^{157}Tb ε decay 1983Be42

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 132, 1 (2016)	4-Dec-2015

Parent: ^{157}Tb: E=0.0; $J^{\pi}=3/2^{+}$; $T_{1/2}$=71 y *7*; Q(ε)=60.04 *30*; %ε decay=100.0

^{157}Tb produced by ^{156}Dy(n,γ) and ^{157}Dy decay, ^{156}Gd(α,3n), and spallation of Ta target with chemical and isotope separation. γ- and x-rays measured with NaI, Si(Li), and Ge detectors, and Auger electrons with proportional counters.

Experimental methods:

1960Na12: Produced by ^{156}Dy(n,γ) reaction on enriched (13.8%) sample with isotopic and chemical separation. Deduced $T_{1/2}$ from K x-ray emission rate from sample of known mass.

1962Bh05: Produced by ^{156}Dy(n,γ) reaction on enriched (13.8%) sample with chemical separation. γ- and X-rays measured with NaI detectors. L/K capture ratio measured.

1963Iw04: Produced by ^{156}Gd(α,3n) reaction on enriched (97.01%) sample with chemical separation. After the decay of the ^{157}Dy activity, the ^{157}Tb was separated. The X rays were measured to determine the decay rate, and thereby the $T_{1/2}$.

1964Fu03: ^{157}Tb produced as in 1963Iw04. γ- and X-rays were measured with NaI detectors.

1964Gr14: Produced by spallation of Ta with 660-MeV protons. ce measured in magnetic spectrometer. From relative ^{157}Dy and ^{157}Tb decay rates, $T_{1/2}$ was determined.

1967Na08: Produced by ^{156}Dy(n,γ) reaction on enriched sample with chemistry and isotope separation. K and L X rays measured on NaI detector.

1983Be42: Produced by spallation of Ta target with 600-MeV p followed by isotope separation. $T_{1/2}$ determined from decay rate and known sample mass. X rays measured with Si(Li) and Ge detectors and Auger e- with proportional counter; coincidences measured.

1992Ra18: From measured ratio of L and K x ray intensities, deduce Q_{ε}=60.0 keV and there is no L capture to 54 level.

^{157}Gd Levels

E(level)	J^{π}[†]
0.0	$3/2^{-}$
54.54 *1*	$5/2^{-}$

[†] From ^{157}Gd Adopted Levels.

ε radiations

E(decay)[†]	E(level)	Iε[‡]	Log *ft*	Comments
(5.5 *3*)	54.54	0.11 *1*	6.92 *10*	εM+=1.000 Additional information 1. Iε: From 1983Be42 and based on measurement of $I_{\gamma}(54)/I_{Kx}=4.16\times10^{-4}$ *10*. Other: 0.34% *2* (1967Na08) which was given in the last evaluation as 0.28% *2* after recalculation (1983Bu16) with later values of the constants. $\varepsilon_L/\varepsilon_M$ was measured to be −0.010 *3*, but interpreted to mean ≤0.006. Value indicates the absence of L capture to this excited state. ε_M is from 1983Be42.
(60.0 *3*)	0.0	99.89 *1*	7.02 *5*	Additional information 2. ε_L is from 1983Be42. Others: $\varepsilon_L/\varepsilon_K$=2.65 *20* (1967Na08), 2.64 (1962Bh05), and 2.18 (1964Fu03). This value includes capture to 0- and 54-keV states, but effectively applies to the ground state.

[†] Values computed from Q_{ε}=60.04 *30* keV from mass evaluation 2012Wa38. This value is close to 60.1 *3* keV from mass evaluation 2003Au03 but smaller than earlier values (especially measurements of 62.9 *7* (1983Be42) and 62.2 *6* (1985Vo09), and 62.8 *7* from earlier mass evaluation 1985Wa02).

[‡] Absolute intensity per 100 decays.

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γ(^{157}Gd)

Iγ normalization, I(γ+ce) normalization: γ transition intensity already normalized (1983Be42).

E_γ	I_γ[#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	δ[‡]	α[†]	Comments
54.5	0.0084 *8*	54.54	5/2⁻	0.0	3/2⁻	M1+E2	0.19	12.12	α(K)=9.53 *14*; α(L)=2.02 *3*; α(M)=0.452 *7* α(N)=0.1028 *15*; α(O)=0.01504 *21*; α(P)=0.000720 *10* I_γ: Deduced by evaluator from I_γ(54)(1+α) and α of 1983Be42.

† Additional information 3.
‡ Additional information 4.
# Absolute intensity per 100 decays.

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Decay Scheme

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