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EDXRF1249 - Analysis of Lube Oils per ASTM D6481



Scope

The measurement of phosphorus (P), sulfur (S), calcium (Ca), and zinc (Zn) in lube oil is demonstrated as per ASTM D6481-99(2010).

Background

ASTM D6481 is a standard test method for measuring lube oil using EDXRF. The elements and concentration ranges are specified in Table 1 of the method.

Element	Range
Phosphorus	0.02 to 0.3 mass %
Sulfur	0.05 to 1.0 mass %
Calcium	0.02 to 1.0 mass %
Zinc	0.01 to 0.3 mass %

ASTM D6481-99(2010)

ASTM Table 1 Elements and Range of Concentrations Determined

Quality control and quality assurance during the lube oil manufacturing process is essential. A fast, simple method of analyzing lube oils is important throughout the QC/QA process. Rigaku meets this industry need with a high performance, low-cost benchtop EDXRF system. Rugged and reliable, [NEX-QC](#) is an ideal tool with simple and intuitive software for the

non-technical operator.

Calibration

Empirical calibrations were built using a suite of 16 commercially available calibration standards.

Element	Concentration range
P	0.020 – 0.300 %
S	0.050 – 1.000 %
Ca	0.005 – 1.000 %
Zn	0.010 – 0.300 %

Repeatability

Three representative samples from the calibration suite were chosen to demonstrate typical instrument repeatability (precision). Ten repeat analyses were performed with the sample in static position.

Sample: ASI 16b				
Units: %				
Element	Standard value	Average value	Std. dev	% Relative
P	0.020	0.0235	0.0026	13
S	0.240	0.2374	0.0014	0.6
Ca	0.200	0.2080	0.0025	1.3
Zn	0.100	0.1040	0.0007	0.7

Sample: ASI 6				
Units: %				
Element	Standard value	Average value	Std. dev	% Relative
P	0.250	0.2555	0.0095	3.8
S	0.800	0.7954	0.0090	1.1
Ca	0.005	0.0042	0.0006	12
Zn	0.300	0.3044	0.0032	1.1

Sample: ASI 10				
Units: %				
Element	Standard value	Average value	Std. dev	% Relative
P	0.150	0.1485	0.0020	1.3

S	0.200	0.1968	0.0010	0.5
Ca	0.100	0.1021	0.0010	1.0
Zn	0.200	0.2041	0.0013	0.7

Conclusion

The results demonstrate excellent performance for basic lube oil formulations using NEX QC. Given standards assayed for Ba, the Ba content can also be measured over similar concentration ranges. Fast and simple, the NEX QC is an ideal tool for monitoring and controlling lube oil add packs and lube formulations during blending and process QC.

Related products



NEX QC Series

Combines quality, affordability, and performance for a wide range of applications