

# GCMS - 3068 Plus GCMS



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

**Analytical Technologies Limited**

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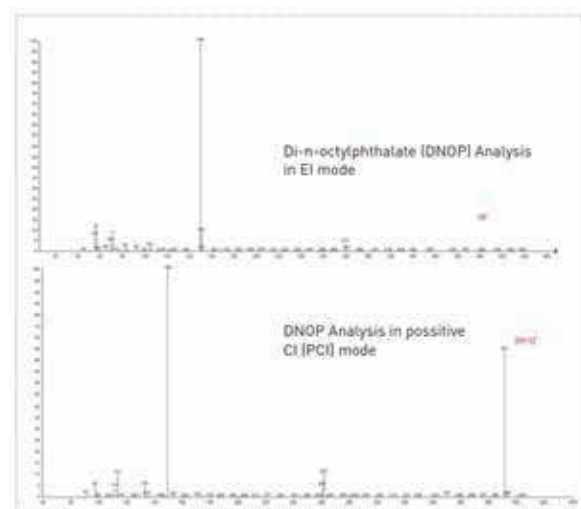
## ►► Quadrupole

New Chemical Ionization (CI) source expands range of applications

Switching between Electron Ionization (EI) source and CI source is quick and easy. When performing the qualitative and quantitative analysis of combustible samples, or for analysis where the response in EI mode is low, such as for certain pesticides, a CI source can effectively lower the limit of detection.



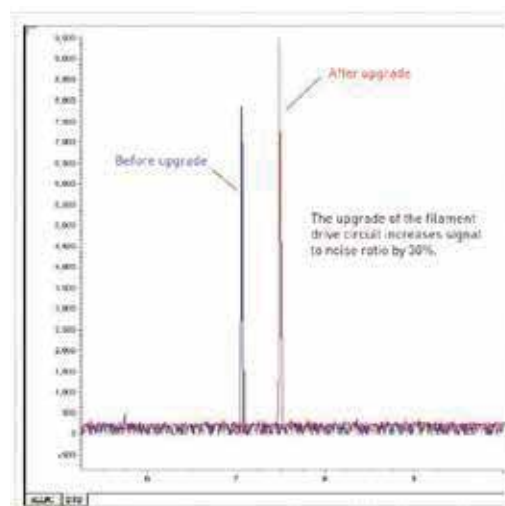
Chemical Ionization Source (Optional)



DNOP Analysis Results

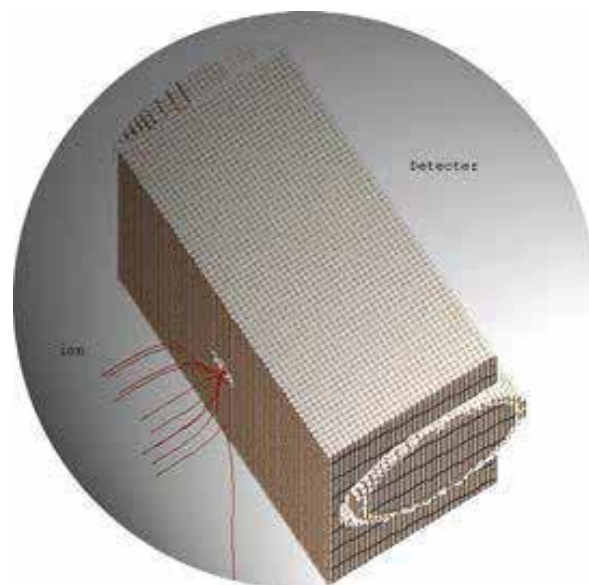
The newly designed ion optics system optimizes ion yields and transmission characteristics, effectively improving the sensitivity and resolution, while reducing neutral particle noise.

- The optimized ion source filament control circuit implements constant emission and constant reception modes. In constant reception mode, the maximum change to the electron flow within a 30-minute period is 0.02  $\mu$ A. Due to the enhanced performance of the feedback system, the stability of the ion signal has been improved. The new, innovative voltage offset technology optimizes the spatial distribution of the electron beam which increases the signal to noise ratio by 30%.



Analysis of octafluoronaphthalene (OFN)

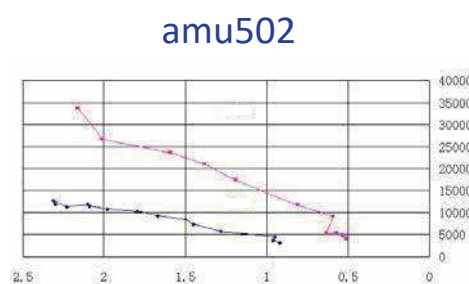
- The improved ion source optical system uses a redesigned magnetic field to more accurately focus the ion beam, which reduces the adverse effects of excessive magnetic fields on the ion trajectory of back-end ion optics system, and improves the ion transmission, and thereby enhances the mass resolution and signal to noise ratio.
- The vertical focus detector system utilizes a high-gain, low dark current electronic multiplier and polished mirror parabolic dynode to decrease neutral noise and background interference of filament photons and to increase high mass end response.

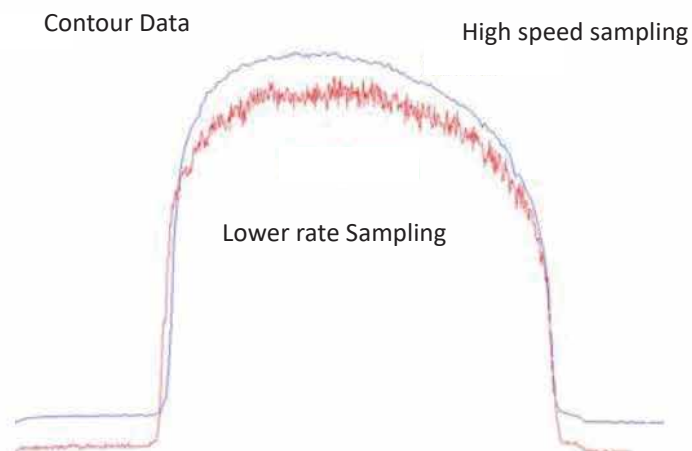


Vertical Focus Detector

**Improved quadrupole circuit control system achieves equal peak width identification within the full mass range and optimizes conduction rates.**

- The sampling system utilizes the most advanced FPGA processing technology. Sampling frequency has been increased to 1 MHz. More data points are processed. Signal stability has been improved. Digital I/O communicates with the workstation using high-speed USB allowing fast data transmission. DC dynamic compensation technique significantly improves the relative transmission rate of target ions. M/Z 502 has been increased from 6.4% to 37.6%.





