ab sciex 5500 specification Handbook

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The AB Sciex 5500 is a state-of-the-art mass spectrometry system designed to meet the rigorous demands of modern analytical laboratories. Renowned for its exceptional sensitivity, high resolution, and robust performance, the AB Sciex 5500 is a preferred choice among researchers in pharmaceuticals, environmental analysis, food safety, and clinical diagnostics. Understanding its specifications is crucial for laboratories aiming to optimize their analytical workflows and ensure accurate, reliable results. This comprehensive guide explores the core features, technical specifications, and practical applications of the AB Sciex 5500, providing valuable insights for scientists and laboratory managers.

Overview of AB Sciex 5500 Mass Spectrometer

The AB Sciex 5500 is a triple quadrupole mass spectrometer equipped with advanced ion source technology and efficient data acquisition capabilities. It combines high sensitivity with rapid scan speeds, enabling detailed analysis of complex samples. Its design emphasizes reliability, ease of use, and versatility, making it suitable for a broad spectrum of analytical tasks.

Core Technical Specifications of AB Sciex 5500

A detailed understanding of the AB Sciex 5500 specifications helps users maximize its capabilities and tailor it to their specific analytical needs. Below are the key technical features:

Mass Range and Resolution

- Mass Range: 50 to 1700 m/z (mass-to-charge ratio)
- Mass Resolution:
- Unit resolution at m/z 400
- High resolution mode up to 20,000 FWHM (Full Width at Half Maximum)
- Mass Accuracy: Typically within ±2 ppm (parts per million), ensuring precise identification

Ion Source and Interface

- Ion Source: Turbo V? ESI (Electrospray Ionization) source
- Ionization Modes: Positive and negative ion modes

- Turbo V? Source Features:
- Enhanced robustness for high-throughput analysis
- Adjustable source temperature and gas flows
- Fast spray start-up and shutdown for increased productivity

Detection and Data Acquisition

- Detectors: Dual-mode detectors for enhanced sensitivity
- Scan Speed: Up to 10,000 Da/sec
- Data Acquisition Modes:
- Multiple Reaction Monitoring (MRM)
- Product Ion Scan
- Precursor Ion Scan
- Neutral Loss Scan
- Enhanced product ion (EPI) mode

Performance and Sensitivity

- Limit of Detection (LOD): As low as 0.1 pg/mL for certain analytes
- Dynamic Range: Up to 7 orders of magnitude
- Sensitivity: Exceptionally high, suitable for trace analysis

Physical and Power Specifications

- Dimensions: Approximately 35" W x 27" D x 55" H (varies based on configuration)
- Weight: Around 1,200 lbs (varies)
- Power Requirements: 100-240V, 50/60Hz, 15A dedicated circuit

Key Features Enhancing the AB Sciex 5500 Performance

Understanding the advanced features of the AB Sciex 5500 reveals why it outperforms many competitors:

Turbo V? ESI Source

- Provides stable and reproducible ionization
- Supports rapid switching between positive and negative modes

- Reduces source contamination and cleaning frequency

QJet? Dual-Stage Quadrupole

- Offers high transmission efficiency
- Enables fast and precise mass filtering
- Supports high-throughput workflows

SmartTune? Technology

- Automates instrument calibration
- Ensures consistent performance over time
- Reduces downtime and maintenance

Compound Optimization

- Facilitates method development by optimizing parameters for specific analytes
- Improves sensitivity and selectivity

Applications of the AB Sciex 5500 Mass Spectrometer

The versatility of the AB Sciex 5500 allows it to excel in numerous scientific and industrial applications:

Pharmaceutical and Bioanalytical Testing

- Quantitative analysis of drugs and metabolites
- Pharmacokinetic and pharmacodynamic studies
- Biomarker discovery and validation

Environmental Analysis

- Detection of pollutants and contaminants
- Monitoring of pesticides and herbicides
- Water and soil sample analysis

Food Safety and Nutrition

- Identification of food additives and preservatives
- Detection of mycotoxins and contaminants
- Nutritional content analysis

Clinical Diagnostics

- Analysis of clinical biomarkers
- Therapeutic drug monitoring
- Disease marker identification

Advantages of Using AB Sciex 5500

Choosing the AB Sciex 5500 offers several benefits, including:

- High Sensitivity: Capable of detecting analytes at sub-picogram levels, crucial for trace analysis.
- Fast Scan Rates: Supports high-throughput screening, reducing analysis time.
- Excellent Resolution: Accurate mass measurements aid in compound identification.
- Robust and Reliable: Designed for continuous operation with minimal downtime.
- Flexible Method Development: Supports various ionization modes and scan types suited to diverse applications.
- Ease of Use: Intuitive software interface and automated calibration streamline workflows.

