P8

MAJOR, MINOR AND TRACE ELEMENTS DETERMINATION USING INAA IN SOIL PROFILE AND SEDIMENT CORE SAMPLES COLLECTED IN THE CATCHMENT AREA OF PONTE NOVA RESERVOIR, SÃO PAULO – BRAZIL

A.R. Silva[a,1], S.R. Damatto[1], L. Leonardo[2], J.M. de Souza[1], P.N. Gonçalves[1] and M.F. Máduar[1]

[a] **andre.rodrigo@usp.br**
[1] *Nuclear and Energy Research Institute, São Paulo, Brazil*
[2] *São Camilo University Center, Brazil*

Elemental Chemical Characterization is a keystone in understanding environmental phenomena and its effects. Major and trace elements give important data about geological, physical, chemical and biological phenomena undergoing in natural environments. Ponte Nova reservoir (23°34'43.23" S, 45°56'56.76" W) is the first reservoir in a cascade system that was built in the 1970s to control Upper Tietê River basin water flow. Nowadays, this reservoir serves as a source of water for agricultural and industrial enterprises and as drinkable water source, and were a major concern for the population of São Paulo state due to a recent severe drought in the years of 2014 and 2015. In the present work, major and trace elements (As, Ba, Ce, Co, Cr, Cs, Eu, Fe, Hf, K, La, Lu, Na, Nd, Rb, Sb, Sc, Sm, Tb, Yb and Zn) were determined using Instrumental Neutron Activation Analysis (INAA) in the IEA-R1 nuclear reactor using the comparative method. This procedure consists in exposing 200mg of the sample and reference materials sealed in polypropylene bags to a thermal neutron flux of $1 \times 10^{12} \, cm^{-2}s^{-1}$. Geo-accumulation indexes and enrichment factors were determined and physicochemical parameters (grain size analysis, pH, real and apparent densities, Loss on Ignition, porosity and humidity) were measured. The major and trace element concentrations were compared with the Upper Continental Crust values. Cluster analysis, correlation matrix and principal component analysis were applied in all the results obtained to verify a probable correlation between the major and trace elements determined in the soil and sediment samples.

P9

NEUTRON ACTIVATION ANALYSES FOR INVESTIGATION OF ANTILONOMIC SERUM FOR CATERPILLARS LONOMIA OBLIQUA WALKER (LEPIDOPTERA: SATURNIIDAE)

A.R. Leão[a,1], C.B. Zamboni[1], D.G.N. da Silva[1], I.M.M.A. Medeiros[1] and S.M. Simons[2]

[a] **anileaoleao@gmail.com**
[1] *Nuclear and Energy Research Institute, São Paulo, Brazil*
[2] *Parasitology Laboratory of Butantan Institute, São Paulo, Brazil*

Since 1996 the Butantan Institute (IBu, São Paulo city), in collaboration with the Health Departments of some Brazilian states, produces serum antilonomic using the caterpillars of the species L. obliqua from several regions of Brazil. However, no data of their elemental composition to ensure that the antivenom produced (considering

the different origins) maybe used to manufacture serum unchanged in the final product, as regards the toxicity of inorganic elements. In this investigation, we intend to check the elemental characterization of this antidote using Neutron Activation Analyses technique (NAA). The NAA measurements were performed in the IEA-R1 nuclear reactor (IPEN/CNEN-SP, Brasil). Each sample was irradiated for 120s and gamma counting endured 300s, HPGe detector (ORTEC-GEM 60195) coupled to a MCA (ORTEC - 919E) used. The elements concentration were obtained using the ATIVAÇÃO software. These quantitative analysis of the antilonomic serum will generate data to evaluate the possibility of establishing a standard extract, which would reduce costs in the antilonomic serum production process, as well as improvements in serum production process antilonomic in the Butantan Institute, meeting the standards of good manufacturing practices and good laboratory practice.

ELEMENTAL COMPOSITION DETERMINATION IN MEDICINAL PLANTS BY NEUTRON ACTIVATION ANALYSIS P11

A. Takamoto[a,1] and M. Saiki[2]

[a] **arissa.takamoto@gmail.com**
[1] Institute of Chemistry, São Paulo University, São Paulo, Brazil
[2] Nuclear and Energy Research Institute, São Paulo, Brazil

The use of medicinal plants in the prevention and treatment of diseases is mainly due to its low costs, ease acquisition and cultural aspects. In addition, the absence of its side effects when compared with synthetic drugs and the belief that plants that are natural origin do not cause harmful effects to the organism have stimulated their uses. However, medicinal plants may contain excess essential elements as well as the toxic ones that even in low concentrations are dangerous to human health. The objective of this study was to analyze medicinal plants: Aloe vera (Babosa), Morus nigra sp. (Amoreira) and Moringa oleifera (Moringa) for further correlation studies of the chemical elements with their therapeutic activities. The analytical method used was neutron activation analysis (NAA). The leaves of Aloe vera and Morus nigra were collected in different localities and that of Moringa oleifera were acquired in a store of natural products. Sample preparation consisted of cleaning, drying and milling the leaves. Aliquots of the samples and synthetic element standards were irradiated for 16h under thermal neutron flux of 5×10^{12} n cm^{-2} s^{-1} of the nuclear reactor IEA-R1. The induced gamma activities were measured using a gamma ray spectrometer coupled to a HPGe detector. The radioisotopes formed were identified by half-lives and gamma ray energies. Element concentrations were calculated by comparative method. Quality of the results was evaluated by analyzing certified reference materials INCT-TL-1 Tea Leaves and INCT-MPH-2 Mixed Polish Herbs and the results showed good precision and accuracy. Elements Ca and K were obtained at high concentrations in the plants at the percentage levels. Calcium exhibits neutralizing action and avoids stomach lesions and K has a diuretic action. Elements Br, Fe, Na, Rb and Zn were found in the order of μg g^{-1}, and As, Co, Cr, Cs, La, Sb and Sc at lower concentrations, in the order of ng g^{-1}. The Aloe Vera plant