



## Trace metals by ICP-MS

### Low level detection of trace elements in waters using Inductively Coupled Plasma – Mass Spectrometry.

EnviroLab Services has installed an Agilent 7500ce Inductively Coupled Plasma Mass Spectrometer equipped with Octopole Reaction Cell (ICP-MS). This particular instrument will be used for the determination of low level elements in a diverse range of sample matrices.

### Trace elements in waters

While ICP-MS is an extremely powerful multi-element analytical technique, it does suffer from some well-documented Polyatomic Interferences due to the presence of salts in the sample. Polyatomic Interferences are formed when two or more atoms bond together giving the same mass that is equal to the mass of the target ion. For example the polyatomic ion formed by the combination of  $40\text{Ar}35\text{Cl}$  (with a combined mass of 75) will interfere with the  $75\text{Arsenic}$  thus potentially giving a false positive result.

The alternative approach to overcome the polyatomic interferences is the use of the Collision/Reaction Cell.

### The Collision Reaction Cell or Octopole Reaction Cell

In Helium mode (collision mode) the interferences are removed based on their physical size. Polyatomic interferences are larger than the analytes they interfere with, therefore they will collide more frequently with the Helium atoms. The polyatomic ions will therefore lose more energy and they will be removed by energy discrimination. The benefit of a collision mode is that a single set of conditions removes all interferences.

In Hydrogen mode (reaction mode) the polyatomic interference reacts with the Hydrogen gas increasing its mass number of one, therefore removing the interference on that particular mass or the polyatomic will pass the positive charge onto the Hydrogen. This mass will not be detected by the mass spectrometer.

The method has been fully validated for the analysis of waters using the ICP-MS with Collision/Reaction cell and this method is now NATA Accredited.

**For further information contact Jacinta Hurst, David Springer, Tania Notaras or Giovanni Agosti on 02 9910 6200 or [enquiries@envirolabservices.com.au](mailto:enquiries@envirolabservices.com.au)**



Kasjan  
with ICP-MS



Drinking water  
expertise



Saline water  
expertise



Limits of Reporting and corresponding ANZECC 2000 sea and fresh water trigger levels are shown below:

ID: insufficient data

Elements	LOR (µg/L)	ANZECC guidelines (µg/L) for marine water 95% trigger	ANZECC guidelines (µg/L) for fresh water 95% trigger
Aluminium	10	ID	ID
Antimony	1	ID	ID
Arsenic	1	24 (As III) 12 (As V)	ID
Barium	1	ID	ID
Beryllium	0.5	ID	ID
Boron	5	ID	370
Cadmium	0.1	5.5	0.2
Chromium	1	ID (Cr III) 1.0 (Cr VI)	27.4 (Cr III) 4.4 (Cr VI)
Cobalt	1	1	ID
Copper	1	1.4	1.3
Iron	1	ID	ID
Lead	1	3.4	4.4
Manganese	5	1900	ID
Molybdenum	1	ID	ID
Nickel	1	11	70
Selenium	1	11	ID
Tin	1	ID	ID
Thallium	1	ID	ID
Thorium	0.5	ID	ID
Uranium	0.5	ID	ID
Vanadium	1	ID	100
Zinc	1	8.0	15



EnviroLab is an analytical testing laboratory that offers a wide array of testing services to support environmental investigations focused on environmental chemistry, asbestos, lead paint, acid sulfate, emissions and industrial hygiene applications. The laboratory employs 40 full-time staff and several casuals. They are a strong, passionate and committed team supported by technology well ahead of the industry standard.

EnviroLab is located in Chatswood in Sydney. This location is centrally situated in the lower north shore area, and provides excellent access to all areas of Sydney.