^{245}Cm α decay 1975Ba65,1994Sh31,1980Di13

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	C. D. Nesaraja	NDS 130, 183 (2015)	30-Sep-2015

Parent: ^{245}Cm: E=0.0; $J^{\pi}=7/2^{+}$; $T_{1/2}$=8423 y *74*; Q(α)=5622.0 *5*; %α decay=100.0

^{245}Cm-J^{π},$T_{1/2}$: From Adopted Levels in ^{245}Cm (2011Br03).

^{245}Cm-Q(α): the evaluator adopts Q(α)=5622.0 *5*, a weighted average of values deduced from α branches to the g.s., 42, 96, 175, 232, and 301 levels. The authors of 2012Wa38 gave an adjusted value of Q(α)=5623.0 *10* from 1975Ba65.

2012Ch30: Energy and intensity from ^{245}Cm α decay were evaluated by the Decay Data Evaluation Project (DDEP)which are based generally on 2005Ma88.

1998Wh01: α decay from a 0.3 mg ^{245}Cm source was measured with a Ge(Li) detector and pulse height analyzer.

1994Sh31: Alpha decay of a ^{245}Cm source prepared at Argonne National Laboratory by chemical separation. Measured $\gamma\gamma$ coincidence using two HpGe detectors with one surrounded by a BGO compton suppression shield and a Low Energy Photon Spectrometer (LEPS). $\alpha\gamma$ coincidence was measured with a Si(Au) surface barrier detector and a HpGe detector.

1991Po17: Measured γ emission from decay of the radio-chemically separated ^{245}Cm using Ge(Li) detectors.

1980Di13: α decay from ^{245}Cm. Gammas measured by 90 cm^2 Ge(Li) detector and an X-ray detector.

1976BaZZ: Review of status of alpha decay data for transactinium isotopes.

1975Ba65: α decay from ^{245}Cm studied using a magnetic spectrograph. Measured Eα and Iα.

1966Ba07: α decay from ^{245}Cm studied using a magnetic spectrograph; measured Eα and Iα. γ spectra were measured for energy region up to 100 keV with a proportional counter and for medium energy gammas (60-500 keV) with a Ge detector. $\alpha\gamma$ coincidence measured with a semiconductor detector and a NaI(Tl) scintillation spectrometer.

1966Fr03: α decay from ^{245}Cm studied using a Si surface barrier detector; measured Eα and Iα. γ spectrum measured with NaI and GeLi detectors.

^{241}Pu Levels

E(level)[†]	J^{π}[‡]	$T_{1/2}$	Comments
0.0	$5/2^{+}$	14.290 y *6*	$T_{1/2}$: From Adopted Level.
41.969 *14*	$7/2^{+}$		
95.786 *3*	$9/2^{+}$		
161.26 *3*	$11/2^{+}$		
161.73 *5*	$1/2^{+}$		
175.043 *17*	$7/2^{+}$		
231.933 *13*	$9/2^{+}$		
260.5? *13*			
301.166 *17*	$11/2^{+}$		
≈376	1/2,3/2		
≈384			

[†] From least-squares fit to Eγ data.

[‡] From Adopted Levels.

α radiations

Eα[†]	E(level)	Iα[@ a]	HF[&]	Comments
≈5151	≈384	≤0.005	≥974	
≈5119	≈376	≤0.004	≥1370	
5234.4 *12*	301.166	0.32	51	
5272.8[b] *12*	260.5?	0.07	419	Eα: May possibly belong to ^{243}Am α decay (1975Ba65).
5304.3[#] *10*	231.933	5.0 *1*	8.78 *20*	Eα: The uncorrected measurements are 5303.8 *12* (1975Ba65) and 5303 *2* (1966Fr03). Iα: From 1976BaZZ. An intensity balance at the 231 level gives Iα=5.0 *2*.

Continued on next page (footnotes at end of table)

^{245}Cm α decay 1975Ba65,1994Sh31,1980Di13 (continued)

α radiations (continued)

Eα[†]	E(level)	Iα[@a]	HF[&]	Comments
5361.1[#] *11*	175.043	93.2 *5*	1.043 *12*	Eα: The uncorrected measurements are 5362.0 *12* (1975Ba65) and 5356 *2* (1966Fr03). Iα: From 1976BaZZ. An intensity balance at the 175 level gives Iα=94.6 *21*.
5371.1[‡] *5*	161.73	0.020 *1*	5.84×10^{3} *30*	Iα: From an intensity balance at the 161.72 level.
5371.6[‡] *5*	161.26	0.43 *18*	2.7×10^{2} *12*	Iα: From an intensity balance at the 161.26 level.
5436.1 *5*	95.786	0.04	7197	
5488.5 *5*	41.969	0.83	715	
5529.0[#] *5*	0.0	0.58	1786	Eα: The uncorrected measurements are 5529.2 *5* (1975Ba65) and 5527 *3* (1966Fr03).

