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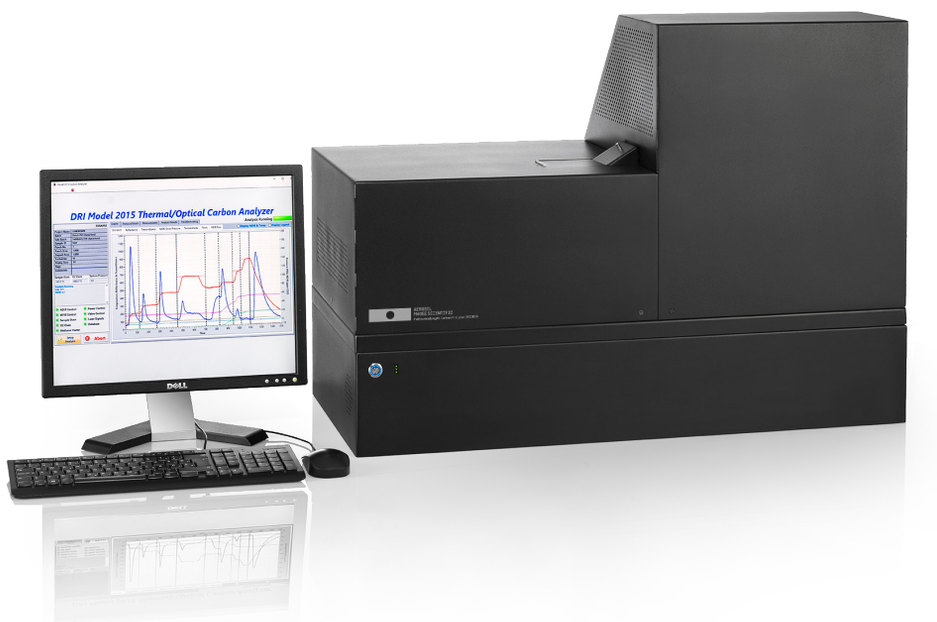
MULTI-WAVELENGTH THERMAL/OPTICAL CARBON ANALYZER



DRI 2015 series 2

MULTIWAVELENGTH OC/EC ANALYZER

KEY FEATURES

- Compatible with EUSAAR2, IMPROVE_A, NIOSH 5040 or any other thermal protocol
- Multi-wavelength measurement of transmission (T) and reflectance (R) intensities
- Nondispersive infrared (NDIR) CO2 detector
- Low helium gas consumption
- Ergonomic engineering

APPLICATIONS

- Air quality and climate change research
- Particulate Matter (PM) speciation trends networks
- PM source apportionment
- Carbonaceous material analysis

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PRODUCT SPECIFICATIONS

BASIC DESCRIPTION

The DRI Model 2015 series 2 Multi-Wavelength Thermal/Optical Carbon Analyzer replaces the widely used DRI Model 2001, and DRI Model 2015 systems for quantifying organic carbon (OC), elemental carbon (EC, also termed Black Carbon [BC]), and temperature-separated carbon fractions on aerosol filter deposits.

DRI Model 2015 series 2 features optical monitoring that accounts for OC charring with reflected (R) and transmitted (T) intensities at wavelengths of 405, 445, 532, 635, 780, 808, and 980 nm. The additional optical information can be used to estimate multiwavelength light absorption of the sampled particles, infer the concentration of brown carbon (BrC) in each sample, and further complement the use of carbon fractions in source apportionment studies (Chen et al., 2015; Chow et al., 2015).
Model 2015 Series 2 software includes temperature programs for commonly-used protocols such as **IMPROVE_A**, **EUSAAR_2**, and **NIOSH**, and it can be programmed to emulate any other protocol. The simultaneous measurement of both R and T at all wavelengths throughout each analysis allows for reproducing any other thermal/optical method and holds potential for better characterizing additional properties of the carbonaceous aerosol.

