

Neutron Production from Thin Targets of Carbon and Iron by 70 MeV Protons

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Thick target neutron yields (TTY) data from the (p,xn) reactions is required in the design of shielding and the choice of neutron sources. In the previous experiments, we obtained the data for the natFe and natCu(p,xn) reactions at 35, 50 and 70 MeV. However, the LA-150 data overestimated the experimental data at higher energy region. In the present experiment, to clarify the reason of this difference, we obtained the data for the (p,xn) reactions at 70 MeV using thin carbon and iron target.

The series of measurements were carried out at Cyclotron and Radioisotope Center, Tohoku University (CYRIC) with the K=110 AVF cyclotron and the beam-swing system. The neutron spectra were measured for almost entire range of secondary neutrons with the bias of 0.6 MeV at several laboratory angles between 0 and 90 deg.. Neutron events were separated from gamma-ray events by the pulse-shape-discrimination (PSD) technique. The absolute yields were obtained by dividing detected counts by absolute detector efficiency calculated with the Monte Carlo code SCINFUL-R. The obtained data were corrected for attenuation effects by air and targets, and compared with the LA-150 data.