^{37}Cl(n,γ) E=thermal 1973Sp06

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 152, 1 (2018)	30-Sep-2017

1973Sp06: thermal neutron beam was produced from the High Flux Reactor at Petten. Targets were samples of 96.05% enriched and natural chlorine. γ rays were detected with two Ge(Li) detectors. Measured Eγ, Iγ. Deduced levels, γ-ray branching ratios.

1980LeZH: measured precise energies of 8 γ rays.

1972Is14, 1963Dr02: measured Eγ, Iγ.

2007ChZX: compilation of Eγ, Iγ from neutron capture for nuclei of Z-1-92. 2007ChZX include results for ^{38}Cl from measurements during 1999-2003 at Budapest reactor facility. Detailed reports of this work at Budapest are available on the following IAEA website: https://www-nds.iaea.org/pgaa/PGAAdatabase/reports/Cl/b38cl.ens. In this work 9 secondary and 5 primary γ rays seem to have been measured for absolute γ-ray cross sections for capture in ^{37}Cl. See also 2011Fi11, 2010Sz06 for capture cross-section data.

Additional information 1.

Others: 1957Gr71, 1954Sc37, 1950Ki68.

Thermal neutron capture cross section=0.433 b *6*, given in the compilation of neutron resonances by 2006MuZX.

^{38}Cl Levels

E(level)[†‡]	J$^\pi$[#]	Comments
0.0	2$^-$	
671.365 *8*	5$^-$	
755.430 *11*	3$^-$	
1309.049 *14*	4$^-$	
1617.412 *15*	3$^-$	
1692.461 *18*	(1,2)$^-$	
1745.49 *15*	0$^-$,1$^-$	
1784.94 *12*	2$^-$,3$^-$,4$^-$	
1941.90 *25*	1$^+$	
1981.193 *15*	2$^-$,3$^-$	
2743.09 *10*	3$^-$	
2894.7 *8*	0$^-$,1$^-$,2$^-$,3$^-$	
3538.4 *6*	0$^-$,1$^-$,2$^-$,3$^-$	
3565.2 *7*	0$^-$,1$^-$,2$^-$,3$^-$	
3683.9 *18*	0$^-$,1$^-$,2$^-$,3$^-$	
3756.5 *3*	0$^-$,1$^-$,2$^-$,3$^-$	
3822.29 *20*	(1,2,3)$^-$	
3862.7 *4*	(1,2,3)$^-$	
3893.47 *12*	(1,2,3)$^-$	
3974.46 *21*	0$^-$,1$^-$,2$^-$,3$^-$	
4011.46 *15*	0$^-$,1$^-$,2$^-$,3$^-$	
4073.33 *23*		
4287.0 *4*	0$^-$,1$^-$,2$^-$,3$^-$	
4405.5 *10*		
4834.78 *22*	0$^-$,1$^-$,2$^-$,3$^-$	
(6107.89 *10*)	1$^+$,2$^+$	E(level): S(n)=6107.88 *8* (2017Wa10). J$^\pi$: s-wave capture in 3/2$^+$ (^{37}Cl g.s.).

† From a least-squares fit to γ-ray energies, unless otherwise noted. Doubly or multiply placed γ rays were not used in the least-squares fitting procedure.

‡ Additional information 2.

\# From Adopted Levels, unless otherwise noted.

^{37}Cl(n,γ) E=thermal 1973Sp06 (continued)

γ(^{38}Cl)

Iγ normalization: normalized assuming Σ(Iγ to g.s.)=100 (1973Sp06).
Additional information 3.

