^{242}Cm α decay

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. Browne, J. K. Tuli	NDS 127, 191 (2015)	1-Jun-2014

Parent: ^{242}Cm: E=0.0; $J^{\pi}=0^+$; $T_{1/2}$=162.86 d *8*; Q(α)=6215.56 *8*; %α decay=100.0
^{242}Cm-$T_{1/2}$: From 2002Ch52 evaluation.
Q(α) 6215.56 *8* from 1995Au04.
$\alpha\gamma$: 1963Bj03, 1964Ba31.
$\gamma\gamma$: 1960As10, 1955As64.
Ag(θ): 1953Mo74.
$T_{1/2}$ from 1986LoZT.
X-Rays: $M_{\alpha,\beta}$:L_e:L_α:$L_{\eta,\beta}$:L_γ= 30 *3*:4.9 *8*: 66. 7: 100 *16*: 23. 3 (1990Po14).

^{238}Pu Levels

E(level)	J^{π}[†]	$T_{1/2}$	Comments
0.0	0^+	87.74 y *4*	
44.08 *3*	2^+	177 ps *5*	$T_{1/2}$: from 1970To08. Other: 183 ps *15* (1960Be25).
146.00 *5*	4^+		
303.42 *7*	6^+		
513.62 *16*	8^+		
605.08 *7*	1^-		
661.28 *11*	3^-		
763.22 *12*	5^-		
941.44 *9*	0^+		
962.72 *8*	1^-		
983.00 *9*	2^+		
1018.6? *3*			
1028.62 *5*	2^+		
1125.79 *17*	(4^+)		
1228.69 *22*	0^+		
1264.29 *22*	2^+		

[†] From Adopted Levels.

α radiations

Eα[†]	E(level)	Iα[‡#]	HF	Comments
4869.43 *23*	1264.29	5.2×10^{-7} *15*	5.9 *18*	
4904.44 *23*	1228.69	5.5×10^{-7} *15*	10 *3*	
5005.64 *19*	1125.79	3.1×10^{-7} *8*	88 *23*	
5101.21 *10*	1028.62	3.7×10^{-6} *8*	32 *7*	
5111.1 *3*	1018.6?	$\leq2\times10^{-7}$	≥686	
5146.07 *12*	983.00	1.7×10^{-6} *4*	137 *33*	Iα: 1966Ba07 report I$\alpha\leq5\times10^{-6}$.
5165.95 *16*	962.72	1.13×10^{-6} *21*	278 *52*	
5186.95 *12*	941.44	3.6×10^{-5} *7*	11.9 *24*	Iα: weighted average of 3.4×10^{-5} *8* (1963Bj01), 2.5×10^{-5} *8* (1966Ba07, with a 30% uncertainty assigned by the evaluators), and 3.5×10^{-5} *7* from the γ intensities.
5366.22 *15*	763.22	2.2×10^{-7} *3*	24432	
5462.47 *14*	661.28	1.26×10^{-5} *24*	1712 *32*	
5517.75 *11*	605.08	2.5×10^{-4} *5*	183 *22*	Iα: weighted average of 2.8×10^{-4} *5* (1963Bj01), 2.5×10^{-4} *6* (1966Ba07, with a 20% uncertainty assigned by the evaluators), and 2.6×10^{-4} *5* from the γ intensities.
5607.76 *16*	513.62	2×10^{-5}	7544	Eα: 1966Ba07 report 5614.

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^{242}Cm α decay (continued)

α radiations (continued)

Eα[†]	E(level)	Iα[‡#]	HF	Comments
				Iα: from 1966Ba07.
5816.39 *11*	303.42	0.0046 *5*	458 *50*	Eα: measured values are 5811 (1953As14), 5809 *2* (1958Ko87), and 5816 (1966Ba07). Iα: from 1958Ko87. Other: 0.0046 (1966Ba07).
5969.24 *9*	146.00	0.035 *2*	395 *23*	Eα: measured values are 5964 (1953As14), 5961 *2* (1958Ko87), 5971 *3* (1963Dz07), and 5971.4 (1966Ba07). Iα: from 1963Dz07. Other: 0.035 (1953As14), 0.030 *1* (1958Ko87), 0.036 (1966Ba07).
6069.43 *12*	44.08	25.92 *6*	1.733 *5*	Eα: energy adjusted by 1991Ry01 due to change in calibration energy. Iα: from 1998Ya17. Others: 26.3 *5* (1953As14), 26.5 *5* (1958Ko87), and 25.8 (1966Ba07).
6112.72 *8*	0.0	74.08 *7*	1.000	Eα: from 1991Ri01. Iα: from 1998Ya17. Others: see 44 level. Σ I(a to g.s. +44 level)=100.

