



## EXPEC 5210 LC-MS/MS

### Triple quadrupole mass spectrometry

For more information visit our website at [www.fpi-inc.com/en](http://www.fpi-inc.com/en)

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## Product Overview

EXPEC 5210 is a triple quadrupole tandem mass spectrometer with independent intellectual property rights developed by FPI. After years of research and development investment and employing a series of innovative mass spectrometry technologies. Aiming at the core technology of triple quadrupole tandem mass spectrometry, the key technologies of high stability electrospray ion source, high efficiency desolvation ion interface, triple quadrupole high-efficiency ion transmission, triple quadrupole mass analyzer, high-speed collision cell, and RF circuit drive have been resolved, to create a new product of triple quadrupole tandem mass spectrometry with superior performance.

EXPEC 5210 has excellent sensitivity and stability, outstanding scalability and best cost performance and is suitable for a wide range of application fields such as environmental testing, medical testing and food safety. MassExpert mass spectrometry workstation software is independently developed with English language. It includes professional mass spectrometry control and quantitative analysis software, with standard method library, automatic tuning, intelligent batch processing and customized report output functions, which greatly reduce the difficulty of operating the mass spectrometry software system. At the same time, MassExpert also has thousands of compound standard libraries and rich application method libraries to meet the application needs of more mass spectrometry users.



## Features

### Unique Dual Orthogonal Ion Source and Dual 3Q Ion Optics

- EXPEC 5210 adopts ESpray dual orthogonal electrospray ion source technology to ensure excellent ion yield and anti-matrix capability. EXPEC 5210 adopts unique triple quadrupole ion guidance technology and triple quadrupole mass analyzer technology to ensure the analytical performance and long-term stability.

### Excellent Sensitivity

- The product adopts a newly designed Step Scan ion transmission technology, which effectively enhances the ion transmission efficiency.
- Innovative axial acceleration collision cell technology greatly improves collision efficiency.
- Through the patented pulse-counting detection technology, ion signals can be detected without any loss, and noise disturbance can be filtered effectively.

### Perfect Stability

- The high-efficiency desolvation ion source and ion interface enhance the system tolerability.
- The patented dual-channel RF power closed-loop adaptive adjustment technology enhances the stability of the quadrupole RF power supply.
- The patented temperature and humidity alternating resistance technology can adapt a wider temperature and humidity application scope.

### Mass Expert Mass Spectrometry Work Station

- The operation of the brand-new Mass Expert mass spectrometry control software and analysis software is easy; the function of "on-click" automatic tuning and mass calibration reduces the complexity of instrument control, and lowers the instrument use threshold. The mass spectrometry analysis software and report templates can be customized for different application fields and different users to meet the demands of different application fields.

## Innovative Triple Quadrupole Mass Spectrometry

### TQ Mass Analyzer

- Gold-plated pure molybdenum quadrupole mass analyzer, providing optimal thermal stability.
- Ultrastable frequency-modulation quadrupole RF power supply, optimal resistance to the changes in temperature and humidity, ensuring excellent stability even under common laboratory conditions.

### Dual Orthogonal E-spray Ion Source

- Powerful and scalable ESI ion source.
- Orthogonal ion path with 90 degree deflection to reduce neutral particles entering the mass spectrum and reduce noise.

### Step Scan Ion Transmission

- Unique Q-Lens, perfectly linking to the ion interface.
- Axial accelerating Q-Funnel ion collection is adopted to improve the ion transmission efficiency.
- Q-Guide, improved quadrupole transmission channel, ensuring the efficient transmission of all ions.

### Pulse Count Detector

- Special deflecting-channel electron multiplier.
- The patented pulse-counting detection provides higher signal response, and generates lower noise.

### High-speed Dynamic Collision Reaction Cell

- The patented 2nd-generation hexapole collision reaction cell.
- The design of axial acceleration enables the ions to pass through the collision cell quickly.
- The patented distributed diffusion mode of collision gases significantly improves collision efficiency and enhances sensitivity.

### Reliable Multi-level Vacuum System

- Multi-level vacuum system based on the molecular pump + prepump.
- Vacuum step transition, reducing sudden changes of air pressure and decreasing ion loss.

### Perfect Instrument Control System

- Interlocking control is adopted for all gas circuits, voltage and heating, ensuring equipment safety.
- The vacuum system is controlled independently, and has complete self-protection function.
- All gas circuits are controlled by MFC, and all parameters are controlled precisely.

