Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	T. W. Burrows	NDS 109,171 (2008)	30-Oct-2007

Q(β^-)=4196.5 *7*; S(n)=8905.5 *7*; S(p)=11231.3 *17*; Q(α)=−1.173×10^4 *7* 2012Wa38

Note: Current evaluation has used the following Q record 4196.5 7 *8877* 36 *11231.3 7* −11733 *69* 2003Au03,2007Ya08.

Q(β^-): From Δ' (^{45}K)=−36615.43 keV *57* (2007Ya08) and Δ' (^{45}Ca)=−40711.95 keV *41* (2003Au03). Other: 4204 keV *10* (2003Au03).

S(n): From Δ' (^{45}K)=−36615.43 keV *57* (2007Ya08) and Δ' (^{44}K)=−35810 keV *36* and Δ' (^{1}n)=80071.317 keV *6* (2003Au03). Other: 8.87 MeV *4* (2003Au03).

S(p): From Δ' (^{45}K)=−36615.43 keV *57* (2007Ya08) and Δ' (^{44}Ar)=−32673.1 keV *16* and Δ' (^{1}H)=7288.97050 keV *11* (2003Au03). Other: 1124 keV *10* (2003Au03).

Q(α): From Δ' (^{45}K)=−36615.43 keV *57* (2007Ya08) and Δ' (^{41}Cl)=−27308 keV *69* and Δ' (^{4}He)=2424.91565 keV *6* (2003Au03). Other: −11730 keV *70* (2003Au03).

2007Ya08: Ti(p,X) E=1.4 GeV. Measured masses; tandem Penning trap mass spectrometer, ISOLTRAP, and ISOLDE High-Resolution Separator at CERN. Relative mass uncertainty of δm/m=10×10^{-8} routinely reached. Reference ion: ^{39}K$^+$; Δ' (^{39}K)=−33807.01 keV *19* (2003Au03).

^{45}K Levels

1980Jo09 examined one-hole states using an extremely large model space. See below for the results on specific states used in the current evaluation. The calculations also predicted yrast states with J^π=9/2$^+$ to 15/2$^+$ at 2.25, 2.7, 3.0, and 3.3 MeV.

Cross Reference (XREF) Flags

A ^{45}Ar β^- decay
B ^{46}Ca(t,α),(d,^{3}He)
C ^{48}Ca(p,α)

E(level)†	J$^\pi$‡	T$_{1/2}$#	XREF	Comments
0.0	3/2$^+$ @	17.81 min *61*	ABC	%β^-=100 μ=+0.1734 *8* (2005St24,1982To02); Configuration=(π d$_{3/2}$)$^{-1}$ (1978πe04) J$^\pi$: J from AB (1976Fu06,1967Ga08); π=+ from L=2 in (t,α),(d,^{3}He). T$_{1/2}$: weighted av of 17.81 min *25* (1980Hu10; ΔT$_{1/2}$ statistical only, ^{45}K β^- decay), 20 min *2* (1967Ga08; av from decay curve of atoms collected from AB; ≈3 T$_{1/2}$), 20 min *1* (1964Mo18; chem, NaI), and 16.3 min *3* (1965Ch07; chem, 4$\pi\beta$ pc; 5 T$_{1/2}$). 17.81 min *61* is the mean of 17.79 min *61* (NRM) and 17.83 min *24* (RT) with uncertainty from NRM. μ: AB; ^{39}K standard.
474.45 *14*	1/2$^+$ @		ABC	Configuration=(π s$_{1/2}$)$^{-1}$ (1978πe04)
1020.03 *4*	(3/2,5/2,7/2$^+$)	<0.7 ns	ABC	J$^\pi$: ≤7/2$^+$ from D,E2 γ to 3/2$^+$. (3/2 to 9/2) from D γ from (5/2$^-$,7/2$^-$). 5/2$^+$ from theory (1980Jo09).
1081.38 *5*	(5/2$^-$,7/2$^-$)	3.2 ns *4*	ABC	
1424.3 *3*	1/2,3/2,5/2(+)		AB	J$^\pi$: γ to 1/2$^+$. L(t,α)=0; however, 1980Jo09 note that the evidence for L=0 pickup is weak and that this state may Be the second 3/2$^+$ and that the calculations suggest the second 1/2$^+$ state is at 2.3 MeV. 1986Ku01 note that their pure shell-model calculations reproduce the experimental excitation energy for J^π=1/2$^+$.
1473.9 *3*		≤0.7 ns	A	
1639.15 *7*			A C	J$^\pi$: 7/2$^+$ from theory (1980Jo09).
1722.6 *3*			ABC	J$^\pi$: L(t,α)=(0,2) would imply π=(+).
2188.22 *8*			A C	
2517.0 *3*			A	