FPGA high-speed processing circuit

- Improved preamplifier circuit utilizes shorter analog signal transmission lines, and enhanced shielding against electromagnetic interference. Electrostatic noise has been reduced by one-third, and linear dynamic range has been increased to  $10^5$  with linearity in the range of  $10^{-12}g$  to  $10^{-7}g$ .
- Improved data communication interface can complete a connection with the workstation within 30 seconds.
- More rigorous fault alarm functions were added for protection of pump power, axis temperature, and each subcomponent's temperature and high-voltage output. Even a new user will not need to worry about damage to the instrument caused by operation error. Advanced warning function will alert the user to potential issues that may cause significant damage or loss of supplies to help users reduce cost and improve efficiency.

### High-Performance, High- Spec Vacuum System

- Vacuum system utilizes a 250 L/s turbo pump and a  $10m^3/min$  two-stage rotary vane mechanical pump and can be used with large diameter capillary columns to enhance analysis speed and sensitivity. The whole vacuum system combines noise isolation technology with an intelligent noise reduction box to provide a clean high vacuum and a quiet laboratory environment at the same time.
- Wide range cold cathode vacuum gauge allows vacuum measurement from atmospheric pressure to  $10^{-7}$  Pa and features long usage life, no consumables, no special maintenance and low cost.



High Performance Molecular Turbo Pump

## ►► Gas Chromatograph and Sample Introduction Unit

- New industrial design is simple and elegant, with a distinctive, user-friendly GC control panel. Interface was designed with protection from user error in mind.
- The EPC gas control uses our patented third generation EPC control unit with pressure or flow control mode. Purge valve is electronically controlled to minimize sample diffusion and loss. Split / splitless sample injection modes are available to satisfy various application requirements. Automated gas-saver function effectively reduces operating costs. Original instant valve switch technology with no dead volume is used eliminate long waiting times for stable pressure when valve switches open in splitless injection mode. This effectively improves peak shape and repeatability of retention times.
- Optimized GC temperature control system increases accuracy of oven temperature control to  $\pm 0.03^{\circ}\text{C}$  which improves analysis repeatability. The built-in installation positions of nitrogen, hydrogen and air gas paths are compatible with other chromatography detectors according to users' needs. Temperature-programmed repeatability has been improved which results in sharper peaks of the heavy compounds in oils.
- Unique CI reagent gas flow control module uses feedback control that automatically adjusts reagent gas flows in proportion to the preset CI gas target ions to an optimum level, thereby ensuring high CI analysis repeatability while saving on reaction gas.

- Innovative rotatable liquid autosampler can rotate 360° on the horizontal plane. The autosampler can be easily removed from the mount to simplify the GC maintenance.



- Simple and practical direct liquid and solid inlet probe option allows fast structural analysis of unknown compounds, providing a powerful tool for chemical synthesis applications. Unique removable probe heater is easy to replace in case of damage or contamination. The maximum temperature is 650°C
- Compatible with standard conventional GC columns.
- Optional autosampler.
- Software can be configured for several optional peripheral accessories. Purge and trap concentrator, liquid autosampler, thermal desorption, headspace sampler, among others can be easily setup, configured, and controlled. Additional DO (Digital Output) port can be used for external device control.
- Innovative rotatable liquid autosampler can rotate 360° on the horizontal plane. The autosampler can be easily removed from the mount to simplify the GC maintenance.





## ►► Powerful Software System

Our user friendly software interface provides ease of use along with a powerful array of features for the advanced user.

System provide practical and accessible solutions for our user's analytical needs.

## ►► Data Acquisition and Control Application

- Chromatograms, mass spectra, parameters and instrument status are displayed simultaneously in a clean interface.

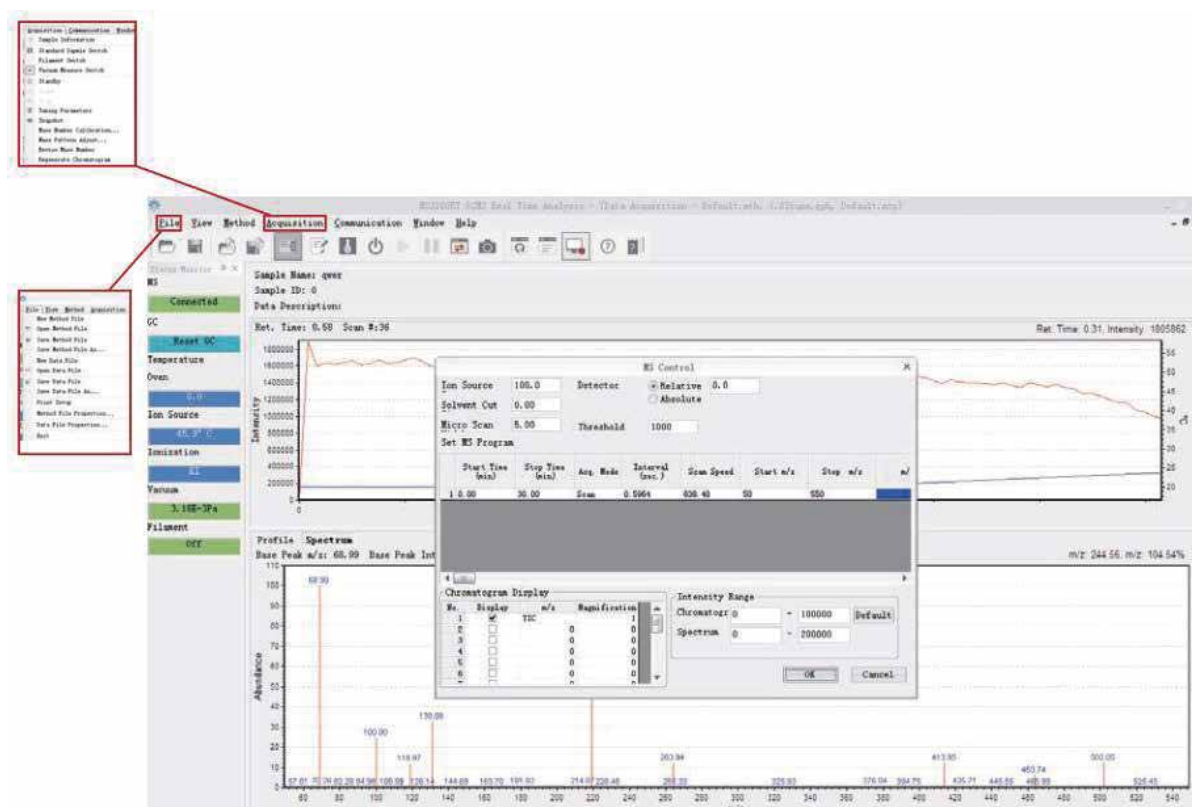
Users can easily reference all relevant information during the analysis.

