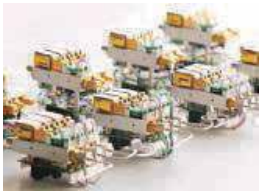
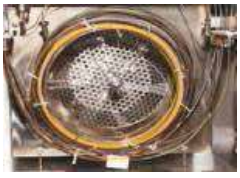
Multiplelabs
Turnkey Laboratories Solutions

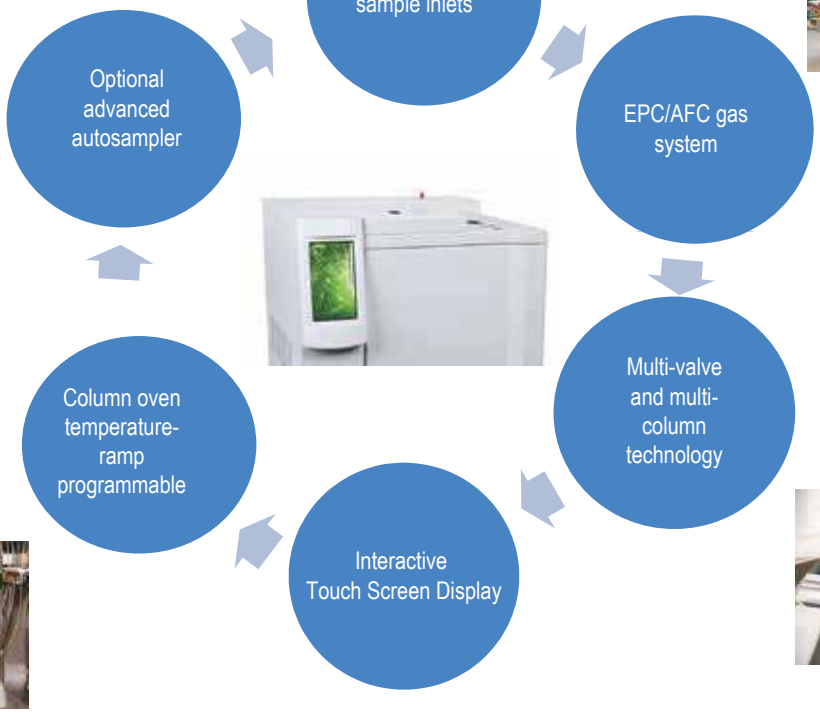
Analytical®
Technologies Limited

GC Optima - 3000 Series

Gas Chromatograph







EPCC / PRODUCTS / APPLICATION / SOFTWARE / ACCESSORIES / CONSUMABLES / SERVICES

Analytical Technologies Limited

An ISO 9001 Certified Company

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Instrument feature

- One button access to routine maintenance information.
- PCM control module much precise with independent-development AFC system;
- Instant Connect Auxiliary Temperature Module with 8-channel high-accuracy temperature control system and 8-channel outside events to fulfill fulfill counter-control system have back flush facility
- Every gas circuit can achieve constant-pressure, constant-flow, constant-speed, programmable-temperature-rise, programmable-flow -rise and programmable-speed-rise;
- Unlimited valve events to fulfill accurate switching of multi-valve;
- Outside power & voltage checking system, over-heating protection system and flow monitoring system to make it intellectualized.
- Vacuum fluorescent display with english Language.
- Multi-function keyboard can set complicated parameters and store 16 chromatography method;
- FID and FPD can provide reminder for auto ignite and turn-off, TCD with overflow/cut-off protection, flameout detection.
- Excellent FID wide-range to enhance linear range;
- Multi-valve and multi-column switch system to make sure complicated analysis at one times injection;
- PCB system shielding function to reduce interference;
- Carrier gas saving mode available to reduce cost;
- Autosampler, headspace and thermal desorption can be incorporated;
- Analchrom workstation can fulfill 3Q certification to meet GMP/GLPstandard.
- GC is capable of upgradation to any 3rd detector or mass Detector.
  Built in display and computer interface, display chromatograms, method parameters like temp., pressure and flow rates etc.
- Automatic evaluate and store the column pneumatic resistance.
- Capable to calculate the carrier gas linear velocity and the column void information
- Automatic ignition and re-ignition of FID flame through keyboard or software
- Capable to measure disinfection by products (THMs, HAAs etc.), pharmaceutically active compounds, polycyclic aromatic compounds etc.
- GCMS/HRMS and MS/MS field upgradable.

EPC/AFC Gas system

AFC: split/splitless mode, carrier gas can fulfill constant-pressure, constant-flow, constant-speed, programmable-temperature-rise, programmable-flow-rise andprogrammable-speed-rise to reduce sample decomposition and discrimination whileincrease separation and shorten analysis time.

EPCAFC fulfill digitalization and automatization, only need input column parameters, EPC/AFC can set best flow of column and show digitally.

EPC/AFC can fulfill gas leaking self-diagnosis and cut off flow & gas source and alarm at the same time.

Carrier and makeup gas setting selectable for He, H2, N2, and Ar, Psi, KPa, Bar units selectable

Pressure control range: 0-150Psi, Pressure accuracy:0.001Psi, Programmable pressure ramps.

Flow range control range: 0-600ml/min up to 1250ml/min

Pressure set points adjustable in increments of 0.001 psi

Make up gas(purge flow): 0 to 50 ml/min or better

facility of retention time locking and browser interface for remote access

Clarity workstation feature

- Multi-channel and multi-user universal workstation to control all parameter Can collect signal from 4 detectors via RS232 or USB
- Basic parameter: max sample-collecting frequency @100Hz/unlimited peak process quantity/integral sensitivity @1μV*s
- Batch processing makes machine control, auto sampling sequence collecting, auto integral correction much easierauto integral correction much easier
- Fully support FDA-21CFR PART 11, SST AND IQ/OQ
- Powerful post-treatment facilitate chromatography comparing, re-correction and data input&output.
- Feature like easy to use report publisher, online help and answer, fully compatible with windows 7/10.
- Offers minimum sampling time snapshot function, single analysis capability. Automatic and manual peak integration, manipulation, identification, calibration points and levels and manual calibration curve creation, column performance calibration, data comparison function etc.
- LAN
- Windows XP/7 support
- Singnal capture from 2 detectors simultaneously
- Sampling frequency: 100Hz
- Sampling Speed: 50 times/sec
- Unlimited peak quantity
- Self-diagnosis: intelligent automatic error identification and self-protection
- Can compatible with Clarity to fully support FDA-21CFR part 11, SST and IQ/OQ.
  Retention time: <0.0008 min Auto Adjustable
- Peak Area: <0.5% RSD