### Ion Interface

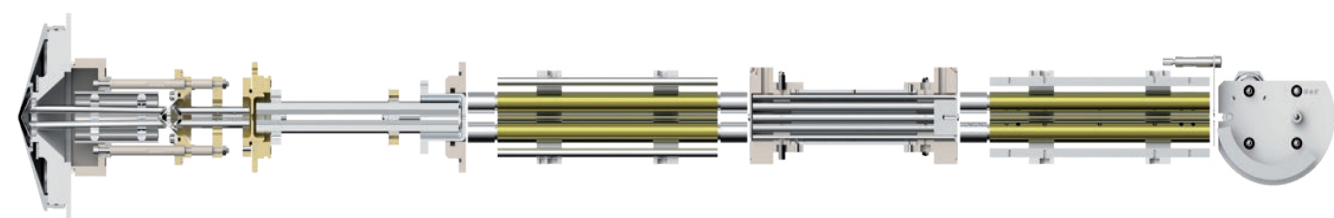
- Blowback gas designed to further improve the desolvation.
- High purity nitrogen back blowing to eliminate interference.
- Independent heating gas circuit, independent temperature control of blowback air.





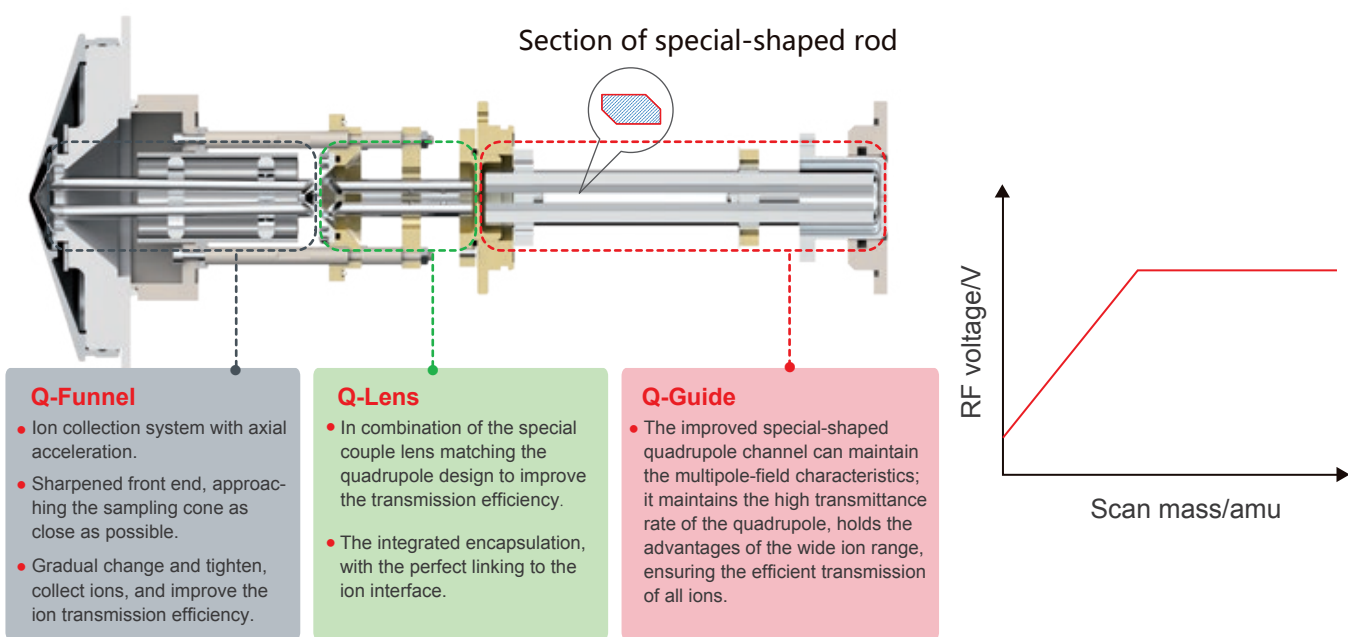
# Robust and Efficient Ion Optics

Innovative dual-3Q ion optical system provides high ion transmission efficiency, excellent matrix tolerance, good balance of sensitivity and stability, and thus superb application effects.



