^{244}Am β^- decay (26 min) 1984Ho02

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	C. D. Nesaraja	NDS 146, 387 (2017)	31-Aug-2017

Parent: ^{244}Am: E=89.5 *16*; $J^\pi=1^+$; $T_{1/2}$=26 min; Q(β^-)=1427.3 *10*; %β^- decay=99.9636 *13*

1984Ho02: ^{244}Am was produced by neutron irradiation on ^{243}Am High Flux Reactor of the Institut Laue-Langevin at Grenoble. γ ray energies and intensities were measured with two curved-crystal spectrometers. Conversion electron data were measured with the beta spectrometer.

1962Va08: ^{244}Am was produced by neutron irradiation on enriched ^{243}Am at the Argonne Reactor CP-5. The decay of the chemically purified ^{244}Am was measured by γ singles and $\gamma\gamma$ and X-ray coincidence methods using the Tl activated NaI detector. $\gamma\beta$ coincidence were observed using scintillation counting techniques The conversion electron data were measured with a propane flow-type proportional counter with two different types of end windows.

^{244}Cm Levels

E(level)[†]	J^π[†]	Comments
0.0	0^+	
42.957 *9*	2^+	
984.914 *15*	0^+	
1020.756? *22*	(2^+)	E(level): This level is tentatively assigned. An alternate placement of the 977.796-keV transition could be to de excite a 977.796-keV 0^+ level to the ground state (1984Ho02).
1084.199? *12*	$(1,2^+)$	
1105.909? *20*	(1,2)	

[†] From Adopted Levels.

β^- radiations

E(decay)	E(level)	Iβ^-[†‡]	Log *ft*	Comments
(410.9[#] *19*)	1105.909?	≈0.36	≈6.8	av Eβ=117.03 *60*
(432.6[#] *19*)	1084.199?	0.56 *16*	6.67 *13*	av Eβ=123.88 *60*
(496.0[#] *19*)	1020.756?	≈0.17	≈7.4	av Eβ=144.20 *62*
(531.9 *19*)	984.914	1.5 *3*	6.53 *9*	av Eβ=155.88 *62*
(1473.8 *19*)	42.957	≈25	≈6.8	av Eβ=495.95 *73*
(1516.8 *19*)	0.0	≈72	≈6.4	av Eβ=512.48 *73*
				E(decay): 1498 keV *10* measured by 1962Va08.

[†] Beta intensity per 100 beta decays of 26-min ^{244}Am, deduced from intensity balance at each level; the normalization factor to convert I_γ's from per 100 neutron captures to per 100 beta decays is taken as 1.05 *15*. Therefore, any change in γ normalization factor will effectively change the β intensities listed here.

[‡] For absolute intensity per 100 decays, multiply by 0.999636 *13*.

[#] Existence of this branch is questionable.

$\gamma(^{244}Cm)$

Iγ normalization: Obtained by assuming that the yield for 26-min ^{244}Am production in ^{243}Am(n,γ) was 95% *14*. See footnote for Iγ.

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^{244}Am β^- decay (26 min) 1984Ho02 (continued)

$\gamma(^{244}Cm)$ (continued)

E_γ[‡]	I_γ[#&]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	α[†]	$I_{(\gamma+ce)}$[&]	Comments
42.965 *10*	≈0.024	42.957	2^+	0.0	0^+	E2	1050	≈25	α(L)=760 *11*; α(M)=214 *3* α(N)=59.5 *9*; α(O)=14.38 *21*; α(P)=2.35 *4*; α(Q)=0.00578 *9* I_γ: Iγ=0.029 listed in 1984Ho02 was calculated from the experimental electron intensities (which include beta decay activities from the 10-hour ^{244}Am) and theoretical conversion coefficients, The evaluator has deduced the Iγ from intensity balance: I(42.965γ from the 10.1-hour decay)≈ 0.0048. Hence I(42.965γ from 26-min ^{244}Am)≈ 0.024. Mult.: see 10.1-h ^{244}Am β decay for ce measurements of 1984Ho02.
941.949 *18*	0.33 *11*	984.914	0^+	42.957	2^+	[E2]	0.01547	0.34 *11*	α(K)=0.01120 *16*; α(L)=0.00318 *5*; α(M)=0.000807 *12* α(N)=0.000222 *4*; α(O)=5.57×10^{-5} *8*; α(P)=1.053×10^{-5} *15*; α(Q)=5.41×10^{-7} *8*
977.796 *20*		1020.756?	(2^+)	42.957	2^+	E0(+M1+E2)		≈0.16	Mult.: Only conversion electrons were observed by 1984Ho02. The 977.92 *7* gamma observed by 1984Vo07 in ^{243}Am(n,γ), could belong to the beta decay of the 26-min isomer. In that case, Iγ(977.9γ)/Iγ(1084.18γ)= 0.23 *10*, measured in ^{243}Am(n,γ) (1984Vo07), gives Iγ(977.9γ)=0.08 *4*. Ice(K)=0.060 *6*, Ice(L1)=0.017 *3*. Ice(total) assumed by evaluator: I(total ce)≈Ice(K)+1.30Ice(L 1)=0.082; if Iγ=0.08, then I(γ+ce)≈0.16 Intensities in units of electrons per 100 neutron captures in ^{243}Am(n,γ).
984.919 *20*		984.914	0^+	0.0	0^+	E0		1.07 *9*	Mult.: Only conversion electrons were observed by 1984Ho02. Ice(K)=0.84 *9*, Ice(L1)=0.17 *2*, Ice(M1)=0.047 *7*, Ice(N1)=0.012 *6*. Ice(total)