Inlets

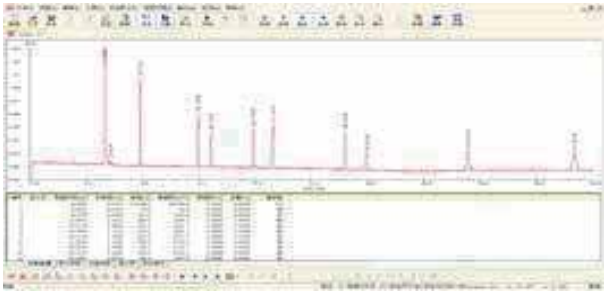
- Packed purge injection port (PPIP)
- Split/splitless capillary port (S/SL)
  1) Max Temperature: 450”
  2) Split ratio: 12500:1
  3) Gas saver mode to reduce gas consumption without compromision performance
  4) Programmable Temp./Pressure ramp: 8 steps
  5) Valve injection is available
  6) Pressure range: 0–1000 kPa (0–150 psi)
  7) User-installable within a few minutes.
  8) Ultra Inert Universal Press Fit Y-Splitter deactivated for splitting column effluent to NPD & FID for simultaneous analysis of Nitro Phosphorus and Organo Pesticides in Same run.
  9) Removable glass liner

System Capability

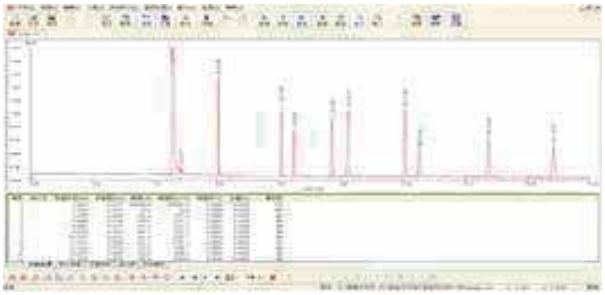
- Assembly simultaneously: 2 inlets +3 detectors (FID, TCD, ECD, FPD and NPD)
- Automatic control can be done from local keyboard and networked PC
- Carrier gas control: EPC/AFC
- Automatic liquid sampling available
- Heated zones up to 7 with GC
- 63 user-selectable events
  Support Multivalve with auxiliary oven
  Operating altitude up to 3500 m above sea level

Basic info

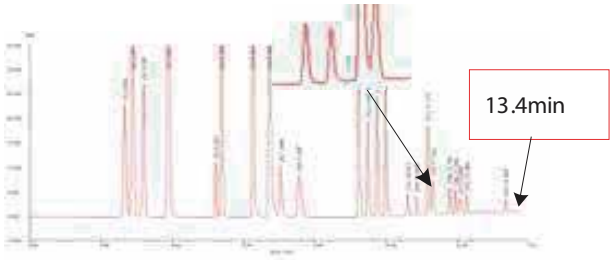
- Voltage: 220V± 10%, 50Hz
- Power: 3000W
- Net dimension 645 x 500 x 555mm
- Net weight: 55Kg



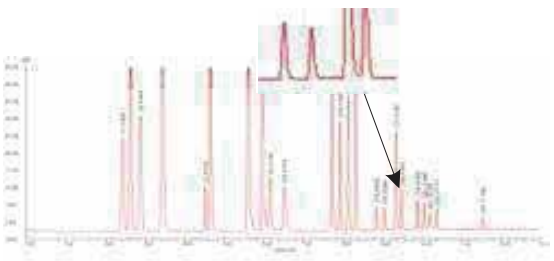
Traditional GC(Column temp @140°C) Analysis time 43min



Optima-3007 (Column temp @140°C) with programmable pressure-rise Analysis time 17min



Traditional GC constant-flow mode Analysis time 13.4min

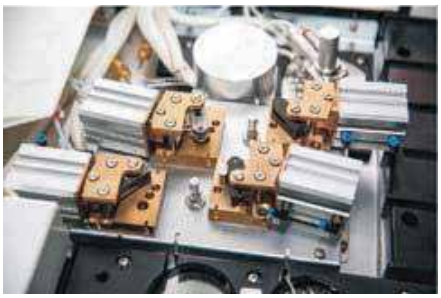


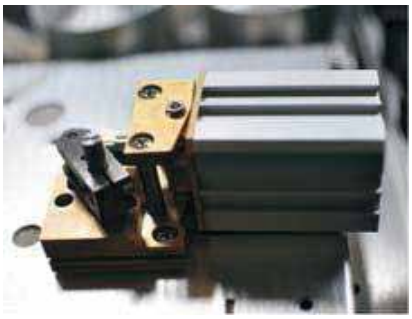
Optima-3007 with programmable pressure-rise Analysis time 17min

Carrier gas saving mode:
After injeciton, can proceed low split flow modeautomatically to reduce carrier gas significantly.

