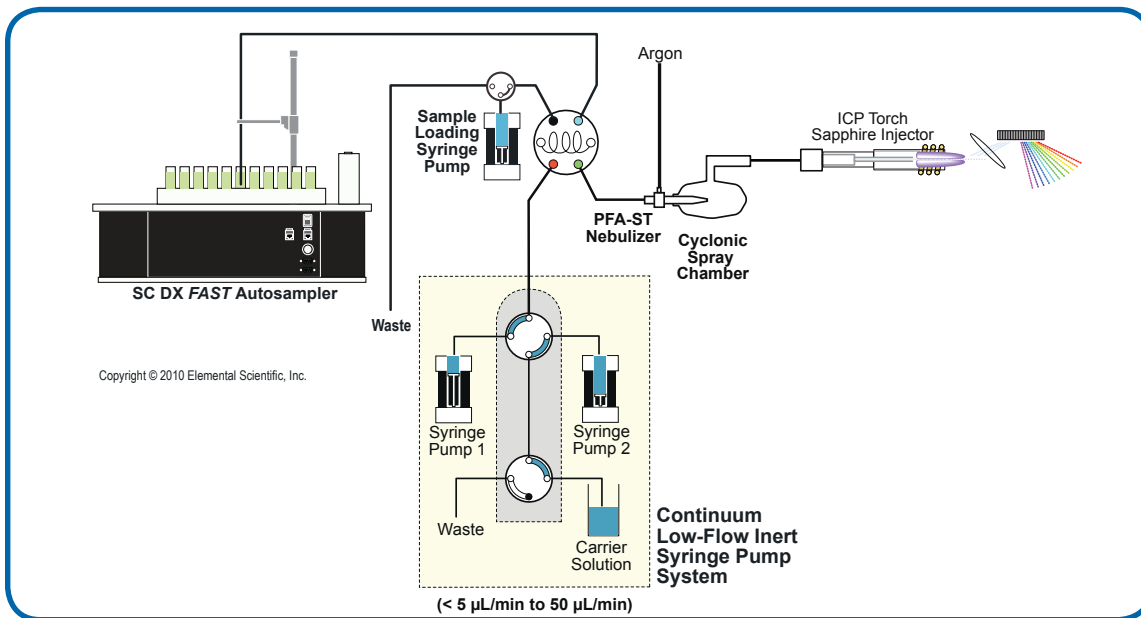


microFAST OS Automated Volatile Organic Solvents Analysis



microFAST OS (Organic Solvent) Analysis System

Description

The microFAST OS is a complete, automated low-flow sample introduction system for the analysis of volatile organic solvents by ICPOES. Low ppb concentrations of metals are reliably determined in undiluted solvents such as methylbutane, hexane, octane, benzene, toluene, gasoline, and naphtha.

Principle

The microFAST OS uses a low-flow syringe pump to draw neat organic samples and standards into a loop on an inert injection valve. When the valve switches, the sample is carried into a PFA nebulizer by a solvent carrier stream driven by a reciprocating continuous low-flow dual syringe pump system operating at between 5 and 40 microliters per minute. At such low flow rates, essentially 100% of the sample enters the ICP injector, minimizing elemental speciation effects.

