^{243}Am α decay 1992Ga01,1996Wo05,1996Sa23

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. Browne, J. K. Tuli	NDS 122, 293 (2014)	30-Jun-2013

Parent: ^{243}Am: E=0.0; $J^{\pi}=5/2^{-}$; $T_{1/2}$=7364 y *22*; Q(α)=5438.8 *10*; %α decay=100.0

Others: 1986LoZT, 1964Ba26, 1975Pa04.

Additional information 1.

$\alpha\gamma$, (α)(ce): 1968Va09 (semi-semi), 1969En02 (semi-semi), 1963Le17 (semi-scin).

Ag(θ): 1962Si12, 1963Fl01, 1967Fa01, 1967Hu03.

Ag(θ,H): deduced effective hyperfine field (1970An13).

^{239}Np Levels

E(level)[†]	J^{π}[#]	$T_{1/2}$	Comments
0.0	$5/2^{+}$		
31.130 *21*	$7/2^{+}$		
71.5 *9*	$9/2^{+}$		
74.660 *18*	$5/2^{-}$	1.39 ns *3*	μ=+2.0 *3* (1967Gu08,2011StZZ) g=0.79 *10* from Ag(θ,H,t) (1967Gu08). $T_{1/2}$: Weighted average of 1.2 ns *1* (1960Un02), 1.40 ns *6* (1963Ch07), 1.41 ns *4* (1968Ob02), 1.38 ns *3* (1969Hu09), and 1.41 ns *4* (1970To08).
117.84 *3*	$7/2^{-}$	≤0.04 ns	$T_{1/2}$: From 1969Hu09.
122.4 *10*	$(11/2^{+})$		
173.02 *4*	$9/2^{-}$		
240.8 *9*	$(11/2^{-})$		
267[‡] *3*	$(5/2^{+})$		
317.4 *15*	$(13/2^{-})$		
325[‡] *3*	$(5/2^{-})$		
347[‡] *3*	$(7/2^{+},9/2^{+})$		J^{π}: analogy to ^{237}Np suggests $7/2^{+}$ 1/2[400] band; however, from (^{3}He,d), $J^{\pi}=9/2^{+}$.
359[‡] *3*	$(9/2^{+})$		J^{π}: analogy to ^{237}Np.
411[‡] *3*			
427[‡] *3*			
438[‡] *3*	$(11/2^{+})$		
662.2	$(5/2^{-})$		

[†] Deduced by evaluator from a least-squares fit to γ-ray energies, unless otherwise specified.

[‡] From alpha particle energy.

[#] From Adopted Levels, unless stated otherwise.

α radiations

Eα[†]	E(level)	Iα[#@a]	HF[&]	Comments
4695 *3*	662.2	1.7×10^{-3} *5*	7.1	Iα: measurement of 1966Le13. α intensity in coincidence with gammas is 0.0016% 5;Incoincidence with ce′s is 0.00007% 3. Iα: 0.00148% 3, deduced by evaluator from γ-ray transition intensity balance.
4919 *3*	438	8.5×10^{-5}	5.4×10^{3}	Iα: From Iα=0.000085% (1964Ba26), recommended in 2010BeZQ.
4930 *3*	427	1.8×10^{-4}	3.0×10^{3}	Iα: From Iα=0.00018% (1964Ba26), recommended in 2010BeZQ.
4946 *3*	411	3.4×10^{-4}	2.0×10^{3}	Iα: From Iα=0.00034% (1964Ba26), recommended in 2010BeZQ.
4997 *3*	359	≤0.0016	$\geq1.0\times10^{3}$	Average of Iα(5008α + 4997α)=0.0016% 5 (1992Ga01) and Iα=0.0020% 4 (1996Sa24). Other value: Iα=0.0016 (1964Ba26).
5008 *3*	347	≤0.0016	$\geq1.2\times10^{3}$	
5029 *3*	325	≤0.004	$\geq0.7\times10^{3}$	Iα(5035α + 5029α)=0.0039% 6, average of Iα=0.0022% (1964Ba26),

Continued on next page (footnotes at end of table)

^{243}Am α decay 1992Ga01,1996Wo05,1996Sa23 (continued)

