^{164}Er(α,t) 1974Ch44

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 194,460 (2024)	31-Oct-2022

1974Ch44 (also 1975Bu02): E(α)=27 MeV. Measured E(t), $\sigma(\theta)$ at 30° and 60° using 67.19% enriched targets, with thicknesses of 25 to 45 μg/cm^2 evaporated on 50 μg/cm^2 carbon backings. Tritons analyzed by Enge split-pole magnetic spectrograph and tracks recorded on photographic emulsion plates at McMaster University FN Tandem van de Graaff generator. FWHM=16-18 keV. Uncertainty in measured cross sections was ≈25%. DWBA analysis. The reaction Q value was measured by 1975Bu02.

^{165}Tm Levels

[dσ/dΩ(^{3}He,d)(50°)]/[dσ/dΩ(α,t)(60°)] ratios are listed under comments.

E(level)	J$^\pi$[&]	L[‡]	NSF[†]	Comments
0[a]	1/2$^+$	[0]	0.63	NSF: for doublet 0+12 levels with L=0+2. dσ/dΩ (for g.s.+12 level)=52.1 μb/sr (60°). [dσ/dΩ(^{3}He,d) at 50°]/[dσ/dΩ(α,t) at 60°]=3.9 for 0+12 levels.
12[a] 2	3/2$^+$	[2]		See comments for g.s. for cross sections.
81[c] 2	7/2$^+$	[4]	0.83	dσ/dΩ=10.0 μb/sr (30°), 12.5 μb/sr (60°). [dσ/dΩ(^{3}He,d) at 50°]/[dσ/dΩ(α,t) at 60°]=1.1.
130[a] 2	5/2$^+$	[2]	0.42	dσ/dΩ=3.0 μb/sr (30°), 9.1 μb/sr (60°). [dσ/dΩ(^{3}He,d) at 50°]/[dσ/dΩ(α,t) at 60°]=5.3.
160[#e] 2	7/2$^+$&1/2$^-$&7/2$^-$	[4+1+3]	0.35,0.21	NSF: 0.35 and 0.21 if the total measured cross section of the triplet is assigned to the 7/2$^+$ member of 1/2[411] band and the 1/2$^-$ member of the 1/2[541] band, respectively. dσ/dΩ=3.2 μb/sr (30°), 5.2 μb/sr (60°). [dσ/dΩ(^{3}He,d) at 50°]/[dσ/dΩ(α,t) at 60°]=5.2.
182[d] 2	5/2$^-$	[3]	0.33	dσ/dΩ=6.6 μb/sr (30°), 9.4 μb/sr (60°). [dσ/dΩ(^{3}He,d) at 50°]/[dσ/dΩ(α,t) at 60°]=4.6.
277[d] 2	3/2$^-$	[1]	0.16	dσ/dΩ=3.0 μb/sr (30°), 3.7 μb/sr (60°). [dσ/dΩ(^{3}He,d) at 50°]/[dσ/dΩ(α,t) at 60°]=12.8.
293[d] 2	9/2$^-$	[5]	0.73	dσ/dΩ=10.5 μb/sr (30°), 11.1 μb/sr (60°). [dσ/dΩ(^{3}He,d) at 50°]/[dσ/dΩ(α,t) at 60°]=1.2.
316[b] 2	5/2$^+$	[2]	1.25	dσ/dΩ=10.1 μb/sr (30°), 23.0 μb/sr (60°). [dσ/dΩ(^{3}He,d) at 50°]/[dσ/dΩ(α,t) at 60°]=6.7.
369[#e] 2	9/2$^+$&11/2$^-$	[4+5]	0.02,1.02	dσ/dΩ=15.9 μb/sr (30°), 20.3 μb/sr (60°). [dσ/dΩ(^{3}He,d) at 50°]/[dσ/dΩ(α,t) at 60°]=1.5.
451[d] 2	7/2$^-$	[3]	0.29	dσ/dΩ=3.0 μb/sr (30°), 7.7 μb/sr (60°). [dσ/dΩ(^{3}He,d) at 50°]/[dσ/dΩ(α,t) at 60°]=2.6.
≈491		(2)[@]		dσ/dΩ≈2 μb/sr (30°), ≈3 μb/sr (60°). [dσ/dΩ(^{3}He,d) at 50°]/[dσ/dΩ(α,t) at 60°]≈7.
688 2		(2)[@]		dσ/dΩ=2.0 μb/sr (30°), 2.1 μb/sr (60°). [dσ/dΩ(^{3}He,d) at 50°]/[dσ/dΩ(α,t) at 60°]=11.9.
≈917	(1/2$^+$)	(0)[@]		dσ/dΩ≈1 μb/sr (30°), ≈1 μb/sr (60°). [dσ/dΩ(^{3}He,d) at 50°]/[dσ/dΩ(α,t) at 60°]≈66.
969[f] 2	11/2$^-$	[5]	0.88	dσ/dΩ=5.6 μb/sr (30°), 10.7 μb/sr (60°). [dσ/dΩ(^{3}He,d) at 50°]/[dσ/dΩ(α,t) at 60°]=3.0.
≈1338	(1/2$^+$)	(0)[@]		dσ/dΩ<1 μb/sr (30° and 60°). [dσ/dΩ(^{3}He,d) at 50°]/[dσ/dΩ(α,t) at 60°]>72.5.

[†] NSF=Nuclear Structure Factor=[dσ/dΩ(exp)]/[2N((dσ/dΩ)(DWBA))], N=23. Theoretically NSF=$[\Sigma_i C^i_{jl} a_i V_i]^2$,where

Continued on next page (footnotes at end of table)

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^{165}Tm Levels (continued)

C^i_{jl}=coefficients to describe Nilsson orbitals in terms of spherical states, a_i=Coriolis mixing amplitudes of states with same spin, V_i=fullness factors for the target. The Nuclear Structure Factors are listed under comments; for calculated values, see tables 6 and 7 (listing all experimental data and relevant calculations) of 1974Ch44.

‡ Assumed values consistent with J^π assignments from "fingerprint method". The (^{3}He,d)/(α,t) cross section ratios are generally consistent with these L-transfer assignments.

Complex line.

@ From [dσ/dΩ(^{3}He,d) at 50°]/[dσ/dΩ(α,t) at 60°].

& The 'fingerprint' method was used to make band assignments. According to this method, the rotational band members based on each single particle state are predicted to exhibit a unique set of cross-sections, characteristic of Nilsson coefficients (C_{jl}) for the state. All the assignments are consistent with those in the Adopted Levels.

a Band(A): π1/2[411] band.

b Band(B): π5/2[402] band.

c Band(C): π7/2[404] band.

d Band(D): π1/2[541] band.

e Band(E): π7/2[523] band.

f Band(F): π9/2[514] band.

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Band(D): π1/2[541] band

7/2$^-$ 451

Band(A): π1/2[411] band

9/2$^+$&11/2$^-$ 369

Band(E): π7/2[523] band

9/2$^+$&11/2$^-$ 369

Band(B): π5/2[402] band

5/2$^+$ 316

9/2$^-$ 293

3/2$^-$ 277

5/2$^-$ 182

7/2$^+$&1/2$^-$&7/2$^-$ 160

7/2$^+$&1/2$^-$&7/2$^-$ 160

7/2$^+$&1/2$^-$&7/2$^-$ 160

5/2$^+$ 130

Band(C): π7/2[404] band

7/2$^+$ 81

3/2$^+$ 12

1/2$^+$ 0

$^{165}_{69}Tm_{96}$

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Band(F): π9/2[514] band

11/2$^-$	**969**

$^{165}_{69}Tm_{96}$