Formacs^{HT-I}
Carbon & Nitrogen Analyzer

Skalar

your partner in chemistry automation

Formacs^{HT-I} TOC / TN Analyzer

The Formacs^{HT-I} provides fast, reliable analysis of Total Organic Carbon (TOC) and Total Nitrogen (TN) in liquid samples by direct sample injection in a high temperature catalytic combustion.

The units are especially designed for particulate laden samples (suspensions), for example in waste water samples, but can handle the concentration of nitrogen and / or carbon fractions from various sample matrices.

The instrument is supplied customized for the sample type and optimized from a range of different catalysts and operation temperatures allowing the analysis of all carbon and nitrogen fractions present in the sample. The fractions can be measured sequentially or simultaneously with automated sample pretreatments such as acidification and purging.

A variety of options and accessories are available, including the Primacs^{MCS} add-on module for carbon determination in solid materials, the ND25 Total Nitrogen detector and the possibility of measuring nitrates and nitrites to provide a true Kjeldahl alternative.

The Formacs^{HT-I} analyzer meets the latest requirements for any laboratory from low level up to extended high concentration ranges.

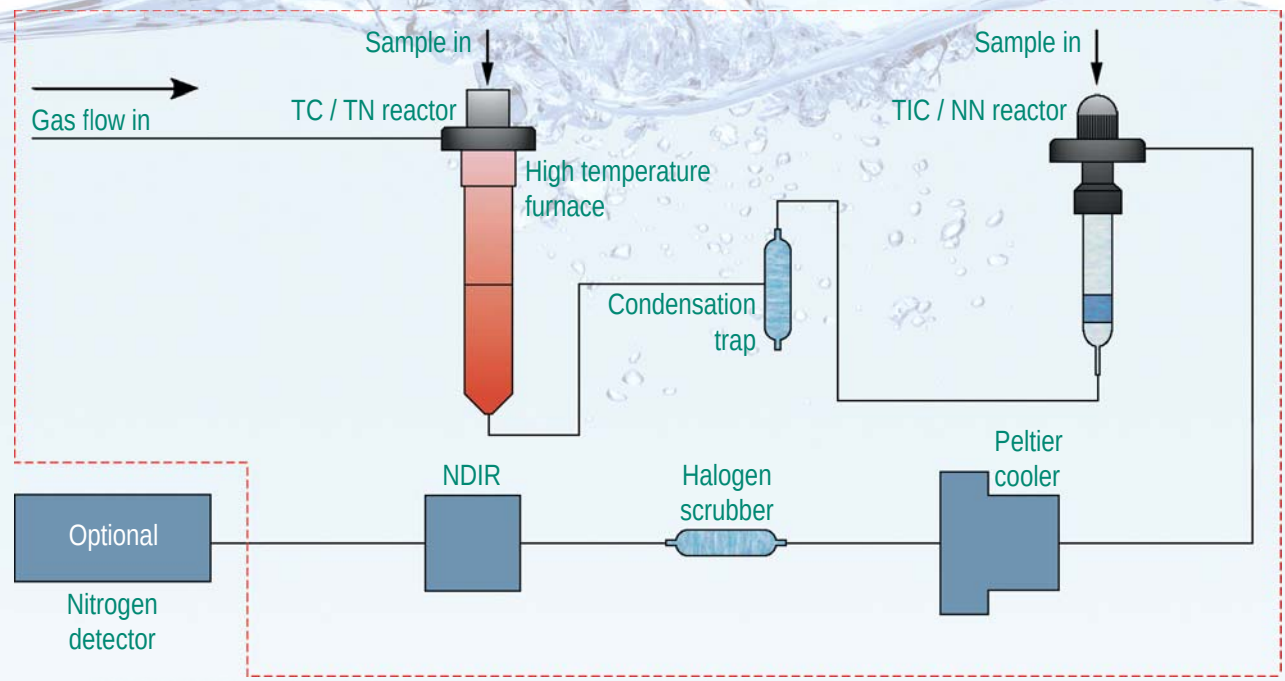
FEATURES

- Simultaneous TOC and Total Nitrogen (TN) analysis
- Unique easy access septum less direct injection system, especially designed for particulate laden samples (suspensions)
- Integrated 80 positions random access auto-sampler
- Selectable contamination free top and magnetic stirring
- Open and/or closed sample vials, 8 ml vials
- Handles particle sizes up to 450 µm
- Detector, automatic range selector for a wide dynamic working range
- Integrated Peltier cooler for optimum moisture removal

