

Neutron Activation Analysis Lifetimes

H.H. Okimura, M.A.G. da Silveira

Centro Universitário da FEI, São Bernardo do Campo, Brazil

N.H. Medina

Instituto de Física da USP, São Paulo, Brazil

C.B. Zamboni

Instituto de Pesquisas Energéticas e Nucleares, São Paulo, Brazil

Lifetime measurements are very important to study beta and gamma decay properties and are also important to identify and quantify nuclides using the parametric Neutron Activation Analysis (NAA)[1]. Beta decay lifetime affects for example the path of r-process in stellar nucleosynthesis. In this work NAA technique was applied to determine beta decay lifetime of isotopes produced at the IEA-R1 nuclear reactor at the IPEN facilities. We have used a standard reference material supplied by the IAEA (soil-7, 2709 and 2710) and NIST (8414, 1486, 1400, 1573a and 1577b) to produce short (minutes) and long-lived (hours to days) isotopes. After the irradiation, the activated samples are gamma-counted using a HPGe Spectrometer of High Energy Resolution and the gamma-ray peaks, corresponding to gamma transitions, related to the nuclides of interest, are evaluated using in-house software. The peak areas from the identified isotopes were tracked from one, five and ten minutes spectra for the short-lived element measurements and thirty and sixty minute gamma-ray spectra in order to extract the long-lived elements. We have measured the lifetimes for the isotopes ^{28}Al , ^{52}V , ^{24}Na , ^{42}K , ^{56}Mn and ^{140}La . The lifetime results were compared with the known values from literature [1] and we have succeeded to improve the measurements for these beta-decay lifetimes.

[1] C. B. ZAMBONI, Fundamentos da Física de Neutrons. Ed. Livraria da Física, 2007.