



Arsenic speciation

The toxicity and biological effects of an element depend to a large extent on the state in which it is present. For As, arsenite is more toxic and more water soluble than arsenate. As a detoxification mechanism, various organisms methylate As, ultimately producing benign As species such as arsenobetaine. ALS Scandinavia can perform As speciation analyses in water, soil, sediment, sludge and food.

Inorganic As species

Arsenite is more toxic than arsenate. It also has a higher water solubility, which makes it more mobile than arsenate. These inorganic species have been classified as being carcinogenic.

Organic As species

Methylation of inorganic As by microorganisms can occur in waters, soils and sediment. In plants and animals, further metabolism leads to the production of various species including arsenobetaine, the predominant form of As in most marine animals.

Stability

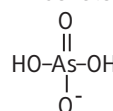
The organic As species are relatively stable, whereas arsenite is subject to oxidation ($\text{As[III]} \rightarrow \text{As[V]}$), and arsenate to reduction ($\text{As[V]} \rightarrow \text{As[III]}$). It is therefore crucial to protect the sample from alteration of the native species during storage and sample preparation.

Analysis

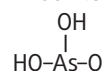
As species are typically extracted from environmental solids using phosphoric acid, and from edible commodities using methanol-water mixtures. Water samples or extracts are analyzed using HPLC-ICP-SFMS.

	Fresh water	Marine water/ urine	Soil/sediment/ sludge	Biota
Sample requirements	1 ml min.	1 ml min.	1 g min.	0.5 g min.
Limit of quantification				
As(III)	0.1 µg/l	1 µg/l	0.01 mg/kg	0.01 mg/kg
As(V)	0.4 µg/l	4 µg/l	0.04 mg/kg	0.04 mg/kg
DMA	0.1 µg/l	1 µg/l	0.01 mg/kg	0.01 mg/kg
MMA	0.2 µg/l	2 µg/l	0.02 mg/kg	0.02 mg/kg
Delivery time	5-10 days	5-10 days	5-10 days	5-10 days

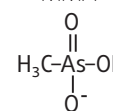
Arsenate



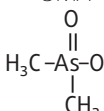
Arsenite



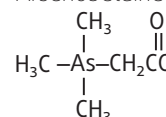
MMA



DMA



Arsenobetaine



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