^{24}Mg(^{16}O,pnγ)   1983Va05,1974Va13

| | | History | |
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 152, 1 (2018)	30-Sep-2017

1983Va05 (also thesis by 1982VaZH): E=36-44 MeV ^{16}O beam was produced from the Utrecht EN tandem. Targets were 99.92% enriched ^{24}Mg on Ni backings. γ rays were detected with Si(Li), LEPS, HPGe and Ge(Li) detectors. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma(\theta)$, γ(lin pol), $\gamma\gamma$(t). Deduced levels, J, π, T$_{1/2}$, γ-ray branching ratios, multipolarities, mixing ratios, conversion coefficients, transition strengths. Comparisons with shell-model calculations.

1974Va13: E=36 and 38 MeV ^{16}O beam was produced from the Utrecht EN tandem. Targets were 1 mg/cm^2 self-supporting natural Mg. γ rays were detected with Si(Li), Ge(Li) and NaI detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, γ(t), recoil-distance. Deduced levels, J, π, T$_{1/2}$, conversion coefficients, γ-ray branching ratios, transition strengths. Comparisons with available data. This work is from the same group as 1983Va05.

Others:

1980Jo11: E=38 MeV, measured isomer half-life, pulsed beam.

1977De02: E=27.5 MeV; measured lifetime by RDM, branching ratio from the 458 level.

1974Ya04: E=32-56 MeV; measured Eγ, Iγ, $\gamma\gamma$, lifetimes. Five γ rays reported from the decay of the isomer at 3458.

^{38}K Levels

E(level)[†]	J$^{\pi}$[‡]	T$_{1/2}$[@]	Comments
0	3$^+$		
130.2 _4_	0$^+$		
458.49 _25_	1$^+$	7.0 ps _6_	T$_{1/2}$: other: 8.3 ps _14_ (1977De02).
1698?			
2401?			
2612.97 _15_	3$^-$		
2646.15 _15_	(4)$^-$	0.98 ns _10_	J$^{\pi}$: 4$^-$ is supported by J$^{\pi}$(3458)=7$^+$ but 2 is not completely ruled out.
2828?			
2869?			
2993?			
3315?			
3341?			
3420.05 _17_	(6)$^-$	70 ps _10_	
3458.08 _17_	(7)$^+$	21.95 μs _11_	%IT=100
			T$_{1/2}$: from γ(t) in 1980Jo11. Others: 22.3 μs _4_ (1983Va05), 22.5 μs _6_ (1974Ya04), 22.1 μs _7_ (1974Va13).
5253.7 _4_	(9$^+$)[#]		
7396.8 _6_	(10$^-$)[#]		
8693.0 _6_	(12$^-$)[#]		
8747.5 _7_	(11$^-$)[#]		
10980.5 _11_	(13$^-$)[#]	<3.5 ps	T$_{1/2}$: from 1983Va05.

[†] From a least-squares fit to γ-ray energies with uncertainties for levels connected with those γ rays and others are from 1983Va05.

[‡] From Adopted Levels, unless otherwise noted.

[#] Proposed by 1983Va05 based on comparison of states in ^{38}K with 0$^+$,g.s.; 2$^+$,1970; 3$^-$,4180; 5$^-$,5170; 4$^-$,5900 and 6$^-$,7350 levels in ^{36}Ar when (7)$^+$ at 3458 in ^{38}K is lined up with the 0$^+$, g.s. of ^{36}Ar. For less likely choice of J(3458)=5, spin would be 2 units less.

[@] From recoil-distance method (1974Va13), unless otherwise stated.

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γ(^{38}K)

Additional information 1.

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	δ	α[#]	Comments
33.18 3	0.67 4	2646.15	(4)$^-$	2612.97	3$^-$	M1(+E2)	<0.09	0.29 8	Mult.,δ: from experimental α(exp)=0.22 13. α(exp)=0.22 13 determined from intensity balance (1983Va05). branching ratio=0.65 4 (1983Va05).
38.03[‡] 3	90 4	3458.08	(7)$^+$	3420.05	(6)$^-$	(E1)		0.402	α(K)=0.368 6; α(L)=0.0310 5; α(M)=0.00331 5; α(N+..)=0.0001153 17 α(N)=0.0001153 17 E_γ: other: 37.9 2 (1974Ya04). I_γ: other: 86 9 (1974Va13). Mult.: from experimental α(exp) determined from intensity balance. α(exp) also consistent with M1+E2 with δ=0.16 3. α(exp)=0.40 6 (1983Va05), 0.42 15 (1974Va13), 0.58 18 (1974Ya04). A$_2$=−0.30 12 (1983Va05). branching ratio=74.6 8 (1983Va05), 75 2 (1974Va13).
79[@]	<0.03	3420.05	(6)$^-$	3341?					
105[@]	<0.03	3420.05	(6)$^-$	3315?					
117[@]	<0.02	3458.08	(7)$^+$	3341?					
143[@]	<0.04	3458.08	(7)$^+$	3315?					
245[@]	<0.04	2646.15	(4)$^-$	2401?					
328.3 3	1.42 7	458.49	1$^+$	130.2	0$^+$	[M1]			E_γ: weighted average of 328.2 3 (1983Va05) and 328.3 3 (1974Va13). I_γ: other: 1.9 3 (1974Va13).
427[@]	<0.05	3420.05	(6)$^-$	2993?					
458.5[@]	0.0136 14	458.49	1$^+$	0	3$^+$	[E2]			I_γ: from Iγ(458.5γ)/Iγ(328.2γ)= 0.0096 10 in (α,nγ) reaction (1977De02).
465[@]	<0.06	3458.08	(7)$^+$	2993?					
551[@]	<0.04	3420.05	(6)$^-$	2869?					
589[@]	<0.05	3458.08	(7)$^+$	2869?					
592[@]	<0.05	3420.05	(6)$^-$	2828?					
630[@]	<0.05	3458.08	(7)$^+$	2828?					
773.9 2	71.3 8	3420.05	(6)$^-$	2646.15	(4)$^-$	E2			E_γ: others: 773.9 3 (1974Ya04), 773.9 2 (1974Va13). I_γ: other: 71.4 (1974Va13). Mult.: from $\gamma(\theta)$ and γ(lin pol) in 1983Va05. A$_2$=+0.23 8, A$_4$=−0.09 7, POL=+1.6 4 (1983Va05). branching ratio=56.6 5 (1983Va05), 58.1 10 (1974Va13).
807[@]	<0.13	3420.05	(6)$^-$	2612.97	3$^-$				
811.9[‡] 2	30.4 4	3458.08	(7)$^+$	2646.15	(4)$^-$	[E3]			E_γ: other: 811.8 3 (1974Ya04).

