What is a semi-quantitative spectrometer



Overview

The semi-quantitative approach involves determining the relative concentrations of elements in a sample rather than obtaining precise quantitative measurement.

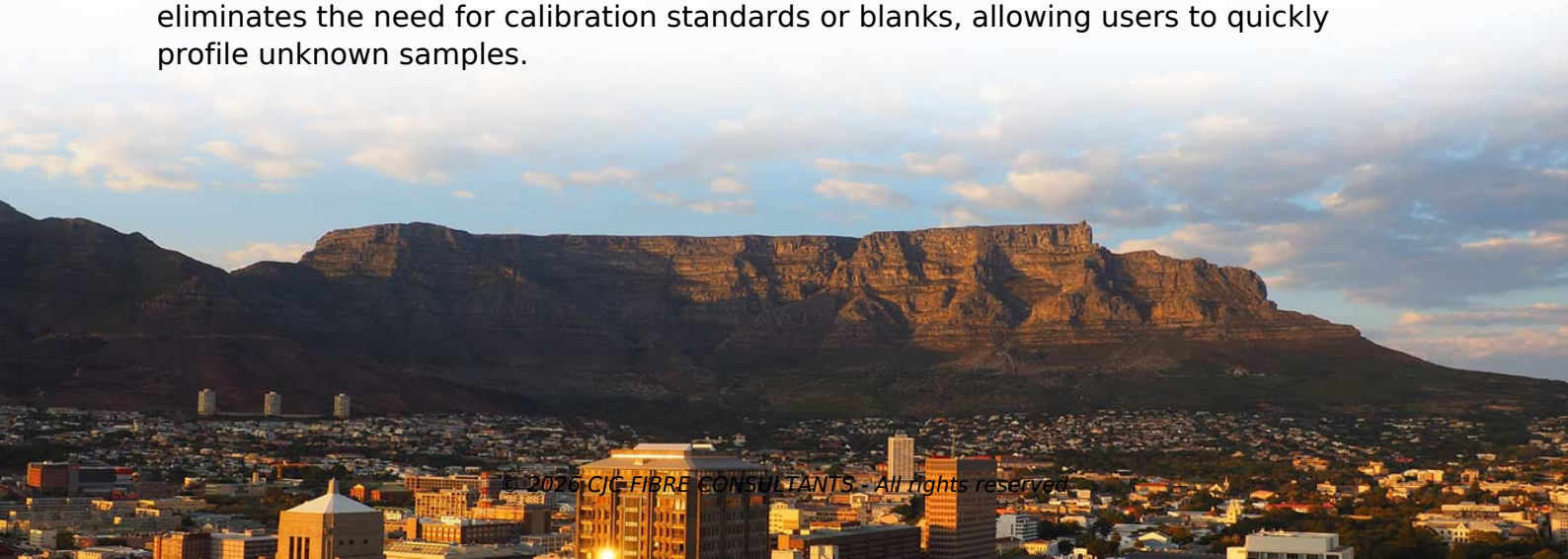
Key Takeaways

A semi-quantitative spectrometer provides relative elemental concentrations for rapid screening and trend analysis without requiring full calibration.

Overview

A semi-quantitative spectrometer is typically an inductively coupled plasma-optical emission spectroscopy (ICP-OES) instrument configured to determine relative concentrations of elements in a sample rather than precise quantitative values. This approach is ideal for rapid screening, identifying elemental trends, or comparing samples, especially when exact concentrations are not immediately necessary. How It WorksSemi-quantitative analysis uses AI and neural networks to simplify complex spectral interpretation.

For example, Thermo Fisher's SemiQuant feature in the Qtegra ISDS Software automatically selects non-interfered peaks, performs intra- and inter-element corrections, and provides approximate concentrations with confidence levels. This eliminates the need for calibration standards or blanks, allowing users to quickly profile unknown samples.



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Applications

Rapid screening of unknown samples to detect major and minor elements. Trend identification in elemental composition across multiple samples. Method development by providing preliminary insights into sample composition.

Food safety and trace elemental analysis where non-targeted screening is required. AdvantagesTime-efficient: No need for prior calibration or standard solutions. AI-assisted: Reduces manual interpretation and potential errors.

Versatile: Can be used for preliminary screening, sample prep assessment, and performance evaluation. Insightful: Provides relative concentrations and confidence levels, helping prioritize samples for full quantitative analysis.

