^{204}Au β^- decay 1984Cr01

History

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

Parent: ^{204}Au: E=0.0; J^π=(2^-); $T_{1/2}$=39.8 s *9*; Q(β^-)=3940; %β^- decay=100.0

1984Cr01: ^{204}Au parent produced via ^{204}Hg(n,p) reaction; natural Hg target; E(n)=14 MeV. Measured γ singles with Ge, $\gamma\gamma$ coin with Ge-Ge(Li); ΔE=1.7 and 2.3 keV at 1332 keV for Ge andGe(Li), 10% efficiency for both; 2-min irradiation followed by 30-35 s delay and 2 min count. Measured γ(t) spectra for Eγ in 400-1000 keV or 1800-2400 keV range, in 6 15-s intervals; $T_{1/2}$(^{204}Au) determined from γ(t) of 436.6γ, 691.7γ, and 723.0γ.

Other: 1972Pa06.

Additional information 1.

^{204}Hg Levels

Additional information 2.

E(level)[†]	J^π[‡]	Comments
0	0^+	
436.552 *8*	2^+	
1128.23 *11*	4^+	Additional information 3.
1828.71 *11*	(2^-)	Additional information 4.
1841.38 *11*	1^+	Additional information 5.
1851.26 *10*	$(2,3)^+$	Additional information 6.
1947.69 *11*	2^+	Additional information 7.
1989.36 *10*	(2^+)	Additional information 8.
2088.51 *10*	2^+	Additional information 9.
2117.0 *5*	2^+	Additional information 10.
2140.86 *10*	(1^+,2^+,3^+)	Additional information 11.
2264.36 *18*	(1,2,3)	Additional information 12.
2300.20 *14*	(2^+,3)	Additional information 13.
2385.9 *4*	1^+,2^+	Additional information 14.
2395.6 *4*	1,2,3	Additional information 15.
2465.46 *20*	$(2)^+$	Additional information 16.
2726.6 *3*	(2^+,3)	Additional information 17.
2812.83 *24*	3^-	Additional information 18.

† From a least-squares fit to Eγ.

‡ From Adopted Levels.

β^- radiations

1972Pa06 measured with a plastic scin an endpoint energy≈3300 keV with $T_{1/2}$=30-40 s, which can be associated with decay of $^{202,\ 204}$Aused on evaluators′ estimate of relative yields of the 436.6γ (^{204}Au) and 439.6γ (^{202}Au, normalized to account for 90% β^- to g.s.) from Fig.1 of 1972Pa06, this is consistent with Q(β^-)(^{202}Au)=2950 keV and systematic Q(β^-)(^{204}Au)=3900 keV. 1967Wa23 report E(β^-)=3500 keV *200* with $T_{1/2}$≈30 s and E(β^-)=4500 keV *300* with $T_{1/2}$≈4 s; decay with the latter lifetime was not confirmed by 1972Pa06 or 1984Cr01. 1984Cr01 deduce Iβ^- to g.s.<10% from estimate of (n,p) cross sections; other Iβ^- branches are from γ+ce intensity balance, assuming negligible feeding to g.s.

The total energy calculated with the program RADLST for β^- decay of ^{204}Au is 4267 keV *155*, compared to the Q value from systematics, 3940 keV, indicating that the decay scheme is incomplete.

Additional information 19.

Continued on next page (footnotes at end of table)

^{204}Au β^- decay 1984Cr01 (continued)

β^- radiations (continued)

