



// XPREP C-IC

TE Instruments introduces the world's first automated independent sample preparation system for Combustion Ion Chromatography: the Xprep C-IC. This unique configuration redefines automated combustion IC analysis through its innovative design and functionalities.

Independent Sample Preparation System

Besides full control over sample combustion, the Xprep C-IC not only collects the oxidized gas stream, but also automatically transfers a fraction of the absorbance liquid to any renowned IC system. The ideal solution to cover the increasing demand for analysis of organic halogens (Fluorine, Chlorine, Bromine, Iodine) compounds for environmental monitoring. These organic compounds get into the environment as pesticides, dioxins, PFAS and other forms, where they form a risk for the environment and humans as these compounds are bioaccumulating, toxic and cannot be broken down by the environment itself.



New Standard in Automated C-IC Analysis

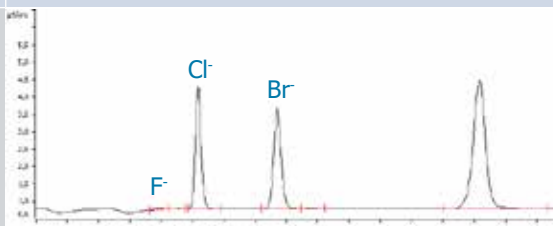
The analysis of speciated halides for environmental monitoring is difficult and requires extensive sample preparation with conventional offline methods. Oxidative Microcoulometry is an alternative detection technique which provides results as a sum-parameter. Combustion IC enables the determination of individual halides by a single analysis while eliminating the complex and time-consuming sample preparation steps of conventional offline digestion/combustion methods.

TE Instruments developed a fully automated, extremely compact sample preparation system covering the oxidative pyrohydrolytic combustion, fraction collection, and sample injection towards the IC. The Xprep C-IC introduces samples via a boat-inlet (boat module) into a horizontal furnace. This automated sample-prep solution reduces complexity of sample transfer and improves user convenience.

Key features include:

- Small Footprint (half the size compared to existing C-IC configurations)
- Fully automated sample introduction by means of robust sampling systems
- Controlled sample introduction by integrated boat inlet system
- Oxidative pyrohydrolytic combustion
- Combustion tube with high combustion efficiency/power.
- Each combusted sample is collected & stored on 1 of the 65 positions of the fraction collection unit
- Option of standalone use of the Xprep C-IC or fully integrated operation with any renowned IC
- Injection of aqueous sample/standards directly from the Fraction collection unit into any renowned IC

Principle of Operation

Element of Interest	Combustion	Collection	IC Analysis
Halogens	H-X, X ₂	X ⁻	

Sample Pretreatment

For environmental monitoring, the organic halogens are the only compounds of interest as they form the risk for the environment and health. To determine the organic content, sample preparation is required to separate the inorganic halogens from the organic halogens in the sample. A known and regulated sample pretreatment for this is called Adsorbable Organic Fluorine (AOF). Other common names are:

- Adsorbable Organic Chlorine (AOCl)
- Adsorbable Organic Bromine (AOBr)
- Adsorbable Organic Iodine (AOI)
- Adsorbable Organic Halogens (AOX)
- Total Organic Fluorine (TOF)
- Total Organic Halogens (TOX)

The sample pretreatment is based on the principle, where organic halogens are adsorbed on activated carbon. There are 2 different ways for this sample pretreatment:

- 1) Column method, applicable for water samples.
- 2) Batch / Shaking method, applicable for water and solid samples.

TE Instruments has developed sample pretreatment systems that can be used for this type of sample preparation.

The Xprep-3 is a three channel sample filtration unit designed to use for both batch & column method. The instrument consists of three independent filtration units, all of which can be equipped with reusable quartz frit filters or joint columns.

The quartz frit separates the water from the activated carbon after the adsorption stage, the column method adsorbs the organic halogens, while the water runs through at a rate of 3 mL/min. Each autonomous channel is pressure- and therefore speed adjustable, while running both filtration methods.

The Xprep-A6 has the ability to automatically and simultaneously run six samples of 100 mL over activated carbon columns at a controlled sample flow of 3 mL/min. Once the water samples have completely passed through the columns a wash cycle automatically starts, which removes the inorganic load from the surface of the activated carbon. The surplus water and wash solution are collected in a central reservoir, which can be connected to a continuous drainage system or simply emptied when it is full.

Introduction

Sample introduction is done fully automated by means of robust sampling systems for the prepared samples. These autosamplers have a proven track-record for controlled and accurate sampling.



Xprep-3



Xprep-A6

The Xprep C-IC can be equipped with two different autosamplers to perform environmental applications fully automated. The Newton solids sampler is most suitable for the introduction of sample cups and frits. The Tuscan is most suitable for the introduction of the activated carbon, present in the AOF column.

Depending on the autosampler used, a different version of boat introduction is required.

Switching between the boat modules and autosamplers is done within minutes, which gives the operator a high degree of flexibility in the analysis of different sample types.

Combustion

Every sample is completely oxidized by pyrohydrolytic combustion in an oxygen-rich environment at high temperature. TE Instruments provides a 5-year warranty on the robust dual-zone furnace. All glassware, including combustion tubes and introduction modules, are designed, developed and manufactured by TE Instruments. The specially developed pyrohydrolytic combustion tube includes a single-stage capturing filter and collision flow technique.

TE Instruments offers a combustion tube, made of quartz glass, specially designed for environmental applications. The collision flow technique delivers utmost oxidation power to fully combust the complete activated carbon within seconds.

All combustion tubes for the Xprep C-IC are equipped with a "self-cleaning" filter, to catch all particles possibly formed during the combustion.

