^{183}Os ε decay (9.9 h) 1983Br24,1970Ak01

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	NDS 134, 149 (2016)	15-Apr-2015

Parent: ^{183}Os: E=170.70 *7*; J$^{\pi}$=1/2^{-}; $T_{1/2}$=9.9 h *3*; Q(ε)=2150 *50*; %ε+%β^{+} decay=85 *2*

^{183}Os-%ε+%β^{+} decay: Assuming Σ (I(γ+ce) to g.s.)=85 *2*. ε branching deduced from %IT(^{183}Os)=15 *2* if negligible ε+β^{+} branch to g.s., but log $f^{1u}t$>8.5 only limits %ε+%β^{+} to <26.

Other references: 1960Ne03, 1968Ha39, 1970PlZZ.

1983Br24: high-purity ^{183}Os sources from ^{182}W(α,3n) using isotopically enriched targets and followed by chemical separation; additional sources from W(α,xn) using natural W foils and chemical separation; low-energy photon spectrometer (FWHM≈0.55 keV At 122 keV) and large-volume Ge(Li) spectrometers (FWHM≈1.9 keV At 1332 keV); measured Eγ, Iγ, γγ coin, γ(t).

1970Ak01: sources from Os fraction or Os from Ir fraction decay following 660 MeV proton bombardment of Au, or from decay of separated Ir isotopes produced by 100 MeV ^{22}Ne bombardment of Ho; β spectrographs and $2\pi\sqrt{2}$ spectrometer (for E(ce)>800); Ge(Li) detectors; measured Eγ, Iγ, I(ce), γγ coin (100 ns resolving time).

The decay scheme is primarily from 1983Br24. the total energy release for this decay scheme is 2102 *260* cf.QxBR=1973 *63*.

^{183}Re Levels

E(level)[†]	J$^{\pi}$[‡]	$T_{1/2}$	Comments
0.0	5/2^{+}	70.0 d *14*	$T_{1/2}$: from Adopted Levels.
114.33 *5*	7/2^{+}		
598.82 *6*	(5/2)$^{-}$		
700.61 *6*	(1/2)$^{-}$		
828.98 *8*	(3/2)$^{-}$		
878.91 *5*	1/2^{+}		
954.78 *4*	(3/2^{+})		
1034.73 *4*	(3/2)$^{+}$		
1040.70 *9*	(5/2)$^{+}$		
1066.09 *9*	(3/2)		
1101.95 *4*	(1/2)$^{+}$		
1107.89 *4*	(3/2)$^{+}$		
1353.76 *5*	(3/2^{+})		
1414.60 *10*	(1/2^{-},3/2)		
1563.13 *14*	≤(1/2^{-},3/2,5/2^{+})		
1903.93 *8*	(1/2^{+},3/2^{+})		

† From least-squares fit to Eγ, omitting the 1904γ which fits its placement poorly.
‡ From Adopted Levels.

ε,β^{+} radiations

E(decay)	E(level)	Iβ^{+} [†]	Iε[†]	Log *ft*	I(ε+β^{+})[†]	Comments
(4.2×10^{2} *5*)	1903.93		0.87 *6*	7.11 *14*	0.87 *6*	εK=0.774 *9*; εL=0.171 *7*; εM+=0.0553 *25*
(7.6×10^{2} *5*)	1563.13		0.22 *4*	8.29 *11*	0.22 *4*	εK=0.8003 *21*; εL=0.1516 *15*; εM+=0.0481 *6*
(9.1×10^{2} *5*)	1414.60		0.40 *7*	8.20 *10*	0.40 *7*	εK=0.8050 *14*; εL=0.1482 *10*; εM+=0.0468 *4*
(9.7×10^{2} *5*)	1353.76		0.97 *19*	7.87 *10*	0.97 *19*	εK=0.8065 *12*; εL=0.1471 *9*; εM+=0.0464 *4*
(1.21×10^{3} *5*)	1107.89		21.9 *6*	6.73 *5*	21.9 *6*	εK=0.8108 *7*; εL=0.1440 *6*; εM+=0.04527 *20*
(1.22×10^{3} *5*)	1101.95		53.7 *16*	6.34 *5*	53.7 *16*	εK=0.8108 *7*; εL=0.1439 *6*; εM+=0.04525 *20*
(1.25×10^{3} *5*)	1066.09		0.5 *4*	8.4 *4*	0.5 *4*	εK=0.8113 *7*; εL=0.1436 *5*; εM+=0.04512 *19*
(1.28×10^{3} *5*)	1040.70		0.42 *6*	9.25^{1u} *10*	0.42 *6*	εK=0.7937 *16*; εL=0.1563 *12*; εM+=0.0500 *5*
(1.29×10^{3} *5*)	1034.73		3.1 *5*	7.63 *8*	3.1 *5*	εK=0.8117 *6*; εL=0.1433 *5*; εM+=0.04501 *18*
(1.44×10^{3} *5*)	878.91	0.0011 *7*	2.0 *3*	7.92 *8*	2.0 *3*	av Eβ=208 *23*; εK=0.8129 *3*; εL=0.1420 *4*; εM+=0.04453 *15*

