^{176}Yb(α,4nγ) 1975Kh04,1976Kh03

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	M. S. Basunia	NDS 107, 791 (2006)	15-Sep-2005

Others: 1972Fe08, 1968Wi16.
1975Kh04: Eα=41-50 MeV. Measured Eγ, Iγ, γ(t), $\gamma(\theta)$, $\gamma\gamma$(t). Detectors: Ge(Li).
1976Kh03: Eα=48 MeV. Measured Eγ, Iγ, Ice, $\gamma(\theta)$, $\gamma\gamma$(t). Detectors: Ge(Li).

^{176}Hf Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	Comments
0.0[‡]	0^+		
88.32[‡] *5*	2^+		
290.15[‡] *6*	4^+		
596.94[‡] *7*	6^+		
997.92[‡] *8*	8^+		
1333.13[‡] *9*	6^+	9.5 μs *2*	$T_{1/2}$: from Adopted Levels.
1481.26[‡] *10*	$(10)^+$		
1505.88[‡] *10*	(7^+)		E(level): E=1508.8 given by 1975Kh04 is probably a misprint.
1559.37[‡] *10*	8^-	9.9 μs *2*	$T_{1/2}$: from Adopted Levels.
1785.15[‡] *13*	$(9)^-$		
1860.14[‡] *12*	$(8)^-$		
2014.32[‡] *14*	$(9)^-$		
2031.11[‡] *13*	(10^-)		
2034.86[‡] *14*	(12^+)		
2194.08[‡] *20*	(10^-)		
2293.91[‡] *15*	(11^-)		
2399.06[‡] *20*	(11^-)		
2563.60[‡] *23*	(12^-)		
2638.2[‡] *5*	(12^-)		
2646.8[‡] *3*	(14^+)		
2827.1[‡] *6*	(13^-)		
2866.0	(14^-)	401 μs *6*	Populated with about 30% of the (α,4n) cross section. E(level),$T_{1/2}$: from 1975Kh04.
3080.4	(15^+)	0.20 ns *+12−8*	$T_{1/2}$: measured in (α,2nγ) (1982Ko08).
3160.7	(15^-)		
3266.4	(16^+)		
3308.0	(16^+)		
3467.7	(16^-)		
3540.4	(17^+)		
3787.4	(17^-)		
3847.6	(18^+)		
4010.8	(18^+)		
4120.6	(18^-)		
4179.4	(19^+)		
4376.7	(19^+)	34 ns	$T_{1/2}$: from 1976Kh03.
4467.0	(19^-)		
4532.3	(20^+)		
4766.5	(20^-)		
4827.0?	(20^-)		
4863.6	(22^-)	43 μs	$T_{1/2}$: from 1976Kh03.

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^{176}Yb(α,4nγ) 1975Kh04,1976Kh03 (continued)

^{176}Hf Levels (continued)

† Levels above 2866 keV are from 1976Kh03.
‡ From Adopted Levels.