E_γ[†]	I_γ[@&]	E_i(level)	J^π_i	E_f	J^π_f	Comments
92.5[c]	<0.2	1784.94	$2^-,3^-,4^-$	1692.461	$(1,2)^-$	
128.1[c]	<0.2	1745.49	$0^-,1^-$	1617.412	3^-	
196.3[c]	<0.2	1981.193	$2^-,3^-$	1784.94	$2^-,3^-,4^-$	
235.7[c]	<0.2	1981.193	$2^-,3^-$	1745.49	$0^-,1^-$	
288.6[c] *2*		3974.46	$0^-,1^-,2^-,3^-$	3683.9	$0^-,1^-,2^-,3^-$	
288.729[#] *10*	2.4 *2*	1981.193	$2^-,3^-$	1692.461	$(1,2)^-$	E_γ: other: 288.6 *2* (1973Sp06).
308.362[#] *6*	12.1 *4*	1617.412	3^-	1309.049	4^-	E_γ: other: 308.40 *8* (1973Sp06). Additional information 6.
363.779[#] *4*	5.0 *2*	1981.193	$2^-,3^-$	1617.412	3^-	E_γ: other: 363.90 *12* (1973Sp06).
383.4[c]	<0.9	1692.461	$(1,2)^-$	1309.049	4^-	
436.4[c]	<1.0	1745.49	$0^-,1^-$	1309.049	4^-	
553.605[#] *26*	2.7 *2*	1309.049	4^-	755.430	3^-	E_γ: other: 554.0 *10* (1973Sp06).
637.685[#] *15*	11.5 *2*	1309.049	4^-	671.365	5^-	E_γ: other: 637.5 *3* (1973Sp06).
671.29[c] *15*		3565.2	$0^-,1^-,2^-,3^-$	2894.7	$0^-,1^-,2^-,3^-$	
671.360[#] *8*	12.4 *3*	671.365	5^-	0.0	2^-	E_γ: other: 671.30 *15* (1973Sp06). Additional information 4.
672.1[c]	<0.4	1981.193	$2^-,3^-$	1309.049	4^-	
723.2[a] *3*	0.5[a] *2*	4287.0	$0^-,1^-,2^-,3^-$	3565.2	$0^-,1^-,2^-,3^-$	
723.2[ac] *3*	0.5[a] *2*	4405.5		3683.9	$0^-,1^-,2^-,3^-$	
755.425[#] *11*	29.0 *6*	755.430	3^-	0.0	2^-	E_γ: other: 755.47 *15* (1973Sp06). Additional information 5.
761.9[c]	<0.2	2743.09	3^-	1981.193	$2^-,3^-$	
801.2[c]	<0.1	2743.09	3^-	1941.90	1^+	
862.04[#] *4*	6.7 *7*	1617.412	3^-	755.430	3^-	E_γ: other: 862.4 *3* (1973Sp06). Additional information 7.
936.8 *3*	1.7 *3*	1692.461	$(1,2)^-$	755.430	3^-	
945.89 *20*	0.8 *2*	1617.412	3^-	671.365	5^-	
958.20 *17*	2.0 *2*	2743.09	3^-	1784.94	$2^-,3^-,4^-$	
990.0[c]	<0.6	1745.49	$0^-,1^-$	755.430	3^-	
997.6[c]	<0.2	2743.09	3^-	1745.49	$0^-,1^-$	
1021.1[c]	<0.09	1692.461	$(1,2)^-$	671.365	5^-	
1029.57 *15*	2.2 *2*	1784.94	$2^-,3^-,4^-$	755.430	3^-	
1050.6[c]	<0.2	2743.09	3^-	1692.461	$(1,2)^-$	
1074.1[c]	<0.6	1745.49	$0^-,1^-$	671.365	5^-	
1125.7 *2*	1.1 *2*	2743.09	3^-	1617.412	3^-	
1225.67 *11*	5.4 *2*	1981.193	$2^-,3^-$	755.430	3^-	Additional information 10.
1273.1 *2*	0.7 *2*	(6107.89)	$1^+,2^+$	4834.78	$0^-,1^-,2^-,3^-$	
1308.8 *4*	1.0 *2*	1309.049	4^-	0.0	2^-	
1309.8[c]	<0.7	1981.193	$2^-,3^-$	671.365	5^-	
1433.98 *16*	2.6 *2*	2743.09	3^-	1309.049	4^-	
[x]1469.5 *5*	0.5 *2*					
1617.12 *14*	4.5 *2*	1617.412	3^-	0.0	2^-	Additional information 8.
[x]1654.28 *20*	1.6 *2*					
1692.11 *14*	21.1 *5*	1692.461	$(1,2)^-$	0.0	2^-	Additional information 9.
1701 *3*	0.5 *4*	(6107.89)	$1^+,2^+$	4405.5		Additional information 13.
1745.31 *17*	6.0 *2*	1745.49	$0^-,1^-$	0.0	2^-	
1784.9[c]	<0.3	1784.94	$2^-,3^-,4^-$	0.0	2^-	

