

oilFAST High-Speed Introduction System for Rapid Analysis of Wear Metals in Oils

Analyze Up to 3 Samples Per Minute

Overview

The oilFAST is the fastest sample introduction system for the analysis of wear metals in lubricating oils. It improves throughput, data quality, and sample turn-around time. Sample-to-sample analysis speed is less than 20 seconds (Figure 1.), running up to 180 samples per hour. The System pre-mixes and analyzes up to 140 samples per hour. Simply put, the oilFAST system provides unequalled benefits.

- Fastest sample-to-sample throughput
- Fastest sample rinse-out
- Lowest sample carry-over
- Reliable long-term performance, with fewest moving parts
- Multiple sample capacities - SC-2 DX, SC-4 DX, SC-8 DX, and SC-14 DX Autosamplers
- Simple conversion from mixing to non-mixing
- Methods and timings transfer easily between instruments and laboratories (also using the oilFAST)



SC-2 DX oilFAST Autosampler

Think *FAST!*

When thinking of improving throughput, think *FAST*.

The SC-FAST sample introduction system for ICP increases sample throughput by up to a factor of 3.5 times.

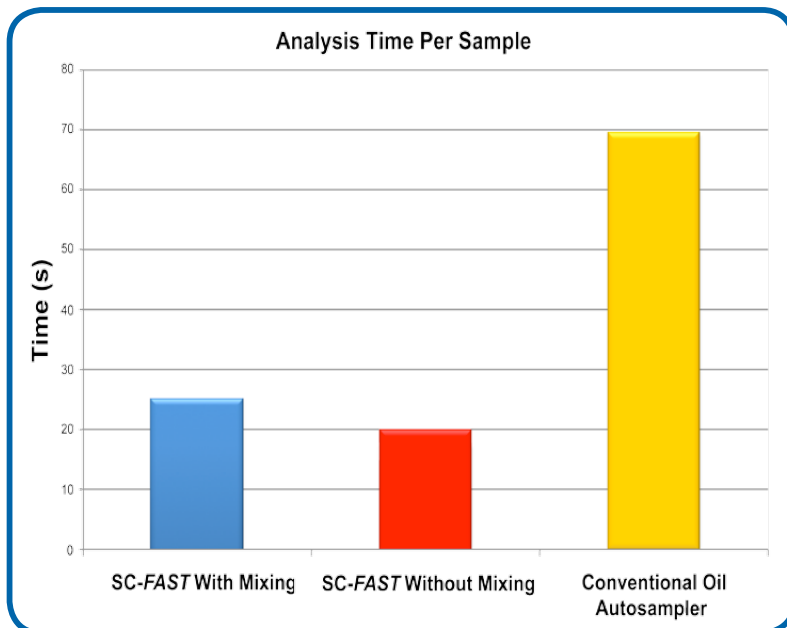


Figure 1. Compared to conventional autosamplers, the oilFAST improves sample-to-sample analysis time by a factor of 3.5 (< 20 seconds per sample).

Components

Screen-Tip Reset Probe

The oilFAST Reset Probe was engineered for oil labs.

Quick, Clean, and Simple - It enters, mixes, aspirates, fills a loop, exits the tube and returns for rinsing - *all in a matter of seconds*.

No More Bent Probes - If the probe hits a misaligned sample tube during high-volume runs, it automatically resets for the next sample.

Non-Clogging - The integrated screen tip eliminates fibers, particulates, and metal shavings that clog the nebulizer.

Automated Sample & Diluent Mixing

The oilFAST System, with sample and diluent mixing, pumps an inert gas through the end of the screened probe to automatically bubble-mix a sample and diluent—adding only 4 seconds to the analysis of a given sample. After mixing is complete, the FAST vacuum loads the sample to the loop for introduction. Figure 2 is a before and after illustration of the mixing process.

Integrated sample mixing, through the ESI screen-tip mixing probe, is a low-maintenance, effective solution to mixing.

