^{186}Re β^- decay (3.7185 d) 2000Wo02,1994Sc39,2016Lu16

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	J. C. Batchelder and A. M. Hurst, M. S. Basunia	NDS 183, 1 (2022)	1-Mar-2022

Parent: ^{186}Re: E=0.0; $J^\pi=1^-$; $T_{1/2}$=3.7185 d *5*; Q(β^-)=1072.7 *8*; %β^- decay=92.50 *10*

^{186}Re-%β^- decay: %β^-=92.50 *10* from [100−%ε]; for calculation of %ε, please see ^{186}Re ε decay (3.7185 d).

Others: 1972Se06 2000Mi03, 1991Co17, 1991Go23, 1972Fo22, 1969La11, 1969Sc11, 1969Va17, 1968Bo01, 1968Bo38, 1968An11, 1968Ma14, 1966Er03, 1964Ma36, 1964Ro19, 1963Fo02, 1963Ma08 (see also 1962Li15), 1962Ba14, 1961Bo08, 1956Jo05, 1956Po28, 1947Go01.

^{186}Os Levels

E(level)	J^π	$T_{1/2}$	Comments
0.0	0^+	2.0×10^{15} y *11*	
137.15 *4*	2^+	868 ps *12*	g=0.032 *3* (1961Bo08) $T_{1/2}$: From Adopted Levels. Other: 0.842 ns *12* − from β-ce or $\beta\gamma$ delayed coincidence; weighted average of 0.81 ns *3* (1968Ma14), 0.845 ns *20* (1964Ro19), 0.82 ns *3* (1963Fo02), 0.87 ns *4* (centroid shift) and 0.890 *35* (1962Ba14), 0.84 ns *3* (1961Bo08).
434.1 *3*	4^+		
767.47 *4*	2^+		
910.6 *4*	3^+		

β^- radiations

E(decay)	E(level)	Iβ^- †#	Log *ft*	Comments
(162.1 *9*)	910.6	2.2×10^{-5} *7*	11.0[1u] *1*	av Eβ=49.49 *33*
(305.2 *8*)	767.47	0.0628 *7*	8.94 *1*	av Eβ=85.98 *25*
(935.5 *8*)	137.15	21.48‡ *7*	8.042 *2*	av Eβ=307.37 *31* E(decay): 934.3 *13* for non-allowed shape (1956Po28 obtain Eβ=933.5 *30* if allowed shape is assumed). Other values: 927 *2* (1956Jo05), 939 *3* (1964Ma36), 939 (1969Va17). Shape is non-allowed (1956Po28,1969Va17). Ratio of first-forbidden decay matrix elements with L=1,2: L(2)/L(1)=0.081 *5* (1981Oe01, from $\beta\gamma(\theta$,H,T)).
(1072.7 *8*)	0.0	70.93‡ *17*	7.731 *2*	av Eβ=360.52 *32* E(decay): 1071.5 *13* (1956Po28), 1070 (1947Go01), 1064 *2* (1956Jo05), 1076 *3* (1964Ma36), 1064 *3* (1968An11), 1073 (1969Va17). Shape is non-allowed (1956Po28,1969Va17).

† From intensity balance in level scheme.

‡ cf. other [Iβ(g.s.), Iβ(137 keV level)]=[76.6 *15*, 23.4 *15*] (1956Po28, based on measured I(γ+ce)(137)/Iβ(total)), [78 *4*, 22 *4*] (1964Ma36).

Absolute intensity per 100 decays.

$\gamma(^{186}Os)$

Iγ normalization: based on absolute measurements of Iγ(137).

Summary of experimental I(x-ray) (%) compared with calculated (2004BeZR) values.

Radiation	1972Se06	1991Co17	1991Go23	1994Sc39	2016Lu16	Calculated
Os L x ray				3.1 3		2.92 11
Os L_α x ray	1.70 1					
Os L_β x ray	1.49 1					
Os $K\alpha_2$ x ray	1.05 5		1.20 3	1.12 3	1.077 37	1.14 3
Os $K\alpha_1$ x ray	2.08 4		2.05 5	1.95 4	1.77 6	1.94 4

Os Kα x ray		2.87 6					3.08 5
Os Kβ$_2$ x ray	0.18 2		0.180 5	0.185 4	0.202 9		0.154 3
Os Kβ$_1$ x ray			0.70 2	0.633 14	0.582 26		0.441 9
Os 137γ	10.0 1	9.45 16	10.0 1	9.39 9	10.12 42		[9.47 3]

