OPTIC-4

4th generation of the world's most powerful multimode inlet

ATAS GL international

The Multimode Inlet for Gas Chromatography

4th generation OPTIC

OPTIC-4 is the ultimate among high performance inlet systems for gas chromatography. Designed to be installed easily onto virtually any gas chromatograph, OPTIC-4 offers the widest range of injection modes for a vast array of sample types.

One inlet, more analytical options

The patented low thermal mass design of the inlet body together with direct resistive heating provide fast linear temperature programming up to 600 °C at rates as high as 60 °C/sec. In addition to standard sampling modes, the programmable inlet can operate effectively as Large Volume Injection, Pyrolysis or Thermal Desorption sample introduction device. With the options for sub-ambient cooling, cryogenic trapping and automated liner exchange, OPTIC-4 is the world's most versatile inlet for Gas Chromatography.

Why OPTIC-4 Inlet?

- Works from cryogenic temperatures (-180 °C) to very high temperatures (600 °C)
- Heats up quickly with the ramp rate ranging from 1 °C/sec to 60 °C/sec
- Cools quickly with any of the three available cooling options - less than 90 sec from 600 °C down to 40 °C with air
- Has uniform temperature profile
- Allows up to nine temperature and flow steps to be programmed
- Accommodates injections of a wide range of sample volumes
- Shows no discrimination up to C_{100}
- Inert, shows minimal decomposition or degradation of labile compounds
- Offers full electronic pressure/flow control including septum purge flow
- Supports direct (in-inlet) sampling techniques like pyrolysis, thermochemolysis and thermal desorption (single and multi-shot)
- Equipped with special solvent sensor in the split line for automated solvent venting
- Offers cryotrap option with quick cooling and heating ramp rates (up to 60 °C/sec)
- Offers automated liner exchange option
- Provides multiple cooling options for inlet and cryogenic trap (compressed air, CO_2 and LN_2)
- Compatible with most GC's and autosamplers
- Compatible with Merlin Microseal^{tm}
- Compatible with SilTite™ metal ferrules
- Offers interface solutions for LC-GC, LCxGC or SEC-Py-GC/MS

Large Volume Injections saves time and improves performance!

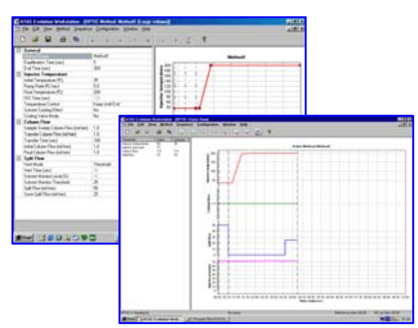
By increasing injection volume from 1-2 µL to 100 µL or higher with the OPTIC inlet, analytical sensitivity is greatly enhanced for analytes with low concentrations. In addition, tedious sample pretreatment procedures may be simplified by eliminating or shortening the solvent evaporation step, which is not only time-consuming but also subject to chemical loss. Alternatively, a lesser amount of sample can be collected for predetermined detection limits.

Benefits:

- Permits smaller sample collection amounts
- Reduces sample detection limit
- Reduces cycle time and re-work
- Saves on shipping and storage costs
- Improves quantification and automation

Control Software

Evolution Workstation Software:

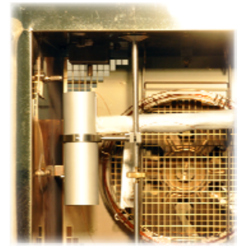


- Complete status information during standby state or method run
- Real-time run-time parameters display
- Easy, on-click analytical method definition and development
- Automatic generation of a method optimisation sequence
- System and method log files
- Password protection with two access levels
- Chemstation, Xcalibur integration (via Chronos software)

OPTIC-4 Options

Sub-ambient Inlet Cooling

- OPTIC-4 inlet can be cooled down to -50 °C if using CO_2 cooling option
- OPTIC-4 inlet can be cooled down to -180 °C if using LN_2 cooling option



Backflush

- OPTIC-4 has a backflush option, contains an extra flow module and a special tee union

Cryogenic Trap

- Operating temperature range: -150 °C to +350 °C
- Cooling: LN_2 or CO_2
- Temperature ramp rates: 1 – 60 °C/sec
- Low LN_2 consumption
- High stability at low temperatures
- Compatible with any GC

Automated Liner Exchanger (LINEX)

- LINEX-DMI option enables automated GC analysis of sample containing dirty matrix, by introducing it directly into the inlet. Sample is contained in a DMI micro-vial inserted into an inlet liner – minimal sample preparation is required.
- LINEX-TD option enables automated direct (in-injector) Thermal Desorption of gas and solid samples.
- Automated Capping-De-Capping (CDC) Station allows using LINEX with capped (sealed from both sides) liners. Cleanliness of liner or integrity of sample placed in liner is protected for several days.

