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Trace element determinations in uranium by Total reflection X-Ray Fluorescence spectrometry using a newly developed polymer resin for major matrix separation

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## Abstract

Trace element determinations in uranium samples by Total reflection X-Ray Fluorescence (TXRF) Spectrometry were carried out using a new polymer resin gel for uranium matrix elimination from the sample solutions. The resin was prepared by using the 1:1 mole proportion of monomers bis [2-(methacryloyloxy) ethyl] phosphate (bis-MEP) and 2-acrylamido-2-methyl propane sulfonic acid (AMPS). This new poly (bis-MEP-AMPS) resin has exhibited superior features for the trace element determinations in uranium matrix compared to the solvent extractants based methods, which could be attributed to its remarkable selectivity towards uranium in 4M HNO<sub>3</sub> medium without sacrificing its uptake efficiency (94%) just by simple equilibration of the resin in the solutions. The separation procedure is very simple and the polymer resin gel can be regenerated by sonicating in a 0.5 wt % Na<sub>2</sub>CO<sub>3</sub> solution for one hour. This resin was successfully used for the trace elemental analysis in a certified reference material (CRM-IV) of uranium oxide by TXRF after separation of uranium from the sample matrix with satisfactory analytical results. Photoluminescence and FTIR studies were performed to understand the coordination of uranyl species with this polymer resin.

Key words: TXRF, MEP-AMPS, polymer resin, uranium, trace element determination

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