- Fewest Moving Parts of any mixer on the market
- No drip cup (requiring periodic cleaning and maintenance)

FAST Valve

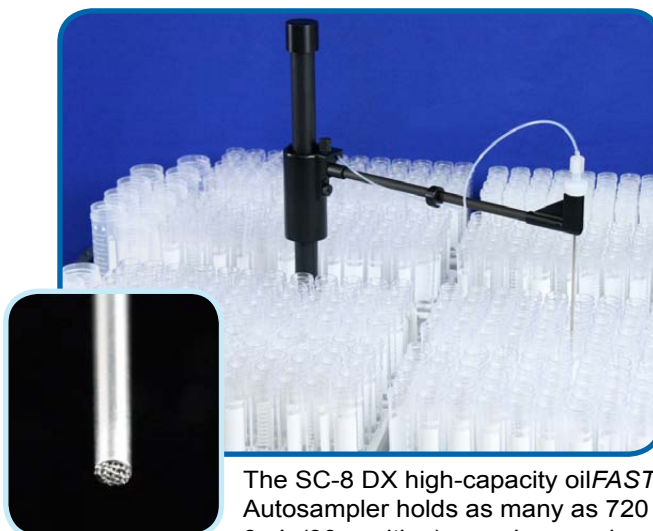
At the heart of the oilFAST system is the easy-to-use, low-maintenance 6-port single FAST valve or 12-port DUO FAST Valve (for mixing), enabling oil labs to maintain reliable data collection—faster.



Single FAST Valve
(non-mixing)



oilFAST Valve
(mixing)



The SC-8 DX high-capacity oilFAST Autosampler holds as many as 720 8mL (90 position) sample vessels.



Screen Tip
Oil Probe



The oilFAST system may be ordered with a variety of racks, including metal. Refer to the oilFAST Rack Matrix on page 6.

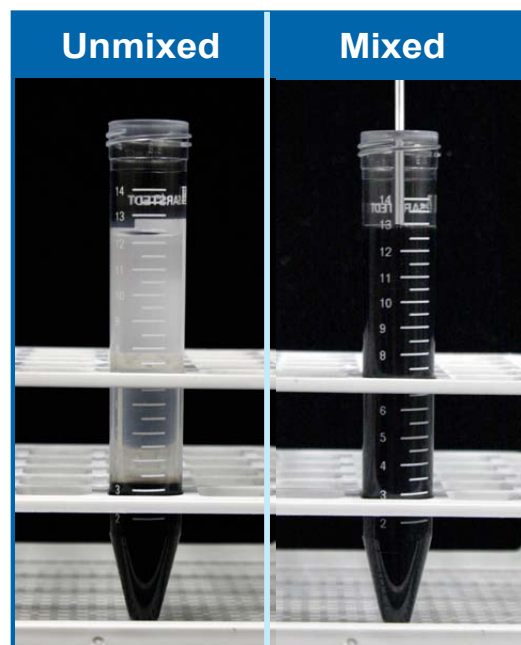


Figure 2. Diesel engine oil sample with kerosene diluent, before and after 3-second mixing, using the oilFAST.

GemCone High Dissolved Solids Nebulizer

High solids GemCones are for samples with high dissolved solids (up to 20%). This cone spray nebulizer allows you to analyze samples with higher solids concentration than is possible with a Cross-Flow nebulizer.

- **Low-Cost & Low-Maintenance**
- **Precise & Superior Wash-out**



GemCone Nebulizer.

Micro Cyclonic Spray Chamber

- **High-purity**
- **Faster wash-in / wash-out characteristics**
- **Less spiking**
- **Higher aerosol transport efficiency**



Micro Cyclonic Spray Chamber

oilFAST Experimental Parameters

Table 1. Plasma Parameters

Plasma	16 L/min
Neb	GemCone Nebulizer
RF Power	1500 Watts
Injector	ESI 1 mm Quartz
Spray Chamber	Micro Cyclonic
Sample Loop	500 µL

Table 2. Analytes Analyzed

Element	Element
Ag	Mn
Al	Mo
B	Ni
Ba	P
Ca	Pb
Co	Si
Cr	Sn
Cu	Ti
Fe	V
K	Zn
Mg	

oilFAST Results

Table 3. Sample Throughput Comparison (2 replicates)

	oilFAST Without Pre-Mixing	oilFAST With Pre-Mixing
Minimum automatic integration time (sec)	0.01	0.01
Max. automatic integration time (sec)	2	2
Read delay (sec)	7	10
Wash-out time (sec)	3	3
Total Time	20	24

Sample throughput for diesel oil samples (mixed) is 26 s/sample. Conventional systems throughput is ~ 70 s/sample (without mixing).