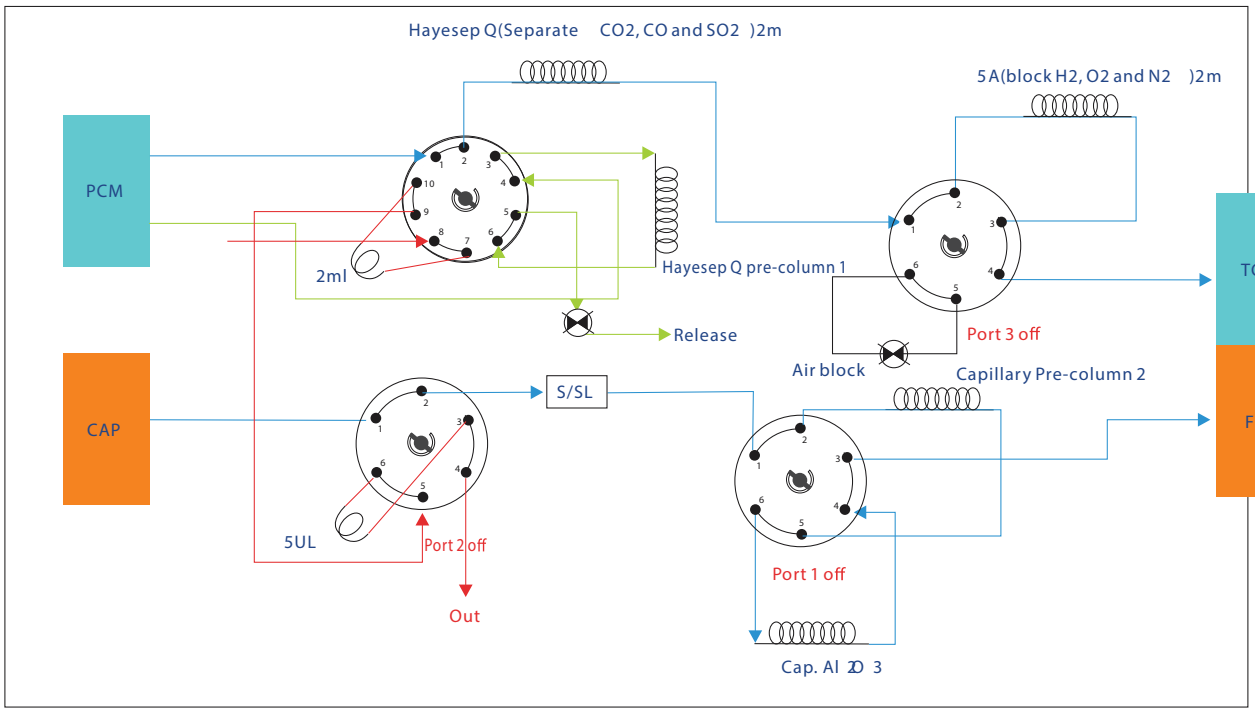
Multi-valve and multi-column switch

Adopting AFP pneumatic valve,can setup 3-valve- 4-column and 4-valve- 5- column switch system to fully analyze only atone time sinpetro chemical, coalgas, trace C2H2 inethylene and trace CO and CO2 in ethylene.





Multi-valve and multi-column flow diagram



Clarity workstation is applicable

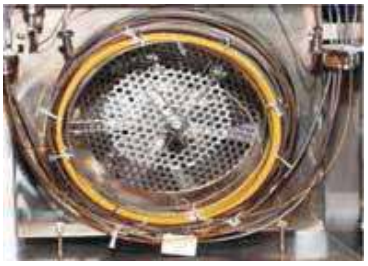
- Multi-channel and multi-user universal workstation to control all parameter
- Can collect signal from 4 detectors via RS232 or USB
- Basic parameter: max sample-collecting frequency @100Hz/unlimited peak process quantity/integral sensitivity @1μV*s
- Batch processing makes machine control, auto sampling sequence collecting, auto integral correction much easier
- Fully support FDA-21CFR PART11, SSTAND IQ/OQ
- Powerful post-treatment facilitate chromatography comparing, re-correction and data input & output.

- Fully counter-control to set all parameter in workstation
- Easy operational
- Multi-channel signal sampling, multi outside events control

Autosampler for optima-3000

Vial capacity: 2 mL (Optional micro-volume vials: 300 μL)
Big displayer with double -tower automatic injection;
Tray vial quantity: 16 or 150;
Injection volume: 0.1-100uL;
Sampling accuracy:+0.01uL;
Injection Port: split/splitless capillary
Injection needle: 5, 10, 50, 100uL;
Injection loop: multiport(0.25ml, 0.5ml and 1ml)
Injection repeatability: <0.5%
Maximum Temperature: 450°C)
Temp. Contrl range: RT+5°C ~ 450°C (0.1°C increment)
Maximum pressure: 0-150psi(with EPC)
Vial volume: 10 ml to 22 rnl
Transfer line based with loop system for precise quantification
Transfer Line to the GC temperature range: 50 to 200 Degree
Automatic leak check and gas saving facility.
system heating up to 200°C or better in increments of 1°C with shaker.
100 sample vial capacity. (upgradable)
Provision for manual injection without any difficulty

Column Oven for optima-3000



Column oven dimension: 278x310x165mm=15L; accommodate up to 2pcs
105m x 0.53mm ID capillary column
Temp. control cool down range: RT+4°C~450°C(0.1°C increment)
Temperature Ramp: multi-ramp(>20)with 21 plateaus Negative ramps are allowed 100 degree C/min
Temperature set point Resolution: 0.1 °C
Heat up time: 50°C to 450°C in less than 5min
Programming heat temp.-ramp speed: 0-125°C/min
Programming temp.-ramp : any step;
Fast cool down: 450~50°C ≤3.5min
Temp. accuracy: 0.1℃.
Max run time: 999.99 minutes
Ambient rejection : <0.01°C per 1°C
The oven temperature stability is within 0.01°C / every °C of actual temperature
Cryogenic option minimum temperature: -100°C with liquid nitrogen;
-50°C with liquid CO_2
Inlets, detectors and auxiliary modules have electronic pneumatic channel control

Wide split ratio setting range;
Max capillary split ratio: 12500:1;
Packed injection, capillary injection, flash-evaporation injection, PTV injection and liquid injection are available;
Easy consumables changeover .

FID Detector

Excellent wide range FID design, no ceiling limit for solvent peak;
Limit of detection can be <1.2 pgC/s
Flameout detection and re-ignition possible;
Solvent no tailing peak.
Sensitivity: >0.03 Coulombs/gC Data
Acuisition Rate: up to 1000Hz

NPD Detector

NPD Detector.
Max operating temperature 400°C;
Baseline noise: ≤$4x10^{-13}$ A
Data acquisition rate: upto 500Hz
Selectivity: 20,000 to 1 g N/g C, 150,000 to 1 g P/g C with azobenzene/malathion/octadecane mixture and equivalent mixture

TCD Detector

TCD Detector
Max operating temp. 400°C
Limit of detection: ≥400 pg/ml(N-C16)
Baseline noise: ≤30uV
Baseline drift (after 2hrs stabilization): ≤100uV /30min
Linear dynamic range: 105
Data Acquisition rate of 300 hz

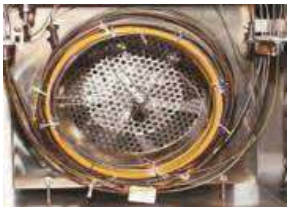
Can incorporate flash-evaporation and high pressure liquid injection

Flash-evaporation injection for gas-liquid mixture, high pressure valve injection for liquid.

PTV sample injection

With multiple accumulated injection and solvent release, increase temperature program-rise to achieve trace analysis.
PTV injector capable of operating in the range from room temperature +5ºC to 450 ºC with 120ºC /min ramp capability.

