UDC 622.7

V.A. PECHERSKYI
(Ukraine, Dnipropetrovs'k, State Higher Educational Institution "National Mining University")

XR FLUORESCENCE AND XR DIFFRACTION

Energy dispersive X-ray Fluorescence technology provides one of the simplest, most accurate and most economic analytical methods for the determination of the chemical composition of many types of materials. It can be used for a wide range of elements, from sodium (11) to uranium (92), and provides detection limits at the sub-ppm level; it can also measure concentrations of up to 100% easily and simultaneously.

Fluorescence spectrometry is an elemental analysis technique with broad application in science and industry.

Modern XRF instruments are capable of analyzing solid, liquid, and thin-film samples for both major and trace (ppm-level) components. The analysis is rapid and usually sample preparation is minimal or not required at all.

XR Diffraction analysis is based on constructive interference of monochromatic X-rays and a crystalline sample: The X-rays are generated by a cathode ray tube, filtered to produce monochromatic radiation, collimated to concentrate, and directed toward the sample.

The characteristic x-ray diffraction pattern generated in a typical XRD analysis provides a unique “fingerprint” of the crystals present in the sample. When properly interpreted, by comparison with standard reference patterns and measurements, this fingerprint allows identification of the crystalline form.

The difference between XRF and XRD is simple: XRF analyses for Chemistry while XRD determines the mineralogy.

XRF and XRD measure different things, each giving different information about the same sample.

XRD identifies and measures the presence and amounts of minerals and their species in the sample, as well identify phases.

XRF will produces and assay by giving information on the chemical composition of your sample without indicating what phases they are present in your sample.

Although its principles are different, XRD can be considered complementary to XRF. In a typical crystalline sample, XRF might measure for example the total calcium (Ca) concentration or the total iron (Fe) concentration. XRD permits analysis of the phases or compounds in crystalline materials such as rocks, minerals and oxide materials and products. So in the same sample, XRD takes the analysis a stage further and gives information about CaO, $CaCO_3$, $Ca(OH)_2$ contents and other Ca phases or the levels of Fe phases, such as FeO, Fe_2O_3 , Fe_3O_4 , Fe_3C and other Fe phases. Therefore combining the results of both XRF and XRD techniques allows for a better and more complete characterization of any given crystalline sample.

Undertaking both types of analysis has traditionally called for two separate X-ray instruments, maintained and operated at significant cost to the user. But the integration of innovative X-ray diffraction systems allows both techniques to be included in the same instrument, bringing significant advantages to the use.

Literature list

1. Electronic resource. Access mode: http://acceleratingscience.com/mining/better-together-xrf-and-xrd/
2. Electronic resource. Access mode: http://www.cemnet.com/Forum/thread/152121/diffrence-between-xrf-xrd-or-chemical-analysis.html

Надійшла до редколегії 21.03.2016 р.
Рекомендовано до публікації к.т.н. О.О. Березняком