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Comprehensive approach to the validation of the standard method for total reflection X-ray fluorescence analysis of water

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Abstract

In this work, we present the validation of the chemical method for total reflection X-ray fluorescence (TXRF) analysis of water, proposed as a standard to the International Standard Organization. The complete experimental procedure to define the linear calibration range, elements sensitivities, limits of detection and quantification, precision and accuracy is presented for a commercial TXRF spectrometer equipped with Mo X-ray tube. Least squares linear regression, including all statistical tests is performed separately for each element of interest to extract sensitivities. Relative sensitivities with respect to Ga, as internal standard, are calculated. Accuracy and precision of the quantification procedure using Ga as internal standard is evaluated with reference water samples. A detailed discussion on the calibration procedure and the limitation of the use of this method for quantitative analysis of water is presented.

Graphical abstract