^{169}Ta ε decay 1975Re05

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	NDS 109, 2033 (2008)	1-Jun-2022

Parent: ^{169}Ta: E=0.0; $J^\pi=(5/2^+)$; $T_{1/2}$=4.9 min *4*; Q(ε)=4430 *40*; %ε+%$β^+$ decay=100.0

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.

^{169}Hf Levels

E(level)[†]	J^π[‡]	$T_{1/2}$
0.0[#]	$5/2^-$	3.24 min *4*
28.80 *4*	$(7/2)^+$	
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_γ	I_γ[†]	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	2.00	α(L)=1.553 *23*; α(M)=0.358 *6*; α(N+..)=0.0916 *14* 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 decays (≤3430), relative to Iγ(28.8γ) (limit determined from x-ray and $\gamma^\pm$ intensities).
38.18 *4*	57 *6*	38.18	$(5/2^+)$	0.0	$5/2^-$	(E1)	0.922	α(L)=0.715 *11*; α(M)=0.1638 *24*; α(N+..)=0.0424 *6* α(N)=0.0374 *6*; α(O)=0.00485 *7*; α(P)=0.0001705 *25* Mult.: see comment with 28.8γ; authors state preference for E1 assignment (M1 also possible), on basis of similar, but less conclusive, argument.
x68.5[‡] *1*	38 *8*							
77.7 *1*	16 *3*	77.7	$(7/2)^-$	0.0	$5/2^-$			

Continued on next page (footnotes at end of table)

^{169}Ta ε decay 1975Re05 (continued)

γ(^{169}Hf) (continued)

E_γ	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α #	Comments
(99.2)	1.9	177.0	$(9/2)^-$	77.7	$(7/2)^-$	[M1,E2]	3.87 *24*	α(K)=2.2 *13*; α(L)=1.3 *8*; α(M)=0.31 *20*; α(N+..)=0.08 *5* α(N)=0.07 *5*; α(O)=0.010 *6*; α(P)=0.00018 *12* Not observed (masked by 2^+ to 0^+ γ ray in ^{170}Hf). Eγ from Adopted Gammas, Iγ from I(177γ) and adopted branching for 177 level.
x132.8 *1*	20 *4*							
(148.4)	7.9	177.0	$(9/2)^-$	28.80	$(7/2)^+$	(E1)	0.1277	α(K)=0.1059 *15*; α(L)=0.01697 *24*; α(M)=0.00383 *6*; α(N+..)=0.001033 *15* α(N)=0.000896 *13*; α(O)=0.0001298 *19*; α(P)=6.80×10^{-6} *10* Not observed; Eγ from Adopted Gammas, Iγ from I(177γ) and adopted branching for 177 level.
x153.5 *1*	80 *8*							
x170.4‡ *1*	18 *4*							
177.0 *1*	24 *5*	177.0	$(9/2)^-$	0.0	$5/2^-$	(E2)	0.435	α(K)=0.234 *4*; α(L)=0.1531 *22*; α(M)=0.0377 *6*; α(N+..)=0.00993 *15* α(N)=0.00877 *13*; α(O)=0.001142 *17*; α(P)=1.494×10^{-5} *21* Mult.: from Adopted Gammas.
x187.8 *2*	12 *2*							
x192.4 *1*	100							
x230.0 *1*	28 *6*							
x394.5 *1*	35 *7*							
x404.0 *2*	21 *4*							
x440.8 *1*	38 *8*							
x511.0‡ *1*	1.26×10^3 *13*							Duplicate entry is given in x-ray and $γ^±$ table above. With uncertain isotope assignment, it is not clear how much $γ^±$ intensity is due to ^{169}Ta decay, and also whether or not ^{169}Ta might have an additional γ ray near this energy.
x520.4 *2*	20 *4*							
x529.0 *2*	26 *5*							
x547.4 *3*	20 *4*							
x595.0 *2*	59 *6*							

† Arbitrary units, relative to Iγ=100 for 192.4γ (1975Re05).
‡ Assignment to ^{169}Ta decay uncertain.
# 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.
x γ ray not placed in level scheme.

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Decay Scheme

Intensities: Relative I_γ