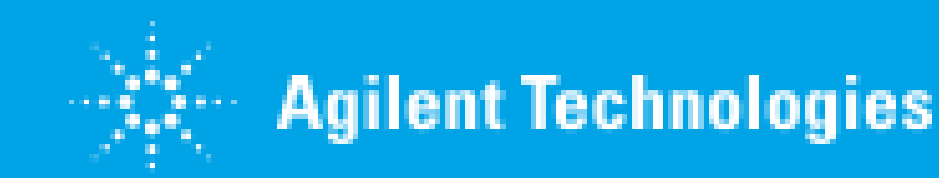


An Innovative New Plasma Source for Elemental Analysis using Atomic Spectroscopy

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2012 Winter Conference
Poster # ThP35



Introduction

The atomic absorption spectrometer was developed in the 1950s by Sir Alan Walsh from the CSIRO Division of Chemical Physics. This elemental analysis technique revolutionized chemical analysis techniques, especially in the 1960s. Despite the widespread acceptance of AA as an analytical technique, the fundamental limitations - including relatively slow multi-element determinations, high ppb detection limits, safety concerns and the requirement for attended analysis - remain even after more than 60 years. While many laboratories have progressed to fast multi-element analysis techniques that offer trace and ultra trace level detection limits, including ICP-OES and ICP-MS, the AA technique has continued to be the workhorse technique in many laboratories for major, minor and some trace level analyses.

This poster describes an innovative new plasma source for elemental analysis that addresses the limitations of the AA technique. This technique produces linear dynamic range, detection limits and analysis speed superior to conventional flame AAS. Based on an atomic emission technique, this elemental analysis technique produces simpler spectra than ICP-OES and greater sensitivity than flame AAS. In addition, it eliminates the need to buy hollow cathode lamps. This innovative elemental analysis technique also eliminates the need for argon or indeed, any bottled gas. It operates from a compressed air supply, producing a significant reduction in operating costs and reduced infrastructure costs.

Common Challenges Facing Laboratories Doing Elemental Analysis Today

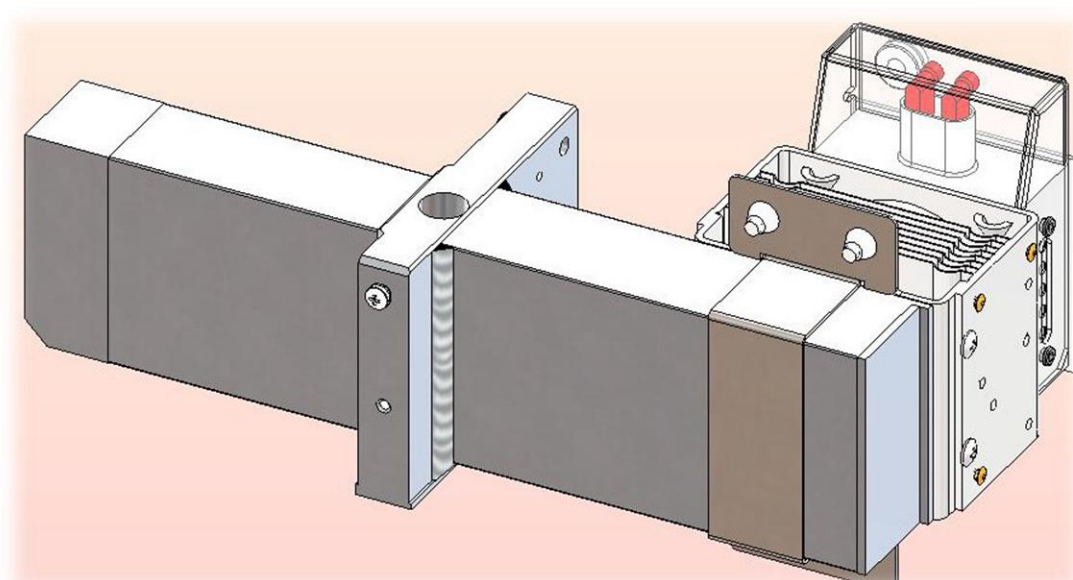
- Increased need for multi-element determination over a wide dynamic range
- Desire to reduce the overall cost of analysis due to rising costs (instrument supplies and consumables; power; labor; etc)
- Difficulty in sourcing some gases – especially in remote areas and emerging geographies
- Availability of suitably trained personnel to develop methods, perform sample measurement and interpret results
- Some laboratories are under pressure to improve safety by removing flammable gases