Components

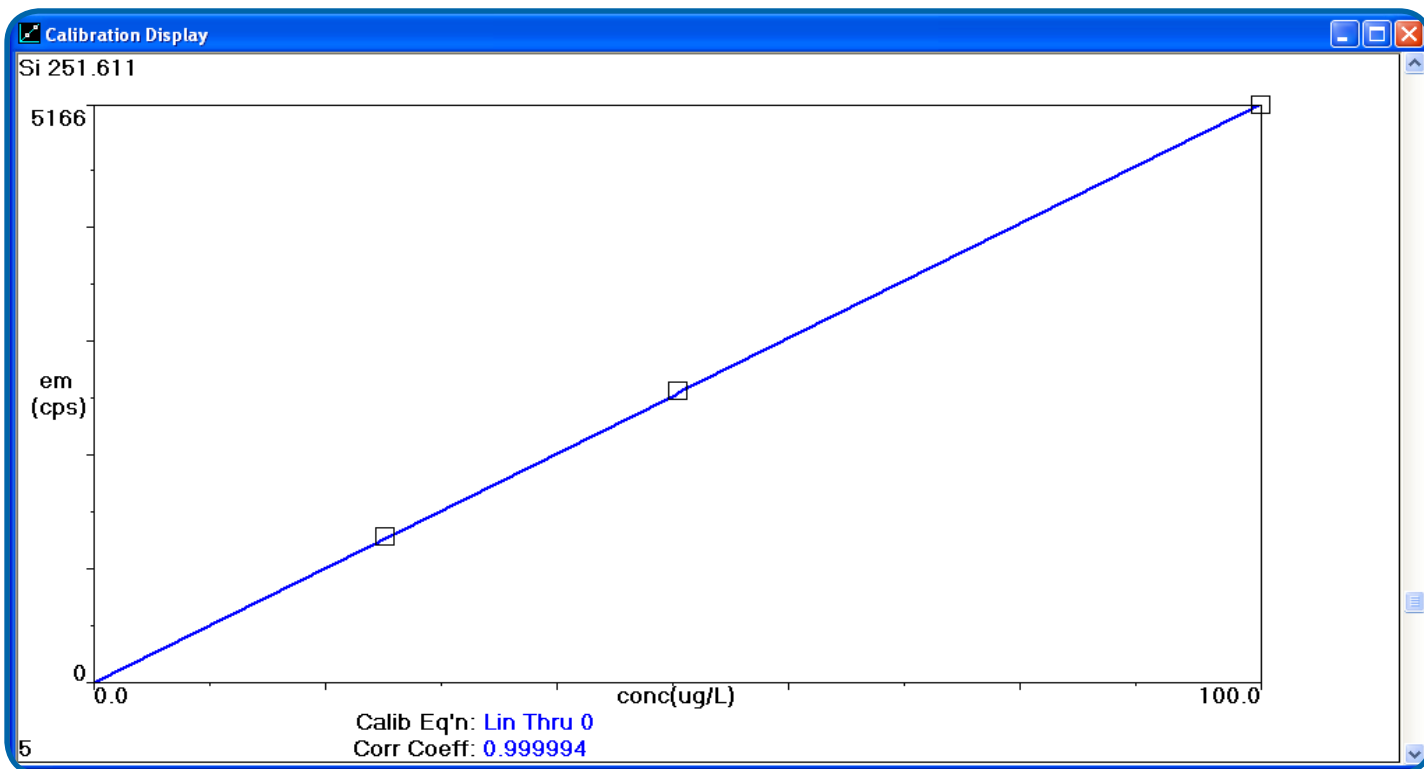
- Inert SC Autosampler
- Inert Sample Injection Valve
- continuum™ Low-Flow Syringe Pump System
 - Continuous delivery of carrier solvent 5 µL/min to 1 ml/min
- PFA MicroFlow Nebulizer
- High-Efficiency O-Ring-Free Cyclonic Spray Chamber
- 2 mm i.d. sapphire injector

Detection Limits (ppb) (Sample flow rate, 10 µL/min)

Analyte	Heptane	Gasoline	Toluene
Ag 328.068	1.5	25	1.4
Al 308.215	7.8	6.0	9.9
B 249.677	5.4	9.4	0.8
Ba 233.527	0.5	0.9	0.6
Ca 317.933	2.4	3.6	3.9
Cd 228.802	1.1	1.1	1.2
Cr 267.716	1	0.3	0.5
Cu 327.393	1.4	0.6	1.0
Fe 238.204	0.6	1.0	0.5
K 766.490	1.7	14	36
Mg 285.213	1.1	0.8	0.9
Mn 257.610	0.3	0.4	0.8
Mo 202.031	2.6	1.9	2.1
Ni 221.648	10	0.4	0.5
Pb 220.353	14	1.6	3.6
Sb 206.836	10	2.6	5
Si 251.611	2	1.1	0.5
Sn 189.927	4	1.5	1.6
Ti 334.940	1.3	0.7	0.6
V 290.880	0.8	0.7	0.4
Zn 206.200	1.2	1.4	0.6

Overall Benefits

- Minimal sample preparation—direct analysis of neat organic solvents
- Eliminate solvent overloading effects by operating at reduced flow rates
- Improved detection limits
 - Reduced spectral interferences
 - Improved sensitivity
 - Elimination of contamination from diluents
- Single calibration for a variety of solvents
- Uniform sensitivity regardless of chemical species
- Reduced consumable and maintenance costs
 - Elimination of peristaltic pump tubing
 - Reduced waste disposal costs

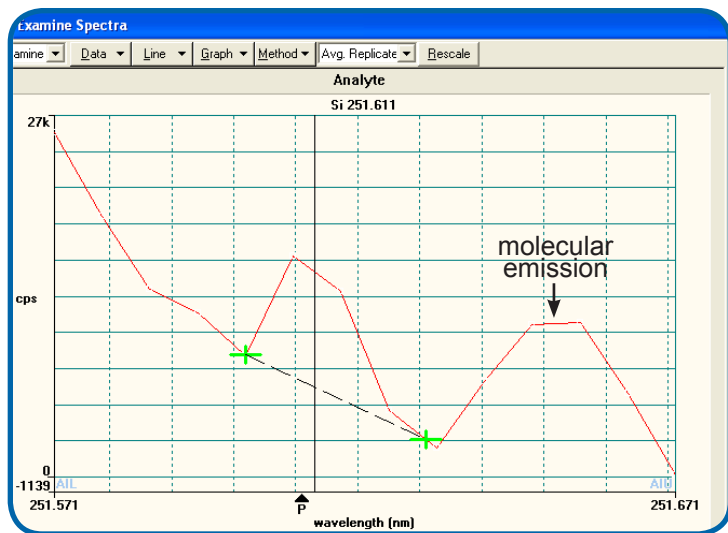


Calibration of Si in heptane using 25, 50, and 100 ppb standards. Silicon detection limits are less than 2 ppb.

