



Seven Second Mehlich-3 Soil Analysis

High-Speed SC-*FAST*
Optima 5300 ICPAES

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11 Elements in 7 Seconds

SC-FAST Overview

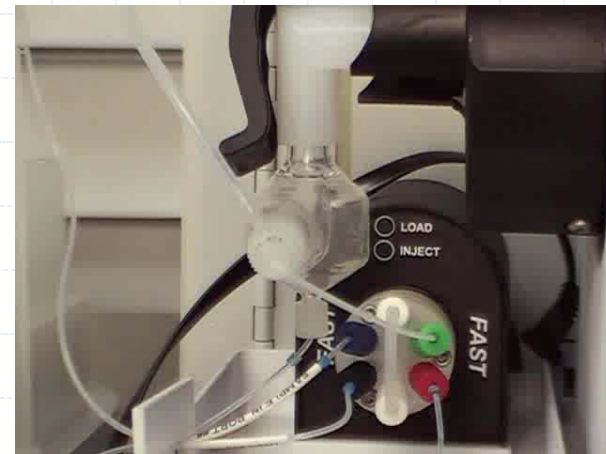
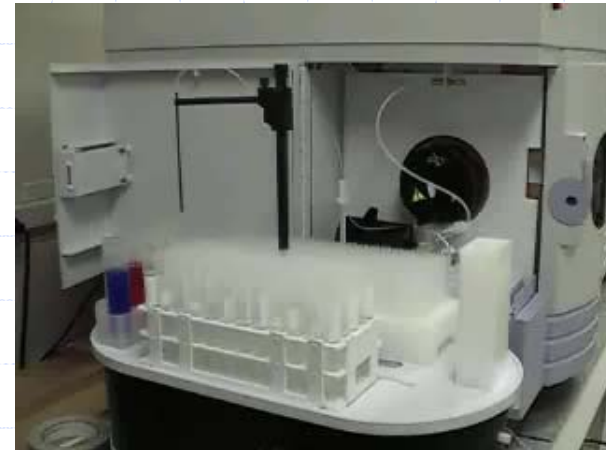


- ◆ SC-FAST Sample Introduction System
- ◆ FAST Method
 - Autosampler settings, injection timing
- ◆ Optima 5300 Method
 - Emission lines, tune and measurement settings
- ◆ Analytical Results
 - Calibration and linearity
 - Recovery in Mehlich Extraction Solution
 - Reproducibility
 - Speed

SC-FAST Soils



- ◆ Complete automated sample introduction
 - High Speed SC Autosampler
 - ◆ SC-2 (240 sample capacity)
 - ◆ SC-4 (360 sample capacity)
 - ◆ SC-14 (1260 sample capacity)
 - Injection valve, nebulizer, mini spray chamber, injector.



SC-FAST Procedure



- ◆ Sample transferred from vial to 0.1 ml sample loop in 0.5 second then injected.
- ◆ ICP read delay time 1 second.
- ◆ During ICP read the sample probe moves above the next sample.
- ◆ 11 elements determined in total analysis time of 7 seconds per sample.
- ◆ Over 500 samples and standards analyzed per hour.



Plasma Conditions



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Method Editor : SC-FAST-Mehlich-7s

Plasma

Source Equilibration Delay (sec) 3

Plasma Conditions: Same For All Elements Vary by Element

Plasma Aerosol Type: Wet Dry

Nebulizer Start-up Instant Gradual

	F'n	Element	Plasma (L/min)	Aux (L/min)	Neb (L/min)	Power (watts)	View Dist	Plasma View
1	A	Mg 279.077	14	0.2	0.60	1500	15.0	Axial
2	A	Ca 227.546	14	0.2	0.60	1500	15.0	Axial
3	A	K 404.721	14	0.2	0.60	1500	15.0	Axial
4	A	Na 589.592	14	0.2	0.60	1500	15.0	Axial
5	A	Fe 238.863	14	0.2	0.60	1500	15.0	Axial
6	A	Mn 293.305	14	0.2	0.60	1500	15.0	Axial
7	A	Cu 324.752	14	0.2	0.60	1500	15.0	Axial
8	A	B 249.677	14	0.2	0.60	1500	15.0	Axial
9	A	P 213.617	14	0.2	0.60	1500	15.0	Axial
10	A	S 181.975	14	0.2	0.60	1500	15.0	Axial

