^{73}Se ε decay (7.15 h) 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=0.0; J$^{\pi}$=9/2^{+}; $T_{1/2}$=7.15 h *9*; Q(ε)=2725 *7*; %ε+%β^{+} decay=100.0
^{73}Se-J$^{\pi}$,$T_{1/2}$: From ^{73}Se Adopted Levels.
^{73}Se-Q(ε): From 2017Wa10.
1980Te01 (also 1978TeZY): measured Eγ, Iγ, $\gamma\gamma$.
The decay scheme is based on energy sums and $\gamma\gamma$-coin data of 1980Te01, 1970Me20 and 1969Ma21.
γ, $\gamma\gamma$: 1970Me20 (also 1970MeZZ), 1969Ma21. Others: 1974Ro14, 1968At04, 1968Ak03, 1967Ra08, 1963Bo16, 1960Ri09, 1956Ha10, 1951Sc70.
ce: 1956Ha10, 1951Sc70.
$\beta\gamma$ coin: 1968Ak03.
($\gamma^{\pm}$)(γ) coin: 1963Bo16, 1960Ri09, 1956Ha10.
$\gamma\gamma$(t): 1963Bo26, 1963Bo16. Others: 1969Iv02, 1968Iv02.
($\gamma^{\pm}$)(γ)(t): 1963Bo16, 1956Ha10.
Xγ(t): 1969Ma21.
β^{+} endpoint energies: 1968Ak03, 1960Ku06, 1960Ri09, 1956Ha10, 1951Sc70.
ε(K)/β^{+}: 1957Ku57.
γ(θ,t): 1988Wh03.
$\gamma\gamma$(θ), $\gamma\gamma$(θ,H,t): 1963Bo26, 1988Be39, 1992Sc21.
$T_{1/2}$(^{73}Se): 1976Bo19, 1969Ma21, 1967Ra08, 1960Ri09, 1957Be46, 1951Sc70, 1948Co07.

^{73}As Levels

E(level)†	J$^{\pi}$‡	$T_{1/2}$‡	Comments
0.0	3/2^{-}	80.30 d *6*	
67.10 *9*	5/2^{-}	4.95 ns *7*	g=+0.65 *4* (1963Bo26); Q=0.356 *12* (1992Sc21) g: from 1963Bo26 using Perturbed Angular Correlation (PAC). $T_{1/2}$: adopted from the same value in 1966Ol04 by delayed coin. Others: 1963Bo16, 1963Bo26.
427.65 *12*	9/2^{+}	5.7 μs *2*	$T_{1/2}$: values from this dataset: 5.5 μs *3* from unweighted average of 6.0 μs *2* (1956Ha10), 5.0 μs *4* (1963Bo16) and 5.6 μs *3* (1969Ma21), all delayed $\gamma\gamma$ coin.
509.72 *12*	(5/2)$^{+}$		
993.45 *10*	(7/2)$^{-}$	0.57 ps *+26−18*	
1036.97 *18*	(13/2)$^{+}$	8.3 ps *6*	
1177.80 *10*	(9/2^{-})		
1274.82 *12*	(7/2)$^{+}$		
1292.73 *17*	(11/2)$^{+}$		E(level): level proposed (evaluator) based on (p,nγ) results.
1292.81 *13*	(7/2)$^{+}$		
1328.42 *13*	(7/2)$^{+}$	0.090 ps *21*	
1850.30 *12*	(9/2)$^{+}$	0.27 ps *+10−7*	
1909.89 *16*	(9/2^{+},11/2)		
1975.09 *15*	(7/2,9/2)		
2180.31 *14*	(7/2,9/2^{+})		
2311.25 *12*	(7/2,9/2^{+})		
2482.47 *25*	(7/2,9/2^{+})		
2583.87 *14*	(7/2,9/2^{-})		

† From least-squares fit to Eγ data. Reduced χ^2=2.0 is somewhat larger than critical χ^2=1.7.
‡ From Adopted Levels.

^{73}Se ε decay (7.15 h) 1980Te01 (continued)

