^{73}Se ε decay (39.8 min) 1980Te01

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 158, 1 (2019)	16-May-2019

Parent: ^{73}Se: E=25.71 *4*; J$^{\pi}$=3/2$^-$; $T_{1/2}$=39.8 min *17*; Q(ε)=2725 *7*; %ε+%β^+ decay=27.4 *3*
^{73}Se-E,J$^{\pi}$,$T_{1/2}$: From ^{73}Se Adopted Levels.
^{73}Se-Q(ε): From 2017Wa10.
^{73}Se-%ε+%β^+ decay: %ε+%β^+=27.4 *3* for decay of ^{73}Se (39.8 min) from ^{73}Se Adopted Levels.
1980Te01 (also 1978TeZY): measured Eγ, Iγ, γγ.
γ, γγ: 1970Me20 (also 1970MeZZ), 1969Ma21. Others: 1970Mu02, 1969Mu03, 1969Ba34, 1968Mu08, 1968At04, 1968Ak03, 1967Ra08, 1960Ri09, 1960Ku06.
ce: 1971Vo10, 1969Ko25, 1968Mu08.
β^+ endpoint energies: 1968Ak03, 1960Ku06, 1960Ri09.
βγ coin: 1968Ak03.
($\gamma^{\pm}$)(γ) coin: 1960Ri09.
Xγ coin: 1969Ko25.
Isomer branching: 1969Mu03, 1969Ma21.
$T_{1/2}$(^{73}Se isomer): 1976Bo19, 1969Ma21, 1970Me20, 1969Mu03, 1968Ak03, 1960Ri09.
The decay scheme is based on energy sums and γγ-coin data of 1980Te01, 1970Me20 and 1969Ma21.

^{73}As Levels

E(level)†	J$^{\pi}$‡	$T_{1/2}$‡	E(level)†	J$^{\pi}$‡	$T_{1/2}$‡
0.0	3/2$^-$	80.30 d *6*	850.18 *18*	(5/2)$^-$	
67.09 *7*	5/2$^-$	4.95 ns *7*	1077.57 *4*	(3/2)$^-$	
84.19 *4*	(1/2)$^-$		1086.69 *5*	5/2$^-$	0.28 ps *+28−12*
253.84 *4*	(1/2)$^-$		1188.72 *10*	(3/2$^-$)	
393.39 *5*	3/2$^-$		1299.41 *9*	(1/2$^-$,3/2)	
509.74 *15*	(5/2)$^+$		1302.05 *6*	(5/2$^-$)	
574.43 *6*	(1/2)$^-$		1972.92 *11*	(1/2$^-$,3/2,5/2$^-$)	
577.6 *3*	5/2$^-$		1982.42 *13*	(1/2,3/2,5/2$^-$)	
655.36 *6*	3/2$^-$		2211.54 *19*	(5/2)$^-$	
769.61 *10*	5/2$^-$		2484.63 *10*	(3/2$^-$)	

† From least-squares fit to Eγ data. Reduced χ^2=1.6 is within the critical χ^2.
‡ From Adopted Levels.

ε,β^+ radiations

E(decay)	E(level)	Iβ^+ ‡	Iε‡	Log *ft*	I(ε+β^+)†‡	Comments
(266 *7*)	2484.63		0.0111 *15*	5.9 *1*	0.0111 *15*	εK=0.8733 *3*; εL=0.10621 *21*; εM+=0.02045 *5*
(539 *7*)	2211.54		0.0066 *17*	6.8 *1*	0.0066 *17*	εK=0.8779; εL=0.10248 *5*; εM+=0.01964 *1*
(768 *7*)	1982.42		0.0125 *16*	6.8 *1*	0.0125 *16*	εK=0.8792; εL=0.10144 *3*; εM+=0.019408 *5*
(778 *7*)	1972.92		0.0078 *11*	7.0 *1*	0.0078 *11*	εK=0.8792; εL=0.10141 *3*; εM+=0.019402 *5*
(1449 *7*)	1302.05	0.0044 *5*	0.100 *9*	6.45 *4*	0.104 *9*	av Eβ=186.4 *30*; εK=0.8435 *22*; εL=0.0961 *3*; εM+=0.01835 *5*
(1451 *7*)	1299.41	0.0049 *6*	0.108 *11*	6.41 *5*	0.113 *12*	av Eβ=187.5 *30*; εK=0.8427 *23*; εL=0.0960 *3*; εM+=0.01834 *5*
(1562 *7*)	1188.72	0.0027 *4*	0.026 *4*	7.1 *1*	0.029 *4*	av Eβ=234.4 *30*; εK=0.798 *4*; εL=0.0908 *4*; εM+=0.01734 *8*
(1664 *7*)	1086.69	0.037 *4*	0.191 *18*	6.29 *5*	0.228 *21*	av Eβ=277.9 *30*; εK=0.739 *5*; εL=0.0841 *6*; εM+=0.01605 *10*
(1673 *7*)	1077.57	0.13 *1*	0.65 *6*	5.76 *5*	0.78 *7*	av Eβ=281.8 *30*; εK=0.733 *5*; εL=0.0834 *6*;

Continued on next page (footnotes at end of table)

^{73}Se ε decay (39.8 min) 1980Te01 (continued)

ε,β^+ radiations (continued)

E(decay)	E(level)	Iβ^+ ‡	Iε‡	Log *ft*	I(ε+β^+)†‡	Comments
						εM+=0.01592 *11*
(1901 *7*)	850.18	0.097 *9*	0.174 *16*	6.44 *5*	0.271 *25*	av Eβ=380.1 *31*; εK=0.564 *6*; εL=0.0640 *7*; εM+=0.01223 *12*
(1981 *7*)	769.61	0.104 *9*	0.138 *12*	6.58 *5*	0.242 *21*	av Eβ=415.3 *31*; εK=0.502 *6*; εL=0.0570 *6*; εM+=0.01088 *12*
(2095 *7*)	655.36	0.97 *8*	0.88 *8*	5.82 *5*	1.85 *16*	av Eβ=465.6 *31*; εK=0.421 *5*; εL=0.0477 *6*; εM+=0.00911 *11*
(2173 *7*)	577.6	0.57 *5*	0.42 *4*	6.18 *5*	0.99 *9*	av Eβ=500.0 *32*; εK=0.371 *5*; εL=0.0421 *5*; εM+=0.00803 *10*
(2176 *7*)	574.43	0.80 *7*	0.57 *5*	6.04 *5*	1.37 *12*	av Eβ=501.4 *31*; εK=0.369 *5*; εL=0.0419 *5*; εM+=0.00799 *10*
(2241 *7*)	509.74	0.090 *8*	0.054 *5*	7.09 *4*	0.144 *12*	av Eβ=530.2 *32*; εK=0.332 *4*; εL=0.0376 *5*; εM+=0.00718 *9*
(2357 *7*)	393.39	0.84 *8*	0.38 *3*	6.29 *5*	1.22 *11*	av Eβ=582.2 *32*; εK=0.274 *4*; εL=0.0310 *4*; εM+=0.00592 *7*
(2497 *7*)	253.84	0.05 *3*	0.01 *1*	7.8 *3*	0.06 *4*	av Eβ=645.0 *32*; εK=0.2178 *25*; εL=0.0247 *3*; εM+=0.00471 *6*
(2667 *7*)	84.19	1.26 *14*	0.29 *3*	6.51 *5*	1.55 *17*	av Eβ=722.0 *32*; εK=0.1665 *19*; εL=0.01884 *21*; εM+=0.00360 *4*
(2684 *7*)	67.09	2.4 *3*	0.55 *7*	6.24 *6*	3.0 *4*	av Eβ=729.8 *32*; εK=0.1622 *18*; εL=0.01835 *20*; εM+=0.00350 *4*
2780 *60*	0.0	12.8 *9*	2.56 *19*	5.60 *4*	15.4 *11*	av Eβ=760.4 *32*; εK=0.1464 *16*; εL=0.01656 *18*; εM+=0.00316 *4*

† From I(γ+ce) imbalances. 39.8-min decay is separated from 7.15-h decay by γ(t).
‡ Absolute intensity per 100 decays.

γ(^{73}As)

Iγ normalization: Deduced from measured annihilation intensity and theoretical ε/β^+ ratios.

The α(K)exp and α(L)exp are from ce intensities in 1971Vo10, assuming mult(84γ)=M1, and α(K)(84γ)=0.1273. α values in 1971Vo10 are normalized to α(K)(84γ)=0.131.

Intensity of $\gamma^{\pm}$ radiation intensity (relative to 100 for 253.7γ)=1713 *156*, unweighted average of 1680 *200* (1969Ma21), 1460 *146* (1970Me20) and 2000 *100* (1980Te01).

E_γ	I_γ[&]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	δ[#]	α[a]	Comments
67.07 *10*	110 *9*	67.09	5/2⁻	0.0	3/2⁻	M1(+E2)	−0.001 *15*	0.272	α(K)=0.241 *4*; α(L)=0.0264 *4*; α(M)=0.00403 *7* α(N)=0.000303 *5* I_γ: 1969Mu03 have separated the 39.8-min and 7.15-h components.
84.0 *1*	86 *4*	84.19	(1/2)⁻	0.0	3/2⁻	(M1)		0.1451	α(K)=0.1288 *19*; α(L)=0.01403 *21*; α(M)=0.00214 *3* α(N)=0.0001614 *24* Mult.: K/(L+M)=5.9 *11*; α(L+..)exp+α(M)exp=0.022 *5*. Additional information 1.
139.47 *8*	4.82 *14*	393.39	3/2⁻	253.84	(1/2)⁻	M1+E2	0.35 *10*	0.058 *12*	α(K)exp=0.051 *10* α(K)=0.051 *10*; α(L)=0.0058 *13*; α(M)=0.00088 *19* α(N)=6.4×10⁻⁵ *13* Additional information 3.
169.72 *6*	2.85 *24*	253.84	(1/2)⁻	84.19	(1/2)⁻	[M1]		0.0220	α(K)=0.0195 *3*; α(L)=0.00209 *3*; α(M)=0.000319 *5* α(N)=2.41×10⁻⁵ *4*
181.06 *7*	19.4 *4*	574.43	(1/2)⁻	393.39	3/2⁻	M1+E2	0.40 *8*	0.028 *4*	α(K)exp=0.025 *3* α(K)=0.025 *3*; α(L)=0.0027 *4*; α(M)=0.00042 *6* α(N)=3.1×10⁻⁵ *4* Additional information 6.
253.70 *7*	100 *1*	253.84	(1/2)⁻	0.0	3/2⁻	M1+E2	0.33 *6*	0.0096 *6*	α(K)exp=0.0085 *6* α(K)=0.0085 *6*; α(L)=0.00091 *6*; α(M)=0.000139 *10* α(N)=1.05×10⁻⁵ *7* Additional information 2.
262.01 *7*	7.12 *17*	655.36	3/2⁻	393.39	3/2⁻	M1+E2	0.6 *2*	0.0113 *20*	α(K)exp=0.0101 *16* α(K)=0.0100 *17*; α(L)=0.00109 *20*; α(M)=0.00017 *3* α(N)=1.23×10⁻⁵ *21* Additional information 9.
309.3 *4*	7.00 *13*	393.39	3/2⁻	84.19	(1/2)⁻	M1+E2	1.2 *4*	0.0093 *16*	α(K)exp=0.0083 *15* α(K)=0.0083 *14*; α(L)=0.00090 *16*; α(M)=0.000137 *23* α(N)=1.02×10⁻⁵ *17* Additional information 4.
320.53 *8*	34.6 *4*	574.43	(1/2)⁻	253.84	(1/2)⁻	M1		0.00444	α(K)exp=0.0048 *5* α(K)=0.00396 *6*; α(L)=0.000416 *6*; α(M)=6.35×10⁻⁵ *9* α(N)=4.83×10⁻⁶ *7* Mult.: α(K)exp gives M1(+E2) with δ<0.55, but ΔJ^π consistent

$^{73}_{33}As_{40}$-3

γ(^{73}As) (continued)

E_γ	I_γ[&]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[#]	α[a]	Comments
									with M1. Additional information 7.
393.43 *7*	69.0 *7*	393.39	3/2⁻	0.0	3/2⁻	M1+E2	1.0 *3*	0.0041 *5*	α(K)exp=0.0037 *4* α(K)=0.0037 *5*; α(L)=0.00039 *5*; α(M)=5.9×10^{-5} *8* α(N)=4.5×10^{-6} *6* Additional information 5.
401.47 *7*	53.0 *5*	655.36	3/2⁻	253.84	(1/2)⁻	M1+E2	1.0 *3*	0.0039 *5*	α(K)exp=0.0034 *5* α(K)=0.0034 *4*; α(L)=0.00037 *5*; α(M)=5.6×10^{-5} *7* α(N)=4.2×10^{-6} *5* Additional information 10.
442.3 *4*	1.11 *7*	509.74	(5/2)⁺	67.09	5/2⁻	E1		1.04×10^{-3}	α(K)=0.000930 *14*; α(L)=9.59×10^{-5} *14*; α(M)=1.460×10^{-5} *21* α(N)=1.108×10^{-6} *16*
490.24 *17*	5.62 *14*	574.43	(1/2)⁻	84.19	(1/2)⁻				
≈510[@]	≈5.9	509.74	(5/2)⁺	0.0	3/2⁻				Ice(K)=11.3 *13* relative to Ice(K)=100 for 254γ.
570.96 *27*	10.28 *29*	655.36	3/2⁻	84.19	(1/2)⁻				α(K)exp=0.0023 *15* Additional information 11.
577.63 *27*	42.1 *6*	577.6	5/2⁻	0.0	3/2⁻	M1+E2	+0.5 *+5−2*	0.00123 *16*	α(K)exp=0.0022 *5* α(K)=0.00109 *15*; α(L)=0.000114 *16*; α(M)=1.74×10^{-5} *24* α(N)=1.32×10^{-6} *18* Additional information 8. Mult.: from Adopted Gammas. α(K)exp is larger than that for E2 or M1, but marginally agrees with E2.
588.28 *17*	3.7 *2*	655.36	3/2⁻	67.09	5/2⁻				
643.9 *3*	0.50 *4*	1299.41	(1/2⁻,3/2)	655.36	3/2⁻				
646.7 *3*	0.04 *2*	1302.05	(5/2⁻)	655.36	3/2⁻				
655.30 *14*	5.04 *7*	655.36	3/2⁻	0.0	3/2⁻				
693.2 *4*	0.92 *4*	1086.69	5/2⁻	393.39	3/2⁻				
702.58 *23*	3.89 *6*	769.61	5/2⁻	67.09	5/2⁻	D+Q			
724.80 *12*	2.00 *6*	1299.41	(1/2⁻,3/2)	574.43	(1/2)⁻				
769.59 *10*	6.39 *14*	769.61	5/2⁻	0.0	3/2⁻	M1(+E2)	<2.0	0.00065 *6*	α(K)=0.00058 *6*; α(L)=6.1×10^{-5} *6*; α(M)=9.2×10^{-6} *9* α(N)=7.0×10^{-7} *7*
792.48 *22*	0.73 *6*	1302.05	(5/2⁻)	509.74	(5/2)⁺				
823.68 *8*	4.62 *26*	1077.57	(3/2)⁻	253.84	(1/2)⁻				
833.09 *10*	2.32 *21*	1086.69	5/2⁻	253.84	(1/2)⁻				
850.17 *18*	11.5 *4*	850.18	(5/2)⁻	0.0	3/2⁻	M1+E2	+0.19 *+19−17*	4.86×10^{-4} *11*	α(K)=0.000434 *10*; α(L)=4.47×10^{-5} *11*;

$^{73}_{33}$As$_{40}$-4

γ(^{73}As) (continued)

E_γ	I_γ[&]	E_i(level)	J_i^π	E_f	J_f^π	Comments
						α(M)=6.82×10^{-6} *16* α(N)=5.22×10^{-7} *12*
^{x}860.16 *24*	0.05 *2*					
908.46 *19*	0.88 *3*	1302.05	(5/2$^-$)	393.39	3/2$^-$	
934.90 *15*	0.95 *3*	1188.72	(3/2$^-$)	253.84	(1/2)$^-$	
993.28 *6*	3.22 *6*	1077.57	(3/2)$^-$	84.19	(1/2)$^-$	
1002.38 *6*	2.79 *6*	1086.69	5/2$^-$	84.19	(1/2)$^-$	
1010.69 *25*	0.32 *20*	1077.57	(3/2)$^-$	67.09	5/2$^-$	
1019.54 *12*	2.35 *5*	1086.69	5/2$^-$	67.09	5/2$^-$	
1045.58 *22*	0.45 *26*	1299.41	(1/2$^-$,3/2)	253.84	(1/2)$^-$	
1077.64 *5*	25.0 *3*	1077.57	(3/2)$^-$	0.0	3/2$^-$	
1086.78 *8*	1.44 *30*	1086.69	5/2$^-$	0.0	3/2$^-$	
1125.5[†] *6*	0.14 *5*	2211.54	(5/2)$^-$	1086.69	5/2$^-$	
1133.4 *6*	0.09 *4*	2211.54	(5/2)$^-$	1077.57	(3/2)$^-$	
1188.69 *13*	0.30 *10*	1188.72	(3/2$^-$)	0.0	3/2$^-$	
^{x}1209.96 *24*	0.33 *5*					
1215.80 *24*	0.79 *7*	1299.41	(1/2$^-$,3/2)	84.19	(1/2)$^-$	
1232.40 *19*	1.06 *5*	1299.41	(1/2$^-$,3/2)	67.09	5/2$^-$	
1302.04 *6*	2.75 *5*	1302.05	(5/2$^-$)	0.0	3/2$^-$	
1326.48 *28*	0.11 *3*	1982.42	(1/2,3/2,5/2$^-$)	655.36	3/2$^-$	
^{x}1395.26 *19*	0.09 *2*					
1407.29 *29*	0.06 *2*	2484.63	(3/2$^-$)	1077.57	(3/2)$^-$	
^{x}1538.69 *17*	0.13 *2*					
1588.5[†] *12*	0.14 *2*	1982.42	(1/2,3/2,5/2$^-$)	393.39	3/2$^-$	
^{x}1606.33 *20*	0.06 *2*					
^{x}1711.1 *4*	0.10 *2*					
1719.1 *4*	0.16 *2*	1972.92	(1/2$^-$,3/2,5/2$^-$)	253.84	(1/2)$^-$	
1888.74 *14*	0.09[‡] *2*	1972.92	(1/2$^-$,3/2,5/2$^-$)	84.19	(1/2)$^-$	
1898.89 *23*	0.06 *3*	1982.42	(1/2,3/2,5/2$^-$)	84.19	(1/2)$^-$	
1905.74 *17*	0.08 *2*	1972.92	(1/2$^-$,3/2,5/2$^-$)	67.09	5/2$^-$	
1910.33 *17*	0.07 *2*	2484.63	(3/2$^-$)	574.43	(1/2)$^-$	
1974.67 *18*	0.18[‡] *2*	2484.63	(3/2$^-$)	509.74	(5/2)$^+$	
1982.24 *17*	0.22 *1*	1982.42	(1/2,3/2,5/2$^-$)	0.0	3/2$^-$	
2090.7 *3*	0.08 *2*	2484.63	(3/2$^-$)	393.39	3/2$^-$	
2127.4 *4*	0.02 *1*	2211.54	(5/2)$^-$	84.19	(1/2)$^-$	
^{x}2135.6 *3*	0.03 *2*					
2144.38 *23*	0.03 *2*	2211.54	(5/2)$^-$	67.09	5/2$^-$	
2400.33 *26*	0.03 *2*	2484.63	(3/2$^-$)	84.19	(1/2)$^-$	
^{x}2425.7 *5*	0.06 *2*					
2484.78 *21*	0.05 *2*	2484.63	(3/2$^-$)	0.0	3/2$^-$	

From ENSDF

$^{73}_{33}$As$_{40}$-5

γ(^{73}As) (continued)

† Possibly doublet.
‡ Corrected for contamination from ^{73}Se ε decay (7.1 h).
# From Adopted Gammas. The adopted values are based on ce data (1971Vo10) given under comments from this study where available.
@ Not resolved from annihilation radiation. Iγ calculated from relative branching in ^{73}Se ε decay (7.15 h).
& For absolute intensity per 100 decays, multiply by 0.0236 *19*.
[a] 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.
[x] γ ray not placed in level scheme.

^{73}Se ε decay (39.8 min) 1980Te01

Decay Scheme

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