^{198}Tl ε decay (1.87 h) 1971Pa06,1971Be09,1970Du10

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Huang Xiaolong and Kang Mengxiao	NDS 133, 221 (2016)	1-Dec-2015

Parent: ^{198}Tl: E=543.5 *4*; $J^{\pi}=7^+$; $T_{1/2}$=1.87 h *3*; Q(ε)=3460 *80*; %ε+%$β^+$ decay=55.9 *23*
Sources produced by ^{197}Au(α,3n) (1971Be09,1956Fi23,1954Mi16) and ^{198}Hg(d,2n) (1971Pa06).
1971Pa06: measure Eγ, Iγ, Xγ-delay, γγ coin, γγ(θ) with Ge(Li)-Ge(Li), Ge(Li)-NaI(Tl), and Ge(Li).
1971Be09: measure Eγ, Iγ, I(ce), γγ(θ), γ-ce delay, x-γ delay with NaI(Tl)-Ge(Li), Ge(Li)-Ge(Li), and Ge(Li).
1970Du10: measure Eγ, Iγ, ce-γ delay, γγ coin, ceγ coin, with Ge(Li) and Si(Li).
Others: 1954Pa19, 1957An55, 1960Ju01, 1968Pe13.

^{198}Hg Levels

E(level)†	J^{π}‡	$T_{1/2}$	Comments
0.0	0^+		
411.80 *20*	2^+		
1048.5 *3*	4^+		
1635.7 *4*	5^-	62 ps *11*	$T_{1/2}$: γce-delay measurement (1971Be09). Other: ≤100 ps (1970Du10,1970To14).
1683.4 *4*	7^-	6.9 ns *2*	$T_{1/2}$: From γce(t) measurements (1970Du10,1970To14). Others: 7.4 ns *4* (1971Be09), 6.6 ns *5* (1971Pa06).
1815.8 *5*	6^+		
1909.7 *4*	6^-		
1910.6 *5*	9^-		
2059.1 *5*	6^-		
2125.4 *4*	$6^-,7^-$		
2202.6 *5*	$6^-,7^-$		
2515.9 *5*			

† From decay scheme and Eγ's by using least-squares fit to data.
‡ From Adopted Levels.

ε,$β^+$ radiations

E(decay)	E(level)	I$β^+$ †‡	Iε†‡	Log *ft*	I(ε+$β^+$)‡	Comments
(1.49×10^3 *8*)	2515.9	0.0014 *13*	2.5 *3*	7.22 *8*	2.5 *3*	av Eβ=231 *37*; εK=0.8015 *7*; εL=0.1495 *8*; εM+=0.0485 *3*
(1.80×10^3 *8*)	2202.6	0.019 *9*	4.4 *6*	7.15 *8*	4.4 *6*	av Eβ=370 *36*; εK=0.8012 *10*; εL=0.1469 *7*; εM+=0.04750 *25*
(1.88×10^3 *8*)	2125.4	0.049 *19*	7.9 *9*	6.94 *7*	7.9 *9*	av Eβ=404 *36*; εK=0.8003 *14*; εL=0.1462 *8*; εM+=0.0473 *3*
(1.94×10^3 *8*)	2059.1	0.017 *6*	2.1 *3*	7.54 *8*	2.1 *3*	av Eβ=433 *35*; εK=0.7992 *18*; εL=0.1457 *8*; εM+=0.0471 *3*
(2.09×10^3 *8*)	1910.6	0.025 *9*	1.8 *4*	7.68 *11*	1.8 *4*	av Eβ=498 *35*; εK=0.795 *3*; εL=0.1442 *9*; εM+=0.0466 *3*
(2.09×10^3 *8*)	1909.7	0.12 *4*	8.3 *17*	7.01 *10*	8.4 *17*	av Eβ=498 *35*; εK=0.795 *3*; εL=0.1442 *9*; εM+=0.0466 *3*
(2.19×10^3 *8*)	1815.8	0.021 *6*	1.14 *17*	7.91 *8*	1.16 *17*	av Eβ=539 *35*; εK=0.792 *4*; εL=0.1432 *10*; εM+=0.0462 *4*
(2.32×10^3 *8*)	1683.4	0.7 *4*	24 *15*	6.6 *3*	25 *15*	av Eβ=597 *35*; εK=0.786 *5*; εL=0.1416 *11*; εM+=0.0457 *4*
(2.37×10^3 *8*)	1635.7	0.019 *19*	2.5 *25*	8.9^{1u} *5*	2.5 *25*	av Eβ=624 *34*; εK=0.7915 *8*; εL=0.1516 *8*; εM+=0.0494 *3*

