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PII: S0584-8547(18)30082-X
DOI: doi:10.1016/j.sab.2018.06.018
Reference: SAB 5475

To appear in: *Spectrochimica Acta Part B: Atomic Spectroscopy*

Received date: 5 February 2018
Revised date: 16 May 2018
Accepted date: 29 June 2018

Please cite this article as: I.F. Seregina, A.I. Volkov, K. Ossipov, M.A. Bolshov , Characterization of REE-Nb ores by a combination of spectrochemical techniques. Sab (2018), doi:10.1016/j.sab.2018.06.018

Characterization of REE-Nb ores by a combination of spectrochemical techniques

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Various spectroscopic techniques and different sample pretreatment schemes were used for the characterization of the uniquely rich Tomtor REE-Nb ores and for the technological solutions used for hydro-metallurgy processing of these ores. The ranges of the target analyte concentrations available for the techniques used, XRF, MP-AES and ICP-MS, were experimentally found. The determination of REE by XRF was possible for concentrations in solid samples above 10^{-3}%. A unique procedure for solid sample borate fusion which resulted in homogeneous, transparent glass disks which were stable during long-term storage was established. Actual concentrations of REE in solid samples were determined using an improved data processing algorithm of XRF spectra evaluation. Metrological parameters for XRF analysis of ore samples were **evaluated** ~~validated~~ by the analysis of certified reference materials CRM OSO №250-91 NFS-23 and Nb ore concentrate CRM DH SX18-03.

Solid sample digestion was used for the determination of low concentrations of REEs by MP-AES and ICP-MS. The metrological parameters of MP-AES are identical to XRF. ICP-MS was used for determination of 40 elements in technological solutions. In the case of ICP-MS, La, Ce and Nd cause severe spectral interferences for Ga, As and Gd. The quantitative contribution of these interferences was estimated. Correction equations were developed, improving the accuracy of target analyte determination.

Keywords XRF; MP-AES; ICP-MS; REE-Nb ores; borate fusion procedure; spectral interferences

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