^{49}K β^- decay

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	T. W. Burrows[a]	NDS 109, 1879 (2008)	14-Jul-2008

Parent: ^{49}K: E=0.0; J$^\pi$=(3/2$^+$); $T_{1/2}$=1.26 s *5*; Q(β^-)=1.097×10^4 *7*; %β^- decay=100.0
^{49}K-E,J$^\pi$,$T_{1/2}$: From ^{50}K Adopted Levels.
^{49}K-Q(β^-): From 2003Au03.
^{49}K-%β^- decay: %β^-n=86 *9* from simultaneous β and N measurements assuming %β^-n(^{9}Li)=50 *4* (1982Ca04).
1978De17: U(p,X) E=24 GeV. Measured β's (2π scin) and γ's and γ(t).
1983RaZR, 1982Ca04: U(p,X) E=600 MeV (ms). Measured β's (scin), γ's, B(t) and γ(t), n′s (long counter), and βn- and γn-coincidences. The thesis of 1983RaZR is apparently a more complete report of the work presented by 1982Ca04.
1986Mi08: U(p,X) E=600 MeV (ms). Measured $\beta^{-\prime}$s (ΔE/E telescope), n′s (scin), and β^-n coincidences. Deduced Q(β^-).
Other: see 1995Bu23.
The β-strength function displays two resonances centered At≈6.5 and≈9.5 MeV In ^{49}Ca. See 1982Ca04 for additional discussion.

^{49}Ca Levels

Excitation energies reported by 1983RaZR appear to Be 10 to 20 keV lower than those of 1982Ca04 for the unbound states.
The states populated In ^{49}Ca *via* allowed β^- decay have a particle-hole nature and most are not seen In (d,p) As expected.

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	Comments
0	3/2$^-$	8.718 min *6*	%β^-=100 $T_{1/2}$,%β^-: from the Adopted Levels.
2023.0 *5*	1/2$^-$		
3585.0 *8*	5/2$^-$		Additional information 1.
4072 *1*	3/2$^-$		
4272 *1*	1/2$^-$		
5.30×10^3 *1*	1/2[#]		
5.59×10^3 *2*	(1/2$^+$,3/2$^+$,5/2$^+$)		
5.71×10^3 *2*	(1/2$^+$,3/2$^+$,5/2$^+$)		
6.33×10^3 *2*	(1/2$^+$,3/2$^+$,5/2$^+$)		
6.37×10^3 *3*	(5/2$^+$)[#]		
6.55×10^3 *3*	(1/2$^+$,3/2$^+$,5/2$^+$)		
6.69×10^3 *3*	5/2$^+$[#]		
6.90×10^3 *3*	5/2$^+$[#]		
7.06×10^3 *4*	5/2$^+$[#]		
7.28×10^3 *5*	(1/2$^+$,3/2$^+$,5/2$^+$)		
7.42×10^3 *5*	(1/2$^+$,3/2$^+$,5/2$^+$)		
7.59×10^3 *6*	(1/2,3/2,5/2)[@]		
7.80×10^3 *7*	(1/2,3/2,5/2)[@]		
8.14×10^3[&] *7*	(1/2$^+$,3/2$^+$,5/2$^+$)		
8.39×10^3[&] *8*	(1/2$^+$,3/2$^+$,5/2$^+$)		
8.67×10^3[&] *9*	(1/2$^+$,3/2$^+$,5/2$^+$)		
9.10×10^3[a]	(1/2$^+$,3/2$^+$,5/2$^+$)		
9.28×10^3 *10*	(1/2$^+$,3/2$^+$,5/2$^+$)		
9.58×10^3 *11*	(1/2$^+$,3/2$^+$,5/2$^+$)		
10.10×10^3[&] *13*	(1/2$^+$,3/2$^+$,5/2$^+$)		

† Energies are from 1982Ca04 and uncertainties are from 1983RaZR.
‡ From the Adopted Levels for states below 5 MeV and from log *ft*<5.9 from (3/2$^+$) for states above 5 MeV, except As noted.