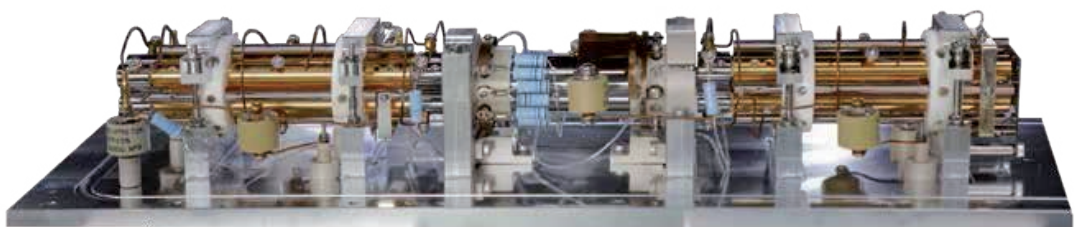
## Step Scan 3Q Ion Transmission System

- Integrated encapsulation, for convenient assembling, disassembling and cleaning.
- 3 sets of quadrupole, forming a unique 3Q ion transmission channel; as the channel diameter of the ion is large, the ion transmission is efficient.
- The design of quadrupole, step scanning, significantly reducing the interference of the low mass number.



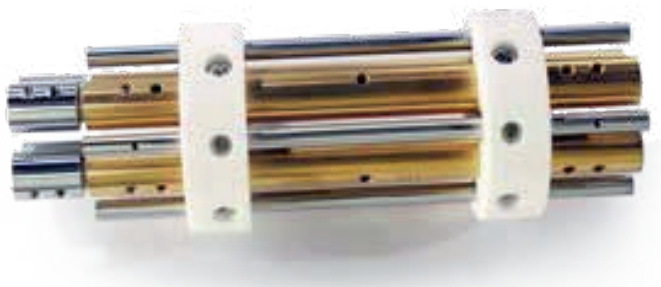
## Tandem QQQ Mass Analyzer

- The design of tandem quadrupole mass analyzer and hexapole collision cell is adopted.
- The stable dual-mass analyzer can be used to carry out various mass analysis, and is applicable for the study on different types of mass spectrometry.
- Efficient collision cell can transmit various ions to the highest extent.
- Including Full Scan, SIM, SIR, Product Ion Scan, Precursor Ion Scan, Neutral Loss Scan, and MRM.



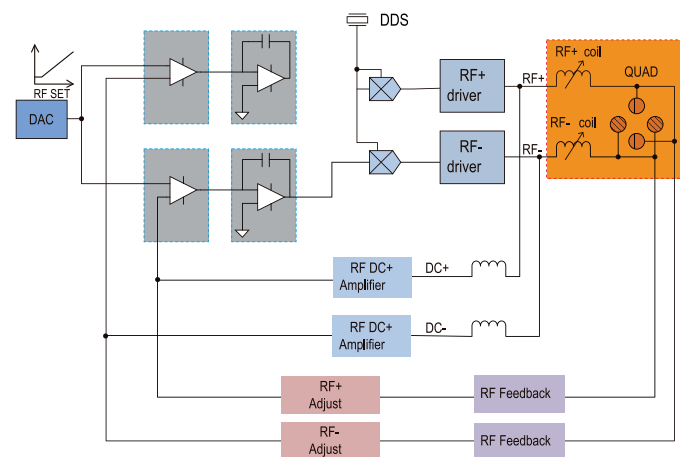
## Self-Developed Pure Molybdenum Quadrupole Mass Analyzer

- The pure molybdenum quadrupole has stable materials and optimal performance, ensuring the stability of the mass axis.
- The quadrupole surface is gold coated, and completely deactivated to eliminate the organic deposits.
- The patented dual-channel RF power closed-loop adaptive adjustment technology enhances the stability of the quadrupole RF.
- The patented temperature and humidity alternating resistance technology can provide the adaptability to the work environment of (15~30)°C, (20~80)%R.H.



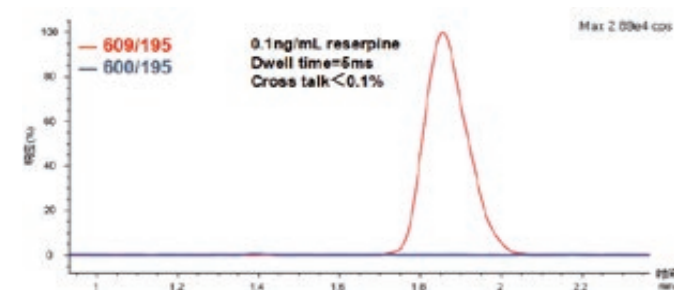
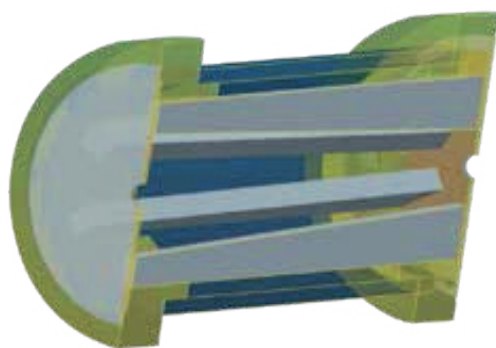
## Advanced Quadrupole RF Power Supply Technology

- The patented dual-channel RF power closed-loop adaptive adjustment technology can be adopted to enhance the stability of quadrupole RF power, ensure the RF power symmetry, and significantly improve the ion screening and the accuracy of ion transmission.
- The temperature and humidity resistance technology is adopted to enhance the environmental adaptability of the quadrupole-driven power supply, providing good stability of the mass spectrometry peak over the full temperature and humidity scope.



