^{149}Tb ε decay (4.17 min) 1971HaWX,1971Ar31,1975To03

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 185, 2 (2022)	23-Aug-2022

Parent: ^{149}Tb: E=35.75 *8*; J^π=11/2$^-$; $T_{1/2}$=4.17 min *5*; Q(ε)=3639 *4*; %ε+%$β^+$ decay=99.978 *3*

^{149}Tb-E,J^π,$T_{1/2}$: From the Adopted Levels of ^{149}Tb.

^{149}Tb-Q(ε): From 2021Wa16.

^{149}Tb-%ε+%$β^+$ decay: From %α=0.022 *3* in the Adopted Levels.

Others: 1969Ch32, 1975SpZU, 1974La28.

$T_{1/2}$(^{149}Tb isomer): 1973Bi06, 1973Bo13, 1971Ar31, 1969Ch32, 1964Ma19, 1962Ma14.

Q value measurements: 1991Ke06 and 1985Sc09. From $β^+γ$ coin, E($β^+$)=1853 *10* (1991Ke06) which gives Q=3671 *10*. 1985Sc09 estimate Q value from I($β^+$)/I(εK(exp)) and I($β^+$)/I(ε+$β^+$) ratios deduced from $γ^±$/I(x ray) and $γ^±$/Iγ(cascades). From I($β^+$)/I(εK(exp))=0.31 *3*, 1985Sc09 deduce Eβ+=1790 *50* which gives Q=3610 *50*.

Total decay energy deposit of 3986.6 keV *34* calculated by RADLIST code is higher than the expected value of 3673 keV *4*, with a difference=314 keV.

^{149}Gd Levels

E(level)	J^π[†]	$T_{1/2}$[†]	Comments
0.0	7/2$^-$	9.28 d *10*	
165.1 *1*	5/2$^-$		Note that there is a significant γ+ce intensity imbalance at 165 level with much less γ feedings to this level than emitted from this level, which could be due to missing transitions feeding this level.
796.0 *1*	9/2$^-$		

[†] From the Adopted Levels.

ε,$β^+$ radiations

E(decay)	E(level)	Iβ$^+$ [†]	Iε[†]	Log *ft*	I(ε+$β^+$)[†]	Comments
(2879 *4*)	796.0	≈21	≈79	≈4.3	≈100	av Eβ=804.6; εK=0.6645; εL=0.09865; εM+=0.02856 Log *ft*: assuming 100% ε decay to this level. There are other transitions which are unassigned. But 1975To03 estimate that none of these transitions is intense enough to change log *ft* value to this level. The allowed β transition is interpreted to proceed between $πh_{11/2}$ and $νh_{9/2}$ states.

[†] Absolute intensity per 100 decays.

γ(^{149}Gd)

Iγ normalization: From I(630.7γ+796.0γ)≈100 based on the assumption of approximately 100% decay to 796 level since other unassigned transitions are not intense enough to change the feeding to this level (1975To03).

E_γ	I_γ[@a]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	δ[&]	α[b]	Comments
[x]75[†]	1.3								
165.0[#] *1*	7.5[#] *5*	165.1	5/2$^-$	0.0	7/2$^-$	M1+E2	−0.93 *2*	0.459 *7*	α(K)=0.349 *5*; α(L)=0.0853 *14*; α(M)=0.01933 *31* α(N)=0.00438 *7*; α(O)=0.000624 *10*; α(P)=2.35×10^{-5} *4* I(γ+ce) of 165.0γ is much higher than the

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γ(^{149}Gd) (continued)

E_γ	I_γ[@][a]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	δ[&]	α[b]	Comments
									intensity of the 630.7γ feeding this level. As the decay scheme is incomplete, this difference is most likely due to missing feeding transitions to the 165 level.
630.7[#] *3*	≈2.9[#]	796.0	9/2⁻	165.1	5/2⁻	[E2]		0.00776 *11*	I_γ: 1971Ar31 give Iγ<20. 1975SpZU assign this γ ray to ^{148}Tb.
[x]651[‡]	33.6								
[x]773[†]	3.5								
796.0[#] *1*	100[#]	796.0	9/2⁻	0.0	7/2⁻	(M1+E2)	+0.18 *2*	0.00783 *11*	α(K)=0.00667 *10*; α(L)=0.000913 *13*; α(M)=0.0001973 *28* α(N)=4.54×10^{-5} *6*; α(O)=7.07×10^{-6} *10*; α(P)=4.83×10^{-7} *7*
[x]853[†]	1.2								
[x]988[†]	2.0								
[x]1681.4[‡]	2.5								

† Reported only by 1971HaWX.
‡ Reported only by 1975SpZU.
# From 1975To03.
@ From 1971HaWX unless otherwise stated.
& From the Adopted Gammas.
[a] For absolute intensity per 100 decays, multiply by ≈0.97.
[b] 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.

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Decay Scheme

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