Continued on next page (footnotes at end of table)

^{49}K β^- decay (continued)

^{49}Ca Levels (continued)

[#] From the Adopted Levels.
[@] log ft=5.8 *2* and 5.6 *3* from (3/2$^+$), respectively.
[&] Not reported by 1982Ca04.
[a] Not reported by 1983RaZR.

β^- radiations

Intensities for B$^-$ feeding of states above 4300 differ by≤≈1% between 1983RaZR and 1982Ca04.
log ft(F) log $f^{1u}t$≥8.5.

E(decay)[†]	E(level)	Iβ^-[‡b]	Log ft	Comments
4.0×10^2[#@c] *13*	10100	0.05 *1*	4.1 *4*	av Eβ=316 *63*
9.1×10^2 *11*	9580	0.10 *2*	4.6 *2*	av Eβ=544 *59*
1.23×10^3 *10*	9280	0.10 *2*	4.9 *2*	av Eβ=680 *57*
(1.87×10^3[&] *7*)	9100	0.2[†]	4.8	av Eβ=763 *33*
1.83×10^3[#@c] *9*	8670	0.30 *6*	5.0 *2*	av Eβ=965 *54*
2.11×10^3[#@c] *8*	8390	1.0 *2*	4.7 *1*	av Eβ=1098 *51*
2.36×10^3[#@c] *7*	8140	0.5 *1*	5.2 *1*	av Eβ=1217 *48*
2.72×10^3 *7*	7800	0.3 *2*	5.6 *3*	av Eβ=1380 *48*
2.93×10^3 *6*	7590	0.3 *1*	5.8 *2*	av Eβ=1481 *45*
3.10×10^3 *5*	7420	1.4 *4*	5.2 *1*	av Eβ=1564 *42*
(3.69×10^3[#@] *9*)	7280	2.5 *6*	5.0 *1*	av Eβ=1631 *42*
(3.91×10^3[#@] *8*)	7060	9.2 *18*	4.65 *1*	av Eβ=1738 *40*
3.61×10^3 *3*	6900	1.4 *4*	5.4 *2*	av Eβ=1816 *37*
(4.28×10^3[#@] *8*)	6690	14.3 *28*	4.5 *1*	av Eβ=1918 *37*
(4.42×10^3[#@] *8*)	6550	17.6 *21*	4.5 *1*	av Eβ=1986 *38*
(4.60×10^3 *8*)	6370	2.1 *4*	5.5 *1*	av Eβ=2074 *38*
(4.64×10^3 *7*)	6330	8.0 *16*	4.9 *1*	av Eβ=2093 *36*
4.78×10^3 *2*	5710	8.4 *19*	5.2 *1*	av Eβ=2396 *36*
4.91×10^3 *2*	5590	13.4 *29*	5.0 *1*	av Eβ=2455 *36*
5.20×10^3 *1*	5300	6.7 *7*	5.4 *1*	av Eβ=2597 *35*
(6.70×10^3 *7*)	4272	3.3	6.1	av Eβ=3101 *35*
(6.90×10^3 *7*)	4072	0.2	7.3	av Eβ=3199 *35*
(7.39×10^3 *7*)	3585.0	0.2	7.5	av Eβ=3438 *35*
(8.95×10^3[c] *7*)	2023.0	0.4[a]	7.6	av Eβ=4206 *35*
(1.097×10^4 *7*)	0	10.0	6.6	av Eβ=5199 *35*