## Axially Accelerated Collision-reaction Cell

- Eliminate the crosstalk interference among ion pairs, with no memory effect.
- Match with the ultra-fast liquid chromatography (HPLC), and implement the high-throughput analysis of nearly one hundred types of compounds.



Collision cell cross-contamination experiment results; the experiment uses two channels: the true channel 609-195 and the false channel 600-195, the dwell time is 5ms, and the ratio of the peak area of the false channel to that of the true channel is less than 0.1%.

## Excellent Stability

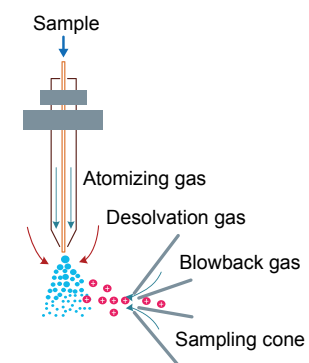
### Orthogonal Transmission of E-Spray Electrospray Ion Source

- The orthographic vertical spray ESI ion source, with 90° deflection for reducing directly sprayed neutral particle pollution, reducing noise while significantly extending the maintenance cycle.
- The coaxial atomizing gas forms powerful, stable ion sources, which is applicable for the stable sampling under different flow rates, i.e. 5ul/min - 2ml/min.



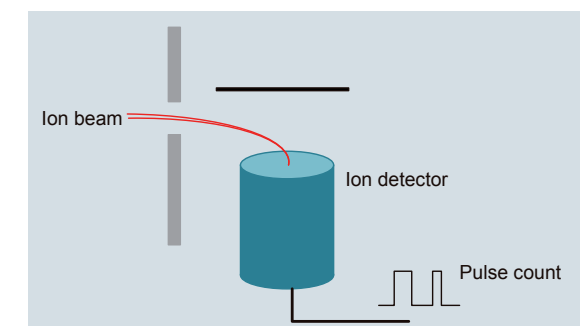
### Contamination-resistant Vacuum Interface

- Effectively remove neutral particle.
- The air curtain is formed by the high-temperature nitrogen flow back-blow.
- The micro negative pressure in the spray chamber expels the solvent droplet.
- Prevent large droplets from entering the vacuum area.



## Ultra Trace Signal Detection

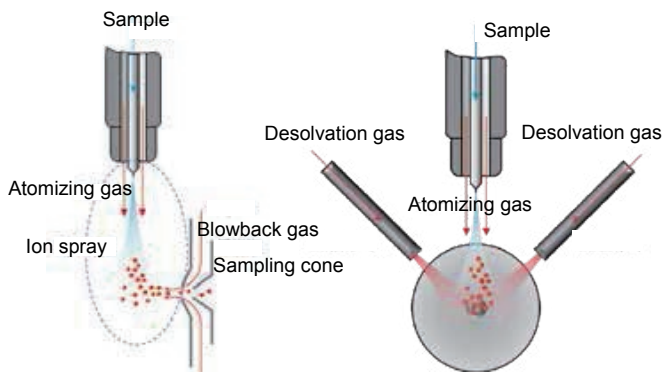
- Channel-type electron multiplier.
- Off-axis design, filtering the noise of neutral particles.
- Innovative pulse-detection technology can effectively improve the signal-noise ratio and obtain better analysis results.





