^{205}Tl(p,d) 1980Sm02

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	C. J. Chiara and F. G. Kondev	NDS 111,141 (2010)	1-Oct-2009

J^π(target)=1/2$^+$.

1980Sm02: 130–μg/cm^2 Tl target, enriched to 99.5% ^{205}Tl, on 20$^-$ μg/cm^2 C backing; E(p)=26.1 MeV; magnetic spectrometer, position-sensitive proportional counter at focal plane, d′s identified by energy loss in plastic scin and by time-of-flight; FWHM=7-10 keV; measured $\sigma(\theta)$ compared with DWBA calculations.

^{204}Tl Levels

The strongly-excited levels are expected to involve a proton hole in the $3s_{1/2}$ orbital (^{205}Tl g.s.) and a neutron hole in one of the low-lying orbitals: $3p_{1/2}$, $2f_{5/2}$, $3p_{3/2}$, $1i_{13/2}$, $1h_{9/2}$, and $2f_{7/2}$. For L=1 transfer, the J^π are 0$^-$, 1$^-$ or 2$^-$; these levels are also expected to be seen in ^{203}Tl(n,γ). Up to≈1400 keV there is good correspondence between the two reactions. At higher energies, it is difficult to be sure of the correlation because of increasing energy uncertainties and higher level densities.

E(level)	J^π[†]	L	C^2S[#]	Comments
0	2$^-$[‡]	1+3		C^2S: for the L=1 and L=3 components, C^2S=0.51 and 1.46, respectively.
142 *2*	0$^-$,1$^-$,2$^-$	1	0.36	E(level): possibly a doublet of 139.97 and 145.89 (see Adopted Levels).
300 *1*	0$^-$,1$^-$,2$^-$	1	0.81	
320 *1*	0$^-$,1$^-$,2$^-$	1	1.39	
349 *1*	2$^-$,3$^-$,4$^-$	3	3.09	
428 *2*	2$^-$,3$^-$,4$^-$	3	0.17	J^π: 1980Sm02 assign J^π=4$^-$ to this level based on measured L value; evaluators have made the J^π assignment less restrictive.
428 *2*	0$^-$,1$^-$,2$^-$	1	0.058	Additional information 1.
473 *1*	0$^-$,1$^-$,2$^-$	1	0.65	
489 *1*	0$^-$,1$^-$,2$^-$	1	0.32	
535 *2*	0$^-$,1$^-$,2$^-$	1	0.038	
628 *1*	0$^-$,1$^-$,2$^-$	1	0.65	E(level): possibly a doublet of 626.31 and 629.40 (see Adopted Levels). C^2S: quoted as 0.065 by 1980Sm02, which may be an error. Changed by evaluators to 0.65 based on similar quoted dσ/dΩ values for this and the 473-keV levels. Additional information 2.
675 *1*	2$^-$,3$^-$,4$^-$	3	0.10	
735 *2*	0$^-$,1$^-$,2$^-$	1	0.13	
762 *2*	0$^-$,1$^-$,2$^-$	1	0.15	
859 *3*	(2$^-$)[‡]	(1+3)		C^2S: for the L=1 and L=3 components, C^2S=(0.010) and (0.034), respectively.
870 *2*	2$^-$,3$^-$,4$^-$	3	0.18	
904 *2*	2$^-$[‡]	1+3		C^2S: for the L=1 and L=3 components, C^2S=0.076 and 0.22, respectively.
966 *3*	2$^-$,3$^-$,4$^-$	3	0.23	
1012 *2*	0$^-$,1$^-$,2$^-$	1	0.017	
1046 *3*	2$^-$,3$^-$,4$^-$	3	0.32	E(level): doublet.
1103 *4*	(7$^+$)	6	4.61	J^π: Assignment by 1980Sm02 made tentative by evaluators. Possible configuration: $\pi[(s_{1/2})^{-1}]\nu[(i_{13/2})^{-1}]$; coupling to 7$^+$ expected to be favored over 6$^+$ coupling (1289-keV level). Additional information 3.
1118 *4*	0$^-$,1$^-$,2$^-$	1	0.150	
1133 *4*	0$^-$,1$^-$,2$^-$	1	0.096	
1176 *4*	2$^-$,3$^-$,4$^-$	3	0.037	
1204 *4*	0$^-$,1$^-$,2$^-$	1	0.11	
1250 *5*	0$^-$,1$^-$,2$^-$	1	0.12	
1289 *6*	(6$^+$)	6	4.36	J^π: Assignment by 1980Sm02 made tentative by evaluators. Possible configuration: $\pi[(s_{1/2})^{-1}]\nu[(i_{13/2})^{-1}]$; coupling to 6$^+$ expected to be unfavored compared to 7$^+$ coupling (1103-keV level). Additional information 4.