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^{37}Cl(n,γ) E=thermal 1973Sp06 (continued)

$\gamma(^{38}Cl)$ (continued)

E_γ [†]	I_γ [@&]	E_i(level)	J^π_i	E_f	J^π_f	Comments
1818.7 *9*	≈0.2	3565.2	0⁻,1⁻,2⁻,3⁻	1745.49	0⁻,1⁻	Additional information 12.
1820.8 *3*	0.9 *2*	(6107.89)	1⁺,2⁺	4287.0	0⁻,1⁻,2⁻,3⁻	
[x]1869.6 *5*	0.5 *2*					
1912.25 *20*	1.0 *2*	3893.47	(1,2,3)⁻	1981.193	2⁻,3⁻	
[x]1936.9 *3*	0.8 *3*					
1941.6 *3*	0.7 *2*	1941.90	1⁺	0.0	2⁻	
1971.8 *6*	≈0.3	3756.5	0⁻,1⁻,2⁻,3⁻	1784.94	2⁻,3⁻,4⁻	
1980.87 *17*	9.9 *2*	1981.193	2⁻,3⁻	0.0	2⁻	Additional information 11.
1987.5 *3*	0.7 *2*	2743.09	3⁻	755.430	3⁻	
1992.8[a] *5*	1.6[a] *2*	3683.9	0⁻,1⁻,2⁻,3⁻	1692.461	(1,2)⁻	
1992.8[ac] *5*	1.6[a] *2*	3974.46	0⁻,1⁻,2⁻,3⁻	1981.193	2⁻,3⁻	
2030.04 *20*	0.5 *2*	4011.46	0⁻,1⁻,2⁻,3⁻	1981.193	2⁻,3⁻	
2034.5 *2*	1.0 *5*	(6107.89)	1⁺,2⁺	4073.33		
2071.7[c]	<0.3	2743.09	3⁻	671.365	5⁻	
2092.2[a] *6*	0.4[a] *2*	4073.33		1981.193	2⁻,3⁻	
2092.2[ac] *6*	0.4[a] *2*	4834.78	0⁻,1⁻,2⁻,3⁻	2743.09	3⁻	
2096.2 *2*	1.8 *2*	(6107.89)	1⁺,2⁺	4011.46	0⁻,1⁻,2⁻,3⁻	
2133.4 *2*	2.9 *2*	(6107.89)	1⁺,2⁺	3974.46	0⁻,1⁻,2⁻,3⁻	
2201.0 *4*	0.4 *2*	3893.47	(1,2,3)⁻	1692.461	(1,2)⁻	
2205.1 *4*	1.2 *2*	3822.29	(1,2,3)⁻	1617.412	3⁻	
2214.48 *17*	5.8 *2*	(6107.89)	1⁺,2⁺	3893.47	(1,2,3)⁻	
2245.1[b] *5*	0.6[b] *2*	3862.7	(1,2,3)⁻	1617.412	3⁻	
2245.1[b] *5*	0.6[b] *2*	(6107.89)	1⁺,2⁺	3862.7	(1,2,3)⁻	
[x]2248.8 *19*	≈0.1					
2276.3 *3*	0.5 *2*	3893.47	(1,2,3)⁻	1617.412	3⁻	
2285.6 *2*	2.3 *2*	(6107.89)	1⁺,2⁺	3822.29	(1,2,3)⁻	
[x]2289.9 *4*	0.5 *2*					
2351.4 *3*	1.1 *3*	(6107.89)	1⁺,2⁺	3756.5	0⁻,1⁻,2⁻,3⁻	Additional information 14.
2422.8[ac] *3*	1.9[a] *2*	4405.5		1981.193	2⁻,3⁻	
2422.8[a] *3*	1.9[a] *2*	(6107.89)	1⁺,2⁺	3683.9	0⁻,1⁻,2⁻,3⁻	
2544.3[a] *10*	0.4[a] *2*	4287.0	0⁻,1⁻,2⁻,3⁻	1745.49	0⁻,1⁻	
2544.3[ac] *10*	0.4[a] *2*	(6107.89)	1⁺,2⁺	3565.2	0⁻,1⁻,2⁻,3⁻	Additional information 15.
2569 *3*	0.4 *2*	(6107.89)	1⁺,2⁺	3538.4	0⁻,1⁻,2⁻,3⁻	
[x]2705.3 *3*	1.4 *2*					
[x]2733.5 *18*	≈0.1					
2743.1 *5*	1.5 *2*	2743.09	3⁻	0.0	2⁻	
[x]2813.5 *8*	0.9 *3*					
[x]2831 *2*	≈0.2					
[x]2854.9 *7*	1.3 *5*					
2895.1[a] *5*	1.7[a] *2*	2894.7	0⁻,1⁻,2⁻,3⁻	0.0	2⁻	
2895.1[ac] *5*	1.7[a] *2*	3565.2	0⁻,1⁻,2⁻,3⁻	671.365	5⁻	
3050.9 *20*	0.8 *2*	4834.78	0⁻,1⁻,2⁻,3⁻	1784.94	2⁻,3⁻,4⁻	
3137.9 *4*	2.3 *2*	3893.47	(1,2,3)⁻	755.430	3⁻	
[x]3202.0 *6*	0.5 *2*					
3213.0 *8*	1.0 *2*	(6107.89)	1⁺,2⁺	2894.7	0⁻,1⁻,2⁻,3⁻	
3364.7 *2*	8.5 *13*	(6107.89)	1⁺,2⁺	2743.09	3⁻	
3538.2 *6*	1.5 *6*	3538.4	0⁻,1⁻,2⁻,3⁻	0.0	2⁻	
3566.2 *10*	0.9 *2*	3565.2	0⁻,1⁻,2⁻,3⁻	0.0	2⁻	
[x]3635.1 *15*	1.6 *5*					
3683.7 *18*	2.1 *2*	3683.9	0⁻,1⁻,2⁻,3⁻	0.0	2⁻	
3892.8 *20*	1.4 *7*	3893.47	(1,2,3)⁻	0.0	2⁻	
3974.5 *6*	2.0 *10*	3974.46	0⁻,1⁻,2⁻,3⁻	0.0	2⁻	
4126.7 *3*	16.8 *17*	(6107.89)	1⁺,2⁺	1981.193	2⁻,3⁻	Additional information 16.
4165.3 *4*	1.0 *2*	(6107.89)	1⁺,2⁺	1941.90	1⁺	