- Available scanning modes include Scan, selected ion monitoring (SIM), or alternating Scan and SIM. Select scan mode based on desired analytical speed and quality.

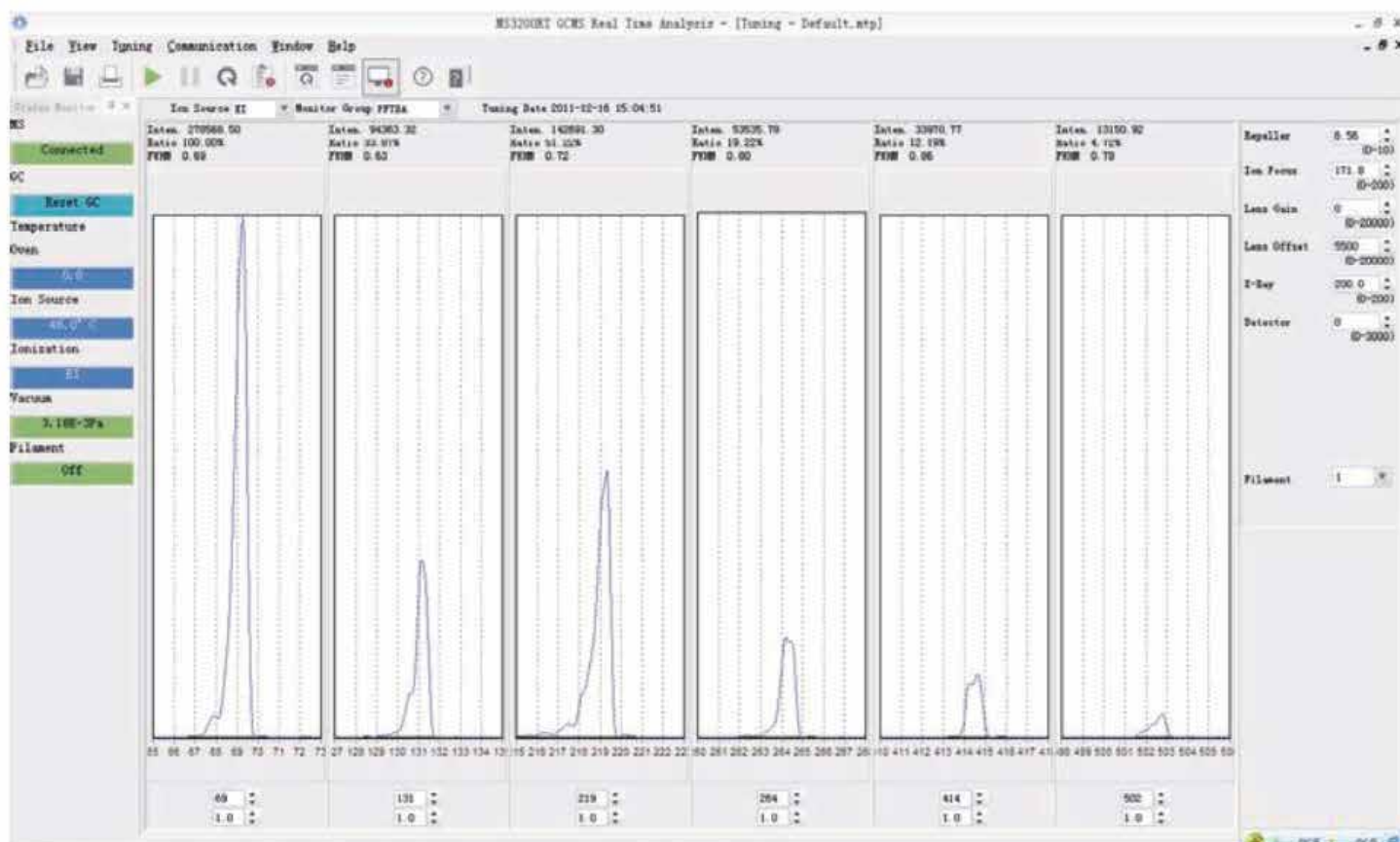
- All analysis parameters can be controlled through software, including carrier gas flow, pressure, column oven temperature, inlet temperature, etc. Automated GC-MS safe power down procedure can be initiated from the software.

- Analysis method can be easily exported and imported.

- Instrument status parameters are displayed in real time. Alarms are shown in noticeable colors. The automated low vacuum protection function protects fragile parts such as the filament, detector, etc.



