

^{216}Fr α decay (0.70 μs) [1996Li37](#)

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	K. Auranen and E. A. Mccutchan		NDS 168, 117 (2020)	1-Aug-2020

Parent: ^{216}Fr : $E=0.0$; $J^\pi=(1^-)$; $T_{1/2}=0.70\ \mu\text{s}$ 2; $Q(\alpha)=9174\ 3$; $\% \alpha$ decay=100.0

^{216}Fr - $T_{1/2}$: from [1970Bo13](#).

[1996Li37](#): ^{216}Fr activity was measured in secular equilibrium with ^{224}Pa ($T_{1/2}=0.8\ \text{s}$) and ^{220}Ac ($T_{1/2}=26\ \text{ms}$). ^{224}Pa was produced by $^{209}\text{Bi}(^{18}\text{O}, 3n)$, $E=96\ \text{MeV}$. Measured α particles, γ rays, $\alpha\gamma$ coin, conversion electrons, α -ce and α - γ -ce coin.

Detectors not given. However, α - and γ -ray spectra suggest that Si(Au) surface barrier and germanium detectors, respectively, were used.

Others: [2003Ni10](#), [2007Ku30](#).

α : [Additional information 1](#).

 ^{212}At Levels

<u>E(level)[†]</u>	<u>J^π[‡]</u>	<u>$T_{1/2}$[‡]</u>
0.0	(1 ⁻)	0.314 s 3
160.3 1	(2 ⁻)	
205.3 2	(3 ⁻)	

[†] From E_γ .

[‡] From the Adopted Levels.

 α radiations

<u>E_α[†]</u>	<u>E(level)</u>	<u>I_α^{†#@}</u>	<u>HF[‡]</u>	Comments
8811 15	205.3	≈ 0.2	≈ 263	E_α : observed in coincidence with 45.0 γ . I_α : reported as ≈ 0.2 for 100 total decays from both the 1 ⁻ , 0.70 μs g.s and the 133-keV, 71 ns isomer measured in equilibrium with the ^{220}Ac parent (1996Li37).
8861 15	160.3	0.5 2	135 55	E_α : observed in coincidence with 160.3 γ . I_α : reported as 0.5 2 for 100 total decays from both the 1 ⁻ , 0.70 μs g.s and the 133-keV, 71 ns isomer measured in equilibrium with the ^{220}Ac parent (1996Li37).
9004 5	0.0	99 1	1.65 11	E_α : others: 9005 keV 12 (1970Bo13), 9004 keV 5 (2007Ku30). I_α : reported as 99 1 for 100 total decays from both the 1 ⁻ , 0.70 μs g.s and the 133-keV, 71 ns isomer measured in equilibrium with the ^{220}Ac parent (1996Li37).

[†] From [1996Li37](#).

[‡] Using $r_0(^{212}\text{At})=1.5522\ 49$, average of $r_0(^{214}\text{Rn})=1.5655\ 13$, $r_0(^{212}\text{Rn})=1.5433\ 36$, $r_0(^{212}\text{Po})=1.5658\ 59$, and $r_0(^{210}\text{Po})=1.5340\ 25$ ([2020Si16](#)).

Intensities are given in [1996Li37](#) as normalized to 100 total decays from both the 1⁻, 0.70 μs g.s and the 133-keV, 71 ns isomer measured in equilibrium with the ^{220}Ac parent. Evaluators have renormalized the intensities here to be for 100 decays of the ground state; original values from [1996Li37](#) given in the comments.

@ Absolute intensity per 100 decays.

^{216}Fr α decay (0.70 μs) **1996Li37 (continued)** $\gamma(^{212}\text{At})$

I_γ normalization: gamma-ray intensities deduce by evaluators from measured absolute α intensities and γ feedings.

E_γ [†]	I_γ [#]	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. [‡]	α	Comments
45.0 1	≈ 0.008	205.3	(3 ⁻)	160.3	(2 ⁻)	M1	24.0	$\alpha(\text{L})=18.2$ 3; $\alpha(\text{M})=4.32$ 7; $\alpha(\text{N})=1.120$ 18; $\alpha(\text{O})=0.240$ 4; $\alpha(\text{P})=0.0331$ 6 I_γ : deduced by evaluators from measured α feeding.
160.3 1	0.17 5	160.3	(2 ⁻)	0.0	(1 ⁻)	M1	3.16	$\alpha(\text{K})=2.56$ 4; $\alpha(\text{L})=0.457$ 7; $\alpha(\text{M})=0.1083$ 16; $\alpha(\text{N})=0.0281$ 4; $\alpha(\text{O})=0.00601$ 9 $\alpha(\text{P})=0.000830$ 12 Mult.: K x ray/ $I_\gamma(160.3\gamma)=3$ 1 (1996Li37). I_γ : deduced by evaluators from measured α and γ feeding.

[†] From 1996Li37.

[‡] From the Adopted Gammas. For cases where values are derived from this dataset, additional support is given in the comments.

[#] Absolute intensity per 100 decays.

 ^{216}Fr α decay (0.70 μs) **1996Li37**Decay Scheme

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

Legend

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

