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PRODUCTION SPECIFICATIONS

Thermo Scientific iCAP 7200 ICP-OES Radial

Cost effective analysis for low sample throughput requirements

Benefits

- Cost effective alternative to AA
- Easy to use with minimal user training
- Comprehensive Qtegra ISDS Software

Keywords
Cost-efficiency, ease of use, elemental analysis, ICP-OES, simplified workflow

The Thermo Scientific™ iCAP™ 7200 ICP-OES Radial is a powerful, easy to use instrument for users who are new to the ICP-OES technique, offering simplicity with no compromise on performance. As a low cost alternative to atomic absorption, the iCAP 7200 ICP-OES Radial achieves better sensitivity than microwave plasma instruments and is the ideal solution for laboratories with low throughput and multi-element analysis needs.

The Thermo Scientific iCAP 7200 ICP-OES Radial is a powerful, simultaneous spectrometer, based on the core technologies of the Thermo Scientific iCAP 7000 Plus Series ICP-OES. The iCAP 7200 ICP-OES Radial is a simple alternative to atomic absorption and microwave plasma techniques, providing a multi-element analysis solution for laboratories with increasing demands for sample throughput and lower detection limit capability. The instrument is driven by the Thermo Scientific™ Qtegra™ Intelligent Scientific Data Solution™ (ISDS) Software. Developed to combine a highly efficient workflow, easy data management, scalability and compliance, Qtegra ISDS Software delivers simplicity, productivity, efficiency and quality in the analysis workflow.

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The instrument is uniquely optimized to reduce gas consumption and running costs with a highly efficient plasma torch and interface design. Integral product components include analysis ready sample introduction kits, enable simple 'out-of-box' operation for rugged, consistent day-to-day analyses, and help analysts who are new to the ICP-OES technique to achieve standard operator competence with minimal training.

Performance

A 3-channel, 12-roller peristaltic pump, with a unique drain sensor, safely and smoothly delivers solution to and from the instrument with minimal background noise. The enhanced, high efficiency free-running 27.12 MHz solid state RF plasma generator delivers rugged reliable performance with the power and stability to cope with even the most difficult sample matrices. The high resolution simultaneous echelle spectrometer has a unique optical layout, resulting in high efficiency light transmission and excellent resolution with enhanced sensitivity and detection capability. A powerful Charge Injection Device (CID) detector, the CID86, enables free choice of wavelengths over the complete 166-847 nm range. More stable, with lower noise and greater dynamic range than previous CID designs, its non-destructive readout allows optimum signal-to-noise measurements at all concentration levels. The iCAP 7200 ICP-OES Radial is also an extremely compact instrument and therefore requires minimal laboratory bench space.

Versatility

The iCAP 7200 ICP-OES Radial uses a mass flow controlled nebulizer gas flow for improved long-term signal stability. A comprehensive range of liquid sample handling kits are available to enable simple and effective configuration of the iCAP 7200 ICP-OES Radial for optimum analytical performance with the required sample matrices. The flexible, intuitive Qtegra ISDS Software and data reporting tools make the instrument simple to learn and use due to its minimized workflow from sample introduction to reporting and data interpretation.

Productivity

The large sample compartment with full visibility door and ergonomically designed components ensures the simplest, most reliable installation and adjustment of the torch and sample handling kits, making maintenance simpler and increasing up-time and productivity. Ducted airflows and a thermostatically controlled polychromator (controlled to within 0.1 °C) ensure an extremely stable spectrometer, enabling extended analytical runs with fewer re-calibrations. Qtegra ISDS Software minimizes task times with few clicks from creation of an analytical LabBook, the start of your intelligent analysis sequence, with full QA/QC protocols and processes, to powerful results reports. Full software control of autosampler sequencing and system optimization ensures simplicity of use and the highest productivity.

Accessories

A range of liquid autosampler accessories are available that allow for 180 to 720 samples, to run unattended. An integrated hydride generation system accessory, with its high efficiency gas/liquid separator, yields sub-ppb performance for hydride forming elements such as As, Bi, Hg, Sb and Se.

Specific sample handling kits are available for organic and volatile solvent-based solutions. Further sampling kits allow use of hydrofluoric acid solutions or high solids solutions containing up to 25% dissolved solids. An argon gas humidifier minimizes blockages with glass concentric nebulizers when used to analyze samples containing high dissolved solids. The ceramic D-Torch can also be configured as part of the sample introduction system and provides enhanced torch longevity with aggressive sample matrices.

Detection Limits

Detection limits (DL) are key indicators of an instrument's capabilities; useful as an aid in determining its suitability for a chosen task. They demonstrate the lowest level of analyte distinguishable from the background noise under optimal conditions and are typically determined several times to improve the statistical accuracy. As a comparison between instruments, instrument detection limits (IDL) provide useful indication to the laboratory chemist either in the decision process for instrument acquisitions or as a measure of performance for current instruments. An IDL is a generic value that defines the lowest concentration of an analyte that can be detected under ideal conditions; and normally measured on a single element basis, using a clean sample e.g. ultrapure water. Typical detection limits are measured on several instruments of the same type to assess the average level of performance that can be expected. Typical detection limits, presented in Table 1, are the IDLs of an iCAP 7200 ICP-OES Radial as determined by applications chemists in a standard laboratory. The IDLs are an excellent indication of what is achievable with the instrument. The detection limits were determined on an iCAP 7200 ICP-OES Radial using standard sample introduction components, including a concentric nebulizer and cyclonic spray chamber.