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Adopted Levels, Gammas (continued)

^{45}K Levels (continued)

E(level)[†]	J$^\pi$[‡]	XREF	Comments
2568.7 *4*		A	
2747.9 *6*		A c	XREF: c(2.75E+3).
2786.6?[&] *6*		A c	XREF: c(2.75E+3).
3311.18 *24*		A C	
3398.3?[&a] *6*		A	
3.44×10^3[b] *3*		C	
3.69×10^3?[ab] *3*	(5/2$^+$)	C	J$^\pi$: from J dependence of $\sigma(\theta)$ for L(p,α)=2.
3707.2 *3*		A	If J^π(^{45}Ar g.s.)=7/2$^-$, then the 3690 state observed in (p,α) and this state are not the same since J^π(3707)=5/2$^-$,7/2$^-$ from γ to 3/2$^+$ and log *ft*=4.7 *1* from ^{45}Ar g.s.
3753[c] *10*	(3/2$^+$,5/2$^+$)	B	
3996.62 *13*		A C	
4044.0 *10*		A	
4357.3 *4*		A	
4569.1 *10*		A C	
4.90×10^3[b] *3*		C	
5.13×10^3[b] *3*		C	
7.77×10^3[b] *5*		C	
12.62×10^3[b] *5*	(5/2$^-$,7/2$^-$)	C	J$^\pi$: IAS(^{45}Ar g.s.)?

[†] From β^- decay, except as noted.
[‡] From angular momentum transfer in (t,α), except as noted. See β^- decay (1980Hu10) for other suggested J^π based on the assumption that J^π(^{45}Ar g.s.)=(7/2$^-$).
[#] From $\gamma\gamma$(t) in β^- decay (1980Hu01), except for the g.s.
[@] C^2((d,^{3}He),g.s.) is considerably smaller than the results for ^{42}Ca(d,^{3}He) and ^{44}Ca(d,^{3}He), which were close to the theoretical expectation C^{2}S=4.0. C^2((d,^{3}He),470)=1.0 is also about half the theoretical value of C^{2}S=2.0 obtained from transitions to ^{43}K and ^{41}K. This result indicates a probable appreciable admixture of core-excited configurations in the g.s. wave function of ^{45}K. (1971Yn02).
[&] Tentative placement. The sum of the 597.8 and 1209.5 γ's is 1807.3, an energy at which a γ is observed and assigned to the crossover transition 3.99-2.19 MeV; as there is no further evidence, the intermediate state could Be at 2.79 or 3.40 MeV.
[a] May Be the same as the following state.
[b] From (p,α).
[c] From (t,α),(d,^{3}He).

γ(^{45}K)

All data are from β^- decay. See β^- decay for unplaced transitions.

E$_i$(level)	J$_i^\pi$	E$_\gamma$	I$_\gamma$	E$_f$	J$_f^\pi$	Mult.[†]	α[&]	Comments
474.45	1/2$^+$	474.43 *15*	100	0.0	3/2$^+$			
1020.03	(3/2,5/2,7/2$^+$)	1020.04 *5*	100	0.0	3/2$^+$	D,E2		
1081.38	(5/2$^-$,7/2$^-$)	61.34 *5*	100.0 *15*	1020.03	(3/2,5/2,7/2$^+$)	D	0.07 *3*	B(E1)(W.u.)≤0.00059 *8*; B(M1)(W.u.)≤0.026 *9* α(K)=0.060 *24*; α(L)=0.0051 *20*; α(M)=0.00055 *21*; α(N+..)=2.0×10^{-5} *8*
		1081.21 *19*	5.2 *25*	0.0	3/2$^+$	(E1,M2)[‡]	7.×10^{-5} *4*	B(E1)(W.u.)≤6.E−9 *3*; B(M2)(W.u.)≤0.024 *12*

