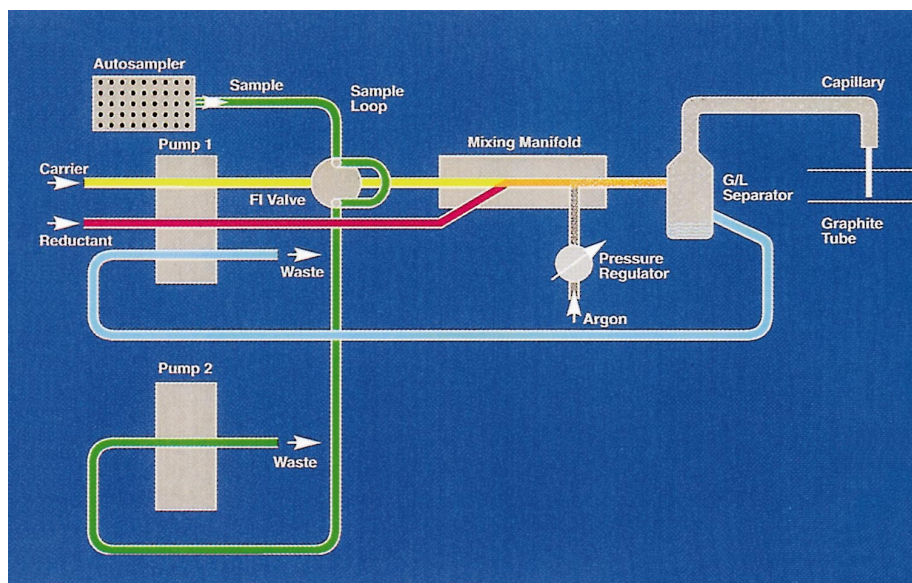


FI-FURNACE COUPLING KIT for graphite furnace atomic absorption spectrometry



Schematic drawing showing the principle of the flow injection-furnace coupling technique.

KEY BENEFITS:

- Major enhancement of detection limits for hydride-forming elements and mercury.
- Automation reduces analysis times and enhances sample throughput.
- Simple operation with fully integrated software controls.
- Simultaneous multi-element determination capabilities.
- Elimination of chemical and background interferences.

Unmatched Detection Limits

Direct coupling of mercury/hydride atomic absorption (MHAA) with graphite furnace atomic absorption (GFAA) automates online element preconcentration in the graphite tube. Using flow injection (FI) or continuous flow techniques, direct coupling allows you to analyze several milliliters of sample instead of the normal microliter volumes typical for graphite furnace AA. This improves graphite furnace detection limits for the hydride-forming elements and for mercury by 2-3 orders of magnitude (100- to 1000-fold).

Fully Automated, Easy To Use

The FI-Furnace Coupling Kit allows a Perkin-Elmer® FIAS™ Flow Injection System to be coupled directly with a Perkin-Elmer graphite furnace, providing a fully integrated system. The complete system is computer-controlled using Perkin-Elmer AA WinLab™ software. Analyses are fully automated, simplifying user interaction, minimizing analysis times and maximizing sample throughput.

PERKIN ELMER

Look to us. And see more.

Characteristic Masses and Detection Limits

Element	mo (pg/0.0044 Qa)	DLs (pg/mL)*
As	50	2
Bi	70	3
Ge	120	10
Sb	60	3
Se	60	1
Sn	110	6
Te	65	3