- Total ion chromatogram and mass spectrum are displayed in the same interface to allow for easy comparison. Mass spectrum can be displayed as a processed bar graph or as raw data.
- Snap spectrum transfer function by one click imports real-time files into the data processing software for qualitative and quantitative analysis.
- The software offers a standard function menu for new users. Advanced users can use shortcut command keys for quicker access to features. Start, stop, and other actions can be performed by using accessible buttons on the main interface.
- Both manual and automatic mass spectrum tuning are provided. Tuning conditions include resolution, sensitivity, abundance ratio, among others. These can be set according to analysis requirements. In manual tuning mode, effects of any changes in parameters on the mass signals can be observed. Manual tuning is suitable for both special application requirements and users with strong background in mass spectroscopy. Parameters and mass spectra are shown together for easy observation.
- Software can perform a vacuum leak check function, which is essential for instrument maintenance.

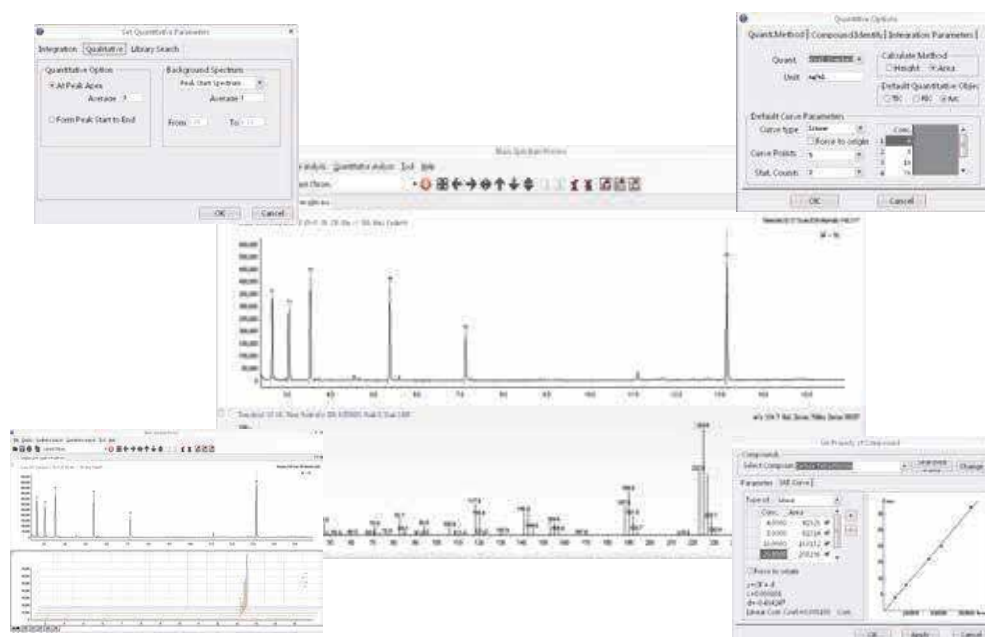




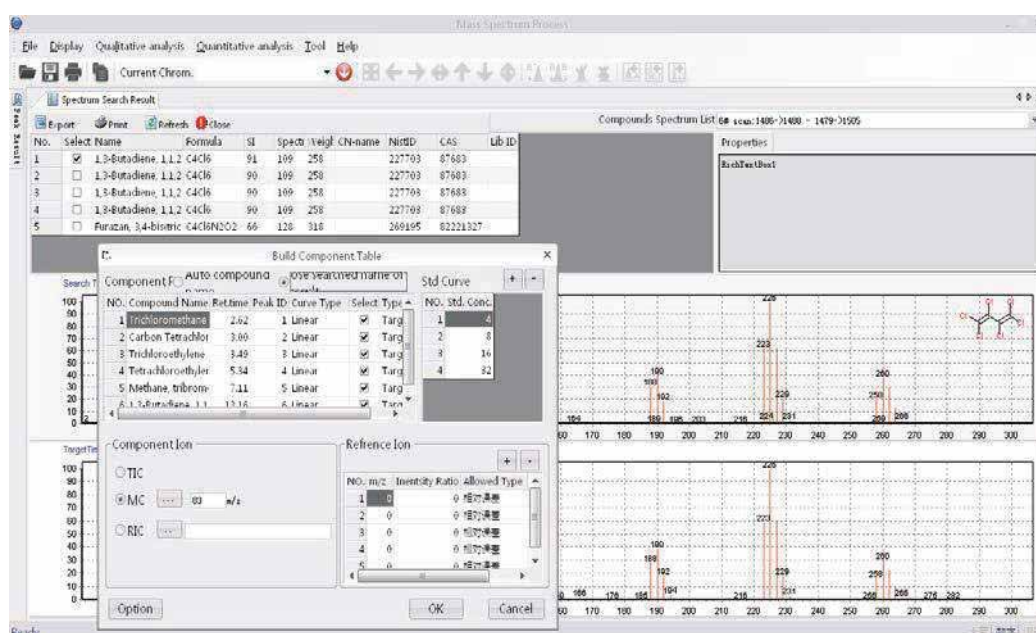
- Instrument status can be monitored in the tuning interface so as to protect the instrument.
- Switch between EI (electron ionization) and CI (chemical ionization) modes. Turn on/off the calibration compound.
- Tuning reports can be quickly printed after tuning is complete.
- Remote instrument diagnostic functions provide fast and professional technical assistance for your instrument anywhere in the world.

## ►► Data Processing Application

- All data processing methods are provided. The total ion chromatogram (TIC), mass spectrum, single ion chromatogram (MC), multiple ion chromatograms (MIC) are displayed on one screen for easy recognition and comparison of peak purity.
- For qualitative analysis, the number of similar compounds displayed in the qualitative report can be set according to requirements. Report contents can be configured to obtain a simple qualitative report.
- Quantitative functions include standard method, internal standard method, normalization method and corrected normalization method. MC, TIC, MIC can all be integrated upon and quantified.
- The three-dimensional rendering function displays retention time, intensity, and mass number more intuitively in the same coordinate system.



