^{51}K β^-n decay (365 ms) 2006Pe16,1983La23

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh	NDS 157, 1 (2019)	15-Apr-2019

Parent: ^{51}K: E=0; $J^\pi=3/2^+$; $T_{1/2}$=365 ms *5*; Q(β^-n)=9002 *13*; %β^-n decay=65 *8*

^{51}K-Q(β^-n): From 2017Wa10.

^{51}K-J^π,$T_{1/2}$: From Adopted Levels for ^{51}K in ENSDF database (March 2016 update).

^{51}K-%β^-n decay: %β^-n=65 *8*, from weighted average of 68 *10* (1983La23, from integral β-delayed neutrons); and 63 *8* (2006Pe16, from measured I(n)/I(β^-) of 17 significant neutron peaks, and using detector efficiencies for neutrons and β^-).

2006Pe16: ^{51}K isotope produced in spallation reaction by bombarding a UC_x target by a 1.4 GeV proton beam produced by the CERN proton-synchrotron booster (PSB). Spallation products analyzed using the high resolution separator (HRS). Measured Eγ, $\gamma\gamma$, β, βn coin, βnγ coin, $\beta\gamma$ coin, and $\beta\gamma\gamma$ coin. The γ rays were detected using two large Ge clusters from the MINIBALL array. Low energy neutrons detected using six detectors each composed of a thick BC400 plastic scintillator. High energy neutrons were detected using 11 curved BC400 scintillating plastic bars from the TONNERRE array. The β particles were detected using a cylindrical plastic scintillator.

1983La23: measured β-delayed neutrons. Deduced %β^-n.

^{50}Ca Levels

E(level)	J^π[†]
0	0^+
1027 *1*	2^+
3003 *1*	(2^+)
3530 *1*	$(1,2^+)$
4035 *2*	$(1,2^+)$

[†] From Adopted Levels.

γ(^{50}Ca)

Iγ normalization: 2006Pe16 give absolute photon intensities.

Eγ	Iγ[†]	E$_i$(level)	J_i^π	E$_f$	J_f^π
1027 *1*	21.7 *22*	1027	2^+	0	0^+
1976 *1*	2.6 *3*	3003	(2^+)	1027	2^+
2503 *1*	0.6 *1*	3530	$(1,2^+)$	1027	2^+
3008 *2*	0.3 *1*	4035	$(1,2^+)$	1027	2^+
3530 *2*	0.8 *1*	3530	$(1,2^+)$	0	0^+
4035 *2*	0.5 *1*	4035	$(1,2^+)$	0	0^+

[†] Absolute intensity per 100 decays.

Delayed Neutrons (^{50}Ca)

E(n)[†]	E(^{50}Ca)	I(n)[†‡]	E(^{51}Ca)
530 *20*	3003	0.5 *2*	7900
690 *20*	3530	1.4 *5*	8590
780 *20*	3003	2.3 *7*	8160
820 *25*	1027	5.5 *16*	6220
830 *20*	4035	1.8 *4*	9240

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^{51}K β^-n decay (365 ms) 2006Pe16,1983La23 (continued)

Delayed Neutrons (continued)

E(n)†	E(^{50}Ca)	I(n)†‡	E(^{51}Ca)	E(n)†	E(^{50}Ca)	I(n)†‡	E(^{51}Ca)
840 *25*	0	63 *12*	5220	199×10^1 *10*	4035	0.9 *4*	10420
910 *30*	1027	9.2 *21*	6320	2190 *80*	1027	12.4 *24*	7650
960 *40*	3530	1.4 *4*	8870	2230 *80*	0	100	6600
980 *40*	3003	4.6 *10*	8360	227×10^1 *12*	3530	1.4 *4*	10210
1170 *40*	1027	22.0 *39*	6600	257×10^1 *20*	3003	0.9 *3*	9880
1420 *80*	4035	0.9 *3*	9880	307×10^1 *13*	1027	7.3 *16*	8590
146×10^1 *10*	3530	2.3 *4*	9360	329×10^1 *15*	0	10.2 *23*	7650
1470 *50*	3003	1.4 *4*	8870	367×10^1 *18*	1027	5.5 *15*	9130
1540 *50*	1027	21.6 *39*	6960	420×10^1 *22*	0	5.1 *16*	8590
184×10^1 *12*	3003	2.3 *6*	9240	486×10^1 *27*	0	5.1 *17*	9360

† From 2006Pe16. Energies in the lab system. Quoted values of intensities are the relative intensities given by 2006Pe16. For intensities per 100 decays of ^{51}K, 2006Pe16 gave a multiplicative factor of 0.218, based on %β^-n=63 *8*. Evaluators obtain corresponding factor of 0.225 based on adopted %β^-n=65 *8*.

‡ For absolute intensity per 100 decays, multiply by 0.225 *28*.

