



Arsenic Speciation in Water and Urine

Envirolab Services has just achieved NATA accreditation for Arsenic Speciation Analysis of waters (surface, ground and sea water) and urine.

Arsenic speciation is determined using a sophisticated hyphenated analytical technique called LC-ICP/MS (liquid chromatography inductively coupled mass spectrometry). This technique allows us to separate inorganic and common organic forms of arsenic, as well as achieving sensitivity to ANZECC guidelines for As (III) and As (V) in marine and freshwaters.

The arsenic species has a variance in toxicity, hence, the need for speciation. The most common technique for identifying arsenic is based on determining the total arsenic content. The order of toxicity is as follows: As(III) > As(V) > DMA ≥ MMA >> AB.⁽¹⁾

Inorganic forms of arsenic (e.g. arsenate and arsenite) have particularly adverse health effects. Organic forms of arsenic (e.g. monomethylarsinic acid, dimethylarsonic acid and arsenobetaine) are much less toxic. Arsenobetaine is a non-toxic species, often associated with diet, hence, speciation is a useful diagnostic tool when analysing Urine for Occupational Health monitoring.

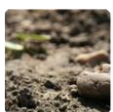
When Arsenic speciation is required, the following species of Arsenic are determined:

| Arsenic species | Practical Quantitation Limits in Waters in µg/L | Practical Quantitation Limits in Urine in µg/L |
|------------------------------|---|--|
| Arsenobetaine (AB) | 1 | 1 |
| Dimethylarsonic Acid (DMA) | 1 | 1 |
| Arsenite As (III) | 1 | 1 |
| Monomethylarsinic Acid (MMA) | 1 | 1 |
| Arsenate As (V) | 1 | 1 |

A PQL of 1 µg/L is default, PQL of 0.5 µg/L available on request.

⁽¹⁾Agilent application 5968-3050-EN-2

ENVIROLAB GROUP SPECIALISES IN



Soil

- Contaminated Sites
- Waste



Water

- Ground
- Surface
- Drinking
- Trade Waste
- Saline



Air

- Indoor
- Workplace
- Emissions
- Ambient
- Soil gas
- Dust / DPM



Asbestos

- Building
- Soil
- Brake pads



SPOCAS

- Acid Sulphate Soil
- AMD

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Collection and Preservation Process:

Water: Preservation of the samples must be performed in the field to reduce changes in arsenic speciation that may occur during transport and storage. Water samples should be filtered in the field through a 0.45µm filter and acidified to pH < 2 with hydrochloric acid and stored for no more than 28 days at 2-8°C (see USEPA method 1632A).

Analysis ASAP is preferred to enable data to reflect in situ concentrations as closely as possible, contact the laboratory prior to sampling to facilitate swift analysis.

Urine: Samples should be collected into a specimen jar (20ml minimum). For the transportation of samples, use a container such as a small esky with a freezer block. It is important to note that analysis should be conducted as soon as possible after collection. Samples should be refrigerated or frozen if they cannot be analysed promptly. See also 'AS 4985:2002 Collection and Stabilisation of Urine Samples for the quantitation of trace and toxic elements.'

Fact:

Arsenic poisoning is a medical condition caused by elevated levels of arsenic in the body. The dominant basis of arsenic poisoning is from ground water that naturally contains high concentrations of arsenic. A 2007 study found that over 137 million people in more than 70 countries are probably affected by natural occurring arsenic poisoning from drinking water!!!

Due to its high level of toxicity, arsenic has been named as the 'King of Poison.' Hence, for this reason, it is used (or has been used) as a wood preservative against insects, bacteria and fungi. Arsenic is also used in manufacturing of insecticides, poisons and weed killers.



FOR FURTHER INFORMATION AND TECHNICAL ASSISTANCE CONTACT

David Springer, Giovanni Agosti or Simon Mills on enquiries@envirolabservices.com.au (02) 9910 6200 or www.envirolabservices.com.au

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