Agilent 4100 Microwave Plasma-Atomic Emission Spectrometer (MP-AES)

New technique for elemental determination using atomic emission

- Microwave excited plasma source
- Nitrogen based plasma - runs on air (using a N2 generator)

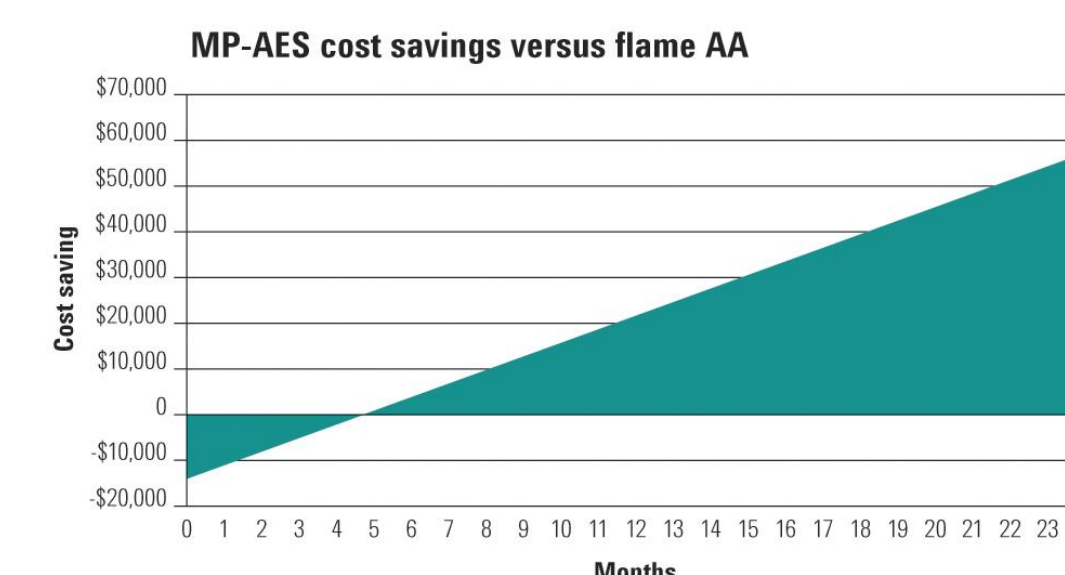
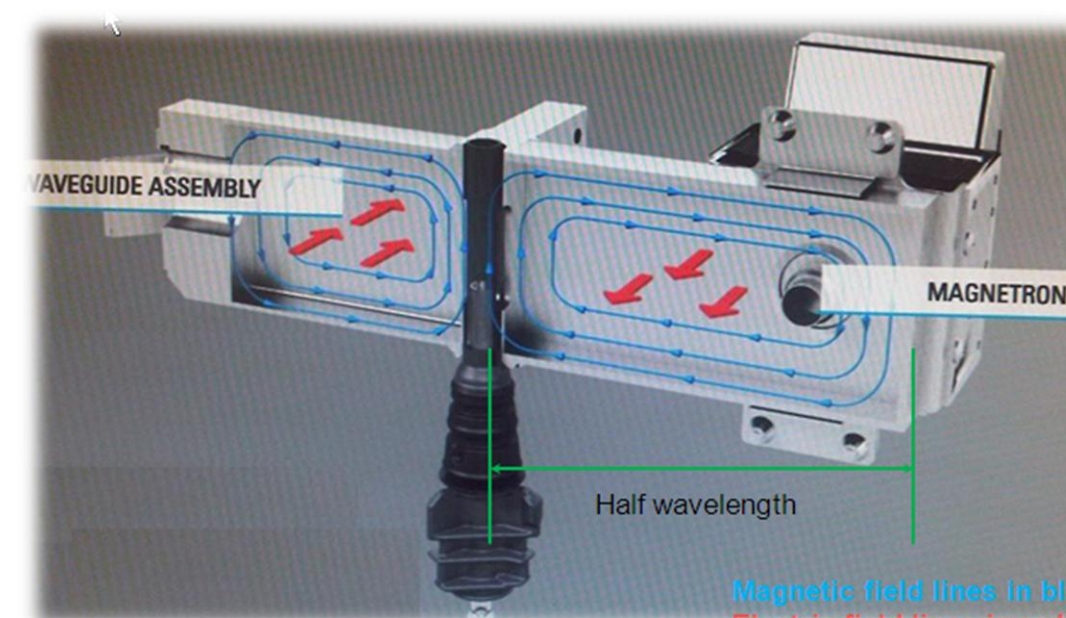
Microwave Excited Plasma



