

1030S Solids Module

Sample Prep Module for TOC Analysis of Solid Samples



- Combusts solid materials soils, sludges, slurries, and powders for TC and TOC analysis.
- Interfaces with Aurora 1030 TOC analyzer allowing analysis of both solid and liquid samples using a single instrument.
- Gas sampling device* collects carbon dioxide (CO₂) from sample combustion for quantitation and analysis of intra-sample replicates.
- Compact vertical design saves laboratory bench space.

* Patent Pending

Description and Function

The 1030S Solids Module is a sample preparation module enabling the analysis of the total organic carbon (TOC) or total carbon (TC) content in solid materials. The 1030S module is operated in conjunction with an Aurora 1030W or 1030C TOC analyzer.

Operating Principle

The 1030S module employs two different techniques to quantify the TOC or TC content of solid samples.

Total organic carbon (TOC) is determined by manually transferring and weighing a solid sample into a quartz sample cup. The total inorganic content (TIC) of sample is removed by adding acid and heating the sample to drive off CO₂ released from inorganic carbon compounds. The sample cup with TIC-free sample is then placed on the lift mechanism and raised into the combustion tube of the 1030S module. The sample is heated to 500 ° - 900 °C inside the furnace. Organic matter in the sample is oxidized and converted to CO₂ which is collected in a 1 L capacity gas sampling bag. When the combustion cycle is completed, CO₂ gas is transferred from the gas sampling bag into the Aurora 1030 TOC Analyzer for measurement by a non-dispersive infrared (NDIR) detector. The result is reported as the TOC content in both mass and concentration of carbon. Analysis of combustion gas from a flexible sampling bag has advantages over direct injection to the detector. Specifically the greater control of combustion time yields an extended mass range and minimizes the effects of sample heterogeneity. Additionally, analysis of intra-sample replicates increases confidence in results.

In the case of total carbon (TC) analysis, the pre-acidification step to remove the TIC content is not required. The sample is manually transferred and weighed into a quartz crucible and placed directly on the 1030S lift mechanism. The subsequent sample combustion, CO₂ gas collection, transfer, and analysis steps are the same performed for TOC analysis. The mass of carbon reported is the total carbon (TC) content (TIC + TOC).

Principal Applications

- Soils
- Sludges
- Slurries
- Raw materials
- Polymers
- Solid samples
- Particulate samples

Methods

- SW 846 Method 9060A
- ISO 10694: 1995
- ASTM E 1915

Specifications

Performance		
Operating Principle	Catalytic combustion in oxygen	
Sample Combustion Temperature	500 °–900 °C (in 1 °C increments)	
Operating Modes	TC, TOC (requires pre-acidification and TIC bakeout)	
Detection/Measurement	Non-dispersive infrared detector in Aurora 1030 TOC Analyzer	
Measurement Range	0.05–mg C to 50–mg C (*determined using graphite)	
Measurement Accuracy	± 10%	
Sample Size (Mass)	50 µg to 2 grams (maximum) dependent upon carbon content (10 to 100 mg typical)	
Sample Cup Volume	Large: 2.5 mL Small: 1.0 mL	
Gas Sample Bag Volume	1 liter	
Gas Replicates from Sample Bag	5 maximum	
Gas Sample Aliquot Volume Range (1030S + 1030W)	1 to 9 mL	
Gas Sample Aliquot Volume Range (1030S + 1030C)	0.25 to 2 mL	
Intra-sample Precision (Replicates from Gas Sample Bag)	< 3% RSD	
Inter-sample Precision	< 10% RSD	
Calibration	Single- or multi-point calibration (up to 12 points)	
Sample Combustion/Analysis Cycle Time	14 minutes (typical)	
Sample Preparation	TIC removal via preliminary manual, offline sample acidification step and heating @ 75–500 °C (250 °C optimal)	
Standard Method Compliance	SW 846 Method 9060A, ISO 10694:1995, ASTM E1915	
Requirements & Operating Environment		
Gas Requirements	Reaction/Carrier Gas: Oxygen > 99.8% purity, 20 psi (138 kPa)	
Power Requirements	115 (± 10%) VAC, 50/60 Hz, 500 VA 230 (± 10%) VAC, 50/60 Hz, 500 VA	
Power Consumption	480 VA under maximum load conditions	
Ambient Temperature Range	10–40 °C	
Ambient Humidity	5–95% non-condensing	
Safety/EMI Certifications		
Safety	Low Voltage Directive (2006/95/EC) IEC–61010-1:2001	
EMC	Directive 89/336/EEC:1989 EN61326-1:2006	CISPR 11:2003 Conducted Emissions CISPR 11:2003 Radiated Emissions
General		
1030S Module Dimensions	24 in. H x 8.125 in. W x 17.25 in D (61 cm x 20.6 cm x 43.8 cm)	
1030S Module Weight	24 lbs. (10.8 kg)	
Warranty	One year on parts and labor	
Patents/Patent Application	2008 Application 03077903A1	

* Sample introduction, sample homogeneity, sample container cleanliness, reagent purity, gas purity, and operator skill affect the analysis range and precision.