

¹⁵⁶Dy(d,t), ¹⁵⁶Dy(³He,α) 1976St06

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 160, 1 (2019)	21-Oct-2019

Additional information 1.

E(d)=15 MeV, FWHM=6 keV; E(³He)=24 MeV, FWHM=18 keV. The target was $\approx 30 \mu\text{g}/\text{cm}^2$ of ¹⁵⁶Dy, deposited on an $\approx 40 \mu\text{g}/\text{cm}^2$ carbon foil. The reaction products were analyzed using an Enge split-pole magnetic spectrograph and detected in photographic emulsions. Spectra were recorded at 15 angles for (d,t) and at 5 angles for (³He,α). DWBA analysis.

Other: 1970Gr46 (d,t). E(d)=12.1 MeV. Measured $d\sigma/d\Omega$ at $\theta=60^\circ, 90^\circ$ and 125° .

¹⁵⁵Dy Levels

E(level) [‡]	J ^π #	L [†]	S ^{@&a}	Comments
0.0 ^c	3/2 ⁻	1	135	
39 ^c	5/2 ⁻		1.2	S: value at $\theta=30^\circ$.
87 ^c	7/2 ⁻	3	193	
134 ^{bm}	5/2 ⁻ & 9/2 ⁺	3,4	74	
154 ^m	13/2 ⁺	6	22	
202 ^f	3/2 ⁻	1	12	
225 ^{bd}	7/2 ⁻ & 9/2 ⁻	5,6	19	L: the expected L=3 component does not contribute much to the peak (1976St06).
234 ^e	11/2 ⁻	5,6	47	
240 ^k	3/2 ⁺	2	314	
248	5/2 ⁺	2,3	36	Coriolis-mixing calculations of 1976St06 indicate that this may be the 5/2 ⁺ member of the "1/2[660]" band.
321 ^{bl}	1/2 ⁺ & 5/2 ⁻ , (3/2) ⁻	0	542	S: this large value indicates that the bandhead of 1/2[400] is present in this peak. L: the strong contribution from L=0 obscures that from the other component.
345 ^{bk}	5/2 ⁺ & 1/2 ⁻ , 3/2 ⁻	1	57	L: the expected contribution from the L=2 component is not large enough to affect the angular distribution (1976St06).
382 ^{bm}	17/2 ⁺ & 3/2 ⁻ , (1/2) ⁻	1	167	Note that the 17/2 ⁺ level cannot be directly populated in single-nucleon transfer. 1976St06 suggest that it is populated by competing two-step processes.
424	5/2 ⁻ , 7/2 ⁻	3	27	
439	5/2 ⁺ , 7/2 ⁺		10	
449 ^h	1/2 ⁻ , 3/2 ⁻	1	39	
459	5/2 ⁻	3,4	8	
482 ^l	5/2 ⁺	2	60	
515	(1/2 ⁺)	(0)	17	
547			3	S: value at $\theta=40^\circ$.
555 ^g	5/2 ⁻ , 7/2 ⁻	2,3	17	
594			5	
656	(3/2 ⁺ , 5/2 ⁺)	(2)	26	
703 ^h		2,3	19	J ^π : from Coriolis-mixing calculations, 1976St06 assign this as the 5/2 ⁻ member of 1/2[530].
774 ^f	(9/2 ⁻ , 11/2 ⁻)	(5)	2	
803			5	
874	(1/2 ⁺)	(0)	11	
895 ⁱ	(1/2 ⁻ , 3/2 ⁻)	(1)	15	
925			2	S: value at $\theta=30^\circ$.
1037 ^j	5/2 ⁻ , 7/2 ⁻	3	39	
1061			5	S: value at $\theta=30^\circ$.
1084 ⁱ	5/2 ⁻ , 7/2 ⁻	3	29	
1119			6	
1145	3/2 ⁺ , 5/2, 7/2 ⁻	2,3	8	
1207			6	
1217	3/2 ⁺ , 5/2 ⁺		<3	

Continued on next page (footnotes at end of table)

$^{156}\text{Dy}(\text{d,t}), ^{156}\text{Dy}(\text{}^3\text{He},\alpha)$ **1976St06 (continued)** ^{155}Dy Levels (continued)

