

^{237}Pa β^- decay 1974Ka05

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	M. S. Basunia	NDS 107, 3323 (2006)	15-Mar-2006

Parent: ^{237}Pa : $E=0.0$; $J^\pi=(1/2^+)$; $T_{1/2}=8.7$ min 2; $Q(\beta^-)=225\times 10^1$ 10; $\% \beta^-$ decay=100.0

^{237}Pa sources were produced from $^{238}\text{U}(\text{n,pn})$ and $^{238}\text{U}(\gamma,\text{p})$ reactions with 14-MeV neutrons and 21-MeV bremsstrahlung, respectively; Detector: several (number not available) Ge(Li) detectors, proportional counter; Measured: $E\gamma$, $I\gamma$, $\gamma\gamma$ coin. See 1962Ve05 for the calculations of $\log ft$ value for the n $3/2[631]$ to p $1/2[530]$ first-forbidden β transition.

 ^{237}U Levels

E(level)	J^π &	$T_{1/2}$
0.0 [†]	$1/2^+$	6.75 d 1
11.3 [‡] 3	$3/2^+$	
56.2 [‡] 3	$5/2^+$	
540.7 [‡] 2	$1/2^-$	
554.9 [‡] 2	$3/2^-$	
734.0 [#] 2	$(1/2^-)$	
865.0 [@] 2	$1/2^-$	
903.3 [@] 6	$(3/2^-)$	
1344.7 5	$(1/2^-)$	
1407.4 5	$(1/2^+)$	

[†] $1/2[631]$ band member.

[‡] $K=1/2$ band member.

[#] $K=1/2$ band member.

[@] $1/2[501]$ band member.

& From Adopted Levels.

 β^- radiations

E(decay)	E(level)	$I\beta^-$ ^{†‡}	Log ft	Comments
$(8.4\times 10^2$ 10)	1407.4	0.27 11	7.4 3	av $E\beta=264$ 37
$(9.1\times 10^2$ 10)	1344.7	0.27 11	7.48 25	av $E\beta=287$ 37
$(1.35\times 10^3$ 10)	903.3	0.51 18	7.81 20	av $E\beta=452$ 39
$(1.39\times 10^3$ 10)	865.0	53 6	5.83 13	av $E\beta=467$ 39
				$E(\beta^-)=1216$ was measured in coincidence with the 865-keV γ (1982GiZX (unpublished)).
$(1.52\times 10^3$ 10)	734.0	2.1 5	7.38 15	av $E\beta=518$ 40
$(1.70\times 10^3$ 10)	554.9	0.9 9	7.9 5	av $E\beta=589$ 40
$(1.71\times 10^3$ 10)	540.7	24 3	6.51 11	av $E\beta=595$ 40
				$E(\beta^-)=1508$ was measured in coincidence with the 529- and 541-keV γ 's (1982GiZX (unpublished)).
$(2.24\times 10^3$ 10)	11.3			
2.25×10^3 10	0.0	19 10	7.06 24	av $E\beta=813$ 41
				$I\beta^-$: deduced from transition intensities of gammas feeding the g.s. band.
				$I\beta=19\%$ 10 is for the total β feeding the g.s. and the 11.3-keV level.
				E(decay): from 1974Ka05.

[†] β feedings have been deduced from intensity balance at each level.

[‡] Absolute intensity per 100 decays.

^{237}Pa β^- decay **1974Ka05** (continued) $\gamma(^{237}\text{U})$

I γ normalization: Normalization factor of 0.34 4 to convert the relative γ intensities to absolute intensities was deduced by **1974Ka05** from their measurement of absolute photon intensity: $\Sigma I\gamma(498.7 \leq E\gamma \leq 554.9) = 28.3\%$.