- Software comes with professional petroleum data analysis tools for rapid analysis of petroleum chemical products for quality process control. Features include spectrum calculation, compound group screening and group composition export. The SNR calculation tool helps to evaluate the performance of instrument at any time. The spectrum addition and subtraction function is used to correct for the interferences caused by system background noise.
- Data files are exported in CDF formats and can be imported by other software.
- Other features include concise display layout, flexible qualitative approach of peaks, powerful batch processing capabilities and full quantitative methods
- Standard spectra library provides manual single component query, and batch query. User defined libraries can be used for special applications.

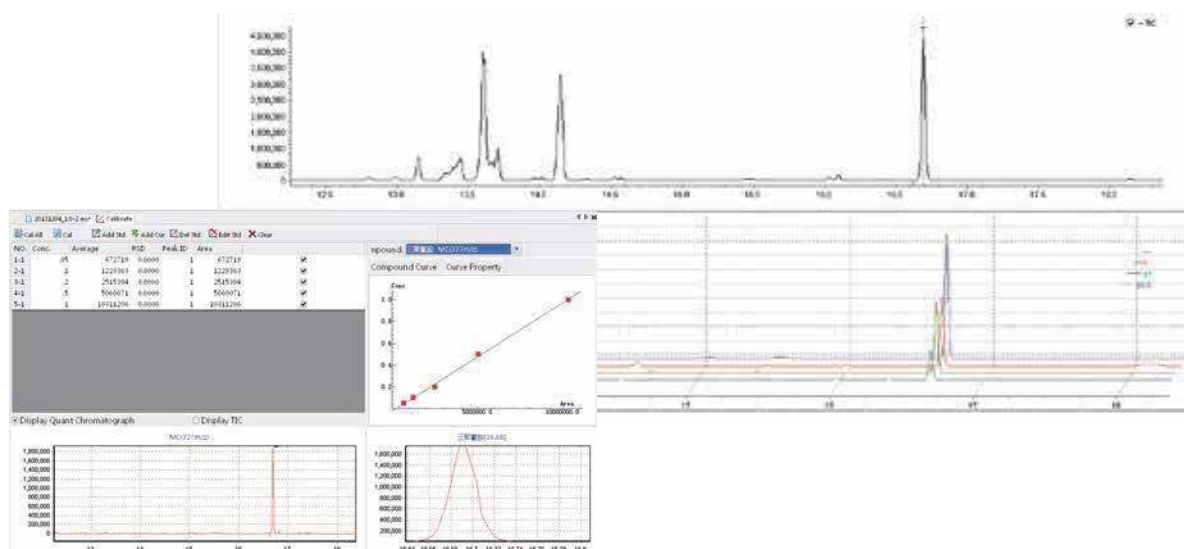


Multicomponent Fast Batch Qualitative and Quantitative Analysis

## ►► Applications

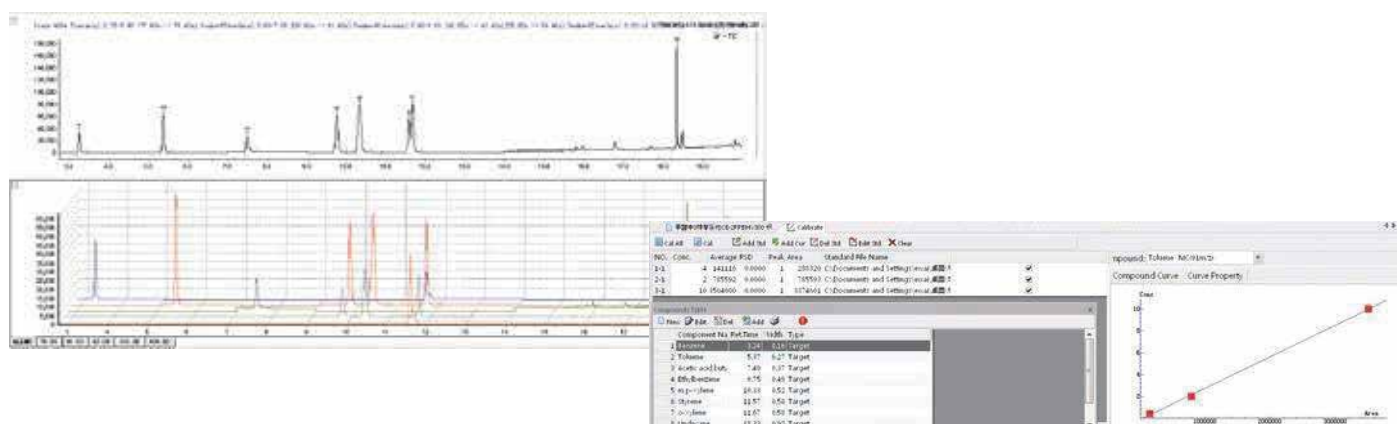
The excellent performance of the GCMS 3068 Plus makes it suitable for applications in various fields including food safety, environmental safety, chemicals, among others.

