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Spectroscopic factor for ^{25}Mg→^{24}Mg+n through the "experimental"ANC from analysis of the peripheral transfer reactions.

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A possibility of determining the spectroscopic factor (SF) for the ^{25}Mg→^{24}Mg+n configuration is demonstrated by a method that significantly reduces its dependence on the model geometric parameters of the bound-state potential. In this method, to exclude the strong dependence of results on the single-particle potential parameters the additional information about the asymptotic normalization coefficient (ANC), C^2_{exp} for ^{25}Mg→^{24}Mg+n [1] is introduced into the DWBA analysis. ANC value is extracted from the analysis within the framework of the MDWBA method (see [2] and references therein) of the reaction ^{24}Mg(d,n)^{25}Mg at E_d =13.6 [3] and 14.5 MeV [1].
Studying the behavior of the test functions R(b) which is a criterion of reaction peripherality [2] in the region of the main maximum of the angular distributions at both energies indicates a strong non-peripherality of the neutron transfer process in this reaction. Here b is the one-particle normalization coefficient, that determines the amplitude of the tail of the one-particle wave function of the neutron in the nucleus ^{25}Mg. So, owning to the MDWBA conception, one can't extract the correct value of ANC for the configuration {^{25}Mg=^{24}Mg+n} from the MDWBA analysis. But, one can obtain the SF Z24Mg+n value if the geometry parameters of the neutron bound state potential are known (or known the single particle ANC b).
With that, owing to the established value of the ANC of this configuration from the analysis of the peripheral reaction ^{25}Mg(d,t)^{24}Mg, it is possible to establish the value of the spectroscopic factor from the DWBA analysis with the additional restriction on b value. As shown in [2], the square of ANC is uniquely related to the SF Z by the relation C2 = Zb2, and the SF value for the bound state ^{25}Mg→^{24}Mg+n can be obtained which is equal to . In this case, the uncertainty of its value, associated with the ambiguity of the choice of the geometrical parameters of the nuclear potential of the bound state ^{24}Mg + n, turns out to be significantly minimized.

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