^{244}Am β^- decay (10.1 h) 1984Ho02

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

Parent: ^{244}Am: E=0.0; J^π=(6$^-$); $T_{1/2}$=10.1 h *1*; Q(β^-)=1427.3 *10*; %β^- decay=100.0

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.

1963Ha29: ^{244}Am was produced by neutron irradiation on ^{243}Am at the DR3 reactor at Riso National Laboratory in Denmark. The irradiation was followed by radiochemical separation to extract the ^{244}Am. Delayed coincidence technique between β particles and conversion electron was used to determine the half-life for decay of the 1042 keV isomeric state using a plastic scintillator. Angular correlations were performed using a NaI(Tl) detector for the 746-154 γ cascade at 90°, 135°, and 180°.

1967Sc34: ^{244}Am was produced by neutron irradiation on ^{243}Am. Gammas from the decay were measured with a Ge detector. Intensities relative to the 744γ were measured for the 99.3γ, 153.7γ and the 205 γ.

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.

1962Ch19: ^{244}Am was produced by neutron irradiation on ^{243}Am at the DR2 reactor at Riso National Laboratory in Denmark. γ rays and electrons were measured using the Naton scintillator. Half life of the 42.9 keV level was determined by the delayed coincidence technique between γ rays and conversion electron lines.

The decay scheme is given as constructed by 1962Va08, and confirmed by 1984Ho02.

^{244}Cm Levels

E(level)†	J^π	$T_{1/2}$	Comments
0.0	0$^+$	18.11 y *3*	$T_{1/2}$: From Adopted Levels.
42.957 *9*	2$^+$	97 ps *5*	$T_{1/2}$: From delayed coincidence technique between γ rays and conversion electron lines by 1962Ch19.
142.340 *10*	4$^+$		
296.204 *10*	6$^+$		
501.779 *11*	8$^+$		
1040.181 *11*	6$^+$	34 ms *2*	$T_{1/2}$: From decay curve measurements in delayed coincidence between β particles and conversion electrons (1963Ha29).

† From Adopted Levels.

β^- radiations

E(decay)	E(level)	Iβ^-†	Log *ft*	Comments
(387.1 *10*)	1040.181	100	5.628 *6*	av Eβ=109.60 *32* E(decay): 387 measured by 1962Va08.

† Absolute intensity per 100 decays.

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$\gamma(^{244}Cm)$

Iγ normalization: From intensity balance at the 1040-keV level: Iβ(to 1040 level)=ΣI(γ+ce) for γ's from 1040 level=100%. The parent decays only to the 1040 level (1984Ho02, 1963Ha29, 1962Va08).

