^{169}Ta $\varepsilon+\beta^+$ decay (4.9 min) 1975Re05

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. Shamsuzzoha Basunia	NDS 209,1 (2026)	1-Oct-2025

Parent: ^{169}Ta: E=0.0; $J^\pi=(5/2^+)$; $T_{1/2}$=4.9 min *5*; Q(ε)=4430 *40*; %ε+%β^+ decay=100

^{169}Ta-J^π,$T_{1/2}$: from ^{169}Ta Adopted Levels.

^{169}Ta-Q($\varepsilon+\beta^+$): from 2021Wa16.

The decay scheme (partial only) and all data are from 1975Re05. Sources from ^{159}Tb(^{16}O,6n), E(^{16}O)=116 MeV; metallic Tb targets (99.9% pure); measured Eγ, Iγ (Ge(Li), FWHM=2.1 keV at 1332 keV; Si(Li), FWHM=200 eV at 5.6 keV).

Others: 1969Ar22, 1975Gr44 – both measured ^{169}Ta half-life.

^{169}Hf Levels

E(level)†	J^π‡	$T_{1/2}$‡
0.0#	5/2$^-$	3.24 min *5*
28.80 *4*	(7/2)$^+$	82 ns *+40−15*
38.18 *4*	(5/2$^+$)	
77.7# *1*	(7/2)$^-$	
177.0# *1*	(9/2)$^-$	

† From Eγ (1975Re05).
‡ From Adopted Levels.
# 5/2[523] band member.

γ(^{169}Hf)

Considerable intensity is unplaced, and origins of x-ray and $\gamma^\pm$ components, partially uncertain. It is not possible to deduce reliable absolute intensities.

Iγ(K x ray), Iγ($\gamma^\pm$) (relative to Iγ(192.4γ)=100):

	Eγ	Iγ	
Hf Kα_1	x ray	55.81 *6*	1350 *140*
Hf Kβ_2'	x ray	65.1 *1*	125 *13*
$\gamma^\pm$		511.0 *1*	1260 *130* (see 511.0γ below)

E$_\gamma$†	I$_\gamma$#	E$_i$(level)	J_i^π	E$_f$	J_f^π	Mult.@	α&	Comments
28.80 *4*	230 *23*	28.80	(7/2)$^+$	0.0	5/2$^-$	E1	2.003 *29*	α(L)=1.553 *23*; α(M)=0.358 *5* α(N)=0.0812 *12*; α(O)=0.01009 *15*; α(P)=0.000317 *5* Mult.: appreciable E1 component deduced from upper limit for total ^{169}Ta decay energy (≤3430 (1975Re05)), relative to Iγ(28.8γ) (limit determined from x-ray and $\gamma^\pm$ intensities) (1975Re05).
38.18 *4*	57 *6*	38.18	(5/2$^+$)	0.0	5/2$^-$	(E1)	0.922 *13*	α(L)=0.715 *10*; α(M)=0.1638 *23* α(N)=0.0374 *5*; α(O)=0.00485 *7*; α(P)=0.0001705 *24* Mult.: see comment with 28.8γ; authors state preference for E1 assignment (M1 also possible), on the basis of similar, but less conclusive, argument.
^{x}68.5‡ *1*	38 *8*							

Continued on next page (footnotes at end of table)

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$\gamma(^{169}Hf)$ (continued)

E_γ[†]	I_γ[#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	α[&]	Comments
77.7 *1*	16 *3*	77.7	$(7/2)^-$	0.0	$5/2^-$			
(99.2)	1.9	177.0	$(9/2)^-$	77.7	$(7/2)^-$	[M1,E2]	3.87 *24*	α(K)=2.2 *12*; α(L)=1.3 *7*; α(M)=0.31 *19* α(N)=0.07 *4*; α(O)=0.010 *5*; α(P)=1.8×10^{-4} *12* E_γ: not observed (masked by 2^+ to 0^+ γ ray in ^{170}Hf). Eγ from Adopted Gammas. I_γ: Iγ from I(177γ) and adopted branching for 177 level.
[x]132.8 *1*	20 *4*							
(148.4 *1*)	7.9	177.0	$(9/2)^-$	28.80	$(7/2)^+$	(E1(+M2))	0.21 *8*	α(K)=0.17 *6*; α(L)=0.033 *16*; α(M)=0.008 *4* α(N)=0.0018 *9*; α(O)=2.7×10^{-4} *14*; α(P)=1.5×10^{-5} *8* E_γ: not observed; Eγ from Adopted Gammas. I_γ: Iγ from I(177γ) and adopted branching for 177 level.
[x]153.5 *1*	80 *8*							
[x]170.4[‡] *1*	18 *4*							
177.0 *1*	24 *5*	177.0	$(9/2)^-$	0.0	$5/2^-$	(E2)	0.435 *6*	α(K)=0.2340 *33*; α(L)=0.1531 *22*; α(M)=0.0377 *5* α(N)=0.00877 *12*; α(O)=0.001142 *16*; α(P)=1.494×10^{-5} *21*
[x]187.8 *2*	12 *2*							
[x]192.4 *1*	100							
[x]230.0 *1*	28 *6*							
[x]394.5 *1*	35 *7*							
[x]404.0 *2*	21 *4*							
[x]440.8 *1*	38 *8*							
[x]511.0[‡] *1*	1.26×10^3 *13*							Duplicate entry is given in x-ray and $\gamma^\pm$ table above. With uncertain isotope assignment, it is not clear how much $\gamma^\pm$ intensity is due to ^{169}Ta decay, and also whether or not ^{169}Ta might have an additional γ ray near this energy.
[x]520.4 *2*	20 *4*							
[x]529.0 *2*	26 *5*							
[x]547.4 *3*	20 *4*							
[x]595.0 *2*	59 *6*							

[†] $\Delta E\gamma$=0.1 based on the authors' note: the accuracy of Eγ of the very low energy lines is believed to be 0.04 keV; for the energy region of x rays and above, the accuracy is about 0.1 keV. Other uncertainties are given by authors in 1975Re05.
[‡] Assignment to ^{169}Ta decay uncertain.
[#] Arbitrary units, relative to Iγ=100 for 192.4γ (1975Re05).
[@] from Adopted Gammas.
[&] Additional information 1.
[x] γ ray not placed in level scheme.

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Decay Scheme

Intensities: Relative I_γ