- Carrier and makeup gas settings selectable for He, H2, N2 and Ar
- Psi, KPa, Bar units selectable
- Pressure control range: 0~150Psi, Pressure accuracy: 0.001Psi
  Programmable pressure ramp RSD ≤ 0.5%
- Flow rate control range: 0~600ml/min upto 1000ml/min , flow rate accuracy: 0.1ml/min
  flow rate RSD ≤ 0.1%
- programmable pressure/flow rate ramping: 20 steps



Column oven dimension: 278x 310x 165mm=15L

- Temp. Contrl range: RT+5°C ~ 450°C (0.1°C in crement)
- Programming temp. - ramp speed : 0-125°C/min
- Programming tamp.-ramp : any stap
- Fast cool down: 450~50°C ≤
- Temp. accuracy: ±0.1°C
- Flow sensor accuracy: ≤±3%, detector module accuracy: <+7%

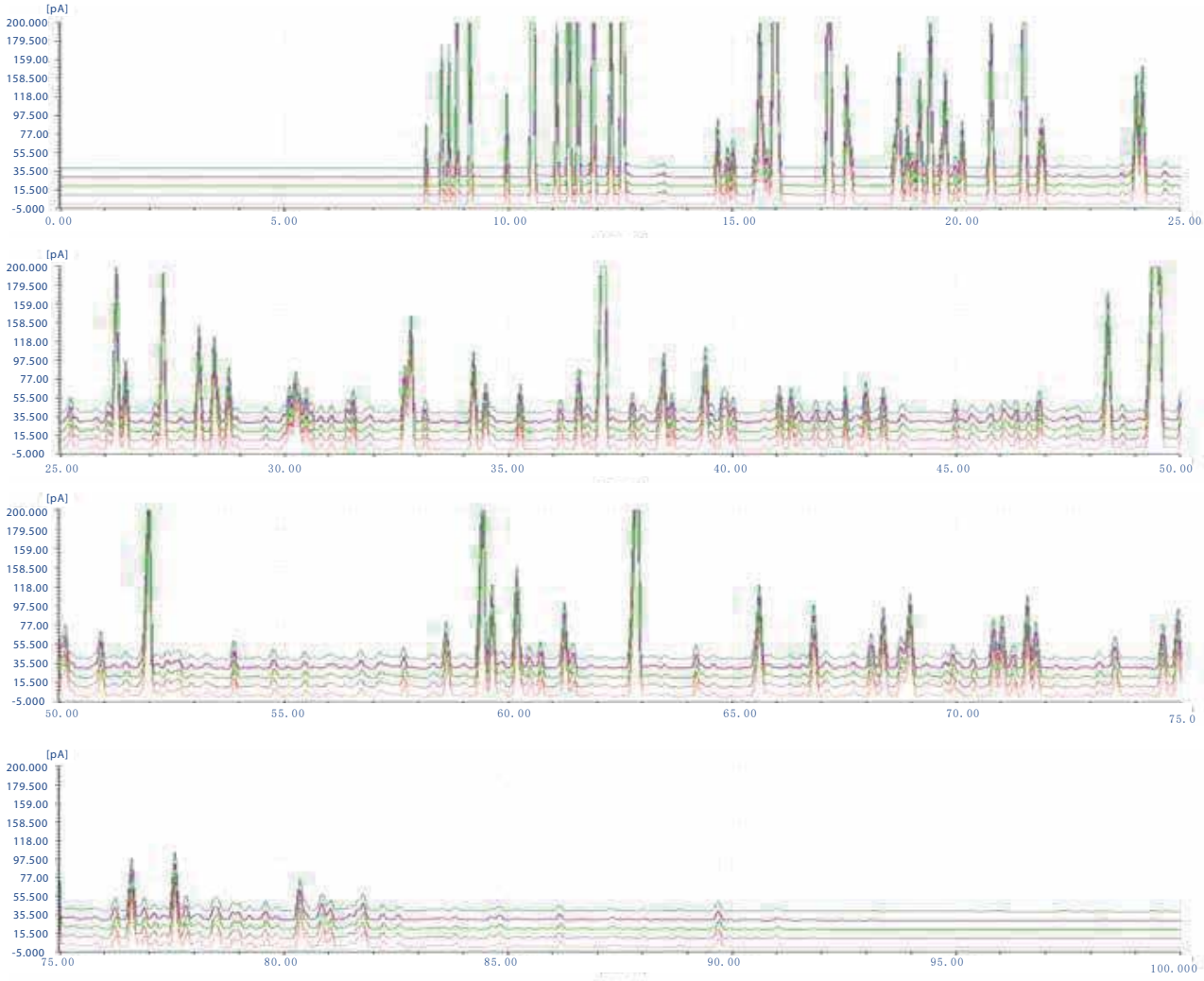
Detector	Max operating temp.	Limit of detection	Baseline noise	Baseline drift (after 2hrs stabilization)	Linear dynamic range
FID	450°C	≤1.2 pgC/s (N-C16)	≤2 x 10^{-14} A	5 x 10^{-14} A/30min	≥ 10^{7}
TCD	400°C	≥ 400 pg/ml (N-C16)	≤30uV	≤ 100uV /30min	≥ 10^{5}
ECD	400°C	<4.5 fg/second	≤20uV	≤ 50uV /30min	≥ 4x10^{4}
FPD	400°C	S: <4 pg s/s P: <100 fg p/s or 2.0 x 10^{-13} g/s	S: ≤2 x 10^{-13} A P: ≤8 x 10^{-13} A	S: ≤1 x 10^{-12} A/30min P: ≤2 x 10^{-12} A/30min	S ≥ 10^{3} P: ≥ 10^{4}
NPD	400°C	N: 0.08 pg N/s P: <0.01 pg/s	≤4 x 10^{-13} A	2 x 10^{-12} A/30min	N: ≥ 10^{5} P: ≥ 10^{5}

Standard setup	Capillary inlet	Split/splitless capillary
	Packed inlet	Packed inlet
	Workstation	Optima-3007 or Analchrom counter-control workstation
Optional sampling device	Injection Value	6 - port valve or 10-port valve
	Headspace sampler	Available
	Thermal desorption	Available
	Auto sampler	16 or 150