[†] Except for the g.s. and 44 level, the Eα values are obtained from Q(α) and the E(level) values. Experimental values are listed where available. Values are reported by 1971Gr17 (s), 1971Bb10 (s), 1966Ba07 (s), 1963Bj03 (αγ), 1963Dz07 (s), 1958Ko87 (s), and 1953As14 (s).

[‡] Deduced from level scheme of 1981Le15, unless otherwise noted. See also 2002Ch52.

[#] Absolute intensity per 100 decays.

^{242}Cm α decay (continued)

γ(^{238}Pu)

Iγ normalization, I(γ+ce) normalization: 1981Le15 deduce Iγ(561γ)=0.00015% 4 based on their relative Iγ data and a previous unpublished value by the authors, based on αγ, of the sum of intensities per 100 α decays for the 515, 561, 605, and 617 γ's.

E_γ †	I_γ ‡ b	E_i(level)	J_i^π	E_f	J_f^π	Mult.#	δ#	α c	$I_{(\gamma+ce)}$ b	Comments
44.08@ *3*	0.03345& *8*	44.08	2^+	0.0	0^+	E2		775	25.96& *6*	ce(L)/(γ+ce)=0.729 *6*; ce(M)/(γ+ce)=0.202 *4*; ce(N+)/(γ+ce)=0.067 *2* α: the value given is the E2 theory value lowered by 3% (see 1987Ra01). I_γ: an unweighted average of the directly measure Iγ values gives Iγ=0.033 *3*.
101.93 *4*	0.00253& *12*	146.00	4^+	44.08	2^+	E2		14.8	0.040& *2*	I_γ: a weighted average of the directly measured values is 0.0033 *8*. An unweighted average is 0.0055 *13*.
157.42 *5*	0.00142& *15*	303.42	6^+	146.00	4^+	[E2]		2.24	0.0046& *5*	I_γ: a weighted average of the directly measured values is 0.0020 *5*.
210.20 *14*	1.2×10^{-5}&	513.62	8^+	303.42	6^+	E2		0.73	2×10^{-5}&	E_γ: from in-beam studies. Not seen in α decay.
336.38 *15*	7×10^{-7} *3*	941.44	0^+	605.08	1^-	[E1]				I_γ: Iγ(336)/Iγ(561)=0.0045 *15*.
357.62@ *7*	4.5×10^{-8} *9*	962.72	1^-	605.08	1^-	M1+E2	2.43 *20*	0.224 *15*		I_γ: from Iγ/Iγ(919γ+963γ)=0.0424 *11* in β^- decay. Note that there is an unplaced 358.0 *5* transition with Iγ=5.9×10^{-7} *25*, part of which probably corresponds to the 358γ from the 962 level.
459.80 *20*	6×10^{-8} *3*	763.22	5^-	303.42	6^+					I_γ: Iγ(459.8)/Iγ(561)=0.00038 *16*.
515.25 *19*	4.5×10^{-6} *12*	661.28	3^-	146.00	4^+	E1+M2	0.114 *17*	0.023 *3*		I_γ: Iγ(515)/Iγ(561)=0.0297 *20*.
561.02 *10*	1.5×10^{-4} *4*	605.08	1^-	44.08	2^+	E1		0.0116		
605.04 *10*	1.0×10^{-4} *3*	605.08	1^-	0.0	0^+	E1		0.0101		I_γ: Iγ(605)/Iγ(561)=0.698 *20*.
617.22d *12*	7.9×10^{-6}da *21*	661.28	3^-	44.08	2^+	E1+M2	0.077 *17*	0.0122 *13*		I_γ: Iγ(617)/Iγ(561)=0.0525 *20*.
617.22d *12*	1.6×10^{-7}da	763.22	5^-	146.00	4^+					I_γ: Iγ(617)/Iγ(561)=0.0011.
837.01 *15*	1.9×10^{-7} *6*	983.00	2^+	146.00	4^+	[E2]		0.0176		I_γ: Iγ(837)/Iγ(561)=0.00124 *20*.
(882.63 *3*)	6.7×10^{-8} *15*	1028.62	2^+	146.00	4^+	(E2)		0.0159		E_γ,I_γ: not seen in α decay. E is from β^- decay, and Iγ is from Iγ/Iγ(984γ+1028γ)=0.01866 *19* in β^- decay.
897.33 *10*	2.2×10^{-5} *6*	941.44	0^+	44.08	2^+	(E2)		0.0154		I_γ: Iγ(897)/Iγ(561)=0.145 *10*.
918.7 *2*	5.4×10^{-7} *15*	962.72	1^-	44.08	2^+	E1		0.00471		I_γ: Iγ(918)/Iγ(561)=0.0036 *3*.
938.91 *10*	1.8×10^{-7} *6*	983.00	2^+	44.08	2^+	E0+E2		4.4 *4*		α: from β^- decay. I_γ: Iγ(939)/Iγ(561)=0.00117 *20*.