α radiations (continued)

Eα[†]	E(level)	Iα[#@a]	HF[&]	Comments
				Iα=0.0033% 5 (1992Ga01), and Iα=0.0044% 5 (1996Sa24).
5035 *3*	317.4	≤0.003	≥1.0×10^3	Iα: 0.00104% 2, deduced by evaluator from γ-ray transition intensity balance.
5088 *5*	267	0.0055 *6*	1.1×10^3	Iα: Average of Iα=0.004% (1964Ba26), Iα=0.0056% 7 (1992Ga01), and Iα=0.0055% 6 (1996Sa24).
5113 *1*	240.8	0.008 *3*	1.1×10^3	Iα: Average of Iα=0.0054% (1964Ba26), Iα=0.010% 1 (1992Ga01), and Iα=0.010% 10 (1996Sa24). Iα: 0.0046% 1, deduced by evaluator from γ-ray transition intensity balance.
5181 *1*	173.02	1.383 *7*	17	Iα: Weighted average (Limited Relative Statistical Weight Method) of Iα=1.1% 2 (1964Ba26,1991Ry01), Iα=1.1% 3 (1955St98, uncertainty estimated by evaluator), Iα=1.3% 2 (1956Hu96), Iα=1.36% 1 (1992Ga01), Iα=1.388% 8 (1996Sa24), and Iα=1.391% 7 (2002Da21). Iα: 1.1% 4, deduced by evaluator from γ-ray transition intensity balance.
5233.3[‡] *10*	117.84	11.46 *5*	4.7	Iα: Weighted average (Limited Relative Statistical Weight Method) of Iα=10.6% 2 (1964Ba26,1991Ry01), Iα=11.5% 3 (1955St98,1991Ry01), Iα=11.5% 3 (1956Hu96), Iα=11.46% 3 (1992Ga01), Iα=11.37% 3 (1996Sa24), and Iα=11.52% 2 (2002Da21). Iα: 10.3% 4, deduced by evaluator from γ-ray transition intensity balance.
5275.3[‡] *10*	74.660	86.74 *5*	1.1	Iα: Weighted average (Limited Relative Statistical Weight Method) of Iα=87.9% 3 (1964Ba26, 1991Ry01), Iα=87.1% 4 (1955St98,1991Ry01), Iα=86.9% 4 (1956Hu96), Iα=86.74% 6 (1992Ga01), Iα=86.79% 3 (1996Sa24), and Iα=86.60% 7 (2002Da21). Iα: 88.1% 17, deduced by evaluator from γ-ray transition intensity balance.
5321 *1*	31.130	0.192 *3*	0.94×10^3	Iα: Average of Iα=0.190% 7 (1992Ga01), Iα=0.194% 3 (1996Sa24), and Iα=0.190% 3 (2002Da21). Other values: Iα=0.12% (1964Ba26), Iα=0.16% (1955St98), and Iα=0.16% (1956Hu96).
5349.4[‡] *23*	0.0	0.240 *3*	1.2×10^3	Iα: Average of Iα=0.230% 7 (1992Ga01), Iα=0.243% 3 (1996Sa24), Iα=0.240% 3 (2002Da21). Other values: Iα=0.16% (1964Ba26), Iα=0.17% (1955St98), Iα=0.17% (1956Hu96).

[†] Deduced from values in 2002Da21 (s), 1996Sa24 (s), and 1964Ba26 (s), recommended in 2010BeZQ, unless otherwise specified. Other: 1968Ba25 (s).
[‡] From 1991Ry01.
[#] Additional information 2.
[@] Deduced from values in 2002Da21, 1996Da24, 1992Ga01, 1964Ba26, 1956Hu96, and 1955St98, recommended in 2010BeZQ.
[&] Using $r_0(^{239}Np)$=1.505, average of $r_0(^{238}U)$=1.5143 *9*, $r_0(^{240}U)$=1.5062 *10*, $r_0(^{238}Pu)$=1.5013 *10*, and $r_0(^{240}Pu)$=1.4979 *7* (1998Ak04).
[a] Absolute intensity per 100 decays.

