Quantitative Chemical Analysis of Red Mud and Products of its Processing to Scandium, Zirconium and REE Oxides by ICP AES

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Abstract

Establishment of scandium production from the red mud of the Ural alumina refineries by RUSAL required implementation of effective process control and quality assessment of the pure scandium oxide produced. To this end, techniques for scandium, zirconium and REE determination in bauxites, muds, semi-products and commercial products using the existing equipment and methods of the facility's central laboratory (i.e. without the purchase of new equipment and/or adoption of additional methods of analysis) were developed by RUSAL's Engineering and Technology Center. Investigations were performed to develop the quantitative chemical analysis of red mud and products of its processing for determination of Sc, Zr and REE oxides by inductively coupled plasma-atomic emission (ICP-AES) on the PerkinElmer OPTIMA 8000 CROSS FLOW-L15 model. The possibility to analyse a wide range of concentrations from 1 ppm to 10% is shown. Comparative determinations of basic element oxides, trace contamination and REE by various analytical methods were performed.

Keywords: scandium, REE, zirconium, ICP-AES, analytical methods.