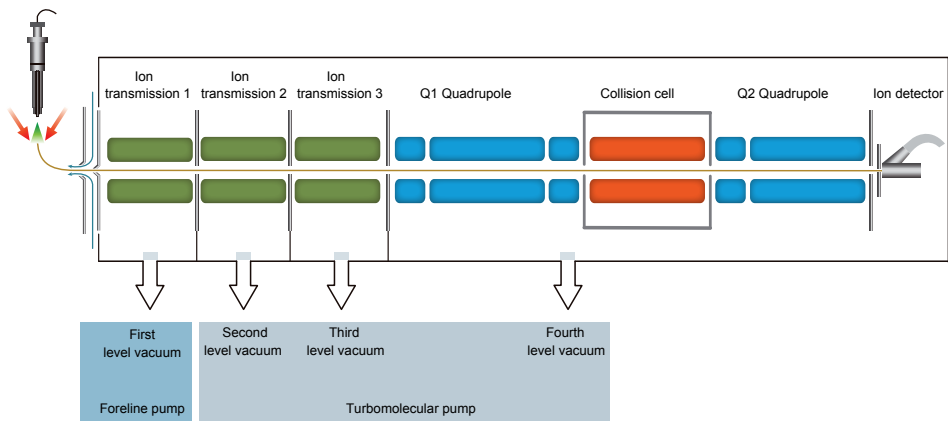
# The Orthogonal Desolvation Gas Can Provide Efficient Desolvation Meeting the Aerodynamics

- On the basis of the aerodynamics and thermodynamic distribution, optimize the spatial location of the desolvation gas, and the orthorhombic symmetry layout can provide optimal desolvation results.
- The temperature of the dual-channel desolvation gas is independently controlled, and the highest desolvation gas temperature can be up to 700°C.
- The temperature and flow rate of the desolvation gas can be automatically optimized and turned on/off, and can be adjusted flexibly to provide optimal desolvation effects.



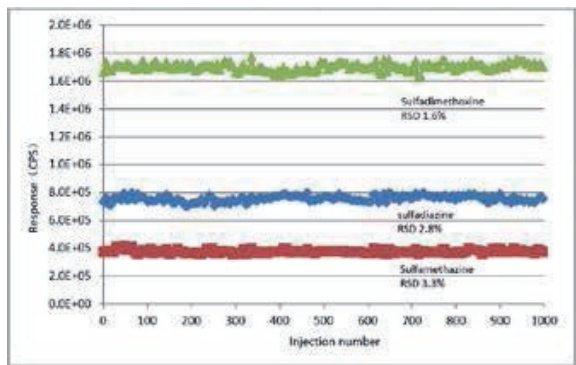
## Vacuum system

- Differential vacuum design is adopted to reduce the ion transmission loss.
- Additionally, it reduces the load of the molecular pump, and enhanced the service life of the turbo molecular pump.



## Excellent Stability

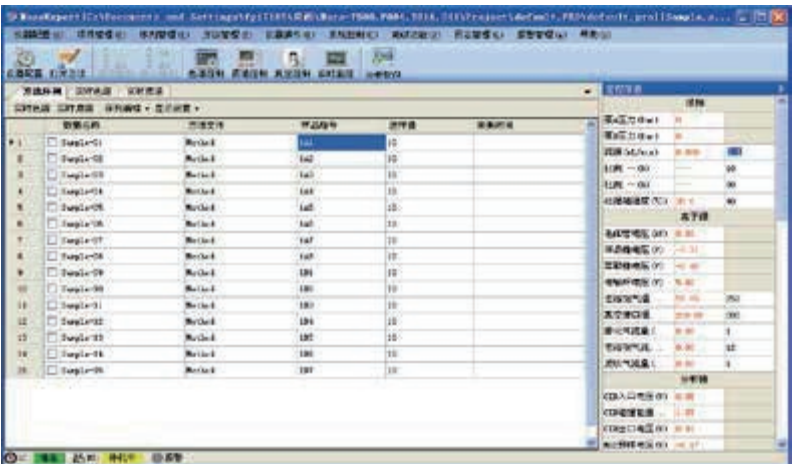
- Continuous sampling 1,000 injections for over 168 hours; the peak area of the 3 types of sulfonamide, CV <4%.



# User-friendly Mass Expert Analysis Workstation

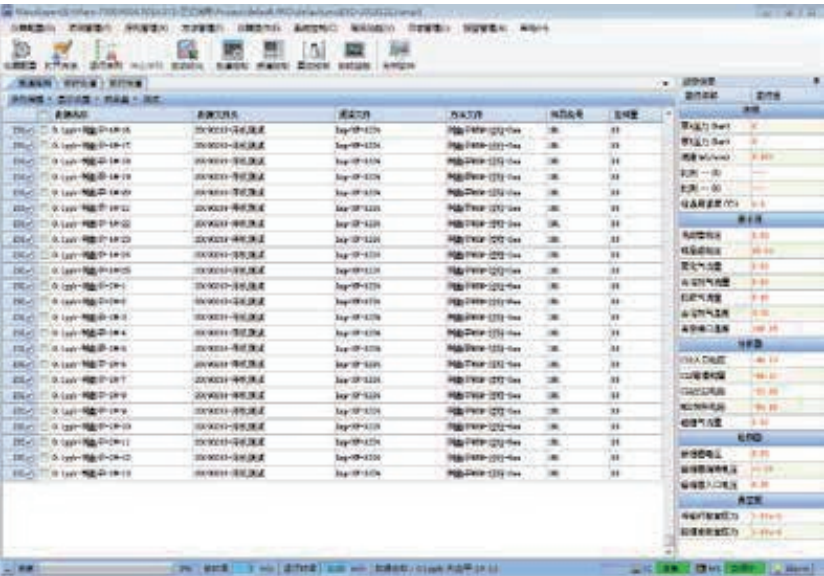
## Powerful Mass Expert Analysis Workstation