Collection

After combustion, absorber solution is added to the output gas stream to guarantee a complete absorption of the analytes in the fraction collection unit. In this process the H-X, X₂ are converted to F⁻, Cl⁻, Br⁻, I⁻. All these negatively charged ions will be separated and analyzed by the IC.



The integrated low maintenance sampling system operates with a dual-channel needle. One channel is used for dosing of the required reagents and absorption of the combustion gas, the other transfers the sample from the collection unit to the IC. Up to 65 combusted samples can be absorbed and stored in the individual absorption vials. Continuously rinsing a single absorption tube is no longer required. The collected samples can be transferred to the IC immediately or stored for analysis at a later stage.

Injection

Once sample preparation has been finalized, the absorbent containing the analytes can automatically be transferred from the fraction collection unit towards any renowned IC. The internal syringe pumps of the collection unit load and rinse the IC sample loop. A six-way-valve and 100 µL sample loop are by default integrated at the front of the fraction collection unit. The sample loop may be used to fill the pre-concentrator when present in the IC.



Typical Applications

- Drinking Water
- Cooling Water
- Surface Water
- Ground Water
- Waste Water
- Pulp
- Paper
- Sludge
- Soil

Compliance and Regulations

Our instrument complies with, but is not limited to, the following international standards:

- EPA 1621
- DIN38409-59

The Combustion Experts

TE Instruments has a rich history in the development and production of trace elemental combustion solutions. Since 1993, our home base in Delft, the Netherlands, facilitates a strong network of well-integrated departments such as Application Development, Research & Development, Glass Manufacturing and Production. This allows us to quickly respond to customer needs. TE Instruments controls the entire production process of its analyzers, starting from fundamental research up to shipment from our warehouse. We are fully dedicated to the development of targeted solutions for elemental combustion analysis with the quality you expect and the attention you deserve.

Autosamplers



XPREP-A6

Column Filtration Apparatus

Sample	Aqueous matrices
Sample positions	6
Compatibility	Activated carbon column



XPREP-3

Batch and Column Filtration Apparatus

Sample	Aqueous & solid matrices
Sample positions	3
Compatibility	16 mm sample frits Column holders for activated carbon column



TUSCAN

Column Autosampler

Sample	Activated carbon columns
Sample positions	42 columns



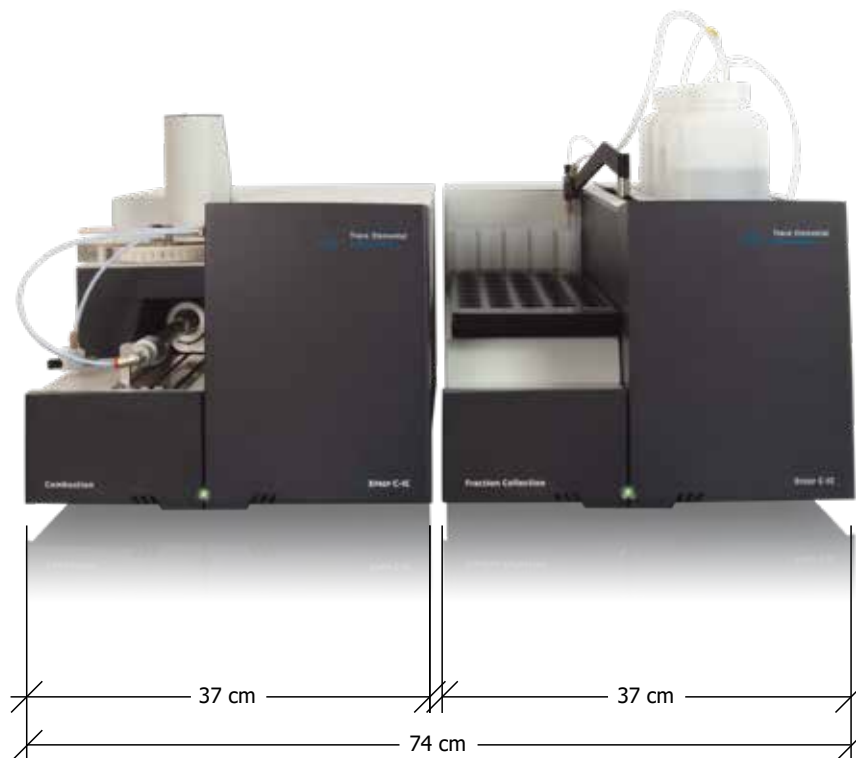
NEWTON

Solids Autosampler with Stackable Trays

Sample	Solids / Activated carbon
Sample positions	20 (one tray), 40 (two trays), 60 (three trays)
Compatibility	16 mm sample cups and frits

Specifications

Compliance	Compliant with the performance standards of international test methods like ASTM, UOP, ISO, DIN, EN, JIS, KS.
Sample types	Water and solids
Typical sample amount	50-60 mg of activated carbon
Sample pyrolysis	Xprep C-IC quartz combustion tube
Furnace voltage	Dual zone, low voltage
Furnace temperature	Max. 1150 °C, 2100 °F
Gases	Oxygen 99.6% (2.6), Argon 99.99% (4.0) or Helium 99.99% (4.0)
Input gas pressure	3-10 bar (45-150 psi)
Absorbent tube	23 mL - 65 positions (optional 40 mL)
Injection to IC	Variable, default 100 µL
Flow path material	PTFE, PEEK
Remote control	Configurable remote Start/Stop
Voltage	100 - 240 VAC, 50 - 60 Hz
Software	TEIS Software



Used images are examples of configurations which may deviate from ordered configurations.