

STUDY OF $^{209}\text{Bi}(\gamma, xn)$ REACTIONS IN ENERGY REGION UP TO 100 MeV

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In order to follow relative yields of $^{209}\text{Bi}(\gamma, xn)$ reactions, samples of natural bismuth were exposed in LINAC 200 bremsstrahlung beam at several different energies (40 MeV, 60 MeV, 80 MeV and 100 MeV). Activities of eight obtained products of photonuclear reactions with different neutron multiplicity, from $(\gamma, 2n)$ to $(\gamma, 9n)$ were detected. Relative yields were calculated for all of them. All measurements were normalized on ^{206}Bi yield.

Obtained yields were compared with the results already available in literature. The data in the literature are not very abundant and in some cases the yields differ by a two orders of magnitude. In all measurements, including this one, it was confirmed that the reaction yield decreases very sharply with the number of neutrons emitted. It has also been observed that for a given multiplicity of neutrons, the relative yield does not depend significantly on maximal energy of the bremsstrahlung.

Yields obtained by measurements are compared with the results of theoretical calculations. Calculation have been performed using the combination of evaporation and exciton models [1]. The level densities employed in the model have been calculated microscopically to take into account shell effects and their dependence on excitation energy [2].

[1] B. S. Ishkhanov and V. N. Orlin, Physics of Atomic Nuclei 71, No. 3, pp. 493–508 (2008).

[2] A.Rahmatinejad, A.N.Bezbakh, T.M.Shneidman, G.Adamian, N.V.Antonenko, P.Jachimowicz, M.Kowal, Phys.Rev. C 103, 034309 (2021).

The speaker is a student or young scientist

No

Section

1. Nuclear structure: theory and experiment

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