ε,β^+ radiations

E(decay)	E(level)	Iβ^+ ‡	Iε‡	Log *ft*	I($\varepsilon+\beta^+$)†‡	Comments
(141 *7*)	2583.87		0.0155 *20*	6.2 *1*	0.0155 *20*	εK=0.8647 *11*; εL=0.1133 *9*; εM+=0.02201 *19*
(243 *7*)	2482.47		0.0087 *17*	7.0 *1*	0.0087 *17*	εK=0.8724 *3*; εL=0.1069 *3*; εM+=0.02062 *6*
(414 *7*)	2311.25		0.157 *6*	6.18 *3*	0.157 *6*	εK=0.8766 *1*; εL=0.10356 *8*; εM+=0.01987 *2*
(545 *7*)	2180.31		0.030 *8*	7.1 *1*	0.030 *8*	εK=0.8779; εL=0.10245 *5*; εM+=0.01963 *1*
(750 *7*)	1975.09		0.095 *3*	6.92 *2*	0.095 *3*	εK=0.8791; εL=0.10150 *3*; εM+=0.019421 *6*
(815 *7*)	1909.89		0.060 *7*	7.20 *6*	0.060 *7*	εK=0.8793; εL=0.10130 *2*; εM+=0.019377 *5*
(875 *7*)	1850.30		0.412 *10*	6.42 *2*	0.412 *10*	εK=0.8795; εL=0.10114 *2*; εM+=0.019343 *4*
(1397 *7*)	1328.42	0.0035 *3*	0.130 *4*	7.34 *2*	0.133 *4*	av Eβ=164.5 *30*; εK=0.8574 *17*; εL=0.09772 *20*; εM+=0.01867 *4*
(1432 *7*)	1292.81	0.016 *1*	0.43 *2*	6.83 *2*	0.45 *2*	av Eβ=179.5 *30*; εK=0.8484 *20*; εL=0.09666 *24*; εM+=0.01846 *5*
(1432 *7*)	1292.73	0.016 *1*	0.43 *2*	6.83 *2*	0.45 *2*	av Eβ=179.5 *30*; εK=0.8483 *20*; εL=0.09665 *24*; εM+=0.01846 *5*
(1450# *7*)	1274.82	0.0004 *4*	0.010 *10*	8.5 *5*	0.010 *10*	av Eβ=187.0 *30*; εK=0.8431 *22*; εL=0.0960 *3*; εM+=0.01834 *5*
(1547 *7*)	1177.80	0.0167 *8*	0.178 *4*	7.29 *1*	0.195 *4*	av Eβ=228.1 *30*; εK=0.805 *4*; εL=0.0916 *4*; εM+=0.01750 *8*
(1688# *7*)	1036.97	<0.0020	<0.0090	>8.7	<0.011	av Eβ=288.2 *30*; εK=0.723 *5*; εL=0.0822 *6*; εM+=0.01570 *11* I($\varepsilon+\beta^+$): 0.003 *8*.
(1732 *7*)	993.45	0.0006 *4*	0.0023 *13*	9.3 *3*	0.0029 *17*	av Eβ=306.9 *31*; εK=0.693 *5*; εL=0.0787 *6*; εM+=0.01504 *11*
(2297 *7*)	427.65	63.9 *8*	33.4 *6*	5.36 *1*	97.3 *10*	av Eβ=555.3 *32*; εK=0.302 *4*; εL=0.0343 *4*; εM+=0.00654 *8*
(2658 *7*)	67.10	0.63 *6*	0.47 *4*	8.77^{1u} *4*	1.1 *1*	av Eβ=744.7 *32*; εK=0.377 *4*; εL=0.0430 *4*; εM+=0.00822 *8*

† From I(γ+ce) imbalances at each level, except for 67 level where it is assumed to be 1.1 *1* for 1U transition.
‡ Absolute intensity per 100 decays.
\# Existence of this branch is questionable.

γ(^{73}As)

Iγ normalization: I(γ+ce)(to g.s.+67, not including 67.07γ)=100 − (assumed feeding to 67=keV level=1.1 *1* for 1U transition).
Intensity of $\gamma^{\pm}$ radiation=126 *3* (1969Ma21) relative to 100 for 361γ.

