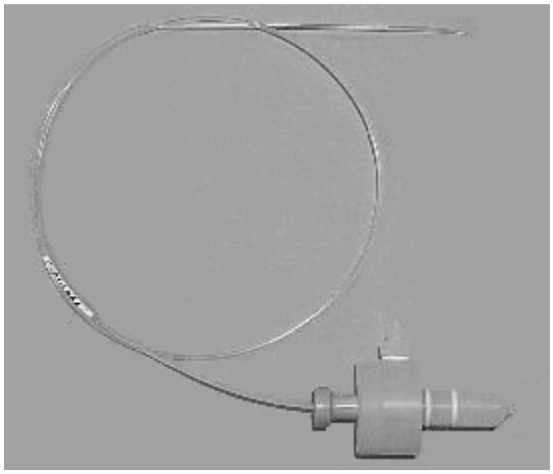
Aridus™ Sample Introduction System

The CETAC Aridus Sample Introduction System combines our experience in low flow nebulizers with a highly efficient membrane desolvation system. Features of the Aridus include:

- Low-flow (<100 µl/min) micronebulizer with membrane desolvation
- Reduced solvent-based interferences for ICP-MS
- Nitrogen addition for ICP-MS signal enhancement
- All wetted parts made of inert materials
- Pumped spray chamber drain and solvent vapor bottle
- Interfaces to all ICP-MS instruments
- Optional CETAC ASX-100 micro-autosampler

