^{99}Tc IT decay (6.0072 h)

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. Browne, J. K. Tuli	NDS 145, 25 (2017)	1-Jul-2017

Parent: ^{99}Tc: E=142.6836 *11*; $J^{\pi}=1/2^{-}$; $T_{1/2}$=6.0072 h *9*; %IT decay=99.9963 *6*

Additional information 1.

The ^{99}Tc isomeric state decays mainly via the 2.17-keV E3 transition which is highly converted. The decay constant depends slightly on the electronic environment of the nucleus. Experimentally studied dependence on chemical state: 1980Ma03, 1972Ni07, 1953Ba41; temperature: 1972Ni07, 1958Be92; pressure (1972Ma27); external electric field: 1970Le25; a theoretical study of these effects together with a review of the experimental results is reported by 1977Do07. See 2004BeZR for evaluated decay data.

For calculation of atomic electron densities and changes in α caused by the chemical and ionization state see 1981Hi03.

The influence of the chemical environment on the conversion electron spectrum has been investigated in 1983Dr15 and 1982Ge01, the influence on I(Kα x ray), I(Kβ x ray) in 1981Yo08. $T_{1/2}$ affected by strong radiation (1993Bi15) $T_{1/2}$ for source implanted in Sn and Pb (2000Ko54), chemical influence on E(ce) (1996FiZW).

Others: $T_{1/2}$ 1939Se04, 1950Gl04; $T_{1/2}$ (environment effect): 1960Po04, 1998Ko72. ce 1951Me18, 1951Mi21, 1952Mi38, 1952Sc27, 1956La40, 1958Ch08, 1995Dr08.

^{99}Tc Levels

E(level)[†]	J^{π}	$T_{1/2}$	Comments
0	$9/2^{+}$		
140.5110 *10*	$7/2^{+}$		
142.6836 *11*	$1/2^{-}$	6.0072 h *9*	$T_{1/2}$: From Adopted Levels. Additional information 2.

[†] From Adopted Levels.

^{99}Tc IT decay (6.0072 h) (continued)

$\gamma(^{99}Tc)$

Iγ normalization: From Σ(I(γ+ce) to g.s.)=99.9963% *6*, deduced by evaluators assuming an estimated uncertainty of 3% in the relative intensity of Iγ(140.5). See β^- decay (6.0072 h) for β^- branching.
All experiments measuring Eγ or ce are referenced with ^{99}Mo β^- decay even if a separated ^{99}Tc (6.0072 h) source has been used.
Measured Tc K x ray intensity ratios: Kα_2 x ray/Kα_1 x ray=0.528 *2*, Kβ_1 x ray/Kα_1 x ray=0.1534 *35*; Kβ x ray/Kα x ray=0.1776 *8* (2007Ya02).

E_γ [@]	I_γ [&]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [@]	δ [‡@]	α [†#]	$I_{(\gamma+ce)}$ [&]	Comments
2.1726 *4*		142.6836	1/2$^-$	140.5110	7/2$^+$	E3		1.4×10^{10}	111.3	ce(M)/(γ+ce)=0.884 *6* ce(N)/(γ+ce)=0.1165 *22*; ce(O)/(γ+ce)=2.54×10^{-6} *5* α(M)=1.211×10^{10} *17* α(N)=1.596×10^{9} *23*; α(O)=3.49×10^{4} *5* E$_\gamma$: From ^{99}Mo β^- Decay (1981Ge05). Others: 2.17 *1* (1971La12), 2.15 *3* (1957Fr35). I$_{(\gamma+ce)}$: deduced from I(γ+ce)(2.17)=I(γ+ce)(140.5).
140.511 *1*	100 *3*	140.5110	7/2$^+$	0	9/2$^+$	M1+E2	+0.129 *35*	0.113 *3*		α(K)=0.0988 *25*; α(L)=0.0120 *5*; α(M)=0.00218 *8* α(N)=0.000345 *12*; α(O)=2.22×10^{-5} *5* E$_\gamma$: From ^{99}Mo β^- Decay (1981He15), value adopted in 2000He14. I$_\gamma$: Uncertainty in Iγ has been estimated by evaluators. I$_\gamma$: Iγ(140.5)=100 *3* x 0.89 *3*=89.0% *3*, per 100 decays of ^{99}Tc(6.0 h). The very low uncertainty of 0.3% is due to the covariant relation between the relative γ-ray intensity (100) and the normalization factor (0.89), the latter deduced by evaluators from the decay scheme.
142.63 *3*	0.025 *2*	142.6836	1/2$^-$	0	9/2$^+$	M4		40.3		α(K)=29.2 *4*; α(L)=9.08 *13*; α(M)=1.778 *25* α(N)=0.269 *4*; α(O)=0.01071 *15* I$_\gamma$: from ce(K)(142.6)/ce(K)(140.5)=0.075 *8* (1969Ag04). Others: 0.021 *3* (1980Di16), 0.032 *6* (1968Va14), both from ^{99}Mo β^- decay γ-spectra in equilibrium. The prompt components have been subtracted by the evaluators. Additional information 3.

[†] Additional information 4.

^{99}Tc IT decay (6.0072 h) (continued)

$\gamma(^{99}Tc)$ (continued)

‡ 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.
# Additional information 5.
@ See ^{99}Mo β^- decay.
& For absolute intensity per 100 decays, multiply by 0.89 *3*.

$^{99}_{43}Tc_{56}$-3

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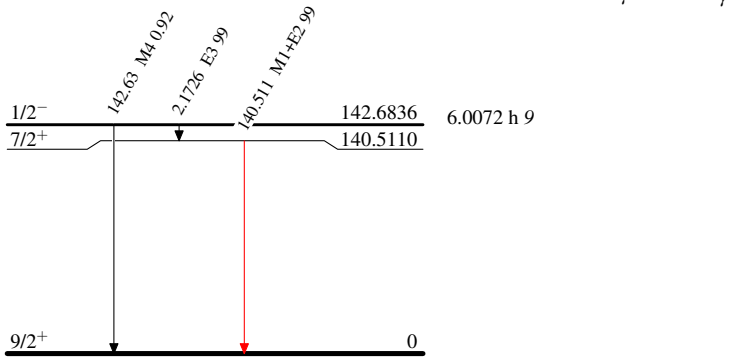
Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
%IT=99.9963 *6*



$^{99}_{43}Tc_{56}$