^{129}Te β^- decay (33.6 d) 1976Ma35

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Janos Timar and Zoltan Elekes, Balraj Singh	NDS 121, 143 (2014)	31-May-2014

Parent: ^{129}Te: E=105.51 *3*; J$^\pi$=11/2$^-$; $T_{1/2}$=33.6 d *1*; Q(β^-)=1502 *3*; %β^- decay=36 *7*

^{129}Te-Q(β^-): From 2012Wa38.

^{129}Te-E,J$^\pi$,$T_{1/2}$: From ^{129}Te Adopted Levels.

^{129}Te-%β^- decay: Iβ(to g.s.)=32% *8* is deduced from the measured ratio Iβ(to g.s.)/Iβ(to 27 level)=0.58 *12* (1964De10,1969Di01), I(105.5γ from ^{129}Te(33.6 d))=64% and Iβ(to 27 level from ^{129}Te(69.6 min))=89%. Iβ(to 27 level) reported by 1964De10 was assumed as ΣIβ(to 27 and 278 levels). Uncertainty in Iβ(to g.s.)/Iβ(to 27 levels) was estimated as 20% by the evaluators.

1976Ma35: 105 mg enriched ^{128}Te (99.5%) was irradiated at the Pool Type Reactor, Livermore. Measured Eγ, Iγ, $\gamma\gamma$-coincidences using two Ge(Li) detectors.

Others:

1973Si14: low-temperature nuclear orientation measurements. 20 mg enriched ^{128}Te irradiated with neutrons. ^{3}He-^{4}He dilution refrigerator was used; the temperature of the radioactive source was kept between 14 mK and 50 mK. Two Ge(Li) detected the G rays at 0 and 90 degrees with respect to the magnetic field.

1969Di01: 100 mg enriched ^{130}Te (99.5%) used in (n,2n) reaction at Livermore 14 MeV neutron generator. 200 mg enriched ^{128}Te (99.46%) irradiated at Livermore pool-type reactor. γ radiation was detected by 6 cm^3 and 20 cm^3 Ge(Li) detectors. Coincidence measurements were performed with two NaI(Tl) detectors.

1968Go34, 1956Gr10: β and ce measurements.

1964De10: 3 mg of enriched ^{129}Te (97%) irradiated with neutrons in the Apsara reactor and 10 mg of enriched ^{128}Te in the DIDO reactor, Harwell. NaI(Tl) used for detecting γ rays and determining relative intensities. Resolution was 8.5% at 662 keV. For $\gamma\gamma$ coincidence, two NaI(Tl) were used. Beta spectrum of ^{129m}Te was studied with Siegbahn-Slatis spectrometer. Beta spectrum of short-lived activity was studied with 4π scintillation β ray spectrometer using plastic phosphors. $\beta\gamma$ coincidences were measured. The log *ft* values were deduced.

Other γ-ray measurements: 1967Be03, 1965Hu08, 1965Bo12, 1964Ra04, 1963Ra11.

Other $\gamma\gamma(\theta)$ measurements: 1974Ro32, 1965Gu07, 1964Ka09, 1963Ra11.

^{129}I Levels

E(level)†	J$^\pi$‡	$T_{1/2}$‡	Comments
0.0	7/2$^+$	1.57×10^7 y *4*	
27.80 *2*	5/2$^+$	16.8 ns *2*	
278.38 *3*	3/2$^+$	0.104 ns *12*	
487.35 *3*	5/2$^+$	11.6 ps *27*	
695.89 *5*	11/2$^+$	4.3 ps *5*	J$^\pi$: assignment from γ(temp,θ) (1973Si14).
729.57 *3*	(9/2)$^+$	3.8 ps *4*	
768.76 *3*	(7/2)$^+$		
844.82 *3*	(7/2)$^+$		
1050.21 *3*	(7/2)$^+$		
1203.61 *11*	(7/2$^+$)		
1281.99 *4*	(7/2$^+$)		
1401.43 *3*	(9/2)$^-$		

† From least-squares fit to Eγ data.

