

Multi-Wavelength Thermal / Optical Carbon Analyzer



Multi-Wavelength OC/EC Analyzer – DRI 2015

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



Developed by Desert Research
Institute, Reno-NV
Manufactured in Europe by Aerosol
d.o.o., Slovenia

APPLICATIONS

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

Product specifications

BASIC DESCRIPTION

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

Model 2015 replaces the 633 nm 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 multi-wavelength light absorption of the sampled particles, quantify the concentration of **brown carbon (BrC)** in each sample, and further complement the use.

Model 2015 software includes temperature programs for commonly-used protocols such as **IMPROVE_A**, **EUSAAR**, and **NIOSH**, and it can be programmed to emulate any other protocol.

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 cm² 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% O₂ at temperatures up to 840 °C.

The liberated carbon is oxidized to carbon dioxide (CO₂) by heated manganese dioxide (MnO₂), and the CO₂ 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.

NOMINAL SPECIFICATIONS

Measurement Range: 0.05 to 750 µg carbon/cm² (depending on carbonaceous composition)

Minimum Detection Limit (MDL):

- Total OC: 0.18±0.06 µg C/cm²
- Total EC: 0.04±0.06 µg C/cm²
- Total Carbon: 0.22±0.06 µg C/cm²

Wavelengths: 405, 445, 532, 635, 780, 808, and 980 nm

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 35 °C

Relative Humidity: 0 to 90%, noncondensing

OPERATING TEMPERATURES

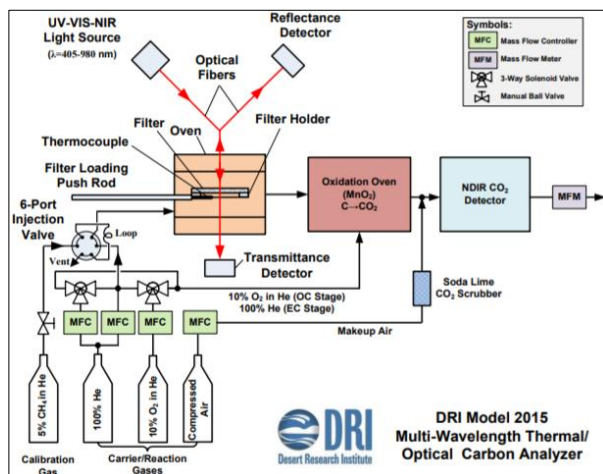
Sample oven: programmable from 60 to 900 °C with maximum heating rate 250 °C/minute

Oxidation oven: 900 °C

Temperature accuracy: ±5 °C or 1%, whichever is greater

PHYSICAL SPECIFICATIONS

- Dimensions: 44 x 92 x 41 cm (17 x 36 x 16 inch)
- Weight: 23 kg (50 lbs)
- Electrical Power supply: 100-240VAC, 50/60Hz
- Power consumption: 1500 W maximum



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>



Scan the code for more info

GENERAL INQUIRIES:

Aerosol d.o.o., Kamniška 39 A, SI-1000 Ljubljana, Slovenia
tel: +386 1 439 1700 fax: +386 59 191 221 www.aerosol.eu

US, Mexico, Canada:
 Magee Scientific Corp., 1916 M.L. King Jr. Way,
Berkeley CA 94704, USA tel: +1 510 845 2801 fax: +1 510 845 7137
www.mageescientific.com

or the distributor responsible for your country.