Continued on next page (footnotes at end of table)

^{198}Tl ε decay (1.87 h) 1971Pa06,1971Be09,1970Du10 (continued)

ε,β^+ radiations (continued)

† From intensity I(γ+ce) imbalance at each level, and no $\varepsilon+\beta^+$ to g.s., 412-, and 1048-keV states assumed. Values are from 1971Pa06.

‡ Absolute intensity per 100 decays.

γ(^{198}Hg)

Iγ normalization: From I(γ+ce)(587.2γ+767.3γ)=55.9% *23* (no ε+β$^+$ to g.s., 412-, and 1048-keV states assumed).
α(K)exp=ce(K)(1970Du10)/Iγ(1971Pa06) normalized to α(K)(282.8γ, ^{198}Tl IT decay (1.87 h))=0.378 (M1 theory). Other α(K)exp (1971Be09,1968Pe13) normalized to α(K)(411.8γ)=0.0301 (E2 theory).

E_γ[#]	I_γ[@ b]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	δ[‡&]	α[†]	Comments
47.74 *5*	0.47 *15*	1683.4	7$^-$	1635.7	5$^-$	E2		171	α(L)=127.8 *19*; α(M)=33.3 *5* α(N)=8.23 *13*; α(O)=1.355 *21*; α(P)=0.001526 *23* B(E1)(W.u.)=0.035 E_γ: Deduced from average of L- and M-subshell energies (1957An55). I_γ: From 1971Pa06. Other: 0.7 *1* (1971Be09). Mult.: From L1:L2:L3=2.5 *8*:100:98 *8*, M2:M3=1.0 *1* (1957An55), α(L)exp≈120 (1971Be09).
149.3 *3*	0.29 *10*	2059.1	6$^-$	1909.7	6$^-$				
[x]194.6 *3*	1.46 *30*					M1(+E2)	0.71 *+36−33*	0.94 *16*	α(K)=0.71 *17*; α(L)=0.172 *6*; α(M)=0.0416 *22* α(N)=0.0104 *6*; α(O)=0.00189 *5*; α(P)=0.000100 *25* α(K)exp=0.74 *17*.
215.6 *3*	2.4 *4*	2125.4	6$^-$,7$^-$	1909.7	6$^-$	M1(+E2)	0.42 *+30−42*	0.81 *12*	α(K)=0.65 *12*; α(L)=0.1232 *19*; α(M)=0.0291 *7* α(N)=0.00729 *15*; α(O)=0.001357 *22*; α(P)=9.1×10^{-5} *17* α(K)exp=0.67 *12*.
226.2 *3*	10.2 *15*	1909.7	6$^-$	1683.4	7$^-$	M1(+E2)	0.50 *+29−38*	0.68 *10*	α(K)=0.54 *10*; α(L)=0.1063 *23*; α(M)=0.0252 *4* α(N)=0.00632 *10*; α(O)=0.00117 *3*; α(P)=7.6×10^{-5} *14* α(K)exp=0.56 *10*.
227.5 *2*	2.7 *5*	1910.6	9$^-$	1683.4	7$^-$	E2		0.253	α(K)=0.1239 *18*; α(L)=0.0972 *14*; α(M)=0.0250 *4* α(N)=0.00621 *9*; α(O)=0.001055 *16*; α(P)=1.557×10^{-5} *22* Mult.: From Adopted Gammas. E_γ: May depopulate 9$^-$ 1910.8 level as in ^{198}Pt(α,4nγ).
[x]249.8[c] *4*	0.60 *25*								
274.0 *3*	2.9 *4*	1909.7	6$^-$	1635.7	5$^-$	M1+E2	−0.9 *+3−5*	0.32 *7*	α(K)=0.25 *7*; α(L)=0.056 *4*; α(M)=0.0135 *7* α(N)=0.00337 *17*; α(O)=0.00061 *4*; α(P)=3.5×10^{-5} *9* δ: From Adopted Gammas. α(K)exp=0.48 *9*.
292.7 *5*	0.40 *15*	2202.6	6$^-$,7$^-$	1909.7	6$^-$				
375.9 *6*	1.47 *30*	2059.1	6$^-$	1683.4	7$^-$				
390.4 *3*	3.2 *4*	2515.9		2125.4	6$^-$,7$^-$				
411.8 *2*	109 *10*	411.80	2$^+$	0.0	0$^+$	E2[a]		0.0439	α(K)=0.0300 *5*; α(L)=0.01055 *15*; α(M)=0.00263 *4* α(N)=0.000655 *10*; α(O)=0.0001152 *17*; α(P)=3.95×10^{-6} *6*
[x]422.2 *4*	1.7 *3*								
423.3 *4*	2.06 *30*	2059.1	6$^-$	1635.7	5$^-$				
441.8 *3*	4.2 *6*	2125.4	6$^-$,7$^-$	1683.4	7$^-$	M1		0.1272	α(K)=0.1047 *15*; α(L)=0.01730 *25*; α(M)=0.00402 *6* α(N)=0.001007 *15*; α(O)=0.000191 *3*; α(P)=1.467×10^{-5} *21* α(K)exp=0.12 *2*.