^{243}Am α decay 1992Ga01,1996Wo05,1996Sa23 (continued)

γ(^{239}Np)

Iγ normalization: from weighted average (Limited Relative Statistical Weights Method) of Iγ(74.7γ)=68.5% 15 (1984Va41), Iγ(74.7γ)=69% 3 (1960As02), Iγ(74.7γ)=61% 6 (1968Va09), Iγ(74.7γ)=66% 3 (1972Ah02), Iγ(74.7γ)=59% 4 (1977St35), Iγ(74.7γ)=60% 4 (1979Po20), Iγ(74.7γ)=68% 2 (1982Ah04), Iγ(74.7γ)=66.7% 12 (1996Wo05), Iγ(74.7γ)=68.4% 13 (1996Sa23). Other values: Iγ(74.7γ)=73% 1 (1969Al14); Iγ(74.7γ)=68.2% 14, evaluated intensity (1986LoZT).

I(L x ray)=41% 5 (αγ pc, 1969Al14).

From decay scheme (Using program RADLST), I(L x ray)=18.8% 7, and I(K x ray)=0.0195% 10. The value I(K x ray)=13.5% reported by 1977St35 is clearly in error; 1972Ah02 did not observe any K x ray in spite of having a better spectrum.

E_γ ‡	I_γ @ a	E_i(level)	J_i^π	E_f	J_f^π	Mult.	δ	α †	$I_{(\gamma+ce)}$ a	Comments
31.14# *3*	0.105 *7*	31.130	7/2+	0.0	5/2+	M1+E2	0.09 *2*	187 *16*		α(L)=140 *11*; α(M)=35 *3*; α(N+..)=12.2 *10* α(N)=9.4 *9*; α(O)=2.30 *20*; α(P)=0.43 *4*; α(Q)=0.0288 *5* Mult.: M1+<30% E2 was deduced by 1972Sc44 from L x ray spectra in coincidence with 43.5γ (contribution from other gammas subtracted by use of (74.6γ)(L x ray) coincidence spectra). Intensity balance at 31.10-keV level requires that α=189 *15* corresponding to δ=0.09 *2*.
43.1	0.097	117.84	7/2−	74.660	5/2−	M1+E2	0.38	154.4		α(L)=113.7 *16*; α(M)=30.2 *5*; α(N+..)=10.51 *15* α(N)=8.22 *12*; α(O)=1.95 *3*; α(P)=0.336 *5*; α(Q)=0.01016 *15* I_γ: deduced by the evaluator from α(M)exp=31, Ice(M)(43.1γ)/Iγ(117.6γ)=3.56 as measured by 1969En02, and Iγ(117.6γ)=0.84 (from intensity balance Iγ=0.11). Mult.: α(M)exp=31 from (α)(ce)/αγ (1969En02).
43.53# *2*	8.78 *15*	74.660	5/2−	31.130	7/2+	E1		1.143		α(L)=0.856 *12*; α(M)=0.215 *3*; α(N+..)=0.0722 *11* α(N)=0.0570 *8*; α(O)=0.01304 *19*; α(P)=0.00206 *3*; α(Q)=6.88×10^{-5} *10* I_γ: Weighted average (Limited Relative Statistical Weight Method) of Iγ=6.04% 13 (1984Va41), Iγ=4.0% 10 (1960As02), Iγ=5.3% 5 (1968Va09), Iγ=5.0% 10 (1969Al14), Iγ=5.5% 3 (1972Ah02), Iγ=5.3% 12 (1979Po20), Iγ=6.2% 3 (1982Ah04), Iγ=5.93% 10 (1996Wo05), Iγ=5.72% 17 (1996Sa23) renormalized to Iγ(74.7γ)=100. Mult.: from intensity balance. Also from ce data in ^{239}U decay.
50.6	0.0044	173.02	9/2−	122.4	(11/2+)	[E1]		0.769		α(L)=0.577 *8*; α(M)=0.1439 *21*; α(N+..)=0.0485 *7* α(N)=0.0382 *6*; α(O)=0.00881 *13*; α(P)=0.001420 *20*; α(Q)=5.06×10^{-5} *7*
55.4	0.0154	173.02	9/2−	117.84	7/2−	M1+E2	0.6 *2*	8.×10^{1} *3*		α(L)=62 *20*; α(M)=17 *6*; α(N+..)=5.8 *19* α(N)=4.5 *15*; α(O)=1.1 *4*; α(P)=0.18 *6*; α(Q)=0.0042 *5*