MEASUREMENT PRINCIPLE

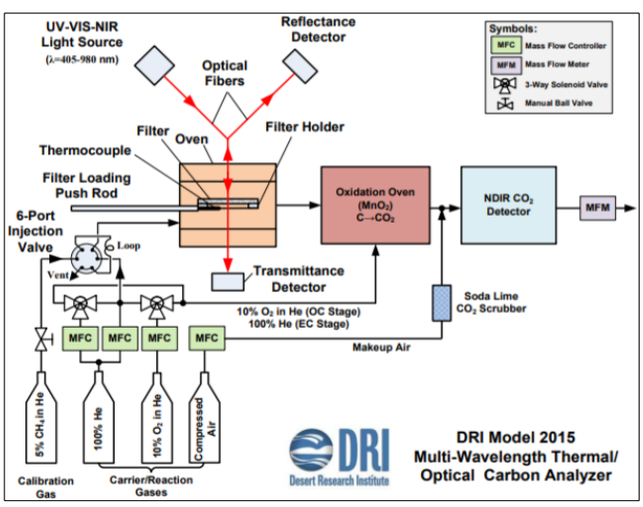
Thermal/optical carbon analysis is based on the preferential oxidation of OC and EC materials under different temperatures and atmospheres.
A ~0.5 cm^2 punch from a particle-laden quartz fiber filter (or other sample form) is heated in programmed temperature steps.
Organic compounds are liberated under a non-oxidizing helium atmosphere at lower temperatures up to 580 °C, while EC is combusted in an oxidizing atmosphere with 2% O_2 at temperatures up to 840 °C.
The liberated carbon is oxidized to carbon dioxide (CO_2) by heated manganese dioxide (MnO_2), and the CO_2 is quantified by an NDIR detector.
Seven modulated diode lasers measure the reflectance from, and transmittance through, each filter at wavelengths from 405 to 980 nm.

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



Reference:

Chen, L.-W.A.; Chow, J.C.; Wang, X.L.; Robles, J.A.; Sumlin, B.; Lowenthal, D.H.; Watson, J.G. (2014). Multi-wavelength optical measurement to enhance thermal/optical analysis for carbonaceous aerosol. Atmos. Meas. Tech. Discuss., 7:9173-9201. http://www.atmos-meas-techdiscuss.net/7/9173/2014/amtd-7-9173-2014-print.pdf

DRI 2015 - SERIES 2

MAIN TECHNICAL SPECIFICATIONS

Measurement Range: 0.1 to 1000 µg carbon/cm^2 (depending on carbonaceous composition)

Minimum Detection Limit (MDL):
Total OC: 0.10 µg/cm^2
Total EC: 0.08 µg/cm^2
Total Carbon: 0.18 µg/cm^2

Wavelengths: 405, 445, 532, 635, 780, 808, and 980 nm (operation in both, TOT and TOR mode by defxault).

Support Gases:
Ultra-high purity (UHP) helium (hydrocarbon free, >99.999% purity)
10% oxygen in UHP helium
5% methane in UHP helium
Compressed air

Data Reporting Interval: 1 second

Software: LABVIEW-Based

ENVIRONMENTAL OPERATING CONDITIONS

Temperature: 10 to 40 °C
Relative Humidity: 30 to 80%, noncondensing
IP protection: IP20
The unit is intended for indoor installations only

OPERATING TEMPERATURES

Sample oven: programmable from 45 to 900 °C with maximum heating rate 250 °C/minute
Oxidation oven: 900 °C
Temperature accuracy: ±5 °C or 1%, whichever is greater

PHYSICAL SPECIFICATIONS

Dimensions: 44 × 92 × 41 cm (17 × 36 × 16 inch)
Weight: 50 kg (110 lbs)
Electrical Power supply: 100-240VAC, 50/60Hz
Power consumption: 1000 W maximum
Allowable electrical supply voltage fluctuations: 90 – 264 V~
Degree of protection against electric shock: Class I equipment
Transient overvoltage protection: Overvoltage category II
Pollution degree: 2

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Please visit AerosolMageesci.com for additional product information or to find the distributor responsible for your country.

DRI 2015 Series 2 is compliant with EN 16909:2017

Manufactured in EU by Aerosol d.o.o.

DRI 2015 S2 specification version 2.1 / 02 2023

Specifications are subject to change without notice.