140
Samples
Mixed and
Analyzed in
One Hour!

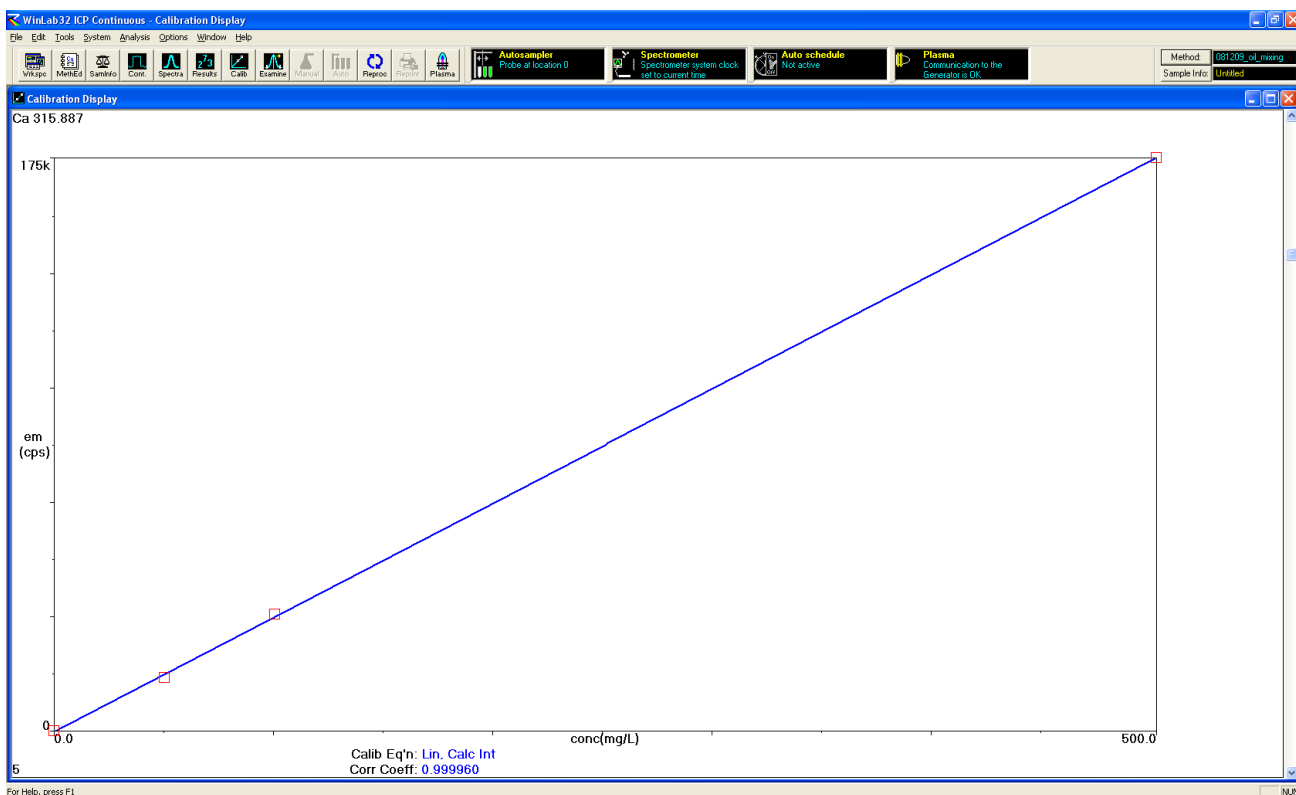
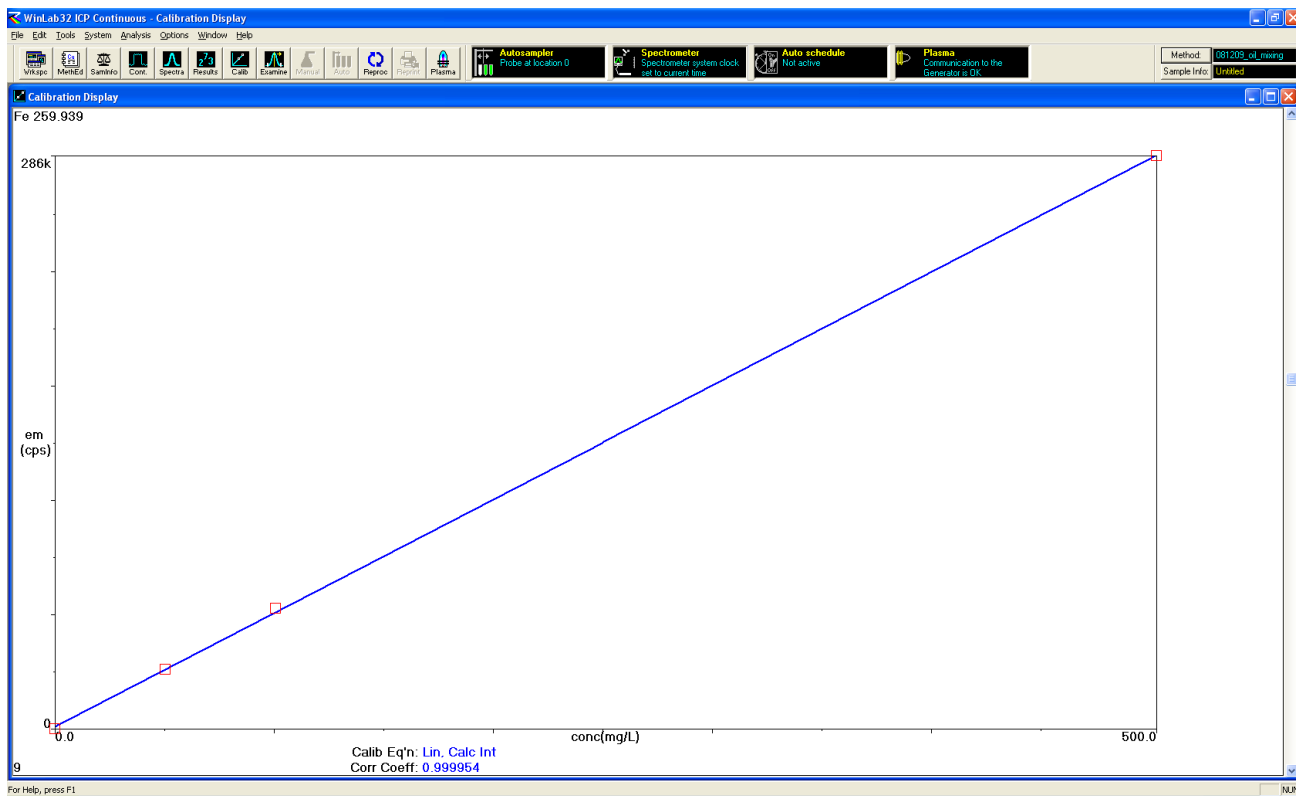