Patented Microwave Waveguide Technology

- Using nitrogen as the plasma gas (a diatomic gas) gives a robust plasma with a conventional torch. Nitrogen can be supplied via bottled gas, dewar or nitrogen generator
- Magnetic excitation gives a toroidal plasma and an effective central zone for sample injection

4100 MP-AES Instrumentation



Assumes measuring 9 elements (4 nitrous-oxide) in batches of 100 samples, 3 days/week. MP-AES using the N₂ generator.

Torch installation in three easy steps



GEOCHEMICAL	CHEMICAL & PETROCHEMICAL	FOOD & AGRICULTURE	ENVIRONMENTAL
Geochem samples in aqua regia digests Trace elements in geological samples Trace level gold in cyanide leach Analysis of high purity gold Platinum group elements in ore grade material Various elements in plating solutions	Additives in lubricating oils Wear metal contaminants in used oils Analysis of coolant Analysis of petroleum and diesel fuel Major elements in polymers	Major elements in foods, beverages and agricultural samples Cations in soils Nutrients in soils Metals in soil extracts Metals in agricultural soil samples	Hg, Pb, Cd and Cr in electronics and plastics (for WEEE/RoHS compliance) Heavy metals in soils As, Sb and Se in sediments and waste Analysis of waste waters, sediments and soils

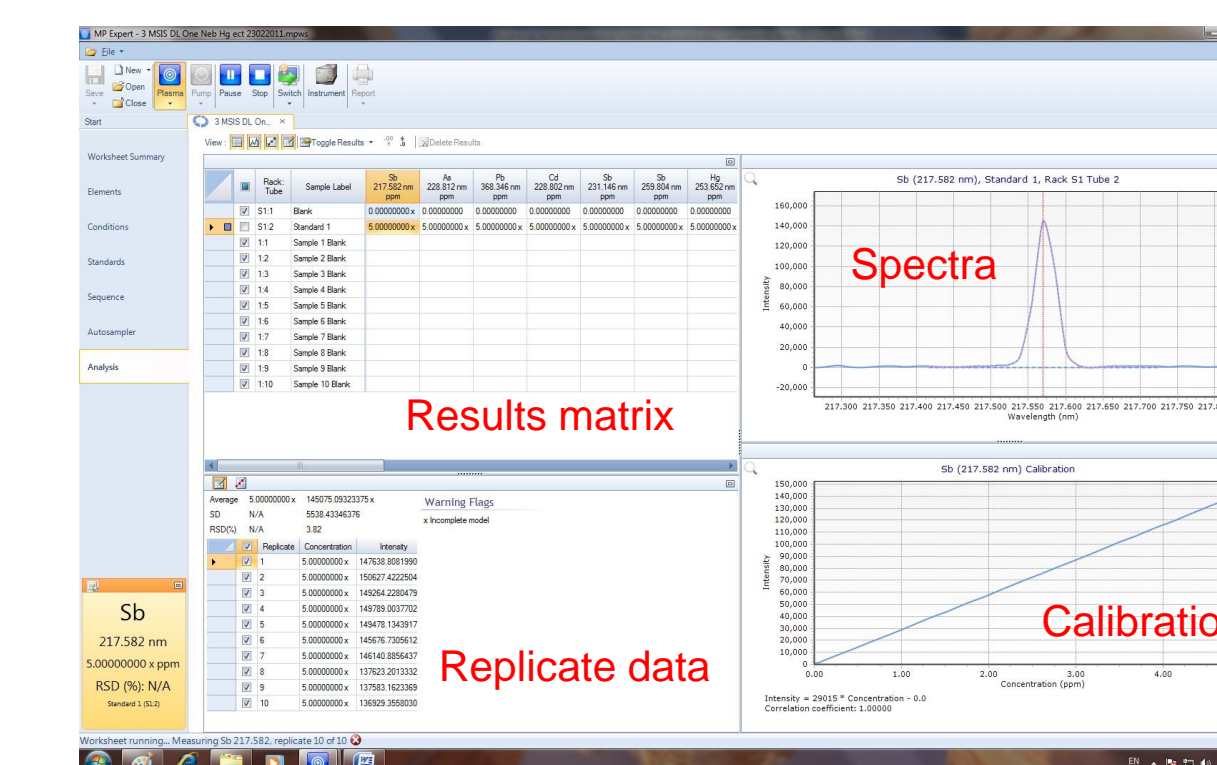
The microwave magnetically excited nitrogen plasma

