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On-line XRF analysis of uranium materials in the mining and processing industry

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The introduction of on-line X-ray fluorescence (XRF) analysis in the mining and processing industry of uranium (U) can improve the representativeness and speed of analysis and lower costs. Potential applicability of the industrial XRF analyzer CON-X series is demonstrated for continuous measurement of uranium content in various materials (rutile and zircon sands, phosphate rock and fertilizers, U ore residues after leaching, monazite ore etc.) and at wide ranges of U concentrations (from 100 ppm up to tens %). In addition to the physical components required to perform on-line XRF measurements, analyzer design and analytical method can be customized to the requirements of specific field or process.

The dynamic laboratory simulation of on-line measurement of uranium in ground N-P-K fertilizers indicates statistically acceptable correlation with routine analysis. Estimated detection limit obtained with replicate measurements is 25-50 ppm depending on the type of phosphate material.

On-site test of the CON-X analyzer for continuous analysis of uranium in ore residues after heap-leaching showed that the difference between on-line and laboratory results was within 10 % relative at the level of 100 ppm U. Uranium detection limit is estimated at 30-50 ppm in 5 minute measurements depending on interfering element.

Advantages and limitations of CON-X analyzer for on-line analysis of uranium solid materials transported by the conveyor are also discussed.

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