

<sup>144</sup>Sm( $\alpha,\gamma$ ) 1977Ha04

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	N. Nica and B. Singh		NDS 181, 1 (2022)	9-Mar-2022

E=20-43 MeV.

Other: 1972Ko24.

1977Ha04: <sup>144</sup>Sm( $\alpha,\gamma$ ): E $\gamma$ , I $\gamma$ ,  $\gamma(\theta)$ ,  $\gamma\gamma$ ,  $\gamma\gamma(t)$ , and  $\alpha\gamma(t)$  were measured and are basis for level scheme. Comparison of the <sup>147</sup>Gd, <sup>145</sup>Sm, and <sup>143</sup>Nd (N=83) isotones is made.

<sup>147</sup>Gd Levels

E(level)	J $^{\pi}$ <sup>†</sup>	T <sub>1/2</sub>	Comments
0.0	7/2 <sup>-</sup>		
997.4	13/2 <sup>+</sup>	24 ns 5	T <sub>1/2</sub> : from 1977Ha04 ( $\gamma\gamma(t)$ ).
1152.8	3/2 <sup>-</sup>		
1235.6	9/2,11/2		
1292.7	3/2,5/2		J $^{\pi}$ : (5/2) in Table 6; adopted value is 1/2 <sup>+</sup> .
1347.1	11/2,13/2		
1396.9	9/2 <sup>-</sup>		
1412.7	(7/2)		J $^{\pi}$ : from Table 6 only; adopted value is 3/2 <sup>+</sup> .
1509.1			
1594.1	11/2,13/2		
1700.0	5/2,7/2		J $^{\pi}$ : adopted value is 3/2 <sup>+</sup> .
1775.6	11/2,13/2		
2029.2	15/2 <sup>(+)</sup>		
2385.2	13/2,15/2		J $^{\pi}$ : adopted value is (13/2 <sup>-</sup> ).
2488.4	17/2 <sup>+</sup>		
2760.2	21/2 <sup>+</sup>		
3035.7?	25/2 <sup>+</sup>		E(level): level depopulated by the stretched Q, 275.5 $\gamma$ (uniquely observed in this dataset), close lying to the 23/2 <sup>+</sup> , 3038 adopted level depopulated by the M1+E2, 277.9 $\gamma$ (multiply observed in different datasets), reason for which this level is marked as questionable.
3395.7	23/2,25/2		J $^{\pi}$ : adopted value is 25/2 <sup>+</sup> .

<sup>†</sup> Proposed by 1977Ha04 in Fig. 8 (Level Scheme); some values from Table 6 (Summary of the  $\gamma$ -ray data) are separately noted in comments.

$\gamma(^{147}\text{Gd})$

E $\gamma$ <sup>†</sup>	I $\gamma$ <sup>‡</sup>	E <sub>i</sub> (level)	J $^{\pi}$ <sub>i</sub>	E <sub>f</sub>	J $^{\pi}$ <sub>f</sub>	Mult.#	Comments
85.0 <sup>@</sup>	5.9 10	1594.1	11/2,13/2	1509.1		(D+Q)	A <sub>2</sub> =0.20 8, A <sub>4</sub> =0.18 7 (1977Ha04).
111.5 <sup>@</sup>	13 1	1347.1	11/2,13/2	1235.6	9/2,11/2	(D+Q)	A <sub>2</sub> =0.31 17, A <sub>4</sub> =0.10 6 (1977Ha04).
120.0	1.1 3	1412.7	(7/2)	1292.7	3/2,5/2	(D+Q)	A <sub>2</sub> =0.19 14, A <sub>4</sub> =0.10 10 (1977Ha04).
139.9	2.0 5	1292.7	3/2,5/2	1152.8	3/2 <sup>-</sup>		A <sub>2</sub> =-0.04 1, A <sub>4</sub> =0.05 2 (1983Ko42).
							A <sub>2</sub> =-0.10 6, A <sub>4</sub> =0.10 8 (1977Ha04).
							A <sub>2</sub> =-0.02 4, A <sub>4</sub> =0.04 5 (1983Ko42).
181.5	3.1 5	1775.6	11/2,13/2	1594.1	11/2,13/2		
247.0 <sup>@</sup>	2.2 4	1594.1	11/2,13/2	1347.1	11/2,13/2		
253.6 <sup>a</sup>	2.5 5	2029.2	15/2 <sup>(+)</sup>	1775.6	11/2,13/2		
271.8	22 3	2760.2	21/2 <sup>+</sup>	2488.4	17/2 <sup>+</sup>	Q	A <sub>2</sub> =0.27 3, A <sub>4</sub> =-0.30 10 (1977Ha04).
273.5	13 3	1509.1		1235.6	9/2,11/2		
275.5 <sup>a</sup>	18 3	3035.7?	25/2 <sup>+</sup>	2760.2	21/2 <sup>+</sup>	Q	See comment about the placement of this $\gamma$ at parent level.
							A <sub>2</sub> =0.33 18, A <sub>4</sub> =-0.20 14 (1977Ha04).
349.7 <sup>@</sup>	3.2 5	1347.1	11/2,13/2	997.4	13/2 <sup>+</sup>		