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^{37}Cl(n,γ) E=thermal 1973Sp06 (continued)

γ(^{38}Cl) (continued)

E_γ[†]	I_γ[@&]	E_i(level)	J^π_i	E_f	J^π_f	Comments
4322.7[c]	<0.2	(6107.89)	$1^+,2^+$	1784.94	$2^-,3^-,4^-$	
4361.8 *3*	4.7 *5*	(6107.89)	$1^+,2^+$	1745.49	$0^-,1^-$	
4405.1 *10*	1.0 *2*	4405.5		0.0	2^-	
4415.1 *3*	12.8 *19*	(6107.89)	$1^+,2^+$	1692.461	$(1,2)^-$	Additional information 17.
[x]4422.4 *7*	2.2 *6*					
4490.3 *4*	15.1 *12*	(6107.89)	$1^+,2^+$	1617.412	3^-	
[x]4734.8 *7*	0.9 *3*					
4798.5[c]	<0.1	(6107.89)	$1^+,2^+$	1309.049	4^-	
5351.9 *4*	7.6 *4*	(6107.89)	$1^+,2^+$	755.430	3^-	
5436.1[c]	<0.3	(6107.89)	$1^+,2^+$	671.365	5^-	
6107[‡] *4*	3.3 *23*	(6107.89)	$1^+,2^+$	0.0	2^-	

[†] Values with uncertainties are from 1973Sp06 and those without uncertainties are from level-energy differences, unless otherwise noted. Original values in 1973Sp06 are corrected for recoil energies and those corrections have been removed by the evaluator in the quoted values here. Values have been compared with those in the PGAA-LBL Budapest database (2007ChZX).

[‡] This line not directly observed due to intense 6111γ from ^{36}Cl.

[#] From 1980LeZH.

