

CHARACTERIZATION OF BARIUM, SAMARIUM AND TITANIUM COMPOUNDS FOR NUCLEAR STRUCTURE STUDIES

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In nuclear structure studies it is very important to assure the high purity of the chemical compounds to be analysed. With this objective, two nuclear techniques : neutron activation analysis (INAA) and gamma-spectroscopy, were employed to the characterization as well as the quantification of three compounds: barium nitrate, samarium oxide and metallic titanium. These techniques are particularly appropriate due to the high thermal neutron capture cross section of these elements.

This study consists of the irradiation of Ba_2NO_3 , Sm_2O_3 and Ti metallic in a thermal neutron flux of 10^{13} n.cm²/s, in the IEA-R1 reactor at IPEN-São Paulo. Two independent gamma spectrometers were assembled inside a lead shielded hood in order to reduce the background radiation. The detectors were calibrated for energy and efficiency through the measurements of standard sources (^{57,60}Co, ¹³³Ba, ¹³⁷Cs and ¹⁵²Eu).

In the gamma-spectroscopy experiment, the identification of these nuclides was made in two ways: determining the energies of gamma-rays and verifying the desintegration periods ($T_{1/2}$) of all radioisotopes produced by (n,γ) reaction.

By using Instrumental Neutron Activation Analysis, the concentrations of the elements Ba, Sm and Ti as well as the impurities present in these compounds were evaluated.