$E(\text{level})^{\ddagger}$	$J^{\pi\#}$	L^{\dagger}	$S^{\@ \& a}$	Comments
1295			6	
1325			5	
1424 ^j	(9/2 ⁻ , 11/2 ⁻)	(5)	3	
1441	5/2 ⁻ , 7/2 ⁻	3	27	
1547	(9/2 ⁻ , 11/2 ⁻)	(5)	3	
1573			6	S: value at $\theta=40^\circ$.
1625 ⁵				E(level): from ($^3\text{He},\alpha$).
1688	(11/2 ⁻)	(5)	8	The strong population of this level in ($^3\text{He},\alpha$), together with the observation of transitions with similar characteristics in several odd-A Gd isotopes, suggests that this is the 11/2 ⁻ member of 9/2 ⁻ [514]. S: value at $\theta=40^\circ$.
1731 ⁵				E(level): from ($^3\text{He},\alpha$).

[†] Listed values are those of **1976St06** and were deduced from (d,t) angular distributions and ratios of ($^3\text{He},\alpha$) and (d,t) cross sections.

[‡] From (d,t), unless otherwise indicated. The authors' estimated uncertainty in these values is 2 keV.

[#] Adopted values. Listed band assignments are those of **1976St06**. Not all of these are included in the Adopted Levels.

[@] Label= $d\sigma/d\Omega(\text{d,t})(\mu\text{b/sr})$.

[&] Values for $\theta=50^\circ$, unless noted otherwise.

^a The relative cross sections at different angles should be good to $\approx 15\%$ for well-populated levels. The absolute values may be in error by $\approx 20\%$, due mainly to the normalization procedure.

^b Doublet in the (d,t) spectrum.

^c Band(A): g.s. band. configuration=3/2(521).

^d Band(B): 5/2(523) band member.

^e Band(C): 11/2(505) bandhead.

^f Band(D): 3/2(532) band member.

^g Band(E): 1/2(521) band member.

^h Band(F): 1/2(530) band member.

ⁱ Band(G): 1/2(541) band member.

^j Band(H): 5/2(512) band member.

^k Band(I): 3/2[402] band member.

^l Band(J): 1/2[400] band member.

^m Band(K): Strongly Coriolis-mixed band containing $i_{13/2}$ -related Nilsson orbitals.

$^{156}\text{Dy}(\text{d,t}), ^{156}\text{Dy}(\text{}^3\text{He},\alpha)$ 1976St06

Band(D): 3/2(532) band member

 $(9/2^-, 11/2^-)$ 774

Band(E): 1/2(521) band member

 $5/2^-, 7/2^-$ 555 $5/2^+ \& 1/2^-, 3/2^-$ 345 $1/2^+ \& 5/2^-, (3/2)^-$ 321

Band(A): g.s. band

 $7/2^- \& 9/2^-$ 225

Band(B): 5/2(523) band member

 $7/2^- \& 9/2^-$ 225

Band(C): 11/2(505) bandhead

 $11/2^-$ 234 $3/2^-$ 202 $5/2^- \& 9/2^+$ 134 $7/2^-$ 87 $5/2^-$ 39 $3/2^-$ 0.0

$^{156}\text{Dy}(\text{d,t}), ^{156}\text{Dy}(\text{}^3\text{He},\alpha)$ 1976St06 (continued)

Band(H): 5/2(512) band member

(9/2⁻, 11/2⁻) 1424

Band(G): 1/2(541) band member

5/2⁻, 7/2⁻ 10845/2⁻, 7/2⁻ 1037(1/2⁻, 3/2⁻) 895

Band(F): 1/2(530) band member

7031/2⁻, 3/2⁻ 44917/2⁺ & 3/2⁻, (1/2)⁻ 382

Band(I): 3/2[402] band member

5/2⁺ & 1/2⁻, 3/2⁻ 3453/2⁺ 240

 $^{156}\text{Dy}(\text{d,t}), ^{156}\text{Dy}(\text{}^3\text{He},\alpha)$ 1976St06 (continued)

Band(J): 1/2[400] band member

5/2⁺ 482Band(K): Strongly Coriolis-mixed
band containing $i_{13/2}$ -related
Nilsson orbitals17/2⁺ & 3/2⁻, (1/2)⁻ 3821/2⁺ & 5/2⁻, (3/2)⁻ 32113/2⁺ 1545/2⁻ & 9/2⁺ 134 $^{155}_{66}\text{Dy}_{89}$