[@] From 1973Sp06.

[&] Intensity per 100 neutron captures.

[a] Multiply placed with undivided intensity.

[b] Multiply placed with intensity suitably divided.

[c] Placement of transition in the level scheme is uncertain.

[x] γ ray not placed in level scheme.

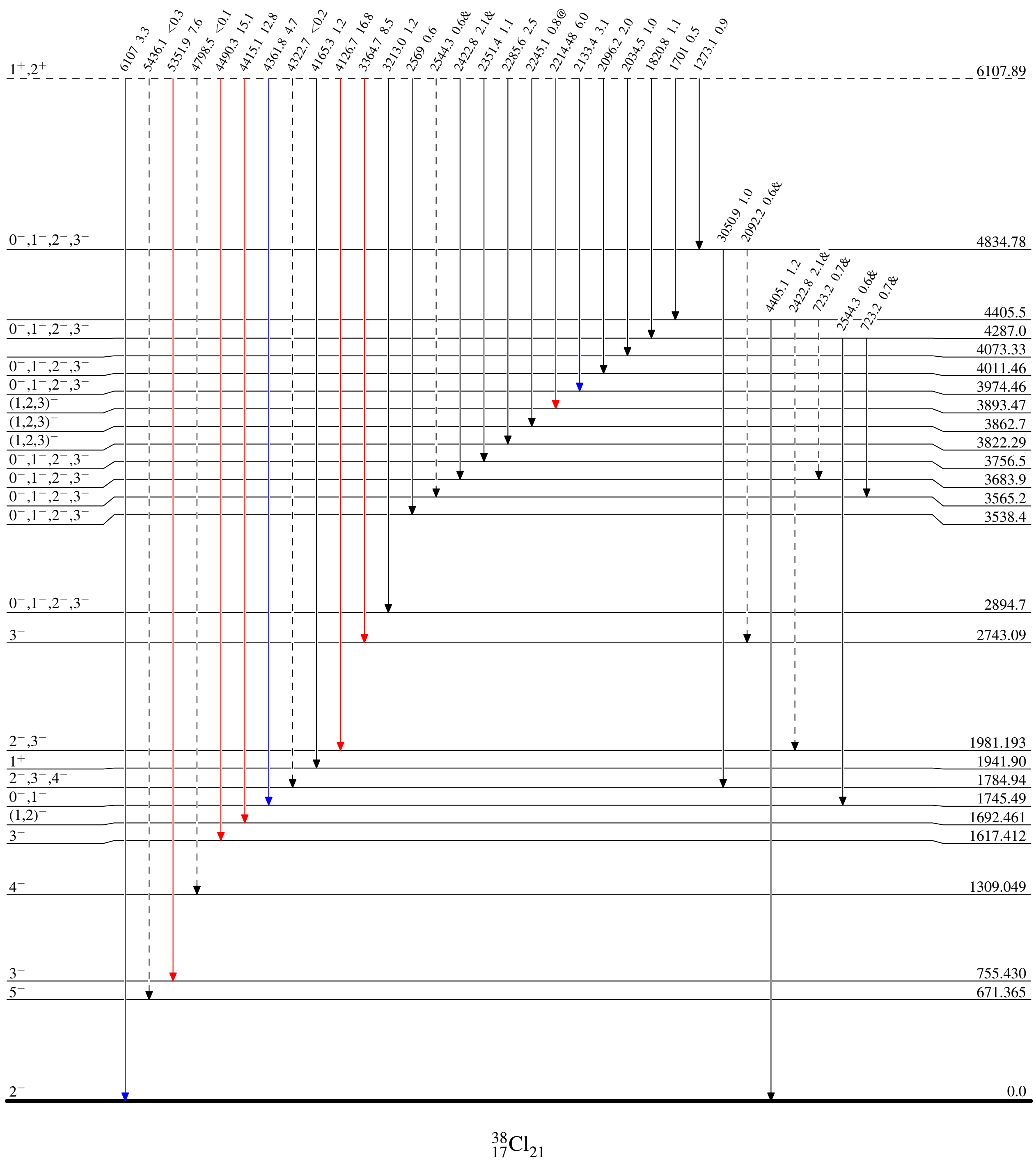
^{37}Cl(n,γ) E=thermal 1973Sp06

Level Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 neutron captures
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)



