^{236}Th β^- decay 1984Mi02

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Shaofei Zhu	NDS 182, 2 (2022).	1-Apr-2022

Parent: ^{236}Th: E=0; $J^\pi=0^+$; $T_{1/2}$=37.5 min *2*; Q(β^-)=921 *20*; %β^- decay=100.0

^{236}Th-Q(β^-): from 2021Wa16.

The decay scheme of 1984Mi02 supersedes the scheme of 1973Or06 because of the observation of more complete γ rays in cascades.

1984Mi02: ^{236}Th decay was assigned based on the correlation of ^{236}Pa daughter decay in equilibrium from ^{236}Th sources produced by ^{238}U(p,3p) followed by chemical and mass separation.

1973Or06: ^{236}Th sources produced by ^{238}U(p,3p).

Other: 1973Ka10.

x-ray: Iγ(Pa K x ray)/Iγ(642γ)=0.32 *8* from an equilibrium source gives Iγ(Pa K x ray)=(0.32 *8*) x 0.37 *2* x 100=12% *4* (per 100 β^- decays of ^{236}Pa) (1973Or06).

α: Additional information 1.

^{236}Pa Levels

E(level)†	J^π‡	$T_{1/2}$
0	$1^{(+)}$	9.1 min *1*
31.54 *9*		
110.76 *8*	$(0^-,1)$	
227.42 *20*		
340.20 *7*	$(0^-,1)$	
580.81 *11*	$(0^-,1)$	
678.11 *8*	$(0^-,1)$	

† From least square fit to Eγ's by evaluator.

‡ From Adopted Levels.

β^- radiations

E(decay)	E(level)	Iβ^-†	Log *ft*	Comments
(243 *20*)	678.11	1.32 *14*	5.4 *1*	av Eβ=66.3 *60*
(340 *20*)	580.81	0.52 *10*	6.4 *2*	av Eβ=95.6 *62*
(581 *20*)	340.20	3.4 *12*	6.4 *2*	av Eβ=173.4 *68*
(694 *20*)	227.42	2.5 *6*	6.8 *2*	
(810 *20*)	110.76	2.0 *17*	7.1 *3*	av Eβ=253.1 *72*
(921 *20*)	0	94.5 *12*	5.6 *1*	av Eβ=293.2 *74*
				Iβ^-: β^- intensity to g.s. + 31.5-keV level.

† Absolute intensity per 100 decays.

γ(^{236}Pa)

Iγ normalization: 1984Mi02 provide absolute intensities noting "The gamma-ray intensities of the parent 37-min ^{236}Th were also put on an absolute basis through measurements in sources in which parent and daughter were in equilibrium; proper account was taken of the parent/daughter ratio (0.76).".

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^{236}Th β^- decay 1984Mi02 (continued)

$\gamma(^{236}Pa)$ (continued)

E_γ [†]	I_γ [†#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α	Comments
(31.5)		31.54		0	$1^{(+)}$			E_γ: not observed, deduced from level scheme (1984Mi02).
110.8 *1*	4.2 *12*	110.76	$(0^-,1)$	0	$1^{(+)}$			E_γ: from 1984Mi02; other: 110.7 *5* (1973Or06). I_γ: from 1984Mi02; other: 10.5 *28* relative to Iγ(642γ)=100 (1973Or06).
112.8 *2*	0.24 *9*	340.20	$(0^-,1)$	227.42				E_γ: from 1984Mi02; other: 112.7 *+5−1* (1973Or06). I_γ: from 1984Mi02; other: 2.6 *12* relative to Iγ(642γ)=100 (1973Or06).
[x]131.6 *10*	0.56 *28*							E_γ: from 1973Or06. I_γ: from 2.0 *10* relative to Iγ(642γ)=100 (1973Or06).
196.0 *5*	0.69 *14*	227.42		31.54		(M1)	3.01 *5*	α(K)=2.40 *4*; α(L)=0.461 *7*; α(M)=0.1111 *18*; α(N)=0.0298 *5*; α(O)=0.00715 *11* α(P)=0.001366 *22*; α(Q)=0.0001128 *18* E_γ,I_γ: from 1984Mi02.
229.5 *1*	0.7 *4*	340.20	$(0^-,1)$	110.76	$(0^-,1)$	(M1)	1.935 *27*	α(K)=1.543 *22*; α(L)=0.296 *4*; α(M)=0.0712 *10*; α(N)=0.01910 *27*; α(O)=0.00458 *6* α(P)=0.000875 *12*; α(Q)=7.23×10^{-5} *10* E_γ: from 1984Mi02; other: 229.6 *10* (1973Or06). I_γ: from 1984Mi02; other: 2.0 *10* relative to Iγ(642γ)=100 (1973Or06).
308.7 *1*	0.42 *5*	340.20	$(0^-,1)$	31.54				
340.1 *1*	0.67 *9*	340.20	$(0^-,1)$	0	$1^{(+)}$			
[x]392.4 *1*	0.17 *3*							
[x]414.8 *3*	0.13 *3*							
[x]434.3 *1*	0.67 *9*							
549.2 *1*	0.32 *9*	580.81	$(0^-,1)$	31.54				
567.1 *3*	0.13 *3*	678.11	$(0^-,1)$	110.76	$(0^-,1)$			
581.1 *2*	0.20 *4*	580.81	$(0^-,1)$	0	$1^{(+)}$			
[x]586.4 *2*	0.09 *4*							
[x]599.7 *1*	0.24 *3*							
646.6 *1*	0.72 *11*	678.11	$(0^-,1)$	31.54				
678.1 *1*	0.47 *7*	678.11	$(0^-,1)$	0	$1^{(+)}$			
[x]719.9 *1*	0.21 *3*							

[†] From 1984Mi02, unless otherwise noted. Absolute intensity from 1984Mi02 relative to Iγ(642γ) in ^{236}Pa at equilibrium, corrected by parent/daughter ratio of 0.76 based on their lifetimes.

[‡] From I(K x ray)/Iγ suggesting that most of the intense γ rays with Eγ>112.6 keV (the K-shell binding energy in Pa) should be M1 (1984Mi02).

[#] Absolute intensity per 100 decays.

[x] γ ray not placed in level scheme.

^{236}Th β^- decay 1984Mi02

Decay Scheme

Intensities: I_γ per 100 parent decays