Applicable for:

- **Waste water**
- **Drinking water**
- **Surface water**
- **Sea water**
- **High saline waters**
- **Process control**
- **Pharmaceutical industry**
- **Soil extracts**
- **Others**

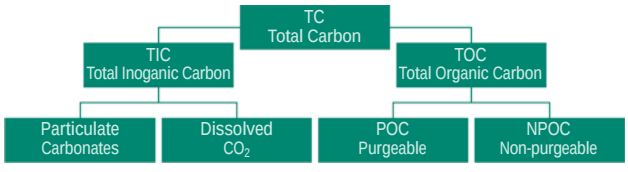
Principle of operation



The Formacs^{HT-I} is a stand-alone TOC / TN analyzer with integrated random access autosampler.

The Formacs^{HT-I} analyzer measures TOC by analyzing TC and TIC. TC in the sample is obtained by catalytic oxidation at a temperature fixed between 680°C - 950°C, which converts the TC present, (organic and inorganic), into Carbon Dioxide (CO_2).

Carbon Fractions



The TC sample is introduced by direct sample Introduction through a unique septum less injection port which prevents any contamination of the sample and is especially useful when analyzing low levels of carbon and suspensions. The CO_2 formed is subsequently dispersed into the carrier gas and passed through a peltier cooler. It is then measured using a non-dispersive infrared detector (NDIR). TIC is determined by acidification of the sample after direct injection in TIC reactor, which converts the inorganic carbon to carbon dioxide. The NDIR measures the quantity of carbon dioxide formed during acidification. TOC is calculated by subtracting the concentration of the TIC from the TC.

In addition, Non Purgeable Organic Carbon (NPOC) can be measured by automatic acidification and purging of the sample. TIC and the Purgeable Organic Carbon (POC) are removed. NPOC remains in the sample and can be measured directly by injecting the sample into the high temperature combustion furnace.

The NPOC equals the TOC if the POC concentration is insignificant (TOC = NPOC + POC).

Simple and reliable design
septum less injection port

TN & TKN analysis

The ND25 detector can be added to the Formacs^{HT-I} Analyzer for Total Nitrogen (TN) analysis.

A wide concentration range of TN can be measured with high accuracy in a short analysis time using chemiluminescence detection (CLD).

The sample is injected into the high temperature furnace where it is catalytically combusted. Oxidative pyrolysis causes the chemically bound nitrogen to be converted to nitric oxide (NO). In the ND25 detector, nitric oxide (NO) reacts to form metastable nitrogen dioxide. The photons emitted from the rapid decay of the metastable nitrogen dioxide are detected by a photomultiplier tube.

The Formacs^{HT-I} analyzer also provides a unique cost-effective and safer alternative for Total Kjeldahl Nitrogen (TKN) analysis, by an integrated NN-reactor for the analysis of NO_3 + NO_2 (NN).

NO_2 and NO_3 Reactor

The TKN value is determined in two steps, i.e. the analysis of Total Nitrogen (TN) and the analysis of NO_3 + NO_2 via chemical reduction, where NO_3 and NO_2 are reduced to nitric oxide (NO) and detected via CLD detection. The TKN value is obtained automatically by subtraction: TKN = TN – NN.

This unique alternative method of TKN analysis results in a very fast analysis time (5 min.), and eliminates the use of hazardous digestion acids. The Formacs^{HT-I} TOC/TN analyzer combines the automation of TOC, TN and TKN all in one system.

FEATURES

- Simultaneous TOC and TN measurements
- CLD detector for analysis of TN and NO_2 + NO_3
- Excellent alternative for Total Kjeldahl Analysis
- Low detection limits
- Fast analyses using no hazardous reagents
- No sample preparation required
- Wide dynamic range
- Low maintenance unit
- Method according to EN 12260, ISO 11905-2, ASTM D5176-91, DIN 38409 H27

Primacs^{MCS} TOC module for solid samples

The Primacs^{MCS} can be added to the Formacs^{HT-I} for solid sample analysis.

