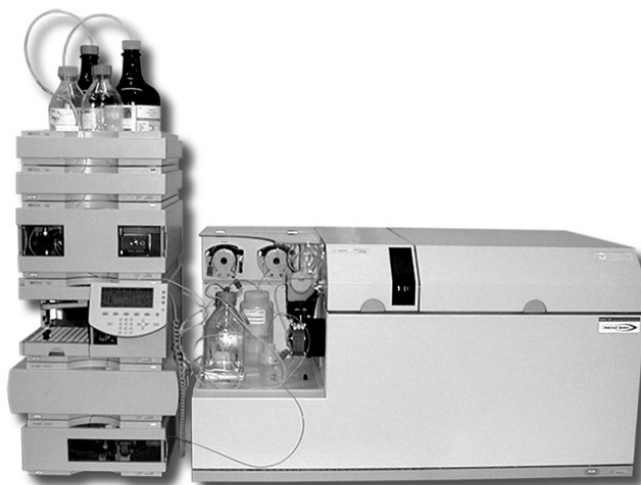
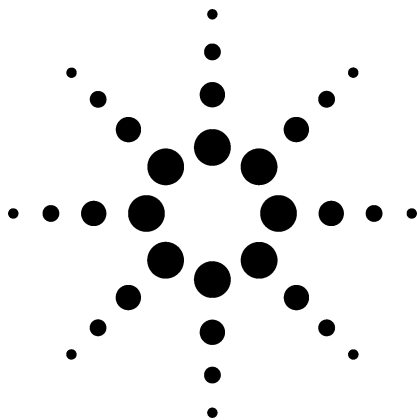


# LC-ICP-MS Connection Kit for Agilent 7500 Series Technology



- **Combining Agilent's expertise in LC and ICP-MS**
- **Easy switching between coupled and standalone configurations**
- **Optimized sample introduction compatible with standard and capillary LC applications**
- **Robust plasma capable of handling any organic mobile phase or gradient, including acetonitrile**
- **High ion transmission delivers high sensitivity even at capillary LC flow rates (20 mL/min)**
- **High stability electronics and mass analyzer for excellent long-term reproducibility**
- **Fully compatible with Agilent Plasma Chromatographic software for real-time data analysis**

- **Allows routine and overnight running of integrated LC-ICP-MS analyses**
- **Routine detection and quantification of elemental species**
- **Isotope analysis capability of ICP-MS enables isotope dilution and isotope tracer studies to be performed**

## Why LC-ICP-MS?

The measurement capability of existing liquid chromatography (LC) detectors may be limited in terms of sensitivity or specificity. Current and future applications are likely to require the analysis of inorganic species and organometallic compounds at ever lower concentrations, so alternative detection systems are necessary. Inductively coupled plasma mass spectrometry

(ICP-MS) provides good selectivity (element specific analysis and even isotopic information) and ultra-trace detection limits for most elements.

Samples are introduced into a high-temperature argon plasma where they are decomposed, atomized, and ionized. Ions are introduced into the mass spectrometer for detection and identification. ICP-MS provides information regarding the total metal concentrations in a sample. When used in combination with a front-end separation technique such as LC, ICP-MS becomes a highly sensitive detector that can be used for a variety of speciation applications. LC-ICP-MS allows for the simultaneous separation and measurement of a variety of species/compounds in a single analytical run.



## The LC-ICP-MS Connection Kit

The Agilent LC-ICP-MS Connection Kit contains all the components required to easily combine the Agilent 1100 LC with the Agilent 7500 ICP-MS. It includes all the necessary fittings, tubing, and cables for complete synchronization of the LC and ICP-MS. An internal standard can be added post-column via the 7500 on-board pump. This provides additional flexibility and allows continuous point-by-point correction to provide the ultimate in data quality.

## Fully Integrated LC-ICP-MS Analysis

The Agilent 7500 Series sample introduction, robust plasma system, and interface can be configured to handle organic samples on a routine

basis, without high plasma or interface loading. Typical mobile phases, such as methanol or 65% acetonitrile, can be introduced to the ICP-MS over extended periods. The column eluent is directed into the nebulizer/spray chamber via a connecting block. Using this configuration, the ICP-MS becomes a very sensitive elemental detector for the LC.

See Figure 1 for a schematic of the LC-ICP-MS system.