‡ From Adopted Levels.

^{129}Te β^- decay (33.6 d) 1976Ma35 (continued)

β^- radiations

E(decay)	E(level)	Iβ^-†	Log *ft*	Comments
(206 *3*)	1401.43	0.15 *3*	8.47 *9*	av Eβ=56.68 *90*
(326 *3*)	1281.99	0.0022 *5*	10.7[1u] *1*	av Eβ=109.5 *11*
(404 *3*)	1203.61	0.00048 *13*	11.8[1u] *1*	av Eβ=136.8 *11*
(557 *3*)	1050.21	0.037 *8*	10.6[1u] *1*	av Eβ=191.4 *11*
(763 *3*)	844.82	0.009 *6*	11.9[1u] *3*	av Eβ=267.3 *12*
(839 *3*)	768.76	0.028 *6*	11.7[1u] *1*	av Eβ=296.2 *12*
(878 *3*)	729.57	0.70 *14*	9.92 *9*	av Eβ=296.4 *12*
(912 *3*)	695.89	3.0 *6*	9.35 *9*	av Eβ=309.9 *12*
(1608 *3*)	0.0	32 *8*	10.2[1u] *1*	av Eβ=609.0 *13* Iβ^-: measured Iβ(to g.s.)/Iβ(to 27.8 level)=0.576 *18* (1964De10), 0.34 (1968Go34) for equilibrium between the isomeric and ground-state activities of ^{129}Te; uncertainty evaluated in 1972Ho55 Nuclear Data Sheets. E(decay): measured Eβ=1530 *5* (1956Gr10), 1595 *10* (1964De10), 1607 7 (1968Go34). All the measured Eβ values are inconsistent with the recommended Q(β^-)=1502 *3*.

† Absolute intensity per 100 decays.

$\gamma(^{129}$I)

Iγ normalization, I(γ+ce) normalization: from level scheme.

E_γ	I_γ[a]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[@]	δ[@]	α[&]	$I_{(\gamma+ce)}$[a]	Comments
27.81 *5*	0.58	27.80	5/2$^+$	0.0	7/2$^+$	M1+E2	−0.053 *3*	5.07 *11*	3.5 *1*	α(L)=4.06 *9*; α(M)=0.825 *18*; α(N)=0.165 *4*; α(O)=0.0186 *4* ce(L)/(γ+ce)=0.663. δ: magnitude from L1/L2/L3=1/0.145 *12*/0.119 *13* (1965Be26) and using BrIccMixing code; sign from δ=−0.045 *14* (from ratio of lines in Mossbauer spectrum (1970De37). E_γ: from level energy difference. $I_{(\gamma+ce)}$: total Iγ+ce feeding the 27.8-keV level. I_γ: deduced from I(γ+ce) and α.
76.10 *5*	0.0068[#] *15*	844.82	(7/2)$^+$	768.76	(7/2)$^+$	[M1+E2]		3.1 *15*		α(K)=2.1 *7*; α(L)=0.8 *7*; α(M)=0.18 *15* α(N)=0.03 *3*; α(O)=0.0032 *24* E_γ: from level-energy difference.
115.30 *16*	0.0058[#] *17*	844.82	(7/2)$^+$	729.57	(9/2)$^+$	[M1+E2]		0.8 *3*		α(K)=0.59 *17*; α(L)=0.15 *10*; α(M)=0.031 *20* α(N)=0.006 *4*; α(O)=0.0006 *4*
208.96 *5*	0.0006[‡] *1*	487.35	5/2$^+$	278.38	3/2$^+$	M1+E2	−0.18 *4*	0.0988 *16*		α(K)=0.0844 *13*; α(L)=0.01110 *20*; α(M)=0.00224 *4* α(N)=0.000452 *8*; α(O)=5.27×10^{-5} *9* Additional information 1.
242.2 *1*	0.014[#] *2*	729.57	(9/2)$^+$	487.35	5/2$^+$	[E2]		0.0812		α(K)=0.0661 *10*; α(L)=0.01207 *17*; α(M)=0.00248 *4* α(N)=0.000490 *7*; α(O)=5.13×10^{-5} *8*
250.62 *5*	0.0084[†] *17*	278.38	3/2$^+$	27.80	5/2$^+$	M1+E2	+0.56 *+16−12*	0.0628 *16*		α(K)=0.0534 *11*; α(L)=0.0076 *5*; α(M)=0.00153 *9* α(N)=0.000308 *18*; α(O)=3.49×10^{-5} *15*
278.43 *5*	0.0124[†] *25*	278.38	3/2$^+$	0.0	7/2$^+$	E2		0.0512		α(K)=0.0422 *6*; α(L)=0.00723 *11*; α(M)=0.001483 *21* α(N)=0.000293 *5*; α(O)=3.12×10^{-5} *5* Mult.: from W(θ) (1974De15).
281.38 *20*	<0.002	768.76	(7/2)$^+$	487.35	5/2$^+$					
281.44 *5*	0.011 *1*	1050.21	(7/2)$^+$	768.76	(7/2)$^+$	[M1+E2]		0.047 *3*		α(K)=0.0394 *15*; α(L)=0.0059 *11*; α(M)=0.00120 *23* α(N)=0.00024 *5*; α(O)=2.7×10^{-5} *4*
320.64 *11*	0.013[#] *2*	1050.21	(7/2)$^+$	729.57	(9/2)$^+$	[M1+E2]		0.0319 *7*		α(K)=0.0271 *4*; α(L)=0.0039 *5*; α(M)=0.00079 *11* α(N)=0.000159 *19*; α(O)=1.78×10^{-5} *14*

