^{36}Ar(α,pγ),(α,p) 1981No05

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 149, 1 (2018)	1-Jan-2018

(α,pγ) reactions:

1981No05 (also 1975No07): E=7.5-16 MeV alpha beams were produced from the Liverpool EN tandem Van de Graaff. Target was gas or solid argon; γ rays were detected with Ge(Li) detectors. Measured Eγ, Iγ, γ(θ,pol), $\gamma\gamma$-coin, Doppler shift attenuation (DSA). Deduced levels, J, π, $T_{1/2}$, γ-ray multipolarities, branching ratios, mixing ratios, transition strengths. Comparisons with shell-model calculations. Report data for 60 excited states. 1981No05 also report data on ^{28}Si(^{16}O,αpγ) and ^{24}Mg(^{18}O,2npγ).

1986St02: E=11.718 MeV alpha beam was produced from the 6-MV Van de Graaff accelerator of the National Accelerator Centre at Faure, Cape. Target was an argon gas cell (99.5% enriched in ^{36}Ar). γ rays were detected with Ge(Li) detectors and protons were detected with a surface-barrier detector. Measured Eγ, pγ-coin, γ(θ). Deduced levels, J, π, γ-ray multipolarities and mixing ratios. Report data for 6 levels up to 4083. 1986St02 report data mostly on ^{39}K(p,p$'\gamma$).

1979Ba54: E=2.5 MeV; measured Iγ(θ,pol) for three transitions at 783, 924 and 3597.

1974Al13: E=10,12,14 MeV; measured Eγ, Iγ, $\gamma\gamma$-coin, γ(θ), lifetimes by DSAM of 5716 and 6475 levels. A total of 15 γ rays reported from 11 excited states up to 6475. Relative intensities of γ rays listed.

1974Ke09: E=15.8,17.0 MeV at TUNL; lifetimes by DSAM of 5164 level.

1973Ke05: E=7.30-10.45 MeV at TUNL; lifetimes by DSAM of 2814 and 3597 levels.

(α,p) reaction:

1956Sc92: E=7.4 MeV from Yale cyclotron. Measured proton spectrum using nuclear emulsions. Report levels at 0, 2500 and 2870.

^{39}K Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$[#]	Comments
0	3/2$^+$		
2522.90 *25*	1/2$^+$	62 fs *21*	
2814.3 *3*	7/2$^-$	44 ps *7*	$T_{1/2}$: from DSAM in 1973Ke05.
3018.7 *3*	3/2$^-$	<14 fs	
3597.3 *3*	9/2$^-$	42 ps *6*	$T_{1/2}$: from DSAM in 1973Ke05.
3883.1 *8*	5/2$^-$	14 fs *5*	J$^\pi$: 3/2$^-$,5/2$^-$ in 1986St02.
3939.0 *5*	3/2$^+$	87 fs *21*	J$^\pi$: 3/2$^+$,5/2$^+$ in 1986St02.
3944.2 *3*	11/2$^-$	>4.2 ps	
4081.9 *4*	3/2$^-$	14 fs *7*	
4095.7 *4*	1/2$^+$	80 fs *21*	
4126.5 *3*	7/2$^-$	59 fs *14*	
4473.9 *7*	1/2$^-$,3/2$^-$		
4514.3 *14*	5/2$^+$	17 fs *7*	J$^\pi$: 3/2$^+$,5/2$^+$ in 1981No05.
4520.4 *3*	9/2$^-$	0.20 ps *5*	
4679.0 *4*	7/2$^-$	0.111 ps *28*	
4737.8 *5*	5/2$^-$,7/2$^-$,9/2$^-$	0.08 ps *4*	
4737.9 *19*	5/2$^+$	21 fs *6*	J$^\pi$: (3/2,5/2)$^+$ in 1981No05.
4930.5 *4*	3/2$^+$	21 fs *9*	
5009.6 *4*	7/2$^-$	0.24 ps *6*	
5011.0 *4*	(3/2,5/2$^-$,7/2$^-$)	35 fs *10*	
5164.2 *3*	9/2$^-$	55 fs *14*	$T_{1/2}$: other: 12 ps *7* (1974Ke09).
5165.9 *5*	5/2$^-$,7/2$^-$,9/2$^-$	0.19 ps *5*	
5174.1 *13*	(1/2,3/2,5/2)	<14 fs	
5264.2 *13*	5/2$^+$	<14 fs	
5319.6 *13*	3/2$^+$	<14 fs	
5353.6 *5*	11/2$^-$	0.06 ps *4*	
5502.3 *4*	7/2$^-$	35 fs *20*	
5598.7 *13*	5/2$^+$	14 fs *7*	
5644.3 *5*	7/2$^-$	0.07 ps *4*	
5715.7 *20*	3/2$^+$	<14 fs	
5718.5 *4*	13/2$^-$[@]	0.19 ps *5*	J$^\pi$: 1981No05 proposed 9/2 and rejected 13/2 since 13/2 gives an unusually low

