

⁷⁴Ge(d,³He),(pol d,³He) 2008KaZT,1978Ro14

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen		NDS 158, 1 (2019)	16-May-2019

J^π(⁷⁴Ge g.s.)=0⁺.

2008KaZT, 2009Ka06: (d,³He),(pol d,³He) E=80 MeV polarized and unpolarized deuteron beam was produced from the AVF Cyclotron at the Research Center for Nuclear Physics (RCNP) at Osaka University and incident on enriched ⁷⁴Ge target. Reaction products were momentum-analyzed with the Grand Raiden spectrograph. Measured σ(E,θ), analyzing powers. Deduced levels, J, π, L-transfers, spectroscopic factors from DWBA analysis. **2008KaZT** contains data details for eight different reactions, and reports levels up to 2467.

1978Ro14: (d,³He) E=26 MeV deuteron beam was produced from the Orsay MP tandem Van de Graaff. Target was 60 μg/cm² 94.48% enriched GeO₂. Reaction products were momentum-analyzed with a split-pole magnetic spectrometer (FWHM=15 keV) and detected with four solid-state position-sensitive detectors. Measured σ(E,θ), θ=8°–34°. Deduced levels, J, π, L-transfers, spectroscopic factors from DWBA analysis. Comparisons with available data. Report levels up to 1777.

Others:

1984Ha31: E=21-24 MeV. Measured σ using a Q3D magnetic spectrograph. Deduced mass excess.

2014Ta22: E<50 MeV. Measured σ.

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°)
<0.3	4.73*	1.23	0.83	-0.094 8
198	1.29	1.11* 10	0.60	-0.068 7
218	0.26* 4	0.078	0.055	
496	0.21	0.18	0.094	+0.010 16
634	0.015	0.018	0.024	
911	0.098* 15	0.038	0.026	
956	0.17	0.19	0.18	+0.047 14
1041	0.17*	0.035	0.028	
1117	1.38*	0.33	0.28	+0.007 14
1235	0.23	0.22	0.18*	+0.016 15
1716	0.046*	0.014		
1771	0.060	0.057		
1924	0.17*	0.058	0.038	
2067	0.063	0.040	0.025	+0.042 34
2249	0.33*	0.11	0.08	
2380	0.22*	0.088	0.056	+0.006 27
2467	0.066	0.052	0.036	

*: cross section used to deduce the spectroscopic factors.

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

⁷³Ga Levels

Spectroscopic factor C²S is obtained using dσ/dΩ(exp)=N×C²S×dσ/dΩ(DWBA)/(2j+1), where N the normalization factor and j the spin of the transferred particle.

E(level) [†]	J ^π [‡]	L ^b	C ² S ^b	Comments
<0.3	3/2 ⁻	1	1.20	E(level): from Adopted Levels, where almost degenerate 1/2 ⁻ g.s. and first excited 3/2 ⁻ level are given. 2008KaZT and 1978Ro14 assigned L=1 to the g.s. but this L-transfer and the vector analyzing power measurement in 2008KaZT suggest that this level corresponds to the 3/2 ⁻ , <0.3 keV level, instead, and that 1/2 ⁻ g.s. is not populated in this reaction.

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⁷⁴Ge(d, ³He), (pol d, ³He) 2008KaZT, 1978Ro14 (continued)

⁷³Ga Levels (continued)

E(level) [†]	J ^π [‡]	L ^b	C ² S ^b	Comments	
				J ^π : vector analyzing power=-0.094 8 (2008KaZT) gives 3/2 ⁻ . C ² S: other: 1.33 (1978Ro14).	
198 [@]	7	5/2 ^{-a}	3	1.52 [@]	C ² S: others: 1.87 for J=5/2, 1.06 for J=7/2 (1978Ro14).
214 [@]	7	3/2 ⁻	1	0.066 [@]	C ² S: others: 0.07 (1978Ro14).
495	7	7/2 ^{-a}	3	0.18	J ^π : 5/2 ⁻ , 7/2 ⁻ is adopted in Adopted Levels, with 5/2 ⁻ from direct population the 496-keV state via Coulomb excitation from 1/2 ⁻ g.s. C ² S: from 1978Ro14 for J=7/2. Other: 0.32 for J=5/2 (1978Ro14).
634 [#]	10				E(level): from 2008KaZT only.
912 ^{&}	7	3/2 ⁻	1	0.025 ^{&}	C ² S: other: 0.04 (1978Ro14).
952 ^{&}	7	7/2 ^{-a}	3	0.50 ^{&}	C ² S: from 1978Ro14 for J=7/2. Other: 0.89 for J=5/2 (1978Ro14).
1041 [#]	6		1 [#]	0.042	E(level),L,C ² S: from 2008KaZT only.
1112	7	1/2 ^{-a}	1	0.35	C ² S: others: 0.43 for J=1/2, 0.35 for J=3/2 (1978Ro14).
1233	7	9/2 ^{+a}	4	0.37	C ² S: other: 0.37 with L=(4) in 1978Ro14.
1534	7		3	1.79,3.15	E(level),L,C ² S: from 1978Ro14 only. Values of C ² S for J=7/2 and 5/2, respectively.
1620	7		3	0.50,0.91	E(level),L,C ² S: from 1978Ro14 only.
1716 [#]	10		1 [#]	0.012	E(level),L,C ² S: from 2008KaZT only.
1777	7		(3)	0.21,0.36	C ² S: from 1978Ro14 for L+1/2 and L-1/2, respectively.
1924			1	0.044	
2067		7/2 ^{-a}	3		
2249 [#]	6		1 [#]	0.088	
2380		1/2 ^{-a}	1	0.058	
2467					

[†] Values with uncertainties are from 1978Ro14 and those without uncertainties are from 2008KaZT, unless otherwise noted.

[‡] From Adopted Levels, unless otherwise noted.

[#] Weak group seen only by 2008KaZT. It cannot be ruled out that this group belongs to some unknown contaminant. L=1 is assigned in 2008KaZT for 1041, 1716 and 2249 levels based on their measured $\sigma(\theta)$ distributions.

[@] 198 and 218 groups are unresolved in 2008KaZT, angle-to-angle ratios of cross sections used to assign separate cross sections.

[&] 911 and 956 groups are unresolved in 2008KaZT, line-shape fitting method was used to assign separate cross sections.

^a From measured polarization asymmetry in 2008KaZT.

^b From DWBA fit to measured $\sigma(\theta)$ distributions. Quoted values are from 2008KaZT, unless otherwise noted. The same assignments of L-transfers for levels up to 1777 are also from 1978Ro14. The C²S values from 2008KaZT were deduced for different L-transfers as follows: 4.5° data for L=1, 8° data for L=3, and 12° data for L=4. Six different sets of optical-model potential parameters and two different bound-state potential parameters were used for the calculations (2008KaZT). Differences in C²S values were less than 10% for different sets of optical parameters used. The effects of the bound-state parameters were also within the uncertainties.