^{183}Tl α decay (53.3 ms) 2004Ra28,1987To09,1980Sc09

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	NDS 110, 265 (2009)	15-Nov-2008

Parent: ^{183}Tl: E=625 *7*; J$^\pi$=(9/2$^-$); $T_{1/2}$=53.3 ms *3*; Q(α)=6058 *9*; %α decay=1.5 *3*

^{183}Tl-%α decay: From mother-daughter intensity relations (2006An11). other Branching data:≈1.5% (tentative value based on one correlated 7000α(^{187}Bi)−6380α(^{183}Tl) event) (1999Ba45). 2004Ra28 estimate %α≈2 based on total Iα compared with Iγ for the delayed 347γ feeding the 9/2$^-$ isomer of ^{183}Tl.

Other: 2006An11.

2004Ra28:^{183}Tl from ^{144}Sm(^{42}Ca,p2nγ) At E=195 and 200 MeV using 95% enriched ^{144}Sm target; RITU gas separator; fusion evaporation residues implanted In Si strip detector In focal plane; 3 NORDBALL- and 2 TESSA-type Ge detectors; measured Eα, Iα, Eγ, Iγ, prompt γ-α(^{183}Tl) coin, $\gamma\gamma$ coin. Supersedes 2002JeZY.

$T_{1/2}$(183TL)=53.3 ms *3* from fit to time difference between pairs of decay α's and recoils, using an exponential fit to the decay curve and assuming an exponential background (2004Ra28). Other: 60 ms *15* from 1980Sc09.

Parent J$^\pi$ from evaluation In 2002Ba19.

Parent E: from Eα=7612 *5* to ^{183}Tl(g.s.) and Eα=7000 *5* to 53 ms ^{183}Tl In ^{187}Bi(9/2$^-$) α decay (2006An11).

The Q(α)=5940 *17* given In 2003Au03 assumed that a 6449α fed the ^{179}Au g.s. the γ data of 2004Ra28 are inconsistent with this assumption. based on the adopted Eα=6338 *6* from 625 *7* level In ^{183}Tl to 203.6+x level In ^{179}Au, Q(α)=6058+x 9, where x is the energy difference, if any, between the ^{179}Au g.s. and the 0+x level At which the 52γ-89γ-62γ cascade observed by 2004Ra28 In α decay terminates.

To identify the ^{183}Tl α decays, 2004Ra28 performed a correlation with subsequent ^{179}Au α decays within a search time of 1 s; this revealed the existence of a new Eα=5810 *15* branch from ^{179}Au.

^{179}Au Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	Comments
0.0+x	(1/2$^+$,3/2$^+$,5/2$^+$)		J$^\pi$: 2004Ra28 suggest (5/2$^+$).
61.8+x *3*	(3/2$^-$)		E(level): an alternative value of 89.4+x is possible because order of 62γ-89γ cascade has not been firmly established. J$^\pi$: 2004Ra28 suggest (3/2$^-$).
86+x *13*		>100 μs	%IT=?; %ε+%β^+=?; %α=? E(level): from difference In adopted values of Eα to this level and Eα to 203.6+x level. $T_{1/2}$: from 2004Ra28; No γ observed In coincidence with α feeding this level.
151.2+x *4*	(7/2$^-$)		J$^\pi$: 2004Ra28 suggest (7/2$^-$). HF is consistent with a moderate angular momentum change In α decay without underlying structural change; this suggests similar structure for the (7/2$^-$) and (9/2$^-$) levels In ^{179}Au.
203.6+x *4*	(9/2$^-$)		J$^\pi$: 2004Ra28 suggest (9/2$^-$) based on unhindered α decay from (9/2$^-$) parent.

† Based on measured Eγ, except As noted. the energy offset ‘x’ allows for the possibility that the level fed by the 62γ might not Be the g.s.

‡ From Adopted Levels. Authors′ suggested values, based on deduced transition multipolarities and an assumption that J values decrease with decreasing level energy, are given In comments on the relevant levels.