Performance introduction
INSTRUMENTS PERFORMANCE IS INTRODUCED

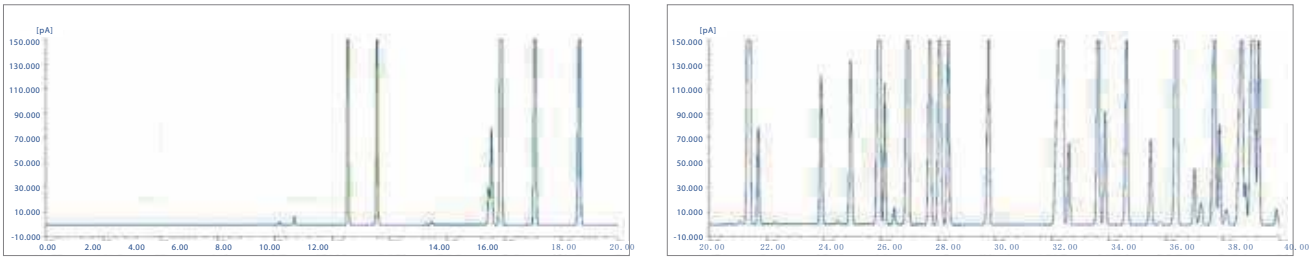
Excellent qualitative repeateability

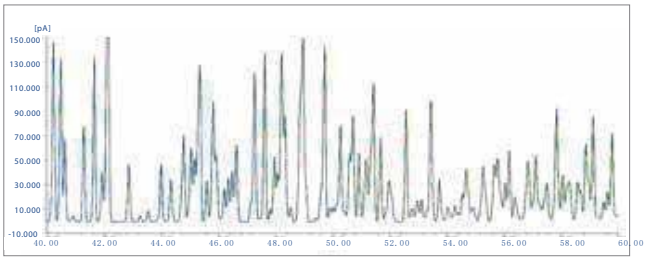
Retention time: <0.0008 min

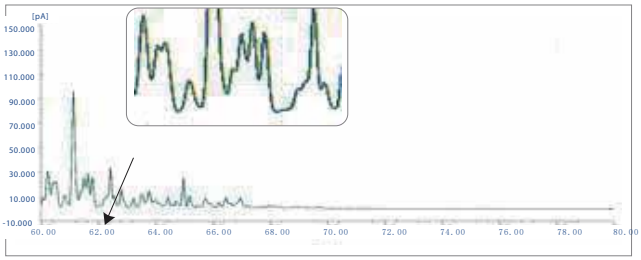


Excellent quantitative repeatability

Peak Area: <0.5% RSD

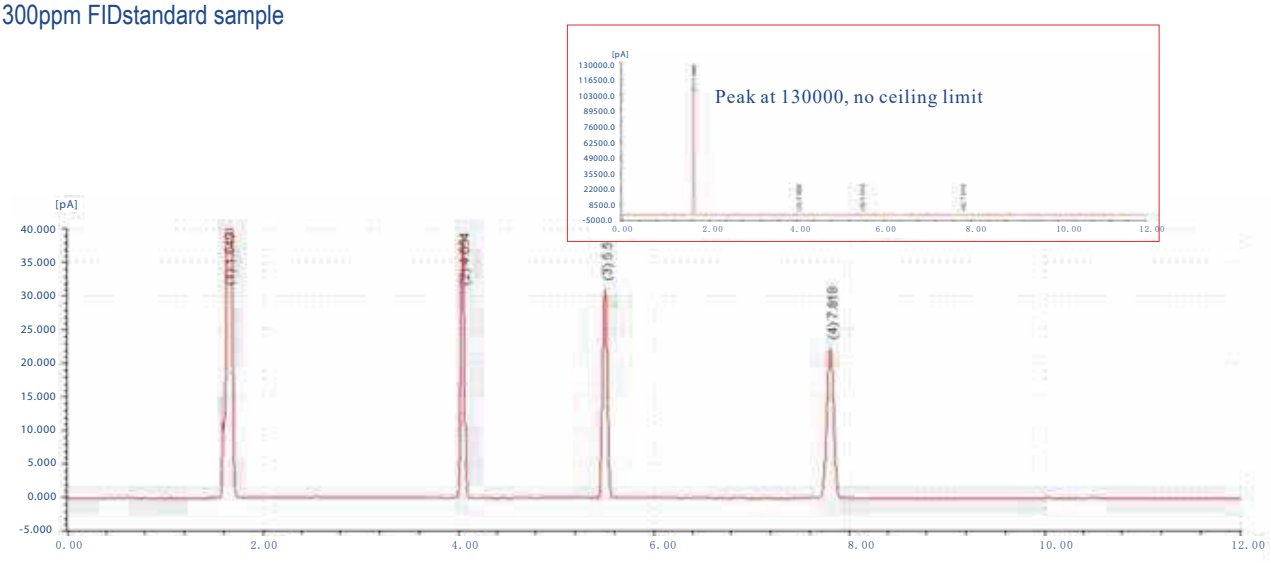






Excellent wide-range design makes no ceiling limit of solvent peak

300ppm FIDstandard sample



Typical application

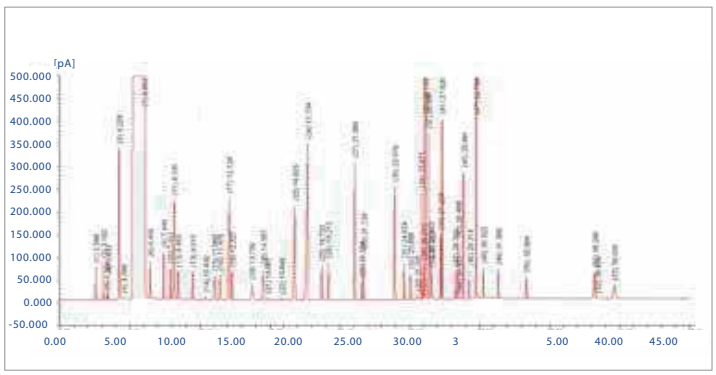
GC-3007 is suitable but no limited to below application: food safety, environmental protection, energy(), medicine Petroleum refining industry and etc.

【Food safety】

Chinse white wine

Setup

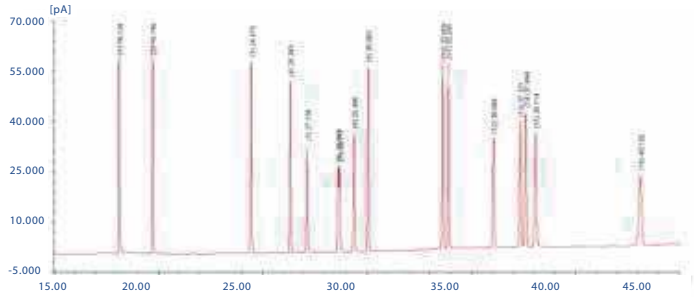
Detector: FID
Inlet: Capillary
Gas control module: 2 sets
Injection mode: liquid autosampler
Column: LZP950 for wine
Workstation: Optima-3007



DEHP(Di-(2-ethylhexyl)phthalate)

Setup

Detector: FID
Inlet: Capillary
Gas control module: 2 sets
Injection mode: liquid autosampler
Column: HP-5 cap.
Workstation: Optima-3007