OPTIC-4 Technical Specifications

General

- Dimensions: 34 cm × 14 cm × 34 cm (h × w × d), weight: 6.7 kg (controller)
- Ambient operating temperature range: 18 – 40 °C, ambient operating humidity: 40 – 70 %
- Mains power: 100 ÷ 240 VAC, 50-60 Hz
- Typical power consumption: 150 W, maximum power consumption: 450 W

Inlet

- Full electronic pressure/flow control
- Maximum operating temperature: up to 600 °C at a GC oven temperature of 35 °C
- Cooling: air (down to 35 °C), CO_2 (down to -50 °C), LN_2 (down to -180 °C)
- Temperature ramp rates: 1 - 60 °C/sec
- Up to nine temperature program ramps including negative

EFC

- Full electronic control of column, split and septum purge flows
- Pressure range: 7 -700 kPa
- Total flow range: 5 - 500 ml/min He (main channel, all models), 1 - 100 ml/min He (auxiliary channel, OPTIC-4D only)
- Pressure sensor: accuracy : ± 1 % full scale, repeatability: ± 0.2 % full scale
- Flow sensors: accuracy : ± 1 % full scale, repeatability: ± 0.2 % of full scale
- He, N_2 or H_2 as carrier gas at a maximum pressure of 700 kPa
- Solvent sensor in the split line

Interfaces

- LAN and USB
- Four auxiliary relay outputs (30 V/500 mA max.)
- Remote start/stop to GC and autosampler

Software

- Method and sequence definition and development
- Real-time system status display
- Automatically generated optimization sequences
- Direct control of the instrument in Standby mode
- System run log file
- Password protection with two access levels

Cryogenic Trap Option

- Operating temperature range : -150 °C to +350 °C
- Temperature ramp rates: 1 - 60 °C/sec
- Cooling: LN_2 from pressurized (150 -200 kPa) vessel

Selection from list of publications with OPTIC

Environmental:

Large Volume Injection in Gas Chromatographic Trace Analysis Using Temperature Programmable (PTV) Injectors.
Hans G.J. Mol, Hans-Gerd Janssen, Carel A. Cramers, Udo A. Th. Brinkman, Trends in Analytical Chemistry, volume 15, issue 4 (1996), p. 206-214.

Programmable Temperature Vaporization interface for on-line trace-level enrichment - GC-MS of micropollutants in surface water. Sjaak De Koning, Mark van Lieshout , Hans-Gerd Janssen, Udo A. Th. Brinkman, Journal of Microcolumn Separations, volume 12, issue 3 (2000), p. 153-159.

Application of solid-phase extraction and rapid, large-volume injection for routine analysis of environmental samples via U.S. EPA SW-846 Method 8270D.
Daniel P. Dodson and Robert S. Johnson. American Laboratory News, April 2001.

Analyses of the wood preservative component N-cyclohexyl- diazeniumdioxide in impregnated pine sapwood by direct thermal desorption-gas chromatography-mass spectrometry. P. Jüngel, S. de Koning, U.A.T. Brinkman, E. Melcher, Journal of Chromatography A, Amsterdam, 953 (2002), p.199-205.

Application of direct thermal desorption gas chromatography and comprehensive two-dimensional gas chromatography coupled to time of flight mass spectrometry for analysis of organic compounds in ambient aerosol particles.
Jurgen Schnelle-Kreis, Werner Welthagen, Martin Sklorz, Ralf Zimmermann, Journal of Separation Science, (2005) 28, p. 1648–1657.

