^{88}Nb ε decay (14.55 min) 1984Ox01

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. A. Mccutchan and A. A. Sonzogni	NDS 115, 135 (2014)	1-Nov-2013

Parent: ^{88}Nb: E=0.0; J$^{\pi}$=(8^{+}); $T_{1/2}$=14.55 min *11*; Q(ε)=7450 *60*; %ε+%β^{+} decay=100.0

1984Ox01: ^{88}Nb activity produced in the Zr(p,3n) and Zr(d,4n) reactions with E(p)=38 MeV and E(d)=47 MeV. Measured Eγ, Iγ, $\gamma\gamma$ using two n-type HPGe detectors (FWHM=2.0 and 2.1 keV at 1.3 MeV) and $\beta\gamma$ coincidences using a E-ΔE telescope consisting of a Ge detector and a Si detector.

A total energy release of 7380 keV *210* is calculated for this decay using the code RADLST, in agreement with the Q value of 7450 keV *60*.

Others: 1974Ba55, 1972Ia01, 1971Do01, 1966Fl03, 1966Hy03.

α: Additional information 1.

^{88}Zr Levels

E(level)†	J$^{\pi}$‡	E(level)†	J$^{\pi}$‡	E(level)†	J$^{\pi}$‡	E(level)†	J$^{\pi}$‡
0	0^{+}	2810.92 *16*	6^{+}	3618.1 *3*	(7^{-})	4612.8 *6*	9^{+}
1057.11 *10*	2^{+}	2887.94 *18*	8^{+}	4237.1 *4*	(7,8^{+})	4934.6 *3*	(7,8^{+})
2139.71 *14*	4^{+}	3213.83 *17*	(6^{+})	4348.5 *4*		5088.0 *3*	(7,8^{+})
2539.11 *16*	5^{-}	3390.85 *20*	8^{+}	4388.5 *3*	(7,8^{+})	5787.4 *5*	(7,8,9)
2801.31 *16*	5^{-}	3484.1 *5*	(7^{-})	4462.0 *3*	(7,8^{+})		

† From a least-squares fit to Eγ by evaluators.
‡ From the Adopted Levels.

ε,β^{+} radiations

E(decay)	E(level)	Iβ^{+} ‡	Iε‡	Log *ft*	I($\varepsilon+\beta^{+}$)†‡	Comments
(1.66×10^{3} *6*)	5787.4	0.016 *6*	0.19 *4*	6.15 *10*	0.21 *4*	av Eβ=283 *26*; εK=0.806 *22*; εL=0.097 *3*; εM+=0.0218 *6*
(2.36×10^{3} *6*)	5088.0	0.21 *3*	0.21 *3*	6.42 *7*	0.42 *4*	av Eβ=590 *27*; εK=0.44 *4*; εL=0.052 *4*; εM+=0.0117 *9*
(2.52×10^{3} *6*)	4934.6	0.72 *7*	0.52 *6*	6.09 *7*	1.24 *10*	av Eβ=659 *27*; εK=0.36 *3*; εL=0.043 *4*; εM+=0.0097 *8*
(2.84×10^{3} *6*)	4612.8	0.34 *8*	0.13 *3*	6.79 *12*	0.47 *11*	av Eβ=805 *28*; εK=0.242 *19*; εL=0.0288 *23*; εM+=0.0065 *5*
(2.99×10^{3} *6*)	4462.0	1.34 *17*	0.40 *6*	6.35 *8*	1.74 *22*	av Eβ=875 *28*; εK=0.201 *16*; εL=0.0239 *19*; εM+=0.0054 *5*
(3.06×10^{3} *6*)	4388.5	0.54 *7*	0.14 *2*	6.81 *8*	0.68 *9*	av Eβ=908 *28*; εK=0.184 *14*; εL=0.0219 *17*; εM+=0.0049 *4*
(3.10×10^{3} *6*)	4348.5	0.29 *5*	0.072 *13*	7.12 *9*	0.36 *6*	av Eβ=927 *28*; εK=0.175 *13*; εL=0.0209 *16*; εM+=0.0047 *4*
(3.21×10^{3} *6*)	4237.1	0.50 *9*	0.11 *2*	6.98 *10*	0.61 *11*	av Eβ=978 *28*; εK=0.154 *12*; εL=0.0183 *14*; εM+=0.0041 *3*
(3.83×10^{3} *6*)	3618.1	0.61 *7*	0.061 *8*	7.38 *7*	0.67 *8*	av Eβ=1267 *29*; εK=0.080 *5*; εL=0.0095 *6*; εM+=0.00212 *13*
(3.97×10^{3} *6*)	3484.1	0.31 *6*	0.027 *5*	7.76 *9*	0.34 *6*	av Eβ=1330 *29*; εK=0.070 *5*; εL=0.0083 *5*; εM+=0.00186 *11*
(4.06×10^{3} *6*)	3390.85	54 *4*	4.3 *4*	5.59 *5*	58 *4*	av Eβ=1374 *29*; εK=0.064 *4*; εL=0.0076 *5*; εM+=0.00171 *10*
(4.24×10^{3}# *6*)	3213.83	1.0 *4*	0.069 *25*	7.42 *17*	1.1 *4*	av Eβ=1457 *29*; εK=0.055 *3*; εL=0.0065 *4*; εM+=0.00146 *8*
(4.56×10^{3} *6*)	2887.94	25 *5*	1.2 *2*	6.23 *9*	26 *5*	av Eβ=1612 *29*; εK=0.0416 *21*; εL=0.00494 *25*; εM+=0.00111 *6*