Continued on next page (footnotes at end of table)

^{24}Mg(^{16}O,pnγ)   1983Va05,1974Va13 (continued)

γ(^{38}K) (continued)

E$_\gamma$[†]	I$_\gamma$[†]	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Comments
						I$_\gamma$: other: 28.2 *4* (1974Ya04).
						branching ratio=25.2 *8* (1983Va05), 25 *2* (1974Va13).
845[@]	<0.03	3458.08	(7)$^+$	2612.97	3$^-$	
948[@]	<0.04	2646.15	(4)$^-$	1698?		
1019[@]	<0.04	3420.05	(6)$^-$	2401?		
1057[@]	<0.05	3458.08	(7)$^+$	2401?		
1296.2 *3*		8693.0	(12$^-$)	7396.8	(10$^-$)	
1350.7 *4*		8747.5	(11$^-$)	7396.8	(10$^-$)	
1722[@]	<0.05	3420.05	(6)$^-$	1698?		
1760[@]	<0.05	3458.08	(7)$^+$	1698?		
1795.6 *3*		5253.7	(9$^+$)	3458.08	(7)$^+$	
2143.0 *4*		7396.8	(10$^-$)	5253.7	(9$^+$)	
2187.6 *2*	1.51 *8*	2646.15	(4)$^-$	458.49	1$^+$	E$_\gamma$: weighted average of 2187.7 *2* and 2187.3 *5* (1974Va13).
						I$_\gamma$: other: 1.21 *14* (1974Va13).
						branching ratio=1.48 *7* (1983Va05), 1.2 *2* (1974Va13).
2287.4 *9*		10980.5	(13$^-$)	8693.0	(12$^-$)	
2516[@]	<0.08	2646.15	(4)$^-$	130.2	0$^+$	
2613.0 *3*	0.82 *7*	2612.97	3$^-$	0	3$^+$	
2646.0 *2*	100.0 *12*	2646.15	(4)$^-$	0	3$^+$	E$_\gamma$: weighted average of 2646.2 *3* (1983Va05), 2645.9 *3* (1974Ya04), 2646.0 *2* (1974Va13).
						I$_\gamma$: other: 100.0 *36* (1974Va13).
						branching ratio=97.87 *9* (1983Va05), 98.8 *2* (1974Va13).
2961[@]	<0.06	3420.05	(6)$^-$	458.49	1$^+$	
2999[@]	<0.05	3458.08	(7)$^+$	458.49	1$^+$	
3290[@]	<0.09	3420.05	(6)$^-$	130.2	0$^+$	
3328[@]	<0.07	3458.08	(7)$^+$	130.2	0$^+$	
3420.0[‡] *3*	54.7 *8*	3420.05	(6)$^-$	0	3$^+$	E$_\gamma$: weighted average of 3419.8 *3* (1974Va13), 3420.4 *4* (1974Ya04).
						I$_\gamma$: other: 51.4 *22* (1974Va13).
						A$_2$=+0.52 *6*, POL=+0.8 *5*.
						branching ratio=43.4 *5* (1983Va05), 41.9 *10* (1974Va13).
3457.7 *4*	0.24 *3*	3458.08	(7)$^+$	0	3$^+$	I$_\gamma$: other: <0.14 (1974Va13).
						branching ratio=0.20 *2* (1983Va05), <0.12 (1974Va13).

[†] From 1983Va05, unless otherwise stated. Values of Eγ without uncertainties are from level-energy differences. Intensities are relative to Iγ(2646.0)=100.0 *12*. Intensities from 1974Va13 are normalized to Iγ(2646.0)=100.0 *36* and given under comments. Branching ratios given under comments have no internal conversion taken into account.

[‡] From 1974Va13, used for calibration by 1983Va05. Original values in 1983Va05 include recoil-energy corrections that have been removed in the quoted values here.

[#] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

[@] Placement of transition in the level scheme is uncertain.

From ENSDF

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Level Scheme

Intensities: Relative I$_\gamma$

Legend

I$_\gamma$ < 2%×I$_\gamma^{max}$
I$_\gamma$ < 10%×I$_\gamma^{max}$
I$_\gamma$ > 10%×I$_\gamma^{max}$
γ Decay (Uncertain)
Coincidence