^{93}Tc ε decay (43.5 min) 1977Po13

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	NDS 112, 1163 (2011)	15-Dec-2010

Parent: ^{93}Tc: E=391.84 *8*; J^π=1/2$^-$; $T_{1/2}$=43.5 min *10*; Q(ε)=3201.0 *10*; %ε+%β^+ decay=22.6 *6*

^{93}Tc-%ε+%β^+ decay: [Σ(I(γ+ce) to ^{93}Mo g.s.) + Ti(^{93}Tc IT)]=98.8% 12, based on expected I(ε+β^+)<2.3% to ^{93}Mo g.s. (from log $f^{1u}t$>8.5); assuming adopted I(2645γ, ^{93}Mo)/I(392γ, ^{93}Tc)=0.246 *9*, (Iγ normalization x Branching)=0.583 *9* and %IT=77.4 *6*, leaving %(ε+β^+)=22.6 *6*.

Others: 1988BeYT, 1974An24, 1974Ch12, 1968Ka25, 1966Al17.

^{93}Mo Levels

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
0.0	5/2+	2182.0 *10*	3/2+	2698.3 *8*	(3/2)−	3220.4 *6*	(3/2)−
943.7 *5*	1/2+	2539.0 *12*	(3/2)	2861.5 *10*	(3/2)−	3298.2 *6*	(3/2)−
1492.2 *5*	3/2+	2644.6 *3*	(3/2)−	2955.6 *12*	1/2−,3/2−		

† From least-squares fit to Eγ.
‡ From Adopted Levels.

ε,β^+ radiations

E(decay)	E(level)	Iβ+ ‡	Iε‡	Log *ft*	I(ε+β+)†‡	Comments
(294.6 *12*)	3298.2		0.45 *4*	4.79 *4*	0.45 *4*	εK=0.8573; εL=0.11570 *5*; εM+=0.02699 *2*
(372.4 *12*)	3220.4		1.05 *9*	4.64 *4*	1.05 *9*	εK=0.8605; εL=0.11315 *3*; εM+=0.026306 *8*
(637.2 *16*)	2955.6		0.93 *12*	5.18 *6*	0.93 *12*	εK=0.8654; εL=0.10931 *2*; εM+=0.025278 *4*
(731.3 *14*)	2861.5		0.35 *6*	5.72 *8*	0.35 *6*	εK=0.8663; εL=0.1086; εM+=0.02510
(894.5 *13*)	2698.3		0.74 *10*	5.58 *6*	0.74 *10*	εK=0.8673; εL=0.1078; εM+=0.02488
(948.2 *11*)	2644.6		14.3 *6*	4.344 *21*	14.3 *6*	εK=0.8676; εL=0.1076; εM+=0.02482
(1053.8 *16*)	2539.0		1.22 *18*	5.51 *7*	1.22 *18*	εK=0.8680; εL=0.1073; εM+=0.02473
(1410.8 *14*)	2182.0	0.0058 *18*	0.57 *18*	6.09 *14*	0.58 *18*	av Eβ=176.44 *61*; εK=0.8604 *2*; εL=0.10543 *2*; εM+=0.024282 *4*
(2100.6 *11*)	1492.2	0.20 *6*	0.50 *17*	6.50 *15*	0.70 *23*	av Eβ=475.92 *50*; εK=0.6243 *6*; εL=0.07588 *8*; εM+=0.01746 *2*
(2649.1 *11*)	943.7	1.2 *2*	0.80 *12*	6.50 *7*	2.0 *3*	av Eβ=721.44 *51*; εK=0.3487 *5*; εL=0.04224 *6*; εM+=0.009713 *13*
(3592.8# *10*)	0.0	≤1.7	≤0.73	≥8.5^{1u}	≤2.4	av Eβ=1172.34 *46*; εK=0.2633 *3*; εL=0.03212 *3*; εM+=0.007393 *7*

† From I(γ+ce) imbalance At level.
‡ Absolute intensity per 100 decays.
# Existence of this branch is questionable.

γ(^{93}Mo)

Iγ normalization: [Σ(I(γ+ce) to ^{93}Mo g.s.) + Ti(^{93}Tc IT)]=98.8% 12, based on expected I(ε+β^+)<2.3% to ^{93}Mo g.s. (from log $f^{1u}t$>8.5); assuming adopted I(2645γ, ^{93}Mo)/I(392γ, ^{93}Tc)=0.246 *9*, (Iγ normalization x Branching)=0.583 *9* and %IT=77.4 *6*, leaving %(ε+β^+)=22.6 *6*.

Several lines are reported for the first time by 1988BeYT. However, Eγ and Iγ of established lines are not in very good agreement with data from earlier studies.

