^{78}Se(d,^{3}He),(pol d,^{3}He) 1983Ro08,2009Ka06

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	30-Sep-2020

1983Ro08: (d,^{3}He) E=25.2 MeV. Enriched target. Magnetic spectrometer, FWHM=9-13 keV. $\sigma(\theta)$ data between 8° and 33° (c.m.). Uncertainty in relative cross sections ≈6% and in absolute cross sections ≈20%. DWBA analysis.

2009Ka06, 2008KaZT: (d,^{3}He) and (pol d,^{3}He) E=80 MeV beam provided by the AVF cyclotron at RCNP, Osaka. Enriched target. Vector-polarized 80-MeV deuteron beam with A_y=0.520 *10*. ^{3}He outgoing particles detected and analyzed with Grand Raiden magnetic spectrograph, with an angular aperture of ±1.1°. FWHM=50 keV. Measured precise absolute cross sections and relative cross sections where these are maximum for the relevant L transfer, angular distributions and polarization asymmetries. Vector analyzing powers were deduced from the measured polarization asymmetries by dividing by a factor of 1.04 (2*[beam vector polarization=0.520 *10*]). Spectroscopic factors were deduced from analysis of cross section data by DWBA calculations using PTOLEMY code and six different sets of optical-model potential parameters and two bound-state potential parameters. The experiments were designed to map out the occupancies of valence proton orbitals in the ground states of ^{74}Ge, ^{76}Ge, ^{76}Se and ^{78}Se by precise measurements of absolute cross sections and relative cross sections at the angles where these are maximum in angular distributions in single-particle transfer reactions. Uncertainty in cross sections: statistical uncertainty of 1% for strong peaks; systematic uncertainties of 5% in absolute values and 3% in relative values. Multiplets have larger uncertainties.

Measured cross sections and polarization asymmetries (2008KaZT)

Level keV	dσ/dΩ(4.5°) mb/sr	dσ/dΩ(8°) mb/sr	dσ/dΩ(12°) mb/sr	V.A.P (10°)
0	2.94 a	0.84	0.53	-0.14 *1*
195	0.18 *2* a	0.042	0.040	
215	2.39 *26* a	0.66	0.43	-0.053 *6*
264	1.37	1.31 *14* a	0.71	
475	0.30	0.36	0.30 *5* a	+0.013 *10*
504	0.77 *9* a	0.18	0.18	+0.019 *20*
615	0.16 a	0.046	0.037	-0.008 *22*
785	0.15	0.15	0.14	+0.033 *25*
889	0.028	0.039	0.045	
1008	0.078 a	0.013	0.016	
1052	0.42 a	0.13	0.087	
1165	0.068	0.10	0.054	-0.059 *22*
1320	0.11	0.11	0.057	+0.035 *20*
1574	0.34	0.13	0.074	
1605	b	b	b	
1617	b	b	b	
1654	0.83 *24* ab	0.26 b	0.18 b	
1654	0.12	0.12	0.094 *28* a	
2000	0.13	0.049	0.033	
2111	0.052		0.008	
2195	0.095 a		0.011	+0.031 *24*
2544	0.35 a	0.13	0.099	
2623	0.37 *+46−7* a	<0.1 c		
2623	0.46 *+37−9*	0.56 *11* c	0.50 *+11−16* a	

a: cross section used to deduce the spectroscopic factors. Systematic uncertainties are 5% in absolute values and 3% in relative values. Statistical uncertainties are 1% for strong peaks, larger for multiplets.

b: see summed σ at 1654, L=1 level

c: cross section at 10°

V.A.P.: vector analyzing power from measured polarization asymmetry.

^{78}Se(d,^{3}He),(pol d,^{3}He) 1983Ro08,2009Ka06 (continued)

^{77}As Levels

E(level)	J$^{\pi}$[b]	L[d]	S[‡]	Comments
0	3/2$^-$	1	0.80	S: 1.17 (1983Ro08).
194[@] *2*		1	0.048[@]	S: 0.05 (1983Ro08).
216[@] *2*	3/2$^-$	1	0.65[@]	S: 0.84 (1983Ro08).
265[@] *2*		3	1.82[@e]	S: 3.36 (1983Ro08).
475[@] *4*		4	0.59[@]	S: 0.73 (1983Ro08).
503[@] *3*	1/2$^-$	1	0.21[@e]	S: 0.33 (1983Ro08).
616 *4*		1	0.044	S: 0.05 (1983Ro08).
638[#] *5*		2	0.14[a]	
786 *5*	7/2$^-$	3	0.27[a]	
887 *5*				
1008[†] *10*		1	0.021	
1052 *6*		1	0.11	S: 0.20 (1983Ro08).
1166 *8*	5/2$^-$	3	0.19[a]	
1204[#] *10*		0	0.015[a]	
1324 *10*	7/2$^-$	3	0.23[a]	
1463[#c] *10*				
1576[&c] *10*			[&]	
1606[&] *10*		1	0.24[&]	
1617[†&]		1	[&]	
1660[&] *10*		1+4	0.23,0.21[&]	E(level),L: doublet proposed in 2008KaZT with L=1+4. S=0.18, L=1 for 1660 level (1983Ro08).
2000[†]		2		
2111[†]		2		
2195[†]	1/2$^-$	1	0.027[e]	
2544[†] *6*		1	0.098	
2623[†]		1+4	0.10,1.26	E(level): doublet.

[†] Level reported only in 2008KaZT.
[‡] For J=L+1/2, unless otherwise stated. Values are from 2008KaZT, unless otherwise stated. The authors used finite-range PTOLEMY code with six different sets of optical potential-model parameters and two different bound-state potential parameters.
[#] Level not reported in 2008KaZT.
[@] 194+216+265 and 475+503 form unresolved groups in 2008KaZT, angle-to-angle cross section used to assign separate cross sections and spectroscopic factors.
[&] 1576+1606+1617+1660(doublet) form unresolved quintet in 2008KaZT, angle-to-angle cross section used to assign separate cross sections and spectroscopic factors.
[a] From 1983Ro08.
[b] From L-transfer and Ay(θ) (2008KaZT).
[c] Weakly populated level.
[d] From 1983Ro08 for levels below 2000 keV and from 2008KaZT for levels above. For most levels below 2000 keV, 2008KaZT obtain L values consistent with 1983Ro08.
[e] For J=L−1/2.