### Detection of Melamine in Milk



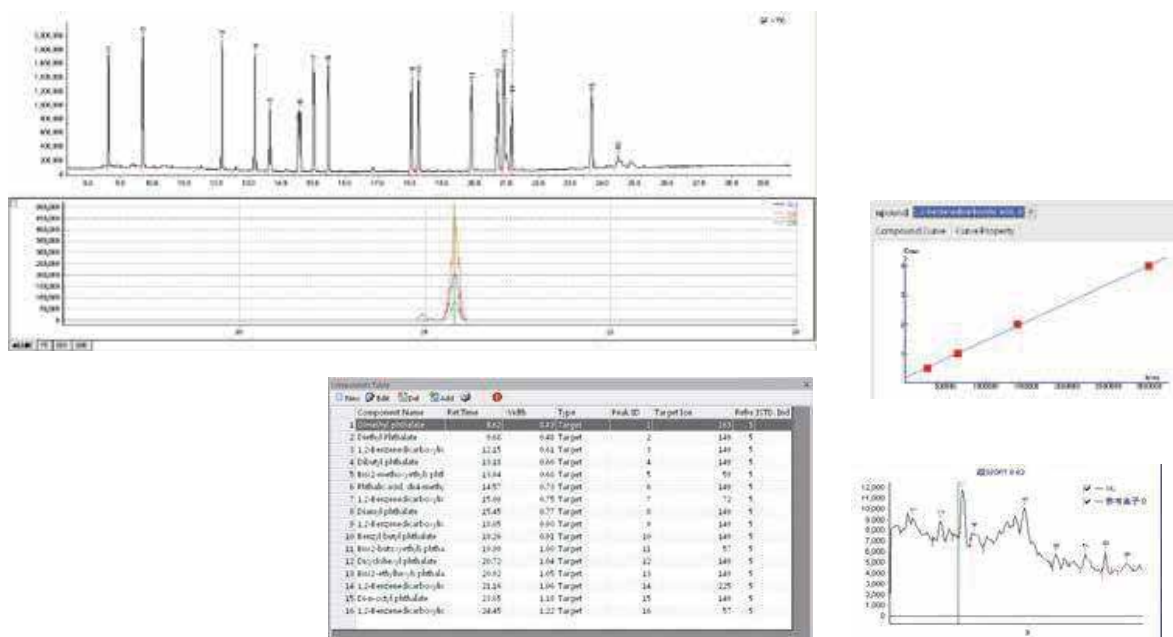
The detection limit is stable at 0.01 mg/kg. Linearity remains excellent between 0.05 - 50 mg/L. Recovery of added standard is between 85% - 108%. Relative standard deviation is less than 5%. Correlation coefficient is above 0.999. Results comply with GB / T 22388-2008 standard.

## ►► Analysis of Volatile Organic Compounds (VOC) in Drinking Water or Surface Water



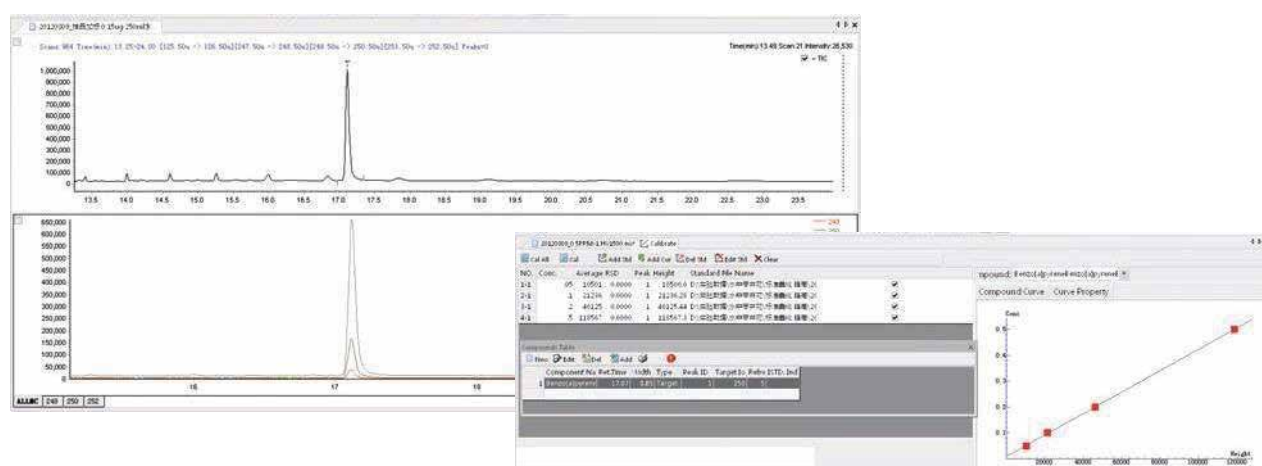
Using external standard method, range of linearity is 0.5 - 100 µg/L. Correlation coefficient of each component is between 0.993 ~ 0.9992. The lowest detection limit is 0.001 mg/L for vinyl chloride. The instrument shows excellent performance in VOC analysis of drinking water in compliance with EPA method 502.2 and GB5749-2006.

## Detection of Plasticizer in Liquors



16 types of phthalates in liquor are analyzed simultaneously. Range of linearity is 0.08 - 1.6  $\mu\text{g/mL}$ . Recovery of added standard is between 70% - 119%. The lowest detection limit achieved is 1.06  $\mu\text{g/kg}$  for DEP. Shows excellent contamination resistance. After 1 month of continuous use, background signal remains within spec.

## Trace PAHs Detection



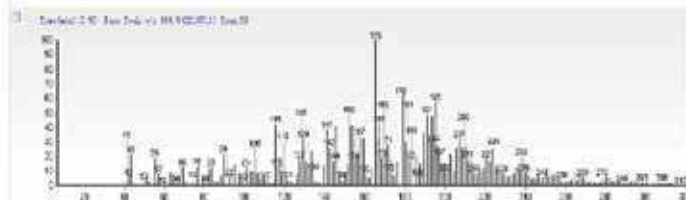
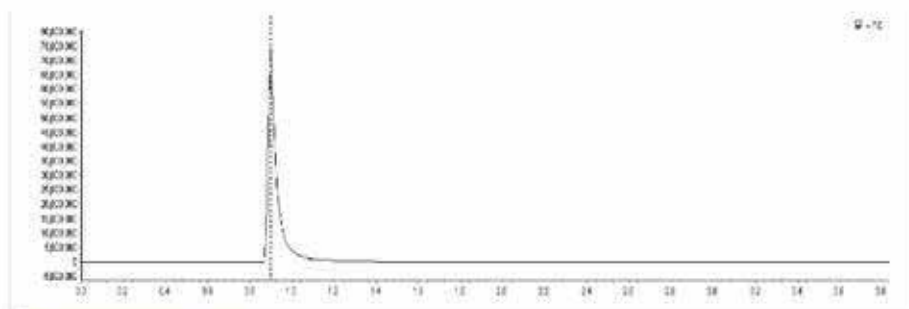
Linear correlation coefficient is more than 0.999 in the concentration range of 0.05 - 0.5  $\mu\text{g/mL}$ .