$\gamma(^{176}Hf)$

E_γ	I_γ†	E_i(level)	J_i^π	E_f	J_f^π	Mult.	Comments
38.7†	5.0	2866.0	(14$^-$)	2827.1	(13$^-$)	(M1)	Mult.: from α=12 *2* deduced from transition intensity balance (1975Kh04).
53.49‡ *7*	51	1559.37	8$^-$	1505.88	(7$^+$)	(E1)#	
74.6@b *CA*	0.27	2638.2	(12$^-$)	2563.60	(12$^-$)		
88.32‡ *5*	18.3	88.32	2$^+$	0.0	0$^+$	E2#	
97.1&		4863.6	(22$^-$)	4766.5	(20$^-$)	E2a	
100@ *CA*	0.40	2293.91	(11$^-$)	2194.08	(10$^-$)		
105.0 *2*	0.88	2399.06	(11$^-$)	2293.91	(11$^-$)		
163.0‡ *2*	1.3	2194.08	(10$^-$)	2031.11	(10$^-$)	(M1+E2)#	
164.3@ *CA*	3.2	2563.60	(12$^-$)	2399.06	(11$^-$)		
172.73‡ *4*	47	1505.88	(7$^+$)	1333.13	6$^+$	(M1+E2)#	
180b *1*	0.20	2194.08	(10$^-$)	2014.32	(9)$^-$		
186.0&		3266.4	(16$^+$)	3080.4	(15$^+$)	M1a	
189.0@ *CA*	5.5	2827.1	(13$^-$)	2638.2	(12$^-$)		
201.82‡ *4*	100	290.15	4$^+$	88.32	2$^+$	E2#	
205.6@b *CA*	0.56	2399.06	(11$^-$)	2194.08	(10$^-$)		
214.4&		3080.4	(15$^+$)	2866.0	(14$^-$)	E1a	
225.74‡ *10*	77	1785.15	(9)$^-$	1559.37	8$^-$	(M1)#	
226.25‡ *6*	12.1	1559.37	8$^-$	1333.13	6$^+$	M2#	
227.9†	9.8	2866.0	(14$^-$)	2638.2	(12$^-$)	(E2)	Mult.: E1 or E2 from $\alpha\leq$0.26, deduced from transition intensity balance (1975Kh04). Decay scheme requires E2.
229.15‡ *7*	0.90	2014.32	(9)$^-$	1785.15	(9)$^-$	(M1)#	
238.8@ *CA*	0.60	2638.2	(12$^-$)	2399.06	(11$^-$)		
245.97‡ *4*	64	2031.11	(10$^-$)	1785.15	(9)$^-$	(M1)#	
262.78‡ *6*	45	2293.91	(11$^-$)	2031.11	(10$^-$)	(M1)#	
263.4@ *CA*	2.2	2827.1	(13$^-$)	2563.60	(12$^-$)		
269.64‡ *18*	20	2563.60	(12$^-$)	2293.91	(11$^-$)		
274.0&		3540.4	(17$^+$)	3266.4	(16$^+$)	M1+E2a	
294.7&		3160.7	(15$^-$)	2866.0	(14$^-$)	(M1+E2)a	
300.78‡ *6*		1860.14	(8)$^-$	1559.37	8$^-$		
302.2†	44	2866.0	(14$^-$)	2563.60	(12$^-$)	(E2)	Mult.: E1 or E2 from $\alpha\leq$0.16, deduced from transition intensity balance (1975Kh04). Decay scheme requires E2.
306.78‡ *4*	73	596.94	6$^+$	290.15	4$^+$	E2#	
307.0&		3467.7	(16$^-$)	3160.7	(15$^-$)		
307.2&		3847.6	(18$^+$)	3540.4	(17$^+$)	(M1+E2)a	
319.7&		3787.4	(17$^-$)	3467.7	(16$^-$)	(M1+E2)a	
331.8&		4179.4	(19$^+$)	3847.6	(18$^+$)	(M1+E2)a	
333.2&		4120.6	(18$^-$)	3787.4	(17$^-$)	(M1+E2)a	
344.3‡ *5*	11.4	2638.2	(12$^-$)	2293.91	(11$^-$)		

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^{176}Yb(α,4nγ) 1975Kh04,1976Kh03 (continued)

$\gamma(^{176}Hf)$ (continued)

E_γ	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.
346.4[&]		4467.0	(19$^-$)	4120.6	(18$^-$)	
352.9[&]		4532.3	(20$^+$)	4179.4	(19$^+$)	
360.0[&b]		4827.0?	(20$^-$)	4467.0	(19$^-$)	
368.1[‡] *2*	9.6	2399.06	(11$^-$)	2031.11	(10$^-$)	
369.9[@] *CA*	1.7	2563.60	(12$^-$)	2194.08	(10$^-$)	
385.1[@] *CA*	0.85	2399.06	(11$^-$)	2014.32	(9)$^-$	
389.8[&]		4766.5	(20$^-$)	4376.7	(19$^+$)	E1[a]
400.99[‡] *4*		997.92	8$^+$	596.94	6$^+$	E2[#]
408.7[‡] *3*	2.7	2194.08	(10$^-$)	1785.15	(9)$^-$	
427.7[@] *CA*	10.0	2827.1	(13$^-$)	2399.06	(11$^-$)	
444.4[@] *CA*	1.7	2638.2	(12$^-$)	2194.08	(10$^-$)	
455.1[‡] *2*	0.57	2014.32	(9)$^-$	1559.37	8$^-$	
471.6[‡] *2*	9.7	2031.11	(10$^-$)	1559.37	8$^-$	
483.33[‡] *5*		1481.26	(10)$^+$	997.92	8$^+$	E2[#]
508.9[‡] *5*	16	2293.91	(11$^-$)	1785.15	(9)$^-$	
529.1[&]		4376.7	(19$^+$)	3847.6	(18$^+$)	(M1)[a]
533.1[‡] *7*	20	2563.60	(12$^-$)	2031.11	(10$^-$)	
533.1[‡] *7*	30	2827.1	(13$^-$)	2293.91	(11$^-$)	
553.6[‡] *1*		2034.86	(12$^+$)	1481.26	(10)$^+$	
581.2[&]		3847.6	(18$^+$)	3266.4	(16$^+$)	
601.6[&]		3467.7	(16$^-$)	2866.0	(14$^-$)	
607.1[@] *CA*	2.1	2638.2	(12$^-$)	2031.11	(10$^-$)	
611.9[‡] *3*		2646.8	(14$^+$)	2034.86	(12$^+$)	
614.4[@b] *CA*	0.59	2399.06	(11$^-$)	1785.15	(9)$^-$	
626.6[&]		3787.4	(17$^-$)	3160.7	(15$^-$)	
639.2[&]		4179.4	(19$^+$)	3540.4	(17$^+$)	
653.0[&b]		4120.6	(18$^-$)	3467.7	(16$^-$)	
661.1[&]		3308.0	(16$^+$)	2646.8	(14$^+$)	E2[a]
679.7[&b]		4467.0	(19$^-$)	3787.4	(17$^-$)	
702.8[&]		4010.8	(18$^+$)	3308.0	(16$^+$)	E2[a]
736.20[‡] *7*	78	1333.13	6$^+$	596.94	6$^+$	E2[#]
836.5[&]		4376.7	(19$^+$)	3540.4	(17$^+$)	
1043.0[‡] *1*	45	1333.13	6$^+$	290.15	4$^+$	E2[#]