- Provides a robust, high temperature source in conventional torches (approx. 5000 K)
- Provides a cooler central channel suitable for sample atomization
- Creates high intensity atomization emission lines

MP Expert software

New Generation MP Expert Software

- Windows 7, worksheet based software
- Provides capability for applet style operation using preset methods, or access to full capabilities
- Innovative and simple to use background correction
- Automated optimization tools

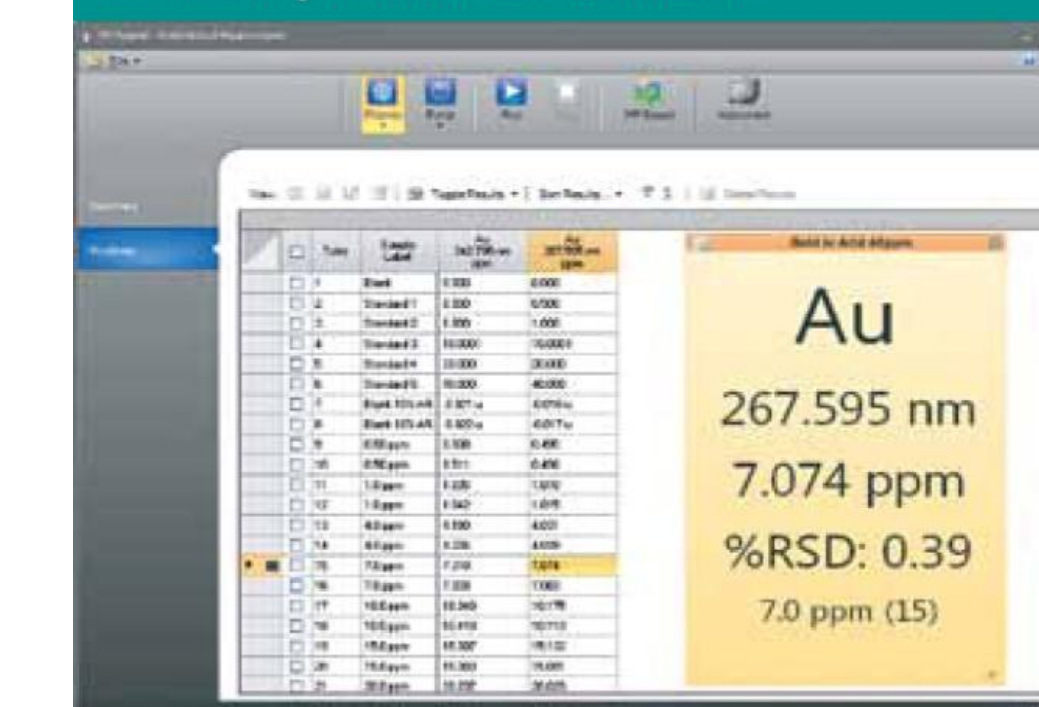


Three steps to analysis

1 Click the applet icon, which automatically loads the pre-set method



2 Enter sample labels, sample type, and weight/volume correction factors



3 Load samples and run the analysis



Summary

Agilent 4100 MP-AES

- **Lowest running cost** of any atomic spectroscopy technique due to capability to run on air – ideal for remote and at site operation
- **Improved safety** – capability to run on air means no flammable gases and no manual handling of cylinders
- **Easy-to-use** software with MP applets and plug and play torch which simplify operation and maximize uptime
- **Superior performance to flame AA**, with capability to run unattended overnight