DRAWELL
Artist of Science

ICP-MSMS DW-EXPEC7350

Triple Quadrupole Inductively Coupled Plasma Mass Spectrometer

Introduction

A true triple quadrupole, the mass spectrometry section must have two independent high-frequency quadrupole mass filters. The first quadrupole (Q1) will simplify the reaction process in the cell by rejecting all ions other than the target analyte ion; the second quadrupole (Q2) will filter the ions from the collision/reaction cell, allowing only the target analyte ion or product ion passes through to the detector. DW-EXPEC7350 ICP-MS/MS is suitable for element, isotope and speciation analysis tasks of various samples in different application fields, and meets the analysis requirements of environment, food, geology, chemical industry, biology, materials, metals, semiconductors and other industries.

Operating Environment

1）Operating temperature： 18-24℃.

2）Operating humidity： (20~60)％ RH

3）Power supply： three sets of single-phase power supplies (220±20) V AC，16A，50 Hz

4）Exhaust air： ＞ 12 m/s

Features

1.System hardware

● ***Ion source***

RF generator： Patented self-excited and solid state ICP ion source, frequency 27.12 MHz, power range 700-1600W continuously adjustable, power stability < ±0.1%, frequency stability < ±0.01%. The RF coil uses water cooling technology; no matching box is required, and the millisecond-level fast frequency conversion matches the plasma load change, which is not easy to flame out.

Vertical ion source plasma (Vertical Ion-source Plasma, VIP), with vertical torch design, better tolerance for analyzing high-salt and volatile samples, reducing argon consumption, and improving the service life of torch and ion interface, Solve horizontal torch challenges with ease.

Balanced Driven Technology (BDT), a two-way balanced drive RF generator, reduces ion kinetic energy dispersion, eliminates plasma potential and secondary cone arc discharge without additional expensive consumables such as shield torch, prolong the service life of the cone.

Inert Protected Coil (IPC), the surface of the coil is protected from corrosion by a PTFE coating. Plasma Colorful Camera (PCC), with the function of real-time observation of plasma with electromagnetic shielding, can monitor the plasma status in real time through workstation software, and monitor the status of plasma, interface cones and central tube in real time in full color, which is convenient for sample analysis and maintenance confirmation. When analyzing organic samples directly or using HPLC-ICP-MS, the green carbon bond emission of the plasma can be observed in real time, and the oxygen flow can be optimized through the color change when oxygen is passed through.

iStandby Mode: Provides an ultra-low power standby mode that reduces argon consumption.

● ***Interface cones***

The improved double interface cones perfectly realizes the transition from atmospheric pressure to high vacuum, realizes the effective extraction of target ions in the transition from ultra-high temperature to normal temperature, and effectively reduces the vacuum load. Through aerodynamic simulation, the design of the two cones is optimized, and the performance of the instrument is greatly improved. Cone material is nickel, platinum optional. Platinum cone has strong corrosion resistance and can be used to analyze highly corrosive matrix samples containing phosphoric acid.

The high-sensitivity or high-salt skimmer cone can be flexibly configured. The high-salt skimmer cone can ensure the stability of long-term analysis of high-salt samples, while the high-sensitivity skimmer cone can ensure the high throughput analysis of different types of samples and other application requirements.

Innovative flip-type cone changing system with interlock protection to prevent abnormal operations. Maintenance of cones is easy and convenient which needs no vacuum venting.

● ***Extraction lens***

A variety of extraction modes, including zero voltage, negative voltage and positive voltage, can be used on the extraction lens. Any voltage from -200 to +5V can be applied, and the extraction voltage can be arbitrarily adjusted for different ions and sample matrix. Positive voltage can completely isolate ions, prevent ions from entering the ion optical system when standby, causing unnecessary pollution, maintenance-free cleaning.

● ***Ion transport system***

Low background ion transmission design, ions are off-axis twice before and after. The orthogonal 90° off-axis in front of the Q1 quadrupole and the off-axis deflection after the collision cell completely realize the effective elimination of interfering particles (neutral particles, electrons, photons), ensuring the best SNR, and does not need to be replaced and cleaned ion lens.

● ***Collision/reaction cell***

The collision reaction cell with compound electric field has the advantages of small cell volume and high ion transfer efficiency. The patented distributed collision/reaction gas diffusion results in a good gas distribution in the cell, and thus greatly improves the collision efficiency and sensitivity. Five built-in collision/reaction gases, multiple selection, fast switching, and more efficient, provide unparalleled multi-element simultaneous analysis performance for complex matrix samples.

Multiple gases can be used simultaneously in the same method, including three modes of collision mode, oxidation reaction mode and reduction reaction mode.

● ***Triple quadrupole***

The unique high-precision pure Mo material quadrupole ensures the best mass axis stability. The specifications of the two sets of quadrupoles are the same, which is a true triple quadrupole design. Both Q1 and Q2 have the ability to unit mass resolution, and the mass range of mass spectrometry is 2-290amu.

