

Experimental studies of $^{10}\text{B}(^7\text{Li}, ^8\text{Li})^9\text{B}$ transfer reaction at 58 MeV

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The angular distributions for the elastic scattering of ^7Li on ^{10}B and lithium-induced reaction of single neutron transfer $^{10}\text{B}(^7\text{Li}, ^8\text{Li})^9\text{B}$ were measured at $E_{\text{lab}} = 58$ MeV. The experiment was performed earlier using the U-400 accelerator beam at FLNR JINR, Dubna [1], [2], [3]. The $^7\text{Li} + ^{10}\text{B}$ reaction products $^4,6\text{He}$, $^6,8\text{Li}$, $^7,9,10\text{Be}$, and $^{10,11,12}\text{B}$ were detected by a $\Delta E-E$ telescope. The theoretical analysis of the $^{10}\text{B}(^7\text{Li}, ^6\text{Li})^{11}\text{B}$ channel was carried out in [4] using the microscopic optical potential and the distorted-wave Born approximation. The reaction channel $^{10}\text{B}(^7\text{Li}, ^8\text{Li})^9\text{B}$ studied in this work is of interest due to the short lifetime 8×10^{-19} s of the reaction product ^9B . It should be noted that the experimental quadrupole deformation parameters are $\beta_2 = -1$ for ^7Li and $\beta_2 = +0.52$ for ^{10}B [5]. In the initial approximation, we performed the DWBA analysis of the transfer to the ground state and to the excited state 1^+ (0.98 MeV) of ^8Li in the representation of ^7Li and ^{10}B as spherical nuclei. In addition, in a more realistic model, the deformations and the cluster structure [6], [7] of the colliding nuclei ^7Li and ^{10}B were taken into account in the shell model [8] and in the time-dependent description of neutron transfer channels [9], [10].

References

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