Maintenance and Support

Maintaining the AB Sciex 5500's peak performance is vital for consistent results. Regular tasks include:

- Source cleaning and maintenance
- Calibration and tuning using SmartTune?
- Software updates and data management
- Routine inspection of vacuum systems and detectors

AB Sciex provides comprehensive technical support, training, and service contracts to ensure optimal operation.

Conclusion

The AB Sciex 5500 mass spectrometer is a powerful analytical instrument characterized by its exceptional specifications and versatile features. Its high resolution, sensitivity, and robust design make it suitable for a wide array of scientific investigations, from pharmaceutical research to environmental monitoring. Understanding its detailed specifications enables laboratories to leverage its full potential, optimize analytical workflows, and achieve reliable, high-quality results. Whether for routine analysis or complex research, the AB Sciex 5500 remains a top-tier choice for modern laboratories seeking precision and efficiency in mass spectrometry.

AB SCIEX 5500: An In-Depth Review of Its Specifications and Capabilities

When it comes to cutting-edge mass spectrometry, the AB SCIEX 5500 stands out as a flagship model designed to meet the rigorous demands of modern analytical laboratories. Known for its high sensitivity, robust performance, and advanced features, the 5500 is a powerful tool for researchers in proteomics, metabolomics, environmental analysis, and pharmaceutical development. This article offers a comprehensive overview of the AB SCIEX 5500?s specifications, exploring each component and feature to help users understand its capabilities and advantages.

Introduction to the AB SCIEX 5500

The AB SCIEX 5500 is a triple quadrupole/linear ion trap hybrid mass spectrometer, optimized for high sensitivity and speed. It combines innovative hardware and software technologies to deliver precise, reliable, and reproducible results across various scientific disciplines.

Designed with versatility in mind, the 5500 provides seamless integration with chromatography systems and advanced data analysis software, making it suitable for both routine analysis and complex research applications. Its modular architecture allows users to customize configurations according to their specific analytical needs.

Core Specifications of the AB SCIEX 5500

Understanding the core technical specifications of the AB SCIEX 5500 provides insight into its performance capacity. Below, each key aspect is explored in detail:

Mass Range

- Mass Range: 50 ? 1,500 m/z

The wide mass range allows the 5500 to analyze small molecules, peptides, proteins, and other

analytes, accommodating a broad spectrum of applications.

Mass Resolution

- Resolution: Up to 30,000 FWHM (Full Width at Half Maximum) at m/z 200

High resolution enables precise mass measurements and differentiation of analytes with similar mass-to-charge ratios, enhancing selectivity and confidence in identification.

Scan Speed

- Scan Rate: Up to 10,000 spectra per second in Multiple Reaction Monitoring (MRM) mode

This rapid scan speed allows for high-throughput analysis, critical in clinical and pharmaceutical settings where large sample volumes are common.

Sensitivity

- Limit of Detection (LOD): Typically in the low parts-per-trillion (ppt) range, depending on analyte and matrix

The 5500?s sensitivity is one of its standout features, making it ideal for detecting trace levels of compounds in complex samples.

Dynamic Range

- Dynamic Range: Approximately 4?5 orders of magnitude

A wide dynamic range ensures accurate quantification across a variety of analyte concentrations within a single run.

Mass Accuracy

- Mass Accuracy: Less than 2 ppm (parts per million)

High mass accuracy supports confident identification and structural elucidation of analytes,

especially in high-resolution applications.

Instrument Hardware Components

The performance of the AB SCIEX 5500 is largely attributable to its advanced hardware components, each designed to optimize sensitivity, resolution, and throughput.

Ion Source

- Electrospray Ionization (ESI): The primary source for liquid chromatography-mass spectrometry (LC-MS) applications, providing gentle ionization suitable for fragile molecules like peptides.
- Atmospheric Pressure Chemical Ionization (APCI): Available as an option, expanding the instrument?s versatility to analyze less polar compounds.
- Dual Source Compatibility: Facilitates switching between ESI and APCI without extensive reconfiguration, saving time and increasing flexibility.

Quadrupole Mass Filter

- Triple Quadrupole Design: Utilized for targeted quantification through MRM, offering high selectivity.
- High-Performance RF/DC Settings: Enable precise mass filtering over a broad m/z range, minimizing interference and improving signal-to-noise ratio.

Ion Optics and Collision Cell

- Ion Optics: Designed for efficient ion transmission, reducing ion losses and enhancing overall sensitivity.
- Collision Cell (Q2): Equipped with a high-performance collision gas system (typically nitrogen or argon), enabling collision-induced dissociation (CID) for tandem MS experiments.