[†] From 1975Ba65, except where noted otherwise. The authors′ values have been lowered by 0.2 keV as recommended by 1991Ry01 to account for changes in calibrations energies. Others: 1954Hu50, 1963Dz07, 1966Fr03, 1966Ba07.

[‡] From E(level) and Q(α). Eα≈ 5370 was measured for the doublet.

[#] Weighted average of values of 1975Ba65 and 1966Fr03 as recommended by 1991Ry01, and including the corrections recommended by 1991Ry01 to account for changes in the calibration energies, −0.2 keV for 1975Ba65 and +3.3 for 1966Fr03.

[@] From 1975Ba65, except where noted otherwise. Others: 1966Ba07.

[&] r_0=1.4966 *8*, average of $r_0(^{240}Pu)$=1.4979 *7* and $r_0(^{242}Pu)$=1.4954 *10*, is used in the calculations.

[a] Absolute intensity per 100 decays.

[b] Existence of this branch is questionable.

γ(^{241}Pu)

Iγ normalization: From two sources referenced by 1994Sh31. 1980Di13 report relative Iγ values along with Iγ(175γ)=9.5 *7* per 100 ^{245}Cm α decays. The values from the thesis referenced by 1994Sh31 report Iγ(175γ)=10.1 *1* per 100 ^{245}Cm α decays. With Iγ values chosen as a weighted average from these two sources, the total Iγ(1+α) feeding the g.s. is 102 *4*. With Iα(g.s.)=0.58, given with no uncertainty, but assumed by the evaluator to be accurate to 0.6 *1*, one gets Iγ normalization=I(γ+ce) normalization=0.97 *17*. This normalization is adopted by the evaluator. It gives Iγ(175γ)=9.8 *3*.

αγ coin: (133γ)(5360α), (174γ)(5360α) (1966Ba07) and (205γ)(≈5230α), (232γ)(≈5300α) (1994Sh31).

K x-rays (Pu): 1980Di13

E(x ray)	I(x-rays) relative to Iγ(175γ)=100		
99.55 *3*	198 *7*	Kα$_2$	x ray
103.76 *3*	306 *10*	Kα$_1$	x ray
116.27 *6*	39.4 *22*	Kβ$_3$	x ray
117.26 *6*	70.7 *32*	Kβ$_1$	x ray
120.60 *15*	27.2 *16*	Kβ$_2$	x ray
121.55 *6*	9.6 *13*	K-O$_2$	x ray + K-O$_3$ x ray

M and L x-rays(Pu):
see 1990Po14 for intensities measured relative to I(L$_\gamma$ x ray+L$_\beta$ x ray).

E$_\gamma$[†]	I$_\gamma$[‡a]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.[#]	δ[#&]	α[@]	I$_{(\gamma+ce)}$[a]	Comments
41.93 *3*	0.374 *31*	41.969	7/2$^+$	0.0	5/2$^+$	M1+E2	0.186 *4*	102.8 *20*		α(L)=76.5 *15*; α(M)=19.5 *4* α(N)=5.32 *11*; α(O)=1.30 *3*; α(P)=0.232 *5*; α(Q)=0.01092 *16*
53.73 *4*	0.075 *5*	95.786	9/2$^+$	41.969	7/2$^+$	M1+E2	0.201 *8*	44.9 *11*		α(L)=33.5 *8*; α(M)=8.46 *21* α(N)=2.31 *6*; α(O)=0.566 *14*; α(P)=0.1026 *22*; α(Q)=0.00522 *8*
56.89 *3*	0.0345 *22*	231.933	9/2$^+$	175.043	7/2$^+$	M1+E2	0.68	92.4 *14*	3.1 *2*	ce(L)/(γ+ce)=0.724 *8*; ce(M)/(γ+ce)=0.197 *4* ce(N)/(γ+ce)=0.0539 *11*; ce(O)/(γ+ce)=0.0128 *3*; ce(P)/(γ+ce)=0.00210 *5*; ce(Q)/(γ+ce)=3.71×10^{-5} *8* α(L)=67.6 *10*; α(M)=18.4 *3* α(N)=5.03 *8*; α(O)=1.198 *17*; α(P)=0.196 *3*; α(Q)=0.00346 *5* E$_\gamma$: From 1998Wh01. 1994Sh31 report Eγ=56.79 *4*. I$_{(\gamma+ce)}$: From an intensity balance at the 232 level. Mult.,δ: From I(γ+ce) and Iγ one deduces α=92 *8* which corresponds to mult=M1+E2 with δ=0.68.
65.44 *4*	0.018 *4*	161.26	11/2$^+$	95.786	9/2$^+$	M1(+E2)	≤0.44	27 *8*		α(L)=20 *6*; α(M)=5.2 *17*

