^{39}K(^{3}He,d) 1966Er05,1967Se10

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 140, 1 (2017)	30-Sep-2015

$J^{\pi}(^{39}\text{K g.s.})=3/2^{+}$.

1966Er05: E=12 MeV ^{3}He beam was produced from the Argonne tandem Van de Graaff. Target was potassium iodide (highly enriched in ^{39}K) with thickness of about 30 μg/cm^2 evaporated onto a self-supporting carbon backing. Reaction products were analyzed with a broad-range magnetic spectrograph and detected in nuclear emulsions. Measured $\sigma(\theta)$. Deduced levels, J, π, L, spectroscopic factors from DWBA analysis. Comparisons with shell-model calculations. Report 15 levels.

1967Se10: E=12,14,16 MeV ^{3}He beams were produced from the Oak Ridge National Laboratory EN tandem accelerator. Target was about 100 μg/cm^2 natural potassium evaporated onto 30 μg/cm^2 carbon backings. Reaction products were detected with a ΔE-E telescope of silicon surface-barrier detectors as ΔE detector and a Li-drifted silicon detector as E detector (FWHM=50 keV). Measured $\sigma(\theta)$. Deduced levels, J, π, L, spectroscopic factors from DWBA analysis. Comparisons with available data and shell-model calculations. Report 15 levels.

1970Fo04: E=11 MeV ^{3}He beam was produced from the Liverpool University Tandem accelerator. Target was 200 μg/cm^2 natural potassium (93.1% in ^{39}K) evaporated onto a thin carbon backing. Reaction products were detected with telescopes of surface-barrier counters. Measured $\sigma(\theta)$. Deduced levels, J, π, L, spectroscopic factors from DWBA analysis. Comparisons with other measurements and shell-model calculations. Report 11 levels.

1971Ca05: E=29.3 MeV ^{3}He beam was produced from the University of Colorado four-sector variable energy cyclotron. Targets were 0.12 0.30 mg/cm^2 natural potassium evaporated onto 20 μg/cm^2 carbon foils. Reaction products were detected with ΔE-E telescopes of silicon surface-barrier detectors as ΔE detectors and Si(Li) detectors as E detectors (FWHM=100 keV). Measured $\sigma(\theta)$. Deduced levels, J, π, L, spectroscopic factors from DWBA analysis. Comparisons with available and shell-model calculations. Report 18 levels.

1968Ba64: E=18 MeV. FWHM=60-80 keV for deuteron spectra. About 20 groups reported from (^{3}He,d) and 3 levels in (^{3}He,dγ).

1994Ve04: E=25 MeV. Measured $\sigma(\theta)$ for g.s.

Additional information 1.

^{40}Ca Levels

Spectroscopic factor C^2S is defined by $(2J+1)/(2J_i+1)\times C^2S=1/N\times(d\sigma/d\Omega)_{exp}/(d\sigma/d\Omega)_{DWBA}$, where J=spin of final state, J_i=target spin=3/2, N the normalization factor, and C the isobaric-spin Clebsch-Gordan coupling coefficient with C^2=1/2 (1966Er05, 1967Se10). Values given here are (2J+1)S.

	Spectroscopic factors of (^{3}He,d)			given as (2J+1)S	
Level	L	1966Er05	1967Se10	1970Fo04	1971Ca05*	1971Ca05@
0#	2	---	6.64	5.83	4.80	6.24
3736	3	5.0a	3.57a	4.2	2.8	3.4
4488	3	13.4	8.4	8.0	7.6	9.2
5616	3	11.8	7.0	6.8	5.6	7.0
5902	1	0.22	0.15	---	0.06	0.09
6026	3	≈1.8b	1.0b	---	0.8	1.05
6288	1	5.0	2.8c	4.3	1.7	2.1
6586	1	1.6	1.2	1.5	0.77	0.84
6751	1	1.0	0.96	0.94	1.50d	1.90d
6952	1	1.65	1.20	1.29	0.39	0.48
7117	1	1.90	1.54	1.40	1.33	1.54
7534	1	4.36	1.50e	---	0.80	0.95
7660	3	8.7	5.5	---	4.3	5.5
7696	3	8.17f	5.8	---	4.4	5.5
8435	3	≈3.2	5.0	---	2.3	2.8
8554	3	≈13.0	10.0	---	7.0	9.2

*: from regular DWBA (1971Ca05)
@: from modified DWBA (1971Ca05)
#: 8.0 for g.s. from 1994Ve04
a: ≈0.08 for L=1 (1966Er05), <0.07 for L=1 (1967Se10)
b: ≈0.27 for L=1 (1966Er05), 0.20 for L=1 (1967Se10)
c: <0.7 for L=3 (1967Se10)

d: for L=3 (1971Ca05)
e: 4.0 for L=3 (1967Se10)
f: <0.8 for L=1 (1966Er05)

E(level)[†]	Jπ[‡]	L[#]	Comments
0	0^+	2	
3353	0^+	(2)	E(level): not observed, upper limit on strength: 8% of g.s. (1967Se10), 5% of 3738 level (1966Er05).
3736 *5*	3^-	3	Additional information 2.
3902	2^+	(2)	not observed, upper limit on strength: 3% of g.s. (1967Se10), 5% of 3738 level.
4410[a]			E(level): this group reported only by 1968Ba64 is suspect (evaluator); not included in Adopted Levels.
4488 *5*	5^-	3	Additional information 3.
5200[&]			
5244[&]			
5274[&]			
5616 *6*	4^-	3	Additional information 4.
5902 *6*	1^-	1	Additional information 5. E(level): from 1966Er05.
6026 *5*	2^-	3	Additional information 6. E(level): from 1966Er05.
6288 *5*	3^-	1	Additional information 7.
6586.1 *6*	3^-	1	Additional information 8.
6751 *6*	2^-	1	Additional information 9. Jπ: $(0)^-$ in 1970Fo04. L: other: L=3 (1971Ca05).
6952 *6*	1^-	1	Additional information 10.
7117 *6*	1^-	1	Jπ: $(3)^-$ adopted in 1971Ca05. Additional information 11.
7534 *6*	2^-	1	Additional information 12.
7660[@] *6*	4^-	3[@]	Additional information 13.
7696[@] *6*	3^-	3[@]	Additional information 14.
8435 *9*	2^-	3	Additional information 15. E(level): from 1967Se10. 8465 *12* from 1966Er05. According to 1973Te04 in (^{3}He,dγ) this level probably corresponds to 8425 level in their γ-ray study.
8554 *9*	5^-	3	Additional information 16.
9140 *50*			E(level): from 1971Ca05 and 1968Ba64, presumably a multiplet.
9410 *50*			E(level): from 1971Ca05 and 1968Ba64, presumably a multiplet.
9700[a]			
10050?[a]			
10380?[a]			
11200[a]			

[†] Weighted average of values from 1966Er05 and 1967Se10, unless otherwise noted.
[‡] From Adopted Levels unless otherwise stated.
[#] From DWBA fits to measured differential cross sections (1966Er05, 1967Se10, 1970Fo04 and 1971Ca05).
[@] 7659+7694 doublet. L=3 with almost equal strengths for both components (1966Er05). 1967Se10 give L=1 for both states with (2J+1)S=5.5 for 7659 and 5.8 for 7696 levels.
[&] 0^+, 2^+, 4^+ triplet with total strength <10% of g.s. (1967Se10), not observed in 1966Er05 and 1967Se10.
[a] From 1968Ba64 only.