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Excitation of isomeric states in reactions (γ, n) and ($n, 2n$) on ^{45}Sc , ^{76}Ge and ^{81}Br

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This work presents work results of investigation of the isomeric yield ratios $\eta = Y_m / (Y_m + Y_g)$ of the $^{45}\text{Sc}(\gamma, n)^{44m,g}\text{Sc}$, $^{45}\text{Sc}(n, 2n)^{44m,g}\text{Sc}$, $^{76}\text{Ge}(\gamma, n)^{75m,g}\text{Ge}$, $^{76}\text{Ge}(n, 2n)^{75m,g}\text{Ge}$, $^{81}\text{Br}(\gamma, n)^{80m,g}\text{Br}$ and $^{81}\text{Br}(n, 2n)^{80m,g}\text{Br}$ reactions. The isomeric yield ratios were measured by the induced radioactivity method. Samples of natural Sc, Ge and Br have been irradiated in the bremsstrahlung beam of the betatron SB-50 in the energy range of 10-35 MeV with energy step of 1 MeV. For 14 MeV neutron irradiation we used the NG-150 neutron generator. The gamma spectra reactions products were measured with a spectroscopic system consisting of HPGe detector CANBERRA with energy resolution of 1,8 keV at 1332 keV gamma ray of ^{60}Co . The filling of the isomeric and ground levels was identified according to their γ lines. In the range 26-35 MeV the isomeric yield ratios Y_m/Y_g of the reaction (γ, n) on ^{76}Ge , ^{82}Se and ^{81}Br are obtained at first. Using the isomer yield ratio and the total cross section of the (γ, n) reaction on Sc, Ge and Br we estimated the cross sections of (γ, n)_m and (γ, n)_g reactions. The cross section isomeric ratios at $E_\gamma = E_m$ are estimated. The experimental results have been discussed, compared with those of other authors as well as considered by the statistical model. Theoretical values of the isomeric yield ratios have been calculated by using code TALYS-1.0.

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