Food & Beverage:

Trace-level determination of pesticides in food using difficult matrix introduction–gas chromatography–time-of-flight mass spectrometry. Sjaak de Koning, Gunter Lach, Manfred Linkerhagner, Ralf Loscher, Peter Horst Tablack, Udo A. Th. Brinkman, Journal of Chromatography A, 1008 (2003), p. 247–252.

Analysis of pesticide residues in lettuce by large volume–difficult matrix introduction–gas chromatography–time of flight–mass spectrometry (LV-DMI-GC-TOF-MS).
Katan Patel, Richard J. Fussell, David M. Goodallb and Brendan J. Keely, Analyst, (2003) 128, p. 1228–1231.

Evaluation of large volume-difficult matrix introduction-gas chromatography-time of flight-mass spectrometry (LV-DMI-GC-TOF-MS) for the determination of pesticides in fruit-based baby foods. K. Patel, R. J. Fussell, D. M. Goodall and B. J. Keely, Food Additives and Contaminants, v. 21, No. 7 (July 2004), p. 658–669.

Use of automated direct sample introduction with analyte protectants in the GC–MS analysis of pesticide residues.
Tomas Èajka, Kateøina Mastovska, Steven J. Lehotay, Jana Hajslova. Journal of Separation Science, (2005) 28, p. 1048–1060.

Evaluation of the QuEChERS sample preparation approach for the analysis of pesticide residues in olives.
Sara C. Cunha, Steven J. Lehotay, Katerina Mastovska, Jos. O. Fernandes, Maria Beatriz, P. P. Oliveira, Journal of Separation Science, (2007) 30, p.620 – 632.

Material Characterization:

Programmed-temperature vaporizer injector as a new analytical tool for combined thermal desorption-pyrolysis of solid samples Application to geochemical analysis. M. van Lieshout, G.A. van den Bos, Journal of Chromatography A, 764 (1997), p. 73-84.

On-line size exclusion chromatography–pyrolysis-gas chromatography–mass spectrometry for copolymer characterization and additive analysis.
Erwin R. Kaal, Geert Alkema, Mitsuhiro Kurano, Margit Geiβler, Hans-Gerd Janssen, Journal of Chromatography A, 1143 (2007), p. 182–189.

On-line SEC-Py-GC-MS for the Automated Comprehensive Characterization of Copolymers (coupling matters).
Erwin R. Kaal, Mitsuhiro Kurano, Margit Geiβler, Peter Schoenmakers and Hans-Gerd Janssen, LC·GC Europe September (2007), p. 444-452.

Hyphenation of aqueous liquid chromatography to pyrolysis-gas chromatography and mass spectrometry for the comprehensive characterization of water-soluble polymers. Erwin R. Kaal, Mitsuhiro Kurano, Margit Geiβler, Hans-Gerd Janssen, Journal of Chromatography A, Volume 1186, Issues 1-2, 4 April 2008, p. 222-227.

Biotechnology & Pharma:

Evaluation of the Programmed Temperature Vaporizer for Large Volume Injection of Biological Samples in Gas Chromatography.
M.W.J. van Hout, R.A. de Zeeuw, J.P. Franke, G.J. de Jong, Journal of Chromatography B, 729 (1999), p. 199-210.

Direct injection of human plasma samples after ultra filtration into programmed temperature vaporizer-gas chromatography–mass spectrometry with packed liner. Mohamed Abdel-Rehim, Karin A. Svensson, Yvonne Askemark, Karl-Johan Pettersson, Journal of Chromatography B, 755 (2001), p. 253–258.

New trend in sample preparation: on-line microextraction in packed syringe for liquid and gas chromatography applications I. Determination of local anesthetics in human plasma samples using gas chromatography-mass spectrometry. Mohamed Abdel-Rehim, Journal of Chromatography B, 801 (2004), p. 317–321.

At-line gas chromatographic-mass spectrometric analysis of fatty acid profiles of green microalgae using direct thermal desorption interface.
P. Blokker, R. Pel, L. Akoto, U.A.T. Brinkman, R.J.J. Vreuls, Journal of Chromatography A, 959 (2002), p.191-201.

Fully automated system for the gas chromatographic characterization of polar biopolymers based on thermally assisted hydrolysis and methylation
Erwin Kaal, Sjaak de Koning, Stella Brudin, Hans-Gerd Janssen, Journal of Chromatography A, 1201 (2008), p. 169–175.

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