*5 mL sample volume

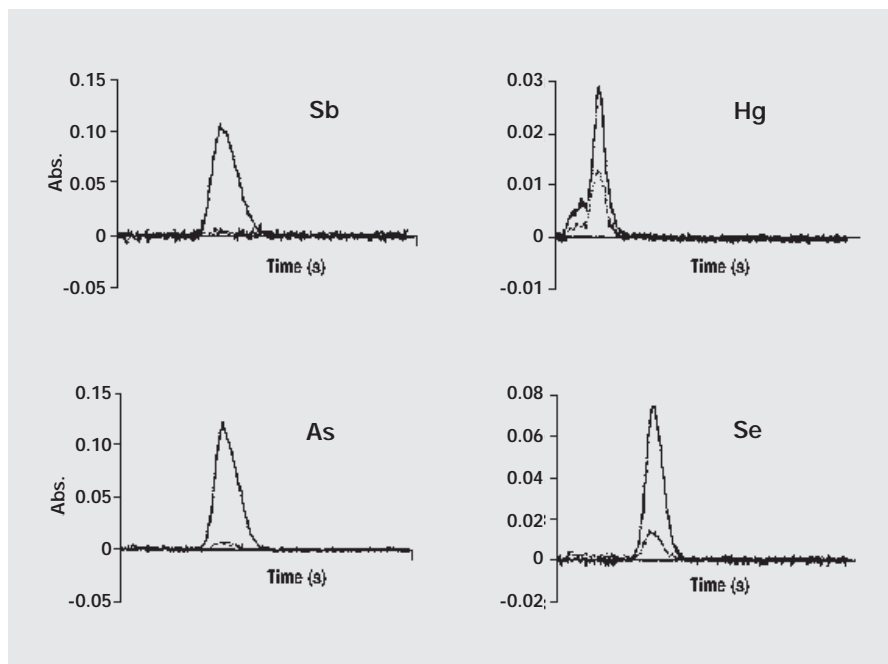
Simultaneous Multi-element Analysis Capabilities

When used with the Perkin-Elmer SIMAA™ 6000 AA Spectrometer, the FI-furnace technique offers simultaneous multi-element analysis capabilities. Up to six elements can be determined simultaneously, significantly reducing analysis times and allowing novel applications to be performed with GFAA.

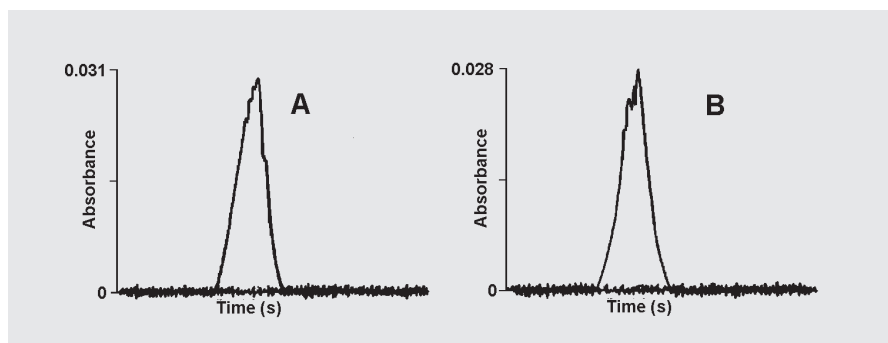
Elimination of Chemical and Background Interferences for Improved Accuracy

Since the analyte elements are removed from the sample matrix using MHAA, chemical and background absorption interferences (which are matrix dependent) are virtually eliminated, improving analytical accuracy.

Elements in complex samples such as saturated brine solutions or highly concentrated acids can be determined with practically the same detection limits as aqueous reference solutions.



Simultaneous determination of hydride-forming elements in acid solutions using FI-Furnace coupling and the SIMAA 6000.



Ultratrace determinations of 25 ng/L As: A) in aqueous reference solution; B) in saturated NaCl (3 mL sample volume).

FI-Furnace AA Methodology

A basic method for FI-furnace AA is very simple. First a layer of iridium is deposited on the L'vov platform inside the graphite tube. This is done automatically by injecting an iridium solution into the graphite tube using a specified furnace program. A single iridium coating on a platform lasts for hundreds of determinations.

Metallic hydrides and mercury vapor generated in the flow injection mercury/hydride system then are passed to the heated graphite tube. The Ir coating on the platform aids in breaking down the metallic hydrides, and acts as a collector for the released

metals and mercury vapor. Repeating this process allows the analyte element to be concentrated in the graphite tube. The degree of concentration (and the improvement in detection limits) depends on the total sample volume analyzed. Sample volumes as large as 50 mL have been used, although 500 μ L to 5 mL are more typical analysis volumes.