● ***Mass resolution***

It has two modes of high resolution and standard resolution, and the adjustment range is 0.3-2.0amu, which is continuously adjustable. Both modes can be used at the same time during the analysis of one method, so as to expand the application range of sample analysis by changing the resolution.

● ***Detector***

The pulsed/analog dual-mode discontinuous dynode detector that can scan and select analysis (qualitative and quantitative) simultaneously in a single injection, and can automatically switch between analog and pulsed modes. The discontinuous electron multiplier has two working modes of analog and pulse, which can greatly improve the dynamic range. It has a dynamic response range of up to 10 orders of magnitude, and can simultaneously measure trace and major elements in the same operation.

Applications

Eenvironment

Food

Geology

Metals

Specifications

Start-up time	**In the case of vacuum venting, the whole preparation process from start-up to ready for analysis can be completed within 30 minutes.**
***Sensitivity in standard mode**	**Mass: M cps/mg/L; Low: 50 Medium: 150; High: 150**
Random background noise in standard mode (No Gas)	**< 0.2 cps (5amu)**
Abundance Sensitivity	**Better than 5.0 x 10-8 at full mass segment**
Oxide ion (CeO+/Ce+)	**< 3%**
Doubly-charged ion（Ce++/ Ce +）	**<3 %**
Detection limit	**Mass:ng/L (ppt); Low:<0.5 Medium:<0.1; High:<0.1**
***Short-term Stability**	**< 2% RSD over twenty minutes**
***Long-term Stability**	**< 3% RSD over two hours**
Mass axis stability	**< 0.05 amu/24h**
Linear dynamic range	**over 10 orders of magnitude.**
***Isotope-ratio Precision**	**< 0.2% (107Ag/109Ag), capable of measuring uranium isotope ratios**

Attachment System

Standard configuration：

1. Computor

i5-8500, 8G, 1TB hard drive, 23-inch high-definition display, dual network cards.

2. Mechanical pump

The pumping speed is 40m3/h, KF25 air inlet, 14mm air outlet, 230V/400V.

Optional configuration：

1. Cooling water recirculation system

The cooling capacity is 2100W, the water tank volume is greater than 2L, and the voltage is 220V.

2. Laser printer

Black and white laser printer

3. AC parametric regulator

15KVA, input voltage 140V-300V, output voltage 220 V±1%.

4. UPS

10KVA, one hour delay, high frequency and configuration 12V38AH-16.

2. Sampling system

● Nebulizer

A variety of nebulizers are available, including standard high-efficiency quartz concentric nebulizer; high-salt-resistant concentric nebulizer; PFA micro-injection nebulizer, with high nebulization efficiency and hydrofluoric acid resistance.

● Spray Chamber

The cyclone spray chamber has the characteristics of small dead volume, high aerosol atomization efficiency and low memory effect. It is equipped with a TEC refrigeration module, and the refrigeration temperature is <-10 °C, which greatly improves the continuous working stability of the instrument and the ability to analyze organic solvents, and effectively reduces the oxide yield, eliminates drift caused by fluctuations in the laboratory environment, and improves the stability of the instrument.

● Torch Tube

Detachable quartz torch with split design, self-collimation installation, and simplified torch design greatly reduce the use cost of the torch, convenient for daily replacement and maintenance without dismantling the gas tubeline.

● Central Tube

Various types of central tube are available. For different applications, it is only necessary to replace the central tube to achieve different injection requirements such as organic, high salt, high sensitivity, and HF acid resistance, which is convenient for replacement and maintenance.

● Peristaltic Pump

12 rollers, 4 channel peristaltic pump. While ensuring stable injection, it can support the simultaneous operation of the injection pipe, internal standard pipe, and waste liquid pipe.

● Gas Control System

It adopts a highly integrated and high-precision digital MFC gas controller, the accuracy is less than 0.5%, and it can be configured with up to ten channels of MFC. Additional configuration of dilution gas, auxiliary oxygen, and five collision reaction gases can be provided.

3. Analyzing Software

Operating system: well-known brand commercial computer, Microsoft® Windows 10 and other multi-tasking, multi-user system software.

Automatic analysis functions (instrument visualization interface, automatic tuning, automatic diagnosis, analysis report, start and close vacuum, torch position adjustment, plasma parameter\ion lens voltage optimization, standard\collision cell working mode switching, etc.).

* HPLC-ICP-MS interface: It is required to use the same computer and the same set of software to control the existing HPLC and ICP-MS at the same time, and realize the system of online automatic synchronous analysis, including real-time display, real-time data analysis, spectrum overlay, retention time , peak integration, working curve, automatic sampling analysis and other functions. Real-time data and report display。

Other intelligent functions include: dynamic adjustment of injection time and flush time, user method library management, and QC function to meet the QC requirements of EPA methods.

The ICP-MS operating software adopts database technology, which greatly improves the data query rate; it includes two parts, control software and data analysis software, which can be installed on a personal computer, and the sample analysis data can be processed and reported off-line.