

The possibilities of simple acid extraction for the extraction of certain trace elements from certified samples of coal ash and their concentrations determined by the method of optical emission spectrometry with inductively coupled plasma

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Abstract

Mineral processing with maximum efficiency is one of the most actual problems of modern economy. To solve this problem, it is necessary to develop a set of methods, including, among other methods, the analysis of the waste chemical composition. The ashes from coal combustion are promising for processing waste, since it contains a large amount of valuable trace elements.

Experimental results on the investigation of the possibility of the determination of eight micro impurity elements Co, Cr, Cu, Ni, V, Zn, La, Y in a coal ash by acid extraction using optical-emission spectrometry with inductively coupled plasma are obtained. The study provides calibration graphs for the determination of the listed elements with their concentrations in solution up to 2 mg/L, the results of determining the stability of the calibration characteristics, the determination of spectral background influences for selected analytic wavelengths in the analysis of ashes (real objects). As a result of the study, the extraction rates of these elements for the certified ash samples were determined, and the contents of the identified elements for the CO-1 ash sample missing in its passport were predicted.

When extracting the CO-1, the certain concentrations of the elements are 35–36% of their certified concentrations. In the extracts of the ZUK-1, the detectable elements are contained in amounts of from 26.7 to 41.4%. Lanthanum is poorly extracted by aqua regia, as in the case of the ZUK-2, only 1%, possibly due to the fact that it is bound to some stable chemical compound with silicon. When the ZUK-2 was extracted, the detectable elements passed into a solution in amounts ranging from 23.5 to 46.7%.

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