Navigation: Plasma, Peristaltic Pump, Autosampler



Mehlich Lines—11 Elements

Method Editor : SC-FAST-Mehlich-7s

Spectral Peak Processing

	F'n	Element	Peak Algorithm	Points per Peak
1	A	Mg 279.077	Peak Area	3
2	A	Ca 227.546	Peak Area	3
3	A	K 404.721	Peak Area	3
4	A	Na 589.592	Peak Area	3
5	A	Fe 238.863	Peak Area	3
6	A	Mn 293.305	Peak Area	3
7	A	Cu 324.752	Peak Area	3
8	A	B 249.677	Peak Area	3
9	A	P 213.617	Peak Area	1
10	A	S 181.975	Peak Area	3
11	A	Zn 213.857	Peak Area	3

Peak Processing

Spectral Corrections

Internal Standards

Internal Stds Checks

Narrow peak measured for P to eliminate Cu interference

Optima Delay Time and Manual Integration and Read Times



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The screenshot displays the 'Method Editor : SC-FAST-Mehlich-7s' window. The 'Settings' section includes:

- Spectral**
 - Purge Gas Flow: Normal High
 - Spectral Profiling: No Yes
 - Resolution: Fixed Variable (Set...)
- Read Parameters**
 - Time(sec): Auto (Min: 1) Manual (Set...)
 - Delay Time (sec): 1
 - Replicates: 1

The 'Set Manual Integration' dialog box is open, showing a table of integration parameters:

	Fh	Element	Integration Time (sec)	Read Time (sec)
1	A	Mg 279.077	0.002	0.100
2	A	Ca 227.546	0.002	0.100
3	A	K 404.721	0.002	0.100
4	A	Na 589.592	0.002	0.100
5	A	Fe 238.863	0.002	0.100
6	A	Mn 293.305	0.002	0.100
7	A	Cu 324.752	0.002	0.100
8	A	B 249.677	0.002	0.100
9	A	P 213.617	0.002	0.100
10	A	S 181.975	0.002	0.100
11	A	Zn 213.857	0.002	0.100

The background shows a spectral plot with peaks for Mg 279.077, Ca 227.546, K 404.721, Na 589.592, Fe 238.863, Mn 293.305, Cu 324.752, B 249.677, P 213.617, S 181.975, and Zn 213.857. The y-axis is 'em (cps)' and the x-axis is 'Wavelength (nm)'. Calibration equations and correlation coefficients are also visible for several elements.

