

The measurement of $^{35}\text{Cl}(n, a)^{32}\text{P}$ reaction cross section for neutron energy range from 3.5–6 MeV

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Abstract

The existing experimental data on $^{35}\text{Cl}(n, a)^{32}\text{P}$ reaction cross-section are bounded by the neutron energy range from 2-4 MeV. There are several data sets in 14 MeV region. The big differences between JENDL-4.0u and ENDF/B –VIII.0 evaluations take place. In this work cross section of $^{35}\text{Cl}(n, a)^{32}\text{P}$ reaction was investigated for the neutrons energy range from 3.5 to 6 MeV. The measurements were carried out using the Frisch-gridded ionization chamber. Neutrons were produced by $\text{D}(d, n)^3\text{He}$ reaction at the tandem accelerator. The $^{238}\text{U}_3\text{O}_8$ layer was used as a neutron flux monitor. Influence of background neutrons on monitor chamber count rate was evaluated by measuring time-of-flight neutron spectrum, for each value of neutrons energy. The used solid chlorine target with thickness 174 ug/cm^2 consisted of barium chloride (natural isotopic composition) which was deposited on a molybdenum foil. Ion beam analysis was applied to measure the layer thickness. The obtained cross sections are in a good agreement with the ENDF/B-VII evaluation.