$^{239}_{93}Np_{146}$-3

^{243}Am α decay 1992Ga01,1996Wo05,1996Sa23 (continued)

γ(^{239}Np) (continued)

E_γ ‡	I_γ @ a	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α †	$I_{(\gamma+ce)}$ a	Comments
(68.1)		240.8	(11/2$^-$)	173.02	9/2$^-$	[E2]	89.0	0.0045 *CA*	Mult.,δ: α(L)exp=90, L12/L3=2.9 from (α)(ce)/αγ (1969En02). α(L)=64.7 *9*; α(M)=18.0 *3*; α(N+..)=6.26 *9* α(N)=4.92 *7*; α(O)=1.146 *16*; α(P)=0.187 *3*; α(Q)=0.000558 *8*
(71.2)		71.5	9/2$^+$	0.0	5/2$^+$	[E2]	72.0		ce(L)/(γ+ce)=0.717 *8*; ce(M)/(γ+ce)=0.200 *4*; ce(N+)/(γ+ce)=0.0693 *14* ce(N)/(γ+ce)=0.0545 *11*; ce(O)/(γ+ce)=0.01270 *25*; ce(P)/(γ+ce)=0.00208 *4*; ce(Q)/(γ+ce)=6.36×10^{-6} *13*
74.66 *2*	100.0	74.660	5/2$^-$	0.0	5/2$^+$	E1	0.276		α(L)=0.207 *3*; α(M)=0.0512 *8*; α(N+..)=0.01740 *25* α(N)=0.01365 *20*; α(O)=0.00320 *5*; α(P)=0.000540 *8*; α(Q)=2.23×10^{-5} *4* Iγ: Iγ=67.2% 12, weighted average (Limited Relative Statistical Weight Method) of Iγ=68.5% 15 (1984Va41), Iγ=69% 3 (1960As02), Iγ=61% 6 (1968Va09), Iγ=66% 3 (1972Ah02), Iγ=59% 4 (1977St35), Iγ=60% 4 (1979Po20), Iγ=68% 2 (1982Ah04), Iγ=66.7% 12 (1996Wo05), Iγ=68.4% 13 (1996Sa23). Mult.: α(L)exp=0.170 from (α)(ce)/αγ, L12/L3=2.2 (1969En02).
86.71# *2*	0.515 *13*	117.84	7/2$^-$	31.130	7/2$^+$	E1	0.186		α(L)=0.1401 *20*; α(M)=0.0345 *5*; α(N+..)=0.01175 *17* α(N)=0.00920 *13*; α(O)=0.00217 *3*; α(P)=0.000371 *6*; α(Q)=1.621×10^{-5} *23* Iγ: Weighted average (Limited Relative Statistical Weight Method) of Iγ=0.350% 10 (1984Va41), Iγ=0.37% 4 (1968Va09), Iγ=0.340% 15 (1982Ah04), Iγ=0.342% 15 (1996Wo05), Iγ=0.344% 9 (1996Sa23) renormalized to Iγ(74.7γ)=100.
98.5	0.014 *CA*	173.02	9/2$^-$	74.660	5/2$^-$	(E2)	15.56		Mult.: α(M)exp≤0.034 from (α)(ce)/αγ (1969En02). α(L)=11.31 *16*; α(M)=3.15 *5*; α(N+..)=1.096 *16* α(N)=0.862 *12*; α(O)=0.201 *3*; α(P)=0.0331 *5*; α(Q)=0.0001300 *19* Iγ: calculated by evaluator from Ice(L)(98.5γ)/Ice(L)(142γ)=21.4 (1969En02), Iγ(142γ), and α(L)(98.5γ)=11.5, α(L)(142.18γ)=0.0394 (theory).
117.60 *15*	0.84 *12*	117.84	7/2$^-$	0.0	5/2$^+$	E1	0.0842		Mult.: α(L)exp≥2.2, L12/L3=1.81 by (α)(ce) coincidences; photon was not observed (1969En02). α(L)=0.0634 *10*; α(M)=0.01551 *23*; α(N+..)=0.00532 *8* α(N)=0.00415 *6*; α(O)=0.000985 *15*; α(P)=0.0001732 *25*; α(Q)=8.36×10^{-6} *12* Mult.: α(L)exp=0.070 from (α)(ce)/αγ (1969En02).
141.89# *3*	0.171 *12*	173.02	9/2$^-$	31.130	7/2$^+$	E1	0.224		α(K)=0.1723 *25*; α(L)=0.0391 *6*; α(M)=0.00955 *14*; α(N+..)=0.00328 *5* α(N)=0.00256 *4*; α(O)=0.000610 *9*; α(P)=0.0001087 *16*; α(Q)=5.55×10^{-6} *8* Iγ: Weighted average (Limited Relative Statistical Weight Method) of Iγ=0.130% 10 (1984Va41), Iγ=0.130% 10 (1968Va09), Iγ=0.128% 6 (1982Ah04), Iγ=0.117% 5 (1996Wo05),