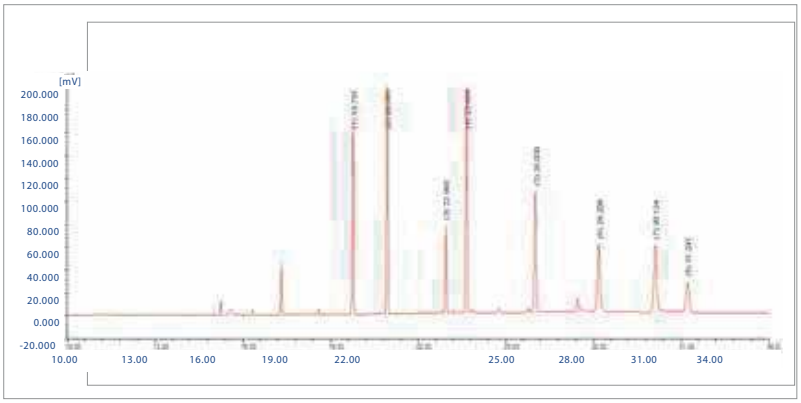


200ppb organochlorine in pesticide residue

Setup

Detector: ECD
Inlet: Capillary
Gas control module: 2 sets
Injection mode: liquid autosampler
Column: HP-5
Workstation: Optima-3007

Peak sequence:α-BHC,β-BHC,γ-BHC, δ-BHC, op-DDE, pp-DDD, op-DDT, pp-DDT

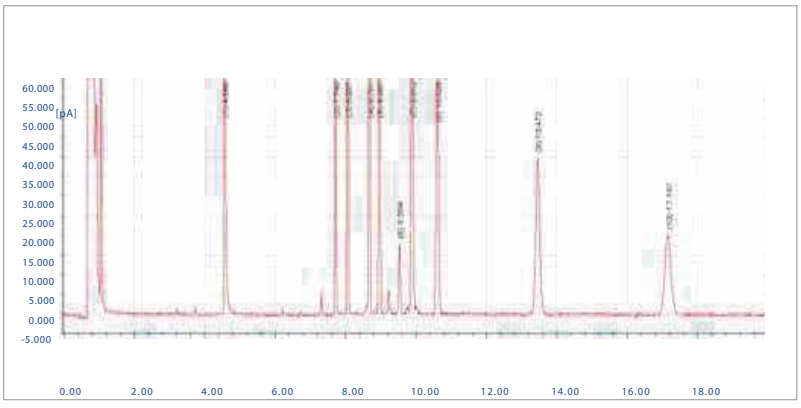


100ppb organophosphoruspesticideresidue

Setup

Detector: FPD
Inlet: Capillary
Gas control module: 2 sets
Injection mode: liquid autosampler
Column: DB-35
Workstation: Optima-3007

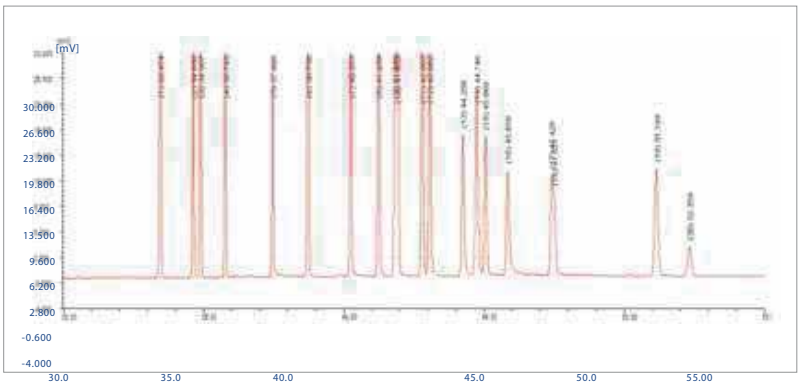
Peak sequence: DDVP, methamidophos, acephate, omethoate, dimethoate, parathionmethyl, fenitrothion, parathion, quinalphos, tiguron triazophos



Complicated Organochlorine

Setup

Detector: ECD
Inlet: Capillary
Gas control module: 2 sets
Injection mode: liquid autosampler
Column: HP-5
Workstation: Optima-3007

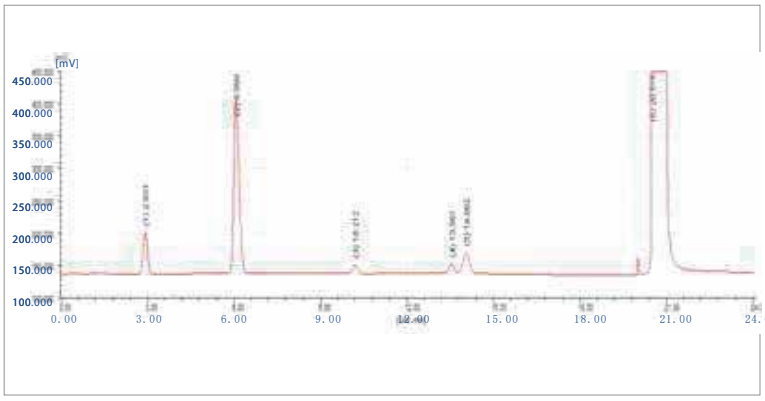


【Environmental protection】

Setup

Detector:TCD
Inlet: Packed
Gas control module: 2 sets
Injection mode: liquid autosampler
Column: Hayesep Q
Workstation: Optima-3007

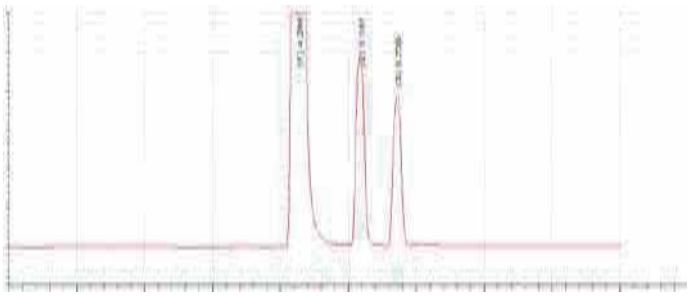
Peak sequence: COS, CS_2, SO_2, Methyl Mercaptan, Ethyl Mercaptan



Setup

Detector: ECD
Inlet: Capillary
Gas control module: 2 sets
Injection mode: liquid autosampler
Column: DM-1
Workstation: Optima-3007

