^{150}Eu ε decay (12.8 h) 1968Ku10,1965Gu03

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	S. K. Basu, A. A. Sonzogni	NDS 114, 435 (2013)	1-Apr-2013

Parent: ^{150}Eu: E=41.7 *10*; J$^{\pi}$=0^{-}; T$_{1/2}$=12.8 h *1*; Q(ε)=2259 *6*; %ε+%β^{+} decay=11 *2*

Some coincidence data were taken from 1974ShYQ.

1968Ku10: sources of ^{150}Eu (12.8 h) were made with the reaction ^{150}Sm(d,2n) E=12 MeV. γ-ray energies, intensities were obtained with a 7-mm Ge(Li) detector with an energy resolution at 662 keV of 2.0 keV. $\gamma\gamma$-coincidence measurements were made with a resolving time of 90 ns. A table of ratios of reduced transition probabilities is given.

See also 1977Ho08.

^{150}Sm Levels

E(level)†	J$^{\pi}$‡	Comments
0.0	0^{+}	
333.88 *9*	2^{+}	
740.38 *12*	0^{+}	
1046.07 *12*	2^{+}	
1165.70 *11*	1^{-}	
1193.74 *19*	2^{+}	
1255.49 *15*	0^{+}	
1786.09? *17*	($\leq$3)	E(level): a level at this energy was first proposed by 1965Gu03 and tentatively assigned by 1968Ku10 on the basis of energy fits. J$^{\pi}$: the log *ft* value (8.0) calculated for electron capture to this level is consistent with those for capture to other 0^{+} and 2^{+} levels in ^{150}Sm, suggesting that J for this level is $\leq$3, assuming that J=(0) for the g.s. of 12.8-h ^{150}Eu.
1963.30 *16*	1$^{(-)}$	

† Evaluators have supplied level energies adjusted by means of a least-squares method which takes into account all transitions and recoil corrections.
‡ From Adopted Levels. $\gamma\gamma(\theta)$ consistent with these assignments.

ε,β^{+} radiations

E(decay)	E(level)	Iβ^{+} #	Iε#	Log *ft*	I($\varepsilon+\beta^{+}$)†#	Comments
(337 *6*)	1963.30		0.41 *7*	6.9 *9*	0.41 *7*	εK=0.8097 *8*; εL=0.1467 *6*; εM+=0.04361 *21*
(515 *6*)	1786.09?		0.050 *10*	8.2 *9*	0.050 *10*	εK=0.8239 *3*; εL=0.13615 *23*; εM+=0.03997 *8*
(1045 *6*)	1255.49		0.27 *5*	8.1 *9*	0.27 *5*	εK=0.8361; εL=0.12706 *5*; εM+=0.03686 *2*
(1107 *6*)	1193.74		0.027 *5*	9.8^{1u} *9*	0.027 *5*	εK=0.8238 *2*; εL=0.1362 *2*; εM+=0.04002 *4*
(1135 *6*)	1165.70		0.43 *8*	8.0 *9*	0.43 *8*	εK=0.8370; εL=0.12641 *5*; εM+=0.03663 *2*
(1255 *6*)	1046.07		0.080 *20*	9.6^{1u} *9*	0.080 *20*	εK=0.8269 *2*; εL=0.13384 *9*; εM+=0.03921 *3*
(1560 *6*)	740.38	0.013 *2*	2.7 *5*	7.5 *9*	2.7 *5*	av Eβ=253.8 *27*; εK=0.8358 *2*; εL=0.12378 *5*; εM+=0.03577 *2*
(1967 *6*)	333.88	0.005 *3*	0.6 *4*	9.5^{1u} *10*	0.6 *4*	av Eβ=450.6 *27*; εK=0.8279 *2*; εL=0.12694 *6*; εM+=0.03688 *2*
2264‡ *25*	0.0	0.66 *18*	6.2 *17*	7.5 *9*	6.9 *19*	av Eβ=579.3 *27*; εK=0.7617 *12*; εL=0.11094 *18*; εM+=0.03198 *6*

† Deduced from γ-ray intensity balance at each level.
‡ E(β^{+})=1242 *25* measured by 1965Gu03.
\# Absolute intensity per 100 decays.