$E_\gamma^\dagger$	$I_\gamma^{\ddagger\#}$	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. ‡	$\alpha^@$	Comments
45.0 5	0.052 22	56.2	5/2 ⁺	11.3	3/2 ⁺		166 65	$\alpha(\text{L})=122\ 54$; $\alpha(\text{M})=33\ 15$ I γ : I(γ +ce)=8.7 11 obtained from intensity balance at the 56.2-keV level and $\alpha=166\ 65$ deduced in ^{242}Pu α decay yield I γ =0.052 22. The 45.0-keV peak in γ spectrum of 1974Ka05 included a ^{236}Pa γ . The ^{237}Pa and ^{236}Pa contributions could not be determined (1974Ka05). $E\gamma=44.86\ 10$ is adopted from ^{241}Pu α decay.
179.1 2	0.5 1	734.0	(1/2 ⁻)	554.9	3/2 ⁻	[M1,E2]	2.8 17	$\alpha(\text{K})=1.9\ 17$; $\alpha(\text{L})=0.704\ 6$; $\alpha(\text{M})=0.067\ 6$ $\alpha(\text{E}2)=1.16$, $\alpha(\text{M}1)=4.50$.
310.1 2	5.1 7	865.0	1/2 ⁻	554.9	3/2 ⁻	[M1,E2]	0.57 40	$\alpha(\text{K})=0.42\ 35$; $\alpha(\text{L})=0.11\ 4$; $\alpha(\text{M})=0.028\ 8$; $\alpha(\text{N}+..)=0.010\ 3$ α : $\alpha(\text{M}1)=0.973$, $\alpha(\text{E}2)=0.174$.
498.7 2	7.1 9	554.9	3/2 ⁻	56.2	5/2 ⁺	[E1]	0.0136	$\alpha(\text{K})=0.0110$; $\alpha(\text{L})=0.0019$; $\alpha(\text{M})=0.00047$; $\alpha(\text{N}+..)=0.00017$
529.4 2	44 4	540.7	1/2 ⁻	11.3	3/2 ⁺	[E1]	0.0121	$\alpha(\text{K})=0.0094$; $\alpha(\text{L})=0.00168$
540.7 2	27 3	540.7	1/2 ⁻	0.0	1/2 ⁺	[E1]	0.0116	$\alpha(\text{K})=0.0093$; $\alpha(\text{L})=0.00166$
543.6 5	0.7 3	554.9	3/2 ⁻	11.3	3/2 ⁺	[E1]	0.0115	$\alpha(\text{K})=0.0093$; $\alpha(\text{L})=0.00166$
554.9 2	4.5 5	554.9	3/2 ⁻	0.0	1/2 ⁺	[E1]	0.0110	$\alpha(\text{K})=0.0089$; $\alpha(\text{L})=0.00159$
^x 701.0 5	0.4 2							
722.6 2	2.4 4	734.0	(1/2 ⁻)	11.3	3/2 ⁺	[E1]	0.00673	
734.0 2	1.9 4	734.0	(1/2 ⁻)	0.0	1/2 ⁺	[E1]	0.00654	
847.1 5	1.5 5	903.3	(3/2 ⁻)	56.2	5/2 ⁺	[E1]	0.00504	
853.7 2	100	865.0	1/2 ⁻	11.3	3/2 ⁺	[E1]	0.00497	$\alpha(\text{K})=0.00405$; $\alpha(\text{L})=0.00069$
865.0 2	46 5	865.0	1/2 ⁻	0.0	1/2 ⁺	[E1]	0.00486	$\alpha(\text{K})=0.00395$; $\alpha(\text{L})=0.00068$ I $\gamma(865\gamma)/I\gamma(853\gamma)=0.23\ 12$ was measured in (n, γ), a factor of 2 smaller than the value given here.
1333.2 5	0.50 25	1344.7	(1/2 ⁻)	11.3	3/2 ⁺			
1344.8 5	0.30 15	1344.7	(1/2 ⁻)	0.0	1/2 ⁺			
1395.9 5	0.50 25	1407.4	(1/2 ⁺)	11.3	3/2 ⁺			
1407.5 5	0.30 15	1407.4	(1/2 ⁺)	0.0	1/2 ⁺			

† From **1974Ka05**.

‡ Assigned by the evaluator from the level scheme.

$^\#$ For absolute intensity per 100 decays, multiply by 0.341 34.

$^@$ Total theoretical internal conversion coefficients, calculated using the BrIcc code (**2008Ki07**) with Frozen orbital approximation based on γ -ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

x γ ray not placed in level scheme.

$^{237}\text{Pa} \beta^-$ decay 1974Ka05

Decay Scheme

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

Legend

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

