^{81}Se β^- decay (57.28 min) 1969Zo06,1971Do09

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. Shamsuzzoha Basunia	NDS 199,271 (2025)	1-Sep-2024

Parent: ^{81}Se: E=102.968 *10*; $J^\pi=7/2^+$; $T_{1/2}$=57.28 min *2*; Q(β^-)=1588.0 *14*; %β^- decay=0.087 *15*

^{81}Se-E,J^π,$T_{1/2}$: from ^{81}Se Adopted Levels.

^{81}Se-Q(β^-): from 2021Wa16.

^{81}Se-%β^- decay: from ^{81}Se(IT branching + β- decay mode branching)=100 using IT Iγ(1+α)=100 × (1+6.80 *10*)=780 *10* and Iγ(1+α) to g.s. feeding=0.68 *12*.

Others: 1969Be82, 1967Pr06, 1967Yt03, 1971Na18, 1974Ve12, 1977Kr18, 2015Kr02.

1969Zo06: chemically separated Se from ^{80}Se(n,γ) (99.87% ^{80}Se); measured Eγ, Iγ with Ge(Li), FWHM=2.5 keV at Eγ=1332, and $\gamma\gamma$ coin with Ge(Li) and NaI, FWHM=7.0 keV at Eγ=1332.

1971Do09: source from ^{82}Se(γ,n) (89.1% ^{82}Se target); measured Eγ, Iγ, $\gamma\gamma$ coin, γ(t); Ge(Li) (FWHM=3.6 keV at 1 MeV) and, for Eγ<300, x-ray Ge(Li) spectrometer (FWHM=0.8 keV at 50 keV, 1.3 keV at 300 keV).

1974Ve12: source from ^{80}Se(n,γ) E=thermal (96.87% ^{80}Se target); measured Eγ, Iγ; Ge(Li) FWHM=4 keV at 662 keV. ΔE(γ) not given; no isomeric assignment made for observed γ rays.

^{81}Br Levels

E(level)†	J^π‡	$T_{1/2}$‡
0	$3/2^-$	
275.93 *5*	$5/2^-$	9.7 ps *14*
536.24 *6*	$9/2^+$	36 μs *3*
767.0 *5*	$(5/2)^-$	0.54 ps *4*
789.258 *19*	$5/2^+$	

† From a least-squares fit to Eγ.

‡ From Adopted Levels.

β^- radiations

β^- av Eβ: Additional information 1.

E(decay)	E(level)	Iβ^-†	Log *ft*	Comments
(901.7 *14*)	789.258	0.012 *3*	8.49 *13*	av Eβ=315.7 *6*
(924.0 *15*)	767.0	0.00070 *19*	9.76 *14*	av Eβ=325.0 *6*
(1154.7 *14*)	536.24	0.074 *24*	8.10 *16*	av Eβ=422.8 *6*

† Absolute intensity per 100 decays.

^{81}Se β^- decay (57.28 min) 1969Zo06,1971Do09 (continued)

$\gamma(^{81}Br)$

Iγ normalization: from I(γ+ce) to (g.s.)=100 (assuming no β^- feeding of g.s. or 275.93 level) and decay mode branching.
α(K)exp,α(L)exp: from 1971Na18, measured with Ge(Li)-γ-ray and Si(Li)-electron spectrometer calibrated using transitions with well-known α(K) and α(L). Data for transitions present in ^{81}Se β^- decay (18.45 min) are listed with that decay only.