[†] From 1975Kh04.
[‡] From adopted gammas.
[#] From adopted gammas.
[@] Deduced by evaluator from level energy differences of 1975Kh04.
[&] From 1976Kh03.
[a] From α(K)exp and α(L)exp measured directly, from α deduced from transition intensity balances, and from $\gamma(\theta)$ (1976Kh03).
[b] Placement of transition in the level scheme is uncertain.

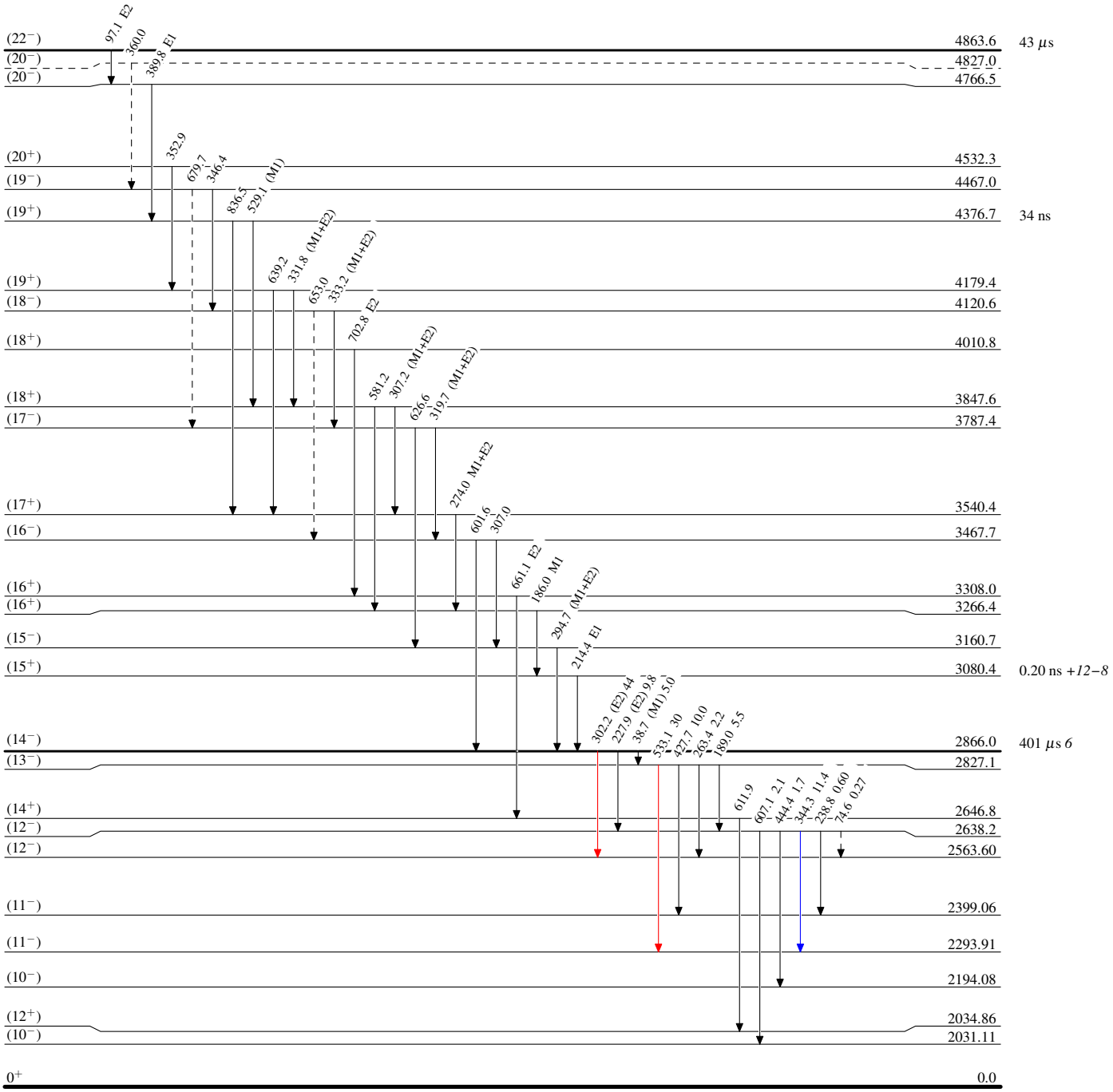
^{176}Yb(α,4nγ) 1975Kh04,1976Kh03

Level Scheme

Intensities: Relative I_γ

Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)