γ(^{129}I) (continued)

E_γ	I_γ[a]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[@]	δ[@]	α[&]	Comments
357.48 *20*	≤0.003	844.82	(7/2)$^+$	487.35	5/2$^+$				
459.60 *5*	0.026 *5*	487.35	5/2$^+$	27.80	5/2$^+$	M1+E2	−0.08 *+4−5*	0.01260	α(K)=0.01090 *16*; α(L)=0.001369 *20*; α(M)=0.000275 *4* α(N)=5.57×10^{-5} *8*; α(O)=6.56×10^{-6} *10* (460γ)(28γ)(θ): A_2=−0.160 *33*, A_4=+0.022 *60* (1965Gu07).
487.39 *5*	0.005 *1*	487.35	5/2$^+$	0.0	7/2$^+$	M1+E2	+0.50 *+17−10*	0.01057 *24*	α(K)=0.00911 *22*; α(L)=0.001169 *18*; α(M)=0.000235 *4* α(N)=4.75×10^{-5} *8*; α(O)=5.55×10^{-6} *10*
490.34 *20*	<0.005	768.76	(7/2)$^+$	278.38	3/2$^+$				
552.43 *5*	0.006[#] *2*	1281.99	(7/2$^+$)	729.57	(9/2)$^+$				
556.65 *5*	2.52 *8*	1401.43	(9/2)$^-$	844.82	(7/2)$^+$	(E1(+M2))	−0.06 *2*		
562.82 *20*	≤0.01[#]	1050.21	(7/2)$^+$	487.35	5/2$^+$				
671.84 *5*	0.53 *2*	1401.43	(9/2)$^-$	729.57	(9/2)$^+$				
695.88 *6*	63.9 *19*	695.89	11/2$^+$	0.0	7/2$^+$	E2			
701.7 *3*	0.53 *2*	729.57	(9/2)$^+$	27.80	5/2$^+$				
705.52 *7*	0.11 *1*	1401.43	(9/2)$^-$	695.89	11/2$^+$				
716.60 *16*	≤0.005[#]	1203.61	(7/2$^+$)	487.35	5/2$^+$				
729.57 *5*	14.9 *6*	729.57	(9/2)$^+$	0.0	7/2$^+$	M1+E2	−0.34 *6*	0.00402 *7*	α=0.00402 *7*; α(K)=0.00348 *6*; α(L)=0.000432 *7*; α(M)=8.67×10^{-5} *14* α(N)=1.76×10^{-5} *3*; α(O)=2.07×10^{-6} *4*
740.96 *5*	0.58 *2*	768.76	(7/2)$^+$	27.80	5/2$^+$	M1+E2	−0.27 *10*	0.00390 *8*	α=0.00390 *8*; α(K)=0.00338 *7*; α(L)=0.000419 *8*; α(M)=8.41×10^{-5} *15* α(N)=1.70×10^{-5} *3*; α(O)=2.01×10^{-6} *4*
768.77 *5*	0.060 *6*	768.76	(7/2)$^+$	0.0	7/2$^+$				
771.80 *16*	0.0063[#] *7*	1050.21	(7/2)$^+$	278.38	3/2$^+$				