$^{238}_{94}Pu_{144}$-3

^{242}Cm α decay (continued)

γ(^{238}Pu) (continued)

E_γ [†]	I_γ [‡ b]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [#]	δ [#]	α [c]	$I_{(\gamma+ce)}$ [b]	Comments
941.5 *2*		941.44	0^+	0.0	0^+	E0			1.3×10^{-5} *4*	E_γ: from ε decay. $I_{(\gamma+ce)}$: from I(γ+ce)/Iγ(897γ)=0.59 *8* in ε decay. 1960As10 report 0.62 in α decay. The value of 1.4 *2* in β^- decay appears to be discrepant.
962.8 *2*	5.3×10^{-7} *15*	962.72	1^-	0.0	0^+	E1		0.00434		I_γ: Iγ/Iγ(561γ)=0.0035 *3*.
974.5 [e] *3*	$\leq2\times10^{-7}$	1018.6?		44.08	2^+					
979.80 *20*	2.6×10^{-7} *8*	1125.79	(4^+)	146.00	4^+					I_γ: Iγ(979)/Iγ(561)=0.00173 *30*.
983.0 *3*	5.0×10^{-7} *18*	983.00	2^+	0.0	0^+	[E2]		0.0129		I_γ: Iγ(983)/Iγ(561)=0.0033 *8*.
984.5 *1*	2.0×10^{-6} *6*	1028.62	2^+	44.08	2^+	M1+E2	>+23	0.00129		I_γ: Iγ(984)/Iγ(561)=0.0131 *20*.
1028.5 *2*	1.6×10^{-6} *5*	1028.62	2^+	0.0	0^+	E2		0.0119		I_γ: Iγ(1028)/Iγ(561)=0.0105 *10*.
1081.7 *3*	5.0×10^{-8} *20*	1125.79	(4^+)	44.08	2^+					I_γ: Iγ(1081)/Iγ(561)=0.00033 *10*.
1118.3 *3*	1.7×10^{-7} *9*	1264.29	2^+	146.00	4^+	[E2]				I_γ: Iγ(1118)/Iγ(561)=0.0011 *5*.
1184.6 *3*	5.0×10^{-7} *15*	1228.69	0^+	44.08	2^+	E2				I_γ: Iγ(1184)/Iγ(561)=0.0033 *4*.
1220.2 *3*	2.8×10^{-7} *9*	1264.29	2^+	44.08	2^+	E0+E2+M1		0.26 *3*		I_γ: Iγ(1220)/Iγ(561)=0.00187 *30*.
(1228.7 *3*)		1228.69	0^+	0.0	0^+	E0			4.6×10^{-8} *15*	E_γ: from ε decay. $I_{(\gamma+ce)}$: from I(γ+ce)/Iγ(1184γ)=0.092 *11* in ε decay.

[†] From 1981Le15, except where noted otherwise.
[‡] From 1981Le15, except where noted otherwise.
[#] From adopted gammas. ce measurements have been made in α decay by 1952Du12, 1956Ba95, 1956Sm18, 1960As10, and 1965Ak02.
[@] From β^- decay.
[&] I(γ+ce) is deduced from the requirement of an intensity balance utilizing the γ branchings and the γ and α feedings. Iγ is then deduced from I(γ+ce) and α.
[a] 1981Le15 report E=617.22 *12* with Iγ/Iγ(561γ)=0.0536 *20* for a doubly placed transition. The authors divide the intensity on the basis of model-dependent arguments.
[b] Absolute intensity per 100 decays.
[c] 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.
[d] Multiply placed with intensity suitably divided.
[e] Placement of transition in the level scheme is uncertain.