Relative standard deviation is less than 6%. The lowest detection quality for benzopyrazole is 0.05 ng.





## Rapid Semi-quantitative Analysis of Hydrocarbons



GC/MS rapid test spectra of light oils

Test results

Table 1: Repeatability results of saturated hydrocarbons in Sample A

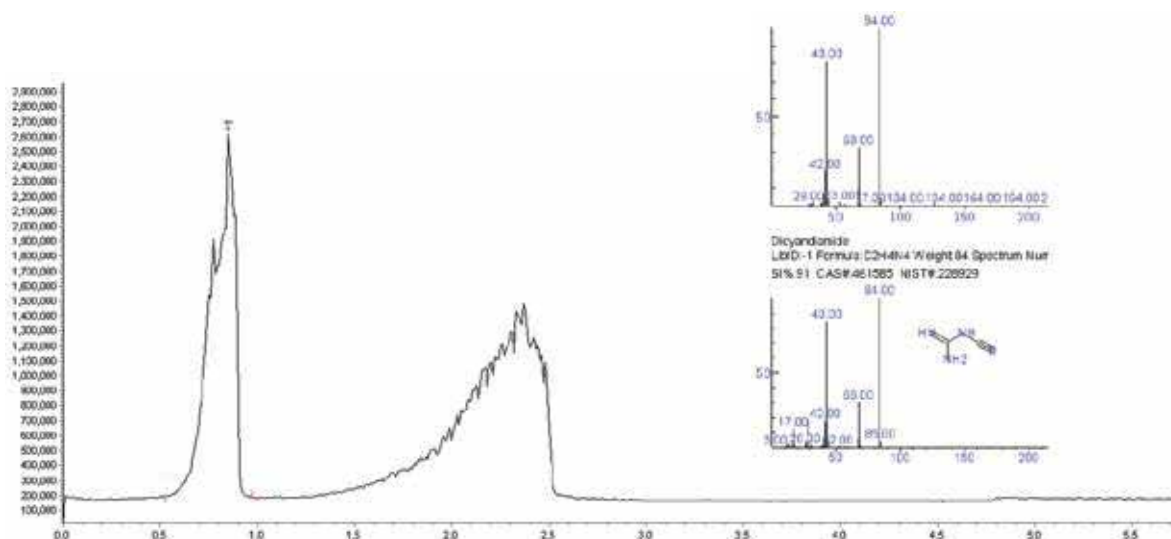
Saturated hydrocarbons in Sample A	1	2	3	4	5	6	Average	RSD
Alkane hydrocarbons	54.8	56.5	54.1	55.5	55.2	56.9	55.50	1.89%
Cycloalkane hydrocarbons	18.6	18.5	17.9	18.7	19.7	17.5	18.48	4.08%
Bicyclic hydrocarbons	17.1	15.8	18.1	16.4	15.8	16.2	16.57	3.38%
Tricyclic hydrocarbons	7.3	7.1	7.3	7.3	7.1	7.2	7.25	2.09%
Alkylbenzenes	2.2	2.1	2.4	2.1	2.2	2.2	2.20	4.98%

Table 2: Repeatability results of aromatic hydrocarbons in Sample A

Aromatic hydrocarbons in Sample A	1	2	3	4	5	6	Average	RSD
Alkane hydrocarbons	0	0	0	0	0	0	0	0
Cycloalkane hydrocarbons	4.5	4.6	4.3	4.3	4.3	4.2	4.37	3.45%
Alkylbenzenes	18.1	16.6	17.8	17.1	17.2	16.7	17.27	3.45%
Indan or Tetralin	15.5	15.7	15.3	15.9	15.6	16.5	15.78	2.42%
Indene or C <sub>14</sub> H <sub>10</sub>	14	12.8	13.5	13.8	13.5	13.3	13.48	3.04%
Naphthalene	0.68	0.7	0.65	0.62	0.72	0.75	0.69	6.88%
Naphthalene compounds	18.7	18.6	18.7	18.8	18.6	18.8	18.70	0.48%
Acenaphthene or C <sub>12</sub> H <sub>10</sub>	13.2	13.7	13.2	13.3	13.3	13.3	13.42	1.66%
Acenaphthylene or C <sub>12</sub> H <sub>8</sub>	9.9	10.6	10.2	10.2	10.5	10.7	10.35	2.91%
Tricyclic aromatic hydrocarbons	5.3	6.4	5.2	5.6	6	5.6	5.68	7.90%

By using a 10 m hollow column combined with crude oil analysis software and rapid GC column oven heating, quantitative results of hydrocarbon group compositions can be obtained within 2 min.

## Qualitative Analysis of Unknown Samples Using Direct Injection Probe



Rapid qualitative analysis of dicyandiamide using DIP



## ►► Flexibility and Expandability

### Flexible Configurations

- **The following configurations are applicable to water quality testing**

(applicable to EPA Method 502.2)

Purge and trap analyzer + GCMS 3068 Plus + software package + DB-624 (30 m × 0.25 mm × 1.4 μm) fused silica capillary column

Headspace sampler + GCMS 3068 Plus + software package + DB-624 (30 m × 0.25 mm × 1.4 μm) fused silica capillary column

Applicable to quantitative detection of volatile organic compounds in surface water, drinking water and reservoir water.

- **Economical configuration applicable to ambient air quality monitoring**

EW-3TD thermal desorption device + GCMS 3068 Plus+ software package + equivalent DB-5MS column (30 m × 0.25 mm × 0.25 μm) moderately polar column

Applicable to air quality testing in indoor environments and public spaces.

Provides high sensitivity for TVOC and other common harmful gases.

- **Typical configuration applied to conventional laboratory analysis**

Autosampler + GCMS 3068 Plus + software package + DB-5MS (30m × 0.25mm × 0.25μm) fused silica capillary column

Suitable for qualitative and quantitative analysis of most organic compounds such as spices and perfumes, pesticides, batch sample analysis of PAHs.