The add-on module is designed for analyzing solid materials and operates in combination with the Skalar Formacs^{HT-I} liquid sample TOC analyzers, offering an economical solution for laboratories handling a large variety of sample matrices.

The unit consists of two integrated reactors for both TC and TIC analysis without any sample preparation. The TC is determined by catalytic oxidation of the sample at 1100°C, which converts the carbon to CO_2. TIC is determined by acidification of the sample in a separate reactor, which converts inorganic carbon to CO_2.

The Primacs^{MCS} uses the multi-range NDIR detector of the Formacs^{series} for the detection of CO_2. The Primacs^{MCS} analyses TC, TIC and TOC. The software calculates the TOC concentration of the samples by subtraction - (TC - TIC = TOC).

FEATURES

- Automatic balance interfacing
- Sample weights up to 3 grams
- Range of 1 mg to 40 mg absolute carbon
- Unique vertical sample introduction system
- Reusable quartz sample crucibles
- Economical concept
- Requires minimal bench space
- Integrated TC and TIC reactors
- No sample pretreatment required
- Method according ISO 10649, ISO 13137,
- EN 13639 , EPA 415.1, ASTM D-2579 US, EPA 9060A

Data Acquisition & Instrument Control

The analyzer is controlled by Skalar's flexible HT-Access data acquisition software.

The Formacs analyzers come with an easy, intuitive operable and flexible data acquisition and instrument control software package. Different access levels are available to prevent unauthorized operation. In templates the analysis sequence can be defined allowing the selection of injection volume, type of analysis (TC, TIC, TOC, NPOC, TN and NN), stirring, and acidification & purging. Samples and standards can be set individually as they may vary, or can be entered as a group batch method. Valuable operator time can be saved by using the unique feature of automatic preparation of working standards and pre- and post dilution of overrange samples.

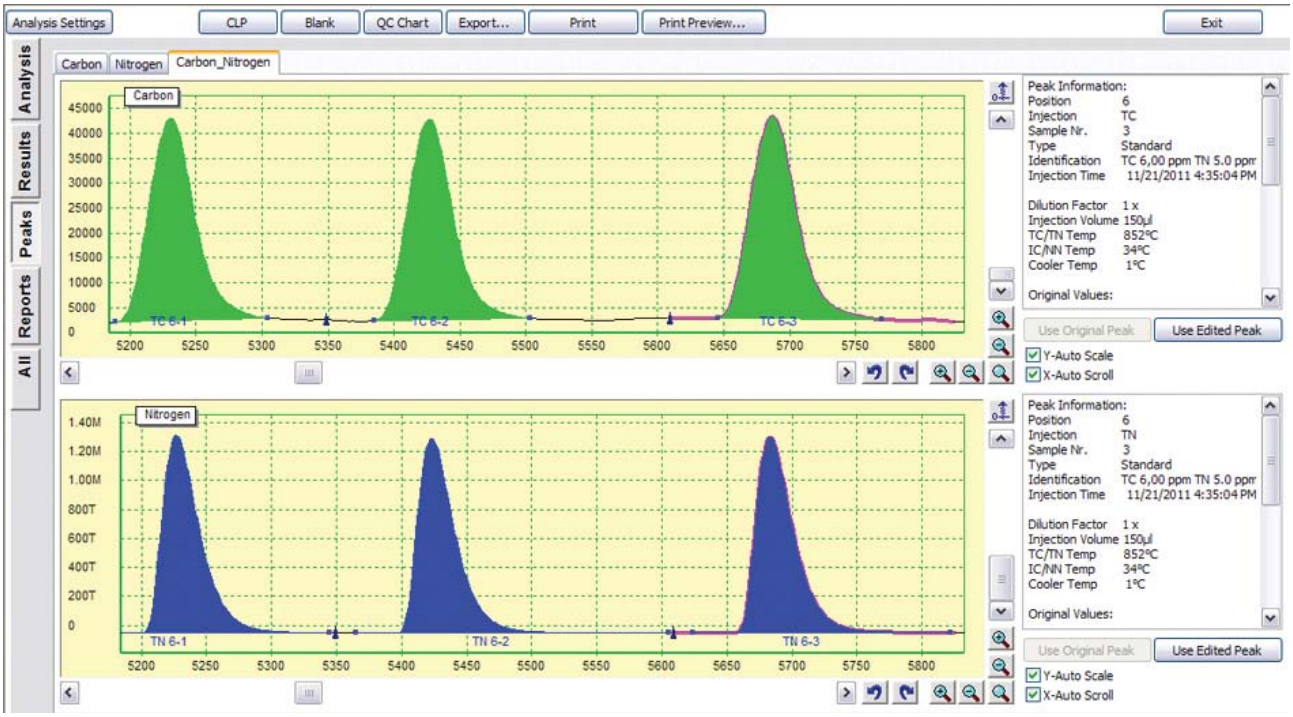
During the analysis the real-time peak information and results are displayed in multiple view screens. When Carbon and Nitrogen are analyzed simultaneously, the realtime graphics either provides visualization for both analyses or individually. Results are automatically calculated during the analysis. Multiple calibration curves can be stored for calculation. The software automatically selects the bestfitting curve. When priority samples need to be analyzed the sample table can be expanded and edited during analysis. Parallel to the running analysis it is possible to open other analysis runs for editing/viewing purposes.