E_γ[†]	I_γ[‡a]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[#]	α[&]	Comments
137.15 *5*	9.47 *3*	137.15	2^+	0.0	0^+	E2		1.271	α(K)=0.434 *6*; α(L)=0.632 *9*; α(M)=0.1610 *23* α(N)=0.0386 *6*; α(O)=0.00575 *9*; α(P)=3.96×10^{-5} *6* I_γ: Weighted average of 10.12 *42* (2016Lu16), 9.49 *3* (2000Mi03), 9.35 *10* (2000Wo02), 9.39 *9* (1994Sc39), 9.45 *8* (1994Co02), and 9.45 *16* (1991Co17). Others: 1991Go23, 1972Fo22, 1972Se06, 1956Po28. Mult.: K:L2:L3:N=3.4 *5*:2.98 *15*:2.44 *12*:0.480 *24* (1969La11). L1/L3=0.200 *5*, L2/L3=1.28 *2* (1966Er03). K/L=0.68 *2*, K/L3=1.70 *5* (1968Bo38). M/L=0.250 *15* (1968Bo01).
(143.17 *5*)	7.4×10^{-7}[@] *25*	910.6	3^+	767.47	2^+	M1+E2	0.7	≈1.772	α(K)≈1.331; α(L)≈0.337; α(M)≈0.0807 α(N)≈0.0196; α(O)≈0.00318; α(P)≈0.0001525 E_γ: from adopted gammas.
296.9 *4*	0.000053 *15*	434.1	4^+	137.15	2^+	E2		0.0942	α(K)=0.0606 *9*; α(L)=0.0255 *4*; α(M)=0.00632 *10* α(N)=0.001523 *23*; α(O)=0.000236 *4*; α(P)=6.08×10^{-6} *9* E_γ,I_γ: from 1972Fo22.
333.4 *4*	0.000062 *15*	767.47	2^+	434.1	4^+	[E2]		0.0671	α(K)=0.0452 *7*; α(L)=0.01666 *25*; α(M)=0.00410 *6* α(N)=0.000989 *15*; α(O)=0.0001548 *23*; α(P)=4.61×10^{-6} *7* I_γ: from 1972Fo22.
(476.40 *5*)	1.5×10^{-6}[@] *5*	910.6	3^+	434.1	4^+	E2+M1	−22 *10*	0.0258 *5*	α(K)=0.0192 *4*; α(L)=0.00503 *8*; α(M)=0.001211 *18* α(N)=0.000293 *5*; α(O)=4.72×10^{-5} *7*; α(P)=2.03×10^{-6} *4* E_γ: from adopted gammas.
630.33 *5*	0.0292 *4*	767.47	2^+	137.15	2^+	M1+E2	−13.7 *+17−23*	0.01330	α(K)=0.01040 *15*; α(L)=0.00223 *4*; α(M)=0.000528 *8*

Continued on next page (footnotes at end of table)

^{186}Re β^- decay (3.7185 d) 2000Wo02,1994Sc39,2016Lu16 (continued)

$\gamma(^{186}Os)$ (continued)

E_γ [†]	I_γ [‡a]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[#]	α[&]	Comments
									α(N)=0.0001280 *18*; α(O)=2.11×10^{-5} *3*; α(P)=1.115×10^{-6} *16* I_γ: Weighted average of 0.0293 *6* (1994Sc39), 0.0295 *6* (2000Wo02), 0.0265 *10* (2016Lu16), 0.032 *3* (1991Co17), 0.0262 *8* (from 0.0254 *8* in 1972Fo22 – assuming $\Delta I\gamma$=10%)), and 0.0294 *4* (from 0.0310 *4* in 1991Go23). δ: from adopted gammas. From A_2=−0.129 *17*, A_4=+0.332 *11* for 630γ-137$\gamma(\theta)$ (1969Sc11), δ=+14 *+7−3*. Other $\gamma\gamma(\theta)$: 1972Na32 ($\gamma\gamma(\theta)$ shown to be same for liquid and solid sources), 1961Bo08.
767.47 *5*	0.0329 *5*	767.47	2$^+$	0.0	0$^+$	E2		0.00856	α(K)=0.00684 *10*; α(L)=0.001323 *19*; α(M)=0.000310 *5* α(N)=7.53×10^{-5} *11*; α(O)=1.254×10^{-5} *18*; α(P)=7.34×10^{-7} *11* I_γ: Weighted average of 0.0312 *16* (2016Lu16), 0.0327 *6* (1994Sc39), 0.0350 *9* (2000Wo02), 0.037 *4* (1991Co17), 0.0295 *6* (from 0.0286 *6* in 1972Fo22 – – assuming $\Delta I\gamma$=10%), 0.0326 *5* (from 0.0344 *5* in 1991Go23).
773.5 *4*	2.2×10^{-5} *7*	910.6	3$^+$	137.15	2$^+$	M1+E2	−60 *+12−20*	0.00842	α(K)=0.00673 *10*; α(L)=0.001297 *19*; α(M)=0.000304 *5* α(N)=7.38×10^{-5} *11*; α(O)=1.230×10^{-5} *18*; α(P)=7.23×10^{-7} *11*

† From 1972Fo22, unless noted otherwise.
‡ Data from 1972Fo22, scaled so I(137γ)=9.47% (instead of 9.2 *9*); exceptions are noted.
# From adopted Levels, Gammas.
@ γ not observed in decay; Iγ calculated by evaluators from Iγ(773) (1972Fo22) and adopted branching ratios.
& Additional information 1.
a Absolute intensity per 100 decays.

^{186}Re β^- decay (3.7185 d) 2000Wo02,1994Sc39,2016Lu16

Decay Scheme

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