American Nuclear Society
International Topical Conference

ABSTRACTS

Ninth International Conference on Methods and Applications of Radioanalytical Chemistry

MARC IX

March 25-30, 2012

was theoretically obtained. The isotope fractionation via intramolecular vibrations was calculated to be much smaller than the experimental result. The isotope fractionation via isotopic change in nuclear volume, named the nuclear field shift effect, was calculated to be ~1‰ in Tl(I)-Tl(III) redox systems and/or ligand exchange systems of Tl(III).

Log: 186. **ASSESSMENT OF DIFFERENCES IN THE TRACE ELEMENT CONCENTRATIONS IN REGIONS OF HUMAN BRAIN BY INAA**. Saiki, M(1); Miranda, N(2); Leite, REP(2); Genezini, FA(1); Grinberg, LT(2); Ferretti, REL(2); Jacob-Filho, W(2).(1)Instituto de Pesquisas Energéticas e Nucleares, IPEN-CNEN/SP. (2)Faculdade de Medicina da Universidade de São Paulo.

Studies have shown that there is a potential relationship between the levels of trace elements in cerebral tissues and neurological disorders. However, there are few publications available to the elemental composition of this tissue as well as for different regions of the brain. The aim of this study was to investigate trace element differences in various human brain regions of an elderly population of normal individuals. This project was approved by the Ethic Committee and brain samples (n=18) from individuals of both genders aged 51-95 years were provided by the Brain Bank of the Brazilian Aging Study Group of the São Paulo University. The tissues from the regions of hippocampus, frontal, parietal, temporal, occipital lobes, cerebellum and amygdale were cut using a titanium knife, ground, freeze-dried and then analyzed by instrumental neutron activation analysis (INAA) technique. Samples and element standards were irradiated with a neutron flux at the IEA-R1 nuclear research reactor for Br, Fe, K, Na, Rb, Se and Zn determinations. Student´s t test (p=0.05) used to compare the results showed, for several element concentrations, significant difference among the brain regions that were analyzed. Most of our results agreed with the published literature data. Biological standard reference materials SRM 1566b Oyster Tissue and SRM 1577c Bovine Liver analyzed for quality control indicated good accuracy of the results.

Log: 187. **CONTRIBUTIONS TO THE GLOBAL ^{37}AR BACKGROUND BY RESEARCH REACTOR OPERATIONS**. Fay, A(1); Biegalski, S(1). (1) University of Texas at Austin.

The Comprehensive Nuclear-Test-Ban Treaty establishes a number of instruments for detecting nuclear explosions and verifying the compliance of member states. Among these instruments is On-Site Inspection (OSI), the deployment of an inspection team to the suspected test site. Recent work has shown that an underground nuclear explosion would produce ^{37}Ar, through the ^{40}Ca(n, α)^{37}Ar reaction, in sufficient concentrations to be used as a detectable signature of a weapon test. This ^{37}Ar signature would be quantified by subsurface sampling at a suspected test site by an OSI team.
In this paper, radiation transport simulation of the University of Texas at Austin 1.1 MW TRIGA reactor was conducted to determine the ^{37}Ar/^{41}Ar production ratio. This ratio was used, along with published ^{41}Ar release data for the US research reactor fleet, to approximate the total ^{37}Ar source term from research reactor operations. Using this source term, atmospheric transport modeling was then conducted to calculate the expected contribution to ^{37}Ar background at potential OSI sites.

Log: 188. **CHEMICAL SPECIATION FOR FORENSIC SCIENCE**. Marianne P. Wilkerson, Los Alamos National Laboratory, P.O. Box 1663, Los Alamos, NM 87545 – USA.

We present the application of chemical speciation for forensic science. For many years, environmental research from U.S. National Laboratories has focused on the chemical speciation of actinides in contaminated soils and groundwaters from former U.S. Nuclear weapon's production sites or disposal areas such as Rocky Flats, Hanford, or the Nevada Test Site. These findings add to a body of observations from around the world where transport of Pu can be traced to particles and colloids as in the case of groundwater transport of Pu from the Mayak Production Association in Russia. Extensive research has shown that particle matrix and radionuclide composition are dependent upon source, and structures and oxidation states are correlated to release conditions. Here, we will discuss our work on bulk and particle measurements on