

INVESTIGATION OF THE EXCITATION OF ISOMERIC STATES IN THE REACTIONS $(,n)$, $(,2n)$ AND $(n,2n)$ ON THE NUCLEUS ${}^{197}\text{Au}$

Friday, October 16, 2020 3:15 PM (25 minutes)

In the present work the results of the experimental study of the photoexcitation of isomeric states ${}^{196m}\text{Au}(J=12^-)$ and ${}^{195m}\text{Au}(J=11/2^-)$ in reactions $(,n)$, $(,2n)$ and $(n,2n)$ on the nucleus ${}^{197}\text{Au}$ in the range 10-35 MeV are presented.

The isomeric yield ratios were measured by the induced radioactivity method. Samples of natural Au have been irradiated in the bremsstrahlung beam of the betatron SB-50 in the energy range of 1035 MeV with energy step of 1 MeV. For 14,1 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 ${}^{60}\text{Co}$, amplifier 2022 and multichannel analyzer 8192 connected to computer for data processing. The filling of the isomeric and ground levels was identified according to their γ lines.

Isomeric ratios for ${}^{197}\text{Au}(n,){}^{196m,g}\text{Au}$ reaction yields are measured in the 12-30 MeV energy range with 1 MeV energy step. The obtained E_{max} dependence of the isomeric ratio yields for the $(,n)$ reaction, d, looks like a saturation curve. In the saturation region $d=(5,60,4)10^{-4}$. Using the isomer yield ratio and the total cross section of the $(,n)$ reaction on ${}^{197}\text{Au}$ [1] we estimated the cross sections of $(,n)^m$ and $(,n)^g$ reactions. For $(,2n)^m$ reaction cross sections are obtained at first. The cross section isomeric ratios of $E_m=17$ MeV are estimated.

In the case of the reaction $(n,2n)$, the cross sections for the formation of the isomeric and ground states and their isomeric ratios σ_m/σ_g were determined. To obtain the absolute values of the cross sections of the ground and isomeric states, methods were used to compare the yields of the test and monitor reactions.

The experimental results have been discussed, compared with those of other authors as well as considered by the statistical model [2]. Theoretical values of the isomeric yield ratios have been calculated by using code TALYS-1.8.

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2. V.M. Mazur // Physics of elementary particles and atomic nuclei.2000.V.31. P.1043.

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Session Classification: Section 2. Experimental and theoretical studies of nuclear reactions

Track Classification: Section 2. Experimental and theoretical studies of nuclear reactions.