$^{239}_{93}Np_{146}$-4

γ(^{239}Np) (continued)

E_γ ‡	I_γ @ a	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α †	Comments
								Iγ=0.107% 3 (1996Sa23) renormalized to Iγ(74.7γ)=100.
								Mult.: α(L)exp=0.055 from (α)(ce)/αγ (1969En02).
169	0.0020	240.8	(11/2$^-$)	71.5	9/2$^+$	[E1]	0.1489	α(K)=0.1156 *17*; α(L)=0.0251 *4*; α(M)=0.00612 *9*; α(N+..)=0.00211 *3* α(N)=0.001641 *23*; α(O)=0.000393 *6*; α(P)=7.07×10^{-5} *10*; α(Q)=3.80×10^{-6} *6* E_γ: measured by 1968Va09 (αγ semi).
195	0.0014	317.4	(13/2$^-$)	122.4	(11/2$^+$)	[E1]	0.1067	α(K)=0.0833 *12*; α(L)=0.01759 *25*; α(M)=0.00428 *6*; α(N+..)=0.001476 *21* α(N)=0.001147 *16*; α(O)=0.000275 *4*; α(P)=5.00×10^{-5} *7*; α(Q)=2.79×10^{-6} *4* E_γ: measured by 1968Va09 (αγ semi).
x 220								Additional information 3. Observed by 1968Va09 in coincidence with 5088α.
544.58 &b		662.2	(5/2$^-$)	117.84	7/2$^-$			
587.77 &b		662.2	(5/2$^-$)	74.660	5/2$^-$			Iγ(544γ+588γ)=0.0005 (1966Le13).
631.09 &	0.0005	662.2	(5/2$^-$)	31.130	7/2$^+$			
662.24 &	0.0017	662.2	(5/2$^-$)	0.0	5/2$^+$			

† Additional information 4.
‡ From 1975Pa04 (semi), 1972Ah02 (semi), 1969En02 (αγ, (α)(ce) semi), unless otherwise noted. Other measurements: 1957As84, 1960As02, 1963Le17, 1966Le13, 1967Ch12, 1968Va09, 1969Al14.
# From 1982Ah04 equilibrium ^{243}Am source; semi.
@ From 1986LoZT, 1982Ah04, 1975Pa04, 1972Ah02, 1968Va09. Iγ normalized to 100 for 74.67γ.
& From ^{239}U β$^-$ decay. Transition was observed in 1966Le13 in αγ coincidence spectrum and placed in level scheme. The measured energy was not given in 1966Le13.
a For absolute intensity per 100 decays, multiply by 0.672 *12*.
b Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

