Poster presentation

PT27

Determination of k0 for 186W(n,gamma)187W, 94Zr(n,gamma)95Zr and 96Zr(n,gamma)97Zr reactions with covariance analysis

Lívia Fernandes Barros, Mauro da Silva Dias, Marina Koskinas, Ione Yamazaki, Renato Semmler
Instituto de Pesquisas Energéticas e Nucleares (IPEN), SÃO PAULO, Brazil

The use of *k0 Method* for quantitative reactor Neutron Activation Analysis (NAA) is a well known technique for determining multi-element concentrations in different materials. In order to achieve good results, there is a continuing need for improving the accuracy of *k0* parameter for several neutron capture reactions. Among these reactions, $^{186}W(n,\gamma)^{187}W$ can be considered particularly interesting because problems appear when compared with the resonance integral value from differential data. On the other hand, $^{94}Zr(n,\gamma)^{95}Zr$ and $^{96}Zr(n,\gamma)^{97}Zr$ reactions are considered important because they can be used for a twofold purpose: as neutron flux monitors and for Zr concentration measurements. These facts motivated the present work which is focused on the measurement of *k0* values for these three reactions with the purpose of improving the existing data catalogues. The irradiations were performed near the core of the IEA-R1 4.5 MW swimming-pool nuclear research reactor of the Instituto de Pesquisas Energéticas e Nucleares (Ipen-Cnen/SP - Nuclear and Energy Research Institute), in São Paulo, Brazil. Two irradiations were carried out in sequence using two sets of samples: the first with a cadmium cover around the samples and the second without. The activity measurements were carried out in an HPGe gamma-ray spectrometer. Standard sources of ^{152}Eu, ^{133}Ba, ^{60}Co and ^{137}Cs supplied by the IAEA were used in order to obtain the HPGe gamma-ray peak efficiency as a function of the energy. The covariance matrix methodology was applied to all uncertainties involved. The final values for *k0* were compared with the literature.