

^{207}Hg β^- decay 1981JoZW

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	F. G. Kondev, S. Lalkovski		NDS 112, 707 (2011)	1-Aug-2010

Parent: ^{207}Hg : $E=0$; $J^\pi=(9/2^+)$; $T_{1/2}=2.9$ min 2; $Q(\beta^-)=482\times 10^1$ 15; $\% \beta^-$ decay=100.0

Facility: CERN-ISOLDE; Parent: mass separated source, produced in $^{208}\text{Pb}(n,2p)$. Neutrons from proton-induced spallation reaction $E(p)=600$ MeV, $I(p)=2\times 10^{12}$ pps. $E(n) > 50$ MeV. 170 g/cm² of ^{208}Pb ; $A(^{207}\text{Hg})=105$ atoms/s. Detectors: mass separator, Mylar tape, plastic scintillator (Eff 100%), two Ge(Li) of 63 and 40 cm³; Measured: β , γ , $\beta\gamma$, $\beta\gamma(t)$, $\gamma(t)$; Deduced: level scheme, J^π ;

 ^{207}Tl Levels

E(level) [†]	J^π [‡]	$T_{1/2}$ [‡]	E(level) [†]	J^π [‡]
0	1/2 ⁺	4.77 min 3	3104.3 3	(7/2,9/2)
350.87 19	3/2 ⁺	30 ps 7	3142.9 4	(7/2,9/2,11/2)
1348.04 21	11/2 ⁻	1.33 s 11	3272.5 3	(7/2,9/2 ⁺)
1682.49 21	5/2 ⁺		3295.5 3	(7/2,9/2)
2675.64 25	(5/2 ⁺)		3335.9 3	(7/2,9/2)
2708.8 3			3357.5 4	(7/2,9/2,11/2)
2911.7 3	(7/2,9/2)		3591.7? 4	(7/2,9/2 ⁺)
2985.1 3	(7/2,9/2)			

[†] From a least-squares fit to E_γ .

[‡] From the Adopted Levels.

 β^- radiations

Level scheme in 1981JoZW is incomplete and unbalanced. The I_β from the parent (9/2⁺) g.s. to the 3/2⁺ excited 350.86-keV state is 19.9%, which contradicts the β -decay selection rules. Therefore, the $\log ft$ values are not given by the evaluators.

Maximum β^- energy of 1800 was deduced from $\beta\gamma$ with γ 's deexciting the four levels between 2911.68 and 3142.91 keV. More than 80% of the β^- intensity feeds seven levels between 2911.68 and 3357.9 keV.

E(decay)	E(level)
$(4.82\times 10^3$ 15)	0

²⁰⁷Hg β⁻ decay 1981JoZW (continued)

