

Theoretical and experimental studies of the effectiveness of sample preparation methods of non-ferrous metals sulfide raw materials for the determination of the micro- and macro-components by ICP-AES

© Anna V. Maiorova,^{*+} Nadezhda V. Pechishcheva, and Konstantin Yu. Shunyaev
Institute of Metallurgy UB RAS. Amundsena St., 101. Yekaterinburg, 620016.
Russia. Phone: +7 (343) 267-89-36. E-mail: imeturooran@mail.ru

^{*}Supervising author; ⁺Corresponding author

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Abstract

The efficiency of the sample preparation procedures of non-ferrous metal sulfide raw material for determination of silver, gold, iron, silicon, sulfur, nickel, cobalt, copper by inductively coupled plasma atomic emission spectrometry (ICP-AES) was investigated. Two methods were considered: acid digestion in a mixture of HCl:HNO₃ (3:1) and an fusion with Na₂O₂. Using thermodynamic modeling («HSC» software) shows that at the acidic sample preparation of copper ore with HCl:HNO₃ (3: 1) there is loss of one of the target analytes - silicon; fusion with Na₂O₂ prevents loss of analytes. The simulation results of the polymetallic ore sample preparation show similar behavior of the analytes with the exception of sulfur, which in the barium presence forms a BaSO₄ precipitate, whereby the sample preparation techniques discussed can not be used for ICP-AES determination of sulfur in barium-containing ores. Experimental studies confirm the obtained theoretical conclusions. Analysis of the certified reference materials showed the effectiveness of proposed methods of sample preparation.