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Isospin splitting of GDR and photoproton reactions on isotopes of tin

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This work is devoted to the experimental and theoretical study of photodisintegration of tin isotopes. Yields of different photonuclear reactions for stable isotopes were determined by the gamma activation technique [1]. Activation analysis method was used to identify the ratio between different photonuclear reactions during the transition from one isotope to another.

Experiment was made on bremsstrahlung γ -beam of a racetrack microtron RM-55 accelerating an electron beam to an energy of 55.6 MeV. Tungsten bremsstrahlung target 2.1 mm thick was bombarded with electron beam. Formed photons hit target behind the bremsstrahlung target which was the plate of a natural mixture of tin isotopes with a surface density of 1.827 g/cm². Two copper monitors with surface density of 0.097 g/cm² located in front and behind the target were used for monitoring irradiation parameters. The duration of irradiation of the target was 10 minutes. After irradiation the target was moved to a low-background room. Measurement of the residual activity in the irradiated target was conducted using high-purity germanium spectrometer Canberra GC3019. The total duration of the measurement of the spectra was about 780 hours. Isotopes formed as a result of photonuclear reactions were identified by γ -quanta energy and half-life time. Obtained yields of photoproton and photoneutron reactions were compared with theoretical calculations using TALYS [2], CEMPR [3] and results from other experimental researches. The influence of isospin splitting of giant-dipole resonance on yields of photoproton reactions was shown. Also it was shown that experimental and theoretical cross-sections were overestimated by 2-3 times in comparison with the results of our experiment.

Literature.

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