

¹⁵⁶Yb ε decay 1983MI01,1999KaZV

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	C. W. Reich	NDS 113, 2537 (2012)	1-Mar-2012

Parent: ¹⁵⁶Yb: E=0; J^π=0⁺; T_{1/2}=26.1 s 7; Q(ε)=3574 13; %ε+%β⁺ decay=90 2

¹⁵⁶Yb-T_{1/2}: [Additional information 1](#).

¹⁵⁶Yb-Q(ε): [Additional information 2](#).

¹⁵⁶Yb-%ε+%β⁺ decay: from measured %α=10 2, which is the weighted average of 21 6 ([1979Ho10](#)), 9 2 ([1983MI01](#)), and 10 +5-2 ([1984GaZY](#)).

[Additional information 3](#).

[2011Es03](#): Source material produced in the ¹⁰³Ru(⁵⁸Ni,αp) reaction. Used total-absorption γ spectroscopy to deduce ε+β⁺ feeding intensities to the 115.2 and 317.5 levels.

[1983MI01](#): Source material from ¹⁴⁷Sm(¹⁶O,7n) with E(¹⁶O)=141 MeV. Enriched (98% ¹⁴⁷Sm) target, followed by isotope separation. α's studied using a Si(Au) detector and γ's using a Ge detector. Same authors as [1982To14](#).

[1999KaZV](#): Source material produced from high-energy proton spallation on a tungsten target, followed by on-line isotope separation. Measured γ, γγ, ce. Report two γ's, one of which is new.

[1982To14](#): Produced from ¹⁴⁷Sm(¹⁶O,7n), followed by isotope separation. γ's measured with Ge detectors and α's with Si(Au) detectors. One γ, and its α(K)exp, reported. Same authors as [1983MI01](#).

¹⁵⁶Tm Levels

E(level)	J ^π †	T _{1/2}	Comments
0	2 ⁻	83.8 s 18	
115.2 2	1 ⁺		
317.5	1 ⁺		E(level): Deduced from 1999KaZV , who state that the 202.3 γ forms a cascade with the 115.2 γ.

† From adopted values.

ε,β⁺ radiations

No levels above 317.5 keV are reported in the ¹⁵⁶Tm decay using conventional Ge detector-based γ spectroscopy. From total-absorption γ spectroscopy, [2011Es03](#) report intensities of the ε+β⁺ transitions feeding the 115.2 and 317.5 levels. These data give values for these transitions that differ considerably from those inferred from the Ge-based spectroscopy, which is not unexpected since the level scheme deduced from spectroscopy of this sort is expected to be quite incomplete in situations such as this. These authors report that (25±3)% of the decays of ¹⁵⁶Yb involve ε+β⁺ transitions to levels above 320 keV in ¹⁵⁶Tm.

E(decay)	E(level)	Iβ ⁺ †	Iε †	Log ft	I(ε+β ⁺) †	Comments
(3257 13)	317.5	0.90 11	2.5 3	5.15 6	3.4 4	av Eβ=1009.5 59; εK=0.613 3; εL=0.0951 5; εM+=0.02851 14 Iβ ⁺ : Deduced by the evaluator from the Iε and total I(ε+β ⁺) values reported by 2011Es03 . I(ε+β ⁺): Value expressed in transitions per 100 decays of ¹⁵⁶ Yb.
(3459 13)	115.2	20 1	42 3	3.98 4	62 4	av Eβ=1100.8 59; εK=0.567 3; εL=0.0879 5; εM+=0.02635 14 Iβ ⁺ : Deduced by the evaluator from the Iε and total I(ε+β ⁺) values reported by 2011Es03 . I(ε+β ⁺): Value expressed in transitions per 100 decays of ¹⁵⁶ Yb.

† For absolute intensity per 100 decays, multiply by 0.999 22.

¹⁵⁶Yb ε decay **1983MI01,1999KaZV (continued)**

γ(¹⁵⁶Tm)

<u>E_γ</u>	<u>I_γ^{†‡}</u>	<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.</u>	<u>α[@]</u>	<u>I_(γ+ce)[#]</u>	<u>Comments</u>
115.2 2	100 4	115.2	1 ⁺	0	2 ⁻	E1	0.230	65 4	ce(K)/(γ+ce)=0.1551 20; ce(L)/(γ+ce)=0.0246 4; ce(M)/(γ+ce)=0.00548 9; ce(N+)/(γ+ce)=0.001435 22 ce(N)/(γ+ce)=0.001260 19; ce(O)/(γ+ce)=0.000168 3; ce(P)/(γ+ce)=7.06×10 ⁻⁶ 11 E _γ : From 1983MI01, 1999KaZV report E _γ =115.3. I _γ : Listed uncertainty is that assumed by the evaluator. Mult.: From measured and calculated K x-ray intensities and lack of L x rays (1982To14). α(K)exp=0.20 2.
202.3	4.5 5	317.5	1 ⁺	115.2	1 ⁺	M1	0.424	3.4 4	ce(K)/(γ+ce)=0.250 3; ce(L)/(γ+ce)=0.0374 6; ce(M)/(γ+ce)=0.00834 12; ce(N+)/(γ+ce)=0.00225 4 ce(N)/(γ+ce)=0.00195 3; ce(O)/(γ+ce)=0.000281 4; ce(P)/(γ+ce)=1.525×10 ⁻⁵ 23 E _γ , I _γ , Mult.: From 1999KaZV, 1983MI01 do not report this γ.

[†] Relative values as reported by **1999KaZV**.

[‡] For absolute intensity per 100 decays, multiply by 0.53 4.

[#] For absolute intensity per 100 decays, multiply by 0.90 2.

[@] Total theoretical internal conversion coefficients, calculated using the BrIcc code (**2008Ki07**) with Frozen orbital approximation based on γ-ray energies, assigned multiplicities, and mixing ratios, unless otherwise specified.

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Decay Scheme

Legend

- I_γ < 2% × I_γ^{max}
- I_γ < 10% × I_γ^{max}
- I_γ > 10% × I_γ^{max}

Intensities: I_(γ+ce) per 100 decays through this branch

