

$^{176}\text{Hf}(n,n'\gamma)$ 1979Bo42

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

Target: 65% enriched ^{176}Hf . Projectile: fast neutrons. Measured E_γ , I_γ at $\theta=90^\circ$. Detector:Ge(Li).

 ^{176}Hf Levels

E(level) [†]	J^π [‡]	Comments
0.0	0 ⁺	
88.32 5	2 ⁺	E(level): from Adopted Levels.
290.0 4	4 ⁺	
596.9 5	6 ⁺	
998 1	8 ⁺	
1149.9 5	0 ⁺	
1226.3 6	2 ⁺	
1247.6 5	2 ⁻	
1292 1	0 ⁺	
1313.3 7	3 ⁻	
1333.1 8	6 ⁺	
1340.6 7	2 ⁺	
1379.2 4	2 ⁺	
1389.9 6	4 ⁺	
1405 1	(4) ⁻	
1445.4 7	3 ⁺	
1508.1 8	(5) ⁻	
1540 1	(4 ⁺)	
1576 1	(3 ⁺)	
1591 1	(4 ⁺)	
1643.2 7	1 ⁻	
1672.2 7	(1) ⁺	
1675 1	(4 ⁺)	
1704.2 7	(2 ⁺)	
1709.7 7	(3 ⁻)	
1722.2 7	1 ⁻	

[†] Deduced by evaluator from a least-squares fit to γ -ray energies.

[‡] From Adopted Levels.

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

E_γ [†]	I_γ	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Comments
88.32 5		88.32	2 ⁺	0.0	0 ⁺	E _γ : from adopted gammas.
201.8 5	390 50	290.0	4 ⁺	88.32	2 ⁺	
^x 226 1	<6					
306.8 5	80 10	596.9	6 ⁺	290.0	4 ⁺	
401 1	6 3	998	8 ⁺	596.9	6 ⁺	
736 @	<20 [‡]	1333.1	6 ⁺	596.9	6 ⁺	
793 1	<5	1389.9	4 ⁺	596.9	6 ⁺	
911 1	≤6	1508.1	(5) ⁻	596.9	6 ⁺	
936.5 10	26 5	1226.3	2 ⁺	290.0	4 ⁺	
^x 980.9 10	12 4					
1023.3 10	30 5	1313.3	3 ⁻	290.0	4 ⁺	
^x 1043.2 10	37 6					

I_γ : a small fraction of I_γ belongs to the transition between the 1333 and 290 levels.

Continued on next page (footnotes at end of table)

$^{176}\text{Hf}(\text{n,n}'\gamma)$ 1979Bo42 (continued) $\gamma(^{176}\text{Hf})$ (continued)

E_γ^\dagger	I_γ	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Comments		
1061.6	5	44	6	1149.9	0 ⁺	88.32	2 ⁺	
1089	1	12	6	1379.2	2 ⁺	290.0	4 ⁺	
1100	1	<30		1389.9	4 ⁺	290.0	4 ⁺	
1115.3	10	24	4	1405	(4) ⁻	290.0	4 ⁺	
1139	1	35	4	1226.3	2 ⁺	88.32	2 ⁺	
1155	1	<20		1445.4	3 ⁺	290.0	4 ⁺	
^x 1157	1	20	10					
1159.3	5	100		1247.6	2 ⁻	88.32	2 ⁺	
^x 1162	1	20	10					
^x 1174	1	15	5					
1204	1	30	15	1292	0 ⁺	88.32	2 ⁺	
1218.3	10	27	7	1508.1	(5) ⁻	290.0	4 ⁺	
^x 1223	1	<10						
1225 [#]	1	105 [#]	15	1226.3	2 ⁺	0.0	0 ⁺	
1225 [#]	1	105 [#]	15	1313.3	3 ⁻	88.32	2 ⁺	
^x 1230	1	20	10					
1250	1	25	7	1540	(4) ⁺	290.0	4 ⁺	
1252	1	25	7	1340.6	2 ⁺	88.32	2 ⁺	
^x 1260	1	10	5					
1291.0	5	51	15	1379.2	2 ⁺	88.32	2 ⁺	
^x 1295.1	10	27	10					
1301.3 [#]	10	10 [#]	5	1389.9	4 ⁺	88.32	2 ⁺	
1301.3 [#]	10	10 [#]	5	1591	(4) ⁺	290.0	4 ⁺	Authors presented $E_\gamma=1330$ (possibly a misprint) and $I_\gamma=10$ 5. Evaluator assumed 1301.3 γ is a doublet.
1340.8	10	35	7	1340.6	2 ⁺	0.0	0 ⁺	
1357.5	10	30	7	1445.4	3 ⁺	88.32	2 ⁺	
1379	1	<7		1379.2	2 ⁺	0.0	0 ⁺	
1385	1	10	4	1675	(4) ⁺	290.0	4 ⁺	
1420	1	≤ 7		1709.7	(3) ⁻	290.0	4 ⁺	
^x 1437	1	≤ 7						
1488	1	24	4	1576	(3) ⁺	88.32	2 ⁺	
^x 1507	1	23	4					
1555	1	11	4	1643.2	1 ⁻	88.32	2 ⁺	
1584	1	17	4	1672.2	(1) ⁺	88.32	2 ⁺	
1616	1	17	4	1704.2	(2) ⁺	88.32	2 ⁺	
1621	1	≤ 8		1709.7	(3) ⁻	88.32	2 ⁺	
1634	1	8	4	1722.2	1 ⁻	88.32	2 ⁺	
1643	1	8	4	1643.2	1 ⁻	0.0	0 ⁺	
1672 [@]	1	<6 [‡]		1672.2	(1) ⁺	0.0	0 ⁺	
1704	1	10	3	1704.2	(2) ⁺	0.0	0 ⁺	
1722	1	≤ 8		1722.2	1 ⁻	0.0	0 ⁺	
^x 1766	1	15	4					
^x 1778	1	15	4					
^x 1863	1	≤ 7						

[†] $\Delta E=0.5$ keV for intense γ rays, and up to 1.0 keV for weak γ rays. Specific values shown here were assigned by evaluator.

[‡] γ ray not observed.

[#] Multiply placed with undivided intensity.

[@] Placement of transition in the level scheme is uncertain.

^x γ ray not placed in level scheme.

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Level Scheme

Intensities: Relative I_γ
& Multiply placed: undivided intensity given

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)