[†] From 1983RaZR.
[‡] Absolute intensity. The g.s. feeding of ^{49}Ca was obtained by comparing ^{49}Ca to ^{49}Sc activity to that of ^{49}K to ^{49}Ca and by direct measurement of the Iβ's and Iγ's. ΔIβ from 1983RaZR adjusted by the evaluator to correspond to Iβ given by 1982Ca04.
[#] Eβ from 1983RaZR and 1986Mi08 are discrepant for these transitions: 3.95 MeV *3*, 3.82 MeV *3*, 3.45 MeV *4* and 3.23 MeV *5* (1983RaZR) compared to 4.17 MeV *10*, 4.18 MeV *6*, 4.05 MeV *5*, and 3.91 MeV *11* (1986Mi08).
[@] Not reported by 1982Ca04.
[&] Not reported by 1983RaZR.
[a] −1.1 *3* from the decay scheme.
[b] Absolute intensity per 100 decays.
[c] Existence of this branch is questionable.

^{49}K β^- decay (continued)

$\gamma(^{49}Ca)$

From %β^-n=86 *9* and Iβ(g.s.)=10.

E_γ[†]	I_γ[‡@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	α[&]	Comments
2023.0	0.4	2023.0	1/2⁻	0	3/2⁻	(M1,E2)	0.000314 *5*	α=0.000314 *5*; α(K)=1.82×10^{-5} *9*; α(L)=1.56×10^{-6} *7*; α(M)=1.85×10^{-7} *9*; α(N+..)=0.00029 *4* α(N)=1.05×10^{-8} *5*; α(IPF)=0.00029 *4* I_γ: 32 *6* (1978De17).
2249	1.54 *28*	4272	1/2⁻	2023.0	1/2⁻	(M1,E2)	0.000415 *6*	α=0.000415 *6*; α(K)=1.52×10^{-5} *6*; α(L)=1.30×10^{-6} *5*; α(M)=1.54×10^{-7} *6*; α(N+..)=0.00039 *5* α(N)=8.8×10^{-9} *4*; α(IPF)=0.00039 *5* I_γ: Iγ(2249γ)/Iγ(4272γ)=27 *6*/31 *8* (1978De17). Note discrepancy with Iγ(2250γ)/Iγ(4272γ)=43 *9*/100 *20* In (d,pγ).
3585.0	0.2	3585.0	5/2⁻	0	3/2⁻	(M1,E2)	0.000977 *14*	α=0.000977 *14*; α(K)=7.25×10^{-6} *17*; α(L)=6.20×10^{-7} *14*; α(M)=7.36×10^{-8} *17*; α(N+..)=0.00096 *7* α(N)=4.20×10^{-9} *10*; α(IPF)=0.00096 *7* I_γ: branching ratio from Adopted Gammas.
4072	0.2	4072	3/2⁻	0	3/2⁻	(M1,E2)	0.001137 *16*	α=0.001137 *16*; α(K)=6.02×10^{-6} *13*; α(L)=5.14×10^{-7} *11*; α(M)=6.11×10^{-8} *13*; α(N+..)=0.00113 *7* α(N)=3.48×10^{-9} *8*; α(IPF)=0.00113 *7* I_γ: branching ratio from Adopted Gammas.
4272	1.76 *28*	4272	1/2⁻	0	3/2⁻	(M1,E2)	0.001208 *17*	α=0.001208 *17*; α(K)=5.62×10^{-6} *12*; α(L)=4.80×10^{-7} *10*; α(M)=5.70×10^{-8} *12*; α(N+..)=0.00120 *8* α(N)=3.25×10^{-9} *7*; α(IPF)=0.00120 *8* I_γ: see comment on Iγ(2249γ).

† From the excitation energies. Others: 2025 *2*, 2252 *2*, and 4278 *4* (1978De17).

‡ Absolute photon intensity from absolute Iβ and branching ratios given under comments. Note that 1978De17 cite absolute Iγ′s assuming No delayed-neutron activity.

\# From the Adopted Gammas.