Continued on next page (footnotes at end of table)

^{36}Ar(α,pγ),(α,p) 1981No05 (continued)

^{39}K Levels (continued)

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$[#]	Comments
			value of ≈0.6 for the alignment parameter in $\gamma(\theta)$ as compared to that for other γ rays in ^{39}K and for γ rays in neighboring nuclides. But analysis by 1982VaZH in ^{28}Si(^{16}O,αpγ) rules out 9/2 and supports 13/2, the authors suggest that 1981No05 applied expected alignments too strictly to be realistic in (α,pγ) reaction. T$_{1/2}$: other: <140 ps (1974Al13).
5788.9 *20*	(5/2,7/2)$^+$	35 fs *17*	
5801.6 *4*	7/2$^-$	14 fs *7*	
5939.3 *24*	5/2$^+$	<24 fs	
6005.8 *5*	11/2$^-$	76 fs *28*	
6054 *3*		24 fs *14*	
6093.4 *7*	5/2$^-$,7/2$^-$	<14 fs	
6248.6 *7*		<35 fs	
6331.6 *20*	3/2$^+$	24 fs *14*	
6411.6 *20*	(1/2 to 7/2$^+$)	<14 fs	
6433.8 *5*	13/2$^+$	128 fs *35*	
6457.6 *20*	(1/2,3/2,5/2)$^+$	<14 fs	
6475.2 *6*	15/2$^+$[@]	>4.2 ps	J$^\pi$: 11/2$^+$ proposed by 1981No05 is rejected in the work of 1982VaZH in ^{28}Si(^{16}O,αpγ). See *J*$^\pi$ comment for 5718 level. T$_{1/2}$: other: <140 ps (1974Al13).
6502.6 *20*	(3/2,5/2)$^+$	59 fs *21*	
6531.6 *20*	(1/2 to 7/2$^+$)	90 fs *60*	
6546.5 *21*	7/2$^-$	<14 fs	
6653.6 *20*	3/2$^+$,5/2$^+$	24 fs *14*	
6686.6 *20*		<35 fs	
6740.6 *20*	(3/2$^+$,5/2$^+$)	<14 fs	
6828.6 *20*		<49 fs	
7092.4 *5*	(9/2$^-$,13/2$^+$)	59 fs *21*	J$^\pi$: 9/2$^+$ is unlikely from δ(Q/D)=+0.12 *3* and RUL.
7140.9 *5*	15/2$^-$	0.29 ps *8*	
7568.8 *6*		0.24 ps *7*	
7588.2 *21*		<0.21 ps	
7774.9 *5*	17/2$^+$[@]	0.94 ps *28*	E(level): doublet of levels at 7774.9 and 7775.8 is proposed by 1981No05 based on differences in Doppler shifts for 1300.7γ and 1341.0γ and poor fit of the two γ rays in the level scheme. But the doublet is not supported in (HI,xnγ) study of 1982VaZH. Only one level is included in Adopted Levels with 1301γ and 1341γ from the same level. J$^\pi$: 13/2$^+$ proposed by 1981No05 is proven to be untenable by 1982VaZH in ^{28}Si(^{16}O,αpγ). See *J*$^\pi$ comment for 5718 level.
7775.9 *8*		>4.2 ps	E(level): see comment for 7774.9 level about the existence of a doublet.
7867.2 *21*		<0.17 ps	
8027.3 *6*	19/2$^-$[@]		J$^\pi$: (15/2,19/2)$^-$ proposed by 1981No05, but only 19/2$^-$ is supported in the work of 1982VaZH in ^{28}Si(^{16}O,αpγ).
8370.3 *7*		35 fs *17*	

[†] From a least-squares fit to γ-ray energies.

[‡] From Adopted Levels. Values from 1981No05 based on $\gamma(\theta)$, γ(lin pol) and RUL are the same for most of levels where those data are available or given under comments if different.

[#] From DSAM in 1981No05, unless otherwise stated. Uncertainty of 25% is added in quadrature by 1981No05 to account for uncertainties in stopping powers.

[@] Assignments (1981No05) of 9/2$^-$ for 5718 level, 11/2$^+$ for 6475 level, 13/2$^+$ for 7774 level, and 15/2$^-$ for 8027 level are proven incorrect by 1982VaZH in studies of (^{16}O,npγ) and (^{16}O,p$\alpha\gamma$) reactions. The revised assignments are listed here as given in Adopted Levels.

^{36}Ar(α,pγ),(α,p) 1981No05 (continued)

$\gamma(^{39}K)$

Values of A_2, A_4 and POL under comments are from 1981No05 at Eα=10 MeV, unless otherwise noted.