- Abundant intelligent suites can meet the application demands of different levels, from the expert to the laboratory technician.
- It is a high-throughput data batch processing and analysis software, allowing analysts to leave the instrument during the analysis and processing.
- It has the built-in standard spectral library of thousands of compounds, and supports the self-built spectral library, which is convenient for users to establish methods by themselves.
- Provide special solutions for industrial applications, and provide customized method packages for environmental monitoring, online analysis, etc.



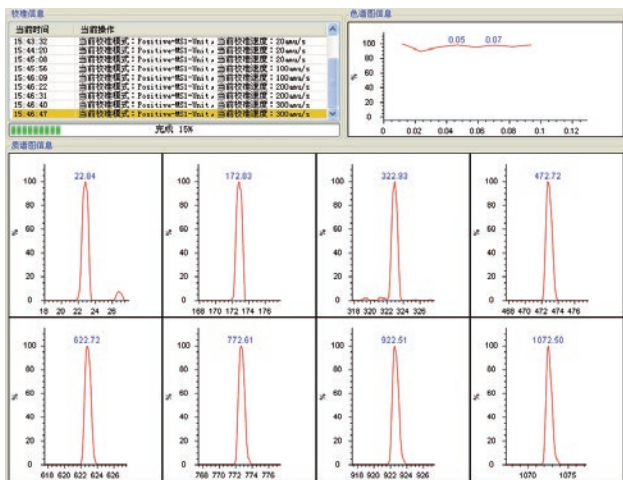
## Easy-to-use Control Software

- Full English interface, new user experience.
- Optimize the methods automatically to accelerate the development process of method.
- Monitor instrument status in a real-time manner, reducing the diagnosis and maintenance difficulties.



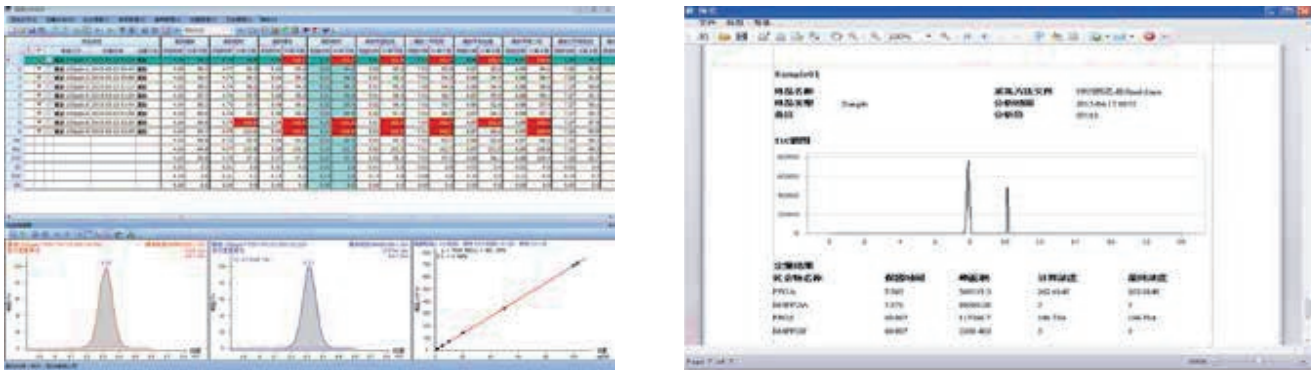
Intelligent Parameter Optimization

- The "one-click" automatic tuning and mass calibration reduce the application difficulty encountered by the user.
- It is a parameter adjustment tool customized for senior users to meet personalized experimental needs.



Customizable Application Analysis Software

- Customized special software for environmental protection, medical diagnosis, food safety, online analysis and other applications.
- With the built-in compound library and analysis method library, it provides analysis method supporting for compounds.
- It automatically marks abnormal values, and accelerates analysis.
- Parameter-free automatic integrator setting is adopted, reducing the time-consuming manual integration operation.
- The analysis data statistics and trend chart indication are convenient and intuitive.