Aridus

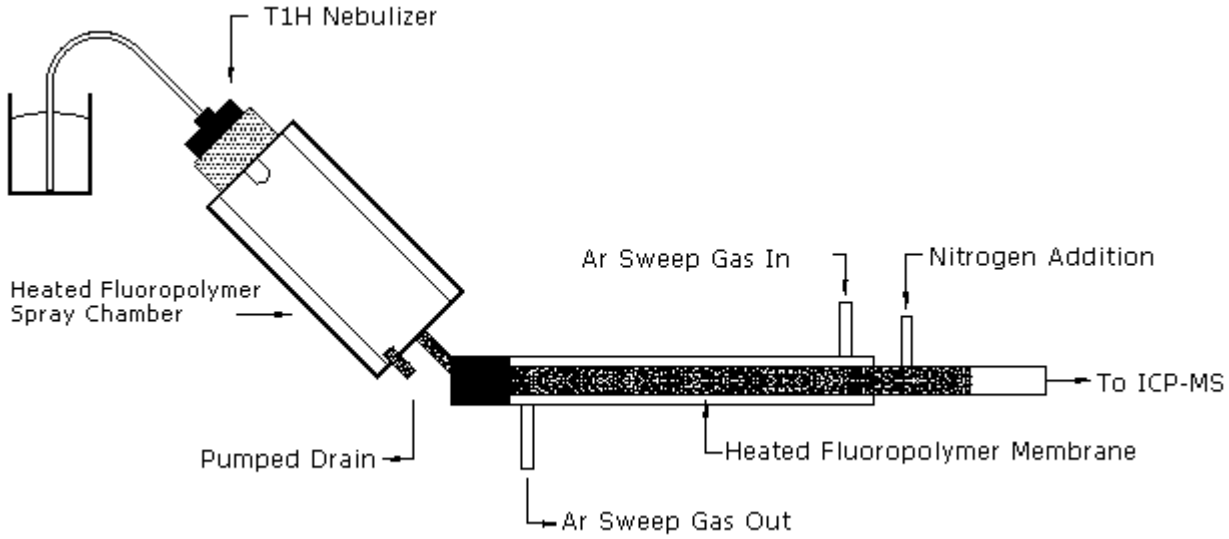


T1H Microconcentric Nebulizer

Introduction

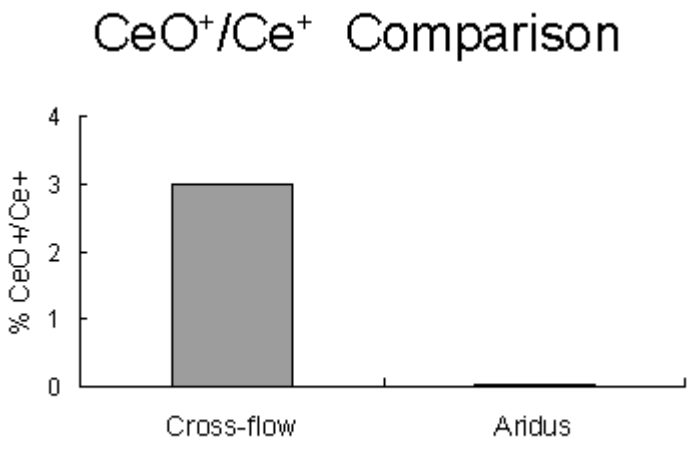
The Aridus Sample Introduction System incorporates a low-flow, fluoropolymer nebulizer with performance equivalent to or better than higher flow concentric nebulizers. With a normal flow rate of approximately 60 µL/min, the Aridus can determine all required elements with less than 1 mL of sample. Constructed completely from inert materials the Aridus system enables the introduction of non-HF containing and HF containing samples with a single sample introduction system, saving both time and money. A built-in peristaltic pump removes waste from the spray chamber and solvent vapor bottle, improving signal stability.

Sample vapor from the spray chamber then enters a heated fluoropolymer membrane. A counter-current flow of argon sweep gas is used to remove solvent vapors which permeate the membrane. An internal schematic of the Aridus is shown below.



Interference Reduction for ICP-MS

The Aridus membrane desolvator effectively removes sample solvent vapor, markedly reducing interferences such as oxides and hydrides from injected water. The following figure compares CeO/Ce for a standard pneumatic nebilizer (cross-flow) to the same ratio for the Aridus system. The ratio of CeO/Ce is reduced from approximately 3% to less than 0.05%.



CETAC Aridus with PerkinElmer ELAN 6000 ICP-MS.

Other water-based interferences are also reduced, including those which compromise detection of K, Ca and Fe. Background reduction with resulting detection limits are listed in the tables below. Note that these results were obtained under non-cleanroom conditions, and with a normal (hot) plasma setting.

Interference Reduction

Interference	Mass	Cross-flow Intensity (cps)	Aridus Intensity (cps)	Improvement Factor
ArH^+	39	>2.0 x 10^6	2800	>700
CO_2^+	44	119500	6600	30
ArO^+	56	>2.0 x 10^6	11400	>175

Note: Solution used was 0.1% HNO_3 made from high-purity reagents.
Intensities are the mean of 20 1.0 s. 1-point integrations.
A PerkinElmer ELAN 6000 ICP-MS was used.