Continued on next page (footnotes at end of table)

^{183}Os ε decay (9.9 h) 1983Br24,1970Ak01 (continued)

ϵ,β^+ radiations (continued)

E(decay)	E(level)	Iβ^+ †	Iε†	Log *ft*	I($\varepsilon+\beta^+$)†	Comments
(1.49×10^3 *5*)	828.98		0.4 *5*	8.7 *6*	0.4 *5*	εK=0.8131 *2*; εL=0.1416 *4*; εM+=0.04439 *14*
(2.32×10^3‡ *5*)	0.0	0.13 *13*	13 *13*	8.8^{1u} *5*	13 *13*	av Eβ=605 *22*; εK=0.8018 *9*; εL=0.1434 *5*; εM+=0.04515 *18*

† For absolute intensity per 100 decays, multiply by 0.85 *2*.
‡ Existence of this branch is questionable.

γ(^{183}Re)

Iγ normalization: assuming Σ (I(γ+ce) to g.s.)=85 *2*. ε branching deduced from %IT(^{183}Os)=15 *2* if negligible ε+β^+ branch to g.s., but log $f^{1u}t$>8.5 only limits %ε+%β^+ to <26.

E_γ[‡]	I_γ[‡b]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	δ[@]	α[†]	$I_{(\gamma+ce)}$[b]	Comments
^{x}66.15 *3*										E_γ: from 1970Ak01; placed by authors from a 665 level known from ^{183}Os ε decay (13.0 h) but not expected to be fed In this decay. Placement implies high multipolarity and γ is otherwise unknown so placement is excluded here and In Adopted Levels, Gammas.
67.24 *3*	1.75 *18*	1101.95	(1/2)$^+$	1034.73	(3/2)$^+$	M1+E2	≈0.075	≈2.93		I(γ+ce)≈1.64 from 1970Ak01 if Ti(1102γ)=100. Mult.: L2/L3≈1 (1970Ak01). α(L)≈2.26; α(M)≈0.520 α(N)≈0.1259; α(O)≈0.0210; α(P)≈0.001477
80.03 *4*		1034.73	(3/2)$^+$	954.78	(3/2$^+$)	[M1]		9.79	<1.9	E_γ: from 1970Ak01; not reported by 1983Br24. Mult.: L1/L2=9 (1970Ak01); α(L1)exp=2.9. L1:L2=65:7.5 (1968Ha39). From 1960Ne03, 1968Ha39, and 1970Ak01. δ calculated from L1/L2=65/7.5 (1968Ha39) and Iγ from relative electron intensities (1968Ha39,1970Ak01) and adopted α. ce(K)/(γ+ce)=0.750 *6*; ce(L)/(γ+ce)=0.1218 *22*; ce(M)/(γ+ce)=0.0279 *6* ce(N)/(γ+ce)=0.00676 *13*; ce(O)/(γ+ce)=0.001135 *22*; ce(P)/(γ+ce)=8.28×10^{-5} *16* α(K)=8.09 *12*; α(L)=1.315 *19*; α(M)=0.301 *5*; α(N)=0.0729 *11*; α(O)=0.01224 *18* I_γ: Iγ=0.45 *11* (1983Br24) is inconsistent with intensity balance through the 955-keV level. Authors indicate that this transition may include a component from ^{183}Os(13 h) decay. The adopted I(γ+ce) is calculated from the intensity balance through the 955-keV level.
101.79 *5*	0.42 *17*	700.61	(1/2)$^-$	598.82	(5/2)$^-$	[E2]		3.84		α(K)=0.816 *12*; α(L)=2.28 *4*; α(M)=0.581 *9* α(N)=0.1379 *20*; α(O)=0.0197 *3*; α(P)=7.42×10^{-5} *11*
114.35 *7*	1.44 *12*	114.33	7/2$^+$	0.0	5/2$^+$	M1+E2	0.24 *4*	3.46 *6*		α(K)=2.79 *6*; α(L)=0.516 *18*; α(M)=0.120 *5* α(N)=0.0289 *11*; α(O)=0.00475 *15*; α(P)=0.000304 *7* I_γ: calculated from intensity balance through 114-keV level. Mult.: from Adopted Gammas.
^{x}126.2 *1*	0.38 *13*									E_γ: from 1970Ak01; placed by authors between the 1353 level and an otherwise unknown level. placement rejected by evaluator.
128.30 *8*	0.28[a] *6*	828.98	(3/2)$^-$	700.61	(1/2)$^-$	[M1]		2.53		α(K)=2.10 *3*; α(L)=0.337 *5*; α(M)=0.0770 *11* α(N)=0.0187 *3*; α(O)=0.00314 *5*; α(P)=0.000229 *4*
147.11 *10*	0.91 *25*	1101.95	(1/2)$^+$	954.78	(3/2$^+$)	(M1)		1.718		α(K)=1.423 *21*; α(L)=0.228 *4*; α(M)=0.0521 *8*

