

Improving Sensitivity in Samples with High Dissolved Solid content using the Apex Sample Introduction System

The Apex has proven to be a simple and reliable way to improve ICP-MS and ICP-AES sensitivity while minimizing contamination and mitigating interferences in a wide variety of sample matrices. Here the Apex HF sample introduction system was compared to the standard sample introduction system (SIS) to investigate whether sensitivity could be improved for a range of analytes in samples containing 1% total dissolved solids. All samples were analyzed using an axially viewed ICP-AES.



Apex HF sample inlet system

Experimental

Spectro Cirros Axial ICP-AES, Lines used: V311.071; Cr205.552; Mo202.030.

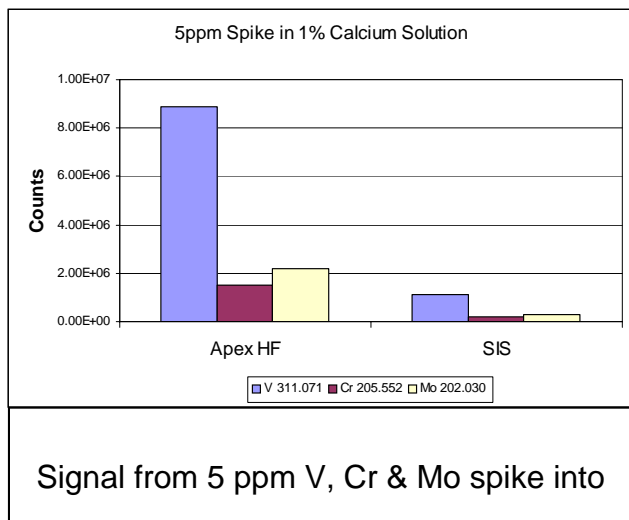
Measurement conditions: Standard, 5 reps (25 sec per rep). All samples were prepared in 50 ml polypropylene vials.

Sample: Analar grade Calcium Chloride diluted to 1% Ca with 2% HNO₃. Calibration prepared using 1% Ca solution spiked with 0, 0.5, 5, and 50 ppm V, Cr & Mo. Standard stock solutions (10000 ppm) obtained from CPI International.

Apex HF: heater temperature 140°C. Peltier cooler temperature 2°C. PFA-ST nebulizer with 400µL/min capillary, sample gas 0.93 l/min, Optimized for maximum Mn signal.

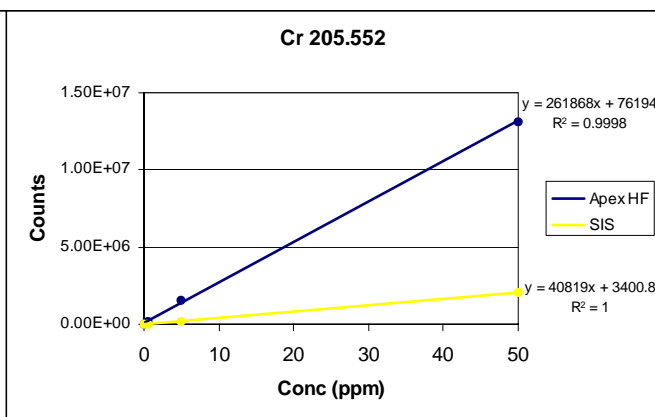
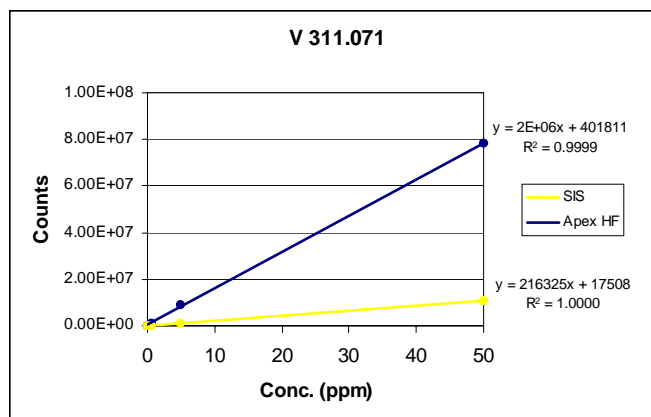
SIS: Scott spray chamber. X-Flow nebulizer, sample gas 0.98 l/min. Sample flow rate 1.0mL/min. Optimized for maximum Mn signal.

Results



Sensitivity was increased 7 - 8 fold for the range of elements when compared to the standard introduction system. The Apex HF also consumes less than half the sample of the SIS.

Line (nm)	Enhancement
V 311.071	7.9
Cr 205.552	7.0
Mo 202.030	7.5



Calibration curves for V and Cr (0, 0.5, 5, 50ppm) in 1% Ca solution. Comparison of Standard introduction system and Apex HF

Line (nm)	SIS DL (ppb)	Apex HF DL (ppb)	SIS BEC (ppb)	APEX HF BEC (ppb)
V 311.071	0.22	0.072	119	27.3
Cr 205.552	1.3	0.43	84.0	45.1
Mo 202.030	37.7	0.20	168	26.4

Conclusion

The Apex is a simple way to improve sensitivity and DL for a range of elements in solutions containing high dissolved solids contents. Calibrations with the Apex are highly linear.

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