γ(^{241}Pu) (continued)

E_γ[†]	I_γ[‡a]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[#&]	α[@]	$I_{(\gamma+ce)}$[a]	Comments
										α(N)=1.4 *5*; α(O)=0.35 *11*; α(P)=0.062 *16*; α(Q)=0.00282 *20*
69.17 *6*	0.007 *3*	301.166	11/2$^+$	231.933	9/2$^+$	M1(+E2)	≤1.2	38 *22*	0.18 *5*	ce(L)/(γ+ce)=0.7 *3*; ce(M)/(γ+ce)=0.19 *14* ce(N)/(γ+ce)=0.05 *5*; ce(O)/(γ+ce)=0.013 *10*; ce(P)/(γ+ce)=0.0021 *16*; ce(Q)/(γ+ce)=5.E−5 *4* α(L)=28 *16*; α(M)=8 *5* α(N)=2.1 *13*; α(O)=0.5 *3*; α(P)=0.08 *5*; α(Q)=0.0020 *6* E_γ: Reported only by 1980Di13, but adopted in the level scheme of 1994Sh31. $I_{(\gamma+ce)}$: From an intensity balance at the 301 level, with a 10% uncertainty assigned to the α branch feeding this level. Mult.,δ: From I(γ+ce) and Iγ one deduces α=26 *+33−11* which corresponds to mult=M1(+E2) with δ|<1.2.
79.27 *4*	0.132 *13*	175.043	7/2$^+$	95.786	9/2$^+$	M1+E2	0.65 *+25−22*	22 *6*		α(L)=16 *4*; α(M)=4.3 *12* α(N)=1.2 *4*; α(O)=0.28 *8*; α(P)=0.047 *11*; α(Q)=0.00129 *22*
(95.786 *3*)	0.0112 *23*	95.786	9/2$^+$	0.0	5/2$^+$	E2		19.3		α(L)=14.00 *20*; α(M)=3.92 *6* α(N)=1.078 *15*; α(O)=0.254 *4*; α(P)=0.0404 *6*; α(Q)=0.0001375 *20* E_γ,I_γ: Obscured by the Kα$_2$ x ray (1980Di13). The energy is from the the adopted level scheme and the intensity is from Iγ(96γ)/Iγ(54γ)=0.15 *3* in adopted gammas.
126.09 *4*	0.007 *2*	301.166	11/2$^+$	175.043	7/2$^+$	[E2]		5.59		α(K)=0.1705 *24*; α(L)=3.94 *6*; α(M)=1.101 *16* α(N)=0.303 *5*; α(O)=0.0714 *10*; α(P)=0.01145 *17*; α(Q)=5.13×10^{-5} *8*
133.08 *3*	2.89 *3*	175.043	7/2$^+$	41.969	7/2$^+$	M1+E2	0.222 *9*	11.36 *17*		E_γ,I_γ: Reported only by 1998Wh01. α(K)=8.80 *13*; α(L)=1.92 *3*; α(M)=0.473 *7* α(N)=0.1288 *19*; α(O)=0.0319 *5*; α(P)=0.00599 *9*; α(Q)=0.000367 *6*
136.127 *20*	0.116 *3*	231.933	9/2$^+$	95.786	9/2$^+$	M1+E2	0.63 *21*	9.0 *10*		α(K)=6.3 *12*; α(L)=2.04 *15*; α(M)=0.53 *5* α(N)=0.144 *14*; α(O)=0.035 *3*; α(P)=0.0062 *4*; α(Q)=0.00027 *5* E_γ: From 1998Wh01. 1994Sh31 report Eγ=136.15 *4*.
139.87 *4*	0.008 *1*	301.166	11/2$^+$	161.26	11/2$^+$	[M1,E2]		7 *4*		α(K)=4 *4*; α(L)=2.0 *5*; α(M)=0.54 *15* α(N)=0.15 *5*; α(O)=0.036 *9*; α(P)=0.0061 *11*; α(Q)=0.00018 *15* E_γ: From 1998Wh01. 1994Sh31 report Eγ=139.80 *4*.