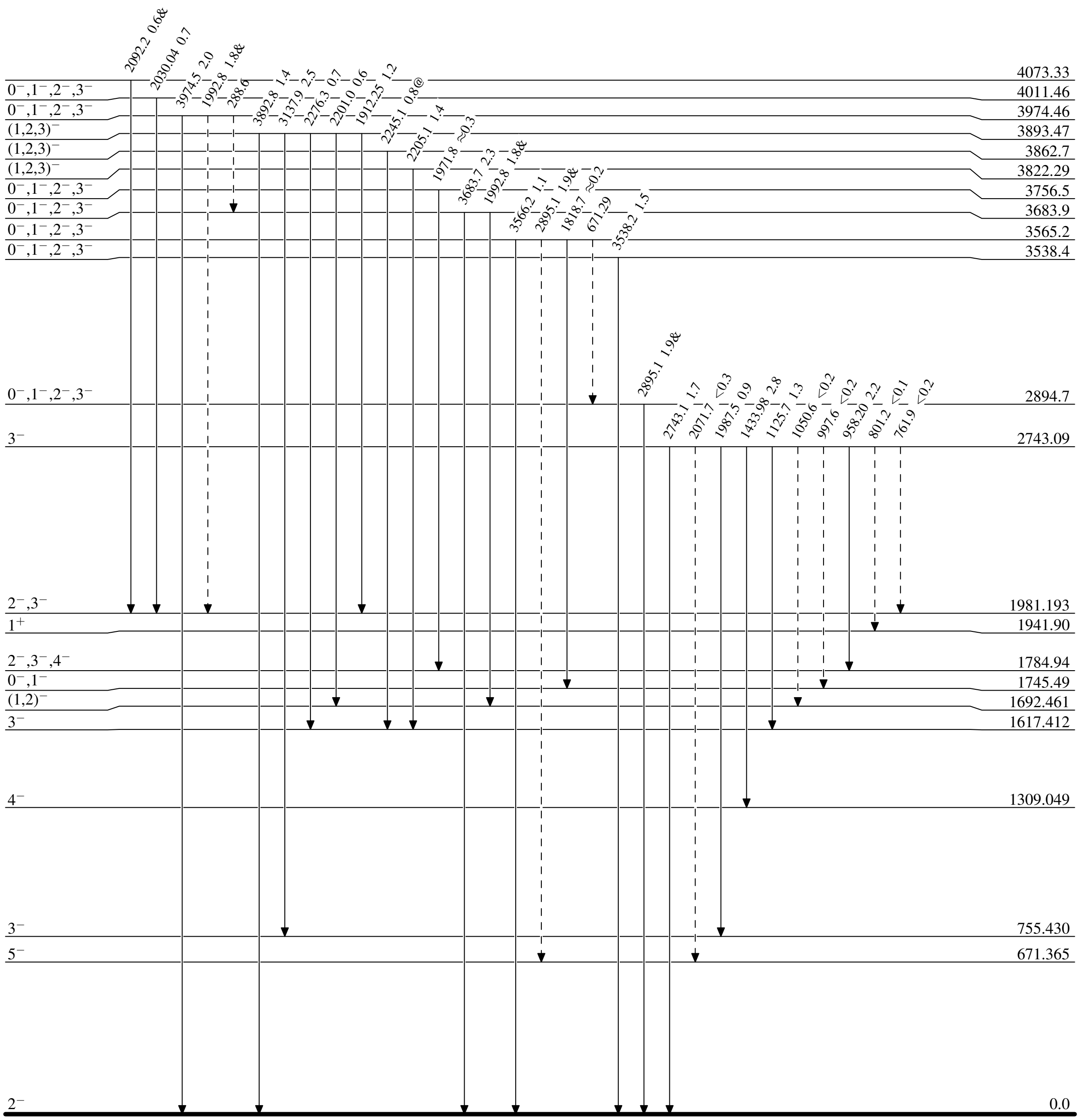
^{37}Cl(n,γ) E=thermal 1973Sp06

Level Scheme (continued)

Intensities: $I_{(\gamma+ce)}$ per 100 neutron captures
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)



