PSA

P S ANALYTICAL – FOOD & BEVERAGE

Hg As Se Sb Bi Te

Using **Atomic Fluorescence Spectrometry** for the determination of **Mercury, Arsenic, Selenium & Antimony** from **Food, Feed and Beverage samples**.




The consumption of food and drink is one of the main sources of exposure to toxic metals. Selenium, on the other hand, is an essential nutritional element and is often added as a supplement to food for health benefits. It is also an important element in animal feed to ensure livestock wellbeing. Coupling ***Atomic Fluorescence Spectrometry (AFS)*** with either cold vapour generation or hydride generation has been PSA's core competency for over 35 years. With the addition of analyte separation capabilities which allows for speciation studies, PSA offers powerful analytical tools to help contract laboratories, food & feed producers and regulators alike with these determinations. Food security has never been more important.

PSA systems offer ultimate detection performance, combined with ease of use and affordability.

AFS Analysers

- *Millennium Merlin & Excalibur*

(10.025 Total Hg - 10.055 Total As, Se, Sb, Bi & Te)

Limits of Detection	ng/L
Hg	0.01
As	2
Se	1
Sb	2
Bi	10
Te	10

- *Key User Benefits*

- Wide dynamic range
- Low carryover – no flow cell
- Robust
- Easy to use and maintain
- Rapid return on investment
- Autosampler options

AFS Food & Feed Applications

(application notes & experimental details available on request)

- Dairy
- Grains (rice, wheat etc)
- Fruit & Fruit Juice
- Vegetables
- Meat
- Fish & Shellfish
- Seaweed
- Animal Feed

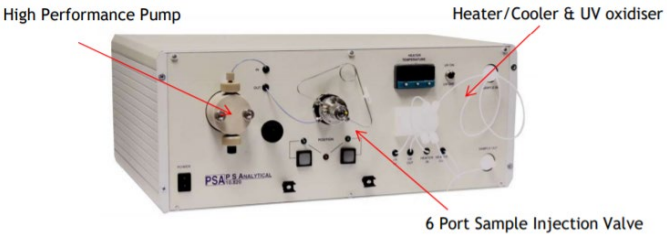
AFS Speciation Studies

Toxicological properties of these elements critically depend on the form (species) in which they occur in food. As a consequence, trace element speciation, particularly for toxic trace elements, is nowadays considered of major importance to ensure food safety. Topical examples include:

- *The separation of methyl mercury from inorganic mercury in water, shellfish, seaweed, dairy products, vegetables and grains.*
- *The determination of inorganic arsenic from less toxic organo arsenic species in water, rice, seaweed are examples of routine applications developed for this growing area of concern.*

To increase the range of applications including speciation studies we employ a configurable chromatographic front end; the ***Modular Interface (MI)***, which is equipped with LC pump, injection valve, UV cracker, heater and cooling modules. This simple interface couples directly to the ***Millennium Merlin*** or ***Excalibur*** for seamless speciation determinations.

- *Modular Interface (MI) 10.820*



- *GC-AFS 10.725*

Another option is to use capillary GC-AFS for mercury speciation analysis. Absolute detection limits of 0.2 pg are easily achieved for methylmercury and ethylmercury in a variety of food samples.

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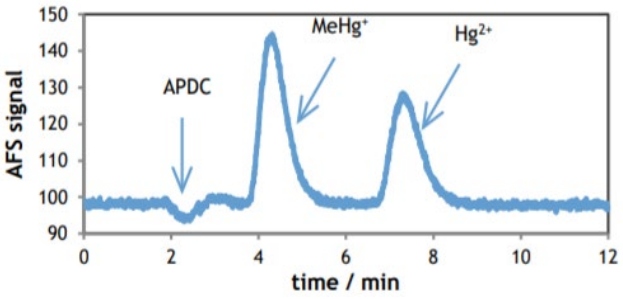
Speciation Applications

