

Direct Determination of Cd and Pb in Human Urine by GFAAS with Deuterium-lamp Background Correction Using Different Chemical Modifiers

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Several authors have contributed to the elaboration of methodology for direct determination of Cd and Pb in urine by graphite furnace atomic absorption spectrometry (GFAAS). In the proposed approaches, Zeemann background correction systems were predominantly used, without paying much attention to the selection of an appropriate chemical modifier. However, systematic studies on eleven recommended and less commonly used modifiers have resulted in optimization of atomization conditions, so that accurate analysis also with the use of D₂-lamp background correction became possible. This was confirmed by comparative measurements using both background correction systems. For determination of Cd in urine, NH₄F has been selected resulting in the lowest limit of detection (LOD): 0.07 µg L⁻¹. NH₄F promotes efficient atomization at low temperatures and suppresses chloride interference effect. Pd + Sr (nitrate) has been selected as the most adequate modifier for determination of Pb. Its presence raised the maximum tolerable pyrolysis temperature up to 1200°C, which resulted in the maximum reduction of the background signal and the lowest LOD of 1.5 mg L⁻¹ for Pb (10 µL aliquots of dispensed urine). Applying the above modifiers to the analysis of standards and samples, direct aqueous calibration for accurate analysis of diluted and acidified urine samples became possible. Accuracy of the analysis was verified by the use of commercially available quality control reference materials.