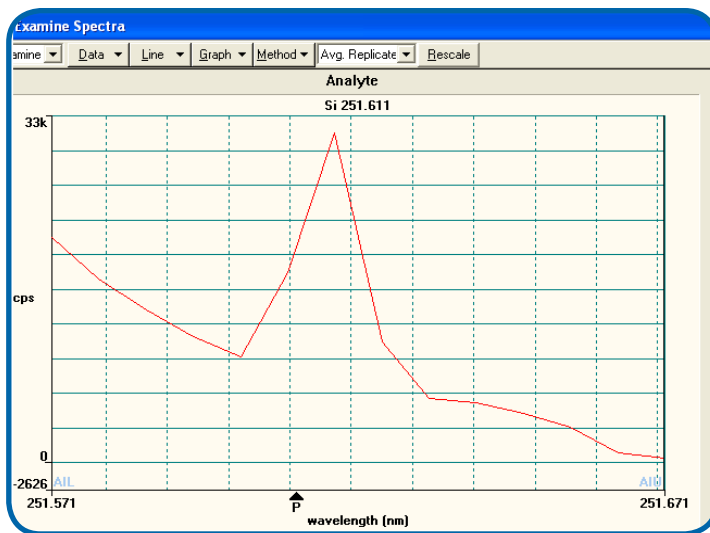
Sensitivity

Comparison of low resolution spectra of Si 251.6 nm in heptane at a sample flow rate of 40 $\mu\text{L}/\text{min}$ with 1 mm injector (left) and 2 mm injector (right). Operating at low sample flow rates allows larger diameter injectors to be reliably used with the added benefits of reduced interferences and higher sensitivity in organic solvent matrices.

Effect of Injector Diameter on Emission Spectrum Around 251.6 nm (100 ppb Si in Heptane @40 $\mu\text{L}/\text{min}$)

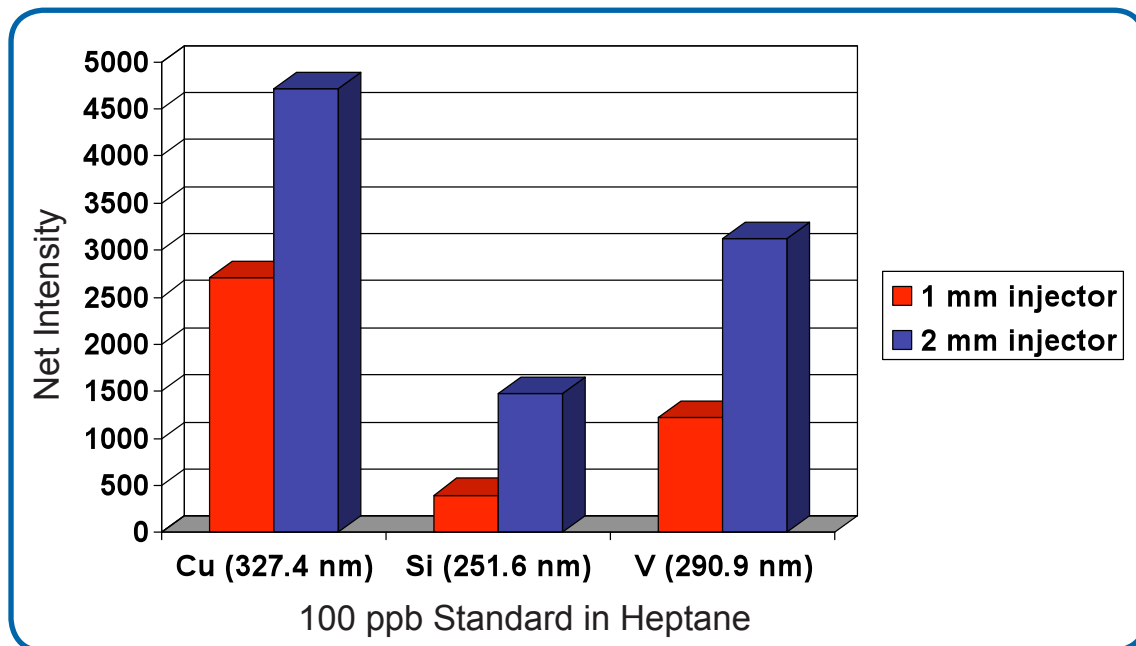


1 mm injector (quartz)



2 mm injector (sapphire)

Effect of Injector Diameter on Emission Intensity



2 mm internal diameter injector improved sensitivity in organic solvent matrices (axially viewed ICPOES).