DETERMINATION OF THE ASYMPTOTIC NORMALIZATION COEFICIENTS AND THE NEUTRON WIDTHS FOR $^{18,20}O+n\rightarrow^{19,21}O$ FROM THE PERIPHERAL $^{18}O(d, p)^{19}O$ AND $^{20}O(d, p)^{21}O$ REACTIONS

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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 (see, e.g., [1] and references therein). Even when the error bars in the experimental differential cross section are small, the uncertainty of the SF is often large, regardless of whether it agrees with the shell-model prediction. One of the main reasons for this fault is the strong dependence of the SF values on the single-particle potential parameters. In contrast of the SF values found from the DWBA analysis, the values of 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 ANCs from the analysis of the DCSs of the peripheral NTR. In both of these methods, the DCS is expressed in terms of the ANCs 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 $^{18}O(d, p)^{19}O$ [5] and $^{20}O(d, p)^{21}O$ [6] reactions populating to the bound and unbound (resonance) states of the residual nuclei measured at the projectile deuteron and ^{20}O-ion energies 16.3 [5] and 210 MeV [6], respectively, are presented. The analysis is performed within the framework of the DPPM [4, 7] 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 [7, 8].

The analysis shows that the DCSs calculated within the DPPM are in a good agreement with the experimental data. The results obtained by us for the ANC values for $^{18,20}O+n\rightarrow^{19,21}O$ and for the neutron widths for the resonance states of the residual nuclei are presented in table 1. As a comparison, the ANC values for $^{18}O+n\rightarrow^{19}O$ and $^{20}O+n\rightarrow^{21}O$ corresponding to the bound

Table1. *Estimations of the ANC and neutron width for $^{20}O+n\rightarrow^{21}O$ and $^{18}O+n\rightarrow^{19}O$ channels*

Reaction A(x, y)B	E*, MeV	J_f^π	l_n	C^2, fm^{-1}			Γ, keV	
				DPPM	DWBA	MC	DPPM	
$^{20}O(d,p)^{21}O$	0	$5/2^+$	2	0.62	0.22 [9]	0.25 [9]		
	1.21	$1/2^+$	0	5.09	5.06 [9]	6.4 [9]		
	4.77	$3/2^+$	2	9.26x10^{-3}			84.77	84 [10]
	6.17	($3/2^+$, $7/2^-$)	2, 3	2.22x10^{-2} 5.28x10^{-3}			317.93 75.69	330 [10] 19 [10]
$^{18}O(d,p)^{19}O$	0	$5/2^+$	2	2.3137	0.4223 [5]			
	1.471	$1/2^+$	0	5.7785	5.2562 [5]			
	3.153	$5/2^+$	2	1.74x10^{-3}	1.12x10^{-3}[5]			
	3.231	$3/2^+$	2	3.53x10^{-3}	6.28x10^{-3}[5]			
	3.944	$3/2^-$	1	6.516x10^{-4}	9.81x10^{-4}[5]			
	4.109	$3/2^+$	2				0.35	<15 [11]

states of the ^{19}O and ^{21}O nuclei and the neutron widths for the resonance states of these nuclei obtained by other authors are also presented in table 1. Besides, the results for the ANC values $^{20}O+n\rightarrow^{21}O$ obtained in [9] within the microscopic calculation (MC) are given in this table. As is seen from table, there is some discrepancy between our results and those obtained in [5, 9].

The main reasons of the discrepancy are also discussed.

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