Quantitative Determination of Hematite and Goethite in Lateritic Bauxites by Thermodifferential X-ray Powder Diffraction

T. Boski[1] and A. J. Herbillon[2]

[1] IFAQ, Vrije Universiteit Brussel, Pleinlaan 2 B-1050 Brussels, Belgium
[2] Centre de Pédologie Biologique du CNRS B.P. 5, F-54501 Vandaeuvre, France

Abstract: An X-ray thermodifferential powder diffraction method for the quantitative determination of goethite and hematite in lateritic bauxites has been developed and consists of measuring the integrated intensities of the 012 line of hematite before and after heating the sample at 900 ° C and of correcting the obtained values by the X-ray mass absorption coefficient of either the untreated or heated matrix. From the corrected line intensities and tile chemical analyses, the amounts of iron to be allocated to goethite and hematite in the untreated samples can be estimated. The actual content of goethite and hematite in a sample is calculated by taking into account the degree of Al substitution in each of these minerals. The method was tested on artificial mixtures of goethite and hematite and subsequently used to analyze 98 auger drill samples from lateritic bauxites of Guinea Bissau. The estimated precision of the determination ofgoethite and hematite content was ± 2% (absolute). The method can not be applied to samples containing < 10% Fe_2O_3 (on a whole weight basis) unless preconcentration is carried out.

Key Words: Bauxite • Goethite • Hematite • Iron • Mineral analysis • Thermal treatment • X-ray powder diffraction

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