Figure 3. Linear calibration of 50, 100, 250, and 500 ppm Ca, Fe oil standards.

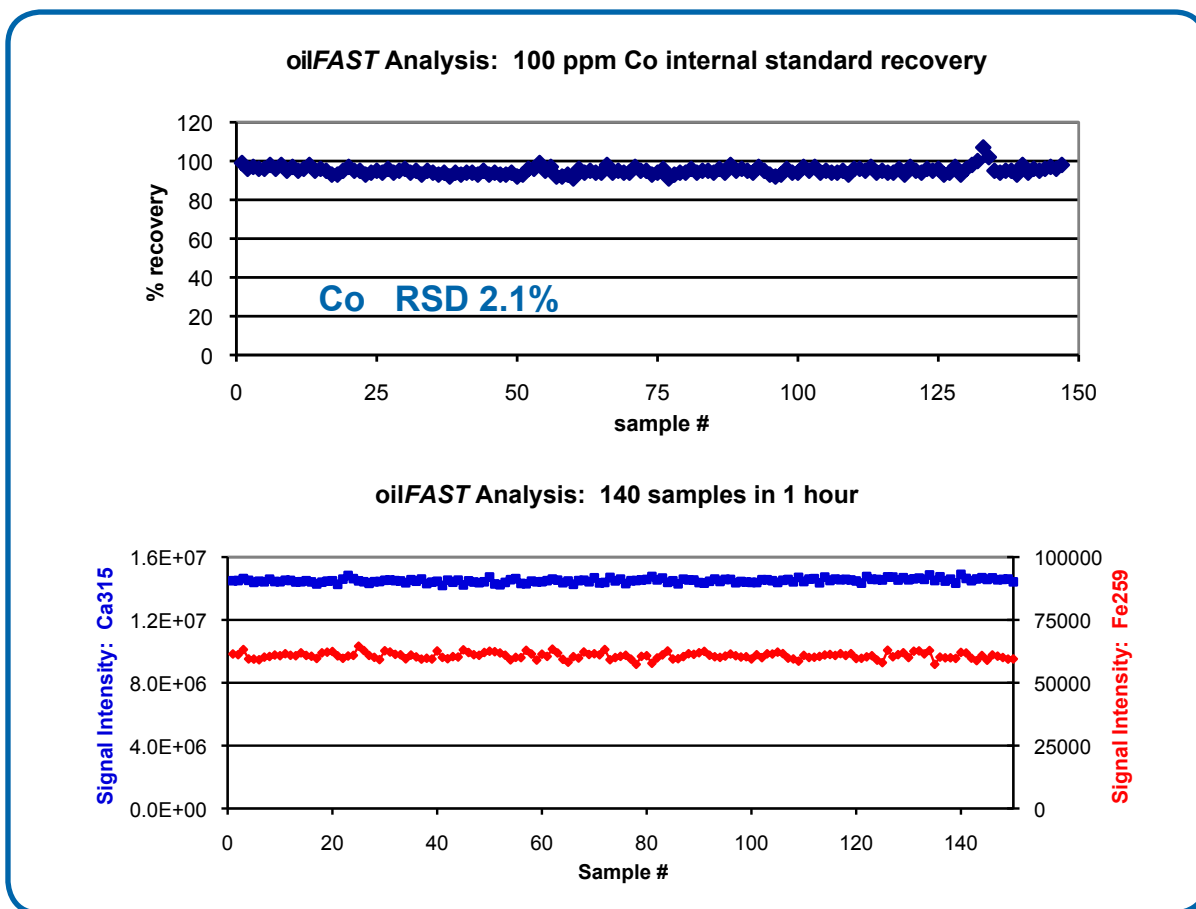


Figure 4. Repeated analysis of a pooled oil sample containing Co internal standard and 21 analytes including Ca at 4300 ppm, and Fe at 8 ppm showing stability after one hour.

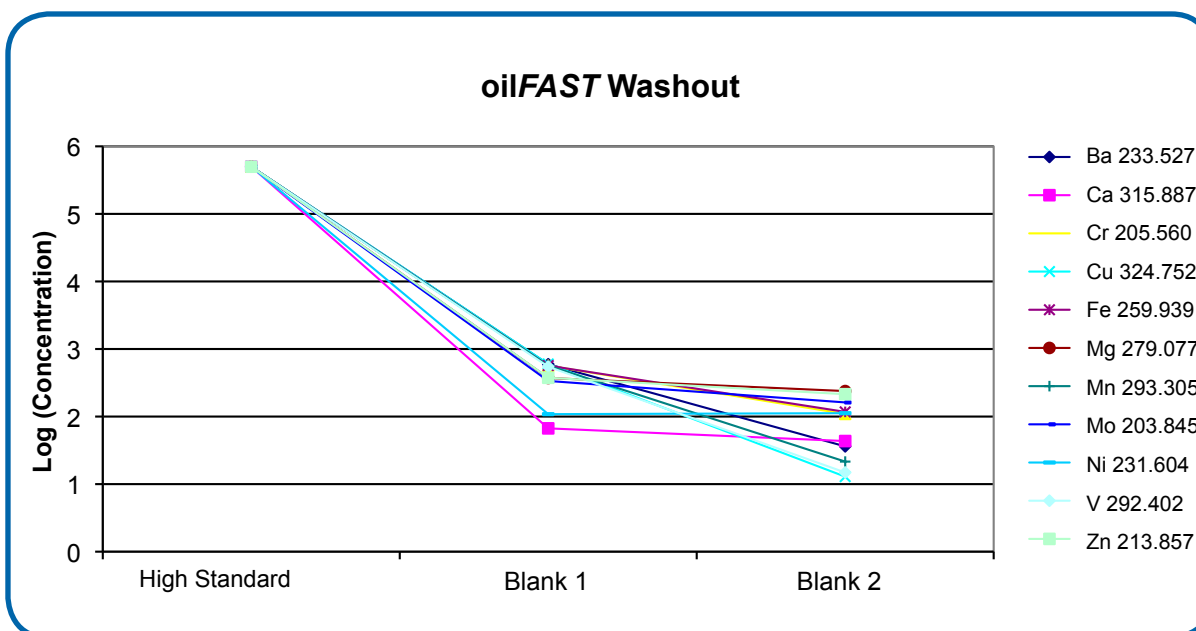


Figure 5. Washout factors for 11 elements after a three second rinse following a 500 ppm standard.