Limitations

Not fully quantitative: Results are approximate and should not replace precise measurements when exact concentrations are required. Dependent on software algorithms: Accuracy relies on AI models and spectral databases. Best for screening: For regulatory compliance or critical measurements, traditional quantitative ICP-OES or ICP-MS is still necessary.

In summary, a semi-quantitative spectrometer is a powerful tool for laboratories needing fast, AI-assisted elemental profiling, enabling efficient decision-making and method optimization without the time and resource demands of full quantitative analysis.

Article Content

Qualitative and Semiquantitative Analysis | Springer Nature Link

Qualitative analysis is the detection or identification of the constituent elements in the sample, semiquantitative analysis is the estimation of their approximate concentrations, and quantitative

Thermo Scientific iCAP PRO Series ICP-OES

Semi-quantitative analysis can be carried out by inductively coupled plasma-optical emission spectroscopy (ICP-OES) and involves determining the relative concentrations of elements in a

Qualitative and Semiquantitative Analysis | Springer Nature Link

A semi-quantitative x-ray spectrometric analysis usually gives analyte concentration as derived from intensities measured with speed and convenience, rather than precision, as primary objectives, and

Thermo Fisher Unveils Semi-Quantification Analysis for ICP-OES

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The semi-quantitative approach involves determining the relative concentrations of elements in a sample rather than obtaining precise quantitative measurement. It is often used for

Guide to Semi-Quantitative Non-Targeted Screening Using

To do semi-quantification of the compounds in a sample, what is really done is an estimation of how well the compound will ionize in the mass spectrometer. Or, in other words, an

Ask an Expert: Getting the best out of Omnian WDXRF

Semi-quantitative analysis is basically the same for Energy Dispersive (EDXRF) and Wavelength Dispersive (WDXRF). Both WDXRF and EDXRF are used to identify and determine the

Use of the Semi-Quantitative Calibration Mode for Rapid Sample

Such measurements are performed in an analysis mode termed ''semi-quantitative'' as it is not designed to deliver the ultimate accuracy but to provide results of sufficient accuracy in both an analysis time

Quantifiability of semi-quantitative GC/MS: CleanControlling

Semiquantitative analyses do not provide exact concentration data, but rather estimate the quantity ratios of the detected substances. This process is based on the comparison of the signal

Semi-quantitative Proteomics Analysis

Overall, semi-quantitative proteomics analysis provides valuable information about protein expression changes across different samples or conditions. By understanding protein regulation, researchers

Guide to Semi-Quantitative Non-Targeted Screening Using

Non-targeted screening (NTS) with reversed phase liquid chromatography electrospray ionization high resolution mass spectrometry (LC/ESI/HRMS) is increasingly employed as an

Advantages and limitations of the semi-quantitative operation mode of ...

Abstract The suitability of the semi-quantitative mode of analysis of a Perkin-Elmer inductively coupled plasma quadrupole-mass spectrometer for multi-element characterization of

Semi-quantitative non-target analysis of water with liquid ...

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To overcome this, non-target analyses could be combined with semi-quantitation. This Perspective aims at describing the current methods for non-target analysis, the possibilities and

Semi-quantification analysis for ICP-OES

Thermo Fisher Scientific has introduced a semi-quantitative analysis tool for inductively coupled plasma - optical emission spectroscopy (ICP-OES), enabling users to profile unknown

Exploring Trace Elemental Analysis in Lithium-Ion Battery Materials

Spectroscopic techniques are essential for the advancement, production, and sustainable disposal of lithium-ion batteries. The ongoing research in this space highlights the use of atomic

Ask an Expert: Getting the best out of Omnian WDXRF semiquantitative ...

Omnian Standardless analysis Omnian is a Malvern Panalytical XRF application package that can provide (semi-)quantitative* chemical composition analysis of virtually any sample that one

Development and Application of a Novel Semi-quantification Approach

In this scenario, a semi-quantitative approach can fill the gap and provide a rough estimation of concentration. This research aimed to develop and compare several semi-quantification

Quantitation

Absolute quantitation of small molecules in various matrixes. Selected Reaction Monitoring (SRM) based targeted quantitative analysis Typical project workflow Getting started – small molecules Standard

Principle of Semi-Quantitative Proteomic Analysis

Explore the principles of semi-quantitative proteomics analysis, focusing on protein quantification through mass spectrometry, its advantages, and limitations in research.

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