When the selected preconcentration step has been completed, atomization of the analytes preconcentrated on the L'vov platform is performed using normal furnace conditions.

It's that simple.

Automatic Combination of Proven Analytical Techniques

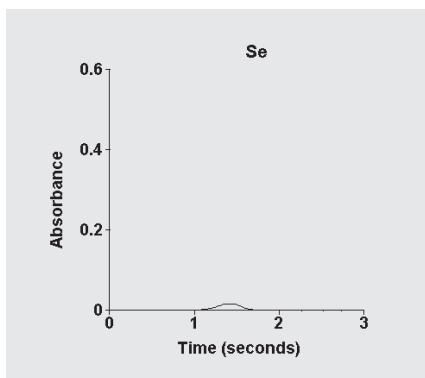
The FI-Furnace Coupling Kit combines three proven analytical techniques: graphite furnace AA (GFAA), mercury-hydride AA (MHAA), and flow injection sample preparation (FI).

GFAA is one of the most sensitive techniques for trace metal determination with absolute detection limits in the range of a few picograms. With typical sample volumes between 10 μ L and 50 μ L, relative detection limits are around 0.1 μ g/L.

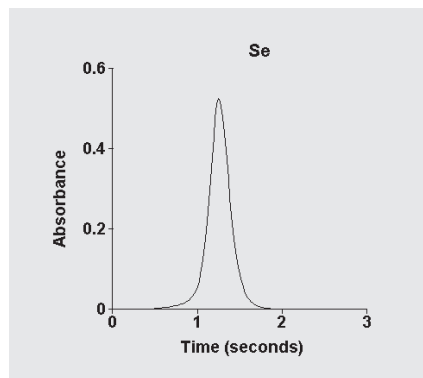
However, even this excellent sensitivity is not sufficient for the determination of ultra-traces analyte concentration in, for example, non-polluted waters. In such cases, time-consuming sample preconcentration steps or more expensive analytical techniques such as ICP-MS or neutron activation analysis have had to be used. Using the FI-Furnace Kit, preconcentration can now be performed automatically, improving GFAA detection limits for the hydride-forming elements and mercury by 2 to 3 orders of magnitude.

MHAA is the most sensitive and interference-free AA technique for the determination of mercury and the hydride-forming elements such as As, Se, Sb, Te, Bi and Sn. One of its advantages is the complete separation of the elements being determined from the sample matrix, resulting in nearly interference-free determinations.

FI is an exceptionally versatile sample preparation technique for atomic spectroscopy. It provides fully automated operation and, in its various configurations, offers short analysis times and high sample throughput, reduced sample and reagent consumption, and exceptional cost efficiency.



Determination of 1 μ g/L Se with graphite furnace AA (5 μ L sample volume).



Determination of 1 μ g/L Se with FI-Furnace Coupling (50 μ L sample volume).

Ordering Information

Part Number	Description
B314-0255	<p>FI-Furnace Coupling Kit. Allows the FIAS-400 Flow Injection System to be directly coupled with the graphite furnace of the Perkin-Elmer SIMAA 6000, AAnalyst™ 800, AAnalyst 700, AAnalyst 600 or Model 4110 ZL for automated on-line element preconcentration in the graphite tube under control of AA WinLab software. The kit consists of a special sample transfer tube (B050-9612); a quartz pipette tip (B0510032); a 50-mL bottle or iridium standard solution (B314-0391); and a FIAS-Furnace User Guide (0993-5250). Required for operation but not included are one of the GFAA spectrometer systems noted, a FIAS-400 Flow Injection System, and an AS-90 or AS-91 Autosampler.</p> <p>Note: The SIMAA 6000 and 4110 ZL spectrometers require AA WinLab Version 2.5 or higher for FI-Furnace control. The AAnalyst 600/700/800 spectrometers require AA WinLab Version 3.1 or higher.</p>
B050-9549	<p>FIAS-Furnace Coupling Kit. Allows the FIAS-400 Flow Injection System to be directly coupled with the graphite furnace of the Perkin-Elmer Model 4100 ZL for automated on-line element preconcentration in the graphite tube under control of PEALABS. The kit consists of a special sample transfer tube; a quartz pipette tip; a special version of PEALABS software; and a FIAS-Furnace User Guide. Required for operation but not included are the Model 4100 ZL, a FIAS-400 Flow Injection System, an AS-90 or AS-91 Autosampler and iridium standard solution.</p>

