^{130}Cd β^- decay (162 ms) 2003Di06

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	31-May-2008

Parent: ^{130}Cd: E=0; $J^\pi=0^+$; $T_{1/2}$=162 ms *7*; Q(β^-)=8.34×10^3 *16*; %β^- decay=100.0

^{130}Cd-Q(β^-): 8344 *+165−157*; from β end-point energy of 6224 *+165−157* (2003Di06) to 2120 level.

^{130}Cd-$T_{1/2}$: 2001Ha39 and 2001Pf04.

2003Di06 (also 2003DiZW): Measured Eγ, Iγ, $\gamma\gamma$, $\beta\gamma$ coin, half-life using four large HPGe detectors and ΔE-E β telescopes. ^{130}Cd isotope produced by 1 GeV proton beam impinging on a Ta or W rod in close proximity to the UC_x-C target. Fast neutrons induce fission while the proton-rich isobaric spallation products are suppressed. A resonance-ionization laser ion source used to achieve chemical sensitivity for elements of of high ionization potentials. The data for gamma-ray energies, intensities and β feedings were obtained from 2003DiZW (priv. comm. from authors of 2003Di06, November 27, 2003).

2000Ka48 (also 2004KaZR): ^{130}Cd isotope tentatively identified in ^{238}U(p,F) reaction E=1 GeV, followed by separation with a chemically selective LASER ion source. Measured γ rays.

^{130}In Levels

E(level)†	J^π#	$T_{1/2}$	Comments
0	$1^{(-)}$	0.32 s	
388.4 *2*	(3^+)	<6 μs	$T_{1/2}$: from 2003HeZT. 2003Di06 quote τ<10 μs from an article by the same authors as 2003HeZT in a conference proceedings.
1170.3 *3*	(0 to 3^-)		J^π: 2003Di06 suggest 0^- or 1^-.
1669.2 *1*	(1^-)		
2120.2 *2*	1^+		configuration=$\pi g_{9/2}\otimes\gamma_{7/2}$.
2585.8 *7*	(0,1)		J^π: 2003Di06 suggest 0^- or 1^-.
4407.4 *6*	(1^+)		
4631.1 *10*	(1^+)		
5098.1‡ *10*	(1^+)		
5196.1‡ *10*	(1^+)		
5390.8‡ *7*	(1^+)		

† From least-squares fit to Eγ's.

‡ Neutron-unbound state; however γ decay is favored over the emission of low-energy neutrons due to angular-momentum considerations.

From 'Adopted Levels'.

β^- radiations

E(decay)	E(level)	Iβ^-†#	Log *ft*†	Comments
(2.95×10^3 *16*)	5390.8	0.9‡	4.6	av Eβ=1223 *75*
(3.14×10^3 *16*)	5196.1	0.4‡	5.0	av Eβ=1314 *76*
(3.24×10^3 *16*)	5098.1	0.6‡	4.9	av Eβ=1360 *76*
(3.71×10^3 *16*)	4631.1	0.3	5.5	av Eβ=1580 *76*
(3.93×10^3 *16*)	4407.4	1.0	5.0	av Eβ=1686 *76*
(5.75×10^3 *16*)	2585.8	0.1	6.8	av Eβ=2550 *76*
(6.22×10^3 *16*)	2120.2	70.2	4.1	av Eβ=2771 *76*
(6.67×10^3 *16*)	1669.2	5.8	5.3	av Eβ=2985 *76*
(7.17×10^3@ *16*)	1170.3	<0.7	>6.3	av Eβ=3222 *76* Iβ^-: −1.2 *19* from intensity balance.
(8.34×10^3 *16*)	0	≈5	≈5.8	av Eβ=3776 *76* Iβ^-: deduced by 2003Di06 from Gross theory of β decay.

Continued on next page (footnotes at end of table)

^{130}Cd β^- decay (162 ms) 2003Di06 (continued)

β^- radiations (continued)

† From 2003DiZW. The total β feedings add to ≈84% which does not include 3.6% from neutron emission; however about 12% feeding still remains unaccounted (evaluator's note).
‡ From γ-ray intensity only; does not include possible contribution due to emission of delayed neutrons from the neutron-unbound level.
# Absolute intensity per 100 decays.
@ Existence of this branch is questionable.

$\gamma(^{130}In)$

Iγ normalization: Σ(Iγ of γ's to 2120 level)=70.2; %β^-n=3.6 *10*. %β^-n is from 2001Ha39 and 2001Pf04. About 12% of the total β feeding remains unaccounted for.
^{130}Cd decays by β^-n also with %β^-n=3.6 *10*; a γ ray at 315.3 *4* (Iγ=3.3 *6* relative to 100 for 1669.2γ) has been assigned to ^{130}Cd β^-n decay to ^{129}In.
A 1395-keV tentative γ ray reported by 2000Ka48 has not been confirmed in the work of 2003Di06, thus it is omitted here.

E_γ †	I_γ †#	E_i(level)	J_i^π	E_f	J_f^π	Comments
388.7 *5*	4.0‡ *26*	388.4	(3$^+$)	0	1$^{(-)}$	
451.0 *2*	88.6 *36*	2120.2	1$^+$	1669.2	(1$^-$)	
949.9 *5*	22.1‡ *33*	2120.2	1$^+$	1170.3	(0 to 3$^-$)	
x1015.5 *2*	5.5 *10*					
x1138.4 *4*	1.7 *3*					E_γ,I_γ: doublet with a peak from ^{130}Sb isomer decay.
1170.3 *3*	20.0 *2*	1170.3	(0 to 3$^-$)	0	1$^{(-)}$	
x1314.4 *2*	2.5 *2*					
1669.2 *1*	100.0	1669.2	(1$^-$)	0	1$^{(-)}$	
1731.8 *1*	4.4 *4*	2120.2	1$^+$	388.4	(3$^+$)	
2120.1 *5*	11.1 *6*	2120.2	1$^+$	0	1$^{(-)}$	
2585.5 *9*	1.3 *3*	2585.8	(0,1)	0	1$^{(-)}$	
2738.3 *6*	1.3 *3*	4407.4	(1$^+$)	1669.2	(1$^-$)	
2804.9 *3*	1.1 *2*	5390.8	(1$^+$)	2585.8	(0,1)	
4407.0 *10*	0.5 *1*	4407.4	(1$^+$)	0	1$^{(-)}$	
4631.0 *10*	0.6 *1*	4631.1	(1$^+$)	0	1$^{(-)}$	
5098.0 *10*	1.1 *3*	5098.1	(1$^+$)	0	1$^{(-)}$	
5196.0 *10*	0.7 *2*	5196.1	(1$^+$)	0	1$^{(-)}$	
5391.0 *10*	0.4 *2*	5390.8	(1$^+$)	0	1$^{(-)}$	

† From 2003DiZW. The authors mention that they have indication for two additional gamma rays above 5 MeV, but these are considered as tentative since these were seen only in one of three detectors.
‡ Uncertainty is large since the line is unresolved from a peak in ^{130}In decay.
# For absolute intensity per 100 decays, multiply by ≈0.56.
x γ ray not placed in level scheme.

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Decay Scheme

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