M077 EVALUATION OF HUMAN DENTAL LOSS CAUSED BY CARBAMIDE PEROXIDE BLEACHING AGENT USING NUCLEAR TECHNIQUES. E. M. Adachi(1), M.N. Youssef(1) and M. Saiki(2)
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In this in vitro study, the radiometric method was applied to the evaluation of dental loss caused by 10% carbamide peroxide gel with carbopol when it is applied on the surface layers of enamel and dentin tissues. Also the dental loss caused by the etching with 37% phosphoric acid procedure used in aesthetic restoration was assessed for comparison with those results obtained for bleaching treatment.
The tooth samples irradiated with a P standard in a thermal neutron flux of the IEA-R1 nuclear reactor were placed in contact with Opalescence 10% carbamide peroxide or with 37% phosphoric acid solution, both at 37 oC and in a humid environment. The radioactivity of 32P transferred from the radioactive teeth to the bleaching gel or to etching acid was measured using a Geiger Muller detector to calculate the mass of P removed in this treatment. The enamel and dentine losses were calculated using their P concentrations previously determined by instrumental neutron activation analysis
Results obtained indicated that enamel and dentin exposed to carbamide peroxide bleaching agent lose phosphorus. The extent of enamel loss was smaller than that obtained for dentin. In the case of acid etching, there was no difference between the results obtained for enamel and dentin loss. Also the dentin loss obtained after a treatment of 30 applications of 10% carbamide peroxide was the same magnitude of that one application of 37% phosphoric acid. The findings indicated that carbamide peroxide used to whiten teeth does not cause damage if it is correctly used.

M078 EFFECT OF LIMING AND FERTILIZER USE ON MINERAL CONTENT AND PRODUCTIVITY OF BRACHIARIA DECUMBENS. M.J.A.Armelin(1), O. Primavesi(2), A.C. Primavesi(2), M. Saiki(1)

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To restore a degraded pasture of Brachiaria decumbens, located in São Carlos - SP, an experiment was carried out to study the effects of limestone use with and without incorporation and fertilizer use on mineral content and forage yield, after 3 years of treatment. Limestone and phosphorus were applied at the beginning. NK were applied after each cutting. The experimental design was a random block (100 m2), with 6 replications and 4 treatments. Each block received 4 t/ha of limestone, except the control. The forage samples were collected 7 cm above the soil surface. Instrumental neutron activation analysis (INAA) followed by gamma-ray spectrometry was the analytical method used to determine mineral contents. Dry matter yield and mineral content did not differ between limestone applied on soil surface or buried in, or the treatment without limestone, although dry matter yield showed great positive (14 times) difference in relation to the treatment with limestone but without NK fertilizer. The contents of Ca, Mn, Rb, Mo, V, Co, Cr, Sm, Th, Cs, Sc and Eu in forage were negatively affected with the NK use, perhaps due to a dilution effect, while a reverse were observed for K, Cl and Se, due to the input of KCl. It seems that limestone is not a key input to restore degraded tropical pastureland, grown on acid soils.

M079 PROMPT-GAMMA NEUTRON ACTIVATION ANALYSIS FOR SMALL ANIMAL IN VIVO BODY COMPOSITION STUDIES: EFFECTS OF ANIMAL BODY SIZE AND INHOMOGENEITIES. K. Kasviki (1,2), I.E. Stamatelatos (1) and J. Kalef-Ezra (2)
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A Prompt Gamma Neutron Activation Analysis (PGNAA) facility for small animal in vivo body composition studies has been developed. A graphite collimated radionuclide neutron source (239Pu-Be) is used to irradiate the animal. Prompt gamma rays from body nitrogen (10.83 MeV) and chlorine (6.11 MeV) are detected using a NaI(Tl) and a HPGe detector, respectively. In the present work, Monte Carlo neutron and photon transport code MCNP was utilized in order to calibrate the facility for animal body size and study the effect of body inhomogeneities on nitrogen and chlorine measurement. The results of the calculations were experimentally verified by measurements performed using sets of cylindrical phantoms representing animals of different sizes (volume range from 0.25 l to 2.0 l). Moreover, a special phanton was constructed in order to validate the calculations of the effect of tissue inhomogeneities (lungs bones). Appropriate body size calibration factors are proposed and discussed. The results of this study will enable an accurate determination of animal body nitrogen and chlorine to be performed. The facility will be used to perform nutritional and metabolic studies in sets of experimental animals for a lov radiation dose (below 25 mSv).

M080 NEUTRON ACTIVATION ANALYSIS OF LARGE VOLUME SAMPLES: TECHNIQUE VALIDATION. F. Tzika (1, 2), I. E. Stamatelatos (1) and J. Kalef-Ezra (2)
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Large Sample Neutron Activation Analysis (LSNAA) is used to perform multi-element, non-destructive contamination-free analysis of large volume samples (i.e. volume > 0.5 L) with high sensitivity an excellent sampling. A LSNAA facility has been developed at GRR-1 research reactor, NCSR 'Demokritos The facility incorporates sample irradiation in the reactor's graphite thermal neutron column an subsequent measurement of the activity induced at a gamma ray spectroscopy system. Appropriat correction algorithms have been derived to account for thermal neutron self-shielding during sampl irradiation and gamma ray self-attenuation during counting procedure, based on no prior knowledge of th sample matrix composition. The neutron self-shielding correction is based on thermal neutron flu measurements at the irradiation position and the vicinity of sample, using activation foils, while gamm ray self-attenuation is assessed through a transmission measurement determination of the total linea attenuation coefficient of the unknown sample. In the present work the LSNAA technique was evaluate by analyzing different samples and comparing the results with those obtained by conventional sma sample instrumental neutron activation analysis (INAA) of the same materials. The samples analyze represented bio-medical, nutritional and environmental materials. Good agreement was observe demonstrating the applicability of neutron activation analysis technique on large volume samples at th GRR-1 research reactor facility. Moreover, the effect of sample inhomogeneities on the accuracy of th technique is discussed.