Peak sequence: CHCl3, CCl4



【Energy】

Setup

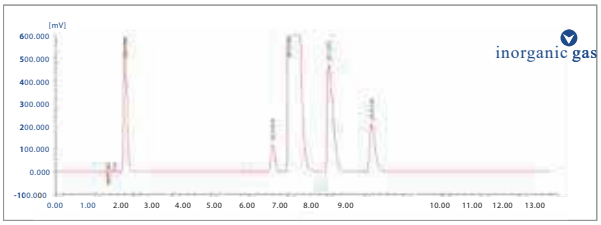
Detector:FID+TOC
Injector: gas/capillary

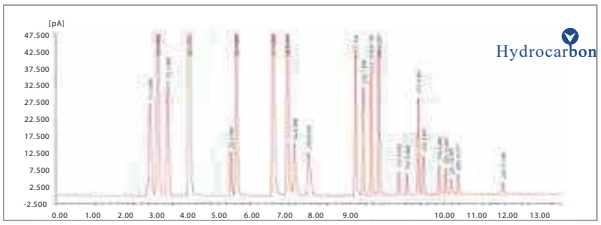
4-valve-5-column
Gas control module: 4sets
Valve injection

Column: Hayesep Q packed, 5A packed, AL_2O_3 capillary, DB-1 capillary
Workstation: GC-3007

Inorganic gas peak sequence: H2, CO_2, O_2, N_2, CO

Hydrocarbon peak sequence: CH4, C2H6, C2H4, C3H6, C3H8, cyclopropane, C2H2, iso-butane, Propadiene, n-butane, trans-2-Butene,, n-butylene, isobutene, cis-2-Butene, isopentane, n-pentane, allylene, 1,3-butadiene, 2-methyl-2-butene, trans-2-Pentene, 1-pentene, cis-2-Pentene, Hexane

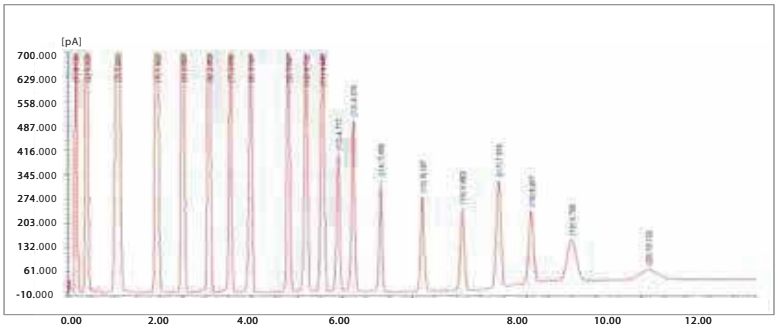




Distillationsimulation

Setup

Detector: FID
Inlet: Capillary
Gas control module: 2 sets
Injection mode: liquid autosampler
Column: HP-1 cap.
Workstation: GC-3007

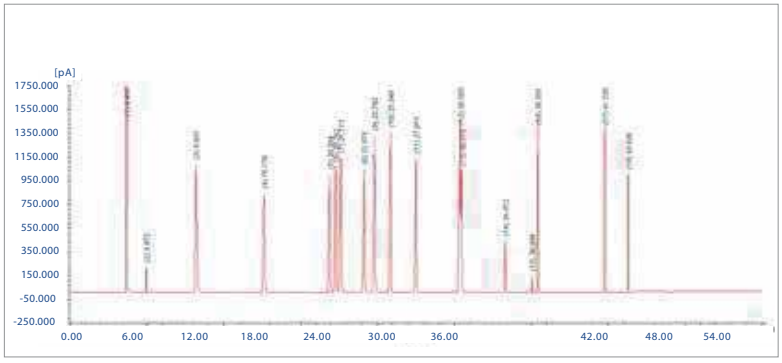


Aromatic compounds

Setup

Detector: FID
Inlet: Capillary
Gas control module: 2 sets
Injection mode: liquid autosampler
Column: Innowax cap.
Workstation: Optima-3007

Peak sequence: Benzene, Toluene, Ethane, P-xylene, M-xylene, P-Ethyltoluene, M-Ethyltoluene, S-Butybenzene, Diethylbenzene, O-diethylbenzene

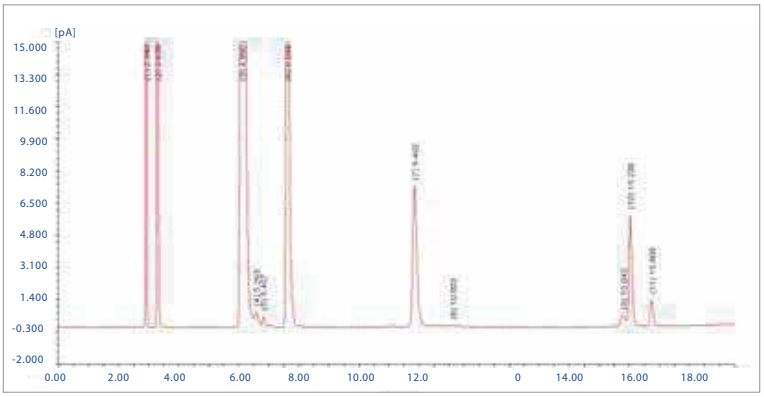


Dimethyl etherinLNG

Setup

Detector: FID
Inlet: Capillary
Gas control module: 2 sets
Injection mode: Gas valve injection
Column: PLOTQ cap.
Workstation: Optima-3007

Peak sequence: CH4, C2H2, prepene, propane, methylal, Dimethyl ether, n-butene, cis-bitene, isoamylene, methyl alcohol, n-pentane



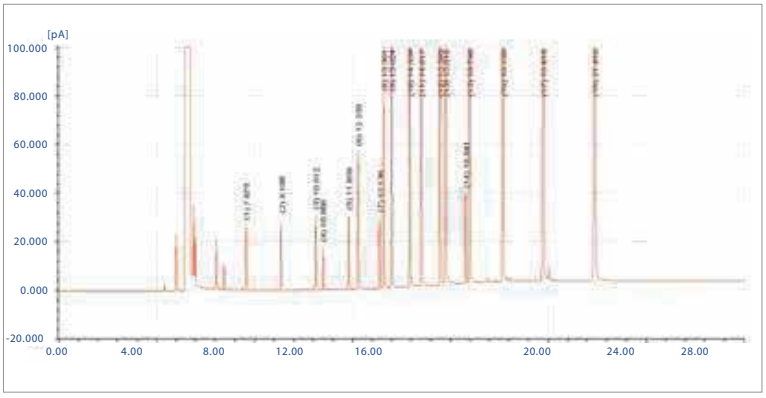
【 Medicine 】

Organic acid

Setup

Detector: FID
Inlet: Capillary
Gas control module: 2 sets
Injection mode: liquid autosampler
Column: DB-FFAP
Workstation: Optima-3007

Peak sequence: acetic acid, propionic acid, butyrate, valeric acid, sovaleric acid, caproic acid, heptylic acid, octanoic acid, n-nonanoic acid, lactic acid, 2-Hydroxy-2-Methylbutyric Acid.

