

UNFOLDING NEUTRON INDUCED REACTION CROSS-SECTIONS AT ENERGY BELOW 50 MEV

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At Kiev Isochronous Cyclotron some experiments to unfolding the neutron cross section by activation method in energy region up to 50MeV were made. Unfolding spatially - energy performances of neutron fields obtained at deuterons energies $E_d=30\text{MeV}$ and $E_d=40\text{MeV}$ measured at 0, 15, 30, 45 and 60 degree axis of beam are presented in this article. However, on energy region more than 20MeV some data require now essential improvement. For definition of neutron cross sections at Kiev Isochronous Cyclotron "U-240" we carried out two series of experiments. The radiant of neutrons were served Beryllium (Be) with a target of a total absorption, which was irradiated with deuterons with energies $E_d=30\text{MeV}$ and $E_d=40\text{MeV}$ /reaction ${}^9\text{Be}(d,n){}^{10}\text{B}$ /. Obtaining of cross sections was carried out by a method of activation foils in a neutron field. The packages of the foils placed at angles: 0, 15, 30, 45 and 60 degree axis of deuteron beam at 25 cm from Beryllium target. The threshold nuclear reactions of activation (where cross section are known with high accuracy) were selected so that their responses in a spectrum overlapped all explored energy regions. A detector foils (Na, Ti, Fe, Al, Ni, Tl, Au, Nb, Co, Zr) were interleaved by monitor Ni foils. Measured activity of the foils placed at all angles used to restore spatially - energy performances of neutron fields at $E_d=30\text{MeV}$ and $E_d=40\text{MeV}$. The restored neutron spectrums later were used for deriving neutron cross sections. The obtained neutron spectrums under all angles at $E_d=30\text{MeV}$ and $E_d=40\text{MeV}$ after smoothing were used for restoration of neutron cross sections known with poor precision. Besides, the cross-sections of ${}^{203}\text{Tl}(n,2n){}^{202}\text{Tl}$, ${}^{58}\text{Ni}(n,np){}^{57}\text{Co}$, ${}^{59}\text{Co}(n,\alpha)$ and other reactions also were unfolded. They differ from those known earlier but are in a good agreement with some experimental data and with calculations of the Japanese scientists.