

Routine Analysis of Organic Samples by ICP-MS - The New Benchmark

The analysis of organic samples is challenging for ICP-MS. The physical properties of heavy organics matrices cause a high plasma and interface loading, which can lead to incomplete sample dissociation, while the high carbon content gives rise to new interferences - notably C₂ (on Mg) and ArC (on Ca). The Agilent 7500 Series has been developed to handle even heavy organics routinely: sample introduction and plasma system design and the ShieldTorch interface enable virtually any organic matrix to be measured at ultratrace levels (including Mg and Cr).

Key features of the 7500 Series include:

- Standard Peltier cooled spray chamber for reduced solvent vapour loading
- High ion transmission to allow the use of low sample uptake rates (50-400 ul/min), which dramatically reduces plasma loading
- High energy, solid state 27.12MHz plasma for optimum energy transfer and complete sample matrix dissociation.
- ShieldTorch cool plasma for complete removal of C-based interferences

Semiconductor Organics

Agilent's ShieldTorch interface enables operation under high power cool plasma conditions (typically 900W), to completely remove C-based interferences while still retaining enough power to dissociate the sample matrix. Figure 1 shows a standard addition calibration of Mg in IPA - with excellent sensitivity and linearity at the 5ppt level. Mg was measured at 226ppq in the IPA, demonstrating the complete removal of C₂ at mass 24. Agilent also offers unique sample introduction solutions for semiconductor users, such as an integrated autosampler for ultratrace analysis and a specially designed ICP torch for photoresist samples.

New Petrochemical Applications

The ultratrace measurement of transition metals in petrochemical matrices such as kerosene is becoming more important as the industry develops solvents and fuels for leading edge applications. Below the analytical range of ICP-OES, only ICP-MS can meet the needs of the industry. The ShieldTorch is employed to reduce both C-based and Ar-based species that interfere with first row transition metals. Figure 2 shows two spectra - one from a high purity kerosene blank (lower) and the other from a 1ppb spike in the same sample. The

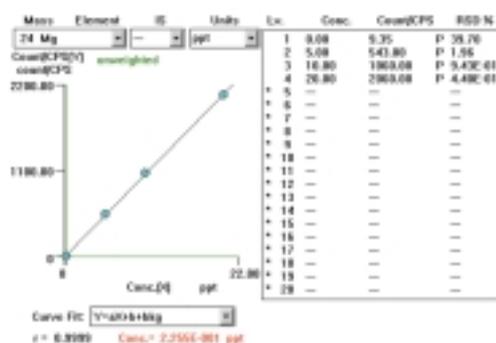


Figure 1 - Calibration of Mg in IPA

absence of peaks in the blank and the good fit of elemental templates confirm that both types of interference have been effectively removed.

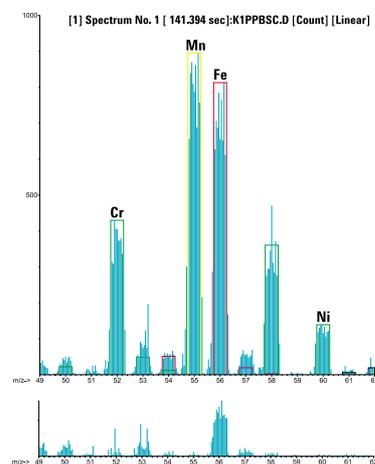


Figure 2 - Spectra of blank & 1 ppb in kerosene

Organic Mobile Phases in LC-ICP-MS

A key requirement of ICP-MS for use with LC is the ability to handle organic mobile phases easily. The 7500 Series' organic sample handling capability makes it the ideal choice for LC-ICP-MS, easily handling mobile phases such as methanol or 65% acetonitrile for extended periods.