γ(^{183}Re) (continued)

E_γ[‡]	I_γ[‡b]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	α[†]	Comments
								α(N)=0.01264 *18*; α(O)=0.00212 *3*; α(P)=0.0001552 *22* Mult.: α(K)exp=1.25. K:L1=18:4 (1968Ha39).
[x]163.2 *1*								E_γ: from 1970Ak01; placed by authors from an 828 level to a 664 level known from ^{183}Os ε decay (13.0 h), but adopted spin change is prohibitively large so evaluator has rejected that placement.
230.10 *15*	0.71[a] *23*	828.98	(3/2)$^-$	598.82	(5/2)$^-$	[M1]	0.492	α(K)=0.408 *6*; α(L)=0.0648 *10*; α(M)=0.01481 *21* α(N)=0.00359 *5*; α(O)=0.000604 *9*; α(P)=4.42×10^{-5} *7*
237.00 *15*	0.5 *5*	1066.09	(3/2)	828.98	(3/2)$^-$	[M1]	0.453	α(K)=0.376 *6*; α(L)=0.0597 *9*; α(M)=0.01364 *20* α(N)=0.00331 *5*; α(O)=0.000556 *8*; α(P)=4.08×10^{-5} *6*
245.90 *5*	0.63 *25*	1353.76	(3/2$^+$)	1107.89	(3/2)$^+$	(M1)	0.410	α(K)=0.340 *5*; α(L)=0.0539 *8*; α(M)=0.01232 *18* α(N)=0.00299 *5*; α(O)=0.000502 *7*; α(P)=3.68×10^{-5} *6* Mult.: α(K)exp=0.50.
251.92 *8*	0.80 *10*	1353.76	(3/2$^+$)	1101.95	(1/2)$^+$	(M1)	0.383	α(K)=0.318 *5*; α(L)=0.0505 *7*; α(M)=0.01152 *17* α(N)=0.00279 *4*; α(O)=0.000470 *7*; α(P)=3.44×10^{-5} *5* Mult.: K:L1=0.016:0.003 (1960Ne03). α(K)exp=0.36.
365.51 *8*	0.34 *12*	1066.09	(3/2)	700.61	(1/2)$^-$	[M1]	0.1400	α(K)=0.1163 *17*; α(L)=0.0183 *3*; α(M)=0.00417 *6* α(N)=0.001011 *15*; α(O)=0.0001701 *24*; α(P)=1.252×10^{-5} *18*
401.32 *8*	0.85 *7*	1101.95	(1/2)$^+$	700.61	(1/2)$^-$			
484.49 *5*	4.52 *23*	598.82	(5/2)$^-$	114.33	7/2$^+$	E1	0.00790	α(K)=0.00662 *10*; α(L)=0.000992 *14*; α(M)=0.000225 *4* α(N)=5.42×10^{-5} *8*; α(O)=8.96×10^{-6} *13*; α(P)=6.07×10^{-7} *9* Mult.: α(K)exp=0.0056 (Eγ misprinted As 84.7 In table 2 of 1970Ak01).
535.62 *25*	0.009[a] *5*	1414.60	(1/2$^-$,3/2)	878.91	1/2$^+$			
550.28 *10*	0.38 *8*	1903.93	(1/2$^+$,3/2$^+$)	1353.76	(3/2$^+$)			
585.60 *10*	0.42[a] *11*	1414.60	(1/2$^-$,3/2)	828.98	(3/2)$^-$			
714.20 *15*	0.20[a] *6*	1414.60	(1/2$^-$,3/2)	700.61	(1/2)$^-$			
[x]724.60 *20*	0.18[a] *8*							
734.01 *15*	0.32[a] *8*	1563.13	≤(1/2$^-$,3/2,5/2$^+$)	828.98	(3/2)$^-$			
[x]762[&] *1*	0.25 *13*							
795.94 *15*	0.68 *7*	1903.93	(1/2$^+$,3/2$^+$)	1107.89	(3/2)$^+$			
815.53 *20*	0.18 *5*	1414.60	(1/2$^-$,3/2)	598.82	(5/2)$^-$			
829.01 *18*	0.26 *7*	828.98	(3/2)$^-$	0.0	5/2$^+$			
840.58 *8*	1.31 *16*	954.78	(3/2$^+$)	114.33	7/2$^+$			
[x]853.37 *15*	0.67 *9*							
878.91 *5*	4.0 *5*	878.91	1/2$^+$	0.0	5/2$^+$	E2	0.00615	α(K)=0.00499 *7*; α(L)=0.000892 *13*; α(M)=0.000207 *3* α(N)=4.99×10^{-5} *7*; α(O)=8.15×10^{-6} *12*; α(P)=5.01×10^{-7} *7* Mult.: α(K)exp=0.0041.
926.06 *20*	0.26 *7*	1040.70	(5/2)$^+$	114.33	7/2$^+$	(E2)	0.00552	α(K)=0.00450 *7*; α(L)=0.000789 *11*; α(M)=0.000182 *3* α(N)=4.40×10^{-5} *7*; α(O)=7.21×10^{-6} *11*; α(P)=4.52×10^{-7} *7* Mult.: from Adopted Gammas.
948.98 *15*	0.47 *4*	1903.93	(1/2$^+$,3/2$^+$)	954.78	(3/2$^+$)			

