^{203}Tl(α,5nγ) 1981Th03

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	F. G. Kondev	NDS 196,342 (2024)	1-Sep-2023

1981Th03: E(α)=55,57,62,66,70 MeV, pulsed with 35 ns, 141 ns and 25 μs repetition time; target: ^{203}Tl (87% enriched); detectors: 2 Ge(Li), 1 LEPS, iron-free orange spectrometer; measured: excitation function, $\gamma\gamma$, $\gamma(\theta)$, γ(t), $\gamma\gamma$(t)(t), ce.
Others: 1980Kl06, 1982Hu07.

^{202}Bi Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$[‡]	Comments
0.0	5^+	1.71 h *4*	J$^\pi$,$T_{1/2}$: From Adopted Levels.
7 *5*	(7^+)		Additional information 1. E(level): From Adopted Levels.
605 *5*	(8^-)		E(level): From Adopted Levels.
605+x	10^-	3.04 μs *6*	μ=+2.55 *3* Additional information 2. E(level): x<40 keV (1981Th03). $T_{1/2}$: From 597.8γ(t) (1981Th03). Configuration=$\pi(h^{+1}_{9/2})\otimes\nu(i^{-1}_{13/2})$. μ: From g=0.255 *3* (1982Hu07); Other: g=0.236 *23* (1980Kl06); both values using the time dependent perturbed angular distribution technique. The expected value for a pure configuration=$\pi(h^{+1}_{9/2})\otimes\nu(i^{-1}_{13/2})$ is μ=+2.64.
1229.12+x *8*	11^-		
1471.29+x *8*	12^-		
1793.72+x *13*	$12^{(-)}$		
1797.10+x *11*	13^-		
1834.59+x *10*	14^-		
1842.70+x *11*	13^-		
2026.72+x *11*	14^+		
2193.26+x *11*	12^-		
2329.11+x *10*	13^-		
2546.37+x *11*	15^-	2.0 ns *2*	$T_{1/2}$: From 325.8γ(t), 371.4γ(t) and 624.1γ(t) (1981Th03). configuration: $\pi(h^{+1}_{9/2})\otimes\nu(p^{-1}_{3/2},f^{-1}_{5/2},i^{-1}_{13/2})$. The assignment is tentative.
2597.07+x *25*	(17^+)	310 ns *50*	μ=+2.06 *5* $T_{1/2}$: From 217γ(t), 326γ(t), 520γ(t), 624γ(t), 712γ(t) and 866γ(t) (1981Th03). It is unlikely that the isomer decays via 50.7−keV, M2 transition to the 2546.37+x−keV, 15^- level, since B(M2)(W.u.) ≈ 14 W.u., which would exceed RUL by more than 3σ. It is suggested in 1981Th03 that the depopulating transition is most likely E1 or E2, thus requiring an intermediate level with J^π=15^+, 16^- or 17^- which has not been observed yet. μ: From g=0.121 *3* (1982Hu07), based on the time dependent perturbed angular distribution technique. configuration: $\pi(h^{+1}_{9/2})\otimes\nu(f^{-1}_{5/2},i^{-2}_{13/2})$.
3050.38+x *15*	16^-		
3150.98+x *23*	(18^+)		
3386.58+x *27*			
3590.08+x *25*			
3629.78+x *18*	(17^-)		
3744.18+x *21*	(18^-)		
4140.28+x *23*	(19^-)		

[†] From a least-square fit to Eγ, unless otherwise stated.
[‡] From 1981Th03, unless otherwise stated.

^{203}Tl(α,5nγ) 1981Th03 (continued)