794.60 *21*	0.012 *3*	1281.99	(7/2$^+$)	487.35	5/2$^+$				
817.04 *5*	1.94 *6*	844.82	(7/2)$^+$	27.80	5/2$^+$	M1+E2	+0.46 *4*	0.00303 *5*	α=0.00303 *5*; α(K)=0.00262 *4*; α(L)=0.000325 *5*; α(M)=6.52×10^{-5} *10* α(N)=1.322×10^{-5} *20*; α(O)=1.556×10^{-6} *24*
844.81 *5*	0.73 *4*	844.82	(7/2)$^+$	0.0	7/2$^+$				
924.5 *20*	<0.0013[#]	1203.61	(7/2$^+$)	278.38	3/2$^+$				
1003.65 *9*	0.015 *3*	1281.99	(7/2$^+$)	278.38	3/2$^+$				
1022.43 *5*	0.37 *2*	1050.21	(7/2)$^+$	27.80	5/2$^+$	M1(+E2)	−0.02 *2*	0.00188 *3*	α=0.00188 *3*; α(K)=0.001633 *23*; α(L)=0.000200 *3*; α(M)=4.00×10^{-5} *6* α(N)=8.12×10^{-6} *12*; α(O)=9.60×10^{-7} *14*
1050.21 *5*	0.38 *3*	1050.21	(7/2)$^+$	0.0	7/2$^+$				
1176.0 *5*	0.002 *1*	1203.61	(7/2$^+$)	27.80	5/2$^+$				
1203.59 *11*	0.005 *1*	1203.61	(7/2$^+$)	0.0	7/2$^+$				
1254.13 *8*	0.009 *1*	1281.99	(7/2$^+$)	27.80	5/2$^+$				
1281.96 *11*	0.0046 *8*	1281.99	(7/2$^+$)	0.0	7/2$^+$				

$^{129}_{53}$I$_{76}$-4

$\gamma(^{129}I)$ (continued)

E_γ	I_γ[a]	E_i(level)	J_i^π	E_f	J_f^π
1373.75 *9*	0.0057 *6*	1401.43	$(9/2)^-$	27.80	$5/2^+$
1401.36 *6*	0.074 *2*	1401.43	$(9/2)^-$	0.0	$7/2^+$

[†] From I(250γ)/I(278γ) in ^{129}Te β^- decay (69.6 min).
[‡] From I(209γ)/I(460γ)/I(487γ) in ^{129}Te β^- decay (69.6 min).
[#] From $\gamma\gamma$-coin.
[@] From Adopted Gammas, mainly based on low-temperature nuclear orientation measurements by 1973Si14.
[&] For [M1+E2] γ rays with no δ value, α overlaps M1 and E2.
[a] For absolute intensity per 100 decays, multiply by 0.047 *9*.

^{129}Te β^- decay (33.6 d) 1976Ma35

Decay Scheme

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