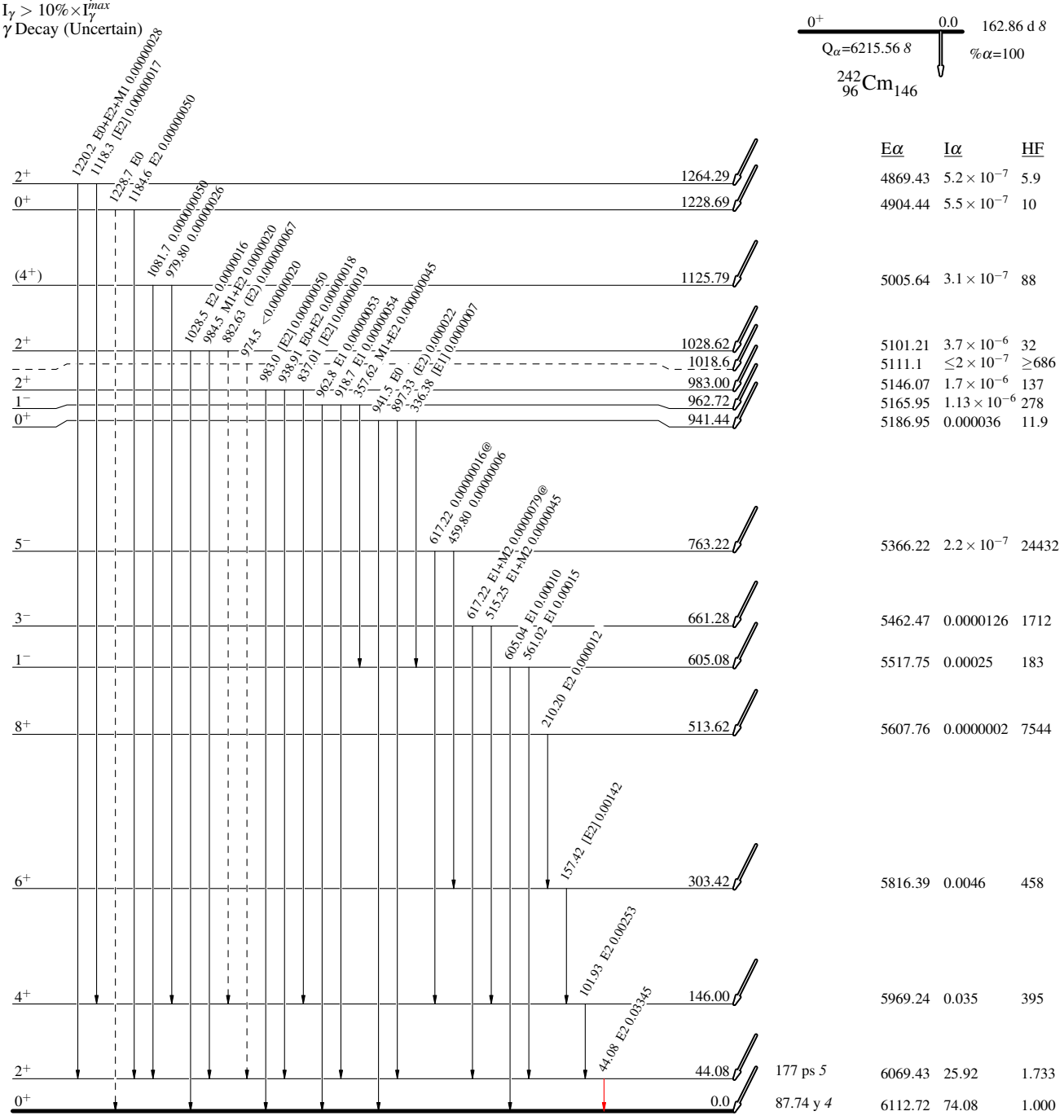
$^{238}_{94}Pu_{144}$-4

^{242}Cm α decay

Decay Scheme

Intensities: I_γ per 100 parent decays
@ Multiply placed: intensity suitably divided

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)



	Eα	Iα	HF
	4869.43	5.2×10^{-7}	5.9
	4904.44	5.5×10^{-7}	10
	5005.64	3.1×10^{-7}	88
	5101.21	3.7×10^{-6}	32
	5111.1	$\leq 2 \times 10^{-7}$	≥686
	5146.07	1.7×10^{-6}	137
	5165.95	1.13×10^{-6}	278
	5186.95	0.000036	11.9
	5366.22	2.2×10^{-7}	24432
	5462.47	0.0000126	1712
	5517.75	0.00025	183
	5607.76	0.0000002	7544
	5816.39	0.0046	458
	5969.24	0.035	395
	6069.43	25.92	1.733
	6112.72	74.08	1.000