

²⁴⁶Cf α decay

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. J. Martin, C. D. Nesaraja	NDS 186, 261 (2022)	31-Dec-2021

Parent: ²⁴⁶Cf: E=0.0; J ^{π} =0⁺; T_{1/2}=35.7 h 5; Q(α)=6861.6 10; % α decay=100.0

²⁴⁶Cf-T_{1/2}: From 2011Br11.

²⁴⁶Cf-Q(α): From 2021Wa16.

²⁴²Cm Levels

E(level)	J ^{π}	T _{1/2}
0.0	0 ⁺	162.88 d 8
42.13 5	2 ⁺	
137 2	4 ⁺	
288 6	6 ⁺	

α radiations

E α #	E(level)	I α ‡@	HF†	Comments
6467 7	288	≈0.015	≈261	E α : α was seen by 1963Fr04 in $\alpha\gamma$ coincidence data. The original energy of 6465 5, listed in 1963Fr04, was calibrated to E α (to g.s.)=6753. These E α 's give E(level)=293; on the other hand, the measured E γ =147 5 to 137-keV level gives E(level)=284 6. An unweighted average of these two energies, E(level)=288 6 is adopted, and E α =6467 7 is calculated from the level energy of 288 6 and E α (to g.s.)=6750.0 10. I α : deduced from intensity balance at 288-keV level. No I α was given by 1963Fr04.
6615.6 10	137	0.15 2	134 18	E α =6726 was measured by 1996Ma72.
6708.2 10	42.13	20.6 10	2.53 13	E α =6719 was measured by 1996Ma72.
6750.0 10	0.0	79.3 10	1.000	E α =6758 was measured by 1996Ma72.

† The nuclear radius parameter r₀(²⁴²Cm)=1.49528 88 is deduced by assuming HF=1.0 for the ground-state to ground-state alpha decay branch.

‡ Alpha intensity per 100 α decays, measured by 1977Ba69, except for the 6467 α as noted. Others:1955Hu31, 1963Fr04.

From 1977Ba69. The authors' original energies have been lowered by 0.2 keV as recommended by 1991Ry01 to correct for a change in the calibration energy used by the authors. Others: 1955Hu31, 1963Fr04, 1996Ma72. The measurements of 1996Ma72 are given for each α group for comparison; the energy resolution was about 20 keV at 7.14 MeV.

@ Absolute intensity per 100 decays.

γ (²⁴²Cm)

E γ ‡	I γ #@	E _i (level)	J _i ^{π}	E _f	J _f ^{π}	Mult.	α †	I _(γ+ce) @	Comments
42 3	0.0178 12	42.13	2 ⁺	0.0	0 ⁺	E2	1155 16	20.6 13	ce(L)/(γ +ce)=0.72 23; ce(M)/(γ +ce)=0.20 11 ce(N)/(γ +ce)=0.057 34; ce(O)/(γ +ce)=0.014 8; ce(P)/(γ +ce)=0.0022 14; ce(Q)/(γ +ce)=5.4×10 ⁻⁶ 31 α (L)=8×10 ² 4; α (M)=2.4×10 ² 10 α (N)=66 29; α (O)=16 7; α (P)=2.6 11; α (Q)=0.0064 24 I _(γ+ce) : From an intensity balance at the 42 level. I γ : From I _(γ+ce) and α . Mult.: deduced in ²⁴² Am β^- decay.

Continued on next page (footnotes at end of table)

${}^{246}\text{Cf}$ α decay (continued) $\gamma({}^{242}\text{Cm})$ (continued)

<u>E_γ</u> [‡]	<u>I_γ</u> ^{#@}	<u>$E_i(\text{level})$</u>	<u>J_i^π</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.</u>	<u>α</u> [†]	Comments
96.3	0.012	137	4 ⁺	42.13	2 ⁺	[E2]	23.4	α : For the adopted energy of 42.129 7. $E_\gamma=42.13$ 5 from ${}^{242}\text{Am}$ β^- decay. $\alpha(\text{L})=16.4$ 26; $\alpha(\text{M})=4.6$ 7 $\alpha(\text{N})=1.29$ 21; $\alpha(\text{O})=0.31$ 5; $\alpha(\text{P})=0.052$ 8; $\alpha(\text{Q})=0.000206$ 27 I_γ : Note that from an intensity balance at the 137 level, with the assumption of mult=E2, one gets $I_\gamma=0.0113$, compared with the measured value of 0.012.
147.5	0.0035	288	6 ⁺	137	4 ⁺	[E2]	3.4 5	$\alpha(\text{K})=0.171$ 5; $\alpha(\text{L})=2.3$ 4; $\alpha(\text{M})=0.66$ 11 $\alpha(\text{N})=0.183$ 31; $\alpha(\text{O})=0.044$ 7; $\alpha(\text{P})=0.0075$ 12; $\alpha(\text{Q})=4.5 \times 10^{-5}$ 5

[†] Additional information 1.

[‡] From 1956Ch77 and 1955Pe57.

[#] Photon intensity per 100 α decays from 1956Ch77 and 1955Pe57.

[@] Absolute intensity per 100 decays.

${}^{246}\text{Cf}$ α decayDecay Scheme

Legend

- $I_\gamma < 2\% \times I_\gamma^{\text{max}}$
→ $I_\gamma < 10\% \times I_\gamma^{\text{max}}$
→ $I_\gamma > 10\% \times I_\gamma^{\text{max}}$

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