

Measure Low Concentrations of Sulfur and Chlorine by MWDXRF

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Often the sulfur and chlorine measurements are required for petroleum products due to the environment regulations and the need of monitoring related corrosion. It is a challenge to obtain a detection limit below 100 ppb for sulfur and chlorine with XRF technologies. Monochromatic excitation design combined with the wavelength dispersive XRF method creates a monochromatic wavelength-dispersive XRF (MWDXRF) method capable of substantially low limits of detection, which has become a powerful analyzer setup for single or even dual elements trace measurement. The monochromatic excitation apparatus produces an intense monochromatic focused small spot X-ray beam with the help of a doubly curved crystal (DCC) optic. The sample X-ray fluorescence generated by that focused X-ray excitation beam will then be collected by another DCC optic and aligned to a detector. This set up could gain one of the highest signal/background ratio in known XRF analyzers, benefitting from the combination of monochromatic excitation and high resolution wavelength dispersive XRF. With a designed geometry, MWDXRF is adopted to detect sulfur and chlorine at the same time. Recent instrumental development pushes the detection limit (LOD) below 100 ppb for sulfur and around 100 ppb for chlorine, which is valuable for aromatics industry and significantly improves the precision for other petroleum product measurement in the range of 1-5 ppm. The test data will show the repeatability and reproducibility of the analyzer, and they are comparable with UV fluorescence.