$^{183}_{75}Re_{108}$-4

γ(^{183}Re) (continued)

E_γ[‡]	I_γ[‡b]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	α[†]	Comments
954.88 *8*	2.82 *4*	954.78	(3/2$^+$)	0.0	5/2$^+$	E2	0.00519	α(K)=0.00424 *6*; α(L)=0.000735 *11*; α(M)=0.0001698 *24* α(N)=4.10×10^{-5} *6*; α(O)=6.72×10^{-6} *10*; α(P)=4.25×10^{-7} *6* Mult.: α(K)exp=0.0043.
964.54 *20*	0.13 *2*	1563.13	≤(1/2$^-$,3/2,5/2$^+$)	598.82	(5/2)$^-$			
993.43 *15*	0.35 *4*	1107.89	(3/2)$^+$	114.33	7/2$^+$			
1034.68 *5*	12.30 *12*	1034.73	(3/2)$^+$	0.0	5/2$^+$	M1+E2	0.007 *3*	α(K)=0.0058 *22*; α(L)=0.0009 *3*; α(M)=0.00021 *7* α(N)=5.1×10^{-5} *17*; α(O)=8.E−6 *3*; α(P)=6.0×10^{-7} *24* Mult.: α(K)exp=0.0072. K:L1=2.1:≈0.7 (1968Ha39).
1040.77 *10*	0.59 *8*	1040.70	(5/2)$^+$	0.0	5/2$^+$	(M1)	0.00944	α(K)=0.00789 *11*; α(L)=0.001198 *17*; α(M)=0.000272 *4* α(N)=6.60×10^{-5} *10*; α(O)=1.113×10^{-5} *16*; α(P)=8.31×10^{-7} *12* Mult.: from Adopted Gammas.
1101.93 *5*	100.0 *10*	1101.95	(1/2)$^+$	0.0	5/2$^+$	(E2)	0.00390	α(K)=0.00321 *5*; α(L)=0.000533 *8*; α(M)=0.0001225 *18* α(N)=2.96×10^{-5} *5*; α(O)=4.88×10^{-6} *7*; α(P)=3.22×10^{-7} *5*; α(IPF)=2.09×10^{-7} *3* Mult.: K:L1=6.05:1 (1968Ha39). %Iγ=49.2 *12* based on recommended decay scheme normalization.
[x]1104.66 *15*	1.1 *4*							
1107.93 *5*	45.7 *4*	1107.89	(3/2)$^+$	0.0	5/2$^+$	M1	0.00808	α(K)=0.00675 *10*; α(L)=0.001023 *15*; α(M)=0.000232 *4* α(N)=5.64×10^{-5} *8*; α(O)=9.51×10^{-6} *14*; α(P)=7.11×10^{-7} *10*; α(IPF)=3.96×10^{-7} *6* Mult.: α(K)exp=0.0060. K:L1=5.65:1.1 (1968Ha39).
[x]1110.44 *20*	0.61 *12*							
[x]1161.11 *20*	1.1 *3*							
[x]1168[&] *1*	0.19 *6*							
[x]1173.99 *10*	0.38[a] *15*							
[x]1283.42 *15*	0.22[a] *8*							
[x]1331.08 *10*	0.15 *8*							
1353.57 *10*	0.35 *5*	1353.76	(3/2$^+$)	0.0	5/2$^+$	(E2)	0.00265	α(K)=0.00218 *3*; α(L)=0.000344 *5*; α(M)=7.86×10^{-5} *11* α(N)=1.90×10^{-5} *3*; α(O)=3.16×10^{-6} *5*; α(P)=2.18×10^{-7} *3*; α(IPF)=2.77×10^{-5} *4* Mult.: α(K)exp=0.0025.
[x]1468.91 *25*	0.03 *1*							
[x]1473.13 *25*	0.03 *1*							
[x]1562.60 *10*	0.06 *2*							
[x]1626.39 *10*	0.13[a] *2*							
[x]1642[&] *2*	0.08 *3*							
[x]1650.02 *10*	0.06 *2*							
[x]1678.48 *10*	0.07 *2*						(E2)	0.00189	α(K)=0.001469 *21*; α(L)=0.000223 *4*; α(M)=5.08×10^{-5} *8* α(N)=1.228×10^{-5} *18*; α(O)=2.05×10^{-6} *3*; α(P)=1.464×10^{-7} *21*; α(IPF)=0.0001329 *19* Mult.: α(K)exp=0.0016.
[x]1707[&] *2*	0.09 *4*							

