

U5000AT+ Technical Note

Enhanced Elemental Detection for Axial-Viewing Inductively Coupled Plasma - Optical Emission Spectrometry (ICP-OES) with Ultrasonic Nebulization

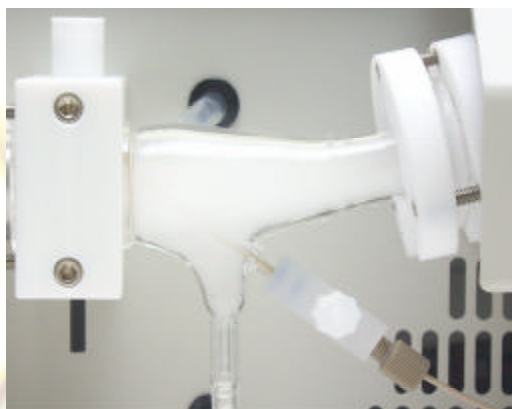
Introduction

Since its introduction in the mid 1990s, axial-viewing ICP-OES instruments have provided laboratories with improved trace level detection for most elements. However, more stringent regulatory requirements have lowered detection limits for difficult to detect elements such as arsenic.

The coupling of an axial-viewing ICP-OES instrument with an ultrasonic nebulizer (USN) can help lower detection limits by up to a factor of 10 or more. This technical note will list the improvement of these limits for a contemporary ICP-OES instrument.



CETAC U5000AT+ Ultrasonic Nebulizer



U5000AT+ Aerosol

Equipment

ICP-OES Instrument: Thermo Iris Intrepid II XSP (with standard concentric nebulizer)

Operating Conditions

	Concentric Nebulizer	U5000AT+ USN
ICP Power	1250 W	1250 W
Auxiliary gas flow	0.4 L/min	0.5 L/min
Nebulizer gas pressure	23 psi	25 psi
Sample uptake rate	2.2 mL/min	2.2 mL/min
Heater temperature	NA	140°C
Cooler temperature	NA	3°C

NA = not applicable



Detection Limits

Detection limits with the U5000AT+ USN are based on 3x the standard deviation of the blank concentration; sample integration time was 30 seconds for 5 replicate measurements. Concentration units are given as µg/L (ppb).

Element	λ(nm)	Concentric Nebulizer	U5000AT+ USN	Improvement Factor
Ag	328.068	0.5	0.04	12
As	189.042	2	0.3	7
Ba	455.403	0.05	0.007	7
Be	234.861	0.03	0.003	10
Bi	223.061	2.4	0.4	6
Cd	214.438	0.15	0.03	5
Co	228.616	0.3	0.04	7
Cr	205.552	0.30	0.02	15
Cu	324.754	1.3	0.05	25
Fe	259.904	0.50	0.08	6
Mg	279.079	0.05	0.003	16
Mn	257.610	0.13	0.02	7
Mo	202.030	0.50	0.09	5
Ni	231.610	0.45	0.04	11
Pb	220.353	3.00	0.4	7
Sb	206.833	2.5	0.2	12
Se	196.090	3.8	0.5	7
Ti	334.941	0.30	0.02	15
Tl	190.864	2.00	0.3	7
V	311.071	0.60	0.06	10
Zn	213.856	0.15	0.01	15