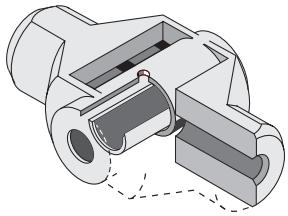
# AUTOMATIC MATRIX MODIFICATION
## for improved analytical quality and sample throughput

## THGA GRAPHITE FURNACE AA



The matrix modification technique is a very important feature in the concept of interference-free trace metal determinations. Applying this technique, the chemical forms, and thereby the physical properties, of the element under study and/or the matrix, can be changed by adding a suitable reagent in excess to the sample and standard reference solutions.

### Matrix modification

- Decreases the volatility of the analyte element and prevents its loss during thermal pretreatment. This also allows application of higher pretreatment temperatures for better matrix removal.
- Increases the volatility of matrix components and promotes their removal before atomization.

Perkin-Elmer furnace autosamplers feature automatic matrix modification with the ability to apply one or more matrix modifiers sequentially or simultaneously.

The following tables provide detailed information on how to prepare the most common matrix modification solutions.

**Table 1. THGA Graphite Furnace: Matrix Modifiers for Routine Applications**

| Modifier | Major Application | Absolute Mass Required | Stock Reagents Required | Working Solutions (for a 5-µL modifier addition) | |
|---|---|---|---|---|---|
| | | | | Preparation | Concentration |
| Pd + $Mg(NO_3)_2$ | Ag, As, Au, Bi, Cd, Cu, Ga, Ge, Hg, In, Mn, Sb, Se, Sn, Te, Tl | 5 µg Pd + 3 µg $Mg(NO_3)_2$ | 1% (10 g/L) Pd* + 1% (10 g/L) Mg ** | Dilute 1 mL of Pd stock solution and 0.1 mL of Mg stock solution to 10 mL with 18 MΩ deionized water. | 0.1% (1 g/L) Pd + 0.06% (0.6 g/L) $Mg(NO_3)_2$ |
| Pd + $Mg(NO_3)_2$ | P | 20 µg Pd + 5 µg $Mg(NO_3)_2$ | 1% (10 g/L) Pd* + 1% (10 g/L) Mg ** | Dilute 4 mL of Pd stock solution and 0.17 mL of Mg stock solution to 10 mL with 18 MΩ deionized water. | 0.4% (4 g/L) Pd + 0.1% (1 g/L) $Mg(NO_3)_2$ |
| $Mg(NO_3)_2$ | Al, Be, Co, Cr Fe, Si | 15 µg $Mg(NO_3)_2$ | 1% (10 g/L) Mg* | Dilute 0.5 mL of Mg stock solution to 10 mL with 18 MΩ deionized water. | 0.3% (3 g/L) $Mg(NO_3)_2$ |
| $Mg(NO_3)_2$ | Zn | 5 µg $Mg(NO_3)_2$ | 1% (10 g/L) Mg* | Dilute 0.17 mL of Mg stock solution to 10 mL with 18 MΩ deionized water. | 0.1% (1 g/L) $Mg(NO_3)_2$ |

**(cont'd.)**

## Table 1. THGA Graphite Furnace: Matrix Modifiers for Routine Applications (cont'd.)

| Modifier | Major Application | Absolute Mass Required | Stock Reagents Required | Working Solutions (for a 5-µL modifier addition) | |
|---|---|---|---|---|---|
| | | | | Preparation | Concentration |
| $NH_4H_2PO_4$ + $Mg(NO_3)_2$ | Cd, Pb | 50 µg $NH_4H_2PO_4$ + 3 µg $Mg(NO_3)_2$ | Use either: **A:** 10% (100 g/L) $NH_4H_2PO_4$ liquid*** + 1% (10 g/L) Mg* or **B:** solid ultrapure $NH_4H_2PO_4$ + 1% (10 g/L) Mg* **Caution:** do not use $(NH_4)_2HPO_4$ | **A:** Dilute 1 mL of $NH_4H_2PO_4$ stock solution and 0.1 mL of Mg stock solution to 10 mL with 18 MΩ deionized water. or **B:** Dissolve 10 g $NH_4H_2PO_4$ in 18 MΩ deionized water and make up to 100 mL. Dilute 1 mL of this solution and 0.1 mL of Mg stock solution to 10 mL with 18 MΩ deionized water. | 1.0% (10 g/L) $NH_4H_2PO_4$ + 0.06% (0.6 g/L) $Mg(NO_3)_2$ |

## Table 2. THGA Graphite Furnace: Matrix Modifiers for Special Applications

| Modifier | Major Application | Absolute Mass Required | Stock Reagents Required | Working Solutions (for a 5-µL modifier addition) | |
|---|---|---|---|---|---|
| | | | | Preparation | Concentration |
| Use either: **A:** 95% Ar + 5% $H_2$ or | Halide matrices (e.g., NaCl) | Used as an alternate internal gas during dry and pyrolysis steps | None | | |
| **B:** $HNO_3$ | | NA | Ultrapure conc. $HNO_3$ | To 80 mL 18 MΩ deionized water, add 20 mL conc. $HNO_3$ | 20% (v/v) $HNO_3$ |
| $CH_3OH$ HF $HNO_3$ | Boric acid matrix | 10 µL $CH_3OH$ + 0.2 µL conc. HF + 0.2 µL conc. $HNO_3$ | $CH_3OH$ + conc. HF + conc. $HNO_3$ | For a 10-µL modifier addition: 10 mL $CH_3OH$ + 200 µL conc. HF + 200 µL conc. $HNO_3$ and mix all | |

* Part No. B019-0635

** Part No. B019-0634
Note: 1% Mg corresponds to 6% $Mg(NO_3)_2$ or 10.5% $Mg(NO_3)_2 \cdot 6H_2O$
1 µg $Mg(NO_3)_2$ corresponds to 0.17 µg Mg or 1.75 µg $Mg(NO_3)_2 \cdot 6H_2O$

*** Part No. N930-3445

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