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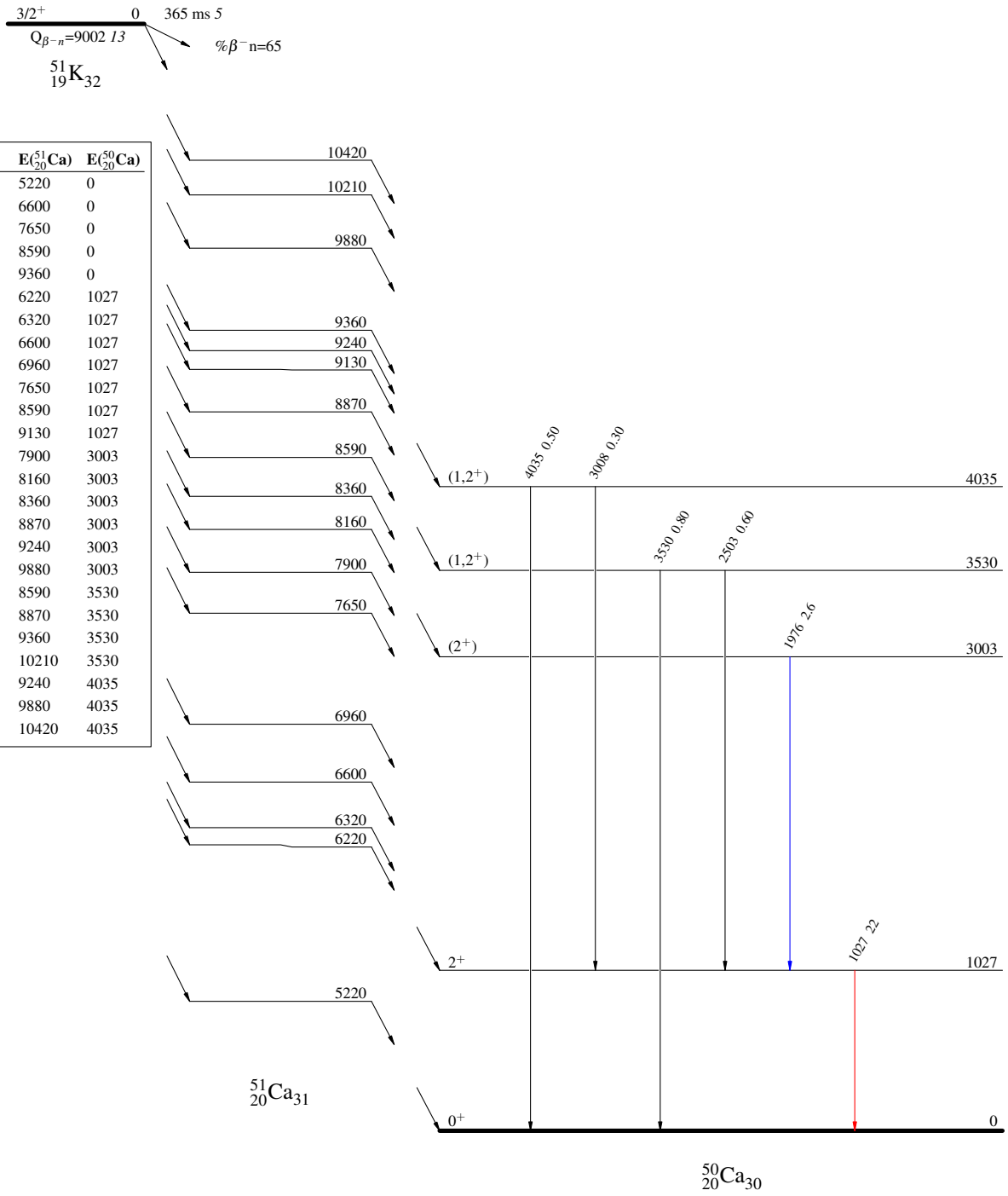
Decay Scheme

γ Intensities: I_γ per 100 parent decays
I(n) Intensities: Relative I(n)



E(n)	I(n)	E($^{51}_{20}$Ca)	E($^{50}_{20}$Ca)
840	14	5220	0
2230	23	6600	0
3290	2.3	7650	0
4200	1.1	8590	0
4860	1.1	9360	0
820	1.2	6220	1027
910	2.1	6320	1027
1170	5.0	6600	1027
1540	4.9	6960	1027
2190	2.8	7650	1027
3070	1.6	8590	1027
3670	1.2	9130	1027
530	0.11	7900	3003
780	0.52	8160	3003
980	1.0	8360	3003
1470	0.32	8870	3003
1840	0.52	9240	3003
2570	0.20	9880	3003
690	0.32	8590	3530
960	0.32	8870	3530
1460	0.52	9360	3530
2270	0.32	10210	3530
830	0.41	9240	4035
1420	0.20	9880	4035
1990	0.20	10420	4035