E_γ[‡]	I_γ[#&]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	α[†]	Comments
42.965 *10*	≈0.0048	42.957	2^+	0.0	0^+	E2	1050	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 listed in 1984Ho02 was calculated from the experimental electron intensities (which include beta decay activities from the 26$^-$ minute ^{244}Am) and theoretical conversion coefficients, The evaluator has deduced the Iγ from the requirement that I(γ+ce)(42.965γ)=100% which gives I(γ+ce)(42.965γ)=0.0048 *10*. In addition, from intensity balance I(γ+ce)(42.965γ)=I(γ+ce)(99.383γ)=4.7 *9*, one obtains Iγ(42.965γ)=0.0044 *8*. Ice(L2): Ice(L3):Ice(M2):Ice(M3):Ice(N2): Ice(N3)= 920 *450*:608 *200*:118 *25*:92 *20*:53 *9*:22 *6* (1984Ho02). These values were listed by 1984Ho02 as the experimental conversion coefficients. Since the photon intensity was calculated from theoretical conversion coefficients, they are quoted here as relative ce intensities. Ice L_{12}/Ice L_3=1.4 (1962Va08).
99.383 *4*	0.23 *4*	142.340	4^+	42.957	2^+	E2	19.3	α(L)=13.93 *20*; α(M)=3.94 *6* α(N)=1.095 *16*; α(O)=0.265 *4*; α(P)=0.0441 *7*; α(Q)=0.000180 *3* α(L1)exp=0.46 *11*, α(L2)exp=8.3 *19*, α(L3)exp=5.1 *11*, α(M2)exp=2.6 *6*, α(M3)exp=1.6 *4*, α(N2)exp=1.25 *27*, α(N3)exp=0.66 *15* (1984Ho02). Ice L_{12}/Ice L_3=1.7, α(total)exp=20 (1962Va08).
153.863 *2*	0.82 *16*	296.204	6^+	142.340	4^+	E2	2.81	α(K)=0.1741 *25*; α(L)=1.90 *3*; α(M)=0.536 *8* α(N)=0.1492 *21*; α(O)=0.0362 *5*; α(P)=0.00610 *9*; α(Q)=3.92×10^{-5} *6* α(L1)exp=0.26 *6*, α(L2)exp=1.27 *28*, α(L3)exp=0.69 *15*, α(M1)exp=0.08 *4*, α(M2)exp=0.37 *8*, α(M3)exp=0.25 *5*, α(N2)exp=0.15 *3*, α(N3)exp=0.20 *4* (1984Ho02). K/L=0.09, α(K)exp=0.19, α(L) exp=2.1, total Ice=50% (1962Va08).
205.575 *4*	0.017 *4*	501.779	8^+	296.204	6^+	[E2]	0.887	α(K)=0.1409 *20*; α(L)=0.541 *8*; α(M)=0.1514 *22* α(N)=0.0421 *6*; α(O)=0.01025 *15*; α(P)=0.001746 *25*; α(Q)=1.644×10^{-5} *23* Ice(L)=0.1% (1962Va08).
538.400 *16*	0.033 *7*	1040.181	6^+	501.779	8^+	[E2]	0.0495	α(K)=0.0292 *4*; α(L)=0.01492 *21*; α(M)=0.00396 *6* α(N)=0.001096 *16*; α(O)=0.000271 *4*; α(P)=4.93×10^{-5} *7*; α(Q)=1.637×10^{-6} *23* Ice(K)=0.02% (1962Va08), Ice(K)=0.019% (1963Ha29).

Continued on next page (footnotes at end of table)

^{244}Am β^- decay (10.1 h) 1984Ho02 (continued)

γ(^{244}Cm) (continued)

E_γ ‡	I_γ #&	E_i(level)	J_i^π	E_f	J_f^π	Mult. @	δ	α †	Comments
743.971 *5*	3.3 *9*	1040.181	6^+	296.204	6^+	M1+E2	−0.92 *5*	0.077 *3*	α(K)=0.0593 *24*; α(L)=0.0130 *4*; α(M)=0.00321 *10* α(N)=0.00088 *3*; α(O)=0.000223 *7*; α(P)=4.34×10^{-5} *14*; α(Q)=2.86×10^{-6} *11* A_2=−0.050 *12*, A_4=0.059 *15* for (744γ)(154γ)(θ) cascade (1963Ha29). δ: from $\gamma\gamma(\theta)$ data of 1963Ha29 (Author had used the Rose phase convention) . Others: $\delta\leq1.1$ from α(K)exp=0.08 *2*, α(L1)exp=0.012 *4*, α(L2)exp=0.003 *1* (1984Ho02). δ=0.9 *+4−3* from $K/L=4.5, α(K)exp=0.06, α(L)exp=0.01 with a 10 % uncertainty, (1962Va08). total Ice=5.8% (1962Va08),Ice(K)=4.5% (1963Ha29).
897.848 *7*	1.4 *4*	1040.181	6^+	142.340	4^+	E2		0.01697	α(K)=0.01215 *17*; α(L)=0.00358 *5*; α(M)=0.000912 *13* α(N)=0.000251 *4*; α(O)=6.29×10^{-5} *9*; α(P)=1.186×10^{-5} *17*; α(Q)=5.93×10^{-7} *9* α(K)exp=0.012 *4*. The electron intensity was used as a calibration point for the measured γ and electron intensities (1984Ho02). K/L=3.3, α(K)exp=0.01, α(L)exp=0.003, total Ice=0.41% (1962Va08), Ice(K)=0.30% (1963Ha29).

† Additional information 1.
‡ From measurements of 1984Ho02. Earlier measurements: 1962Va08, 1967Sc34.
\# Photon intensities measured by 1984Ho02 following ^{243}Am(n,γ), and given as per 100 neutron captures. Other measured photon intensities: 1962Va08, 1967Sc34.
@ From conversion electron measurements of 1984Ho02 and 1962Va08.
& For absolute intensity per 100 decays, multiply by 20 *4*.

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Decay Scheme

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