E(decay)	E(level)	Iβ⁻[†]	Log *ft*	Comments
(1127.17 *24*)	2812.83	0.66 *7*	≈6.0	av Eβ=378.84
(1213.4 *3*)	2726.6	0.61 *19*	≈6.2	av Eβ=412.77
(1474.54 *20*)	2465.46	0.35 *6*	≈6.7	av Eβ=517.77
(1544.4 *4*)	2395.6	2.9 *5*	≈5.9	av Eβ=546.34
(1554.1 *4*)	2385.9	0.10 *5*	≈7.4	av Eβ=550.32
(1639.80 *14*)	2300.20	2.0 *4*	≈6.1	av Eβ=585.62
(1675.64 *18*)	2264.36	2.03 *16*	≈6.2	av Eβ=600.46
(1799.14 *10*)	2140.86	3.11 *19*	≈6.1	av Eβ=651.87
(1823.0 *5*)	2117.0	0.20 *7*	≈7.3	av Eβ=661.85
(1851.49 *10*)	2088.51	1.05 *8*	≈6.6	av Eβ=673.79
(1950.64 *10*)	1989.36	5.9 *4*	≈6.0	av Eβ=715.48 Additional information 20.
(1992.31 *11*)	1947.69	26.5 *14*	≈5.3	av Eβ=733.07
(2088.74 *10*)	1851.26	31.5 *16*	≈5.3	av Eβ=773.85
(2098.62 *11*)	1841.38	3.8 *6*	≈6.3	av Eβ=778.05 Additional information 21.
(2111.29 *11*)	1828.71	21.7 *12*	≈5.5	av Eβ=783.43 Additional information 22.
(2811.77[‡] *11*)	1128.23	<0.7	>8.8[1u]	av Eβ=1053.00
(3503.448 *8*)	436.552	<2	>7.4	av Eβ=1386.43 Iβ⁻: No feeding to this level was deduced from either 1984Cr01 or 1972Pa06. In both works, more γ intensity was identified feeding this level than depopulating it.
(3940[‡])	0	<10	>8.5[1u]	av Eβ=1541.47

[†] Absolute intensity per 100 decays.
[‡] Existence of this branch is questionable.

$\gamma(^{204}Hg)$

Iγ normalization: Based on the assumption that Iβ⁻ to g.s. is negligible and Σ Ti(to g.s.)=100%.
All intense γ's are in coin with Eβ>500 keV (1972Pa06).
Additional information 23.

Eγ[‡]	Iγ[&]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[@]	α[†]	Comments
436.551 *8*	100 *4*	436.552	2⁺	0	0⁺	E2	0.0378	α(K)=0.0263 *4*; α(L)=0.00870 *13*; α(M)=0.00216 *3*; α(N+..)=0.000636 *9* α(N)=0.000538 *8*; α(O)=9.50×10⁻⁵ *14*; α(P)=3.47×10⁻⁶ *5* Eγ: From adopted gammas. Eγ=436.56 keV *5* in 1984Cr01. Additional information 25.
554.7 *3*	3.0 *5*	2395.6	1,2,3	1841.38	1⁺			
ˣ654.9[#] *4*	9.0 *8*							$T_{1/2}$=70 s *20*; 1984Cr01 suggest possibility this may be due to 53 s *2*, Eγ≈690 keV γ from ^{203}Au β⁻ decay (1972Bu42). However, no such γ was later confirmed to be from ^{203}Au β⁻ decay (see 2005Ko20); evaluator rejects this possible origin.
691.74 *15*	26.4 *8*	1128.23	4⁺	436.552	2⁺	E2	0.01285	α(K)=0.00991 *14*; α(L)=0.00224 *4*; α(M)=0.000538 *8*; α(N+..)=0.0001603 *23*

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^{204}Au β^- decay 1984Cr01 (continued)

$\gamma(^{204}Hg)$ (continued)

