Detection of Beryllium in Digested Autopsy Tissues by Inductively Coupled Plasma Mass Spectrometry Using a High Matrix Interface Configuration

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This article describes a robust methodology using the combination of instrumental design (high matrix interface—HMI), sample dilution and internal standardization for the quantification of beryllium (Be) in various digested autopsy tissues using inductively coupled plasma mass spectrometry. The applicability of rhodium as a proper internal standard for Be was demonstrated in three types of biological matrices (i.e., femur, hair, lung tissues). Using HMI, it was possible to achieve instrumental detection limits and sensitivity of 0.6 ng L^{-1} and 157 cps L ng^{-1}, respectively. Resilience to high salt matrices of the HMI setup was also highlighted using bone mimicking solution ($[Ca^{2+}]$ = 26 to 1,400 mg L^{-1}), providing a 14-fold increase in tolerance and a 2.7-fold decrease in method detection limit compared to optimized experimental conditions obtained without the HMI configuration. Precision of the methodology to detect low levels of Be in autopsy samples was demonstrated using hair and blood certified reference materials. Be concentration ranging from 0.015 to 255 µg kg^{-1} in autopsy samples obtained from the U.S. Transuranium and Uranium Registries were measured using the methodology presented.

Keywords: ICP-MS, Beryllium, biological samples, high matrix, nuclear application

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