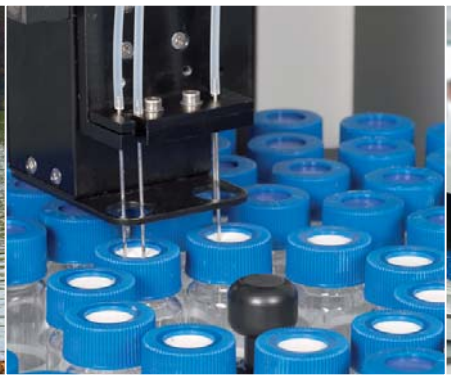
Formacs^{HT}
Carbon & Nitrogen Analyzers


Skalar

your partner in chemistry automation

Formacs^{HT} TOC / TN Analyzer

The Formacs^{HT} TOC / TN analyzers provide fast, reliable analysis of Total Organic Carbon (TOC) and Total Nitrogen (TN) in liquid samples using high temperature catalytic combustion.

The units are designed to measure and handle the concentration of nitrogen and / or carbon fractions from various sample matrices. The analyzer can be operated as stand-alone analyzer, but for complete automation a random access autosampler is available.

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.

FEATURES

- Stand-alone TOC operation or with auto-sampler
- Homogenization by automated stirring (rod or magnetic)
- Robust rotary septumless injection ports
- Integrated Peltier cooler for optimum moisture removal
- Large variety of vial sizes including septum-closed vials
- Allows a true system blank analysis
- Method according to EPA 415.1, Standard Methods 5310B, DIN 38409 H3, ASTM D-5173, USP <643>, EU 2.2.44, ISO 8245, EN 1484, USEPA 9060A

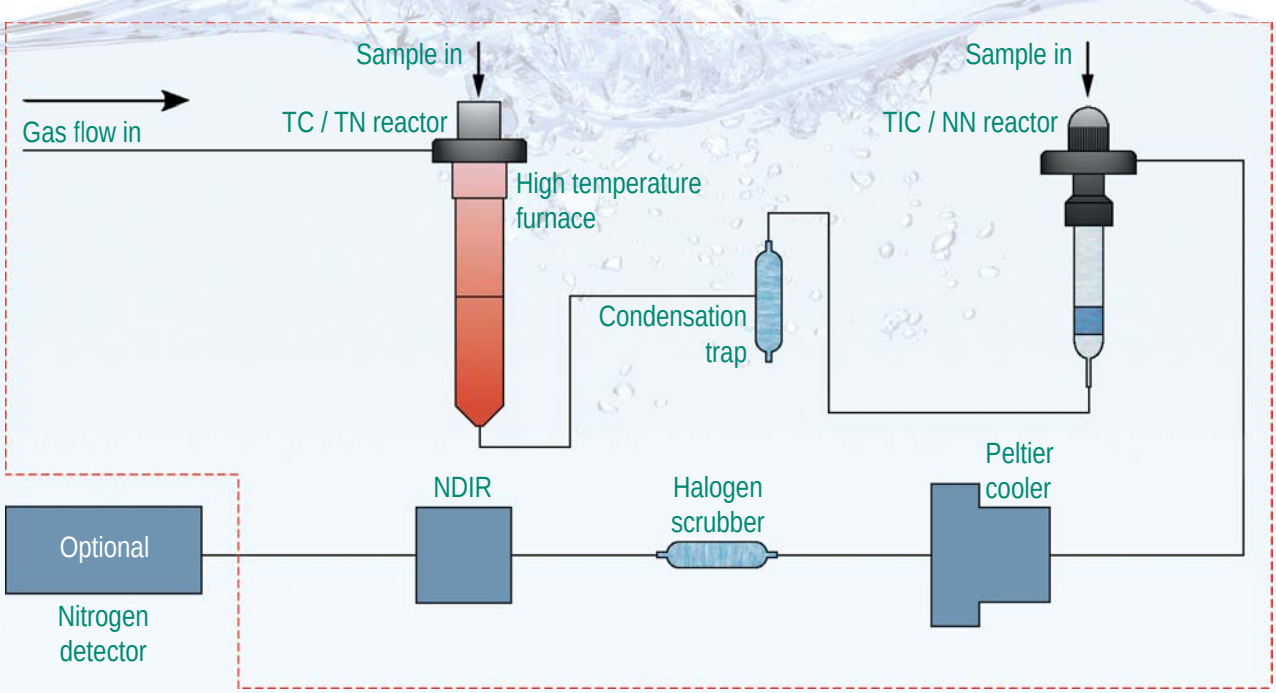
A variety of options and accessories are available such as the Primacs^{MCS} add-on module for Carbon determination in solid materials, the ND25 Total Nitrogen detector and the possibility of measuring Nitrates and Nitrites to provide a true Kjeldahl alternative.

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

Application fields:

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

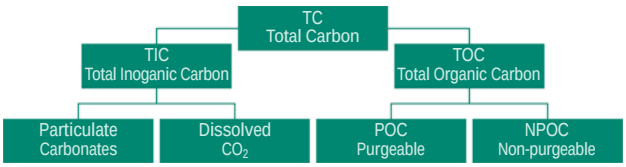
Principle of operation



The Formacs^{HT} analyzer can be operated as stand-alone analyzer. A random access auto sampler is available for complete automation.