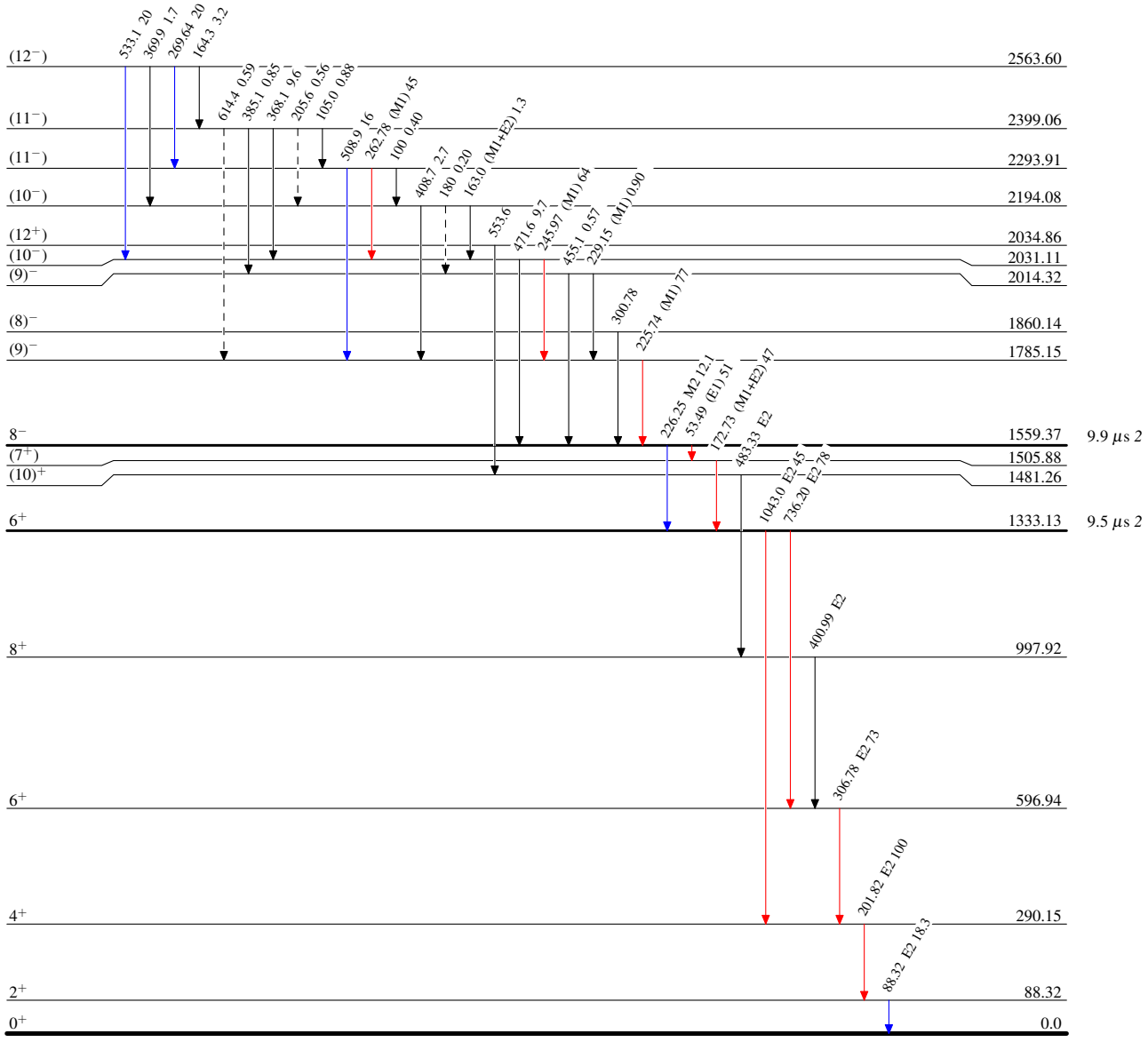
$^{176}_{72}Hf_{104}$

^{176}Yb(α,4nγ) 1975Kh04,1976Kh03

Level Scheme (continued)

Intensities: Relative I_γ

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)



$^{176}_{72}Hf_{104}$