Liquid Chromatography System

Humanized Design to Improve User Experience

- Plunger rod self-cleaning (back wash) is equipped as standard to reduce the impact of buffer salt on the pump system and prolong the service life of the gasket.
- Online degasser (Degasser) is equipped as standard to reduce user's exhaust bubble operation and improve system operation stability.
- Solvent switching valve (SSV, optional), realize fast switching of four mobile phases on binary pump, no need to manually switch mobile phases.



Small System Delay to Achieve Rapid Gradient Changes

- The gradient of mobile phase B (5% → 95%) changed rapidly within 2 min, and then balanced to the initial 5% B within 25s, reflecting the super performance of the infusion pump.

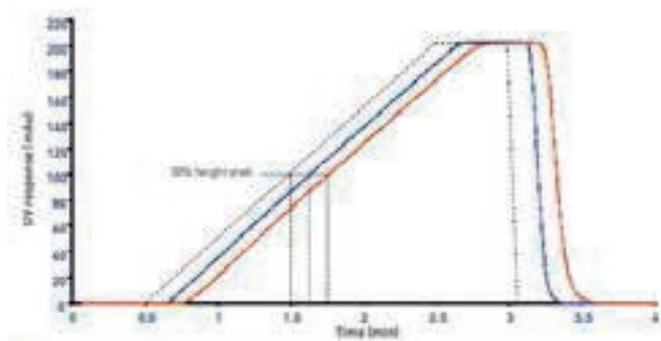


Figure 2: Linear gradient utilizing identical solvents (A & B1), Red 0.25 mL/min, Blue 0.5 mL/min.

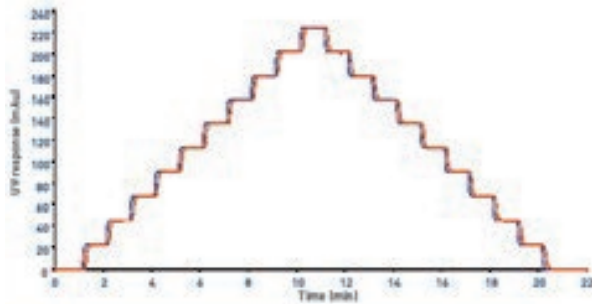


Figure 3: Step gradient utilizing identical solvents (A & B1), Red 0.25 mL/min, Blue 0.5 mL/min.

High gradient accuracy to ensure experiment repeatability.

Solvent composition accuracy (Bias, %)									
Flow (mL/min)	10	20	30	40	50	60	70	80	90
0.25	0.02	0.05	0.04	0.07	0.11	0.20	0.19	0.07	0.05
	0.04	0.11	0.14	0.14	0.16	0.14	0.14	0.22	-0.01
0.50	-0.02	-0.04	-0.03	-0.04	-0.02	-0.01	-0.03	0.08	0.23
	0.00	0.04	0.04	0.04	0.05	0.03	-0.01	-0.01	-0.02

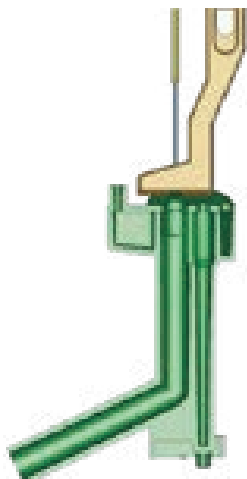


## Reliable Column Oven

- Temperature range: room temperature +5°C-90°C, accuracy<0.1°C.
- Up to 6 different chromatographic columns can be switched through column switching valve to save time of method development.
- Multi-dimensional alarm protection to ensure the normal operation of the system.
  - liquid leakage alarm.
  - Door opening alarm when heating.
  - Heating timeout protection.
  - Heating over temperature protection.

## Unique Needle Washing Design Realizes Zero Residue of Samples

- The "needle inside needle" design of the combination of outer needle and inner needle truly realizes zero residues of samples.
- Programmable needle washing program, which can switch up to 6 kinds of needle washing solutions.



## Multifunctional Sampler to Realize Ultra-low Temperature Sampler

- Compatible with various types of sample trays:
  - 10ml sample bottle.
  - 384 positions microplate.
  - 48 position sample tray (2ml universal sample bottle).
  - 96 position shallow hole plate/deep hole plate.
- Ultra low temperature sampling function (optional):
  - truly realize the cooling injection at 4°C, which is suitable for easily deteriorated samples such as biological samples.



## Products

EXPEC 5210 is a new generation of LC-MS /MS, with excellent sensitivity and stability. It is suitable for a wide range of application fields such as environmental testing, medical testing, drug testing and food safety.