In a typical analysis, an ICP-MS sequence is created containing information on calibration standards, unknown samples, and any QC samples, such as those used for recalibration of retention times. The LC sequence controls sample injection and then sends a “start” signal to the ICP-MS. After data collection, the Plasma Chromatographic Software (Plasma Chrom) automatically

locates and integrates the peaks and generates quantitative results for each compound identified in the sample, based upon a response curve generated from the standards analyzed. A quantitative analysis report can be printed automatically in real-time during the sequence, or the data can be manipulated (for example, using different integration parameters) and quantified offline at a later date.

## Ease of Use

Chromatographic data analysis is conducted via the optional Plasma Chrom module of the Agilent 7500 ChemStation software suite. The software enables, for the first time, the analysis of chromatographic data in real-time. Based on Agilent’s renowned ChemStation chromatographic software, Plasma Chrom incorporates all of the

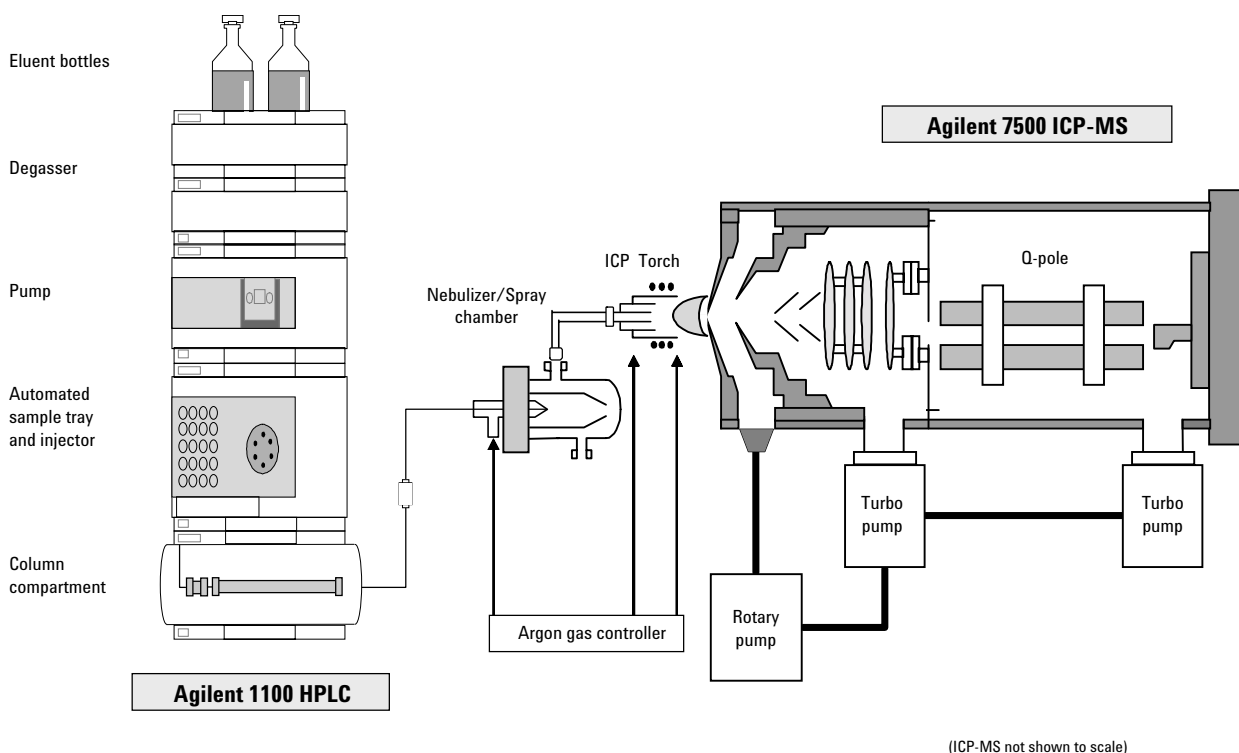


Figure 1. Schematic of Agilent 1100 HPLC coupled to Agilent 7500 ICP-MS.

features that chromatographers expect, such as real-time quality control (QC), advanced peak integration routines and confirmation of target analytes. Moreover, operation of the fully integrated Agilent LC-ICP-MS system is easy, making it suitable for both an R&D setting and for routine use.

