^{182}Hf β^- decay (61.5 min) 1974Wa14

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	NDS 130, 21 (2015)	15-Jul-2015

Parent: ^{182}Hf: E=1172.90 *19*; J^π=(8^-); $T_{1/2}$=61.5 min *15*; Q(β^-)=381 *6*; %β^- decay=54 *2*

^{182}Hf-Configuration=π7/2[404]$\otimes\pi$9/2[514], $K^\pi=8^-$.

^{182}Hf-J^π,$T_{1/2}$: From ^{182}Hf Adopted Levels.

^{182}Hf-Q(β^-): From 2012Wa38.

^{182}Hf-%β^- decay: From 1974Wa14.

1974Wa14 (also 1971Wa09): the 61.5 min activity of ^{182}Hf produced by irradiation of natural and enriched ^{186}W targets with 50 and 200 MeV protons followed by chemical and mass separation. Measured Eγ, Iγ, $\gamma\gamma$, β, $\beta\gamma$ coin with Ge(Li) detectors and plastic scintillators.

The decay scheme of 1974Wa14 has been supplemented by the evaluators with information from (n,γ) thermal.

^{182}Ta Levels

E(level)†	J^π‡	$T_{1/2}$	Comments
0.0	3^-		
16.273 *4*	5^+		
97.77 *8*	4^-		
114.22 *11*	4^-		
163.14 *7*	6^+		
173.33 *7*	5^-		
292.91 *10*	5^-		
316.51 *10*	6^-		
334.61 *8*	7^+		
488.70 *11*	(6^-)		
519.61 *13*	10^-	15.84 min *10*	$T_{1/2}$: from Adopted Levels.
652.41 *17*	(9^-)		
776.49 *9*	(7^-)		
1116.10 *8*	(7^-)		
1336.90 *13*	(8^-)		

† From least-squares fit to Eγ data.

‡ From Adopted Levels.

β^- radiations

E(decay)	E(level)	Iβ^-†	Log *ft*	Comments
(217 *6*)	1336.90	1.6 *5*	5.1 *2*	av Eβ=59.3 *18*
(438 *6*)	1116.10	43 *5*	4.61 *6*	av Eβ=128.8 *20* E(decay): (943γ)(β) coin gives E_β(end-point)=480 *50*.
(901 *6*)	652.41	9.9 *25*	6.3 *1*	av Eβ=295.8 *23* E(decay): E_β(end-point)=970 *70* from singles β spectrum.

† Absolute intensity per 100 decays.

^{182}Hf β^- decay (61.5 min) 1974Wa14 (continued)

$\gamma(^{182}Ta)$

Iγ normalization: From I(g+ce) of gammas from 652, 1116 and 1337 levels adding to absolute intensity of 54% *2*, assuming β^- feeding to no other levels.

