E-02

ANALYSIS OF MINERAL SANDS USING A PORTABLE X-RAY FLUORESCENCE ANALYSER

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The use of a portable X-ray Fluorescence Analyser for the determination of Ti, Mn, Cr and Fe in samples of Ilmenite, Monazite and Zircon is described. The analyser uses the principle of energy dispersive X-ray fluorescence. The radiation from a radioactive source (Cd^{109}) strikes the sample and excites fluorescent radiation. The spectrum of this radiation is measured by a proportional counter and processed by a micro-computer.

The instrument has to be calibrated in order to relate the measured counts to percentage composition of the elements. The calibration consists of (*a*) Instrument calibration, to set microchannel limits for counting the emitted radiation from the desired elements of the sample; for this, pure elements are used and the resulting counts are measured. (*b*) Sample calibration, to relate the percentage composition of the desired elements to the emitted radiation. This requires approximately 20 samples of known composition. These are used to set up a multiregression model from which other unknown samples of the same type can be analysed. Once a calibration is carried out for a given set of four elements, unknown samples of the same type can be analysed very quickly (e.g. measurement times of 15 sec 1 min 4 min and 16 min can be used).

Advantages of the technique are: high speed, absence of elaborate sample preparation, small sample quantity (approx. 200 g), portability and suitability for field use. The accuracy that can be attained depends on the element and the matrix in which it occurs. In the present analysis an accuracy of 10% was achieved.