Quadrupole and multi-collector ICP-MS analysis of ^{226}Ra in brain from a radium dial painter

D.L Arbova[1], S.Y. Tolmachev[2], J.D. Brockman[1,3]

*[1]Department of Chemistry, University of Missouri, Columbia, MO, USA; [2]*United *States Transuranium and Uranium Registries, College of Pharmacy and Pharmaceutical Sciences, Washington State University, Richland, WA, USA; [3]Research Reactor, University of Missouri, Columbia, MO, USA*

Two ICP-MS methods were developed to measure the radiotoxic isotope ^{226}Ra in brain tissues from a radium dial painter worker. The first method was a direct analysis of acid digested samples using quadrupole ICP-MS. The instrumental LOD of ^{226}Ra was 0.1 ng kg^{-1}. Polyatomic interferences at *m/z* 226 were investigated and Pb was identified from a polyatomic interferent in an in-house sample prepared from bovine brain, with a 226/208 formation ratio of 4×10^{-8}. The quadrupole ICP-MS method was also used to measure levels of beryllium, strontium, and uranium. A second method was developed that included cation-exchange chromatography to separate ^{226}Ra followed by analysis with sector field MC-ICP-MS. The instrumental LOD for the cation exchange method with MC-ICP-MS detection was 0.5 pg kg^{-1} (19 mBq kg^{-1}). The measured concentrations of ^{226}Ra in different brain regions ranged from 0.09–0.72 ng kg^{-1} (3.3–27 Bq kg^{-1}) and radium was non-uniformly distributed in the brain.

USTUR-0601-21