

## Press Release

# Lubricating Oil Analysis by WDXRF According to ASTM D6443-04

**The Woodlands, TX – December 6, 2012.** Rigaku Corporation is pleased to announce the publication of a new application report on the Rigaku ZSX Primus sequential wavelength dispersive X-ray fluorescence (WDXRF) spectrometer. Application Note #5003 demonstrates quantitative analysis of lubricating oil in accordance with ASTM method D6443-04, *Standard Test Method for Determination of Calcium, Chlorine, Copper, Magnesium, Phosphorus, Sulfur, and Zinc in Unused Lubricating Oils and Additives by Wavelength Dispersive X-ray Fluorescence Spectrometry*. The report covers sample preparation, method calibration and repeatability analysis.

The functional properties of lubricating oil for specific purposes are established by mixing additives with base oil. Controlling the concentrations of additive elements is fundamental in lubricating oil production plants. X-ray fluorescence (XRF) spectrometry is used for quantitative analysis of additive elements such as magnesium (Mg), phosphorus (P) and zinc (Zn) in lubricating oil because of its high precision and simple sample preparation requirements. In the XRF analysis of lubricating oil, a sample is simply poured into a liquid cell. No complicated treatment, such as chemical decomposition or dilution, is required.

As described in the report, the analysis is carried out on the Rigaku ZSX Primus WDXRF spectrometer, a system that is optimized for routine analyses commonly performed by today's petroleum laboratories. The spectrometer was equipped with a 3 kW Rh-target X-ray tube. A 4 kW X-ray tube can be mounted if higher sensitivity or precision is required. The operation software is designed for ease of use in routine analyses, guiding users through establishing calibrations. The calibration curves were generated with matrix corrections applied for all analytes except for Mg, as indicated in ASTM D6443-04. Repeatability tests were carried out for two different samples.

The results confirm that lubricating oil can be routinely analyzed with high accuracy and precision on the ZSX Primus with a 3 kW X-ray tube, and that the performance of the instrument meets the requirements of ASTM D6443-04. The ZSX Primus also can be applied to the standard method of ASTM D4927-05, which covers higher concentration ranges of additive elements in lubricating oil.

*A copy of this application report may be requested at:* <http://www.rigaku.com/products/xrf/primus/app5003>

### About Rigaku

Since its inception in Japan in 1951, Rigaku has been at the forefront of analytical and industrial instrumentation technology. Rigaku and its subsidiaries form a global group focused on general-purpose analytical instrumentation and the life sciences. With hundreds of major innovations to their credit, Rigaku companies are world leaders in X-ray spectrometry, diffraction, and optics, as well as small molecule and protein crystallography and semiconductor metrology. Today, Rigaku employs over 1,100 people in the manufacturing and support of its analytical equipment, which is used in more than 70 countries around the world supporting research, development, and quality assurance activities. Throughout the world, Rigaku continuously promotes partnerships, dialog, and innovation within the global scientific and industrial communities.

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