Calibration Standards



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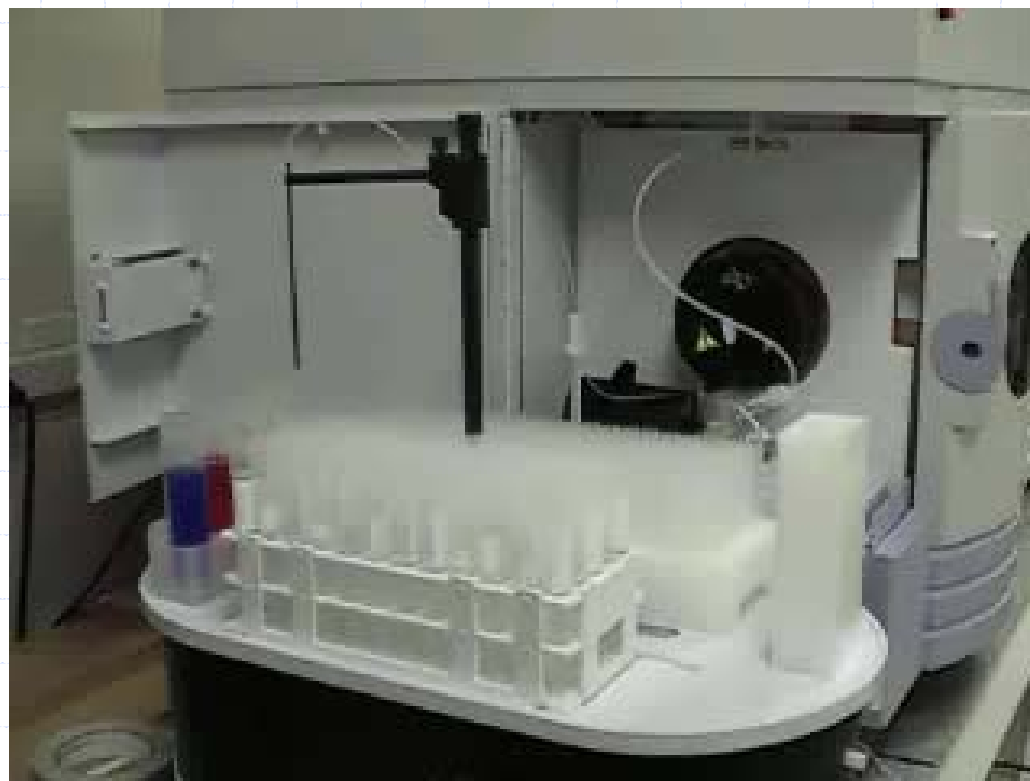
Calibration Units and Standard Concentrations

	Analyte	Calib Units	4x	2x	1x
1	Mg 279.077	mg/L	150	300	600
2	Ca 227.546	mg/L	1500	3000	6000
3	K 404.721	mg/L	250	500	1000
4	Na 589.592	mg/L	37.5	75	150
5	Fe 238.863	mg/L	50	100	200
6	Mn 293.305	mg/L	25	50	100
7	Cu 324.752	mg/L	5	10	20
8	B 249.677	mg/L	1.25	2.5	5
9	P 213.617	mg/L	50	100	200
10	S 181.975	mg/L	25	50	100
11	Zn 213.857	mg/L	2.5	5	10

- Define Standards
- Calib Units and Concentrations
- Blank Usage
- Equations and Sample Units
- Initial Calibration
- Multiline Calibration