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γ(^{150}Sm)

Iγ normalization: γ-ray intensity normalization was determined from the following considerations: the 12.8-h ^{150}Eu Iε, Iβ^- branching was determined from I(K x ray)/Iβ^-=0.10 *2* (1965Gu03) using an ω(K) of 0.928 and Iε/Iε(K)=1.18. Iβ^-=89% *2* and Iε=10.7% *18*. The Iβ^+ to the g.s. of ^{150}Sm can be deduced two ways. 1965Gu03 measured Iβ^-/Iβ^+=250 (no uncertainty given) from which Iβ^+=0.35%. If this branch is deduced from Iε/Iβ^+ (obtained from I(K), I($\gamma^\pm$) in table 1 of 1965Gu03), Iβ^+=0.54%. However, I($\gamma^\pm$)/I(334)γ of 1965Gu03 is almost twice that reported by 1962Ri05 and 1963Yo07, who appear to be in agreement with the value 0.35%. Thus, there is a discrepancy in these measurements which may be inherent in the values reported for I($\gamma^\pm$). From I(334)γ/I(K x ray) of 1965Gu03 and details of the proposed decay scheme, one deduces the combined β^+ and ε feeding of the ^{150}Sm g.s. to be ≈6.8%, of which theory gives 0.6% as the β^+ component for an allowed transition. This value is adopted for the β^+ branch to ^{150}Sm, since no appreciable β^+ branch to the excited states is indicated by theory. ε branches to the excited states are deduced from γ-ray intensity balances. With this normalization the intensity of the 334γ is 3.9% *7* (1976Ba18).

E_γ[@]	I_γ[@&]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[†]	α[a]	$I_{(\gamma+ce)}$[&]	Comments
209.4 *1*	0.55[#] *8*	1255.49	0+	1046.07	2+				
305.4 *4*	≈0.08	1046.07	2+	740.38	0+	E2	0.0535		α(K)=0.0417; α(L)=0.00918; α(M)=0.00203; α(N+..)=0.00055
333.9 *1*	100. *8*	333.88	2+	0.0	0+	E2	0.0407		α(K)=0.0321; α(L)=0.00669; α(M)=0.00148; α(N+..)=0.00040
406.5 *1*	71[#] *6*	740.38	0+	333.88	2+	E2			
425.3 *3*	0.20 *4*	1165.70	1−	740.38	0+				
515.3 *8*		1255.49	0+	740.38	0+	E0		0.7[‡]	Seen as highly converted transition by 1961Ha23.
620.3 *2*	0.80 *12*	1786.09?	(≤3)	1165.70	1−				
712.2 *1*	3.3 *3*	1046.07	2+	333.88	2+	E2+E0+M1	0.0091		α(K)=0.0077; α(L)=0.001
740.4 *5*		740.38	0+	0.0	0+	E0		1.3[‡]	Mult.: 1963Yo07 found no 740-keV photon. 1968Ku10 attribute all or most of their 740 peak to summing. ce(K) reported by 1961Ha23.
740.4[b] *5*		1786.09?	(≤3)	1046.07	2+				
831.8 *1*	5.0 *4*	1165.70	1−	333.88	2+	(E1)	0.00148		α(K)=0.00126; α(L)=0.00016
860.1 *5*	0.23 *6*	1193.74	2+	333.88	2+	E2+M1(+E0)	0.00347		α(K)=0.00291; α(L)=0.00042
917.7 *6*	1.1 *2*	1963.30	1(−)	1046.07	2+				
921.7 *3*	5.3[#] *4*	1255.49	0+	333.88	2+	E2			
1046.2 *3*	0.21 *5*	1046.07	2+	0.0	0+				
1165.7 *2*	6.5 *6*	1165.70	1−	0.0	0+	E1	0.00078		α(K)=0.00067
1193.7 *2*	0.46 *10*	1193.74	2+	0.0	0+	E2			
1223.0 *2*	5.0 *4*	1963.30	1(−)	740.38	0+				
1452.3 *2*	0.37 *13*	1786.09?	(≤3)	333.88	2+				
1629.4 *3*	1.45 *19*	1963.30	1(−)	333.88	2+				
1963.0 *3*	2.9 *3*	1963.30	1(−)	0.0	0+				

† From adopted gammas.
‡ From relative ce intensities of 1961Ha23.
# The γ-ray intensity ratios for the following E2 transitions are Iγ(406):Iγ(921):Iγ(209)=100(6):8.0(6):0.94(12)(1986Pa14).

Continued on next page (footnotes at end of table)

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$\gamma(^{150}Sm)$ (continued)

[@] From 1968Ku10.

[&] For absolute intensity per 100 decays, multiply by 0.040 *7*.

[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.

[b] Placement of transition in the level scheme is uncertain.

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