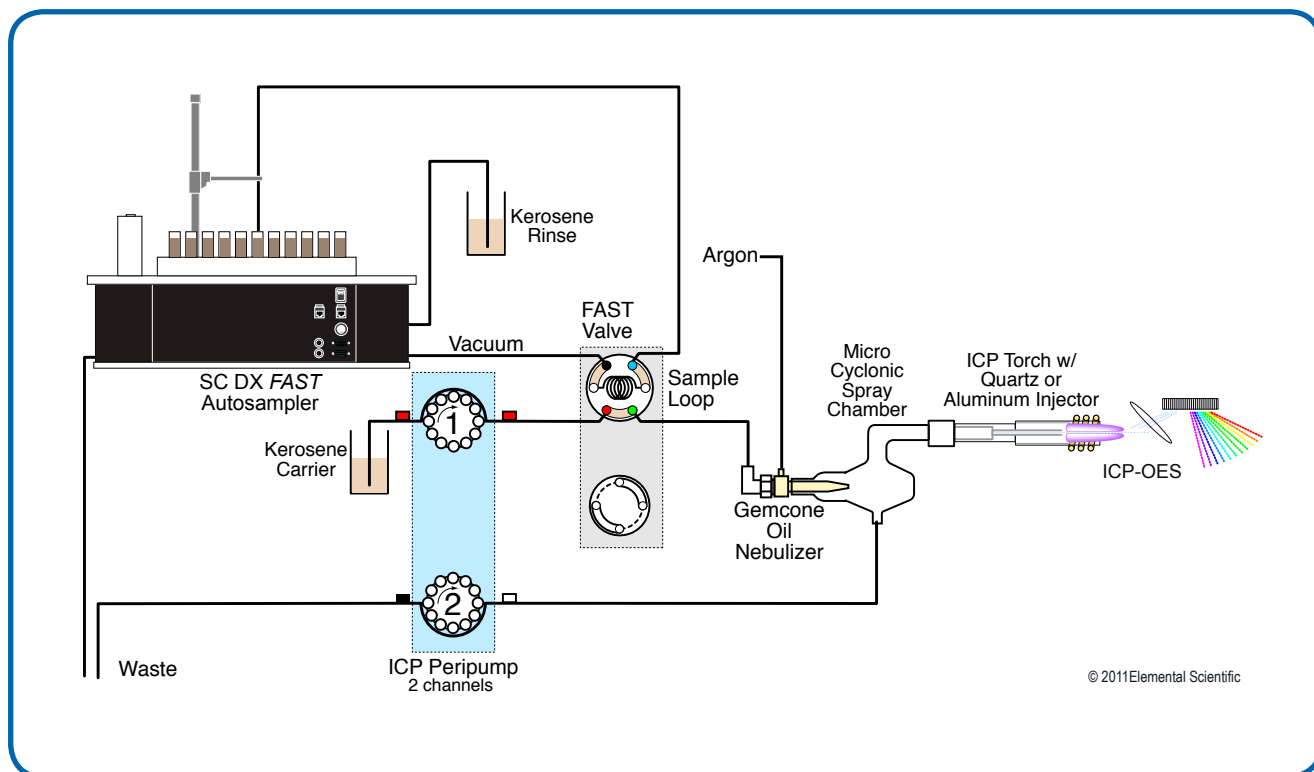


Figure 6. Schematic Diagram of the oilFAST High-Speed ICP Sample Introduction System.

