Excitation of Isomeric States in Reactions (γ,n) and (n,2n) on ^{74,82}Se Nuclei

T.M. Muminov[1], S.R. Palvanov[1, 2], G.S. Palvanov[1, 2]
[1]*Institute of Applied Physics, National University of Uzbekistan, Tashkent, Uzbekistan*
[2]*Department of Physics, National University of Uzbekistan, Tashkent, Uzbekistan*
e-mail: satimbay@yandex.ru

In the present work results of investigation of the isomeric yield ratios reactions ^{74}Se(γ,n)^{73m,g}Se, ^{82}Se(γ,n)^{81m,g}Se, ^{74}Se(n,2n)^{73m,g}Se and ^{82}Se(n,2n)^{81m,g}Se are presented. The isomeric yield ratios were measured by the induced radioactivity method.

Samples of natural Se have been irradiated in the bremsstrahlung beam of the betatron SB-50 of Institute of Applied Physics of National University of Uzbekistan 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 of Institute of Nuclear Physics.

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, amplifier 2022 and multichannel analyzer 8192 connected to computer for data processing.

The yields of the metastable state decays were evaluated by using the 254 keV (^{73m}Se, $J^{\pi}=1/2^{-}$, $T_{1/2}$=38,9 m) and 103 keV (^{81m}Se, $J^{\pi}=7/2^{+}$, $T_{1/2}$=57,3 m) γ-rays. The yields of the ground state decays were evaluated by using the 361 keV (^{73g}Se, $J^{\pi}=7/2^{+}$, $T_{1/2}$=7,1 h) and 275 keV (^{81g}Se, $J^{\pi}=1/2^{-}$, $T_{1/2}$=18,5 m) γ-rays.

For the ^{82}Se(γ,n)^{81m,g}Se the results of calculation are given in the table below (27÷30 MeV).

$E_{\gamma max}$, MeV	27	28	29	30
Y_m/Y_g	0,56±0,02	0,57±0,02	0,57±0,02	0,56±0,02

For the ^{74}Se(γ,n)^{73m,g}Se and ^{82}Se(γ,n)^{81m,g}Se the results are in good agreement with the date of ref. [1]. The isomeric yield ratios of the reaction (γ, n) on ^{74,82}Se in the 25-35 MeV energy range are obtained at first. $(\gamma, n)^m$ and $(\gamma, n)^g$ reactions cross section are obtained. For the ^{74}Se(n,2n)^{73m,g}Se results are in good agreement with the date of ref. [2]. The results are compared with the calculations made in the statistical Fermi-gas theory.

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