$\gamma(^{202}Bi)$

E_γ	I_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [‡]	α [#]	Comments
37.4 *1*	0.3 *1*	1834.59+x	14^-	1797.10+x	13^-	M1	34.0 *6*	α(L)=26.0 *5*; α(M)=6.12 *10*; α(N+..)=1.92 *3* α(N)=1.57 *3*; α(O)=0.320 *6*; α(P)=0.0380 *7* Mult.: From intensity balance in 1981Th03.
114.4 *1*	0.8 *2*	3744.18+x	(18^-)	3629.78+x	(17^-)			Mult.: A_2=−0.32 *14*, A_4=0.11 *19*.
[x]125.2 *1*	0.8 *2*							
135.9 *1*	1.7 *3*	2329.11+x	13^-	2193.26+x	12^-	M1	4.25	α(K)=3.45 *5*; α(L)=0.605 *9*; α(M)=0.1423 *21*; α(N+..)=0.0447 *7* α(N)=0.0364 *6*; α(O)=0.00744 *11*; α(P)=0.000885 *13* Mult.: From α(exp)=4 from intensity balance in 1981Th03; A_2=−0.17 *6*, A_4=−0.05 *9*.
184.0 *1*	9.1 *14*	2026.72+x	14^+	1842.70+x	13^-	E1		Mult.: From intensity balance in 1981Th03; A_2=−0.13 *1*, A_4=0.02 *2*.
192.1 *1*	1.0 *2*	2026.72+x	14^+	1834.59+x	14^-	D		Mult.: A_2=0.32 *12*, A_4=−0.05 *16*. ΔJ=0 transition.
217.2 *1*	8.8 *14*	2546.37+x	15^-	2329.11+x	13^-	E2	0.338	α(K)=0.1390 *20*; α(L)=0.1480 *21*; α(M)=0.0388 *6*; α(N+..)=0.01187 *17* α(N)=0.00987 *14*; α(O)=0.00185 *3*; α(P)=0.0001533 *22* Mult.: α(K)exp=0.11 *3*; A_2=0.17 *2*, A_4=−0.04 *3*.
229.7 *1*	≈5	2026.72+x	14^+	1797.10+x	13^-			
242.1 *1*	5.1 *8*	1471.29+x	12^-	1229.12+x	11^-	M1	0.837	α(K)=0.682 *10*; α(L)=0.1184 *17*; α(M)=0.0278 *4*; α(N+..)=0.00874 *13* α(N)=0.00712 *10*; α(O)=0.001454 *21*; α(P)=0.0001731 *25* Mult.: α(K)exp=0.9 *3*; A_2=−0.27 *3*, A_4=0.03 *4*.
325.8 *1*	22 *3*	1797.10+x	13^-	1471.29+x	12^-	M1	0.370	α(K)=0.302 *5*; α(L)=0.0521 *8*; α(M)=0.01224 *18*; α(N+..)=0.00385 *6* α(N)=0.00313 *5*; α(O)=0.000640 *9*; α(P)=7.62×10^{-5} *11* Mult.: α(K)exp=0.33; A_2=−0.29 *1*, A_4=0.01 *2*.
363.4 *1*	4.5 *7*	1834.59+x	14^-	1471.29+x	12^-	(E2)	0.0696	α(K)=0.0427 *6*; α(L)=0.0202 *3*; α(M)=0.00515 *8*; α(N+..)=0.001585 *23* α(N)=0.001312 *19*; α(O)=0.000251 *4*; α(P)=2.30×10^{-5} *4* Mult.: A_2=0.22 *4*, A_4=−0.03 *5*.
371.4 *1*	8.8 *13*	1842.70+x	13^-	1471.29+x	12^-	M1	0.260	α(K)=0.212 *3*; α(L)=0.0364 *6*; α(M)=0.00856 *12*; α(N+..)=0.00269 *4* α(N)=0.00219 *3*; α(O)=0.000447 *7*; α(P)=5.33×10^{-5} *8* Mult.: α(K)exp=0.42; A_2=−0.28 *2*, A_4=−0.03 *3*.
396.1 *1*	8.3 *12*	4140.28+x	(19^-)	3744.18+x	(18^-)	M1	0.218	α(K)=0.1783 *25*; α(L)=0.0306 *5*; α(M)=0.00718 *10*; α(N+..)=0.00226 *4* α(N)=0.00184 *3*; α(O)=0.000375 *6*; α(P)=4.47×10^{-5} *7* Mult.: α(K)exp=0.32 *11*; A_2=−0.30 *3*, A_4=0.00 *4*.
439.1 *1*	2.7 *4*	3590.08+x		3150.98+x	(18^+)			
504.0 *1*	7.2 *11*	3050.38+x	16^-	2546.37+x	15^-	M1		α(K)=0.07 *3*; α(L)=0.012 *4*; α(M)=0.0029 *8*; α(N+..)=0.00092 *23* α(N)=0.00075 *19*; α(O)=0.00015 *4*;

Continued on next page (footnotes at end of table)

^{203}Tl(α,5nγ) 1981Th03 (continued)

$\gamma(^{202}Bi)$ (continued)

