

⁴³Ca(³He,d) 1968Sc15

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh	NDS 190,1 (2023)	20-Jun-2023

Target ⁴³Ca J^π=7/2⁻.

1968Sc15: E=12 MeV ³He beam was produced from the tandem Van de Graaff accelerator at the Argonne National Laboratory.

Target was 50 μg/cm² calcium (enriched to 81% in ⁴³Ca) on a 165 μg/cm² gold backing. Reaction products were momentum analyzed by a 75-cm Brown-Buechner broad-range spectrograph and detected in Kodak-type NTB emulsions placed in the focal plate. Measured σ(E_d,θ), θ(c.m.)=7.5° to 55°. Deduced levels, J, π, L-transfers, spectroscopic factors from DWBA analysis.

Uncertainty in cross section is 25%.

1974Ch43: E=13.5 MeV ³He beam was produced from the AERE, Harwell, tandem accelerator. Target was ≈30 μg/cm² 81.2% enriched ⁴³Ca. Reaction products were momentum analyzed by a multi-range magnetic spectrograph and detected in Ilford K2 emulsions. Measured σ(E_d,θ). Deduced levels, J, π, L-transfers, spectroscopic factors from DWBA analysis. Report data for g.s., 271, 350 and 425 states.

⁴⁴Sc Levels

Spectroscopic factor C²S is defined by N×g×C²S=σ(θ)^{exp}/σ(θ)^{DWBA}, where g=(2J_f+1)/(2J_i+1), N is the normalization factor.

N=4.4 in 1968Sc15, J_f=spin of final state, J_i=spin of target=7/2⁻.

dσ/dΩ under comments are maximum observed cross section from 1971Ra09. It is not specified by the authors at what angle the maximum cross section is obtained.

E(level) [†]	L [‡]	[(2J _f +1)/(2J _i +1)]C ² S [‡]	Comments
0	3	0.28	dσ/dΩ=0.11 mb/sr.
274 6	3	0.73 [#]	dσ/dΩ=0.34 mb/sr.
354 9	1+3	0.023,0.45 [@]	dσ/dΩ=0.22 mb/sr.
429 13	2&	0.11 ^{&}	dσ/dΩ=0.04 mb/sr.
521 11			dσ/dΩ<0.05 mb/sr.
637 6	0	0.04	dσ/dΩ=0.59 mb/sr.
671 10	3	0.15	dσ/dΩ=0.07 mb/sr.
760 7	1+3	0.055,0.17	dσ/dΩ=0.37 mb/sr.
980 10	3	1.62	dσ/dΩ=0.76 mb/sr.
1058 12	1+3	0.17,0.34	dσ/dΩ=1.12 mb/sr.
1197 8	1+3	0.024,0.49	dσ/dΩ=0.30 mb/sr.
1433 18	1+3	0.010,0.070	dσ/dΩ=0.08 mb/sr.
1512 9	1+3	0.020,0.14	dσ/dΩ=0.16 mb/sr.
1537 11	1+3	0.038,0.76	dσ/dΩ=0.45 mb/sr.
1598 12	1+3	0.014,0.043	dσ/dΩ=0.10 mb/sr.
1653 12	1	0.014	dσ/dΩ=0.12 mb/sr.
1683 9	2	0.17	dσ/dΩ=0.12 mb/sr.
1773 13	1+3	0.049,0.097	dσ/dΩ=0.39 mb/sr.
1865 8	1	0.008	dσ/dΩ=0.06 mb/sr.
1903 11			dσ/dΩ<0.05 mb/sr.
1956 10	1	0.058	dσ/dΩ=0.49 mb/sr.
2035 10	1+3	0.042,0.084	dσ/dΩ=0.33 mb/sr.
2104 6	1+3	0.016,0.032	dσ/dΩ=0.13 mb/sr.
2173 11	1+3	0.018,0.055	dσ/dΩ=0.15 mb/sr.
2250 14	3	0.19	dσ/dΩ=0.13 mb/sr.
2295 9	1+3	0.062,0.064	dσ/dΩ=0.48 mb/sr.
2334 5			dσ/dΩ<0.05 mb/sr.
2383 5			dσ/dΩ<0.05 mb/sr.
2427 10	1+3	0.007,0.015	dσ/dΩ=0.07 mb/sr.
2476 10	1+3	0.010,0.011	dσ/dΩ=0.80 mb/sr.
2525 11			dσ/dΩ<0.05 mb/sr.
2556 10			dσ/dΩ<0.05 mb/sr.

