

Multivariate Analysis of ICP OES Calibration Conditions for Sequential Extraction of Metals Ions

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Sequential extraction procedures are normally applied to evaluate sediments, soils and plants. The reagents are often selected with the intention that they should target well-defined minerals phases although specificity cannot be guaranteed. Inductively coupled plasma optical emission spectrometry (ICP OES) is an instrumental technique that can be used for inorganic determinations. The simultaneous, multi-element nature of the technique allows the determination of a large number of elements in a very brief period of time. However, to accuracy results it is necessary the preparation of multiple calibration curves nearest as possible of the sample preparation extraction solution. In this work some commonly solutions used in sequential analysis (nitric, acetic, hydrochloric and perchloric acid, water, aqua regia, ammonium acetate, DTPA, and hydroxylamine chloridrate) were tested for Al, B, Ba, Cd, Co, Cr, Cu, Fe, K, Mg, Mn, Na, Ni, P, Sr and Zn determination in different wavelengths and in robust and non-robust ICP OES condition, aiming to evaluate their influence on results. Calibration curves were plotted to compare the extractants solutions effect in each analyte. With the obtained sensitivity, principal components analysis was performed. The results showed that when robust condition was used, most of the extractants solutions do not cause interference in the calibration. The intensity of emission is also a significant factor, the most intense lines showed better accordance among the extractors. Therefore, considering the robust conditions and the more intense spectral lines, the determination of analytes in the different evaluated extractions solutions can be performed with accuracy using only two calibration curves for a wide range of elements by ICP OES, considering that principal components analysis showed two distinct groups: one from water and nitric acid and other from all another evaluated solutions.

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