E$_\gamma$ ‡	I$_\gamma$ ‡ d	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult. c	δ c	α †	Comments
x201 #	0.030 # 4								%Iγ=0.0038 *11*
260.305 *12*	0.55 a *12*	536.24	9/2$^+$	275.93	5/2$^-$	M2		0.0454 *6*	α(K)exp=0.038 *1*; α(L)exp=0.005 *2* α(K)=0.0399 *6*; α(L)=0.00468 *7*; α(M)=0.000749 *10* α(N)=6.92×10^{-5} *10* %Iγ=0.074 *24* E$_\gamma$: weighted average of 260.2 *2* (1969Zo06), 260.0 *2* (1971Do09), 260.306 *10* (2015Kr02). Mult.: from α(K)exp, α(L)exp (1971Na18).
275.93 *5*	0.58 & *12*	275.93	5/2$^-$	0	3/2$^-$	M1+E2	−0.10 *3*	0.00816 *15*	α(K)=0.00725 *13*; α(L)=0.000782 *14*; α(M)=0.0001242 *23* α(N)=1.159×10^{-5} *21* %Iγ=0.075 *24* E$_\gamma$: weighted average of 275.94 *5* (1969Zo06) and 275.9 *1* (1971Do09).
491.3 @	0.0007 @ *1*	767.0	(5/2)$^-$	275.93	5/2$^-$	M1+E2	+0.25 *13*	0.00208 *8*	α(K)=0.00184 *7*; α(L)=0.000196 *8*; α(M)=3.12×10^{-5} *13* α(N)=2.92×10^{-6} *12* %Iγ=9.0×10^{-5} *26*
766.9 *5*	0.0048 b *5*	767.0	(5/2)$^-$	0	3/2$^-$	M1+E2	−0.263 *11*	7.49×10^{-4} *11*	α(K)=0.000666 *9*; α(L)=7.02×10^{-5} *10*; α(M)=1.114×10^{-5} *16* α(N)=1.045×10^{-6} *15* %Iγ=0.00061 *17* E$_\gamma$: weighted average of 767.3 *10* (1969Zo06), 767.0 *5* (1971Do09), 766.6 *5* (1977Kr18 – shown for ^{81g}Se decay with Iγ=0.15).
789.254 *19*	0.091 *4*	789.258	5/2$^+$	0	3/2$^-$				%Iγ=0.0116 *29* E$_\gamma$,I$_\gamma$: from 2015Kr02. Corresponding Eγ is probably 789.1 *5* listed in 18.45-min decay dataset. In 1969Zo06, no determination for isomeric decay. In 2015Kr02, not have much evidence for this line to belong to the 18.45-min decay.

† Additional information 2.
‡ Weighted average of data from 1969Zo06 and 1971Do09, unless noted otherwise. Intensities are from mixed source in transient equilibrium, and are relative to I(102.968γ, ^{81}Se IT)=100. The listed γ-ray intensities are for this decay mode only.

^{81}Se β^- decay (57.28 min) 1969Zo06,1971Do09 (continued)

$\gamma(^{81}Br)$ (continued)

From 1974Ve12; this γ was placed by 1974Ve12 between the known 768 and 567 levels on the basis of Eγ alone. However, since it is much more intense than the observed 767γ and since other authors who observe the 768 level do not report a 201γ, the evaluator considers this placement of the 201γ to be incorrect and suspects the 201γ was wrongly assigned to ^{81}Se ε decay.

@ Eγ from Adopted Gammas. Weak 492γ seen in coin spectrum only; Iγ=0.0010 *2* (1969Zo06), deduced from both $\gamma\gamma$ coin in 1969Zo06 and 2422γ:767γ branching from the literature. The 492γ is known from other reactions, the evaluator deduced the Iγ shown here from Iγ(492γ)/Iγ(767γ)=0.153 *12* (from Adopted Gammas) and Iγ(767γ) from 1969Zo06.

& Deduced by evaluator from I(260γ) and I(491γ?) assuming α(260γ)=0.0456, α(276γ)=0.0082, and no β^- feeding of the 275 level. This γ must follow the 260γ and 491γ(?) to deexcite the 276-keV level following ^{81}Se (57.28 min) β^- decay; however, the observed I(276γ) included the (large) contribution from ^{81}Se (18.45 min) β^- decay created in the source following ^{81}Se (57 min) IT decay.

a Unweighted average of 0.59 *6* (1969Zo06), 0.33 *3* (1971Do09), and 0.73 *2* (estimated value from 0.81 *2* − authors in 2015Kr02 note ≈10% contribution from 260.584γ ^{83}Se). Other: 0.84 *7* (1974Ve12); possibly somewhat overestimated as a result of I(102.968γ, ^{81}Se IT) being underestimated, since Iγ data for ^{81}Se (18 min) relative to I(102.968γ, ^{81}Se IT) are consistently ≈20% higher than in 1969Zo06 and 1971Do09. Weighted and unweighted averages of all four is same and Iγ(260γ)=0.62 *11*.

b From 1969Zo06. γ observed, but not placed by 1971Do09, and intensity was not determined in that (1971Do09) study.

c From Adopted Gammas, except as noted.

d For absolute intensity per 100 decays, multiply by 0.128 *32*.

x γ ray not placed in level scheme.

$^{81}_{35}Br_{46}$-3

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Decay Scheme

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