E_γ	I_γ [@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	α[&]	$I_{(\gamma+ce)}$ [@]	Comments
(16.273 *4*)		16.273	5^+	0.0	3^-	(M2)	4.30×10^4	35 *4*	ce(L)/(γ+ce)=0.746 *8*; ce(M)/(γ+ce)=0.198 *4*; ce(N+)/(γ+ce)=0.0557 *11* ce(N)/(γ+ce)=0.0482 *10*; ce(O)/(γ+ce)=0.00717 *15*; ce(P)/(γ+ce)=0.000356 *7* E_γ: from Adopted Gammas. $I_{(\gamma+ce)}$: deduced by the evaluators from intensity balance at 16.27 level.
59.1 *1*	12.5 *21*	173.33	5^-	114.22	4^-	(M1)[‡]	3.41		α(L)=2.64 *4*; α(M)=0.600 *9* α(N)=0.1434 *22*; α(O)=0.0227 *4*; α(P)=0.001567 *24*
75.6 *1*	3.6 *8*	173.33	5^-	97.77	4^-	(M1)[‡]	9.74		α(K)=8.08 *12*; α(L)=1.287 *19*; α(M)=0.292 *5* α(N)=0.0698 *11*; α(O)=0.01105 *16*; α(P)=0.000764 *11*
97.8 *1*	11 *4*	97.77	4^-	0.0	3^-	M1	4.65		α(K)=3.86 *6*; α(L)=0.610 *9*; α(M)=0.1383 *20* α(N)=0.0331 *5*; α(O)=0.00524 *8*; α(P)=0.000362 *6* I_γ: doublet, the other component is from ^{182}Hf IT decay (61.5 min). Total intensity resolved by 1974Wa14 by intensity matching of 97.8γ and 224.4γ in ^{182}Hf.
114.3	17.7 *18*	114.22	4^-	0.0	3^-	(M1)	2.97		α(K)=2.47 *4*; α(L)=0.389 *6*; α(M)=0.0882 *13* α(N)=0.0211 *3*; α(O)=0.00334 *5*; α(P)=0.000231 *4*
132.8 *1*	8.5 *20*	652.41	(9^-)	519.61	10^-	(M1)[‡]	1.94		α(K)=1.612 *23*; α(L)=0.253 *4*; α(M)=0.0574 *9* α(N)=0.01374 *20*; α(O)=0.00218 *3*; α(P)=0.0001506 *22*
143.2 *1*	12.3 *13*	316.51	6^-	173.33	5^-	(M1,E2)	1.3 *3*		α(K)=0.9 *5*; α(L)=0.31 *11*; α(M)=0.07 *3*; α(N+..)=0.020 *8* α(N)=0.018 *7*; α(O)=0.0025 *8*; α(P)=7.E−5 *5*
146.8 *1*	13.5[#] *14*	163.14	6^+	16.273	5^+	M1	1.459		α(K)=1.214 *18*; α(L)=0.190 *3*; α(M)=0.0432 *7* α(N)=0.01033 *15*; α(O)=0.001635 *24*; α(P)=0.0001133 *16*
171.5 *1*	11[#] *3*	334.61	7^+	163.14	6^+	M1	0.941		α(K)=0.783 *11*; α(L)=0.1226 *18*; α(M)=0.0278 *4* α(N)=0.00665 *10*; α(O)=0.001053 *15*; α(P)=7.30×10^{-5} *11*

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^{182}Hf β^- decay (61.5 min) 1974Wa14 (continued)

$\gamma(^{182}Ta)$ (continued)

