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Photonuclear reactions on stable isotopes of molybdenum at bremsstrahlung end-point energies of 10-23 MeV

In this study experiments were performed at bremsstrahlung end-point energies of 10-23 MeV with the beam from the MT-25 microtron using of the γ-activation technique. The electron energies were in range of 10-23 MeV with an energy step of 1 MeV. To produce gamma radiation, a radiator target made of tungsten, which is a common convertor material, was used. To remove the remaining electrons from the bremsstrahlung beam, a 30 mm thick aluminum absorber was placed behind the tungsten converter. The accelerator current was calibrated by comparing the experimentally measured yield of the reaction 65Cu(γ,n)64Cu. The yield was calculated using the estimated cross section, and the bremsstrahlung spectrum was computed with Geant4. The induced activity in the irradiated target was measured using a high purity germanium γ-detector. The experimental yields of the reactions were normalized to the yield of reaction 100Mo(γ,n)99Mo. The experimental values of relative yields were compared with theoretical results obtained on the basis of TALYS with the standard parameters [1] and the combined model of photonucleon reactions [2].
In the case of relative yields for photoproton reactions on the heavy molybdenum isotopes, the theoretical values calculated using the CMPR are much larger than the TALYS results. For photoproton reactions on the isotopes of 96Mo, 97Mo and 98Mo, the ratios of theoretical relative yields YrelCMPR / YrelTALYS with increasing energy increase in the ranges of 5-55. The experimentally obtained results lie closer to the theoretical curve according to the CMPR code. Including isospin splitting in the CMPR allows to describe experimental data on reactions with proton escape in the energy range from 10 to 23 MeV.

Section

Nuclear physics (Section 1)

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