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P4.194 Experimental verification of dosimetry reaction rates of Co Nb Au Bi with d-Li neutrons

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Conceptual design activity for Advanced Fusion Neutron Source (A-FNS) is being carried out for neutron irradiation test of fusion DEMO reactor materials. We are to apply multi activation foils for A-FNS neutron monitor system in order to measure the neutron spectrum using an activation method with an unfolding code. It is important to evaluate the dosimetry cross section data above 20 MeV neutron because of a lack of experimental data. Therefore, we measured the dosimetry reaction rates using the activation foils with d-Li neutrons at CYRIC of Tohoku University. The neutrons are generated by the reaction between 40 MeV deuteron and solid Li target of 25 mm in thickness, and its spectrum is similar to that of A-FNS. We measured the dosimetry reaction rates of $^{59}\text{Co}(n,3n)^{57}\text{Co}$, $^{197}\text{Au}(n,2n)^{196}\text{Au}$, $^{209}\text{Bi}(n,4n)^{206}\text{Bi}$, $^{93}\text{Nb}(n,2n)^{92m}\text{Nb}$, $^{59}\text{Co}(n,p)^{59}\text{Fe}$ and $^{59}\text{Co}(n,2n)^{58}\text{Co}$ reactions as functions of distances between the Li target and foils, and angles between the beam line and foils, to verify the reaction rate due to differences of the neutron spectrum. We performed experimental analyses using Monte Carlo code, McDeLicious-11, which is an extension of MCNP5, and the latest nuclear data libraries, FENDL-3.1d, IRDFF-1.05 and FENDL/A-3.0. The calculated reaction rates of $^{59}\text{Co}(n,3n)^{57}\text{Co}$, $^{197}\text{Au}(n,2n)^{196}\text{Au}$, $^{209}\text{Bi}(n,4n)^{206}\text{Bi}$ and $^{93}\text{Nb}(n,2n)^{92m}\text{Nb}$ reactions using IRDFF-1.05 and FENDL/A-3.0 were agreed well with the experimental ones. It was found that the calculated reaction rates of $^{59}\text{Co}(n,p)^{59}\text{Fe}$ and $^{59}\text{Co}(n,2n)^{58}\text{Co}$ reactions were disagreed with the experimental ones in some angles, and these cross section data should be revised.

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