$^{198}_{80}Hg_{118}$-3

^{198}Tl ε decay (1.87 h) 1971Pa06,1971Be09,1970Du10 (continued)

γ(^{198}Hg) (continued)

E_γ[#]	I_γ[@ b]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	α[†]	Comments
489.6 *3*	8.6 *9*	2125.4	6^-,7^-	1635.7	5^-			
519.2 *3*	6.8 *8*	2202.6	6^-,7^-	1683.4	7^-	M1	0.0830	α(K)=0.0684 *10*; α(L)=0.01124 *16*; α(M)=0.00261 *4* α(N)=0.000654 *10*; α(O)=0.0001239 *18*; α(P)=9.55×10^{-6} *14* α(K)exp=0.076 *13*.
[x]531.6 *5*	1.0 *2*							
[x]541.0 *4*	1.5 *2*							
567.0 *5*	0.40 *15*	2202.6	6^-,7^-	1635.7	5^-			
587.2 *2*	100	1635.7	5^-	1048.5	4^+	E1	0.00638	α(K)=0.00531 *8*; α(L)=0.000825 *12*; α(M)=0.000190 *3* α(N)=4.74×10^{-5} *7*; α(O)=8.84×10^{-6} *13*; α(P)=6.30×10^{-7} *9* α(K)exp=0.0057 *7* (1971Be09), ≈0.0048 (1968Pe13).
606.0 *10*	0.52 *20*	2515.9		1909.7	6^-			
636.7 *2*	109 *10*	1048.5	4^+	411.80	2^+	E2	0.01540	α(K)=0.01172 *17*; α(L)=0.00280 *4*; α(M)=0.000677 *10* α(N)=0.0001690 *24*; α(O)=3.06×10^{-5} *5*; α(P)=1.555×10^{-6} *22* α(K)exp=0.010 *3* (1971Be09), ≈0.0092 (1968Pe13).
[x]698.0 *4*	1.47 *20*							
[x]744.2 *5*	0.60 *25*							
767.3 *3*	2.13 *30*	1815.8	6^+	1048.5	4^+			
832.9 *4*	0.86 *15*	2515.9		1683.4	7^-			
[x]898.5 *4*	1.61 *25*							
[x]1050.2[c] *5*	0.48 *20*							
[x]1281.5 *5*	0.70 *25*							
[x]1392.0 *4*	0.74 *20*							

[†] Additional information 1.
[‡] If No value given it was assumed δ=1.00 for E2/M1, δ=1.00 for E3/M2 and δ=0.10 for the other multipolarities.
[#] From 1971Pa06, except as noted.
[@] Relative intensities normalized to Iγ(587.2γ)=100. Values are from 1971Pa06. Others: 1970Du10, 1971Be09.
[&] From α(K)exp, except as noted.
[a] From ce data in ^{198}Au β^- decay.
[b] For absolute intensity per 100 decays, multiply by 0.544 *22*.
[c] Placement of transition in the level scheme is uncertain.
[x] γ ray not placed in level scheme.

$^{198}_{80}Hg_{118}$-4

^{198}Tl ε decay (1.87 h) 1971Pa06,1971Be09,1970Du10

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays