^{90}Mo ε decay 1968Co05,1966Pe10

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	S. K. Basu, E. A. Mccutchan	NDS 165, 1 (2020)	1-Mar-2020

Parent: ^{90}Mo: E=0.0; $J^{\pi}=0^{+}$; $T_{1/2}$=5.56 h *9*; Q(ε)=2489 *3*; %ε+%β^{+} decay=100.0

1968Co05: ^{93}Nb(p,4n), E=50-55 MeV, chemical separation. Measured: γ singles and $\gamma\gamma$ coin with Ge(Li) and NaI.

1966Pe10: measured: ce(t) and β^{+} spectra.

Others: 1955Ma31, 1965Co14, 1965Gr29, 1981KaZI, 1984Bu36.

α: Additional information 1.

^{90}Nb Levels

The decay scheme has been established from $\gamma\gamma$ coin data (1968Co05) and excit in ^{90}Zr(p,nγ) (1972Yo03).

E(level)	J^{π}†	$T_{1/2}$†	E(level)	J^{π}†	$T_{1/2}$†	E(level)	J^{π}†
0	8^{+}	14.60 h *5*	382.0 *4*	1^{+}	6.19 ms *8*	1344.1 *5*	1^{+}
122.370 *22*	6^{+}	63 μs *2*	651.20 *21*	$4^{(+)}$		1769.1 *5*	1^{+}
124.7 *4*	4^{-}	18.91 s *6*	822.6 *6*			1844.8 *6*	(1^{+})
285.30 *10*	5^{+}		827.4 *4*			2125.6 *7*	1^{+}
328.00 *10*	$4^{(+)}$		854.32 *23*	2^{-}		2309.0 *7*	3^{+}

† From Adopted Levels.

ε,β^{+} radiations

ε branches are obtained from I(γ+ce) imbalance at each level.

E(decay)	E(level)	Iβ^{+} †	Iε†	Log *ft*	I($\varepsilon+\beta^{+}$)†	Comments
(180 *3*)	2309.0		2.1 *6*	4.51 *13*	2.1 *6*	εK=0.8492 *5*; εL=0.1223 *4*; εM+=0.02846 *10*
(363 *3*)	2125.6		4.1 *5*	4.87 *6*	4.1 *5*	εK=0.8619 *1*; εL=0.11231 *8*; εM+=0.02580 *2*
(644 *3*)	1844.8		1.69 *24*	5.77 *7*	1.69 *24*	εK=0.8668; εL=0.10841 *3*; εM+=0.024775 *7*
(720 *3*)	1769.1		8.0 *8*	5.20 *5*	8.0 *8*	εK=0.8675; εL=0.10790 *2*; εM+=0.024640 *5*
(1145 *3*)	1344.1		0.73 *11*	6.65 *7*	0.73 *11*	εK=0.8694; εL=0.1063; εM+=0.02422
(2107 *3*)	382.0	25 *2*	56 *3*	5.30 *3*	81 *5*	av Eβ=477.9 *14*; εK=0.6020 *18*; εL=0.07263 *21*; εM+=0.01652 *5*

† Absolute intensity per 100 decays.

γ(^{90}Nb)

Iγ normalization: Calculated from total γ+ce feeding to g.s. assuming no ε feeding to g.s. (0^+ to 8^+ transition).
α(K)exp values given in comments are calculated from Iγ (1968Co05) and Ice (1966Pe10) assuming α(K)(122.4γ)=0.47 for an E2 transition.