E_γ	I_γ [@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	α[&]	Comments
173.4[a] *1*	8.0 *26*	173.33	5^-	0.0	3^-	[E2]	0.484	α(K)=0.247 *4*; α(L)=0.180 *3*; α(M)=0.0447 *7* α(N)=0.01047 *15*; α(O)=0.001414 *20*; α(P)=1.745×10^{-5} *25* E_γ: treated as uncertain assignment (by the evaluator) since not confirmed in (n,γ).
178.7 *1*	6.3 *23*	292.91	5^-	114.22	4^-	[M1]	0.839	α(K)=0.698 *10*; α(L)=0.1092 *16*; α(M)=0.0248 *4* α(N)=0.00592 *9*; α(O)=0.000938 *14*; α(P)=6.50×10^{-5} *10*
185.0 *1*	6.2[#] *25*	519.61	10^-	334.61	7^+	E3	3.19	α(K)=0.633 *9*; α(L)=1.92 *3*; α(M)=0.500 *8* α(N)=0.1179 *17*; α(O)=0.01559 *23*; α(P)=7.47×10^{-5} *11*
195.8 *1*	3.1 *12*	488.70	(6^-)	292.91	5^-	[M1]	0.650	α(K)=0.541 *8*; α(L)=0.0845 *12*; α(M)=0.0192 *3* α(N)=0.00458 *7*; α(O)=0.000726 *11*; α(P)=5.04×10^{-5} *7*
220.8 *1*	2.7 *8*	1336.90	(8^-)	1116.10	(7^-)	[M1]	0.466	α(K)=0.388 *6*; α(L)=0.0604 *9*; α(M)=0.01370 *20* α(N)=0.00328 *5*; α(O)=0.000519 *8*; α(P)=3.61×10^{-5} *5* α(K)= 0.399 *12*; α(L)= 0.0621 *19*; α(M)= 0.0140 *4*; α(N+..)= 0.00414 *12*
318.3 *1*	1.6[#] *5*	334.61	7^+	16.273	5^+	E2	0.0688	α(K)=0.0478 *7*; α(L)=0.01605 *23*; α(M)=0.00388 *6* α(N)=0.000914 *13*; α(O)=0.0001295 *19*; α(P)=3.81×10^{-6} *6*
339.6 *1*	16.2 *15*	1116.10	(7^-)	776.49	(7^-)	[M1]	0.1446	α(K)=0.1206 *17*; α(L)=0.0186 *3*; α(M)=0.00421 *6* α(N)=0.001007 *15*; α(O)=0.0001596 *23*; α(P)=1.113×10^{-5} *16*
603.2 *1*	15.0 *25*	776.49	(7^-)	173.33	5^-	[E2]	0.01280	α(K)=0.01012 *15*; α(L)=0.00207 *3*; α(M)=0.000482 *7* α(N)=0.0001145 *16*; α(O)=1.717×10^{-5} *24*; α(P)=8.63×10^{-7} *12*
613.3[a] *1*	3.3 *8*	776.49	(7^-)	163.14	6^+	[E1]	0.00443	α(K)=0.00374 *6*; α(L)=0.000541 *8*; α(M)=0.0001213 *17* α(N)=2.89×10^{-5} *4*; α(O)=4.52×10^{-6} *7*; α(P)=3.00×10^{-7} *5*
627.4 *1*	3.0 *8*	1116.10	(7^-)	488.70	(6^-)	[M1]	0.0290	α(K)=0.0243 *4*; α(L)=0.00367 *6*; α(M)=0.000829 *12* α(N)=0.000198 *3*; α(O)=3.15×10^{-5} *5*; α(P)=2.21×10^{-6} *4*
799.6 *1*	27 *3*	1116.10	(7^-)	316.51	6^-	[M1]	0.01569	α(K)=0.01315 *19*; α(L)=0.00197 *3*; α(M)=0.000444 *7* α(N)=0.0001063 *15*; α(O)=1.690×10^{-5} *24*; α(P)=1.193×10^{-6} *17*
823.2 *1*	7.4 *15*	1116.10	(7^-)	292.91	5^-	[E2]	0.00641	α(K)=0.00522 *8*; α(L)=0.000922 *13*; α(M)=0.000212 *3* α(N)=5.04×10^{-5} *7*; α(O)=7.73×10^{-6} *11*; α(P)=4.49×10^{-7} *7*
942.8 *1*	54 *5*	1116.10	(7^-)	173.33	5^-	[E2]	0.00484	α(K)=0.00397 *6*; α(L)=0.000669 *10*; α(M)=0.0001530 *22* α(N)=3.64×10^{-5} *6*; α(O)=5.63×10^{-6} *8*; α(P)=3.42×10^{-7} *5*
952.9[a] *1*	0.7 *3*	1116.10	(7^-)	163.14	6^+	[E1]	0.00187	α(K)=0.001583 *23*; α(L)=0.000223 *4*; α(M)=4.99×10^{-5} *7* α(N)=1.189×10^{-5} *17*; α(O)=1.88×10^{-6} *3*; α(P)=1.290×10^{-7} *18*

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^{182}Hf β^- decay (61.5 min) 1974Wa14 (continued)

$\gamma(^{182}Ta)$ (continued)

† From Adopted Gammas, unless otherwise stated.
‡ Inferred from intensity balance.
# In equilibrium with ^{182}Ta IT decay (15.84 min).
@ For absolute intensity per 100 decays, multiply by 0.40 *3*.
& 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.
a Placement of transition in the level scheme is uncertain.

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Decay Scheme

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