Spectrometer | Sampler | Process | Calibration | Checks | OK QC | Options

Row of Samples Analyzed SC-FAST Optima 5300

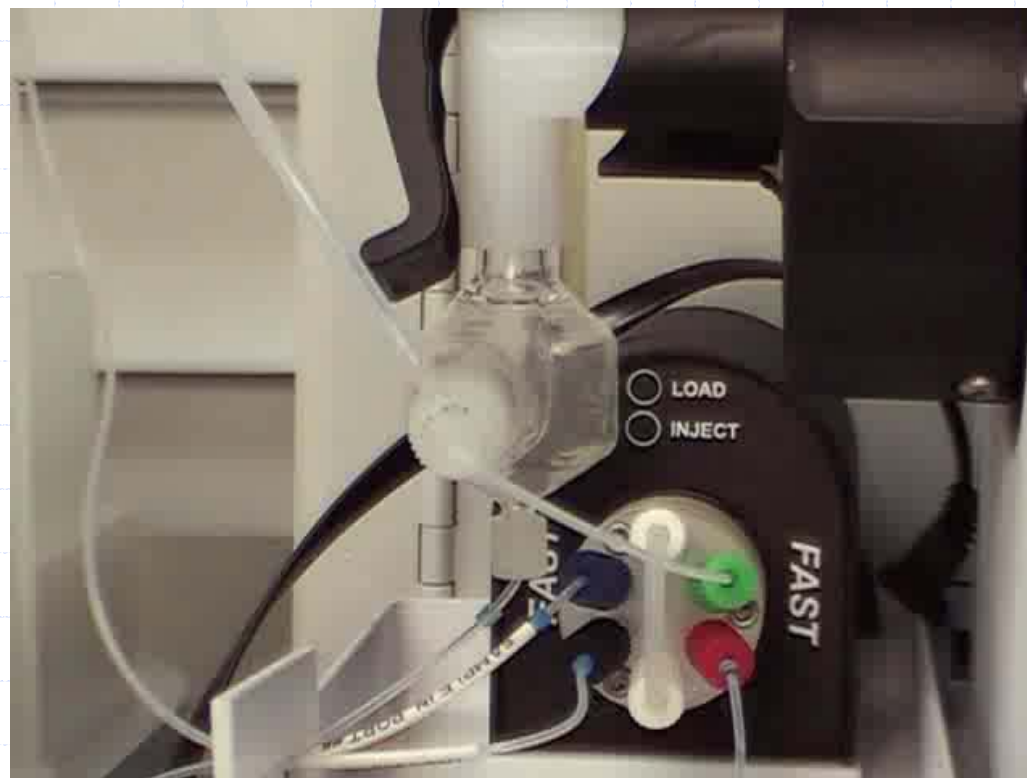


SC-2 autosampler shown

Injection Valve, Nebulizer, MiniChamber SC-FAST Optima 5300



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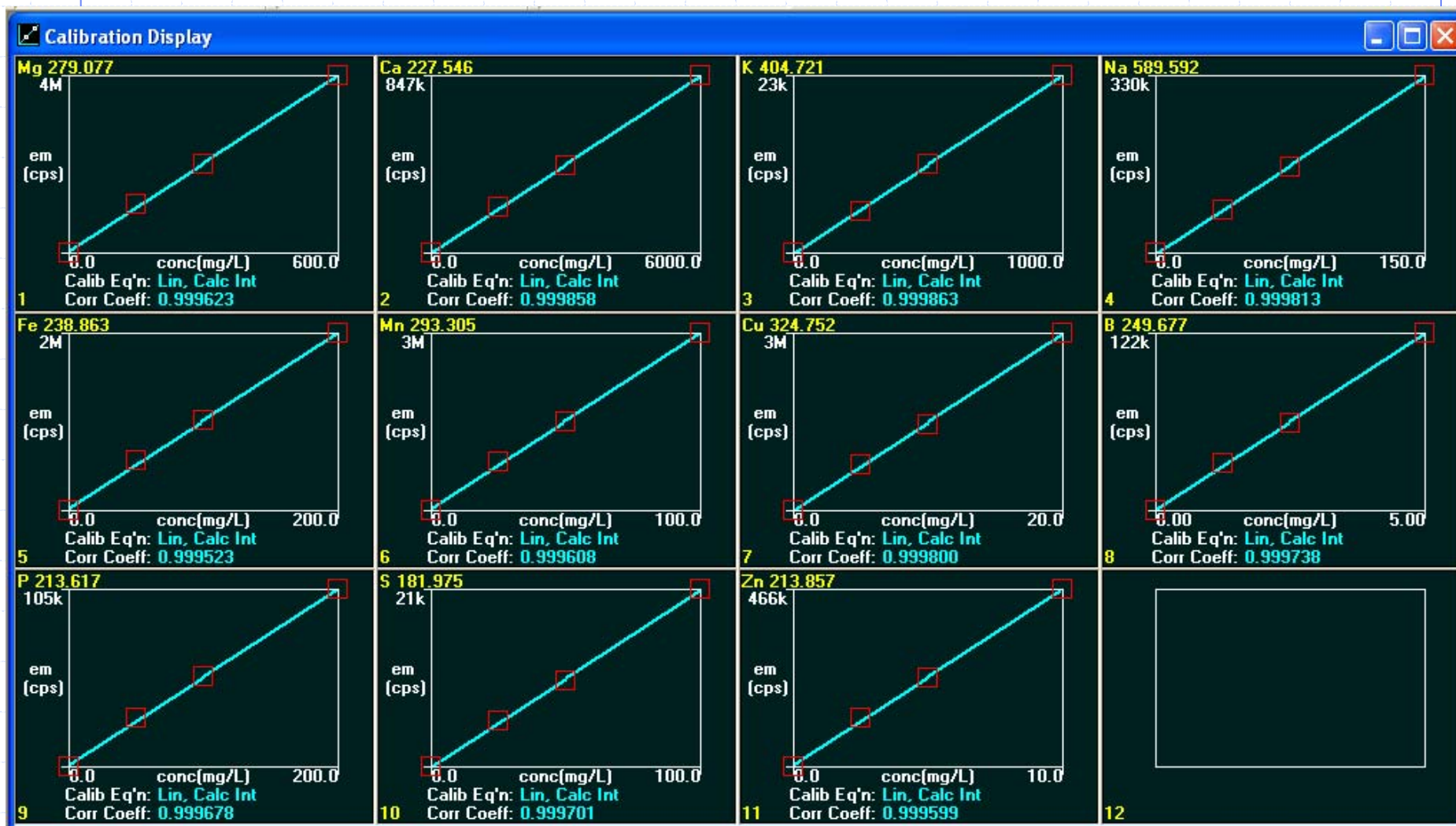


