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ASYMPTOTIC NORMALIZATION COEFFICIENTS AND THE NEUTRON WIDTHS FOR ^{30}Si+n $\rightarrow^{31}$Si FROM THE PERIPHERAL ^{30}Si$(d,p)^{31}$Si REACTION

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Usually the differential cross sections (DCSs) of nucleon transfer reactions (NTR) are analyzed within the conventional DWBA for determination of a nucleonic spectroscopic factor S (SF) by normalization of the calculated DCS to the experimental data ([1] and references therein). The SF have strong dependence on the single-particle potential parameters. In contrast of the SF, the values of the asymptotic normalization coefficients (ANCs) [2] found from the analysis of the peripheral NTR are fairly weakly dependent on the single-particle potential parameters. The modified DWBA [3] and the dispersion peripheral pole model (DPPM) [4] can be used for determination of the ANCs from the analysis of the DCSs of the peripheral NTR. In both of these methods, the DCS is expressed in terms of the ANC for the removed nucleon from the residual nuclei. Nevertheless, the modified DWBA [3] can be applied when the residual nucleus in the reaction under consideration is formed only in bound (nonresonance) states, whereas the DPPM allows analyzing the DCS of the peripheral NTR populating to both bound and unbound states of the residual nucleus.
In the present work, the results of the analysis of the experimental DCSs for the ^{30}Si$(d,p)^{31}$Si reaction populating to the bound and unbound (resonance) states of the residual nuclei measured at the projectile deuteron energy 12.3 MeV [5] are presented. The analysis were performed within the framework of the DPPM [4] and MDWBA [3] with correct taking into account the three-body Coulomb dynamics in the transfer pole mechanism and Coulomb-nuclear distorted effects in the exit and entrance channels [6].
The analysis shows that the DCSs calculated within MDWBA [3] and DPPM [4] are in a good agreement with the experimental data. The new values of the ANC for ^{30}Si+n $\rightarrow^{31}$Si with their uncertainties corresponding to the bound states of the ^{31}Si nuclei are obtained from the analysis of the experimental DCSs of the reaction ^{30}Si$(d,p)^{31}$Si within DPPM [4] and MDWBA [3]. The neutron widths for the resonance states of the 31Si nuclei are obtained from the analysis of the experimental DCSs of the reaction ^{30}Si$(d,p)^{31}$Si within DPPM [4].

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The speaker is a student or young scientist

Yes

Section

1. Experimental and theoretical studies of nuclear reactions

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