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^{244}Am β^- decay (26 min) 1984Ho02 (continued)

$\gamma(^{244}Cm)$ (continued)

E_γ[‡]	I_γ[#&]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	α[†]	$I_{(\gamma+ce)}$[&]	Comments
									deduced by evaluator= 1.07 *9* Intensities in units of electrons per 100 neutron captures in ^{243}Am(n,γ) (1984Ho02).
1041.278 *22*	0.18 *6*	1084.199?	(1,2$^+$)	42.957	2$^+$			0.18 *6*	
1062.953 *18*	0.26 *8*	1105.909?	(1,2)	42.957	2$^+$			≈0.29	Mult.: Experimental conversion coefficients do not rule out M2 and M3 multipolarities: α(K)exp=0.09 *3*, α(L1)exp=0.02 *1*. The M3 character can be ruled out based on the decay scheme. As the authors (1984Ho02) point out, the 1062- and 1105-keV gammas might be strongly hindered; conversion coefficients for anomalous E1 transitions could exceed the theoretical coefficients by a factor as large as 100. No multipolarity for the 1062.953γ is adopted. $I_{(\gamma+ce)}$: Deduced by evaluator with $\alpha\approx$ 0.114 assumed from experimental conve coefficients: α(K)+1.20α(L1).
1084.181 *14*	0.34 *11*	1084.199?	(1,2$^+$)	0.0	0$^+$	(M1)	0.0440	0.35 *11*	α(K)=0.0348 *5*; α(L)=0.00690 *10*; α(M)=0.001680 *24* α(N)=0.000461 *7*; α(O)=0.0001174 *17*; α(P)=2.31×10^{-5} *4*; α(Q)=1.653×10^{-6} *24* Mult.: The experimental K-conversion coefficient suggests M1 or M1+E2. α(K)exp=0.03 *1* (higher multipolarities are excluded because of beta feeding from the 1$^+$ parent.) Since a γ transition to the 0$^+$ g.s. cannot have M1, E2 admixture, E2 character can also be ruled out from α(K)exp if the authors′ normalization for conversion electrons is precise.
1105.43 *19*	0.04 *2*	1105.909?	(1,2)	0.0	0$^+$			≈0.05	Mult.: α(K)exp=0.14 *11* suggests either M1, M2 or M3 multipolarity. By assuming that the decay scheme is correct, the M3 character can be ruled out. See the comment for the 1062.953γ for the possibility of an anomalous E1 transition. $I_{(\gamma+ce)}$: Deduced by evaluator with $\alpha\approx$ 0.17 assumed from experimental conver coefficients: α(K)+0.20α(K).

† Additional information 1.
‡ Measurements of 1984Ho02. Other measurements: 1962Va08.
# Photon intensity, measured by 1984Ho02; they are given as per 100 n captures in ^{243}Am(n,γ). As pointed out by 1984Ho02, absolute intensities can be obtained from isomeric cross section ratio: $\sigma(^{243}Am(n,\gamma)^{244}Am$ (26 min))/$\sigma(^{243}Am(n,\gamma)^{244}Am$

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^{244}Am β^- decay (26 min) 1984Ho02 (continued)

$\gamma(^{244}Cm)$ (continued)

(10.1 h))=18.6 *19*, reported by 1964Va04. The amount of 26-min isomeric state, therefore, was 95% *14* of the total ^{244}Am production. Multiplying the photon intensities given here by a factor of 1.05 *15* (i.e. 1/0.95 *14*) will convert them to per 100 ^{244}Am (26-min) decays.

@ From conversion electron measurements in 1984Ho02.

& For absolute intensity per 100 decays, multiply by 1.05 *15*.

^{244}Am β^- decay (26 min) 1984Ho02

Decay Scheme

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