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⁴³Ca(³He,d) **1968Sc15** (continued)

⁴⁴Sc Levels (continued)

E(level) [†]	L [‡]	[(2J _f +1)/(2J _i +1)]C ² S [‡]	Comments
2591 14	1+3	0.024,0.049	dσ/dΩ=0.20 mb/sr.
2617 10			dσ/dΩ<0.05 mb/sr.
2632 11			dσ/dΩ=0.05 mb/sr.
2684 10			dσ/dΩ<0.05 mb/sr.
2712 8	1+3	0.058,0.12	dσ/dΩ=0.45 mb/sr.
2796 5	3	0.11 ^a	dσ/dΩ=0.08 mb/sr.
2878 9			dσ/dΩ<0.05 mb/sr.
2931 10	1+3	0.076,0.23	dσ/dΩ=0.73 mb/sr.
3010 11			dσ/dΩ<0.05 mb/sr.
3035 10			dσ/dΩ=0.05 mb/sr.
3049 10			dσ/dΩ=0.08 mb/sr.
3071 8	1+3	0.017,0.067	dσ/dΩ=0.13 mb/sr.
3097 10	1+3	0.030,0.031	dσ/dΩ=0.25 mb/sr.
3152 10			dσ/dΩ=0.15 mb/sr.
3176 8			dσ/dΩ=0.08 mb/sr.
3204 7			dσ/dΩ<0.05 mb/sr.
3281 15	1+3	0.093,0.28	dσ/dΩ=0.84 mb/sr.
3370 14	1+3	0.060,0.062	dσ/dΩ=0.54 mb/sr.
3427 11	1	0.015	dσ/dΩ=0.14 mb/sr.
3483 12	1+3	0.014,0.029	dσ/dΩ=0.14 mb/sr.
3568 6			dσ/dΩ<0.05 mb/sr.
3626 10	1+3	0.026,0.024	dσ/dΩ=0.24 mb/sr.
3851 6	1	0.41	dσ/dΩ=0.36 mb/sr.
3967 12			dσ/dΩ<0.05 mb/sr.
4024 13			dσ/dΩ=0.07 mb/sr.
4038 14			dσ/dΩ<0.05 mb/sr.
4053 15			dσ/dΩ=0.19 mb/sr.
4087 7	1	0.055	dσ/dΩ=0.48 mb/sr.
4150 10			dσ/dΩ=0.17 mb/sr.
4185 10			dσ/dΩ<0.05 mb/sr.
4254 11	1	0.034	dσ/dΩ=0.27 mb/sr.
4293 15	1+3	0.015,0.03	dσ/dΩ=0.14 mb/sr.
4363 11	1	0.18	dσ/dΩ=0.58 mb/sr.
4391 14	3	0.19	dσ/dΩ=0.16 mb/sr.
4461 14	1+3	0.048,0.045	dσ/dΩ=0.42 mb/sr.
4500 16			dσ/dΩ=0.25 mb/sr.
4533 10	1	0.024	dσ/dΩ=0.20 mb/sr.
4595 10			dσ/dΩ<0.05 mb/sr.
4622 12			dσ/dΩ<0.05 mb/sr.
4645 14			dσ/dΩ=0.07 mb/sr.
4697 10	1+3	0.022,0.023	dσ/dΩ=0.17 mb/sr.
4746 14	2	0.68	dσ/dΩ=0.08 mb/sr.
4762 10			dσ/dΩ=0.08 mb/sr.
4820 10	1	0.025	dσ/dΩ=0.21 mb/sr.
5012 15			dσ/dΩ=0.10 mb/sr.
5277 10			dσ/dΩ<0.05 mb/sr.
5336 6			dσ/dΩ<0.05 mb/sr.
5526 13	3	0.15	dσ/dΩ=0.13 mb/sr.
5553 11	2	0.14	dσ/dΩ=0.11 mb/sr.
5608 5			dσ/dΩ<0.05 mb/sr.
5716 13			dσ/dΩ<0.05 mb/sr.

[†] From **1968Sc15**.

[‡] From DWBA analysis of measured σ(θ) in **1968Sc15**, unless otherwise noted. **1978En02** give (2J_f+1)s values, for selected well-resolved levels, adjusted upwards by ≈30% based on standard normalization factor for DWBA analysis (see **1977En02**).

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 ${}^{43}\text{Ca}({}^3\text{He,d})$ **1968Sc15** (continued) ${}^{44}\text{Sc}$ Levels (continued)

0.81 (1974Ch43).

@ 0.026 I for $L=1$, 0.53 3 for $L=3$ (1974Ch43).

& From 1974Ch43. 1968Sc15 gives $L=1+3$; $S=0.004$ for $L=1$, 0.084 for $L=3$.

^a $(2J_f+1)S=3.5$ for $T=2$ (1978En02).