Speciation of Chromium by High-Performance Thin-Layer Chromatography with Direct Determination by Laser Ablation Inductively Coupled Plasma Mass Spectrometry - DTU Orbit (20/10/2018)

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It is of considerable importance to be able to distinguish metallic species because their toxicity depends on their chemical form. Therefore, the analysis of environmental samples can be enhanced by the combination of high-performance thin-layer chromatography (HPTLC) with laser ablation inductively coupled plasma mass spectrometry (LA-ICPMS). In this study, Cr³⁺ and Cr⁶⁺ were separated on silica gel HPTLC plates using aqueous mobile phases. Separation was achieved in seconds with retardation factors (Rf) of 0 and 1 for Cr³⁺ and Cr⁶⁺, respectively. LA was used to volatilize the chromium species directly from the chromatographic material prior to ICPMS detection. A linear calibration was obtained, and detection limits (3σ) of 6 ng for Cr⁶⁺ and 0.4 ng for Cr³⁺ were achieved with precision ranging from 3 to 40% at the 95% confidence level. The silicon present in the stationary phase was used as an internal standard. This procedure allows for a rapid separation and quantification, requires only 0.5 μL of sample, and lower detection limits can be achieved through preconcentration.

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