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Sulfur in Oil

Spectrolab RX-6000 Series XRF

Sulfur in oil application note

ASTM D4294 – ISO 9754 – B7995

1. Introduction

The latest RX-6000 series is a high performance bench top energy dispersive X-ray fluorescence spectrometer designed to analyze sulfur in oil from low ppm level to high percentage and with very high accuracy. ASTM D4294, ISO 8754 and B7995 describes the methods to measure the sulfur content in oil by EDXRF. This application note describes how the RX-6000 is used according to these methods.

2. Instrument parameters

Model	Tube voltage	Tube current	Collimator	Filter	Helium purge	Time
RX-6000S	7Kv	600uA	8mm	None	No	100-300S

3. Detection limits shown are without helium purge. Purging can significantly improve overall performance and reduce detection limits further

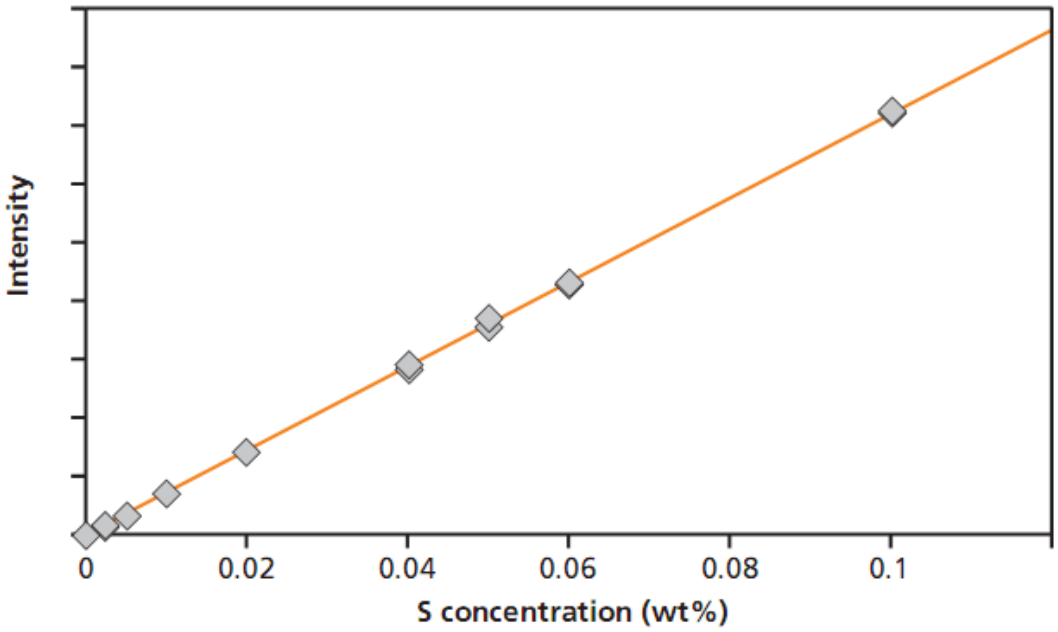
Blank(Oil)200s		2500ppm(standard)200s	
Measure times	**intensity**	**Measure times**	**Intensity**
1	37.65	1	180.445
2	37.705	2	181.735
3	37.165	3	181.865
4	37.485	4	180.685
5	37.5	5	180.7
6	37.765	6	180.635
7	37.46	7	182.88
Average	37.53	**Average**	181.28
Standard deviateion	0.19	**standard deviation**	0.84
3s	0.56	**3s**	2.51
RSD(%)	0.49%	**RSD(%)**	0.46%
Detection limit of Sulfur in oil=9.8ppm			

4. Calibration.

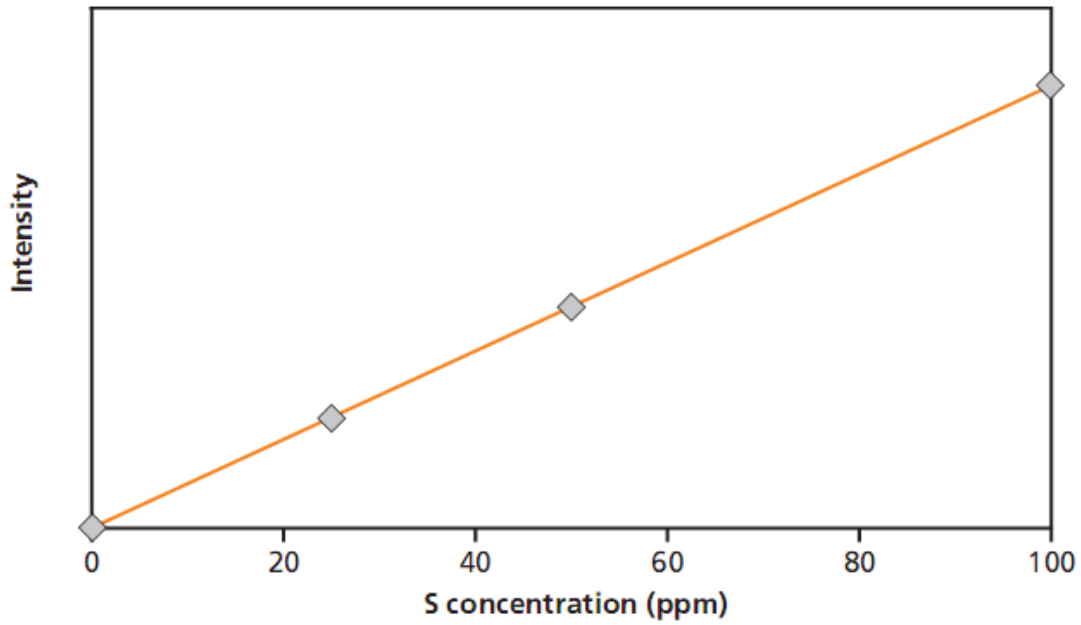
   A number of commercially available oil standards were used to calibrate the RX6000 analyzer Special contamination free sample cups are used for both the standards and the samples for subsequent measurement. See picture as below:

RX Sample cups

Calibration Curves are shown as below:



Calibration range from 0.01%-0.1%



Calibration range from 0-100ppm

How XRF works

X-rays have a unique ability to ionize or “excite” elements present in materials including oil. When elements such as Sulfur have been ionized by Xrays the electrons quickly return to a relaxed or stable state. In so doing they will emit fluorescent photons whose energy levels are “signatures” of specific elements present. Spectrolab XRF analyzers utilize this phenomenon by imaging ionizing x-rays onto a sample and measure the energy levels of the returning fluorescent x-rays (the elements’ “signature”), The quantity and energy of X-rays measured determines the relative concentration of each individual element present.

The onboard microprocessor then provides a complete elemental analysis of the sample and displays it on to a high brightness screen. All of this is done in just a few seconds, The analyzed results are stored in an Excel test report.

5 . Conclusion

The RX-6000S is capable of measuring sulfur in oil or other fuel samples at great sensitivity and fully complies with ASTM 4294 and others.

Other Spectrolab EDXRF instruments

Hand held XRF	Desk top EDXRF
XRF Gold analyzer	Karat Determination
Jewelry analyzer	WDXRF EDXRF