- **Configuration applicable to quality control in a chemical synthesis process**

DIP100 + GCMS 3068 Plus+ software package + DB-5MS (30m × 0.25mm × 0.25μm) fused silica capillary column

Applicable to rapid qualitative analysis of chemical synthesis intermediates and final products and quantitative analysis combined with GC sample introduction.

- **Mobile laboratory mounted in monitoring van**

Analytical laboratory can be mounted to a mobile laboratory platform for rapid investigation of chemical contaminants in cases of food safety and environmental pollution emergencies.

## ►► Technical Specifications

Working Conditions	
Power	220 V, 50 Hz
Temperature	15°C-35°C
Humidity	25%-80% RH
Specifications	
Gas Chromatograph	
• Column oven	
Column oven temperature	Room temperature + 10°C-400°C
Temperature stability	≤±0.03°C
Maximum heating rate	40°C/min
Maximum run time	999.99 min
10-segment programmable temperature control	
• Split/splitless inlet (3rd generation EPC)	
Maximum temperature: 400°C	
Electronic controlled pressure, flow rate and split ratio	
Pressure range: 0-999 kPa	
Flow range: 0-200 mL/min	
• Autosampler (optional)	
Mass Spectrometer	
• Main Specifications	
Mass range	1.5 - 1050 amu
Mass stability	Better than 0.1 amu/48 h
Resolution	Unit mass
Sensitivity	DB-5MS 30m*0.25mm*0.25um fused silicacapillary column or similar column.
	El source, full scan: (range 100-300 amu).
	1 pg OFN S/N≥100:1
Maximum scan rate	10,000 amu/s
Dynamic range	10 <sup>5</sup>

• Ion source	Electron impact ionization source (EI), standard.
	Chemical ionization source (CI), optional.
Dual filaments	Programmable switch
Maximum filament current	3 A
Emission current	10 – 350 $\mu$ A adjustable
Ionization energy	5 – 150 eV adjustable
Ion source temperature	150 – 320°C adjustable, individually controlled
• Mass analyzer	Quadrupole.
	Full scan, selected ion monitoring (SIM) and acquisition.
	At most 128 groups in SIM mode.
	At most 128 ions in each group.
• Detector	electron multiplier + high-energy dynode back focusing assembly
• GC-MS interface	
Individually controlled through transmission cable, 150–320°C adjustable	
• Vacuum system	
Turbomolecular pump (250 L/s), mechanical pump (180 L/min)	
Wide range compound cold cathode gauge	
Data processing system	
Hardware	Computer (optional)
Printer	Laser printer (optional)
Software	MS3200RT Real-time data acquisition application and MS3200P data processing application
Optional Accessories	
DIP 100 liquid/solid direct injection probe assembly	
Thermal desorption device	
Dynamic headspace sampler	
Purge-and-trap sample concentrator	

## HPLC Servicing, Validation, Trainings and Preventive Maintenance :

**HPLC Servicing** :HPLC Servicing : We have team of service engineers who can attend to any make of HPLC promptly @the most affordable cost.

**Trainings** :We also take up preventive Maintenance to reduce downtime of HPLC's Trainings.

**AMC's/CMC** :AMC's/CMC :We offer user training both in-House and at customer sites on HPLC principles, operations, trouble-shooting.

**Validations** :Validations :We have protocols for carrying out periodic Validations as per GLP/GMP/USFDA norms.

**Instruments** :Instruments :We offer instruments/Renting Services Modules like pumps,detector etc. on Rent.



## About Analytical Technologies

Analytical Technologies is synonymous for offering technologies for doing analysis and is the Fastest Growing Global Brand having presence in at least 96 countries across the global. Analytical Technologies Limited is an ISO:9001 Certified Company engaged in Designing, Manufacturing, Marketing & providing Services for the Analytical, Chromatography, Spectroscopy, Bio Technology, Bio Medical, Clinical Diagnostics, Material Science & General Laboratory Instrumentation. Analytical Technologies, India has across the Country operations with at least 4 Regional Offices, 6 Branch Offices & Service Centers. Distributors & Channel partners worldwide.

## Our Products & Technologies



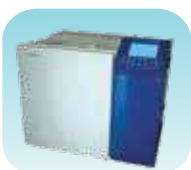
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Double Beam



Infra FTIR



Optima Gas  
Chromatograph  
3007



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Chromatograph  
2979 Plus



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Chromatograph



Atomic Absorption  
Spectrophotometer



Liquid Particle  
Counter



Optical Emission  
Spectrophotometer



DSC/TGA



Semi Auto Bio  
Chemistry Analyzer



HEMA 2062  
Hematology  
Analyzer



Micro Plate  
Reader/Washer



URINOVA 2800  
Urine Analyzer



Total Organic  
Carbon 3800



Fully Automated  
CLIA



NOVA-2100  
Chemistry Analyzer



PCR/Gradient PCR/  
RTPCR



TOC  
Analyzer



Laser Particle  
Size Analyzer



Ion Chromatograph



Water purification  
system

## Regulatory compliances



## Corporate Social Responsibility

Analytical Foundation is a nonprofit organization (NGO) found for the purpose of:



**Analytical**  
**Foundation**

1. Research & Innovation Scientist's awards/QC Professional Award : Quality life is possible by innovation only and the innovation is possible by research only, hence ANALYTICAL FOUNDATION is committed to identify such personalities for their contributions across various field of Science and Technology and awarding them yearly. To participate for award, send us your details of research / testing / publication at [Info@analyticalfoundation.org](mailto:Info@analyticalfoundation.org)

2. Improving quality of life by offering YOGA Training courses, Work shops/Seminars etc.

3. ANALYTICAL FOUNDATION aims to DETOXYFY human minds,souls and body by means of yoga, Meditation, Ayurveda, Health Care, Awards, Media, Events, Camps etc.



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