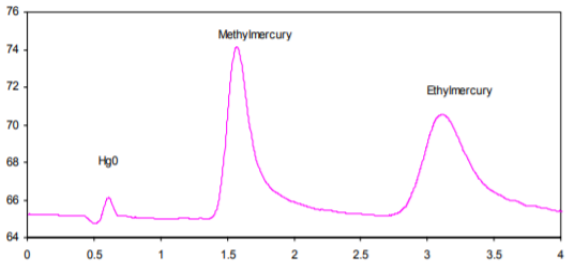
- *Mercury and Methyl mercury*
  - Fish and Shellfish

Reference Material	MeHg in Sample by CVG (mg kg⁻¹)	Certified Concentration (mg kg⁻¹)
SRM 1566b (oyster tissue)	0.0136 ± 0.007	0.0132 ± 0.0013
TORT-2 (lobster hepatopancreas)	0.158 ± 0.004	0.152 ± 0.013
ERM-CE464 (tuna)	5.09 ± 0.068	5.50 ± 0.17
DOLT-4 (dogfish liver)	1.33 ± 0.004	1.33 ± 0.12

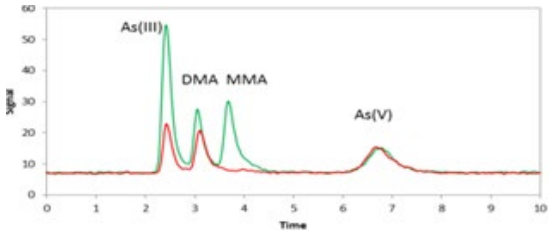
  - TORT 2 (Lobster Tissue)



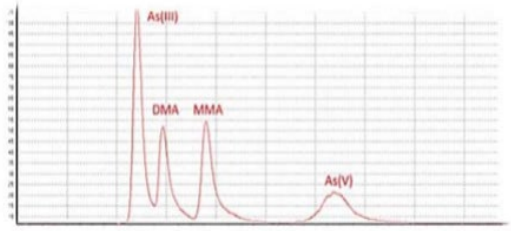
  - Ethylated fish tissue at 5ng/L (GC-AFS)



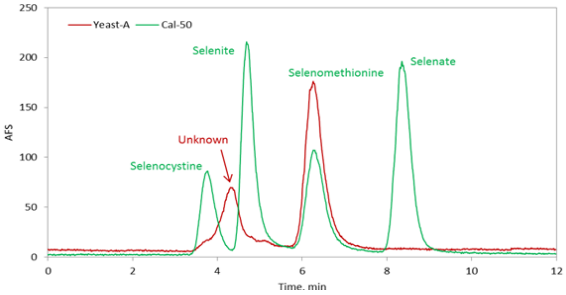
- *Arsenic Speciation*
  - Rice (10ppb standards and sample)



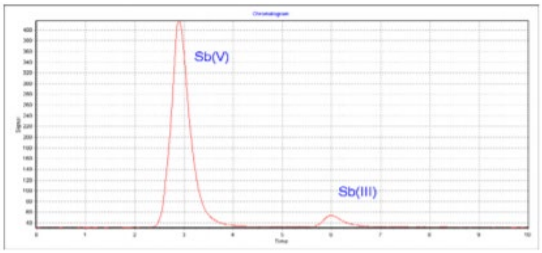
  - Apple Juice (Spiked with 10ppb standards)



- *Selenium Speciation*
  - Selenium Enriched Yeast



- *Antimony Speciation*
  - Stevia (Sweetener) Extract



HPLC-ICP-MS v HPLC- HG-AFS

The coupling of the ICP-MS with HPLC has a number of negative consequences for a busy laboratory:

- The system is tuned for single element analysis and in this configuration cannot carry out normal high-speed multi-element determinations.
- Speed of analysis is dependent on the chromatographic run times.
- Long run times consume large volumes of argon (20 and 30L/min).
- Severe polyatomic interferences are common and need to be managed carefully.
- A dedicated technician is normally employed to operate the HPLC-ICP-MS.

These issues are not experienced with the PSA approach.

For Further Details
PLEASE CONTACT US AT:
http://www.psanalytical.com/information/inforeg.html

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