$^{241}_{94}Pu_{147}$-4

^{245}Cm α decay 1975Ba65,1994Sh31,1980Di13 (continued)

γ(^{241}Pu) (continued)

E_γ [†]	I_γ [‡a]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[#&]	α[@]	Comments
161.73 *5*	0.0068 *2*	161.73	1/2$^+$	0.0	5/2$^+$	E2		1.96	I_γ: Weighted average of values of 1994Sh31 and 1998Wh01. α(K)=0.190 *3*; α(L)=1.287 *19*; α(M)=0.359 *5* α(N)=0.0987 *14*; α(O)=0.0233 *4*; α(P)=0.00378 *6*; α(Q)=2.31×10^{-5} *4*
175.01 *3*	10.1 *1*	175.043	7/2$^+$	0.0	5/2$^+$	M1+E2	0.217 *19*	5.21	α(K)=4.07 *7*; α(L)=0.855 *12*; α(M)=0.209 *3* α(N)=0.0570 *8*; α(O)=0.01415 *20*; α(P)=0.00267 *4*; α(Q)=0.000168 *3*
189.965 *10*	0.209 *3*	231.933	9/2$^+$	41.969	7/2$^+$	M1+E2	0.63 *+6−7*	3.36 *16*	α(K)=2.46 *15*; α(L)=0.665 *10*; α(M)=0.1680 *25* α(N)=0.0459 *7*; α(O)=0.01125 *16*; α(P)=0.00205 *3*; α(Q)=0.000103 *6*
205.404 *20*	0.009 *1*	301.166	11/2$^+$	95.786	9/2$^+$	[M1,E2]		2.1 *14*	E_γ: From 1998Wh01. 1994Sh31 report Eγ=189.94 *4*. α(K)=1.4 *13*; α(L)=0.50 *5*; α(M)=0.129 *3* α(N)=0.0354 *7*; α(O)=0.0086 *4*; α(P)=0.00152 *18*; α(Q)=6.E−5 *5*
231.96 *3*	0.0123 *16*	231.933	9/2$^+$	0.0	5/2$^+$	[E2]		0.497	E_γ: From 1998Wh01. 1994Sh31 report Eγ=205.58 *7*. I_γ: Weighted average of values of 1994Sh31 and 1998Wh01. α(K)=0.1200 *17*; α(L)=0.275 *4*; α(M)=0.0760 *11* α(N)=0.0209 *3*; α(O)=0.00495 *7*; α(P)=0.000816 *12*; α(Q)=8.41×10^{-6} *12*
[x]388.16 *5*	0.019 *1*								E_γ: From 1998Wh01. 1994Sh31 report Eγ=232.17 *7*. E_γ,I_γ: Reported only by 1998Wh01.

[†] Weighted average values from 1994Sh31 unless stated otherwise. Transitions with energy 89.58, 93.82, and 165.3 reported by 1980Di13 have been shown by 1994Sh31 to be Ge escape peaks. While the reported 185.8 and 210.6 transitions are background and ^{243} α decay contaminant, respectively. Others: 1998Wh01, 1991Po17, 1966Ba07.

[‡] Weighted average of values in 1994Sh31, except where noted otherwise. Note: for Iγ from 1998Wh01, the transitions listed in the authors' Table I (1998Wh01) with footnote *i* should be divided by 10 and for Iγ from values in Table 1 of 1994Sh31 should be multiplied by 100.

[#] From Adopted Levels, except where noted otherwise.

[@] Additional information 1.

[&] If No value given it was assumed δ=1.00 for E2/M1, δ=1.00 for E3/M2 and δ=0.10 for the other multipolarities.

[a] For absolute intensity per 100 decays, multiply by 0.975.

[x] γ ray not placed in level scheme.

$^{241}_{94}Pu_{147}$-5

^{245}Cm α decay 1975Ba65,1994Sh31,1980Di13

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 decays through this branch

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