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
2522.90	1/2$^+$	2522.6 *3*	100	0	3/2$^+$			Eγ: other: 2523.0 *4* (1974Al13).
2814.3	7/2$^-$	2814.0 *4*	100	0	3/2$^+$	M2+E3	+0.14 *2*	Eγ: other: 2813.5 *15* (1974Al13). Additional information 1. δ: others: +0.16 *3* (1986St02), +0.19 *10* (1974Al13). A_2=+0.492 *11*, A_4=−0.030 *12*, POL=−0.50 *3*. A_2=+0.66 *3*, A_4=−0.04 *4* (1986St02). A_2=+0.37 *3*, A_4=+0.01 *3* (1974Al13).
3018.7	3/2$^-$	3018.8 *4*	100	0	3/2$^+$	E1+M2	+0.05 *4*	A_2=+0.207 *8*, A_4=0.000 *9*, POL=−0.23 *5*. δ: other: +0.04 *7* (1986St02). A_2=+0.41 *9* (1986St02).
3597.3	9/2$^-$	783.2 *2*	44.6 *17*	2814.3	7/2$^-$	M1+E2	+0.58 *2*	Eγ: other: 783.9 *10* (1974Al13). Additional information 2. δ: others: +0.64 *+10−8* (1979Ba54), +0.8 *+16−3* (1974Al13). A_2=+0.63 *2*, A_4=+0.10 *2*, POL=−0.94 *2*. A_2=+0.60 *4*, A_4=+0.10 *6* (1974Al13).
		3597.3 *4*	55.4 *17*	0	3/2$^+$	E3		Eγ: other: 3597.7 *30* (1974Al13). Additional information 3. A_2=+0.70 *3*, A_4=+0.11 *3*, A_6=−0.13 *4*, POL=+0.84 *11*. δ(M4/E3)=0.00 *5* (1986St02), +0.11 *+15−11* (1979Ba54). A_2=+0.81 *3*, A_4=+0.12 *7* (1986St02).
3883.1	5/2$^-$	3883.0 *10*	100	0	3/2$^+$	E1(+M2)	−0.06 *7*	δ: other: +0.27 *7* for J=5/2, −0.12 *10* for J=3/2 (1986St02). A_2=−0.104 *12*, A_4=−0.041 *12*, POL=+0.34 *10* at Eα=12.5 MeV. A_2=+0.15 *11* (for J=5/2) or +0.18 *13* (for J=3/2), A_4=+0.04 *2* (for J=5/2) (1986St02).
3939.0	3/2$^+$	1416.2 *4*	8.2 *12*	2522.90	1/2$^+$	M1+E2	+0.61 *12*	A_2=+0.30 *4*, A_4=−0.03 *4*, POL=−0.51 *20*.
		3938.3 *10*	91.8 *12*	0	3/2$^+$	M1+E2	−1.2 *+6−15*	δ: other: −0.05 *20* for J=3/2, +0.38 *18* for J=5/2 (1986St02). A_2=+0.343 *13*, A_4=+0.059 *12*, POL=+0.24 *11*. A_2=+0.3 *2* (for J=3/2 or 5/2), A_4=+0.07 (for J=5/2) (1986St02).
3944.2	11/2$^-$	346.85 *12*	34.8 *17*	3597.3	9/2$^-$	M1(+E2)	−0.01 *1*	Eγ: other: 346.9 *15* (1974Al13). Additional information 4. δ: other: −0.05 *5* (1974Al13). A_2=−0.311 *13*, A_4=−0.045 *15*, POL=−0.40 *3*. A_2=−0.31 *5*, A_4=−0.03 *4* (1974Al13).
		1129.8 *2*	65.2 *17*	2814.3	7/2$^-$	E2		Eγ: other: 1129.4 *10* (1974Al13). Additional information 5.

Continued on next page (footnotes at end of table)

^{36}Ar(α,pγ),(α,p) 1981No05 (continued)

