^{31}S ε decay (2.5534 s) 1980Wi13

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh	NDS 184, 29 (2022)	24-Jun-2022

Parent: ^{31}S: E=0.0; J^π=1/2$^+$; $T_{1/2}$=2.5534 s *18*; Q(ε)=5398.01 *23*; %ε+%β^+ decay=100.0

^{31}S-J^π,$T_{1/2}$: From Adopted Levels of ^{31}S.

^{31}S-Q(ε): From 2021Wa16.

1980Wi13: ^{31}S from ^{31}P(p,n), 11 MeV protons from the ONR-CIT tandem accelerator. Target of MnP powder was bombarded then transferred to a counting station via a pneumatic shuttle (rabbit) system. Ge detectors used to measure Eγ and Iγ. Also 1980WiZQ thesis.

1974Al03: ^{31}S from ^{31}P(p,n), 10 MeV protons from the Van de Graaff at Brookhaven. Rabbit transfer system from bombarding chamber to remote counting cell. Ge detectors used for Eγ and Iγ measurements.

1971De05: ^{31}S from ^{31}P(p,n), 9-18 MeV protons from University of Colorado Nuclear Physics lab. Phosphorus target bombarded then transferred to a counting station via pneumatic shuttle system. Ge detectors used for β-delayed γ-ray measurements but only reported β-branching ratios.

2012Ba54: measured g.s. half-life of ^{31}S.

Total energy deposit calculated by the RADLIST code is 5398.6 *18*, in a good agreement with Q-value=5398.01 *23* (2021Wa16), indicating the completeness of the decay scheme.

^{31}P Levels

E(level)†	J^π†	$T_{1/2}$†
0.0	1/2$^+$	stable
1266.08 *8*	3/2$^+$	510 fs *24*
2233.63 *8*	5/2$^+$	256 fs *17*
3134.3 *4*	1/2$^+$	7.1 fs *4*
3506.1 *6*	3/2$^+$	8.8 fs *+16−12*
4260.4 *10*	3/2$^+$	10.4 fs *42*
4592.5 *10*	3/2$^+$	13 fs *4*

† From Adopted Levels.

ε,β^+ radiations

E(decay)	E(level)	Iβ^+ ‡	Iε‡	Log *ft*	I(ε+β^+)†‡	Comments
(805.5 *10*)	4592.5		<0.0015	>3.7	<0.0015	εK=0.9065; εL=0.08407; εM+=0.009394
(1137.6 *10*)	4260.4	<1.6×10^{-6}	<0.00020	>4.9	<0.00020	av Eβ=47.95 *41*; εK=0.8992 *3*; εL=0.08327 *3*; εM+=0.009304 *3*
(1891.9 *7*)	3506.1	0.0111 *9*	0.00105 *9*	4.57 *4*	0.0121 *10*	av Eβ=358.16 *28*; εK=0.07845 *17*; εL=0.007255 *16*; εM+=0.0008105 *1*
(2263.7 *5*)	3134.3	0.0317 *19*	0.00097 *6*	4.76 *3*	0.0327 *20*	av Eβ=521.79 *21*; εK=0.02700 *3*; εL=0.002496 *3*; εM+=0.0002789 *4*
(4131.93 *24*)	1266.08	1.10 *4*	0.00206 *8*	4.96 *2*	1.10 *4*	av Eβ=1393.74; εK=0.0017008 *5*; εL=0.0001571; εM+=1.7550×10^{-5} *5*
(5398.01 *23*)	0.0	98.79 *4*	0.0671 *7*	3.6786 *4*	98.86 *4*	av Eβ=2005.98; εK=0.0006159 *1*; εL=5.6883×10^{-5} *9*; εM+=6.354×10^{-6} *1* I(ε+β^+): from 100−%I(γ to g.s.).

† From intensity balance for excited states.

‡ Absolute intensity per 100 decays.