E_γ ‡	I_γ &	E_i(level)	J_i^π	E_f	J_f^π	Mult. @	α †	Comments
								α(N)=0.0001345 *19*; α(O)=2.45×10^{-5} *4*; α(P)=1.313×10^{-6} *19* Additional information 26.
723.00 *16*	24.4 *7*	1851.26	(2,3)$^+$	1128.23	4$^+$	M1+E2	0.023 *12*	α(K)=0.019 *10*; α(L)=0.0033 *14*; α(M)=0.0008 *3*; α(N+..)=0.00024 *10* α(N)=0.00020 *8*; α(O)=3.7×10^{-5} *15*; α(P)=2.6×10^{-6} *14*
897.9 *6*	0.30 *19*	2726.6	(2$^+$,3)	1828.71	(2$^-$)			
1172.0 *1*	1.8 *4*	2300.20	(2$^+$,3)	1128.23	4$^+$			E_γ: From adopted gammas.
1392.15 *11*	24.2 *6*	1828.71	(2$^-$)	436.552	2$^+$	(E1)	0.001391 *20*	α=0.001391 *20*; α(K)=0.001080 *16*; α(L)=0.0001589 *23*; α(M)=3.63×10^{-5} *5*; α(N+..)=0.000115 α(N)=9.08×10^{-6} *13*; α(O)=1.714×10^{-6} *24*; α(P)=1.320×10^{-7} *19*; α(IPF)=0.0001042 *15*
1404.82 *12*	4.24 *20*	1841.38	1$^+$	436.552	2$^+$	M1+E2	0.0048 *17*	α=0.0048 *17*; α(K)=0.0040 *14*; α(L)=0.00064 *21*; α(M)=0.00015 *5*; α(N+..)=0.00010 *3* α(N)=3.7×10^{-5} *12*; α(O)=7.1×10^{-6} *23*; α(P)=5.3×10^{-7} *20*; α(IPF)=5.0×10^{-5} *12*
1414.72 *11*	9.6 *3*	1851.26	(2,3)$^+$	436.552	2$^+$	M1+E2	0.0048 *17*	α=0.0048 *17*; α(K)=0.0039 *14*; α(L)=0.00063 *21*; α(M)=0.00015 *5*; α(N+..)=0.00010 *3* α(N)=3.7×10^{-5} *12*; α(O)=6.9×10^{-6} *23*; α(P)=5.3×10^{-7} *20*; α(IPF)=5.3×10^{-5} *13*
1511.10 *12*	27.7 *7*	1947.69	2$^+$	436.552	2$^+$	[M1+E2]	0.0041 *14*	α=0.0041 *14*; α(K)=0.0034 *11*; α(L)=0.00054 *17*; α(M)=0.00013 *4*; α(N+..)=0.00013 *4* α(N)=3.1×10^{-5} *10*; α(O)=5.9×10^{-6} *19*; α(P)=4.5×10^{-7} *16*; α(IPF)=8.9×10^{-5} *22*
1552.8 *1*	6.51 *19*	1989.36	(2$^+$)	436.552	2$^+$			E_γ: From adopted gammas.
1598.4 *3*	0.37 *7*	2726.6	(2$^+$,3)	1128.23	4$^+$			
1680.4 *5*	0.22 *7*	2117.0	2$^+$	436.552	2$^+$	M1+E2	0.0034 *10*	α=0.0034 *10*; α(K)=0.0026 *8*; α(L)=0.00042 *12*; α(M)=0.00010 *3*; α(N+..)=0.00020 *5* α(N)=2.4×10^{-5} *7*; α(O)=4.6×10^{-6} *14*; α(P)=3.5×10^{-7} *12*; α(IPF)=0.00017 *4* E_γ: placed by evaluators based on the 1680.9γ in adopted gammas. Additional information 31.
1704.3 *1*	3.42 *14*	2140.86	(1$^+$,2$^+$,3$^+$)	436.552	2$^+$	(M1+E2)	0.0033 *10*	α=0.0033 *10*; α(K)=0.0026 *8*;

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^{204}Au β^- decay 1984Cr01 (continued)

$\gamma(^{204}Hg)$ (continued)

