

Measurement of the $^{124}\text{Xe}(n, p)^{124}\text{I}$ Reaction Cross Section Induced by 14.8 MeV Neutron

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Abstract

The measurement of (n,p) reaction cross section induced by fast neutron plays an important role in nuclear reaction mechanism research and nuclear technology applications. Measurement of the $^{124}\text{Xe}(n, p)^{124}\text{I}$ reaction cross section at 14.8 MeV neutron has been performed by the activation method. Quasi monoenergetic neutron beams were produced at the Cock-croft Walton Accelerator of China Institute of Atomic Energy, by the T(d, n) ^4He reaction. A cell made of quartz was used as the container of ^{124}Xe (99.95% abundance) gas, and the mass of ^{124}Xe in cell was determined by weighing method. Two high-purity thin ^{93}Nb foils were attached to the cell and performed as monitors of the neutron flux determination by $^{93}\text{Nb}(n, 2n)^{92m}\text{Nb}$ reaction. After irradiation, the activities of ^{124}I and ^{92m}Nb were measured off-line by HPGe gamma-ray spectroscopy calibrated with different activity standard sources. As a result, the cross section induced by 14.8 ± 0.2 MeV neutrons has been deduced to be 43.9 ± 2.2 mb, and the result was compared with the literature data and evaluations.