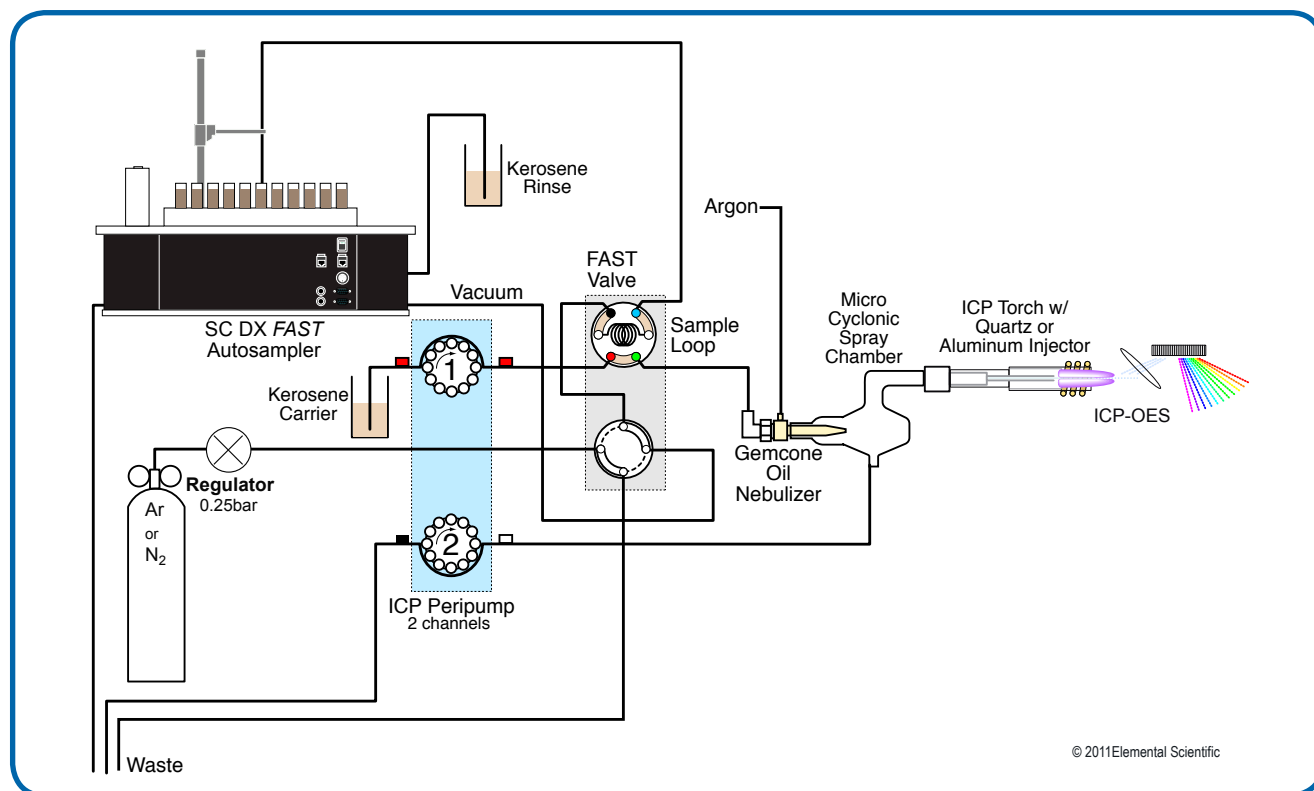


Figure 7. Schematic Diagram of the oilFAST High-Speed ICP Sample Introduction System, **with Mixing**.

Ordering Information

Table 4. Ordering Information and Configurations

Autosampler/ Capacity	Max Number of Samples		oilFAST Autosamplers	oilFAST w/mixer Autosamplers	Optional Enclosure
	8 mL(90 positions)	15 mL(60 positions)			
SC-2 oilFAST 2 Racks	180	120	2OF1	2OF2	SC-1207-0200 SC-1207-1200 (w/ULPA)
SC-4 oilFAST 4 Racks	360	240	4OF1	4OF2	SC-1407-0200 SC-1407-1200 (w/ULPA)
SC-8 oilFAST 8 Racks	720	480	8OF1	8OF2	SC-1807 SC-1807-1000 (w/ULPA)
SC-14 oilFAST 14 Racks	1260	840	14OF1	14OF2	SC-1107-0020 SC-1107-1030 (w/ULPA)

Complete System Includes: nebulizer, injector, valve module, and SC-Autosampler.

Table 5. oilFAST Sample Rack Matrix

Rack	Max Number of Samples	
	8 mL(90 positions)	15 mL(60 positions)
SC-2 oilFAST 2 Racks	180	120
SC-4 oilFAST 4 Racks	360	240
SC-8 oilFAST 8 Racks	720	480
SC-14 oilFAST 14 Racks	1260	840
ESI Part No.	LR-90-13	LR-60-16