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$\gamma(^{31}P)$

Iγ normalization: From absolute intensity of 1266γ, obtained by comparing I(1266γ) intensity with the positron-annihilation intensity. Adopted value is weighted average of 0.01087 *21* (1980Wi13), 0.0125 *6* (1974Al03), 0.011 *1* (1960Ta14), 0.0098 *20* (1977Az01).

E_γ[‡]	I_γ[#@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	δ[‡]	α[†]	Comments
1266.1 *1*	100.0 *20*	1266.08	3/2+	0.0	1/2+	M1+E2	+0.26 *3*	3.32×10^{-5} *5*	%Iγ=1.10 *4* α=3.32×10^{-5} *5*; α(K)=1.681×10^{-5} *24*; α(L)=1.252×10^{-6} *18*; α(M)=9.51×10^{-8} *14* α(IPF)=1.509×10^{-5} *23*
1868.1	<0.17	3134.3	1/2+	1266.08	3/2+				%Iγ<0.00188
2233.6 *1*	<0.064	2233.63	5/2+	0.0	1/2+	E2		0.000436 *6*	%Iγ<7.1×10^{-4} α=0.000436 *6*; α(K)=6.92×10^{-6} *10*; α(L)=5.15×10^{-7} *7*; α(M)=3.91×10^{-8} *5* α(IPF)=0.000429 *6*
2239.9	0.44 *7*	3506.1	3/2+	1266.08	3/2+	(M1(+E2))	−0.06 *19*	0.000352 *7*	%Iγ=0.0049 *8* α=0.000352 *7*; α(K)=6.31×10^{-6} *9*; α(L)=4.69×10^{-7} *7*; α(M)=3.57×10^{-8} *5* α(IPF)=0.000345 *7*
2358.6	<0.074	4592.5	3/2+	2233.63	5/2+				%Iγ<8.2×10^{-4}
3134.1	2.88 *8*	3134.3	1/2+	0.0	1/2+	(M1)		0.000717 *10*	%Iγ=0.0318 *12* α=0.000717 *10*; α(K)=3.78×10^{-6} *5*; α(L)=2.81×10^{-7} *4*; α(M)=2.134×10^{-8} *30* α(IPF)=0.000713 *10*
3326.2	<0.056	4592.5	3/2+	1266.08	3/2+	M1+E2	−0.8 *4*	0.00084 *4*	%Iγ<6.2×10^{-4} α=0.00084 *4*; α(K)=3.52×10^{-6} *6*; α(L)=2.62×10^{-7} *5*; α(M)=1.99×10^{-8} *4* α(IPF)=0.00084 *4*
3505.9	0.66 *4*	3506.1	3/2+	0.0	1/2+	M1+E2	+0.41 *3*	0.000878 *13*	%Iγ=0.0073 *5* α=0.000878 *13*; α(K)=3.23×10^{-6} *5*; α(L)=2.400×10^{-7} *34*; α(M)=1.824×10^{-8} *26* α(IPF)=0.000874 *13*
4260.1	<0.018	4260.4	3/2+	0.0	1/2+	M1+E2	+0.35 *4*	1.13×10^{-3} *2*	%Iγ<2.0×10^{-4} α(K)=2.449×10^{-6} *34*; α(L)=1.820×10^{-7} *26*; α(M)=1.383×10^{-8} *19* α(IPF)=0.001126 *16*
4592.1	<0.0051	4592.5	3/2+	0.0	1/2+	(M1+E2)		0.00129 *8*	%Iγ<5.6×10^{-5} α(K)=2.23×10^{-6} *4*; α(L)=1.659×10^{-7} *32*; α(M)=1.261×10^{-8} *25* α(IPF)=0.00129 *8*

Continued on next page (footnotes at end of table)

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$\gamma(^{31}P)$ (continued)

† Additional information 1.
‡ From Adopted Gammas. None of the papers cited above contain independently measured γ-ray energies.
# From 1980Wi13.
@ For absolute intensity per 100 decays, multiply by 0.01103 *30*.

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Decay Scheme

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