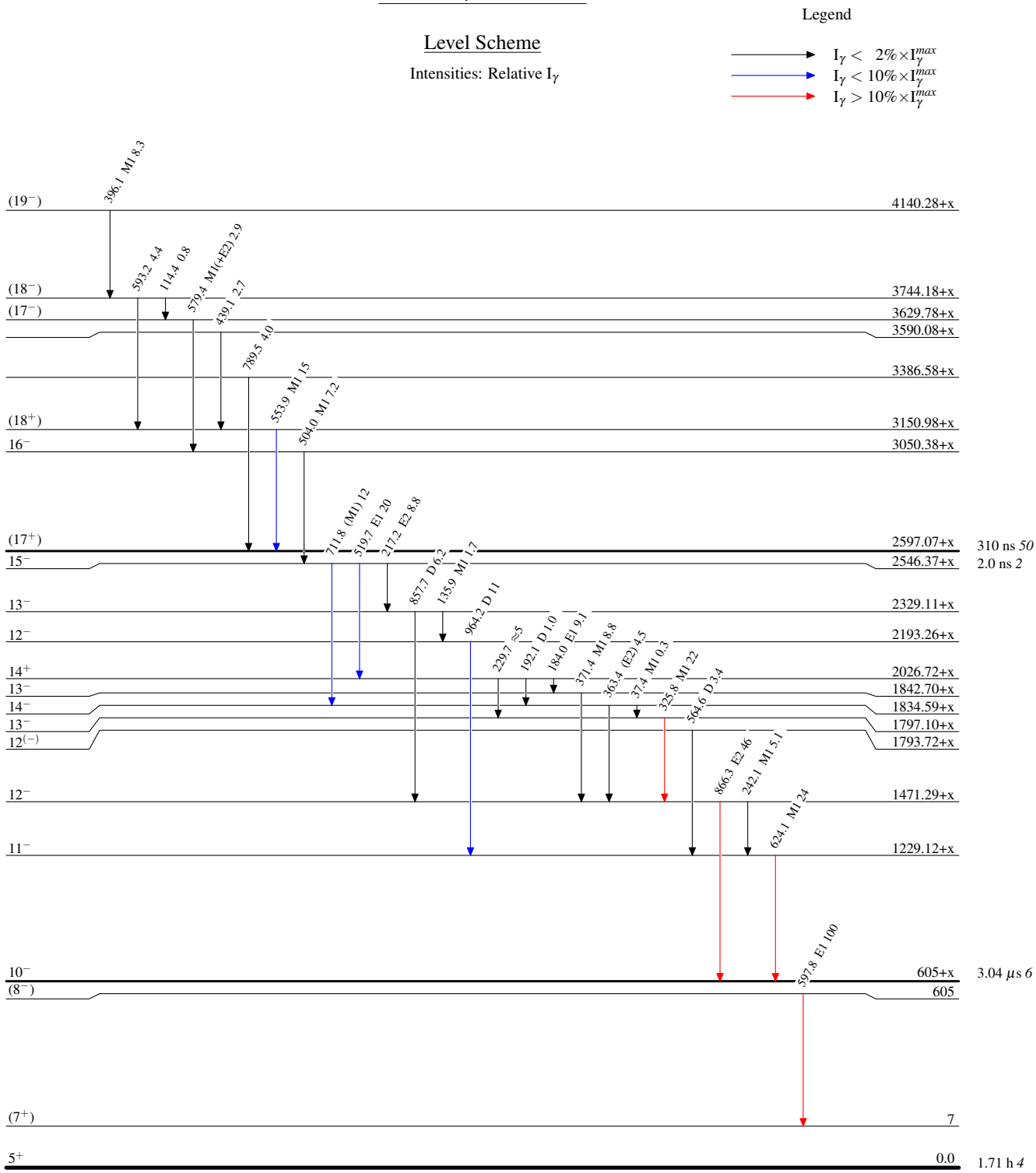
E_γ	I_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [‡]	α [#]	Comments
								α(P)=1.8×10^{-5} *6* Mult.: α(K)exp=0.066 *20*; A_2=−0.43, A_4=0.01 *5*.
519.7 *1*	20 *3*	2546.37+x	15$^-$	2026.72+x	14$^+$	E1	0.00915	α(K)=0.00755 *11*; α(L)=0.001223 *18*; α(M)=0.000285 *4*; α(N+..)=8.87×10^{-5} *13* α(N)=7.24×10^{-5} *11*; α(O)=1.459×10^{-5} *21*; α(P)=1.668×10^{-6} *24* Mult.: α(K)exp=0.009 *3*; A_2=−0.16 *1*;
553.9 *1*	15 *2*	3150.98+x	(18$^+$)	2597.07+x	(17$^+$)	M1	0.0894	α(K)=0.0732 *11*; α(L)=0.01243 *18*; α(M)=0.00291 *4*; α(N+..)=0.000916 *13* α(N)=0.000745 *11*; α(O)=0.0001524 *22*; α(P)=1.82×10^{-5} *3* Mult.: α(K)exp=0.09 *3*; A_2=−0.45 *2*, A_4=0.02 *3*.
564.6 *1*	3.4 *5*	1793.72+x	12$^{(-)}$	1229.12+x	11$^-$	D		Mult.: A_2=−0.36 *8*, A_4=0.04 *11*.
579.4 *1*	2.9 *5*	3629.78+x	(17$^-$)	3050.38+x	16$^-$	M1(+E2)		Mult.: A_2=−0.5 *2*, A_4=0.01 *2*.
593.2 *1*	4.4 *7*	3744.18+x	(18$^-$)	3150.98+x	(18$^+$)			Mult.: A_2=0.37 *6*, A_4=0.07 *8*.
597.8 *1*	100 *15*	605	(8$^-$)	7	(7$^+$)	E1	0.00689	α(K)=0.00570 *8*; α(L)=0.000912 *13*; α(M)=0.000212 *3*; α(N+..)=6.60×10^{-5} *10* α(N)=5.39×10^{-5} *8*; α(O)=1.089×10^{-5} *16*; α(P)=1.253×10^{-6} *18* Mult.: α(K)exp=0.007 *2*; A_2=−0.09 *1*, A_4=0.01 *1*.