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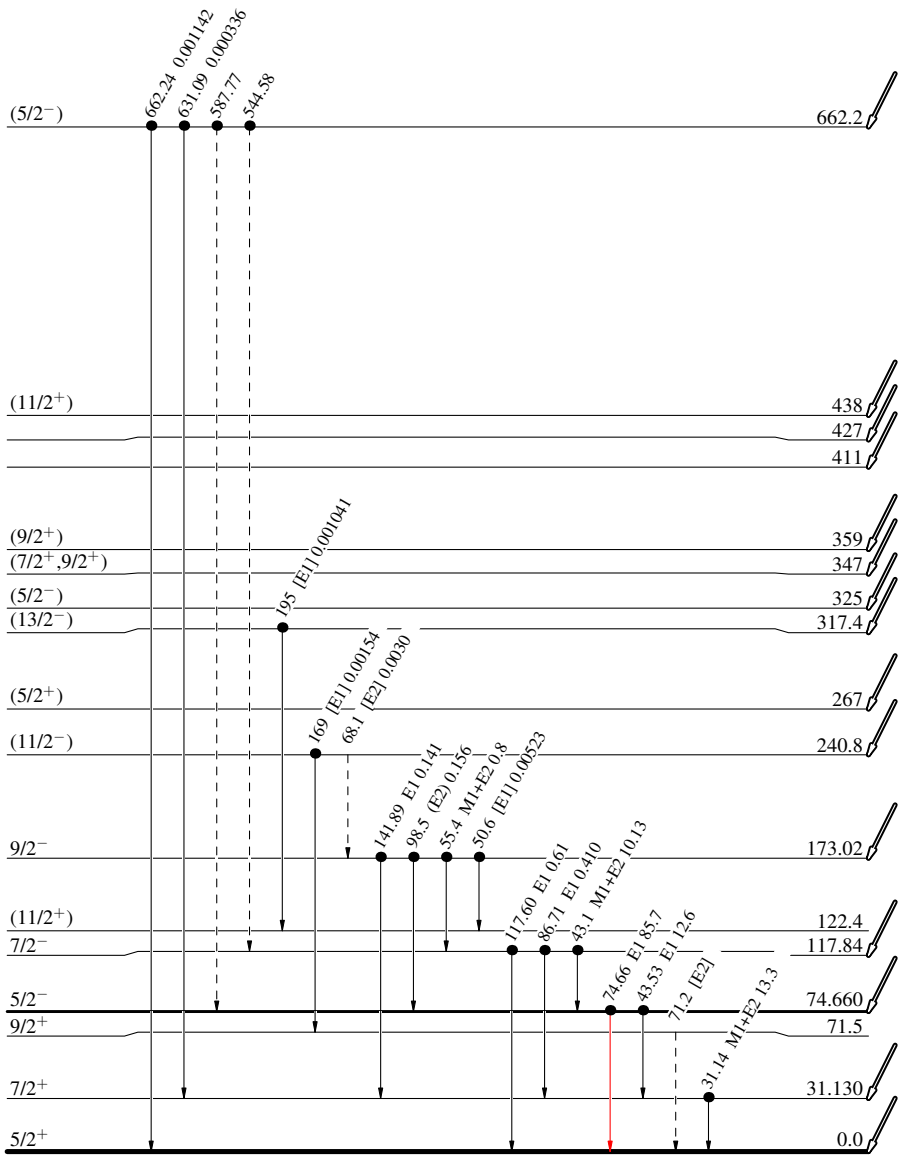
^{243}Am α decay 1992Ga01,1996Wo05,1996Sa23

Decay Scheme

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

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)
- Coincidence

$^{243}_{95}Am_{148}$: 5/2⁻, 0.0, 7364 y 22, Qα=5438.8 10, %α=100



		Eα	Iα	HF
662.2		4695	0.0017	7.1
438		4919	0.000085	5400
427		4930	0.00018	3000
411		4946	0.00034	2000
359		4997	≤0.0016	≥1000
347		5008	≤0.0016	≥1200
325		5029	≤0.004	≥0700
317.4		5035	≤0.003	≥1000
267		5088	0.0055	1100
240.8		5113	0.008	1100
173.02		5181	1.383	17
122.4				
117.84	≤0.04 ns	5233.3	11.46	4.7
74.660	1.39 ns 3	5275.3	86.74	1.1
71.5				
31.130		5321	0.192	0940
0.0		5349.4	0.240	1200

$^{239}_{93}Np_{146}$