$^{38}_{17}Cl_{21}$

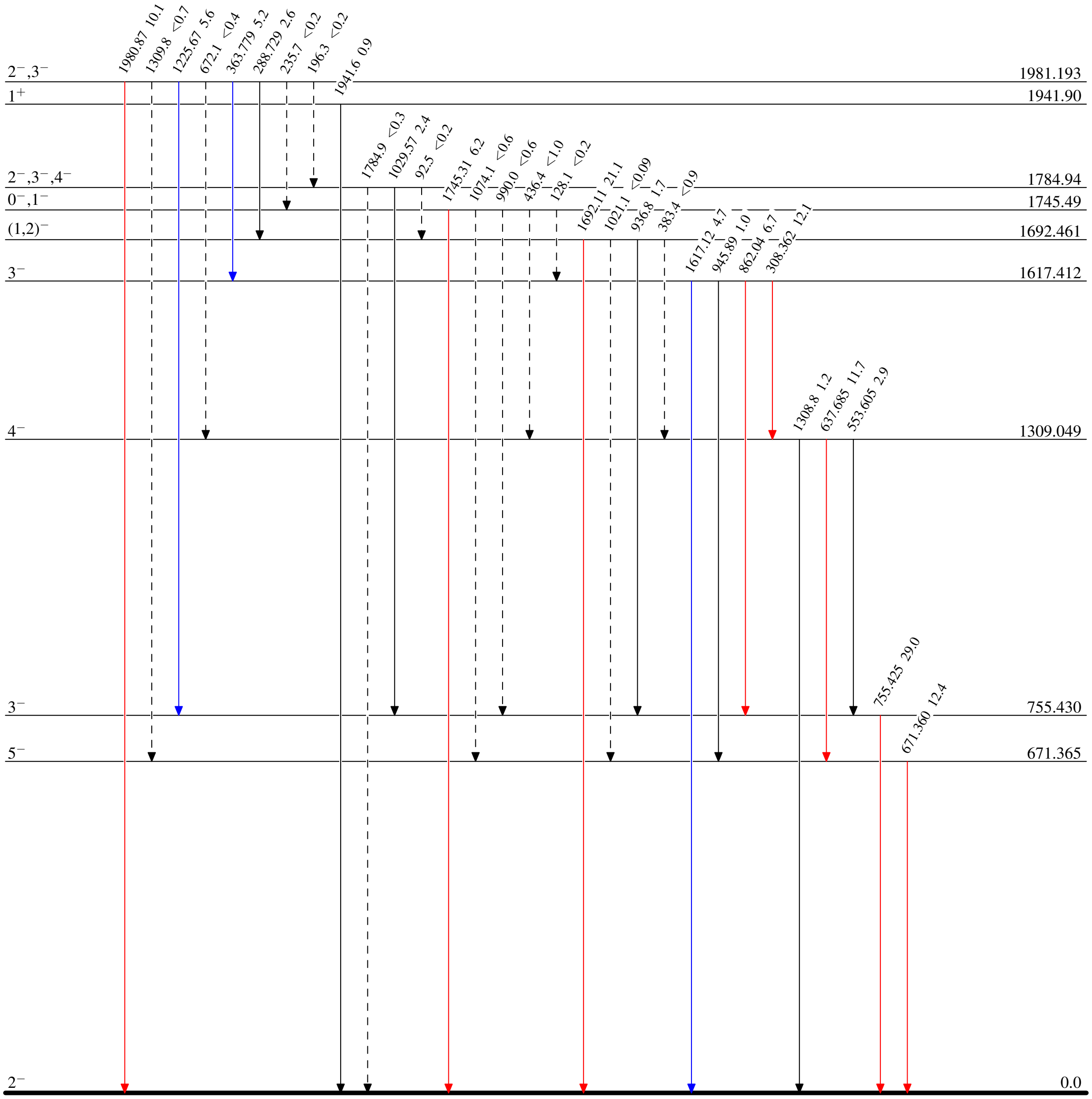
^{37}Cl(n,γ) E=thermal 1973Sp06

Level Scheme (continued)

Intensities: $I_{(\gamma+ce)}$ per 100 neutron captures
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)



$^{38}_{17}Cl_{21}$