$\gamma(^{39}K)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
								δ(M3/E2)=−0.02 *5* (1974Al13). A_2=+0.407 *8*, A_4=−0.271 *10*, POL=+0.78 *4*. A_2=+0.34 *3*, A_4=−0.111 *5* (1974Al13).
4081.9	3/2$^-$	1063.1 *3*	12.7 *14*	3018.7	3/2$^-$	M1+E2	+0.16 *13*	A_2=+0.27 *5*, A_4=0.00 *5*, POL=+0.19 *13*.
		1559.1 *4*	19.7 *22*	2522.90	1/2$^+$	E1(+M2)	−0.02 *6*	A_2=−0.35 *4*, A_4=+0.03 *4*, POL=+0.44 *13*.
		4082.4 *13*	68 *4*	0	3/2$^+$	E1(+M2)	−0.05 *7*	A_2=+0.16 *3*, A_4=+0.10 *4*, POL=−0.57 *26*. δ: other: +0.06 *11* (1986St02). A_2=+0.43 *13* (1986St02).
4095.7	1/2$^+$	1077.4 *4*	15.4 *11*	3018.7	3/2$^-$			
		1572.5 *3*	84.6 *11*	2522.90	1/2$^+$			
4126.5	7/2$^-$	1312.2 *2*	100	2814.3	7/2$^-$	M1+E2	−0.11 *1*	E_γ: other: 1312.9 *10* (1974Al13). Additional information 6. A_2=+0.362 *12*, A_4=−0.028 *12*, POL=+0.86 *4*.
4473.9	1/2$^-$,3/2$^-$	1455.2[‡]		3018.7	3/2$^-$			
		1950.9[‡]		2522.90	1/2$^+$			
		4474.0 *14*		0	3/2$^+$			A_2=−0.04 *5*, A_4=+0.18 *6*.
4514.3	5/2$^+$	4514.0 *14*	100	0	3/2$^+$	M1+E2	−1.0 *2*	δ: for J(4514)=5/2; +1.2 *5* for 3/2. A_2=+0.66 *3*, A_4=+0.03 *3*, POL=−0.65 *36*.
4520.4	9/2$^-$	393.9 *2*	2.0 *5*	4126.5	7/2$^-$	M1(+E2)	+0.04 *4*	A_2=−0.19 *5*, A_4=−0.09 *6* at Eα=13.0 MeV.
		576.20 *13*	9.2 *7*	3944.2	11/2$^-$	M1(+E2)	+0.05 *5*	E_γ: other: 576.9 *15* (1974Al13). Additional information 7. A_2=−0.16 *7*, A_4=−0.22 *8*, POL=+0.58 *22*.
		923.0 *2*	88.8 *9*	3597.3	9/2$^-$	M1		E_γ: other: 923.95 *10* (1974Al13). Additional information 8. Mult.: pure M1 from γ(lin pol) (1979Ba54). δ: +0.01 *3* (1981No05), 0.00 *4* (1979Ba54). A_2=+0.44 *2*, A_4=+0.04 *2*, POL=+0.85 *5*.
4679.0	7/2$^-$	552.44 *14*	7.5 *9*	4126.5	7/2$^-$	M1(+E2)	−0.1 *2*	A_2=+0.37 *18*, A_4=−0.08 *18*, POL=+1.3 *7*.
		1864.5 *4*	92.5 *9*	2814.3	7/2$^-$	M1+E2	−0.42 *4*	E_γ: other: 1864.4 *30* (1974Al13). Additional information 9. A_2=+0.07 *4*, A_4=−0.06 *4*, POL=+1.1 *3*.
4737.8	5/2$^-$,7/2$^-$,9/2$^-$	1923.5 *3*	100	2814.3	7/2$^-$	M1+E2		δ: +0.27 *9* or +6 *2* for J=5/2, −1.2 *5* for 7/2, −0.06 *3* for 9/2. A_2=−0.39 *5*, A_4=−0.05 *5*, POL=+0.27 *23*.
4737.9	5/2$^+$	4737.9 *19*	100	0	3/2$^+$	E2(+M1)	<−50	δ: for J(4738)=5/2; −0.14 *3* for 3/2. A_2=+0.13 *2*, A_4=+0.04 *2*, POL=+0.77 *26*.

Continued on next page (footnotes at end of table)

^{36}Ar(α,pγ),(α,p) 1981No05 (continued)