HTAccess includes excellent Quality control features. QC samples can be analyzed and Quality control charts together with other valuable statistical information can be created. The software complies also with CLP protocols ensuring accuracy and precision of analytical results.

Analysis results can be exported to LIMS or Excel, including the statistical data of the analysis such as the calibration curve, CV values and average concentrations. Export and print layouts can be customized by the user.

SOFTWARE FEATURES

- Automatic preparation of working standards
- Automatic pre- and post dilution of overrange samples
- Possibility of opening multiple analysis runs
- All information of a sample in one single view
- Possibility of using Quality samples and creating
- Quality Control Charts
- Contract Laboratory Protocol (CLP) compliant.
- User definable concentration limits for the different
- CLP samples and required actions (up to 4)
- Possibility of exporting results during analysis
- Windows 7 compatible
- 21CFR part 11 compliant
- BOD/COD calculation possible via TOC analysis
- Remote signal monitoring

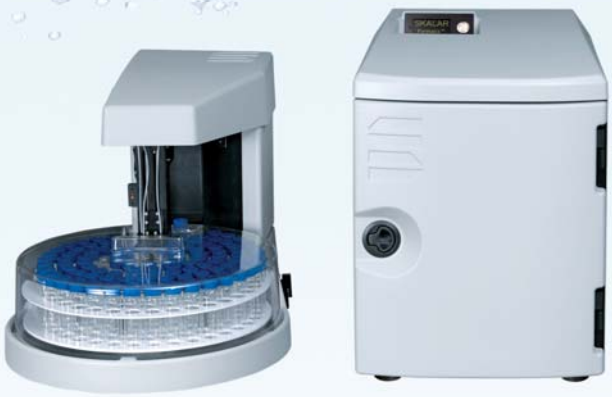


Other Skalar TOC & TN Analyzers

Skalar offers a variety of TOC and TN analyzers that are available for liquid or solid samples, all based on international standard regulations.

Liquid Samples

Formacs^{HT} TOC Analyzer
The Formacs^{HT} TOC analyzer provides a fast and reliable analysis of Total Organic Carbon (TOC) in liquid samples using high temperature catalytic combustion. The unit is designed to measure TC, IC, TOC, NPOC, POC and DOC in water samples. The instrument is customized for the sample type and optimized from a range of different catalysts. Optionally the Formacs^{HT} can be extended for TN and NO_3 + NO_2 analysis.



Solid Samples

Primacs$^{SNC-100}$ TOC - TN / Protein Analyzer
The Primacs$^{SNC-100}$ is a flexible solid sample analyzer with integrated 100-position autosampler for determination of Nitrogen (N)/Protein, Total Carbon (TC), Total Elemental Carbon (TEC), Total Inorganic Carbon (TIC) and Total Organic Carbon (TOC). The analyzer provides fast, accurate and low level analysis for these parameters in applications such as soil & plant, sludges & sediments, animal feed & grain, food, malt, fertilizer etc.

The Primacs^{SLC} analyzer
This analyzer provides Carbon analysis on solid materials. Based on a dual furnace design, the system is capable of performing fast, reliable and separate determinations of TC and TIC without sample pretreatment. The TOC is automatically calculated (TOC = TC-TIC). Applications include fertilizer, soil, plant, sludges, sediments and solid waste.

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