^{89}Zr ε decay (78.41 h) 1969Ro02,1968Hi12,1979Ba46

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	NDS 114, 1 (2013)	20-Oct-2012

Parent: ^{89}Zr: E=0.0; J$^{\pi}$=9/2$^+$; T$_{1/2}$=78.41 h *12*; Q(ε)=2833.0 *28*; %ε+%β^+ decay=100.0
^{89}Zr-Q(ε): From 2011AuZZ. Other: 2932.9 *28* (2003Au03).
1969Ro02 (also 1969HaZP), 1968Hi12, 1971Ar18: measured γ spectra.
1979Ba46: measured γ, K x ray, $\gamma^{\pm}$.
Others:
γ: 1969Cl11, 1969GuZV, 1968Dr02, 1964Va03, 1964Aw02, 1962Ho10, 1961Mo12, 1953Sh48, 1951Go42.
ce: 1985HaZI, 1984HaZC.
β^+: 1964Va03, 1960Ha26, 1953Sh48, 1951Hy24.
ε: 1957Ku57, 1953Sh48, 1951Go42.
ε/β^+: 1964Va03, 1961Mo12.
T$_{1/2}$ and assignment: 1984Sk01, 1964Va03, 1961Ra06, 1960Ha26, 1953Sh48, 1953Ka11, 1951Sh24, 1951Hy24, 1951Go42, 1940Du05, 1940Sa08.
Production of ^{89}Zr: 1997La20.
Change in T$_{1/2}$ with chemical environment: 1979Au09, 1973Le13, 1970Ga03.
Energy balance: total decay energy of 2833 keV *6* deduced (using RADLIST code) from proposed decay scheme is in agreement with the expected value of 2833 keV *3*, indicating that the decay scheme is complete.

^{89}Y Levels

E(level)	J$^{\pi}$ †	T$_{1/2}$
0	1/2$^-$	stable
909.15 *15*	9/2$^+$	
1744.5 *2*	5/2$^-$	
2529.97 *25*	7/2$^+$	
2566.47 *25*	11/2$^+$	
2622.2 *7*	9/2$^+$	

† From Adopted Levels.

ε,β^+ radiations

E(decay)	E(level)	Iβ^+ †	Iε †	Log *ft*	I($\varepsilon+\beta^+$) †	Comments
(211 *3*)	2622.2		0.745 *13*	6.18 *2*	0.745 *13*	εK=0.8576; εL=0.11620 *19*; εM+=0.02619 *5*
(267 *3*)	2566.47		0.106 *5*	7.25 *2*	0.106 *5*	εK=0.8615; εL=0.1131; εM+=0.02538 *3*
(303 *3*)	2529.97		0.073 *5*	7.53 *3*	0.073 *5*	εK=0.8633; εL=0.1117; εM+=0.02503
(1089 *3*)	1744.5		0.123 *4*	9.09^{1u} *2*	0.123 *4*	εK=0.8677; εL=0.1082; εM+=0.02413
(1924 *3*)	909.15	22.74 *24*	76.21 *24*	6.152 *2*	98.95 *5*	av Eβ=395.5 *11*; εK=0.6726 *15*; εL=0.07995 *18*; εM+=0.01772 *4*

† Absolute intensity per 100 decays.

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$\gamma(^{89}Y)$

Iγ normalization: Ti(909γ+1744γ)=100.
Iε/Iβ^+=3.63 *6*, I(K x ray)/I(909γ)=0.498 *19*, I(εK(exp))/Iβ^+=3.16 *7*, 2.89 *34* (measured ratios from 1979Ba46).

E_γ[†]	I_γ[‡#]	E_i(level)	J^π_i	E_f	J^π_f	Mult.	δ	α[@]	Comments
909.15 *15*	100	909.15	9/2$^+$	0	1/2$^-$	M4+E5	0.00041 *4*	0.00851	α(K)=0.00743 *11*; α(L)=0.000906 *13*; α(M)=0.0001561 *22*; α(N+..)=2.22×10^{-5} *4* α(N)=2.09×10^{-5} *3*; α(O)=1.395×10^{-6} *20*
1620.8 *2*	0.074 *5*	2529.97	7/2$^+$	909.15	9/2$^+$				
1657.3 *2*	0.107 *5*	2566.47	11/2$^+$	909.15	9/2$^+$				
1713.0 *6*	0.752 *13*	2622.2	9/2$^+$	909.15	9/2$^+$	(M1+E2)			Mult.: from ce data (1985HaZI,1984HaZC).
1744.5 *2*	0.124 *4*	1744.5	5/2$^-$	0	1/2$^-$				

† Weighted average from 1969Ro02 and 1968Hi12.
‡ Weighted average from 1979Ba46, 1971Ar18, 1969Ro02 and 1968Hi12.
# For absolute intensity per 100 decays, multiply by 0.9904 *3*.
@ 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.

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Decay Scheme

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