γ(^{39}K) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
4930.5	3/2$^+$	2407.4 *3*	23.8 *20*	2522.90	1/2$^+$	M1+E2	>+0.6	A_2=+0.39 *12*, A_4=−0.04 *15*.
		4931.4 *12*	76.2 *20*	0	3/2$^+$	M1+E2	−1.3 *6*	A_2=−0.43 *5*, A_4=+0.06 *6*, POL=−0.1 *8*.
5009.6	7/2$^-$	883.08 *15*	77 *5*	4126.5	7/2$^-$	M1(+E2)	−0.04 *4*	E_γ: other: 883.2 *10* (1974Al13). Additional information 10. A_2=+0.431 *13*, A_4=−0.020 *13*, POL=+0.55 *6* at Eα=12.5 MeV.
		1412.3[‡]		3597.3	9/2$^-$			
5011.0	(3/2,5/2$^-$,7/2$^-$)	1127.9[‡]		3883.1	5/2$^-$			
		1992.2 *3*		3018.7	3/2$^-$			δ: >+0.04 for 5/2. A_2=+0.29 *6*, A_4=−0.09 *6*.
5164.2	9/2$^-$	643.73 *15*	21.4 *10*	4520.4	9/2$^-$	M1(+E2)	−0.02 *5*	E_γ: other: 644.1 *15* (1974Al13). Additional information 11. A_2=+0.43 *5*, A_4=0.00 *6*.
		1037.7 *2*	23.3 *12*	4126.5	7/2$^-$	M1+E2	−0.03 *2*	A_2=−0.33 *2*, A_4=−0.07 *3*, POL=−0.13 *9* at Eα=12.5 MeV.
		1220.3 *2*	55.3 *15*	3944.2	11/2$^-$	M1(+E2)	−0.01 *1*	E_γ: other: 1221.5 *15* (1974Al13). Additional information 12. A_2=−0.148 *11*, A_4=−0.008, POL=−0.19 *5* at Eα=12.5 MeV.
5165.9	5/2$^-$,7/2$^-$,9/2$^-$	2351.5 *3*	100	2814.3	7/2$^-$	M1+E2		δ: −0.6 *3* for J=5/2, +0.75 *15* for J=7/2, +0.38 *4* for J=9/2. A_2=+0.30 *12*, A_4=+0.09 *9*, POL=−0.14 *22* at Eα=12.5 MeV.
5174.1	(1/2,3/2,5/2)	5173.7 *13*	100	0	3/2$^+$			A_2=+0.07 *8*, A_4=−0.12 *8*.
5264.2	5/2$^+$	5263.8 *13*	100	0	3/2$^+$	M1+E2	−0.7 *3*	A_2=−0.76 *4*, A_4=+0.09 *4*.
5319.6	3/2$^+$	5319.2 *13*	100	0	3/2$^+$	M1,E2		A_2=−0.15 *4*, A_4=+0.04 *4*.
5353.6	11/2$^-$	1409.8 *6*	100	3944.2	11/2$^-$	M1(+E2)	+0.03 *7*	E_γ: weighted average of 1409.6 *6* (1981No05) and 1410.7 *15* (1974Al13). Additional information 13. A_2=+0.48 *4*, A_4=−0.10 *4*, POL=+0.91 *9* at Eα=12.5 MeV.
5502.3	7/2$^-$	823.1 *2*	49.5 *22*	4679.0	7/2$^-$	M1(+E2)	−0.02 *6*	A_2=+0.37 *4*, A_4=+0.04 *3*, POL=+0.70 *10* at Eα=13.0 MeV.
		981.9 *3*	7 *3*	4520.4	9/2$^-$			
		1905.5 *4*	31.8 *17*	3597.3	9/2$^-$	M1+E2	−0.26 *6*	A_2=+0.21 *7*, A_4=−0.05 *7*, POL=−0.16 *29* at Eα=13.0 MeV.
		2687.4 *7*	11.5 *25*	2814.3	7/2$^-$			
5598.7	5/2$^+$	5598.3 *13*	100	0	3/2$^+$	M1+E2	−1.1 *9*	δ: from δ=−0.2 to −1.9. A_2=−0.54 *5*, A_4=+0.01 *6*.
5644.3	7/2$^-$	906.8	25 *10*	4737.9	5/2$^+$			E_γ: from level-energy difference.
		965.2 *3*	75 *10*	4679.0	7/2$^-$	M1(+E2)	+0.12 *13*	A_2=+0.53 *9*, A_4=−0.09 *9*, POL=+0.9 *4* at Eα=12.5 MeV.
		1517.8[‡]		4126.5	7/2$^-$			
5715.7	3/2$^+$	5715.3 *20*	100	0	3/2$^+$			A_2=−0.08 *15*, A_4=+0.12 *16*.
5718.5	13/2$^-$	364.9 *2*	1.6 *2*	5353.6	11/2$^-$			Mult.,δ: 1981No05 quote M1 with δ(E2/M1)=−0.01 *6* for

Continued on next page (footnotes at end of table)

^{36}Ar(α,pγ),(α,p) 1981No05 (continued)