Continued on next page (footnotes at end of table)

^{88}Nb ε decay (14.55 min) 1984Ox01 (continued)

ϵ,β^+ radiations (continued)

E(decay)	E(level)	Iβ^+ ‡	Iε‡	Log *ft*	I($\varepsilon+\beta^+$)†‡	Comments
(4.64×10^3# *6*)	2810.92	6 *3*	0.3 *1*	6.90 *22*	6 *3*	av Eβ=1649 *29*; εK=0.0391 *20*; εL=0.00465 *23*; εM+=0.00104 *5*

† From an intensity balance at each level.
‡ Absolute intensity per 100 decays.
# Existence of this branch is questionable.

$\gamma(^{88}Zr)$

Iγ normalization: From ΣI(γ+c.e)(to g.s.)=100 and assuming no direct feeding to g.s. (ΔJ=8).

E_γ	I_γ[b]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[†]	α	$I_{(\gamma+ce)}$[‡b]	Comments
77.0 1	22.4 7	2887.94	8^+	2810.92	6^+	E2	2.87		α(K)=2.29 4; α(L)=0.486 8; α(M)=0.0855 13; α(N)=0.01103 17; α(O)=0.000355 6 α(K)/α(L)=4.5 5, α(L)/α(M)=6.0 7 (1974Ba55). Mult.: from α(K)/α(L) and α(L)/α(M).
[x]172.5 5	0.34 6								
177.0[&]	0.06 6	3390.85	8^+	3213.83	(6^+)				
262.2 1	0.03 1	2801.31	5^-	2539.11	5^-	M1(+E2)	0.025 10	0.3 1	ce(K)/(γ+ce)=0.021 8; ce(L)/(γ+ce)=0.0026 11; ce(M)/(γ+ce)=0.00045 19; ce(N)/(γ+ce)=6.E−5 3; ce(O)/(γ+ce)=3.9×10^{-6} 14 α(K)=0.022 9; α(L)=0.0027 12; α(M)=0.00046 20; α(N)=6.E−5 3; α(O)=4.0×10^{-6} 14 I_γ: deduced from I(γ+ce) and α.
271.8 1	30.1 9	2810.92	6^+	2539.11	5^-	E1	0.00637		α(K)exp=0.0046 12 α(K)=0.00562 8; α(L)=0.000623 9; α(M)=0.0001077 16; α(N)=1.518×10^{-5} 22 α(O)=1.034×10^{-6} 15 Mult.,α(K)exp: from Ice(K)(271)/Ice(K)(77)=0.0027 3 (1974Ba55) if the 77γ is pure E2.
399.4 1	31.8 12	2539.11	5^-	2139.71	4^+	E1	0.00227		α(K)=0.00201 3; α(L)=0.000221 4; α(M)=3.83×10^{-5} 6; α(N)=5.41×10^{-6} 8; α(O)=3.75×10^{-7} 6
402.9[&]	0.6[a] 2	3213.83	(6^+)	2810.92	6^+				
502.9 1	60 4	3390.85	8^+	2887.94	8^+				
546.1 5	0.17 4	4934.6	$(7,8^+)$	4388.5	$(7,8^+)$				
586.1 5	[#]	4934.6	$(7,8^+)$	4348.5					
661.6 1	0.06 3	2801.31	5^-	2139.71	4^+	[E1]	6.76×10^{-4}	0.06 3	ce(K)/(γ+ce)=0.000597 9; ce(L)/(γ+ce)=6.53×10^{-5} 10; ce(M)/(γ+ce)=1.131×10^{-5} 16; ce(N)/(γ+ce)=1.605×10^{-6} 23 ce(O)/(γ+ce)=1.127×10^{-7} 16 α(K)=0.000598 9; α(L)=6.54×10^{-5} 10; α(M)=1.132×10^{-5} 16; α(N)=1.606×10^{-6} 23 α(O)=1.128×10^{-7} 16 I_γ: deduced from I(γ+ce) and α.
671.2 1	64 2	2810.92	6^+	2139.71	4^+	E2	0.00181		α(K)=0.001595 23; α(L)=0.000182 3; α(M)=3.15×10^{-5} 5; α(N)=4.44×10^{-6} 7; α(O)=3.02×10^{-7} 5
673.2[&]	[#]	3484.1	(7^-)	2810.92	6^+				
[x]796.0 5	0.42 8								
807.0 3	0.31 6	3618.1	(7^-)	2810.92	6^+				