E_γ[†]	I_γ[†&]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[@]	δ[@]	α[a]	Comments
67.07 *10*	72 *8*	67.10	5/2⁻	0.0	3/2⁻	M1(+E2)	−0.001 *15*	0.272	%Iγ=70 *7* α(K)=0.241 *4*; α(L)=0.0264 *4*; α(M)=0.00404 *6*; α(N)=0.000304 *5* Mult.: γγ(θ) and RUL. δ: −0.001 *15* from 67γ(θ,H,t) (1988Be39). Other: +0.035 *17* from (361γ)(67γ)(θ) if 361γ is M2 (1963Bo26). K/LM=10.2 *2* (1956Ha10), 7.6 (1951Sc70). A_2U_2=+0.267 *12* (1988Be39).
361.2 *3*	100	427.65	9/2⁺	67.10	5/2⁻	M2+E3	−0.035 *10*	0.01311	%Iγ=97.0 *10* α(K)=0.01165 *17*; α(L)=0.001286 *18*; α(M)=0.000197 *3*; α(N)=1.486×10^{-5} *21* δ: from 361γ(θ,H,t) (1988Be39); A_2U_2=−0.346 *9*. α(K)exp=0.0105 *12*, α(L)exp=0.00124 *19* (1971Vo10) normalized to ce data for 84γ. K/L=8.4 *7* (1971Vo10), 8 *2* (1956Ha10), 8.6 (1951Sc70).
428.3 *3*	0.080 *15*	427.65	9/2⁺	0.0	3/2⁻	[E3]		0.01353	%Iγ=0.078 *15* I_γ: corrected for summing (1980Te01).
442.3 *3*	0.052 *3*	509.72	(5/2)⁺	67.10	5/2⁻	E1			%Iγ=0.050 *3*
≈510[#]	0.274 *8*	509.72	(5/2)⁺	0.0	3/2⁻				%Iγ=0.266 *9*
557.9 *5*	0.055 *2*	1850.30	(9/2)⁺	1292.73	(11/2)⁺				%Iγ=0.0534 *21*
575.9 *5*	0.150 *7*	1850.30	(9/2)⁺	1274.82	(7/2)⁺				%Iγ=0.146 *7*
[x]600.33 *29*	0.021 *3*								%Iγ=0.020 *3*
609.17 *19*	0.051 *4*	1036.97	(13/2)⁺	427.65	9/2⁺	E2			%Iγ=0.049 *4*
682.25 *20*	0.020 *2*	1975.09	(7/2,9/2)	1292.81	(7/2)⁺				%Iγ=0.0194 *20*
700.0 *5*	0.046 *2*	1975.09	(7/2,9/2)	1274.82	(7/2)⁺				%Iγ=0.0446 *20*
765.07 *12*	0.131 *2*	1274.82	(7/2)⁺	509.72	(5/2)⁺	M1+E2	−0.31 *+12−28*		%Iγ=0.1271 *24*
783.7 *3*	0.060 *2*	1292.81	(7/2)⁺	509.72	(5/2)⁺	M1,E2			%Iγ=0.0582 *21*
[x]793.0 *5*	0.066 *2*								%Iγ=0.0640 *21*
813.38 *29*	0.009 *1*	1850.30	(9/2)⁺	1036.97	(13/2)⁺	[E2]			%Iγ=0.0087 *10*
818.65 *15*	0.038 *2*	1328.42	(7/2)⁺	509.72	(5/2)⁺				%Iγ=0.0369 *20*
847.16 *17*	0.083 *6*	1274.82	(7/2)⁺	427.65	9/2⁺	M1,E2			%Iγ=0.081 *6*
[x]857.0 *3*	0.024 *6*								%Iγ=0.023 *6*
865.09[b] *12*	0.52[b] *2*	1292.73	(11/2)⁺	427.65	9/2⁺	M1,E2			%Iγ=0.504 *20* I_γ: total Iγ=0.540 *17*. Intensity divided on the basis of (p,nγ) data.
865.09[b] *12*	0.02[b] *1*	1292.81	(7/2)⁺	427.65	9/2⁺	D			%Iγ=0.019 *10*

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

^{73}Se ε decay (7.15 h) 1980Te01 (continued)

γ(^{73}As) (continued)