Six injections alternating blue, red, yellow colored sample solutions

Calibration SC-FAST Optima 5300 11 Elements in 7 Seconds



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Calibration Summary

7 Second Method



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Calibration Summary

Analyte	Stds.	Equation	Corr. Coef.
Mg 279.077	3	Lin, Calc Int	0.999838
Ca 227.546	3	Lin, Calc Int	0.999999
K 404.721	3	Lin, Calc Int	0.998426
Na 589.592	3	Lin, Calc Int	0.999830
Fe 238.863	3	Lin, Calc Int	0.999655
Mn 293.305	3	Lin, Calc Int	0.999788
Cu 324.752	3	Lin, Calc Int	0.999995
B 249.677	3	Lin, Calc Int	0.999981
P 213.617	3	Lin, Calc Int	0.999820
S 181.975	3	Lin, Calc Int	0.999998
Zn 213.857	3	Lin, Calc Int	0.999814

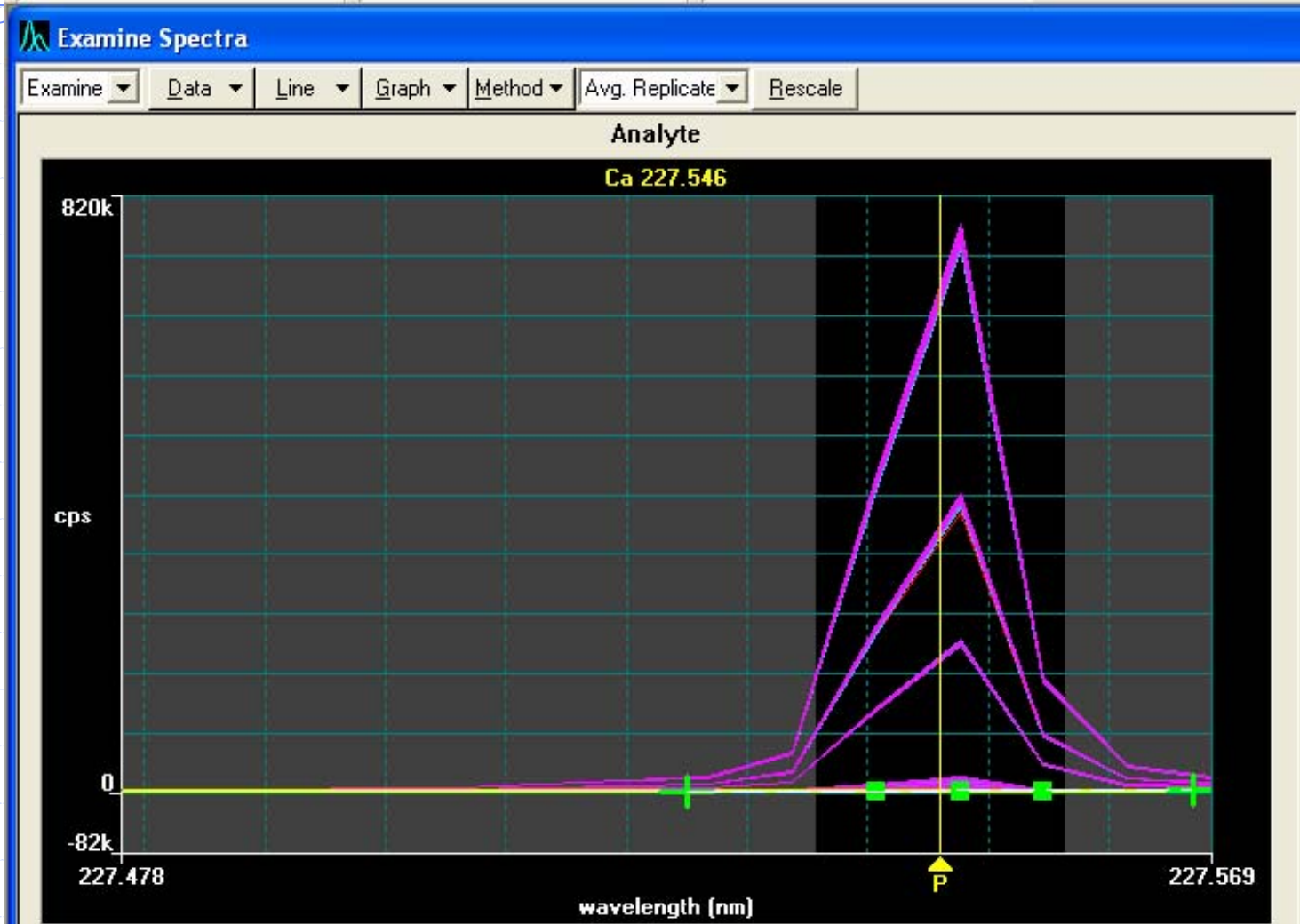
7 Second Method—Stability

Ca Spectral Overlay 244 Samples

Blank, 1000, 3000, 6000 ppm each analyzed 61 times



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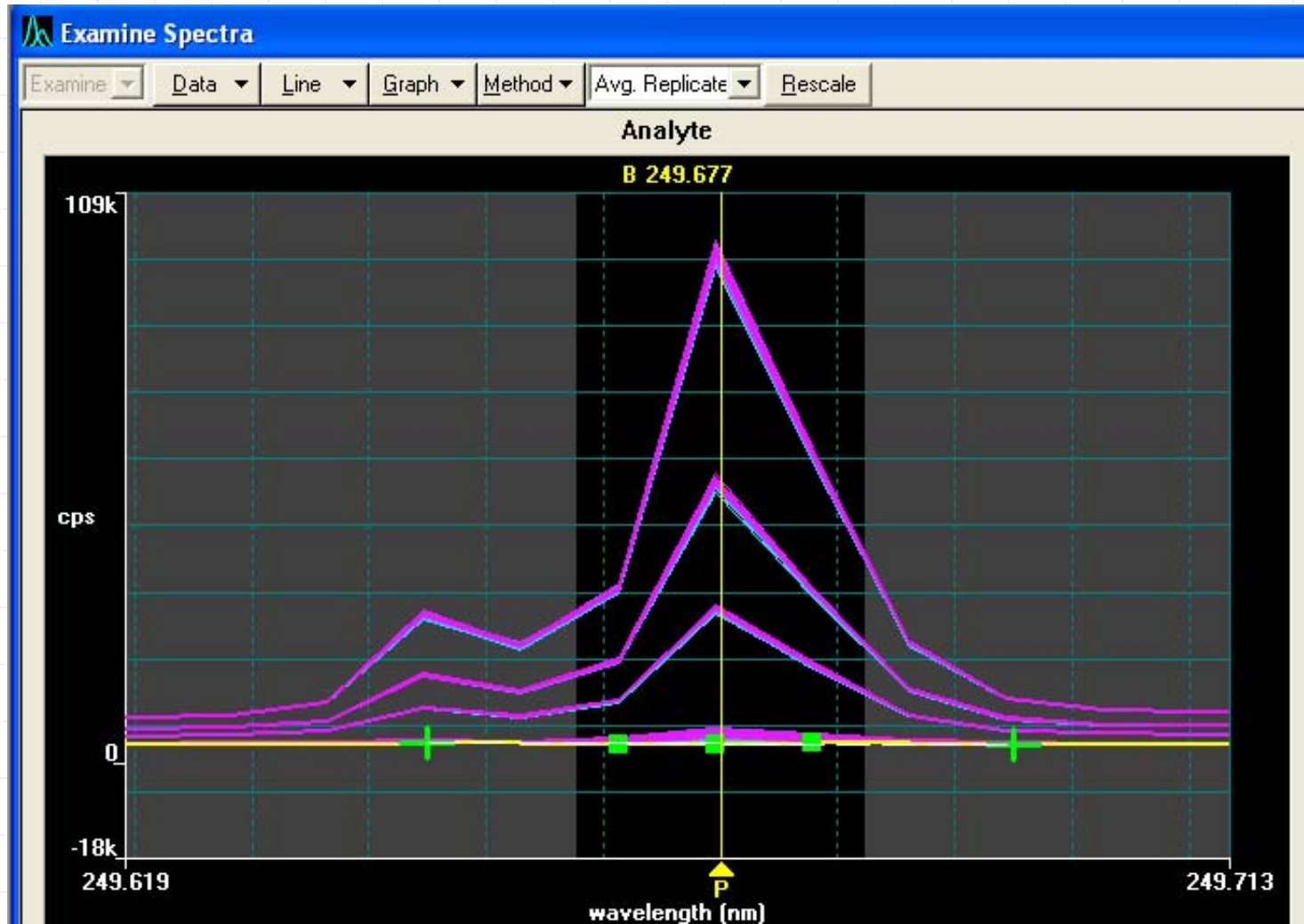