$^{183}_{75}Re_{108}$-5

γ(^{183}Re) (continued)

E_γ[‡]	I_γ[‡b]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	α[†]	Comments
[x]1725[&] *2*	0.08 *3*							
[x]1787[&] *2*	0.10 *4*							
[x]1806.71 *13*	0.19 *3*					(E2)	1.72×10^{-3}	α(K)=0.001284 *18*; α(L)=0.000193 *3*; α(M)=4.39×10^{-5} *7* α(N)=1.061×10^{-5} *15*; α(O)=1.777×10^{-6} *25*; α(P)=1.279×10^{-7} *18*; α(IPF)=0.000187 *3* Mult.: α(K)exp=0.0009.
[x]1826.06 *25*	0.16[a] *2*					(M1)	0.00264	α(K)=0.00198 *3*; α(L)=0.000296 *5*; α(M)=6.70×10^{-5} *10* α(N)=1.625×10^{-5} *23*; α(O)=2.74×10^{-6} *4*; α(P)=2.07×10^{-7} *3*; α(IPF)=0.000274 *4* Mult.: α(K)exp=0.0016.
1903.50 *10*	0.23 *2*	1903.93	($1/2^+$,$3/2^+$)	0.0	$5/2^+$	(E2)	1.62×10^{-3}	α(K)=0.001168 *17*; α(L)=0.0001746 *25*; α(M)=3.96×10^{-5} *6* α(N)=9.58×10^{-6} *14*; α(O)=1.606×10^{-6} *23*; α(P)=1.163×10^{-7} *17*; α(IPF)=0.000230 *4* Mult.: α(K)exp=0.0018. E_γ: fits placement poorly; omitted from least-squares fit.
[x]1919.00 *25*	0.04 *1*							Mult.: α(K)exp=0.0028.
[x]1948.13 *25*	0.07 *2*							

[†] Additional information 1.
[‡] From 1983Br24, except As noted.
[#] Based on conversion electron data from 1970Ak01 and Iγ adopted here, except As noted. the γ and ce intensity scales were normalized so α(K)exp(1102γ)=α(K)(E2 theory)=0.00321.
[@] From Adopted Gammas.
[&] Unplaced γ from 1970Ak01. Iγ from 1970Ak01 renormalized so I(1102γ)=100 as In 1983Br24.
[a] Transition may include contribution from ^{183}Os(13.0 h) ε decay.
[b] For absolute intensity per 100 decays, multiply by 0.492 *12*.
[x] γ ray not placed in level scheme.

^{183}Os ε decay (9.9 h) 1983Br24,1970Ak01