E_γ[†]	I_γ[†&]	E_i(level)	J^π_i	E_f	J^π_f	Mult.	δ	α[a]	Comments
^{x}288.3[@]	0.24[@] *10*								E_γ: a similar Eγ is associated with 2450 and 2535 levels.
^{x}309.2[@]	0.57[@] *10*								
943.7 *5*	5.0[#] *4*	943.7	1/2$^+$	0.0	5/2$^+$	[E2]		0.000883 *13*	α=0.000883 *13*; α(K)=0.000777 *11*; α(L)=8.83×10^{-5} *13*; α(M)=1.577×10^{-5} *23*; α(N+..)=2.53×10^{-6} α(N)=2.39×10^{-6} *4*; α(O)=1.331×10^{-7} *19* %Iγ=2.91 *23* assuming recommended decay scheme normalization.
1046.8 *10*	2.1 *3*	2539.0	(3/2)	1492.2	3/2$^+$	D+Q	−1.28 *+14−15*	0.000708 *11*	α=0.000708 *11*; α(K)=0.000624 *9*; α(L)=7.01×10^{-5} *10*; α(M)=1.251×10^{-5} *18*; α(N+..)=2.01×10^{-6} *3* α(N)=1.90×10^{-6} *3*; α(O)=1.077×10^{-7} *16* Mult.,δ: from Adopted Gammas.
^{x}1343.8[@]	0.97[@] *17*								E_γ: a similar Eγ is associated with a 2821 level, but a 1458γ of similar strength that should accompany the 1344γ is absent here.
1492.2 *5*	3.30[#] *24*	1492.2	3/2$^+$	0.0	5/2$^+$	(M1)		0.000415 *6*	α=0.000415 *6*; α(K)=0.000307 *5*; α(L)=3.39×10^{-5} *5*; α(M)=6.05×10^{-6} *9*; α(N+..)=6.88×10^{-5} *10* α(N)=9.23×10^{-7} *13*; α(O)=5.33×10^{-8} *8*; α(IPF)=6.78×10^{-5} *10* Mult.: from Adopted Gammas.
^{x}1694.0 *10*	1.1 *3*								E_γ: a similar Eγ is associated with 1695 level. γ May not originate solely from ^{93}Tc (43.5 min) because Iγ depends on duration of target irradiation (1977Po13). Eγ=1695.2, Iγ=0.47 *10* reported by 1988BeYT.
2011.9 *10*	1.6 *2*	2955.6	1/2$^-$,3/2$^-$	943.7	1/2$^+$				
^{x}2029.4[@]	1.14[@] *17*								
2182.0 *10*	1.0 *3*	2182.0	3/2$^+$	0.0	5/2$^+$	(M1)		0.000524 *8*	α=0.000524 *8*; α(K)=0.0001459 *21*; α(L)=1.604×10^{-5} *23*; α(M)=2.86×10^{-6} *4*; α(N+..)=0.000359 α(N)=4.37×10^{-7} *7*; α(O)=2.53×10^{-8} *4*; α(IPF)=0.000359 *5* Mult.: from Adopted Gammas.
2644.58 *26*	24.6 *9*	2644.6	(3/2)$^-$	0.0	5/2$^+$				%Iγ=14.3 *5* assuming recommended decay scheme normalization. E_γ: weighted average of 2644.5 *3* from 1974Ch12 and

γ(^{93}Mo) (continued)

E_γ[†]	I_γ[†&]	E_i(level)	J^π_i	E_f	J^π_f	Comments
						2644.8 *5* from 1977Po13. I_γ: weighted average of 25 *3* (1977Po13), 23.5 *13* (1974An24), and 26.0 *15* (1974Ch12).
2698.3 *8*	1.27[#] *17*	2698.3	(3/2)$^-$	0.0	5/2$^+$	
[x]2739.5[@]	1.59[@] *17*					E_γ: a weak γ with this Eγ is reported in ^{93}Tc ε decay (2.75 h) also,
2861.5 *10*	0.6 *1*	2861.5	(3/2)$^-$	0.0	5/2$^+$	
[x]3129.0 *5*	3.7 *2*					From 1974Ch12. Attributed by 1977Po13 to ^{94m}Tc decay. Also present in 1988BeYT (Iγ=2.10 *17*).
3220.3[‡] *6*	1.80[‡] *14*	3220.4	(3/2)$^-$	0.0	5/2$^+$	
3298.1[‡] *6*	0.77[‡] *6*	3298.2	(3/2)$^-$	0.0	5/2$^+$	

[†] From 1977Po13, if not indicated otherwise. Iγ is relative to I(392γ, ^{93}Tc IT)=100.

[‡] Weighted average from 1977Po13 and 1974Ch12.

[#] Weighted average from 1977Po13 and 1974An24.

[@] From 1988BeYT; not reported in other ^{93}Tc ε decay (43.5 min) studies. Evaluator has renormalized Iγ so I(2645γ)=24.6 (cf. authors′ value of 26 *1*); note, however, that I(392γ, ^{93}Tc IT)≈60 rather than 100. Evaluator considers that assignment of this γ to this decay has yet to be established.

[&] For absolute intensity per 100 decays, multiply by 0.583 *9*.

[a] 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