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Determining the energy released by electron capture into different atomic subshells for ^{110m}Ag isomer in the dependence on the ionization degree and assumed electronic configuration

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The proposed studies focus on a performing the comprehensive analysis of the optimal conditions for a detailed knowledge of the nuclear excitation by electron capture (NEEC) process for selected nuclear isomers (i.e. metastable exited states of atomic nuclei) of a few elements. The part of these research focuses on the especially interesting and important case of NEEC process for the ^{110m}Ag isomer ($T_{1/2}$ ~ 249.83 d).

Within the framework of our previous studies for the ^{93m}Mo [1,2] and ^{242m}Am [3] isomers we have determined, using the multiconfiguration Dirac-Fock (MCDF) method [4-9], the dependence of the energy released by electron capture into different L, M and N subshells (for ^{93m}Mo) and O, P and Q subshells (for ^{242m}Am) on the ionization degree (and assumed electronic ground state configuration). Here it is worth noting that the energy released by the electron capture process to the system with q ionized degree can be treated as binding energy of the caught electron for the (q-1) ionized system. In connection with this, we have performed for the ^{110m}Ag isomer the detailed MCDF calculations concerning the dependence of the energy released by electron capture into different subshells for N, O and P shell of ^{110m}Ag isomer on the degree of ionization and electronic configuration.

These research have a basic research character, because they are concentrated on a systematic study directed toward greater knowledge and understanding of the various aspects of a new physical phenomena, i.e. the NEEC process. It is worth noting that these studies are starting point for applied research, which purpose will be to allow the controlled release of energy stored in the nuclear isomer of selected elements.

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