U5000AT+ Application Note

Enhanced Arsenic Detection in a Biological Sample 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 improve analyte sensitivity by up to a factor of 10 or more. This application note will show the use of a USN for measurement of a low arsenic level in a certified oyster tissue sample.

CETAC U5000AT+ Ultrasonic Nebulizer

U5000AT+ Aerosol

Equipment

ICP-OES Instrument: Thermo Iris Intrepid II XSP
Ultrasonic Nebulizer: CETAC U5000AT+

Sample Preparation
A sample of approximately 0.5 g of NIST SRM 1566a Oyster Tissue was accurately weighed into a precleaned 50-mL polypropylene conical vial. 5.0 mL of a high-purity grade HNO_3 (GFS Chemicals, Columbus, Ohio USA) was added to the sample vial.

The sample vial was heated via a water bath on a hot plate for 3 hours. Then 5 mL of deionized water was added to the sample vial and heating continued for 2 more hours. The sample vial was then cooled to room temperature and the final volume brought to 50 mL with deionized water.

Operating Conditions

ICP-OES Spectrometer:

ICP Power:	1250 W
Auxiliary gas flow:	0.3 L/min
Nebulizer gas pressure:	27 psi
As wavelength:	189.042 nm
Viewing:	axial
Integration time:	30 s
Replicates:	3

Ultrasonic Nebulizer:

Heater temperature:	140^0C
Cooler temperature:	3^0C
Sample uptake rate:	2 mL/min

Results

Use of the U5000AT+ USN shows excellent agreement with the certified arsenic value:

Certified Concentration (µg/g)	Determined Concentration (µg/g)
13.4 +/- 1.9	13.3 +/- 0.8

Uncertainty is based on a 95% confidence interval (2σ).