References

- H. Sinemus, J. Kleiner, and H. Stabel. Combination of Flow Injection Hydride Generation and Sequestration on a Graphite Tube for the Automated Determination of Antimony in Potable and Surface Waters. *Journal of Analytical Atomic Spectrometry*, 1992, **Vol.7**.
- I. Shuttler, M. Feuerstein, and G. Schlemmer. Long-term Stability of a Mixed Palladium-Iridium Trapping Reagent for In-Situ Hydride Trapping Within a Graphite Electrothermal Atomizer. *Journal of Analytical Atomic Spectrometry*, 1992, **Vol.7**.
- L. Tsalev, A. D'Ulvio, L. Lampugnani, M. Di Marco, and R. Zamboni. Thermally Stabilized Iridium on an Integrated, Carbide-coated Platform as a Permanent Modifier for Hydride-forming Elements in ETAAS. Part 2. Hydride Generation and Collection, and Behaviour of Some Organoelement Species. *J. Anal. At. Spectrom.*, 1996, **979-988**.
- D. L. Tsalev, A. D'Ulvio, L. Lampugnani, M. Di Marco, and R. Zamboni. Thermally Stabilized Iridium on an Integrated, Carbide-coated Platform as a Permanent Modifier for Hydride-forming Elements in Electrothermal Atomic Absorption Spectrometry. Part 3. Effects of L-Cysteine. *J. Anal. At. Spectrom.*, 1996, **989-995**.
- S. N. Willie. First order speciation of As using flow injection hydride generation atomic absorption spectrometry with in-situ trapping of the arsine in a graphite furnace. *Spectrochim. Acta*, Part B, 1996, **1781-1790**.
- P. Bermejo-Barrera, J. Moreda-Piñeiro, A. Moreda-Piñeiro, and A. Bermejo-Barrera. Use of Flow Injection Cold Vapour Generation and Preconcentration on Coated Graphite Tubes for the Determination of Mercury in Polluted Seawaters by Electrothermal Atomic Absorption Spectrometry. *J. Anal. At. Spectrom.*, 1997, **317-321**.
- J. Murphy, P. Jones, G. Schlemmer, I. Shuttler, and S. Hill. Investigation Into the Simultaneous Determination of Bismuth and Selenium by 'In Atomizer Trapping' Electrothermal Atomic Absorption Spectrometry. *Anal. Commun.*, 1997, **359-362**.



Get MORE Connected.

The lines of advanced communication are OPEN. It's the Perkin-Elmer commitment to building relationships by sharing information and solving problems together. So no matter how far-reaching your needs, our world-wide support and service teams will take you where you need to go. Experience MORE of what PE can do for you here: Visit our **Website** at www.perkin-elmer.com. **E-MAIL** us at info@perkin-elmer.com. **Call** us at **1-203-762-4000**. **Fax** us at **1-203-762-4228**.



PERKIN ELMER
Look to us. And see more.

U.S.A., The Perkin-Elmer Corporation, 761 Main Ave., Norwalk, CT 06859-0012 Tel: (800) 762-4000. Fax: (203) 762-4228
Perkin-Elmer is a registered trademark and FIAS, WinLab, AAnalyst and SIMAA are trademarks of The Perkin-Elmer Corporation.