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^{205}Tl(p,d) 1980Sm02 (continued)

^{204}Tl Levels (continued)

E(level)	J^{π}[†]	L	C^2S[#]	Comments
1388 *6*	$2^-,3^-,4^-$	3(+1)	0.31	C^2S: for L=3; a possible L=1 component adds 0.084.
1405 *6*	$0^-,1^-,2^-$	1	0.015	
1424 *8*	$(2)^-$[‡]	1(+3)		L: 1980Sm02 give L=1 in Fig.4, but have L=1+3 tabulated. C^2S: for the L=1 and L=3 components, C^2S=0.004 and 0.016, respectively.
1463 *8*				
1489 *8*	$(2^-,3^-,4^-)$	(3)	(0.037)	
1516 *8*	$0^-,1^-,2^-$	1	0.008	
1545 *6*	$0^-,1^-,2^-$	1	0.022	
1584 *5*		5,(6)	1.03	J^{π}: 1980Sm02 make the restrictive assignment of $J^{\pi}=(4^-)$ without offering justification; evaluators leave J^{π} unassigned. C^2S: for L=5; 0.93 if L=6.
1652 *5*	$0^-,1^-,2^-$	1	0.024	
1683 *5*	$0^-,1^-,2^-$	1	0.036	
1709 *5*		5,(6)	1.54	J^{π}: 1980Sm02 make the restrictive assignment of $J^{\pi}=(5^-)$ without offering justification; evaluators leave J^{π} unassigned. C^2S: for L=5; 1.56 if L=6.
1753 *10*				
1810 *10*				
1834 *5*	$2^-,3^-,4^-$	3	1.32	
1908 *5*	(2^-)[‡]	(1+3)		C^2S: for the L=1 and L=3 components, C^2S=(0.059) and (0.20), respectively.
1933 *5*	$2^-,3^-,4^-$	3	0.35	
1951 *5*	$2^-,3^-,4^-$	3	0.29	
1969 *5*	$(\leq 4)^-$	3(+1)		L,C^2S: Can be L=1+3, with C^2S<0.017 and 0.073 for the two components, respectively, or L=3 alone, with C^2S=0.11.
1997 *5*				
2049 *5*	$2^-,3^-,4^-$	3	0.62	
2084 *10*				
2116 *5*	$2^-,3^-,4^-$	3	0.15	
2146 *5*	(2^-)	(1+3)		C^2S: for the L=1 and L=3 components, C^2S=(0.017) and (0.063), respectively.
2166 *5*	$(\leq 4)^-$	1(+3)	<0.018	C^2S: for L=1; a possible L=3 component adds 0.045.
2191 *5*				
2228 *5*	$2^-,3^-,4^-$	3	0.76	
2243 *8*	$(2^-,3^-,4^-)$	(3)	(0.30)	
2271 *9*	$2^-,3^-,4^-$	3	0.18	
2320 *9*	$(2^-,3^-,4^-)$	(3)	(0.026)	
2374 *6*	$2^-,3^-,4^-$	3	0.31	
2397 *6*	$2^-,3^-,4^-$	3	0.15	
2420 *9*	$2^-,3^-,4^-$	3	0.097	
2475 *9*	$2^-,3^-,4^-$	3	0.20	
2492 *8*	$2^-,3^-,4^-$	3	0.11	
2570 *6*	$2^-,3^-,4^-$	3	0.19	
2642 *8*	$2^-,3^-,4^-$	3	0.076	
2673 *6*	$2^-,3^-,4^-$	3	0.14	
2705 *8*	$2^-,3^-,4^-$	3	0.11	
2728 *8*	$2^-,3^-,4^-$	3	0.54	
2796 *10*	$2^-,3^-,4^-$	3	<0.039	
2807 *10*	$2^-,3^-,4^-$	3(+1)	<0.068	C^2S: for L=3; a possible L=1 component adds 0.009.
2831 *10*	$(0^-,1^-,2^-)$	(1)	(0.017)	
2934 *10*				
2968 *10*				
2986 *15*				
3002 *15*				
3045 *10*	$(2^-,3^-,4^-)$	(3)	(0.055)	
3067 *10*				
3093 *10*				

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^{205}Tl(p,d) 1980Sm02 (continued)

^{204}Tl Levels (continued)

E(level)
3117 *15*
3142 *20*

† From 1980Sm02, based on measured L values, except as noted.
‡ For cases where a level is populated by both L=1 and L=3 transfer and a doublet peak could be ruled out, J^{π} must be 2^-.
# For L=1, the $3p_{1/2}$ configuration was assumed; multiply by 0.94 to convert to $3p_{3/2}$. For L=3, the $2f_{5/2}$ configuration was assumed; multiply by 0.85 to convert to $2f_{7/2}$. For L=5 and L=6, the respective configurations $1h_{9/2}$ and $1i_{13/2}$ were assumed. 1980Sm02 use $C^2S=N(2j+1)(d\sigma/d\Omega)_{exp}/(d\sigma/d\Omega)_{DWBA}$, with N=1/2.29.