624.1 *1*	24 *3*	1229.12+x	11$^-$	605+x	10$^-$	M1	0.0653	α(K)=0.0535 *8*; α(L)=0.00906 *13*; α(M)=0.00212 *3*; α(N+..)=0.000667 *10* α(N)=0.000543 *8*; α(O)=0.0001110 *16*; α(P)=1.325×10^{-5} *19* Mult.: α(K)exp=0.071 *21*; A_2=−0.44 *2*, A_4=0.00 *3*.
711.8 *1*	12 *2*	2546.37+x	15$^-$	1834.59+x	14$^-$	(M1)		α(K)=0.0109 *3*; α(L)=0.00258 *5*; α(M)=0.000629 *12*; α(N+..)=0.000196 *4* α(N)=0.000161 *3*; α(O)=3.18×10^{-5} *6*; α(P)=3.38×10^{-6} *7* Mult.: α(K)exp=0.009 *3*; A_2=−0.21 *3*, A_4=0.03 *4*.
789.5 *1*	4.0 *6*	3386.58+x		2597.07+x	(17$^+$)			Mult.: A_2=0.31 *6*, A_4=−0.05 *9*.
857.7 *1*	6.2 *9*	2329.11+x	13$^-$	1471.29+x	12$^-$	D		Mult.: A_2=0.02 *5*, A_4=−0.04 *7*.
866.3 *1*	46 *7*	1471.29+x	12$^-$	605+x	10$^-$	E2	0.00929	α(K)=0.00725 *11*; α(L)=0.001545 *22*; α(M)=0.000372 *6*; α(N+..)=0.0001160 *17* α(N)=9.50×10^{-5} *14*; α(O)=1.89×10^{-5} *3*; α(P)=2.07×10^{-6} *3* Mult.: α(K)exp=0.01 *3*; A_2=0.24 *1*, A_4=−0.06 *1*.
964.2 *1*	11 *2*	2193.26+x	12$^-$	1229.12+x	11$^-$	D		Mult.: A_2=−0.35 *3*, A_4=0.02 *4*.

[†] From E(α)=66 MeV data in 1981Th03.
[‡] From 1981Th03 based on $\gamma(\theta)$, α(K)exp and intensity balances.
[#] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
[x] γ ray not placed in level scheme.

^{203}Tl(α,5nγ) 1981Th03

Level Scheme

Intensities: Relative I_γ



$^{202}_{83}Bi_{119}$