$^{88}_{40}Zr_{48}$-3

$\gamma(^{88}Zr)$ (continued)

E_γ	I_γ[b]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	α	Comments
817.0 *4*	0.36[@] *5*	3618.1	(7$^-$)	2801.31	5$^-$			
945.0 *5*	0.34 *6*	3484.1	(7$^-$)	2539.11	5$^-$			
957.6 *4*	0.36 *6*	4348.5		3390.85	8$^+$			
997.6 *3*	0.41 *6*	4388.5	(7,8$^+$)	3390.85	8$^+$			
1057.1 *1*	100 *4*	1057.11	2$^+$	0	0$^+$	E2	5.91×10^{-4}	α(K)=0.000522 *8*; α(L)=5.79×10^{-5} *9*; α(M)=1.003×10^{-5} *14*; α(N)=1.422×10^{-6} *20*; α(O)=9.95×10^{-8} *14*
1071.2[&]	0.47 *18*	4462.0	(7,8$^+$)	3390.85	8$^+$			
1074.1 *1*	1.8 *3*	3213.83	(6$^+$)	2139.71	4$^+$			
1082.6 *1*	103 *4*	2139.71	4$^+$	1057.11	2$^+$	E2	5.60×10^{-4}	α(K)=0.000495 *7*; α(L)=5.48×10^{-5} *8*; α(M)=9.50×10^{-6} *14*; α(N)=1.346×10^{-6} *19*; α(O)=9.43×10^{-8} *14*
1134.6 *10*	[#]	4348.5		3213.83	(6$^+$)			
1174.7 *5*	0.44 *5*	4388.5	(7,8$^+$)	3213.83	(6$^+$)			
1221.9 *6*	0.47 *11*	4612.8	9$^+$	3390.85	8$^+$			
1247.8 *5*	0.24 *7*	4462.0	(7,8$^+$)	3213.83	(6$^+$)			
[x]1276.3 *3*	0.33 *4*							
1349.1 *5*	0.33 *6*	4237.1	(7,8$^+$)	2887.94	8$^+$			
1426.3 *6*	0.28 *9*	4237.1	(7,8$^+$)	2810.92	6$^+$			
1543.7[&]	0.58 *7*	4934.6	(7,8$^+$)	3390.85	8$^+$			
1573.9 *3*	0.54 *7*	4462.0	(7,8$^+$)	2887.94	8$^+$			
[x]1585.1 *4*	0.38 *6*							
1651.6 *4*	0.49 *7*	4462.0	(7,8$^+$)	2810.92	6$^+$			
1720.8 *4*	0.49 *6*	4934.6	(7,8$^+$)	3213.83	(6$^+$)			
2277.1 *3*	0.42 *4*	5088.0	(7,8$^+$)	2810.92	6$^+$			
2396.5 *5*	0.21 *4*	5787.4	(7,8,9)	3390.85	8$^+$			

[†] From the Adopted Gammas, except where noted.
[‡] Intensity deduced from γ-ray feeding (1984Ox01).
[#] Weak.
[@] Contamination intensity subtracted.
[&] From level energy difference.
[a] From coincidence spectra.
[b] For absolute intensity per 100 decays, multiply by 1.00 *4*.
[x] γ ray not placed in level scheme.

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Decay Scheme

Intensities: I_γ per 100 parent decays