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Adopted Levels, Gammas (continued)

$\gamma(^{45}K)$ (continued)

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.[†]	Comments
							α(K)=6.E−5 *4*; α(L)=5.E−6 *3*; α(M)=6.E−7 *4*; α(N+..)=2.1×10^{-8} *12* α(N)=2.1×10^{-8} *12*
1424.3	1/2,3/2,5/2$^{(+)}$	949.8 *3*	100.0[#] *12*	474.45	1/2$^+$		
		1424.4 *5*	65.3[#] *12*	0.0	3/2$^+$		
1473.9		1473.6 *3*	100	0.0	3/2$^+$	D,Q	
1639.15		557.76 *9*	24.4 *11*	1081.38	(5/2$^-$,7/2$^-$)		
		619.25 *12*	31.0 *26*	1020.03	(3/2,5/2,7/2$^+$)		
		1638.81 *22*	100.0 *26*	0.0	3/2$^+$		
1722.6		1722.5 *3*	100	0.0	3/2$^+$		
2188.22		549.08 *8*	23.8 *15*	1639.15			
		1106.82 *8*	100.0 *33*	1081.38	(5/2$^-$,7/2$^-$)		
2517.0		1042.8 *3*	92[#] *15*	1473.9			
		1434.8 *10*	100[#] *21*	1081.38	(5/2$^-$,7/2$^-$)		
		2517.9 *5*	88[#] *16*	0.0	3/2$^+$		
2568.7		845.4 *10*	34.6[#] *6*	1722.6			
		1548.5 *5*	100[#] *6*	1020.03	(3/2,5/2,7/2$^+$)		
2747.9		1323.2 *6*	67[#] *15*	1424.3	1/2,3/2,5/2$^{(+)}$		
		2749.8 *16*	100[#] *15*	0.0	3/2$^+$		
2786.6?		597.8[a@b] *5*	100[a]	2188.22			
3311.18		1123.1 *5*	100[#] *4*	2188.22			
		1670.7 *8*	25[#] *4*	1639.15			
3398.3?		1209.5[a@b] *4*	100[a]	2188.22			
3707.2		1138.2 *5*	2.0 *6*	2568.7			
		2283.2 *7*	2.5 *7*	1424.3	1/2,3/2,5/2$^{(+)}$		
		2687.5 *4*	27.8 *27*	1020.03	(3/2,5/2,7/2$^+$)		
		3703.2 *13*	100.0 *28*	0.0	3/2$^+$		
3996.62		597.8[a@b] *5*	<2.5[a]	3398.3?			
		685.3 *2*	9.2 *13*	3311.18			
		1209.5[a@b] *4*	<3.8[a]	2786.6?			
		1808.38 *16*	100.0 *26*	2188.22			
		2357.43 *15*	59.6 *16*	1639.15			
		3995.3 *15*	2.1 *5*	0.0	3/2$^+$		
4044.0		4043.8 *10*	100	0.0	3/2$^+$		
4357.3		1840.1 *5*	100 *18*	2517.0			
		2885.0 *20*	38 *15*	1473.9			
		3338.1 *10*	66.7 *24*	1020.03	(3/2,5/2,7/2$^+$)		
		4356.0 *10*	58 *12*	0.0	3/2$^+$		
4569.1		4568.9 *10*	100	0.0	3/2$^+$		

[†] From comparison to RUL, except as noted.
[‡] D,Q,(E3) from comparison to RUL. (E1,M2) from $\Delta\pi$=(yes).
[#] From branching ratios in 1980Hu01.
[@] See footnote on 2.79- or 3.40-MeV state.
[&] 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.
[a] Multiply placed with undivided intensity.
[b] Placement of transition in the level scheme is uncertain.

