

<sup>247</sup>Fm  $\alpha$  decay (31 s) 2006He27

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	C. D. Nesaraja, E. A. Mccutchan		NDS 121, 695 (2014)	30-Sep-2013

Parent: <sup>247</sup>Fm: E=0.0; J <sup>$\pi$</sup> =(7/2<sup>+</sup>); T<sub>1/2</sub>=31 s I; Q( $\alpha$ )=8258 10; % $\alpha$  decay=64.0

<sup>247</sup>Fm-T<sub>1/2</sub>: from recoil- $\alpha$ (t) in 2006He27. Others: 29 s I (2004He28), 37 s +2I-10 (1989He03) both earlier results by same first author as in 2006He27, 35 s 4 (1967F115).

<sup>247</sup>Fm-% $\alpha$  decay: from 2006He27. Other:  $\geq$ 50% (1967F115).

2006He27: <sup>247</sup>Fm activity from  $\alpha$  decay chain of <sup>255</sup>Rf produced in <sup>207</sup>Pb(<sup>50</sup>Ti,2n), E(<sup>50</sup>Ti)=4.85 MeV/nucleon and  $\alpha$  decay of <sup>251</sup>No produced in <sup>206</sup>Pb(<sup>48</sup>Ca,3n), E(<sup>48</sup>Ca)=4.8 MeV/nucleon. Isotopes separated with the velocity filter SHIP and implanted into a position-sensitive 16-strip PIPS detector. Measured E $\alpha$ , I $\alpha$ , recoil- $\alpha$  coincidences, recoil- $\alpha$ (t), conversion electrons with the PIPS detector and E $\gamma$ , I $\gamma$ ,  $\gamma\gamma$  and  $\alpha\gamma\gamma$  coincidences using a HPGe Clover detector. Early results presented in 2005KuZZ, 2004He28.

Others: 1989He03, 1967Nu01, 1967F115.

<sup>243</sup>Cf Levels

E(level)	J <sup><math>\pi</math></sup>	Comments
0.0 <sup>†</sup>	(1/2 <sup>+</sup> )	
$\approx$ 7 <sup>†</sup>	(3/2 <sup>+</sup> )	E(level): from systematics of 3/2 <sup>+</sup> to 1/2 <sup>+</sup> spacings in the 1/2 <sup>+</sup> [631] band, E=7 keV 2 is extrapolated by 2006He27.
$\approx$ 67 <sup>†</sup>	(5/2 <sup>+</sup> )	
$\approx$ 149 <sup>‡</sup>	(5/2 <sup>+</sup> )	J <sup><math>\pi</math></sup> : from systematics of the energy difference between the 7/2 <sup>+</sup> member and the 5/2 <sup>+</sup> bandhead of the 5/2 <sup>+</sup> [622] Nilsson level.
$\approx$ 193 <sup>‡</sup>	(7/2 <sup>+</sup> )	E(level): from 315-keV level - 122 $\gamma$ . Shown as $\approx$ 197 in Fig. 5 of 2006He27.
$\approx$ 315 <sup>#</sup>	(7/2 <sup>+</sup> )	J <sup><math>\pi</math></sup> : unhindered $\alpha$ decay from <sup>247</sup> Fm ground state with J <sup><math>\pi</math></sup> =(7/2 <sup>+</sup> ) and configuration 7/2 <sup>+</sup> [624]; the same J <sup><math>\pi</math></sup> and configuration are suggested.

<sup>†</sup> Proposed band based on 1/2<sup>+</sup>[631] Nilsson level.

<sup>‡</sup> Proposed band based on 5/2<sup>+</sup>[622] Nilsson level.

<sup>#</sup> Proposed bandhead of 7/2<sup>+</sup>[624] Nilsson level.

$\alpha$  radiations

1989He03 and 1967F115 both observe complex  $\alpha$  structures. 1967F115 report E $\alpha$ =7870 50 with I $\alpha$  $\approx$ 70 and E $\alpha$ =7930 50 with I $\alpha$  $\approx$ 30, while 1989He03 report sum peaks of  $\alpha$  groups with conversion electrons at E=8010 15 and 8060 15 with equal relative intensities. 2006He27 also observe a very broad distribution in  $\alpha$  energies, however, through  $\alpha\gamma$  and  $\alpha$ -K x-ray coincidences, they establish that there is only a single  $\alpha$  peak, which is significantly broadened due to summing with a number of different conversion electron energies.

E $\alpha$	E(level)	I $\alpha$ <sup>‡</sup>	HF <sup>†</sup>	Comments
7824 18	$\approx$ 315	100	$\approx$ 0.60	E $\alpha$ : $\Delta$ E=18 keV from 10 keV statistical and 15 keV systematic uncertainties combined in quadrature. Other: 7840 keV 20 (2004He28).

<sup>†</sup> r<sub>0</sub>(<sup>243</sup>Cf)=1.49 2, extrapolated from r<sub>0</sub> systematics given in 1998Ak04.

<sup>‡</sup> For absolute intensity per 100 decays, multiply by 0.64.

$^{247}\text{Fm}$   $\alpha$  decay (31 s) **2006He27** (continued) $\gamma(^{243}\text{Cf})$ 

$E_\gamma$ †	$E_i(\text{level})$	$J_i^\pi$	$E_f$	$J_f^\pi$	Mult.	$\alpha$ ‡	Comments
82.2 2	$\approx 149$	(5/2 <sup>+</sup> )	$\approx 67$	(5/2 <sup>+</sup> )			
121.8 2	$\approx 315$	(7/2 <sup>+</sup> )	$\approx 193$	(7/2 <sup>+</sup> )			
141.8 2	$\approx 149$	(5/2 <sup>+</sup> )	$\approx 7$	(3/2 <sup>+</sup> )	(M1)	14.00	$\alpha(\text{K})=10.88\ 16$ ; $\alpha(\text{L})=2.33\ 4$ ; $\alpha(\text{M})=0.573\ 9$ $\alpha(\text{N})=0.1589\ 24$ ; $\alpha(\text{O})=0.0412\ 6$ ; $\alpha(\text{P})=0.00797\ 12$ ; $\alpha(\text{Q})=0.000469\ 7$ $\alpha(\text{K})_{\text{exp}}=11\ 5$ (2004He28). Mult.: from $\alpha(\text{K})_{\text{exp}}$ .
166.6 2	$\approx 315$	(7/2 <sup>+</sup> )	$\approx 149$	(5/2 <sup>+</sup> )	(M1)	8.89	$\alpha(\text{K})=6.93\ 10$ ; $\alpha(\text{L})=1.471\ 22$ ; $\alpha(\text{M})=0.362\ 6$ $\alpha(\text{N})=0.1002\ 15$ ; $\alpha(\text{O})=0.0260\ 4$ ; $\alpha(\text{P})=0.00502\ 8$ ; $\alpha(\text{Q})=0.000295\ 5$ $\alpha(\text{K})_{\text{exp}}=6.7\ 25$ (2004He28). Mult.: from $\alpha(\text{K})_{\text{exp}}$ .

† From 2006He27, observed in coincidence with  $\alpha$  decays.

‡ Additional information 1.

 $^{247}\text{Fm}$   $\alpha$  decay (31 s) **2006He27**Decay Scheme