$\gamma(^{39}K)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
								J(5718)=9/2; but no $\gamma(\theta$,pol) data are listed by 1981No05.
5718.5	13/2$^-$	1774.2 *3*	98.4 *2*	3944.2	11/2$^-$	M1+E2	−0.25 *2*	E_γ: other: 1773.8 *20* (1974Al13). Additional information 14. δ: other: +19 *+30−8* for J(5718)=13/2; −4.7 *8* for J(5718)=9/2 (1974Al13). A_2=+0.190 *11*, A_4=−0.003 *12*, POL=−0.40 *6* at Eα=12.5 MeV. A_2=+0.139 *17*, A_4=−0.005 *20*, POL=−0.44 *7* at Eα=11.5 MeV. A_2=+0.112 *24*, A_4=+0.060 *28*, POL=−0.57 *10* at Eα=13.0 MeV. A_2=+0.123 *14*, A_4=+0.019 *15*, POL=−0.48 *4* at Eα=16.0 MeV.
5788.9	(5/2,7/2)$^+$	5788.4 *20*	100	0	3/2$^+$			A_2=+0.37 *3*, A_4=+0.01 *3* (1974Al13).
5801.6	7/2$^-$	637.5 *3*	24.9 *16*	5164.2	9/2$^-$			A_2=+0.26 *7*, A_4=−0.08 *7*. E_γ: other: 637.95 *15* unplaced in 1974Al13. A_2=+0.39 *4*, A_4=+0.05 *4* at Eα=13.0 MeV.
		1280.7 *4*	26.8 *17*	4520.4	9/2$^-$			
		1675.1[‡]	18 *4*	4126.5	7/2$^-$			I_γ: line not analyzed by 1981No05, Iγ from Iγ(1675)/Iγ(1281)=24 *5*/36 *5* 1974Du01 in (p,p′γ).
		2987.3 *7*	30.3 *21*	2814.3	7/2$^-$			
5939.3	5/2$^+$	5938.8 *24*	100	0	3/2$^+$	D+Q	−0.6 *2*	A_2=−0.93 *17*, A_4=+0.04 *17*.
6005.8	11/2$^-$	2061.6 *3*	100	3944.2	11/2$^-$	M1(+E2)	+0.02 *4*	E_γ: other: 2060.1 *30* unplaced in 1974Al13. Additional information 15. A_2=+0.47 *2*, A_4=+0.03 *2*, POL=+0.96 *10* at Eα=12.5 MeV.
6054		6053 *3*	100	0	3/2$^+$			A_2=+0.79 *16*, A_4=−0.04 *18*.
6093.4	5/2$^-$,7/2$^-$	3279.0 *6*	100	2814.3	7/2$^-$			A_2=−0.07 *6*, A_4=−0.06 *6*, POL=+0.6 *5* at Eα=12.5 MeV.
6248.6		3434.2 *6*	100	2814.3	7/2$^-$			A_2=+0.25 *5*, A_4=+0.01 *5*, POL=0.0 *2* at Eα=12.5 MeV.
6331.6	3/2$^+$	6331 *2*		0	3/2$^+$			
6411.6	(1/2 to 7/2$^+$)	6411 *2*		0	3/2$^+$			
6433.8	13/2$^+$	2489.4 *4*	100	3944.2	11/2$^-$	E1(+M2)	+0.02 *2*	A_2=−0.17 *3*, A_4=−0.08 *3*, POL=+0.54 *10* at Eα=12.5 MeV.
6457.6	(1/2,3/2,5/2)$^+$	6457 *2*		0	3/2$^+$			
6475.2	15/2$^+$	756.7 *4*	100	5718.5	13/2$^-$	E1(+M2)	−0.02 *2*	E_γ: weighted average of 756.6 *4* (1981No05) and 757.4 *10* (1974Al13). Additional information 16. δ: other: −0.04 *4* for J(6475)=15/2; +0.11 *6* for J(6475)=11/2 (1974Al13). A_2=−0.285 *15*, A_4=+0.019 *15*, POL=+0.40 *2* at Eα=13.0 MeV. A_2=−0.31 *5*, A_4=−0.03 *4* (1974Al13).
6502.6	(3/2,5/2)$^+$	6502 *2*		0	3/2$^+$			
6531.6	(1/2 to 7/2$^+$)	6531 *2*		0	3/2$^+$			

Continued on next page (footnotes at end of table)

^{36}Ar(α,pγ),(α,p) 1981No05 (continued)

$\gamma(^{39}K)$ (continued)