E_γ †	I_γ ‡@	E_i(level)	J_i^π	E_f	J_f^π	Mult.#	δ	α	$I_{(\gamma+ce)}$ @	Comments
(2.3 *4*)		124.7	4−	122.370	6+	[M2+E3]		3.3×10^9 *89*	8.2 *8*	ce(M)/(γ+ce)=0.9 *11*; ce(N)/(γ+ce)=0.10 *35*; ce(O)/(γ+ce)=4.E−6 *13* α(M)=3.0×10^9 *81*; α(N)=3.3×10^8 *86*; α(O)=1.4×10^4 *17* E_γ: From level-energy differences. For an attempt to measure the conversion electron energy see 1988GeZV. $I_{(\gamma+ce)}$: From intensity balance of 124.7 level.
42.70 *4*	2.8 *3*	328.00	4(+)	285.30	5+	M1+(E2)	<0.18	2.9 *4*		α(K)=2.46 *22*; α(L)=0.38 *11*; α(M)=0.067 *20*; α(N)=0.0095 *26*; α(O)=0.00041 *3* Mult.: α(K)exp=2.3 *8*, K/L=9.5 *40* (1966Pe10). δ: From α(K)exp/α(L)exp.
122.370 *22*	83 *3*	122.370	6+	0	8+	E2		0.557		α(K)=0.464 *7*; α(L)=0.0768 *11*; α(M)=0.01365 *20*; α(N)=0.00187 *3*; α(O)=6.63×10^{-5} *10* Mult.: K/L=6.03 *18* (1966Pe10).
162.93 *9*	7.7 *7*	285.30	5+	122.370	6+	M1+E2	0.24 *17*	0.067 *13*		α(K)=0.059 *11*; α(L)=0.0071 *17*; α(M)=0.0012 *3*; α(N)=0.00018 *4*; α(O)=9.8×10^{-6} *15* Mult.: a(K)exp=0.059 *6*.
203.13 *10*	8.2 *7*	854.32	2−	651.20	4(+)			0.036 *4*		Mult.: a(K)exp=0.034 *4*. Mult.: M1+E2 with δ<0.36 is inconsistent with adopted Δπ.
257.34 *4*	100 *3*	382.0	1+	124.7	4−	E3(+M4)	<0.12	0.182 *12*		α(K)=0.149 *10*; α(L)=0.0269 *19*; α(M)=0.0048 *4*; α(N)=0.00066 *5*; α(O)=2.33×10^{-5} *22* Mult.: a(K)exp=0.150 *11*, K/L=5.51 *16* (1966Pe10). δ: From α(K)exp and α(K)exp/α(L)exp.
323.20 *18*	8.1 *7*	651.20	4(+)	328.00	4(+)	M1+E2	0.6 *3*	0.0122 *15*		α(K)=0.0107 *13*; α(L)=0.00126 *17*; α(M)=0.00022 *3*; α(N)=3.2×10^{-5} *5*; α(O)=1.76×10^{-6} *18* Mult.: a(K)exp=0.0106 *12*. δ: From α(K)exp.
x421.0 *3*	0.32 *10*									a(K)exp=0.0038 *14*.
425.1 *5*	0.46 *10*	1769.1	1+	1344.1	1+					
440.5‡ *6*	1.2 *3*	822.6		382.0	1+					

$^{90}_{41}$Nb$_{49}$-2

γ(^{90}Nb) (continued)

E_γ[†]	I_γ[‡@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	α	Comments
445.37 *21*	7.7 *8*	827.4		382.0	1^+			Mult.: a(K)exp=0.0050 *7*.
472.2 *3*	1.83 *19*	854.32	2^-	382.0	1^+			Mult.: a(K)exp=0.0029 *4*.
489.8 *4*	0.94 *13*	1344.1	1^+	854.32	2^-			Mult.: a(K)exp=0.0038 *7*.
[x]517.7[‡] *7*	0.20 *13*							
941.5 *4*	7.1 *8*	1769.1	1^+	827.4				Mult.: a(K)exp=0.00071 *10*.
946.4[‡] *8*	0.9 *3*	1769.1	1^+	822.6				
[x]987.3[‡] *10*	0.18 *7*							
990.2 *6*	1.31 *13*	1844.8	(1^+)	854.32	2^-			Mult.: a(K)exp=0.00070 *12*.
1271.3 *6*	5.3 *5*	2125.6	1^+	854.32	2^-			Mult.: a(K)exp=0.00050 *6*.
1387.4 *5*	2.4 *3*	1769.1	1^+	382.0	1^+	M1+E2	4.06×10^{-4} *7*	α(K)=0.000320 *9*; α(L)=3.53×10^{-5} *9*; α(M)=6.21×10^{-6} *15*; α(N)=9.11×10^{-7} *23*; α(O)=5.34×10^{-8} *17* Mult.: a(K)exp=0.00044 *6*.
[x]1446[‡] *2*	0.06 *3*							
1454.6 *7*	2.4 *7*	2309.0	3^+	854.32	2^-			Mult.: a(K)exp=0.00036 *12*.
1463.5 *9*	0.9 *3*	1844.8	(1^+)	382.0	1^+			Mult.: a(K)exp=0.00048 *22*.
1481.6 *14*	0.3 *3*	2309.0	3^+	827.4				

† From 1966Pe10 (from ce spectra), except as noted.
‡ From 1968Co05.
# From conversion coefficient data above and adopted J^π's. E3/M2 and MR=0.10 for the other multipolarities. E3/M2 and MR=0.10 for the other multipolarities.
@ For absolute intensity per 100 decays, multiply by 0.774 *29*.
x γ ray not placed in level scheme.

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