Increased Sensitivity Through Hydride Generation

Brief
The hydrideFAST 2 is an inline sample introduction system that revolutionizes hydride generation by enabling simultaneous determination of both hydride and nebulized elements. The system enhances sensitivity for hydride-forming elements while maintaining the multi-element capabilities of direct nebulization.

Features:
- Three Modes of operation
  - Hydride generation only
  - Simultaneous hydride and FAST nebulization
  - FAST nebulization only
- MP² peripump
- Gas-liquid separator
- Small internal volume
- Integrated, modular design
- Flexible

Figure 1. Continuous hydride generation while simultaneously aspirating sample illustrates > 30 to nearly 400 fold improvement in sensitivity.
Figure 2. Continuous, simultaneous introduction of hydride and nebulized elements.

Abstract

Simultaneous analysis of directly nebulized and hydride forming elements increases sensitivity (10 to 400x) for As, Se, and Hg while maintaining complete functionality for nonhydride forming elements (eg. Mn, Zn, Ba and Pb). Mn, Zn, Ba As, Se, Hg and Pb were calibrated on an ICP-OES using standards ranging between 0 to 20 ppb with excellent linearity. Five replicates of unspiked and spiked (10 ug/L) tap water illustrate good accuracy with recoveries near 100% and well within the EPA guidelines. Improved detection limits for hydride elements are better than 10x lower than the required EPA maximum contaminant level illustrating the utility of the method for determination of contaminant levels in drinking water.
Simultaneous Calibration of Hydride and Nebulized Elements

Figure 4. Hg and Ba calibration curves are plotted as examples of hydride and simultaneously nebulized elements. Excellent linearity (> 0.9999) is typical for both hydride and nebulized elements.

Spike Recovery

Figure 5. Omaha tap water is used as the EPA 200.8 defined, Laboratory Fortified Matrix (LFM) and Quality Control Standard (QCS). Recovery of 95-105% greatly exceeds EPA requirements of 70-130%.
Benefits:

- Stable signal for improved detection limits
- Stable hydrogen gas formation
- Enhances sensitivity
- Small internal volume for low memory effect and fast washout
- Conserves lab space
- Upgrade to prepFAST hydride