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APPLICATION NOTE

SpectrOil 100 Series – Performance with Lubrication Oils

Spectro Scientific is bringing great enhancements to its high performance line of RDE-OES (Rotating Disk Electrode-Optical Emission Spectrometers) for elemental analysis. The new SpectrOil 100 Series instruments now deliver the highest level of performance, stability and ease-of-use ever seen in the SpectrOil line of products.

To drive performance of both the existing and new SpectrOil products, we have developed significant enhancements to the new SpectrOil v8 software which truly bring the instruments' performance to a new level. In addition to several user experience enhancements (like temperature stability indications, and service requirement counters), SpectrOil Software Version 8 introduces "Integrated Standardization." Integrated standardization automatically does an optical profile and disk offset correction without requiring the user to perform extra burns every time the instrument is standardized. This greatly simplifies the daily operating procedure and saves valuable testing time.

SpectrOil v8 also brings new enhanced background correction and refined signal processing capabilities which lead to a more stable instrument. Results are repeatable over time, and standardization is required much less frequently. Historically, results for low sensitive lines like Sn and Pb would drift consistently high or low for several burns or days at a time. This drift may be due to a variety of factors including changes in the environment, inherent instabilities in the instrument, and others. SpectrOil v8 software counteracts this drift by smart collection and utilization of background scans. In Table 1 and associated chart, standards at 0, 5, 10, and 100 PPM were burned over a period of 13 days (3-8 burns per day). Results from a total of 84 burns were collected and analyzed using both SpectrOil 7 and the new SpectrOil v8 software. Procedures for routine operation were followed, including restandardization when the instrument failed the daily check burns. Using the SpectrOil 7 software the instrument was restandardized 6 times in those 13 days. When the same burns were analyzed using SpectrOil v8 software, standardization was not required after the first day.

Sn Results	0 PPM		5 PPM		10 PPM		100 PPM	
	Spectroil 8	Spectroil 7	Spectroil 8	Spectroil 7	Spectroil 8	Spectroil 7	Spectroil 8	Spectroil 7
# Burns	84		30		29		36	
AVE (ppm)	0.00	-0.69	5.13	4.55	10.51	9.75	98.73	97.99
SD (ppm)	0.29	0.79	0.34	0.83	0.47	0.80	1.81	2.06
Improvement in Repeatability	2.7X		2.4X		1.7X		1.1X	

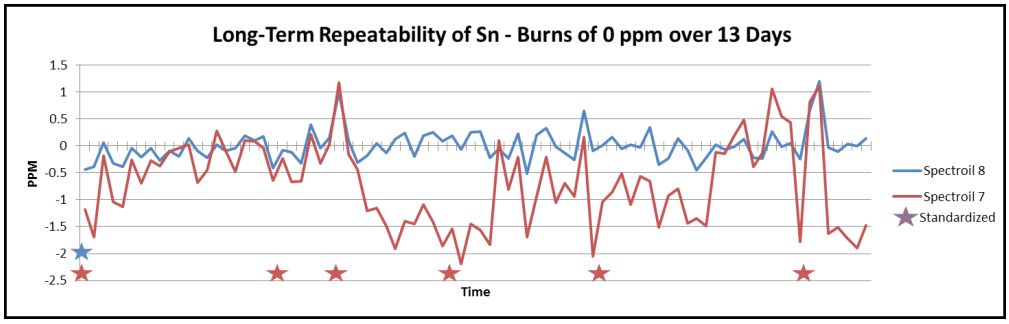

Table 1 & Figure 1: Long-term stability is improved by 2x with the SpectrOil v8 software

Performance data

A bit deeper within the software, SpectrOil v8 utilizes advanced signal processing and background correction capabilities which bring significant performance improvements. A more intelligent method of measuring peak signal results in a lower LOD by about 2X for most elements. Table 2 shows the LOD for the CS-24 elements, defined as the standard deviation of 10 repeats of a blank. Strategic background collection to minimize noise results in highly repeatable results as shown in Table 3.

The tables below highlight the performance of the newest of SpectrOil models, operating with v8 software.

Element	Typical LOD
Li	≤0.01
Ag	
Cu	
K	
Na	0.05
Cr	
B	
Ti	
Ba	0.1
Zn	
Ca	
Mn	
Ni	
Si	
Al	
Fe	
Cd	
Mg	
V	0.2
Mo	
Sn	
Pb	0.3
Sb	1
P	

Table 2. Typical 2-Sigma LOD for SpectrOil v8 calibrated with the CS-24 commercial oil analysis program.

Element	Typical Repeatability @ 10 ppm
Ag	0.3
K	
Cu	
Cr	
Sn	
V	
Cd	
Ni	0.4
Zn	
Si	
Mn	
Fe	
Na	
Ti	
Ba	
Li	
Al	0.5
Mo	
Ca	
Pb	
Mg	
B	
P	1
Sb	

Table 3. Typical repeatability at 10 ppm for a SpectrOil v8 instrument with the CS-24 commercial oil analysis program.

(Note: Performance improvements may vary when upgrading S/N 10,000 products or newer to Spectroil v8 software)

The new SpectrOil v8 software offers several improvements in signal processing and workflow making the instrument smarter and stronger in performance and stability. Improved signal processing and background collection yield impressive LODs and repeatability. Instrument instabilities are detected and messaged to the user. The more efficient integrated standardization and better long term stability save time and allow the user to focus more on running samples.

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