

^{213}Pb β^- decay (10.2 min) 2004DeZV

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	M. S. Basunia	NDS 181, 475 (2022)	1-Jan-2022

Parent: ^{213}Pb : $E=0.0$; $J^\pi=(9/2^+)$; $T_{1/2}=10.2$ min 3; $Q(\beta^-)=2028$ 8; $\% \beta^-$ decay=100.0

^{213}Pb - $J^\pi, T_{1/2}$: From Adopted Levels.

Adapted/Edited the XUNDL dataset compiled by M. Birch and B. Singh (McMaster); June 8, 2011.

^{213}Pb produced via the reaction $^{232}\text{Th}(p,X)$ with $E(p)=1.0$ GeV, ionized by a plasma ion source and separated using the ISOLDE on-line mass separator. Detector system included an Si-detector for α -particles, a LEGe (25 mm thick, with 300 μm beryllium entrance window) and a HPGe set up in close geometry for X-rays and γ -rays, as well as a 0.5 mm thick plastic scintillator ΔE detector for β -particles. Measured $E\gamma$, $I\gamma$, $I\beta$, $\beta\gamma$ and $\gamma\gamma$ coincidence. Deduced levels.

 ^{213}Bi Levels

E(level) [†]	J^π [‡]	$T_{1/2}$	Comments
0.0	$9/2^-$	45.59 min 6	$T_{1/2}$: From Adopted Levels.
257.63 7	$7/2^-$		
592.72 8	$(5/2^-, 7/2, 9/2)^-$		J^π : Other: $(5/2^-, 7/2^-)$ in 2004DeZV.
874.2 5			
977.71 8			J^π : $(9/2^-)$ in 2004DeZV.
982.87 10			
1142.39 9			
1149.33 10			
1171.01 10			
1202.14? 12			
1222.34? 12			
1287.24? 12			
1295.33 12			
1343.1? 3			
1445.08 10			
1495.04 12			
1543.15 12			
1592.62 15			

[†] From least-squares fit of the $E\gamma$ data. Uncertainties of following $E\gamma$ were doubled in the fitting procedure to get an acceptable reduced $\chi^2=2.8$ as compared to critical $\chi^2=2.0$, otherwise the reduced $\chi^2=7.0$: 1187.0, 1335.5, 1445.4, 1592.1 from 1445 and 1592 keV levels.

[‡] From Adopted Levels.

 β^- radiations

E(decay)	E(level)	$I\beta^-$ ^{†‡}	Log ft
(435 8)	1592.62	1.7	5.5
(485 8)	1543.15	0.9	6.0
(533 8)	1495.04	2.6	5.7
(583 8)	1445.08	8.8	5.2
(685 8)	1343.1?	0.6	6.6
(733 8)	1295.33	2.3	6.1
(826 8)	1202.14?	1.0	6.7
(857 8)	1171.01	6.8	5.9
(879 8)	1149.33	1.9	6.5
(886 8)	1142.39	3.7	6.2
(1045 8)	982.87	2.3	6.6
(1050 8)	977.71	23.4	5.6

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^{213}Pb β^- decay (10.2 min) 2004DeZV (continued)

β^- radiations (continued)

E(decay)	E(level)	$I\beta^{-\dagger\ddagger}$	Log ft	Comments
(1154 8)	874.2	3.6	6.6	
(1435 8)	592.72	1.0	7.5	
(1770 8)	257.63	1.4	7.7	
(2028 8)	0.0	34.0	6.5	

$I\beta^-$: Ground state feeding, $\leq 34\%$, was estimated by 2004DeZV from the absolute β branching of the 264.6 keV γ -ray in ^{217}Bi β^- decay and the intensity ratio of the 257.7 keV to 264.6 keV γ transitions.

\dagger Per 100 decays of the parent (2004DeZV).

\ddagger Absolute intensity per 100 decays.

$\gamma(^{213}\text{Bi})$

$I\gamma$ normalization: Estimated by the evaluator based on $\Sigma I\gamma(1+\alpha)=66$, assuming g.s. β feeding=34% (in 2004DeZV $\leq 34\%$).

E_γ	$I_\gamma^\#$	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult.	α^\ddagger	Comments
103.5 5		977.71		874.2				
248.0 5		1543.15		1295.33				
257.7 1	100	257.63	$7/2^-$	0.0	$9/2^-$	M1+E2	0.45 26	$\alpha(\text{K})=0.33$ 24; $\alpha(\text{L})=0.087$ 13; $\alpha(\text{M})=0.0213$ 21 $\alpha(\text{N})=0.0054$ 6; $\alpha(\text{O})=0.00107$ 15; $\alpha(\text{P})=1.12 \times 10^{-4}$ 33 Mult.: From $\alpha(\text{K})\text{exp}=0.56$ 4 (2004DeZV).
274.3 @ 5	4.0 19	1445.08		1171.01				
295.4 5		1445.08		1149.33				
302.7 1	12.3 16	1445.08		1142.39				
324.2 @ 1	9.5 12	1495.04		1171.01				
334.9 1	3.2 5	592.72	$(5/2,7/2,9/2)^-$	257.63	$7/2^-$			
389.8 5		982.87		592.72	$(5/2,7/2,9/2)^-$			
462.7 5		1445.08		982.87				
467.8 5		1445.08		977.71				
565.5 5		1543.15		977.71				
592.9 1	4.0 7	592.72	$(5/2,7/2,9/2)^-$	0.0	$9/2^-$	[M1+E2]		
720.3 1	62 8	977.71		257.63	$7/2^-$			
874.3 10	27 4	874.2		0.0	$9/2^-$			
893.1 10	6.8 10	1149.33		257.63	$7/2^-$			
913.8 10	3.2 8	1171.01		257.63	$7/2^-$			
944.5 \dagger @ 1	7.3 11	1202.14?		257.63	$7/2^-$			
964.7 \dagger @ 1	26 4	1222.34?		257.63	$7/2^-$			
977.5 1	111 15	977.71		0.0	$9/2^-$			
982.9 1	17.0 23	982.87		0.0	$9/2^-$			
1029.6 \dagger @ 1	4.8 7	1287.24?		257.63	$7/2^-$			
1037.7 1	16.7 23	1295.33		257.63	$7/2^-$			
1085.5 \dagger @ 3	4.6 7	1343.1?		257.63	$7/2^-$			
1142.4 1	40 5	1142.39		0.0	$9/2^-$			
1149.3 1	6.9 10	1149.33		0.0	$9/2^-$			
1171.0 1	61 8	1171.01		0.0	$9/2^-$			
1187.0 1	41 6	1445.08		257.63	$7/2^-$			

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 ^{213}Pb β^- decay (10.2 min) [2004DeZV](#) (continued) $\gamma(^{213}\text{Bi})$ (continued)

E_γ	$I_\gamma^\#$	$E_i(\text{level})$	J_i^π	E_f	J_f^π		
1237.4	1	8.2	12	1495.04		257.63	7/2 ⁻
1285.5	1	6.8	10	1543.15		257.63	7/2 ⁻
1335.5	1	4.2	12	1592.62		257.63	7/2 ⁻
1445.4	1	7.5	11	1445.08		0.0	9/2 ⁻
1592.1	1	8.6	12	1592.62		0.0	9/2 ⁻

† Depopulation level listed as questionable in [2004DeZV](#) – so do for E_γ by evaluator.

‡ [Additional information 1](#).

For absolute intensity per 100 decays, multiply by ≈ 0.154 .

@ Placement of transition in the level scheme is uncertain.

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Decay Scheme

Intensities: Relative I_γ

Legend

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