α radiations

Eα	E(level)	Iα[†#]	HF[‡]	Comments
6338 *6*	203.6+x	83 *4*	1.6 *4*	Eα: weighted average of 6333 *10* (2004Ra28), 6340 *15* (1987To09), 6343 *10* (1980Sc09). this Eα implies Q(α)(^{183}Tl)=6058+x 9 (cf. 5940 *17* In 2003Au03 where the 6453α is assumed to feed the ^{179}Au g.s.). other Iα: 80 *9* (including ce-α sum peaks) (2004Ra28).
6381 *11*	151.2+x	16 *2*	12 *3*	Eα: weighted average of 6384 *16* (2004Ra28), 6378 *15* (1980Sc09).

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^{183}Tl α decay (53.3 ms) 2004Ra28,1987To09,1980Sc09 (continued)

α radiations (continued)

Eα	E(level)	Iα[†#]	HF[‡]	Comments
				other Iα: 16 *4* (2004Ra28).
6453 *11*	86+x	1.0 *3*	3.6×10^{2} *14*	Eα: weighted average of 6456 *15* (2004Ra28), 6449 *15* (1980Sc09). other Iα: 4 *2* (2004Ra28).

[†] From 1980Sc09. Iα data from 2004Ra28 (given In comments) are In excellent agreement, but a little less precise.
[‡] Assuming r_0=1.513 *9* (unweighted average of r_0(^{180}Hg)=1.505 *13* and r_0(^{178}Pt)=1.522 *5* (1998Ak04)) and Q(α)=6058 *9*.
[#] For absolute intensity per 100 decays, multiply by 0.015 *3*.

γ(^{179}Au)

Iγ normalization: 0.061 *2*, assuming Ti(62)/Iα(total)=0.99.

E_γ[†]	I_γ[†#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α[@]	Comments
52.4 *2*	109 *10*	203.6+x	(9/2$^-$)	151.2+x	(7/2$^-$)	M1	8.58 *16*	α(L)=6.60 *12*; α(M)=1.53 *3*; α(N+..)=0.456 *9* α(N)=0.382 *7*; α(O)=0.0701 *13*; α(P)=0.00473 *9* 52γ is In prompt coincidence with both the 89γ and the 62γ. Placement is supported by 6384α and 6333α energy difference of 51 *19* (2004Ra28). Mult.: α(exp)=11.5 *14* (based on Iα=83% 4 and adopted γ normalization) rules out E1 and E2. Observed ce(L)-α summing In spectrum gated by 89γ is consistent with M1 or E2 (2004Ra28).
61.8 *3*	1233 *35*	61.8+x	(3/2$^-$)	0.0+x	(1/2$^+$,3/2$^+$,5/2$^+$)	E1	0.305 *6*	α(L)=0.235 *5*; α(M)=0.0550 *11*; α(N+..)=0.0157 *3* α(N)=0.0134 *3*; α(O)=0.00223 *5*; α(P)=8.34×10^{-5} *15* Mult.: intensity balance At 62+x level rules out E2 and M1 and higher order multipolarity for the 62γ.
89.4 *2*	124 *11*	151.2+x	(7/2$^-$)	61.8+x	(3/2$^-$)	(E2)	8.37 *15*	α(K)=0.682 *10*; α(L)=5.76 *11*; α(M)=1.50 *3*; α(N+..)=0.427 *8* α(N)=0.368 *7*; α(O)=0.0589 *11*; α(P)=0.0001272 *20* Mult.: probably E2. Observed shape of summed α spectrum when gated by 52γ is consistent with ce(L)(89)-α summing; E1 would give negligible ce-α summing, M1 would lead to different shape due to dominance of ce(K) over ce(L). also, M1 is ruled out by the observed low I(K x ray) (2004Ra28) and E1 by intensity balance At the 62+x level.

[†] From 2004Ra28.

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γ(^{179}Au) (continued)

‡ The 52γ-62γ and 52γ-89γ coincidences are prompt and none of the 52γ, 62γ and 89γ appears to Be delayed with respect to α's, so 2004Ra28 conclude that the gammas have multipolarity No higher than E1, M1 or E2.

For absolute intensity per 100 decays, multiply by 0.00091 *19*.

@ 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.

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