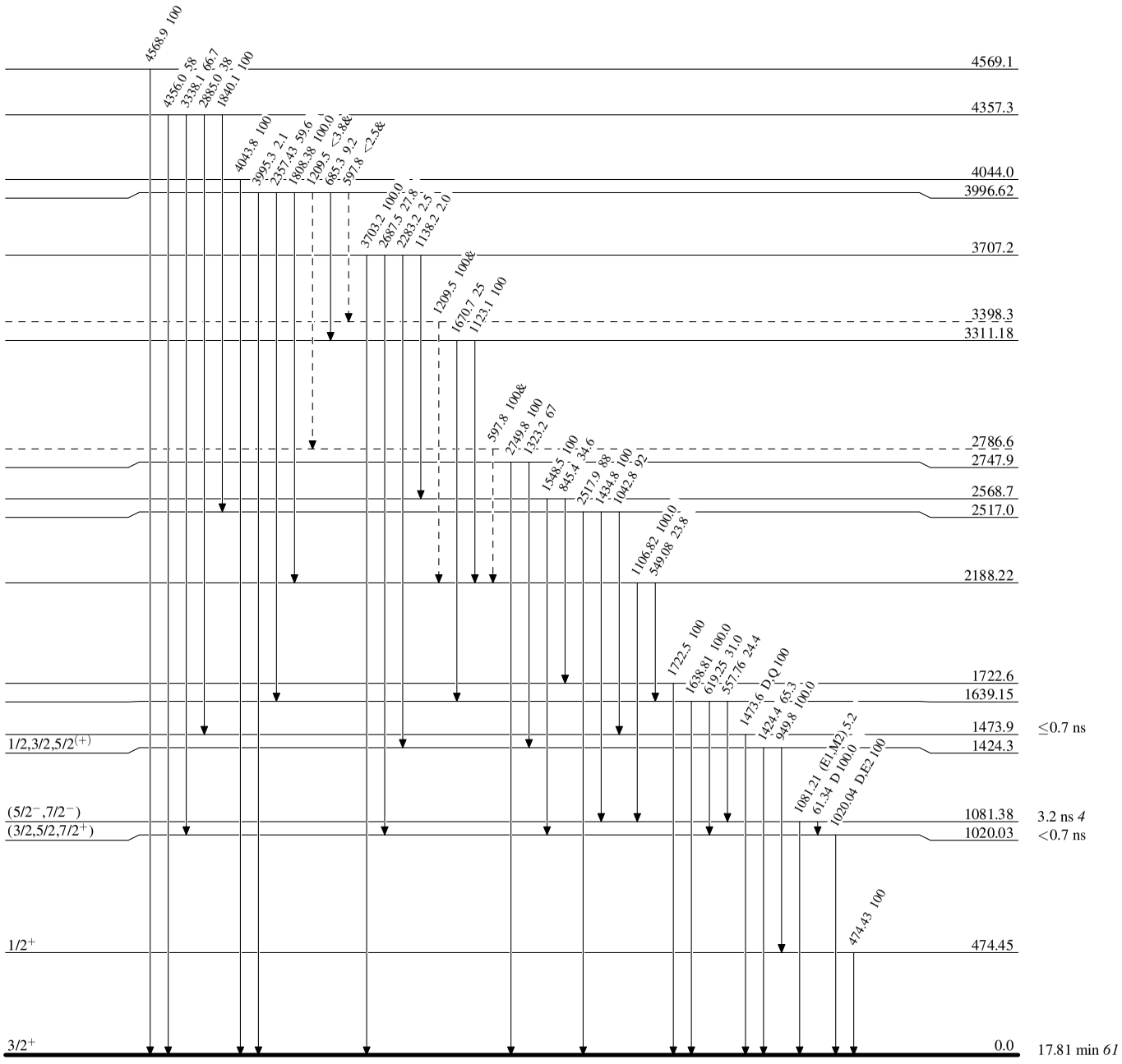
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

γ Decay (Uncertain)



$^{45}_{19}K_{26}$