E_γ[‡]	I_γ[&]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[@]	α[†]	Comments
								α(L)=0.00041 *12*; α(M)=9.E−5 *3*; α(N+..)=0.00021 *5* α(N)=2.4×10^{-5} *7*; α(O)=4.5×10^{-6} *13*; α(P)=3.4×10^{-7} *11*; α(IPF)=0.00018 *5* E_γ: From adopted gammas.
[x]1817.4 *6*	0.16 *7*							Additional information 24.
1827.80 *18*	2.23 *14*	2264.36	(1,2,3)	436.552	2+			E_γ: Placed by evaluator based on the 1827.4γ in (n,n′γ) (see adopted gammas). Additional information 32.
1841.38 *19*	2.91 *11*	1841.38	1+	0	0+	M1	0.00357 *5*	α=0.00357 *5*; α(K)=0.00271 *4*; α(L)=0.000429 *6*; α(M)=9.90×10^{-5} *14*; α(N+..)=0.000339 *5* α(N)=2.48×10^{-5} *4*; α(O)=4.71×10^{-6} *7*; α(P)=3.70×10^{-7} *6*; α(IPF)=0.000310 *5* Additional information 27.
1851.7[#a] *4*	≤0.28	1851.26	(2,3)+	0	0+			Additional information 28.
1863.3 *3*	0.39 *4*	2300.20	(2+,3)	436.552	2+			E_γ,I_γ: From adopted gammas.
1947.76 *20*	1.47 *11*	1947.69	2+	0	0+	[E2]	0.00197 *3*	α=0.00197 *3*; α(K)=0.001432 *20*; α(L)=0.000227 *4*; α(M)=5.24×10^{-5} *8*; α(N+..)=0.000259 *4* α(N)=1.311×10^{-5} *19*; α(O)=2.47×10^{-6} *4*; α(P)=1.85×10^{-7} *3*; α(IPF)=0.000243 *4* Additional information 29.
1959.0[#] *4*	≤0.29	2395.6	1,2,3	436.552	2+			
2028.9 *2*	0.38 *6*	2465.46	(2)+	436.552	2+			E_γ: From adopted gammas. Additional information 34.
2088.5 *1*	1.15 *7*	2088.51	2+	0	0+	E2	0.00183 *3*	α=0.00183 *3*; α(K)=0.001263 *18*; α(L)=0.000198 *3*; α(M)=4.57×10^{-5} *7*; α(N+..)=0.000322 *5* α(N)=1.144×10^{-5} *16*; α(O)=2.16×10^{-6} *3*; α(P)=1.631×10^{-7} *23*; α(IPF)=0.000308 *5* E_γ: From adopted gammas. Additional information 30.
2376.26 *24*	0.72 *7*	2812.83	3−	436.552	2+	[E1]	0.001321 *19*	α=0.001321 *19*; α(K)=0.000448 *7*; α(L)=6.47×10^{-5} *9*; α(M)=1.476×10^{-5} *21*; α(N+..)=0.000793 *1* α(N)=3.69×10^{-6} *6*; α(O)=6.99×10^{-7} *10*; α(P)=5.52×10^{-8} *8*; α(IPF)=0.000789 *11* Additional information 35.
2385.9 *4*	0.11 *5*	2385.9	1+,2+	0	0+			Additional information 33. E_γ: From adopted gammas.

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^{204}Au β^- decay 1984Cr01 (continued)

$\gamma(^{204}$Hg) (continued)

† Additional information 36.
‡ From 1984Cr01, with assignment to ^{204}Au β^- decay based on $T_{1/2}$ and on $\gamma\gamma$-coin; other: 1972Pa06. For Eγ<400 keV, sensitivity was reduced by Pb absorbers; $\gamma\gamma$ not recorded if Eγ<400 keV.
# Assigned to both ^{204}Au and ^{202}Au (1984Cr01).
@ From adopted γ's.
& For absolute intensity per 100 decays, multiply by 0.91 *4*.
^{a} Placement of transition in the level scheme is uncertain.
^{x} γ ray not placed in level scheme.

^{204}Au β^- decay 1984Cr01

Decay Scheme

Intensities: I_γ per 100 parent decays