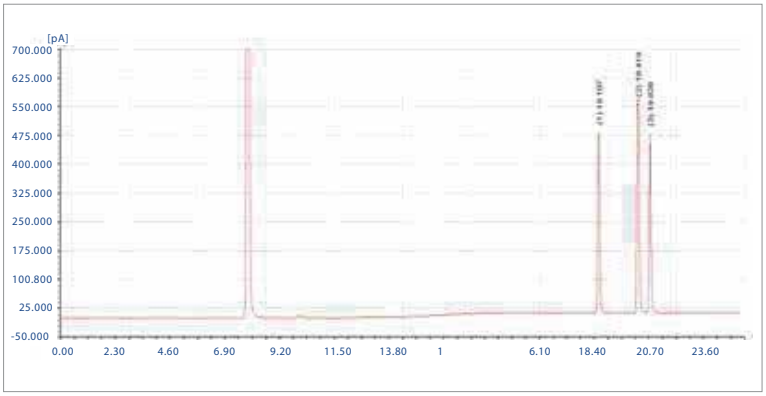


Cresolisomer

Setup

Detector: FID
Inlet: Capillary
Gas control module: 2 sets
Injection mode: liquid autosampler
Column: specialized for cresol
Workstation: Optima-3007

Peak sequence:o-cresol, p-cresolm-cresol

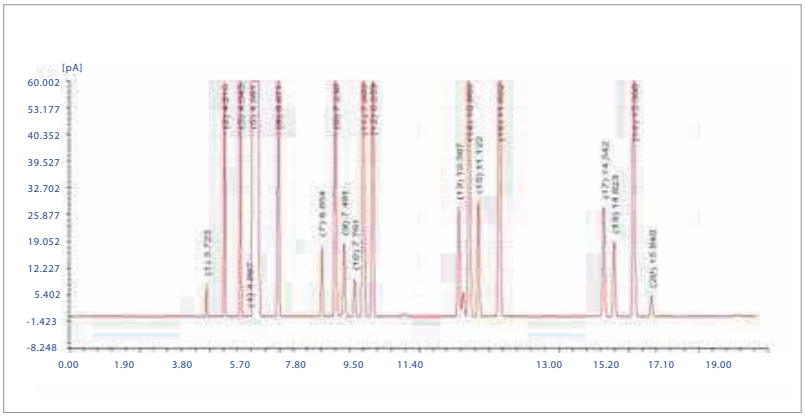


Organic solvent:

Setup

Detector: FPD
Inlet: Capillary
Gas control module: 2 sets
Injection mode: liquid autosampler
Column: DB-624 cap.
Workstation: Optima-3007

Peaksequence:methyl alcohol, ethanol, acetone+ isopropanol, acetonitrile, dichloromethane,chloroform, isobutanol CCl_4 Benzene, n-heptane, isoamylol, pyridine, toluene, n-amyl alcohol, ethylbenzene, p-xylene, n-Hexanol, o-xylene

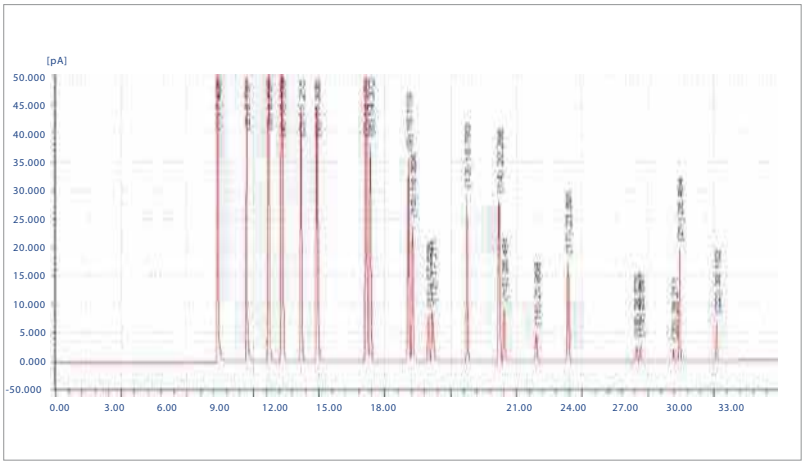


VOCS2nd-level solution

Setup

Detector: FPD
Inlet: Capillary
Gas control module: 2 sets
Injection mode: liquid autosampler
Column: PC-VOCOL
Workstation: Optima-3007

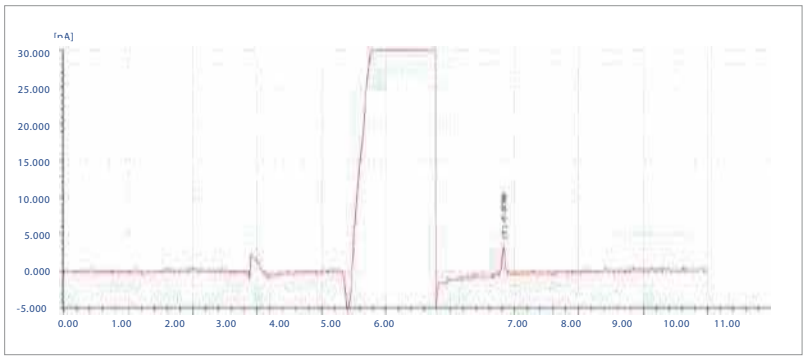
Peak sequence: methanol, ethanol, isopropanol, acetone, methyl acetate, n-butyl alcohol, butanone, ethyl acetate, acetic acid isopropyl ester benzene, 1-Methoxy-2-propanol, propyl acetat, 4-methyl-2-pentanone, 1-Ethoxy-2-propanol, toluene, n-butyl acetate, ethylbenzene, o-xylene, styrene



50ppb thiopheneinBenzene

Setup

Detector: FPD
Inlet: Capillary
Gas control module: 2 sets
Injection mode: liquid autosampler
Column: HP-Innowax
Workstation: Optima-3007



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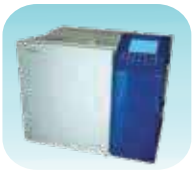

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