## Applications

Agilent has developed the fully automated LC-ICP-MS interface in response to the demand for routine and overnight running of analyses in the environmental, clinical, nutritional, bio/pharmaceutical research, and quality control areas. LC-ICP-MS is applicable wherever the quantification of different

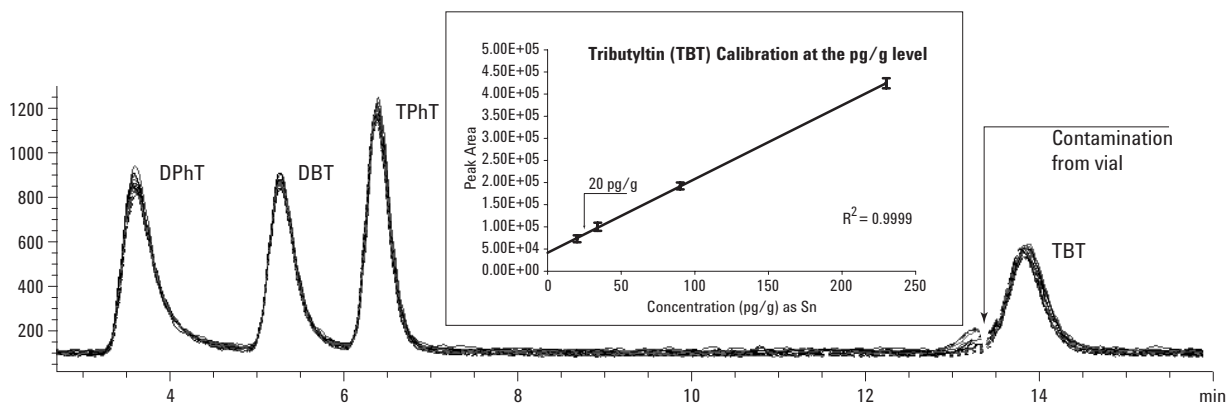
species, forms, oxidation states, or biomolecules associated with trace elements is required. The ICP-MS adds the capacity to measure isotopic composition, so isotope ratio measurements, isotope dilution analysis, isotopic spike recovery, and tracer studies can be carried out.

Figure 2 displays a series of chromatograms obtained from a 12-hour long-term stability study (20 overlaid chromatograms, obtained from separate visits to sample vials during the 12 hours). The sample was a mixed organotin solution containing diphenyltin (DPhT), dibutyltin (DBT), triphenyltin (TPhT), and tributyltin (TBT), each at 2 ppb, running with an acetonitrile (65%), acetic acid (10%)

mobile phase (minor contaminants can be observed just before the tributyltin (TBT) peak). No reoptimization or retention time calibration was performed. The excellent stability and reproducibility of the system is clearly demonstrated.

## Conclusions

Agilent's LC-ICP-MS is opening up new possibilities for speciation measurement. The long-term reproducibility of the Agilent system will enable, for the first time, the study of species interconversion and equilibria within a given sample matrix. This has far reaching implications in terms of the development of new speciation standards and the validation of speciation measurement.



**Figure 2.** Twenty overlaid chromatograms showing 12-hour long-term stability for a mixed organotin standard running acetonitrile/acetic acid mobile phase. Included is a low-level calibration for tributyltin. Data courtesy of LGC (Teddington) Ltd, UK.

## Ordering Information for the Agilent LC-ICP-MS Connection Kit

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Description	Part no.
<b>LC-ICP-MS Connection Kit</b>	G1833-65200
Kit contents:	
Sample tubing	
Union joint	
Tee joint	
Connectors	
Ferrules	
APG remote cable	

### Required 1100 Series LC Configuration for:

#### *Automated analysis*

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Description	Order code
Agilent 1100 Series HPLC	
Iso pump	G1310A
Autosampler	G1313A
Control module	G1323B

#### *Manual analysis*

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Description	Order code
Agilent 1100 Series HPLC	
Iso pump	G1310A
Manual injector assembly	G1328B
Control module	G1323B

**Note 1:** If the 1100 LC is controlled by a standalone ChemStation PC, then it is not necessary to order the G1323B Control Module.

**Note 2:** Additional optional items, not included in the LC connection kit, are required for the analysis of organic mobile phases.

## For More Information

For more information on our products and services, visit our Web site at [www.agilent.com/chem](http://www.agilent.com/chem).

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