Continued on next page (footnotes at end of table)

$^{144}\text{Sm}(\alpha, n\gamma)$  **1977Ha04** (continued) $\gamma(^{147}\text{Gd})$  (continued)

$E_\gamma$ <sup>†</sup>	$I_\gamma$ <sup>‡</sup>	$E_i(\text{level})$	$J_i^\pi$	$E_f$	$J_f^\pi$	Mult. <sup>#</sup>	Comments
360.0	5.4 5	3395.7	23/2,25/2	3035.7?	25/2 <sup>+</sup>		$A_2=0.12$ 4.
407.3	0.5 1	1700.0	5/2,7/2	1292.7	3/2,5/2		$A_2=0.01$ 4, $A_4=0.05$ 6 ( <b>1983Ko42</b> ).
428.5	3.6 5	1775.6	11/2,13/2	1347.1	11/2,13/2		
459.2	<1	2488.4	17/2 <sup>+</sup>	2029.2	15/2 <sup>(+)</sup>		
547.2	2.0 3	1700.0	5/2,7/2	1152.8	3/2 <sup>-</sup>		$A_2=0.06$ 2, $A_4=-0.11$ 4 ( <b>1983Ko42</b> ).
597.0 <sup>@</sup>	<1	1594.1	11/2,13/2	997.4	13/2 <sup>+</sup>		
609.6	5.9 6	2385.2	13/2,15/2	1775.6	11/2,13/2		
635.5	2.7 4	3395.7	23/2,25/2	2760.2	21/2 <sup>+</sup>		
894.3	4.5 6	2488.4	17/2 <sup>+</sup>	1594.1	11/2,13/2	(Q)	$A_2=0.24$ 8 ( <b>1977Ha04</b> ).
997.4	100 4	997.4	13/2 <sup>+</sup>	0.0	7/2 <sup>-</sup>	E3 <sup>&amp;</sup>	$A_2=0.27$ 3, $A_4=-0.30$ 10 ( <b>1977Ha04</b> ).
							$A_2=0.40$ 1, $A_4=0.08$ 1 ( <b>1983Ko42</b> ).
1031.8	6.2 6	2029.2	15/2 <sup>(+)</sup>	997.4	13/2 <sup>+</sup>	D+Q	$A_2=-0.49$ 20, $A_4=0.37$ 25 ( <b>1977Ha04</b> ).
1152.8	2.5 4	1152.8	3/2 <sup>-</sup>	0.0	7/2 <sup>-</sup>		$A_2=0.14$ 3 ( <b>1977Ha04</b> ).
							$A_2=0.00$ 1, $A_4=0.01$ 1 ( <b>1983Ko42</b> ).
1235.6 <sup>@</sup>	26 1	1235.6	9/2,11/2	0.0	7/2 <sup>-</sup>		$A_2=0.40$ 4 ( <b>1977Ha04</b> ).
1388.2 <sup>a</sup>	3.5 4	2385.2	13/2,15/2	997.4	13/2 <sup>+</sup>		$A_2=0.38$ 10, $A_4=0.20$ 10 ( <b>1977Ha04</b> ).
1396.9	10.2 10	1396.9	9/2 <sup>-</sup>	0.0	7/2 <sup>-</sup>		$A_2=0.48$ 1, $A_4=0.16$ 2 ( <b>1983Ko42</b> ).
1491.0	42 3	2488.4	17/2 <sup>+</sup>	997.4	13/2 <sup>+</sup>	Q	$A_2=0.30$ 5, $A_4=-0.23$ 4 ( <b>1977Ha04</b> ).
							$A_2=0.45$ 7, $A_4=-0.10$ 10 ( <b>1983Ko42</b> ).
1594.1 <sup>@</sup>	2.0 5	1594.1	11/2,13/2	0.0	7/2 <sup>-</sup>		
1775.6 <sup>a</sup>	1.3 5	1775.6	11/2,13/2	0.0	7/2 <sup>-</sup>		

<sup>†</sup>  $\Delta E$  for the stronger lines is  $\approx 0.2$  keV.

<sup>‡</sup> From E=22-MeV spectrum.

<sup>#</sup> Based on angular distributions, unless otherwise stated.

<sup>@</sup> Not observed in **1983Ko42** ( $^{147}\text{Sm}(\alpha, n\gamma)$ ).

<sup>&</sup> From comparison to RUL and  $\gamma(\theta)$  (**1977Ha04**),  $T_{1/2}$  in  $(\alpha, n\gamma)$  (**1975KI01**). **1977Ha04** caution that E3 is not uniquely established and M2 cannot be excluded. E3 is favored by shell-model arguments.




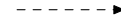

<sup>a</sup> Placement of transition in the level scheme is uncertain.

$^{144}\text{Sm}(\alpha, n\gamma)$  1977Ha04

Level Scheme

Intensities: Relative  $I_\gamma$

Legend

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

