and BC.

PHYSICAL SPECIFICATIONS
• Dimensions: 78 x 48 x 57 cm
• Weight: 89 kg
• Electrical Power supply: 100-230VAC, 50/60Hz (auto-switching)

• Power consumption: 625 W
• Internal Vacuum Pump
• Modular hardware, constructed in a fully-enclosed 19'' rack
Mount chassis, hermetically sealed

ACCESSORIES
Neutral Density Optical Filter validation kit
Ambient meteorological sensor
PM2.5 inlet (2.5 µm @ 5 LPM)
ALICAT FP-25 flow calibrator with communication cable

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Keeping an Eye on the Air

European Patent EP19213028.4 and other patents pending
US Patent 8,411,272, and US Patent 9,018,583, and other patents pending.

Manufactured in EU by Aerosol d.o.o.

CASS specification version 2.2 / 01 2025