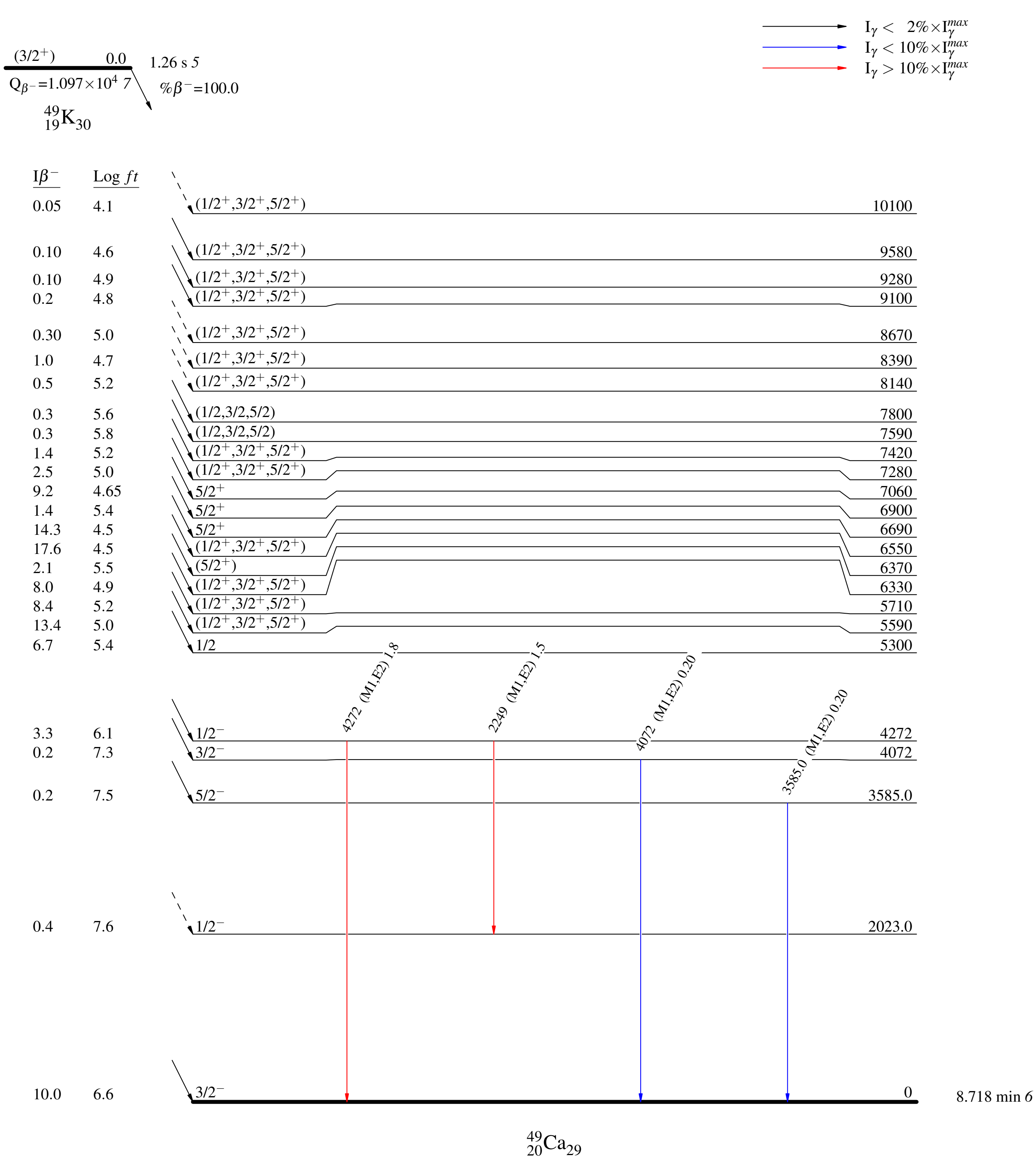
@ For absolute intensity per 100 decays, multiply by 1.00 *23*.

& 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.

^{49}K β^- decay

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays



^{49}K β^- decay

Decay Scheme (continued)

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays