



## Extending the Capabilities of ICP-MS with Chromatography - Separating Organometallic Species using Coupled GC-ICP-MS

When used in combination with an on-line separation technique, Inductively Coupled Plasma Mass Spectrometry (ICP-MS) becomes a sensitive and highly specific detector for a wide variety of applications. The Agilent 7500 Series is already used as a sensitive detector in conjunction with liquid chromatography (LC), ion chromatography (IC) and capillary electrophoresis (CE).

Coupling GC and ICP-MS, combining the separation capabilities of GC with the selectivity and sensitivity of ICP-MS, offers real benefits in the measurement of ultratrace levels of organically bound metals.

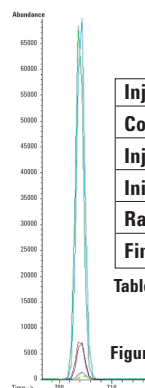
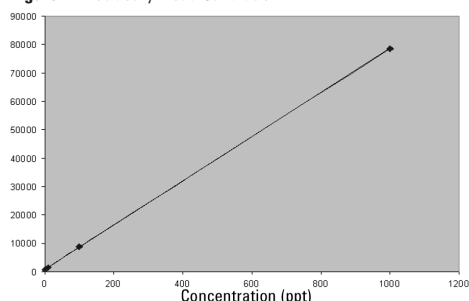
Agilent Technologies has introduced a novel GC interface that allows easy coupling of the 6890 series GC to the 7500 Series ICP-MS instruments and makes full use of the powerful features of both devices.

### The Interface Features

- Specially designed high performance torch - optimized for use with gaseous/volatile samples
- Heating throughout the length of the transport line to 300°C - avoiding cold spots and condensation of high boiling point compounds
- Full temperature control via the GC - for optimum performance
- Easy-fit connection to the 7500 motorized torchbox - fast mounting and demounting of the interface

The optimized sample introduction system of the 7500 Series is designed around a high temperature 27.12MHz ICP produced by a stable, solid state RF generator. This source dramatically reduces the formation of interfering molecular species by completely dissociating sample matrices. The high temperature 27.12MHz plasma more efficiently ionizes elements that have a high ionization potential (IP), giving improved sensitivity for elements, such as Be, As, Se, Cd and Hg.

Figure 1 - Tetraethyl Lead Calibration



Injection Type	Splitless
Column	HP-5 30M x 0.25mm x 0.25u
Injector Temp	250°C
Init Temp/time	100°C/1 min
Rate	15°C/min
Final Temp	200°C

Table 1 - Acquisition parameters for the GC

Figure 2 - Replicate 1ul injections of the tetraethyl lead standards

### Measuring Tetraethyl lead by GC-ICP-MS

The 7500 was operated in normal plasma mode. The combined GC-ICP-MS system was optimised by tuning on the signal for  $^{120}\text{Xe}$ , a contaminant in the argon plasma gas.

Standards were prepared by diluting neat tetraethyl lead into isooctane to yield a 1000ppm tetraethyl lead stock solution. Serial dilutions were prepared in isooctane at 1, 10, 100 and 1000 ppt and placed in capped GC autosampler vials.

Duplicate injections (1uL) were autoinjected and acquired in time resolved mode. No internal standard or time reference compounds were employed. The analytical conditions are summarized in Table 1 and the calibration curve produced is illustrated in Figure 1. Figure 2 highlights the reproducibility with the duplicate injections overlaid.

### Other Applications for GC-ICP-MS

Organotin and organomercury compounds as well as being toxic demonstrate substantial biological activity within the environment. GC-ICP-MS will allow the easy analysis of these species.

### Advanced Tools for Difficult Analyses

Agilent Technologies has a wide range of accessories and software tools that will extend the capabilities of ICP-MS. These include an LC connection kit; speciation kits featuring columns with full methodology and the powerful Plasma Chromatographic software suite that integrates into the 7500 ChemStation. This optional package allows users to acquire and manipulate time-based data in real time, and provides a wealth of features required for routine chromatographic analysis.

