

EVALUATION OF UNCERTAINTY SOURCES FOR THE DETERMINATION OF INORGANIC ELEMENTS IN RESIDENTIAL INDOOR DUST BY WDXRF

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ABSTRACT

The studies related to potentially toxic inorganic elements determination in the environment have been the focus of many worldwide researches. In this context, the residential indoor dust has detached. Thereby, to provide a rapid methodology, low cost, environmentally correct and in accordingly to ISO 17025 is great importance. In this work, the wavelength dispersive X-ray fluorescence spectrometry (WDXRF) with a procedure for direct analysis, i.e. without previous chemical treatments in the sample preparation, non-destructive, multi-element and without the necessity of selective individual calibration curve by the fundamental parameters method (FP) were used. The total process was evaluated by certified reference materials (MRCs) such as Indoor Dust (2584) and Domestic Sludge (2781) from NIST, USA for the elements Na, Mg, A, B, P, K, Ca, Ti, Cr, Mn, Fe, Ni, Cu, Zn, Se, Ba, Hg and Pb. The uncertainty of measurement calculated as the relative standard deviation (RSD%) showed that the largest part of the elements analyzed were less than 7% and relative error (ER%) below 10%, demonstrating satisfactory repeatability. The t-student test to evaluate the difference between the certified and determined values was applied and showed to be valid the null hypothesis, which demonstrate no significant differences between the values tested. Hence, the proposed methodology was validated.

Key words: X-ray fluorescence, indoor dust analysis, methodology validation