Detection Limit Determination

To determine the detection limit for an element, a standard of 50-times the expected value of the IDL and a blank were prepared. Following plasma ignition and instrument stabilization, 10 measurements of each solution were taken, using 15 second integration times. The detection limits were calculated using the raw intensity data from the standard and the blank as follows:

$$IDL = 3SD_{blk} \frac{STD_{conc}}{STD_x - BLK_x}$$

Where:

IDL is the instrument detection limit

SD_{blk} is the standard deviation of the intensities of the multiple blank measurements

STD_{conc} is the concentration of the standard

STD_x is the mean signal for the standard

BLK_x is the mean signal for the blank

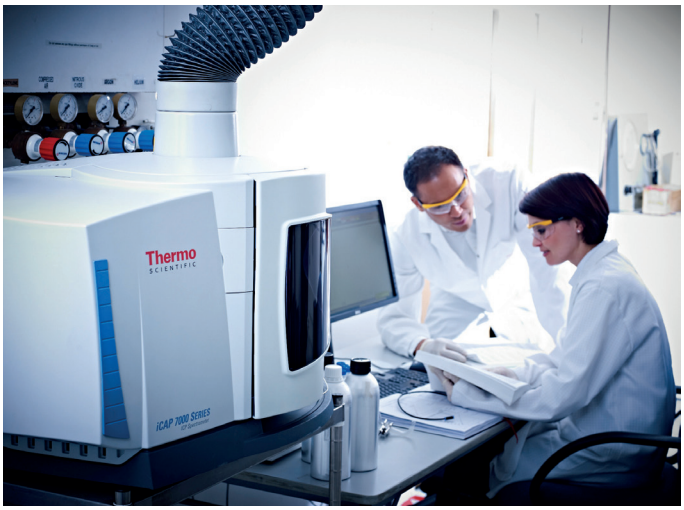
The multiplier of three is based on the student's t-test table and shows that a confidence interval of 99% is used to calculate the detection limit.

Table 1. The detection limits for the iCAP 7200 ICP-OES Radial.

Element	Wavelength (nm)	iCAP 7200 ICP-OES Radial DL µg/L (15 s)
Ag	328.068	2.46
Al	167.079	1.51
As	189.042	4.74
Ba	455.503	0.17
Be	311.107	0.07
Ca	393.366	0.02
Cd	214.438	0.19
Co	228.616	1.16
Cr	205.560	0.85
Cu	324.754	2.36
Fe	259.940	0.80
Hg	184.950	1.10
K	766.490	5.10
Li	670.784	0.83
Mg	279.553	0.04
Mn	257.610	0.21
Mo	202.030	1.11
Na	589.592	1.80
Ni	231.604	2.29
P	177.495	5.66
Pb	220.353	4.50
S	180.731	2.22
Sb	206.833	9.36
Se	196.090	7.36
Sn	189.989	1.57
Sr	407.771	0.04
Ti	336.121	0.58
Tl	190.856	7.33
V	309.311	0.80
Zn	213.856	0.60

iCAP 7200 ICP-OES Radial	
Dimensions (mm)	840 W x 750 D x 590 H
Peristaltic pump	3-channel, 12 roller peristaltic pump Speed: 0 to 125 rpm
Standard sample introduction kit	Concentric glass nebulizer Glass cyclonic spray chamber Semi-demountable EMT torch 2 mm bore quartz center tube
Plasma gas	Fixed, 12 L/min
Auxiliary gas	Fixed, 4 flows 0, 0.5, 1.0, 1.5 L/min
Nebulizer gas	Mass flow control, 0-1.5 L/min
Plasma Viewing	Radial
RF source	27.12 MHz solid state 750-1500 W
Spectrometer	Simultaneous echelle type
Spectral bandpass	7 pm at 200 nm
Wavelength range	166-847 nm
Detector	High performance solid state CID86 chip
Data acquisition mode	Standard precision mode

	Required items
iCAP 7200 ICP-OES Radial	BRE0003177 or BRE0003188 (N. America)
TF900 Turbine Pump Chiller (230 V/50 Hz)	101163010000001 (or user supplied equivalent)
TF900 Turbine Pump Chiller (115 V/60 Hz)	101163010000003 (or user supplied equivalent)
TF900 Turbine Pump Chiller (208 V/60 Hz)	101163010000000 (or user supplied equivalent)
Data Station (110 or 220 V)	8423 140 50004 (or user supplied equivalent)
	Optional accessories
Autosampler:	
CETAC ASX-280 (up to 180 samples)	BRE0007611
CETAC ASX-560 (up to 360 samples)	BRE0003260
Radial sample introduction kits:	
Organics	8423 120 52311
Volatile organics	8423 120 52301
HF resistant	8423 120 52291
High solids	8423 120 52281
Standard aqueous	8423 120 52271
Ceramic D-Torch kit	8423 120 52201
Argon humidifier	8423 120 52090
Basic hydride generation kit/Internal standards mixing kit	8423 120 51551



Find out more at **thermofisher.com/ICP-OES**

PS43253-EN 0417

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