The Formacs^{HT} Analyzer measures Total Organic Carbon (TOC) by analyzing the Total Carbon (TC) and the Total Inorganic Carbon (TIC). Total Carbon (TC) is obtained by injection of the sample into a high temperature combustion furnace.

Carbon Fractions



TC is converted to Carbon dioxide (CO_2) at temperatures up to 950°C by catalytic oxidation. The CO_2 formed is subsequently dispersed into the carrier gas and the CO_2 concentration is measured by a non-dispersive infrared detector (NDIR).

TIC is determined by injecting the sample into a reactor containing acid, converting inorganic carbon (IC) to CO_2. The NDIR measures the CO_2 concentration formed during acidification. The TOC concentration is calculated by automatically subtracting 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 than removed. NPOC remains in the sample and is 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).

Optionally, the Formacs^{HT} can be configured to measure POC directly. POC is purged from the liquid sample. The carrier gas + POC are injected in the high temperature combustion furnace and measured by NDIR.

TN & TKN analysis

The ND25 detector can be added to the Formacs^{HT} 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, 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} 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 Nitrate + Nitrite (NN).

The TKN value is determined in two steps, i.e. the analysis of TN and the analysis of NO_3 + NO_2 via chemical reduction, where NO_3 and NO_2 are reduced to 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} TOC/TN analyzer combines the automation of TOC, TN and TKN all in one system.

NO_2 and NO_3 Reactor

FEATURES

- Simultaneous TOC and TN measurements
- CLD detector for analysis of TN and NO2 + NO3
- 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} add-on module analyses solid materials and operates in combination with the Formacs^{HT} liquid sample 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 IC to CO_2. The Primacs^{MCS} uses the NDIR detector of the Formacsseries 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.

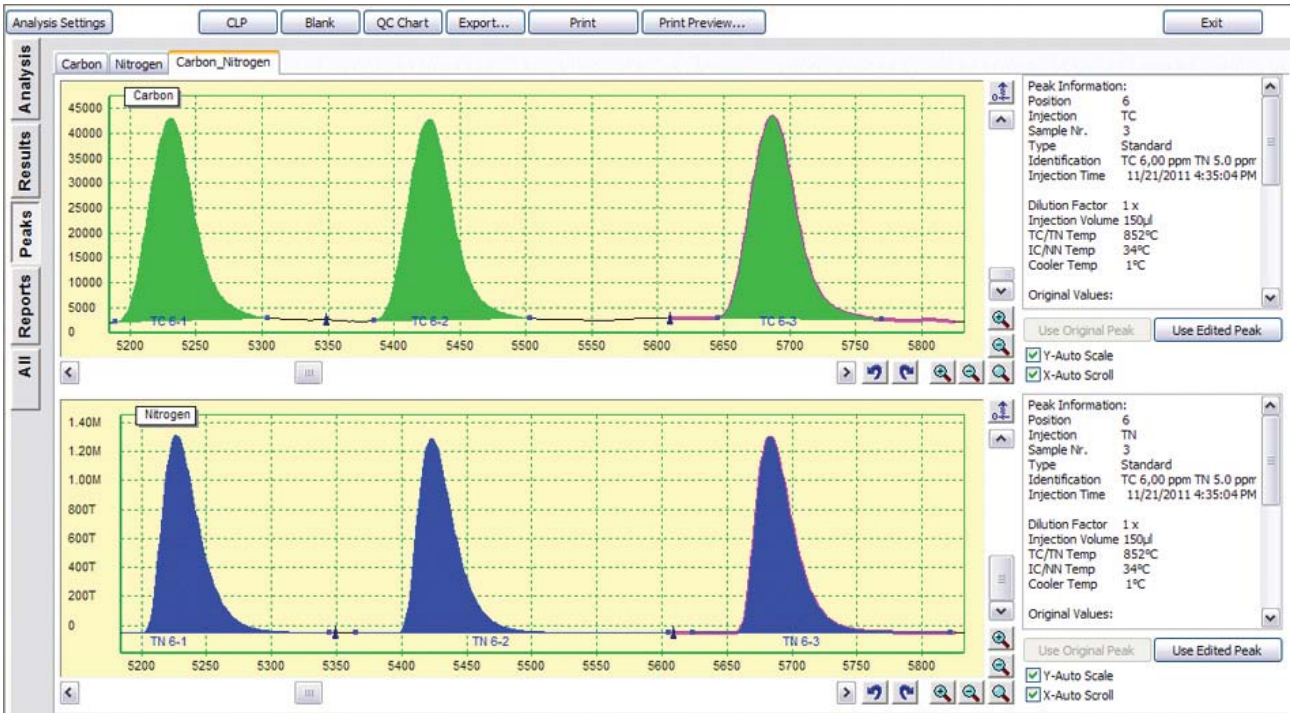
During the analysis the real-time peak information and results are displayed in multiple view screens. When Carbon and Nitrogen are analyzed simultaneously, the real-time graphics either provides visualization for both analyses or individually. Results are automatically calculated during the analysis. Multiple calibration curves can be stored for calculation. The software automatically selects the best-fitting 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-I} TOC Analyzer
The Formacs^{HT-I} TOC / TN analyzers provide fast, reliable analysis of TOC and TN in liquid samples by direct sample injection in a high temperature catalytic combustion furnace. The Formacs^{HT-I} units are especially designed for particulate laden samples (suspensions) like waste waters, but can handle the concentration of nitrogen and/or carbon fractions from various other sample matrices as well.

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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