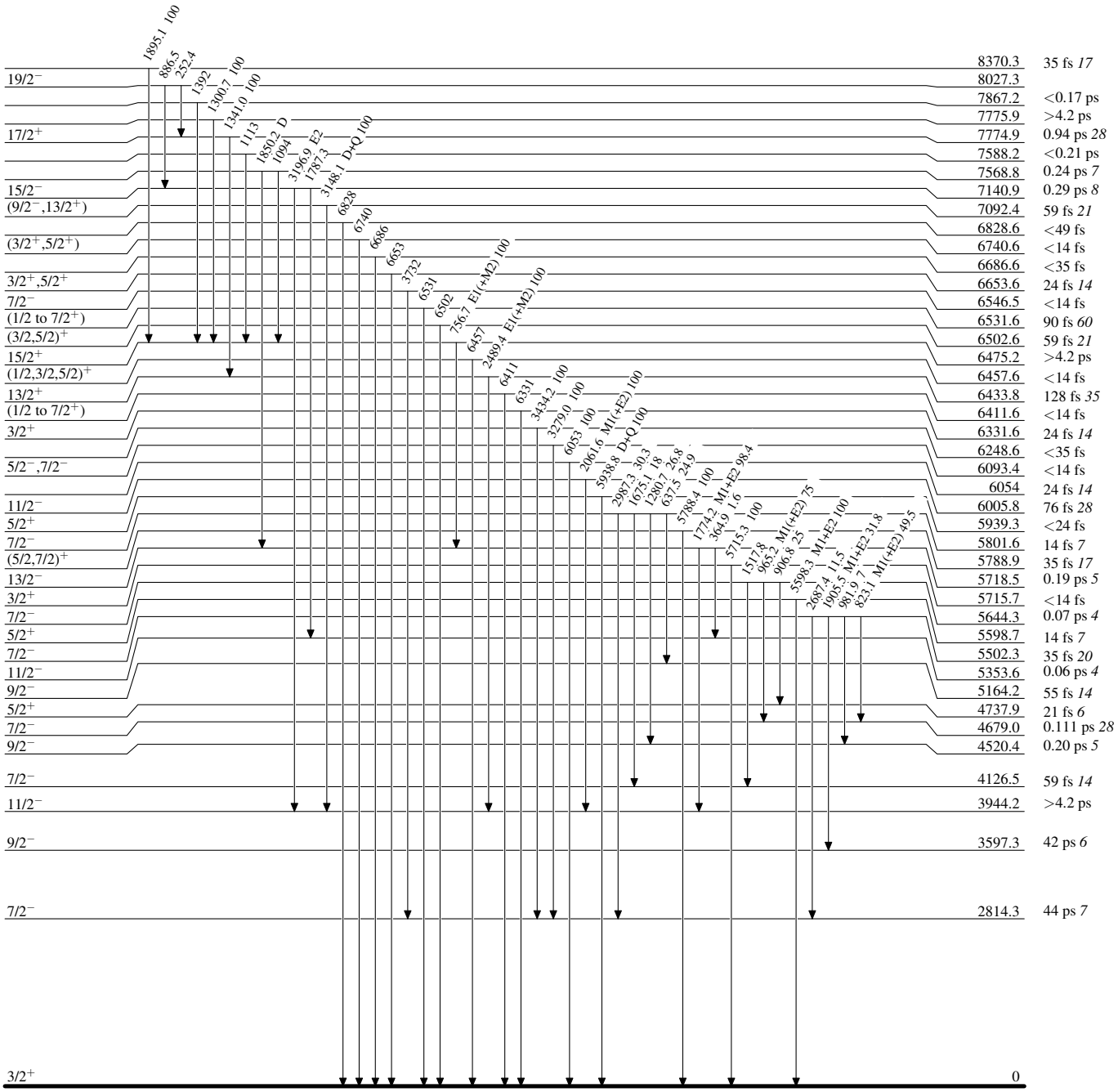
E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	Comments
6546.5	$7/2^-$	3732 *2*		2814.3	$7/2^-$		
6653.6	$3/2^+,5/2^+$	6653 *2*		0	$3/2^+$		
6686.6		6686 *2*		0	$3/2^+$		
6740.6	$(3/2^+,5/2^+)$	6740 *2*		0	$3/2^+$		
6828.6		6828 *2*		0	$3/2^+$		
7092.4	$(9/2^-,13/2^+)$	3148.1 *4*	100	3944.2	$11/2^-$	D+Q	Mult.,δ: D+Q, δ=+0.12 *3* for 9/2, E1(+M2) δ=−0.03 *3* for $13/2^+$. A_2=−0.33 *2*, A_4=−0.05 *2*, POL=+0.5 *2* at Eα=16.0 MeV.
7140.9	$15/2^-$	1787.3		5353.6	$11/2^-$		E_γ: this transition cannot be analyzed due to the shifted component of the 1774.2γ from 5718 level (1981No05).
		3196.9 *5*		3944.2	$11/2^-$	E2	A_2=+0.363 *16*, A_4=−0.150 *16*, POL=+0.80 *18* at Eα=16.0 MeV.
7568.8		1094 *2*		6475.2	$15/2^+$		
		1850.2 *4*		5718.5	$13/2^-$	D	Mult.: A_2=−0.27 *11*, A_4=+0.37 *14*, POL=+0.6 *5* at Eα=16.0 MeV.
7588.2		1113 *2*		6475.2	$15/2^+$		
7774.9	$17/2^+$	1341.0 *3*	100	6433.8	$13/2^+$		Mult.,δ: with the revised J^π=$17/2^+$, mult(1341γ)=E2. 1981No05 give mult=M1+E2, δ=−0.50 *3*. The A_2, A_4 and POL values given by 1981No05 are also consistent with ΔJ=2, E2 transition, as with ΔJ=0, M1+E2 transition proposed by 1981No05. A_2=+0.14 *2*, A_4=−0.11 *2*, POL=+0.55 *12* at Eα=16.0 MeV.
7775.9		1300.7 *5*	100	6475.2	$15/2^+$		E_γ: 1301γ and 1341γ placed from a single level at 7776 keV in Adopted Levels. POL=+0.29 *6* at Eα=16.0 MeV.
7867.2		1392 *2*		6475.2	$15/2^+$		
8027.3	$19/2^-$	252.4 *3*		7774.9	$17/2^+$		
		886.5 *4*		7140.9	$15/2^-$		δ(Q/D)=+1.1 *2* for J=15/2. A_2=+0.27 *4*, A_4=−0.27 *4* at Eα=16.0 MeV.
8370.3		1895.1 *4*	100	6475.2	$15/2^+$		A_2=+0.18 *6*, A_4=−0.07 *6*, POL=−1.2 *5* at Eα=16.0 MeV.

