AN ANALYSIS OF THE $^{11}B(\alpha,t)^{12}C$ – REACTION WITHIN THE FRAMEWORK OF THE METHOD OF COUPLED CHANNELS

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The purpose of the work is the analysis of experimentally-obtained differential cross-sections of the $^{11}B(\alpha,t)^{12}C$ – reaction at E_α=50 MeV on to three level of the final ^{12}C-nucleus: basis and excited [^{12}C (0^+, 7.65 MeV) and ^{12}C (4^+,14.08 MeV)].

In experimental angular distributions there is observed the visible growth of the cross-sections at the largest angles, stipulated by manifestation of cluster structure of the nucleus-target. At the considered energy the $^{11}B(\alpha,t)^{12}C$- reaction can be realized at the expense of both direct mechanisms and statistical mechanism of the compound nucleus in the approach of Houser-Feschbach. Because the shape of experimental spectra shows the predominant contribution of direct mechanisms (presence of oscillations, growth at front angles), in the first place we have considered the contribution into the angular distribution of mechanisms of break-down (Fig.1a) and of exchange by heavy cluster (Fig. 1b). For calculations there was used the programme code FRESCO [1], based on the method of connected channels with finite radius of interaction. An exceptionality of considered reactions consists in that, that because of selection rules direct mechanisms of break-down and exchange act separately: the ^{12}C (4^+,14.08 MeV) – state can be formed as a result of the exchange by heavy cluster, contribution of which into the reaction on to levels of ^{12}C with zero moment is negligible. The indicated circumstance gives the possibility to do an independent picking-up of parameters of wave functions and to determine spectroscopical factors of the ^{12}C-nucleus in basic and excited states, including ambiguous.

1. I.J.Tompson // Comput. Phys. Rep. 1988. V. 7. P. 167.