EXPEC 5210 is equipped with Mass Expert mass spectrometry workstation in English, including professional mass spectrometry control and quantitative analysis software. It contains thousands of compound standard libraries and rich application method libraries, which greatly reduces the operation difficulty of massspectrometry software system.



**EXPEC 5210**

### LC-MS /MS Can be Configured:

- ULC 500 HPLC or ULC 510 UPLC
- AS 510 auto sampler
- CH 520 column oven



**EXPEC 5210 Water Quality Online Monitoring System**

EXPEC 5210 is an online monitoring system based on the LC-MS/MS for the monitoring of water quality characterized organic pollution factors. It can effectively realize real-time online monitoring of water quality characterized pollution factor of surface water, drinking water and pollution sources. A powerful tool for online monitoring of residues, antibiotics and contraband in water.

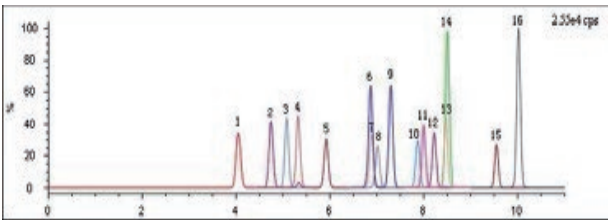
The system adopts a complete analysis process such as automatic sampling, ultrasonic filtration, online pretreatment (solid phase extraction), online quality control and automatic LC-MS/MS analysis, which greatly improves the ability of online monitoring of water organic pollutants, achieves low detection limit to the ppt level and truly achieves the monitoring needs of organic matter indicators in water quality.



# Application Case

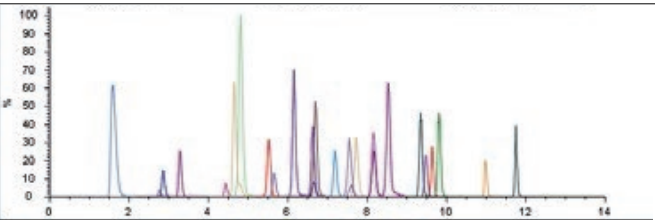
## Detection of Sulfonamides in Pork

The limit of quantification is two orders of magnitude, which meets the application requirements for the detection of 16 kinds of sulfonamides in meat.



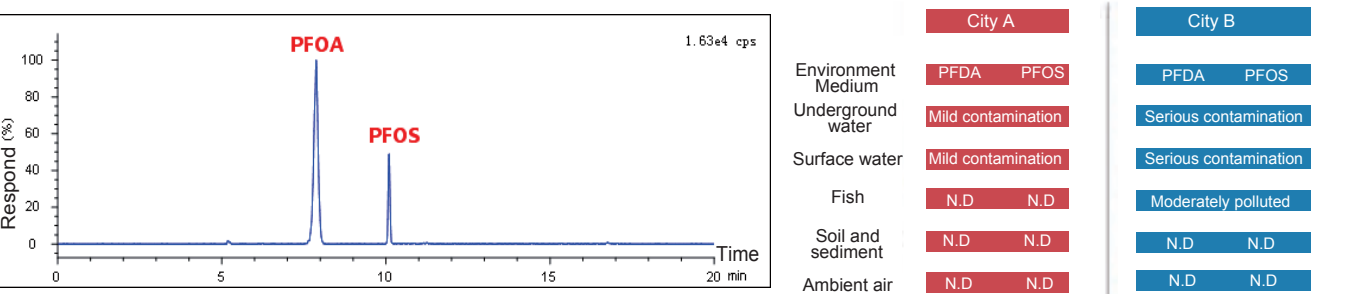
## Detection of Carbamate Pesticides in Water

It has strong ability for trace multi-component pesticide residue analysis in complex matrices of environmental water.



## Detection of Perfluorinated Compounds in Environmental Media

EXPEC 5210 LC-MS /MS was used to quantitatively evaluate the pollution level of per fluorinated compounds in environmental media in ordinary areas (city A) and production areas (city B), so as to provide reference for environmental monitoring and treatment.



## Detection of Vitamin D in Serum

The concentration of 25-hydroxy-vitamin D in serum was determined by EXPEC 5210 to evaluate the nutritional status of human vitamin D, which can meet the needs of clinical detection.

## Screening of Inherited Metabolic Diseases in Neonates

More than 60 kinds of amino acids and acyl carnitine in neonatal blood were quantitatively analyzed by EXPEC 5210. More than 30 kinds of genetic and metabolic diseases could be screened in only 2 minutes each time.