7 Second Method—Stability

Boron Spectral Overlay For 244 Standard Solution
Blank, 1.25, 2.5, and 5 ppm each analyzed 61 times



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Recovery

SC-FAST Optima 5300 (7 second method)

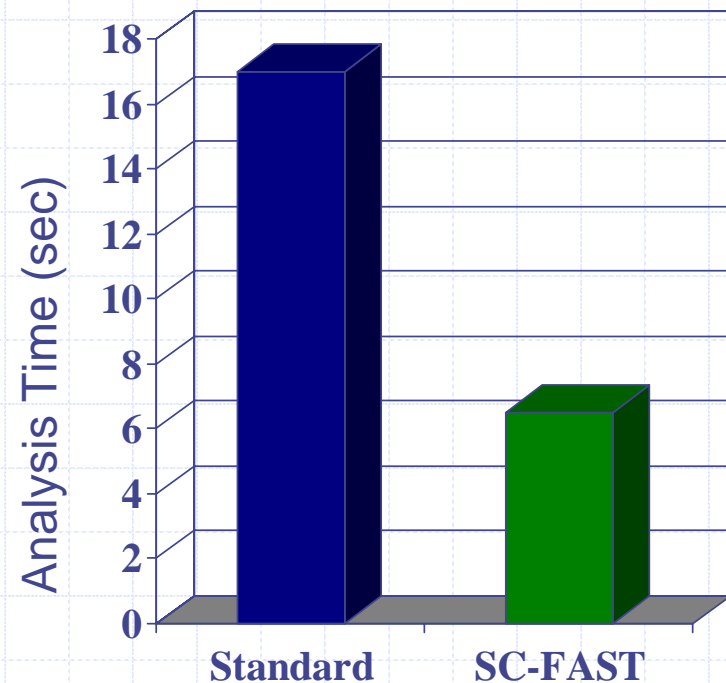


Element	Conc. (ppm)	Recovery	% Recovery
Mg	600	590	98
Ca	6000	5934	99
K	1000	968	97
Na	150	153	102
Fe	200	197	98
Mn	100	99	99
Cu	20	19.8	99
B	5	5.0	100
P	200	200	100
S	100	99	99
Zn	10	9.8	98

SC-FAST ICPAES High Speed Soil Analysis



- Breakthrough in throughput and accuracy for ICP soil sample analysis.
- Full turnkey method developed including installation for rapid implementation.
- Available with 2, 4, and 14 rack autosamplers.



SC-FAST > 500 Samples Per Hour