E_γ[†]	I_γ[†&]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	δ[@]	Comments
872.56 *27*	0.039 *7*	1909.89	(9/2$^+$,11/2)	1036.97	(13/2)$^+$			%Iγ=0.038 *7*
887.46 *18*	0.011 *8*	2180.31	(7/2,9/2$^+$)	1292.81	(7/2)$^+$			%Iγ=0.011 *8*
900.73 *10*	0.139 *2*	1328.42	(7/2)$^+$	427.65	9/2$^+$	M1,E2		%Iγ=0.1348 *24*
926.19 *15*	0.004 *1*	993.45	(7/2)$^-$	67.10	5/2$^-$	M1+E2	+1.0 *+11−5*	%Iγ=0.0039 *10*
^{x}930.09 *15*	0.005 *1*							%Iγ=0.0049 *10*
^{x}968.1[‡] *8*	0.020[‡] *10*							%Iγ=0.019 *10*
982.75 *13*	0.035 *1*	2311.25	(7/2,9/2$^+$)	1328.42	(7/2)$^+$			%Iγ=0.0340 *11*
993.52 *12*	0.005 *1*	993.45	(7/2)$^-$	0.0	3/2$^-$	(E2)		%Iγ=0.0049 *10*
1001.9 *2*	0.004 *1*	2180.31	(7/2,9/2$^+$)	1177.80	(9/2$^-$)			%Iγ=0.0039 *10*
1018.52 *13*	0.055 *2*	2311.25	(7/2,9/2$^+$)	1292.81	(7/2)$^+$			%Iγ=0.0534 *21*
1036.38 *9*	0.015 *1*	2311.25	(7/2,9/2$^+$)	1274.82	(7/2)$^+$			%Iγ=0.0146 *10*
1110.64 *6*	0.207 *2*	1177.80	(9/2$^-$)	67.10	5/2$^-$	Q		%Iγ=0.201 *3*
1153.9 *3*	0.005 *1*	2482.47	(7/2,9/2$^+$)	1328.42	(7/2)$^+$			%Iγ=0.0049 *10*
^{x}1158.2 *4*	0.003 *1*							%Iγ=0.0029 *10*
1207.9 *3*	0.004 *1*	1274.82	(7/2)$^+$	67.10	5/2$^-$			%Iγ=0.0039 *10*
^{x}1215.4[‡] *8*	0.060[‡] *10*							%Iγ=0.058 *10*
1226.6 *9*	0.003 *2*	1292.81	(7/2)$^+$	67.10	5/2$^-$			%Iγ=0.0029 *20*
^{x}1249.9 *2*	0.004 *1*							%Iγ=0.0039 *10*
1274.39 *21*	0.007 *1*	1274.82	(7/2)$^+$	0.0	3/2$^-$	[M2]		%Iγ=0.0068 *10*
1308.9 *2*	0.004 *1*	2583.87	(7/2,9/2$^-$)	1274.82	(7/2)$^+$			%Iγ=0.0039 *10*
1317.75 *21*	0.006 *1*	2311.25	(7/2,9/2$^+$)	993.45	(7/2)$^-$			%Iγ=0.0058 *10*
^{x}1323.81 *20*	0.007 *1*							%Iγ=0.0068 *10*
1340.50 *7*	0.071 *2*	1850.30	(9/2)$^+$	509.72	(5/2)$^+$	[E2]		%Iγ=0.0689 *21*
1406.3 *4*	0.002 *1*	2583.87	(7/2,9/2$^-$)	1177.80	(9/2$^-$)			%Iγ=0.0019 *10*
1422.68 *7*	0.140 *5*	1850.30	(9/2)$^+$	427.65	9/2$^+$			%Iγ=0.136 *5*
^{x}1439.10 *17*	0.002 *1*							%Iγ=0.0019 *10*
^{x}1451.6 *2*	0.006 *2*							%Iγ=0.0058 *20*
1482.29 *12*	0.023 *1*	1909.89	(9/2$^+$,11/2)	427.65	9/2$^+$			%Iγ=0.0223 *10*
1547.45 *12*	0.032 *1*	1975.09	(7/2,9/2)	427.65	9/2$^+$			%Iγ=0.0310 *11*
1670.81 *16*	0.005 *1*	2180.31	(7/2,9/2$^+$)	509.72	(5/2)$^+$			%Iγ=0.0049 *10*
^{x}1738.4 *5*	0.002 *1*							%Iγ=0.0019 *10*
1752.88 *20*	0.011 *1*	2180.31	(7/2,9/2$^+$)	427.65	9/2$^+$			%Iγ=0.0107 *10*
1801.36 *14*	0.020 *5*	2311.25	(7/2,9/2$^+$)	509.72	(5/2)$^+$			%Iγ=0.019 *5*
^{x}1847.82 *26*	0.008 *1*							%Iγ=0.0078 *10*
1883.85 *15*	0.031 *2*	2311.25	(7/2,9/2$^+$)	427.65	9/2$^+$			%Iγ=0.0301 *20*
^{x}1889.57 *20*	0.003 *1*							%Iγ=0.0029 *10*
1973.4 *4*	0.001 *1*	2482.47	(7/2,9/2$^+$)	509.72	(5/2)$^+$			%Iγ=0.0010 *10*
^{x}2006.2 *4*	0.002 *1*							%Iγ=0.0019 *10*
^{x}2023.86 *26*	0.002 *1*							%Iγ=0.0019 *10*
^{x}2048.1 *8*	0.001 *1*							%Iγ=0.0010 *10*
2053.8 *6*	0.003 *1*	2482.47	(7/2,9/2$^+$)	427.65	9/2$^+$			%Iγ=0.0029 *10*
2156.04 *14*	0.005 *1*	2583.87	(7/2,9/2$^-$)	427.65	9/2$^+$			%Iγ=0.0049 *10*

γ(^{73}As) (continued)

E_γ[†]	I_γ[†&]	E_i(level)	J^π_i	E_f	J^π_f	Comments
[x]2170.50 *26*	0.002 *1*					%Iγ=0.0019 *10*
2517.31 *25*	0.005 *1*	2583.87	$(7/2,9/2^-)$	67.10	$5/2^-$	%Iγ=0.0049 *10*

[†] From 1980Te01, unless otherwise stated.
[‡] From 1970Me20.
[#] Not resolved from annihilation radiation. Iγ calculated from intensity imbalance by assuming no ε feeding of 510 level.
[@] From Adopted Gammas. The adopted values are from this dataset where arguments are given under comments.
[&] For absolute intensity per 100 decays, multiply by 0.970 *10*.
[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.
[b] Multiply placed with intensity suitably divided.
[x] γ ray not placed in level scheme.

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^{73}Se ε decay (7.15 h) 1980Te01

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
@ Multiply placed: intensity suitably divided