$\gamma(^{207}\text{Tl})$									
E_γ ‡	I_γ ‡	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult.#	$\delta^\#$	α^\dagger	Comments
119.1 @& 3		3104.3	(7/2,9/2)	2985.1	(7/2,9/2)				
152.6 @& 3		3295.5	(7/2,9/2)	3142.9	(7/2,9/2,11/2)				
157.7 @& 3		3142.9	(7/2,9/2,11/2)	2985.1	(7/2,9/2)				
191.2 @& 3		3295.5	(7/2,9/2)	3104.3	(7/2,9/2)				
192.6 @& 3		3335.9	(7/2,9/2)	3142.9	(7/2,9/2,11/2)				
231.1 @& 3		3142.9	(7/2,9/2,11/2)	2911.7	(7/2,9/2)				
231.2 @& 3		3335.9	(7/2,9/2)	3104.3	(7/2,9/2)				
253.8 @& 3	4	3357.5	(7/2,9/2,11/2)	3104.3	(7/2,9/2)				
310.3 @& 3	12	3295.5	(7/2,9/2)	2985.1	(7/2,9/2)				
351.0 3	960	350.87	3/2 ⁺	0	1/2 ⁺	M1+E2	+0.271 4	0.243 4	$\alpha(\text{K})=0.199$ 3; $\alpha(\text{L})=0.0342$ 5; $\alpha(\text{M})=0.00801$ 12; $\alpha(\text{N}+..)=0.00245$ 4 $\alpha(\text{N})=0.00202$ 3; $\alpha(\text{O})=0.000392$ 6; $\alpha(\text{P})=3.65 \times 10^{-5}$ 6
446.3 @& 3	13	3357.5	(7/2,9/2,11/2)	2911.7	(7/2,9/2)				
563.8 3	9	3272.5	(7/2,9/2 ⁺)	2708.8					
596.4 3	4	3272.5	(7/2,9/2 ⁺)	2675.64	(5/2 ⁺)				
993 1	5	2675.64	(5/2 ⁺)	1682.49	5/2 ⁺				
997.1 3	780	1348.04	11/2 ⁻	350.87	3/2 ⁺	[M4]		0.1460 21	$\alpha(\text{K})=0.1092$ 16; $\alpha(\text{L})=0.0278$ 4; $\alpha(\text{M})=0.00689$ 10; $\alpha(\text{N}+..)=0.00212$ 3 $\alpha(\text{N})=0.001752$ 25; $\alpha(\text{O})=0.000334$ 5; $\alpha(\text{P})=2.83 \times 10^{-5}$ 4
1331.7 3	45	1682.49	5/2 ⁺	350.87	3/2 ⁺	[M1+E2]		0.0058 22	
1348.1 3	30	1348.04	11/2 ⁻	0	1/2 ⁺	[E5]		0.0266 4	$\alpha(\text{K})=0.0186$ 3; $\alpha(\text{L})=0.00603$ 9; $\alpha(\text{M})=0.001514$ 22; $\alpha(\text{N}+..)=0.000461$ 7 $\alpha(\text{N})=0.000384$ 6; $\alpha(\text{O})=7.16 \times 10^{-5}$ 10; $\alpha(\text{P})=5.53 \times 10^{-6}$ 8
1563.9 3	150	2911.7	(7/2,9/2)	1348.04	11/2 ⁻				
1590.3 3	20	3272.5	(7/2,9/2 ⁺)	1682.49	5/2 ⁺				
1637.1 3	295	2985.1	(7/2,9/2)	1348.04	11/2 ⁻				
1682.7 3	7	1682.49	5/2 ⁺	0	1/2 ⁺	[E2]		0.00251 4	
1756.3 3	160	3104.3	(7/2,9/2)	1348.04	11/2 ⁻				
1794.9 3	74	3142.9	(7/2,9/2,11/2)	1348.04	11/2 ⁻				
1909.2 & 3	2	3591.7?	(7/2,9/2 ⁺)	1682.49	5/2 ⁺				
1947.5 @& 3	38	3295.5	(7/2,9/2)	1348.04	11/2 ⁻				
1987.4 3	50	3335.9	(7/2,9/2)	1348.04	11/2 ⁻				
2009.5 3	24	3357.5	(7/2,9/2,11/2)	1348.04	11/2 ⁻				
2358.0 3	5	2708.8		350.87	3/2 ⁺				
2560.5 3	8	2911.7	(7/2,9/2)	350.87	3/2 ⁺				
2634.1 3	35	2985.1	(7/2,9/2)	350.87	3/2 ⁺				

^{207}Hg β^- decay 1981JoZW (continued)

$\gamma(^{207}\text{Tl})$ (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>Comments</u>
2675.2 3	1	2675.64	(5/2 ⁺)	0	1/2 ⁺	E_γ : given as 2675.4 in decay scheme, but as 2675.2 in text.
2753.3 3	7	3104.3	(7/2,9/2)	350.87	3/2 ⁺	
2985.4 3	0.4	3335.9	(7/2,9/2)	350.87	3/2 ⁺	

† Additional information 1.

‡ From 1981JoZW, unless otherwise stated.

From Adopted Levels.

@ From the level energies difference by the evaluators.

& Placement of transition in the level scheme is uncertain.

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Decay Scheme

Intensities: Relative I_γ

Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- - - - - γ Decay (Uncertain)

$(9/2^+)$ 0 2.9 min 2
 $Q_{\beta^-} = 482 \times 10^1$ 15
 $\% \beta^- = 100$
 $^{207}\text{Hg}_{127}$

