

# X-SUPREME8000

## Sulfur in oil conformance to ISO13032 (IP600) specification

### METHOD

The test method ISO13032 (IP600) covers the “Determination of low concentration of sulphur in automotive fuels - Energy-dispersive X-ray fluorescence spectrometric method”, and allows the measurement of sulphur at low concentrations, i.e. at the 10 mg/kg (ppm) level.

To ensure that a benchtop EDXRF analyser has sufficient sulphur elemental sensitivity and low background to enable accurate measurements at the 10 mg/kg (ppm) level, in section 5.1.1 Apparatus, there are two instrument performance characteristics that need to be met. The test for conformance involves measurement of a blank oil (zero sulphur) and a 10 mg/kg standard, recording the gross count rate (counts per second) obtained on both samples and calculating the vales shown in the equations below.

### PERFORMANCE AND RESULTS

This performance data sheet demonstrates that the X-Supreme8000 meets both of these requirements and the following readings were obtained during recent measurements:

#### 1) Calculation: $(R_s - R_b) / \sqrt{R_b} \geq 1.3$

$R_s$  is the gross count rate (in counts per second) for a 10 mg/kg standard.  
 $R_b$  is the gross count rate (in counts per second) for a blank standard.

Measuring a blank oil and a 10mg/kg standard using Poly-M sample film on both the sample cell and safety window gave a typical value of 1.45 meeting the specification, where the calculated value needs to be equal to or greater than 1.3.

#### 1) Calculation: $C_v(R_s) < 5\%$

Where  $C_v$  is the coefficient of variation (relative standard deviation) based on 10 measurements of the 10ppm standard. Note: As described in section 8.4.4 of the method, the values shown in table 1 are the average sulphur concentration from the measurement of two aliquots of the 10 ppm standard.

Using equation number 2 and the data shown in Table 1, gives a coefficient of variation of 3.28% where the performance criteria is less than 5% so again meeting the specification.



**Table 1: Repeat Measurements**

Number	1	2	3	4	5	6	7	8	9	10	Average	Std. Dev	Cv (RSD)
<b>S (mg/kg)</b>	10.4	10.2	9.7	9.8	9.8	10.3	9.8	9.8	9.3	9.8	9.89	0.32	3.28%

## CONCLUSION

The above data demonstrates that the X-Supreme8000 instrument conforms to the instrument performance criteria of the ISO 13032 test method and be used for rapid and accurate measurements at the 10 ppm sulphur concentration level.

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