[†] From 1981No05, unless otherwise stated. Relative γ-ray intensities are available for 18 γ rays from 1974Al13.
[‡] Transition is obscured (1981No05); from level-energy difference.
[#] From 1981No05 based on $\gamma(\theta)$ and γ(lin pol) and parity is from RUL when γ(lin pol) data are not available, unless otherwise noted.
[x] γ ray not placed in level scheme.

^{36}Ar(α,pγ),(α,p) 1981No05

Level Scheme

Intensities: % photon branching from each level

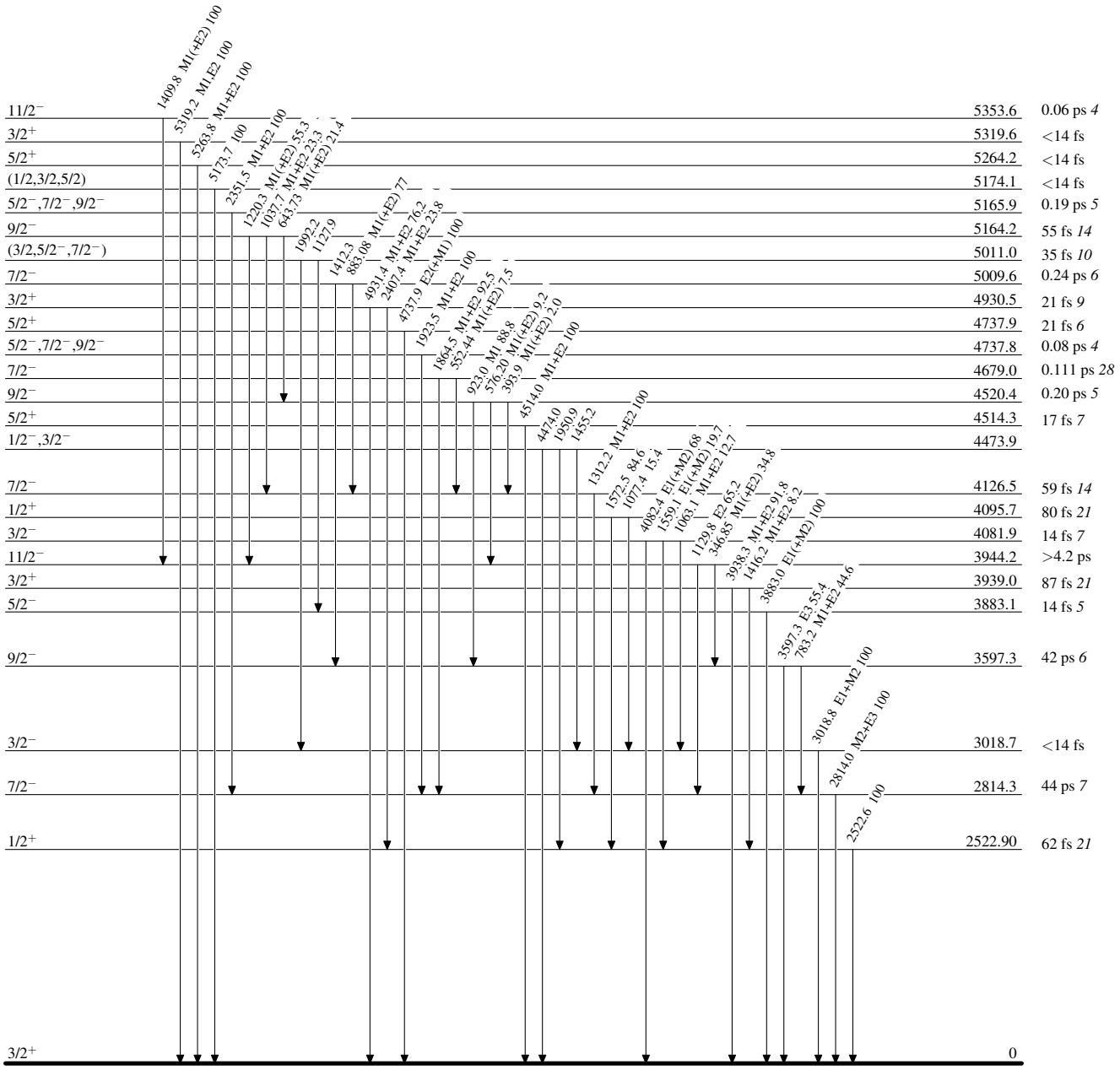


$^{39}_{19}K_{20}$

^{36}Ar(α,pγ),(α,p) 1981No05

Level Scheme (continued)

Intensities: % photon branching from each level



$^{39}_{19}K_{20}$