Detector System

- Electron Multiplier Detector: Highly sensitive, capable of detecting ions at very low abundance levels.
- Enhanced Dynamic Range: Provides reliable detection across a wide range of analyte concentrations.

Advanced Features and Software Integration

Beyond hardware, the AB SCIEX 5500 offers a suite of software tools and advanced features to optimize performance and data analysis.

SmartSpray® Ion Source

- Ensures consistent spray stability and robust performance over long runs.
- Facilitates automated tuning and calibration, reducing downtime and manual intervention.

TurboV? Software

- Provides an intuitive interface for method development, instrument control, and data acquisition.
- Supports real-time monitoring and troubleshooting, improving productivity.

Multi-Component Analysis

- Enables rapid, simultaneous detection of multiple analytes with high specificity.
- Optimized for MRM and dynamic MRM (dMRM) workflows.

Data Processing and Quantification

- Compatibility with AB SCIEX?s Analyst® and Skyline software.
- Features for peak integration, calibration curve generation, and statistical analysis.

Performance Benchmarks and Application Suitability

The AB SCIEX 5500?s specifications translate into outstanding performance metrics suitable for a wide range of analytical tasks.

Sensitivity and Detection Limits

- The low ppt detection capability makes it suitable for trace analysis in environmental samples, forensic science, and clinical diagnostics.

Speed and Throughput

- High scan rates support large-scale screening and high-throughput workflows, essential for pharmaceutical testing and biomarker discovery.

Resolution and Accuracy

- High resolution and mass accuracy enable detailed structural elucidation, identification of isobaric compounds, and accurate quantification.

Reproducibility and Stability

- Consistent performance over extended periods ensures reliable data collection necessary for regulatory submissions and research reproducibility.

Conclusion: Is the AB SCIEX 5500 the Right Choice?

The AB SCIEX 5500 is a versatile, high-performance mass spectrometer that combines advanced hardware components with intelligent software solutions. Its specifications demonstrate its ability to deliver sensitive, accurate, and rapid analysis across diverse applications. Whether in targeted quantification, untargeted discovery, or complex mixture analysis, the 5500?s capabilities position it as a valuable asset for any analytical laboratory aiming for excellence.

Its high resolution, exceptional sensitivity, and flexible ionization options make it particularly well-suited for demanding research environments such as proteomics, metabolomics, and pharmaceutical development. While its cost and complexity may be considerations for smaller labs, for institutions seeking a robust, reliable, and versatile instrument, the AB SCIEX 5500 offers an impressive combination of performance and innovation.

In summary, the AB SCIEX 5500?s detailed specifications reflect a state-of-the-art instrument that continues to push the boundaries of what is achievable in mass spectrometry. Its comprehensive features and high-level performance define it as a top-tier choice for laboratories committed to precision, sensitivity, and throughput.

QuestionAnswer What are the key specifications of the AB SCIEX 5500 mass spectrometer? The AB SCIEX 5500 features a triple quadrupole mass spectrometer with a scan speed of up to 10,000 Da/sec, high sensitivity with sub-pg/mL detection limits, and a wide mass range of 10-1,500 Da, making it suitable for complex analytical workflows. What is the ionization mode available on the AB SCIEX 5500? The AB SCIEX 5500 supports both positive and negative electrospray ionization (ESI) modes, allowing versatile analysis of various compound classes. What are the throughput capabilities of the AB SCIEX 5500? The instrument offers rapid scan speeds and efficient data

acquisition, enabling high-throughput analysis suitable for large sample sets and clinical applications. Does the AB SCIEX 5500 support high-resolution mass spectrometry? While primarily a triple quadrupole system optimized for targeted quantitation, the AB SCIEX 5500 can be integrated with hybrid systems for enhanced resolution, but its core specifications focus on sensitivity and specificity. What types of applications are best suited for the AB SCIEX 5500? The AB SCIEX 5500 is ideal for quantitative analysis in pharmacokinetics, drug development, clinical research, and environmental testing due to its high sensitivity and robustness. What is the maximum scan speed of the AB SCIEX 5500? The AB SCIEX 5500 offers a maximum scan speed of approximately 10,000 Da/sec, enabling rapid data collection for complex sample analysis. What are the main features of the AB SCIEX 5500's interface and user control? The instrument features an intuitive software interface with real-time data visualization, automated calibration, and method setup options to streamline operation and ensure reproducibility. How does the AB SCIEX 5500 ensure data accuracy and reproducibility? It incorporates advanced hardware stability, automated calibration routines, and robust data processing algorithms to deliver precise and reproducible results across runs.

Related keywords: AB SCIEX 5500, mass spectrometer, triple quadrupole, analytical instrument, LC-MS/MS, high sensitivity, spectral resolution, method development, laboratory equipment, pharmaceutical analysis