Detection Limits

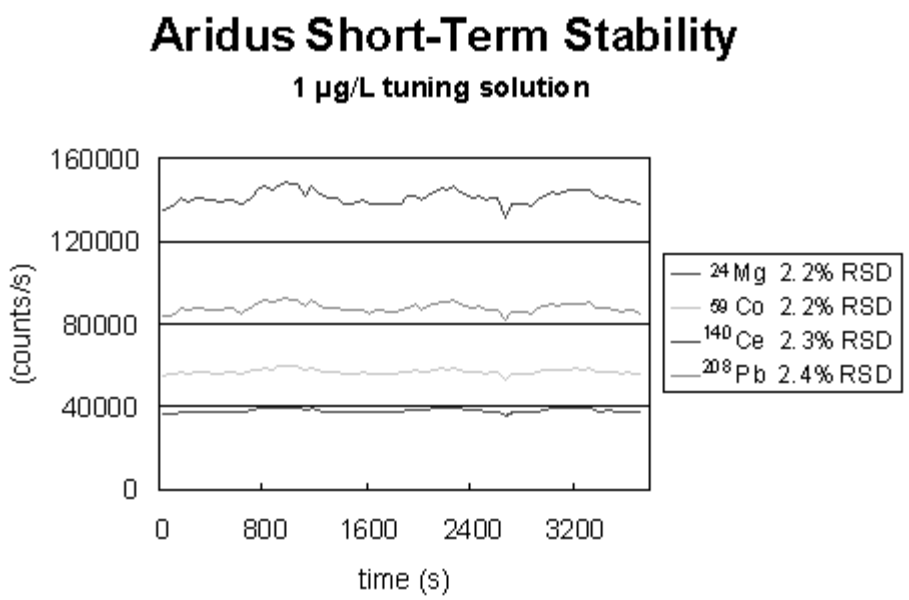
Aridus with Quadrupole ICP-MS

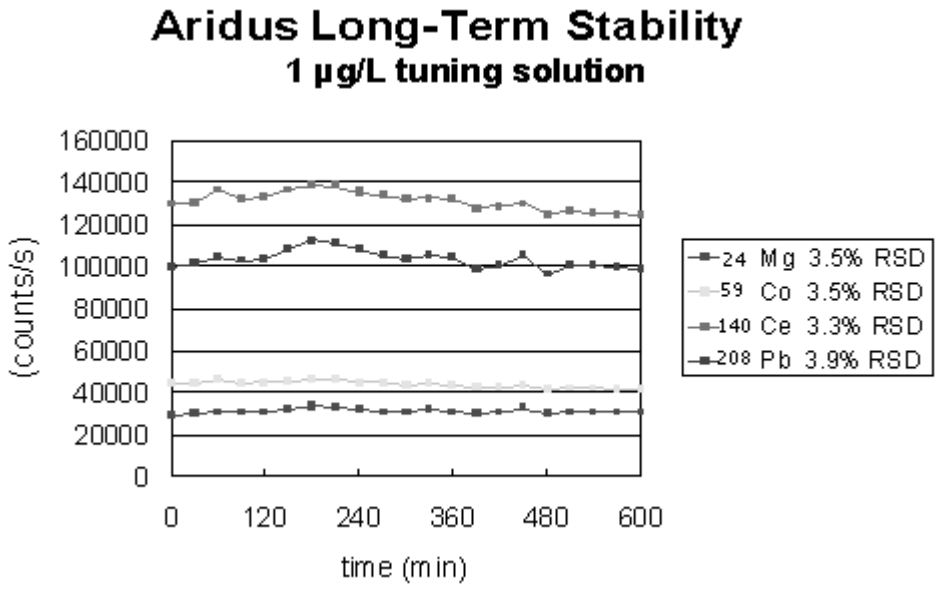
Element	m/z	Detection Limit (ng/L)
Al	27	10
Cr	53	3
Mn	55	14
Co	59	0.3
Ni	60	2
Cu	63	0.7
Zn	66	8
As	75	2
Se	82	500
Mo	95	2
Cd	111	0.4
Sb	121	0.4
Ce	140	0.3
Pb	208	0.2
U	238	0.03

Note: Detection limits based on 3x the Std. Dev. of a 0.1% HNO_3 blank.
PerkinElmer ELAN 6000 ICP-MS

Excellent Signal Stability

Aridus short-term (1 hour) signal stability is excellent, with the %RSDs for four common tuning elements well under 3% (see figure below). Long-term signal stability (10 hours) is very good, with %RSDs well under 5% (see figure below).





Stable Isotope Ratio Measurements

The Aridus system is especially useful for the measurements of stable isotope ratios by multicollector HR (high resolution) ICP-MS. Signal enhancement and signal stability improve ion counting statistics, particularly for low abundance isotopes. This feature enables more precise isotope ratio measurements.

The CETAC Aridus Sample Introduction System package includes (2) fluoropolymer nebulizers, a rinse kit, a spare parts kit and a one year limited warranty on all components. The CETAC ASX-100 micro-autosampler (option) may be coupled to the Aridus for automated low-volume sample analysis.

Specifications

- **Nebulizer**

  T1H Microconcentric with fluoropolymer capillary

- **Fluoropolymer Desolvating Membrane**

  Sweep gas: 0-5.0 L/min
  Nitrogen gas: 0-100 mL/min
  Membrane Temperature: 160º C

- **Spray Chamber**

  Fluoropolymer with pumped drain
  Temperature: 75º C

- **Voltage**

  Part No. ARD99-0001A: 120 VAC +/- 10%, 50/60 Hz, 6 A
  Part No. ARD99-0001B: 220 VAC +/- 10%, 50/60 Hz, 3 A

- **System Dimensions**

  30.5 cm W x 28.6 cm H x 43.2 cm D

- **Weight**

  18 lbs (8.2 kg)

- **Autosampler (optional)**

  ASX-100 (please specify ICP-MS type)