^{44}Sc ε decay (58.61 h) 1990Me15,1976Co06

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh	NDS 190,1 (2023)	20-Jun-2023

Parent: ^{44}Sc: E=271.241 *10*; $J^\pi=6^+$; $T_{1/2}$=58.61 h *10*; Q(ε)=3652.7 *18*; %ε+%$β^+$ decay=1.23 *1*

^{44}Sc-E,J^π,$T_{1/2}$: From ^{44}Sc Adopted Levels.

^{44}Sc-Q(ε): From 2021Wa16.

^{44}Sc-%ε+%$β^+$ decay: From Iγ(1001.8γ)/ΣIγ(γ to g.s.)=0.0123 *1* in 1976Co06, where 1001.8γ is only from this decay channel and γ rays to g.s. are from ε+$β^+$ decays of g.s. and all isomers of ^{44}Sc. Other: the ratio is 0.0120 *7* in 1968Wa21, 0.01237 *13* in 1983Gu11, 0.0114 *25* in 1974HeYW.

1990Me15, 1976Co06: Source of ^{44}Sc was prepared by the (γ,n) reactions on natural Sc at the Livermore linear accelerator or by the (α,dxn) reaction on natural Ca metal at the Berkeley 88-inch cyclotron. γ rays were detected with a Ge(Li) detector. Measured Eγ, Iγ. Deduced levels, branching ratios, log *ft*.

Additional information 1.

Others:

$T_{1/2}$(^{44}Sc isomer): 1940Wa01, 1945Hi05, 1950Br52, 1952Ru23, 1954An25, 1956Ru45.

Isotopic assignment: 1937Wa03, 1937Wa07, 1937Wa04, 1937Wa05, 1937Po04, 1938Bu05, 1938Co01, 1940Wa01, 1942Sm01, 1945Hi05, 1950Br52, 1951Ba84, 1954An25.

γ: 1983Gu11, 1974HeYW, 1972Ta36, 1971Ok03, 1970Ei07, 1968Wa21, 1967Ki07, 1963Kl06, 1962Di06, 1955Bl23, 1950Br52, 1942Sm01, 1941He01.

^{44}Ca Levels

E(level)†	J^π‡	$T_{1/2}$‡
0.0	0^+	
1157.018 *15*	2^+	2.94 ps *12*
2283.118 *25*	4^+	1.9 ps *7*
3285.006 *32*	6^+	13.3 ps *12*

† From Eγ data.

‡ From the Adopted Levels.

ε,$β^+$ radiations

E(decay)	E(level)	Iε†	Log *ft*	Comments
(638.9 *18*)	3285.006	1.23 *1*	5.870 *10*	εK=0.8985 *5*; εL=0.08695 *32*; εM+=0.01457 *17* I(ε+$β^+$): from Iγ(1001.83γ)/Iγ(1157γ) from the decay of g.s.+isomer mixture in 1990Me15 and 1976Co06, assuming all ε+$β^+$ feedings of this isomer go to 3285 level. Other: the ratio is 0.0120 *7* from 1968Wa21, 0.0114 *25* in 1974HeYW.

† Absolute intensity per 100 decays.

γ(^{44}Ca)

Eγ	Iγ†#	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	α@	Comments
1001.876 *20*	100	3285.006	6^+	2283.118	4^+	E2	9.16×10^{-5} *13*	α(K)=8.35×10^{-5} *12*; α(L)=7.18×10^{-6} *10*; α(M)=8.52×10^{-7} *12* α(N)=4.82×10^{-8} *7* Eγ: weighted average of 1001.850 *31* (1990Me15), 1001.888 *20* (1983Gu11), 1001.86 *15* (1974HeYW), 1001.5 *10* (1970Ei07), 1001.8 *5* (1968Wa21).

Continued on next page (footnotes at end of table)

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γ(^{44}Ca) (continued)

E_γ	I_γ[†#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α[@]	Comments
								Iγ(1002)/Iγ(1157γ)=12.3 *1*/100 from the decay of g.s.+isomer mixture (1990Me15,1976Co06), 0.01237 *13* (1983Gu11), 0.0114 *25* (1974HeYW), 0.0120 *7* (1968Wa21), <0.027 (1973Si05).
1126.084 *20*	100	2283.118	4+	1157.018	2+	E2	7.12×10^{-5} *10*	α(K)=6.31×10^{-5} *9*; α(L)=5.42×10^{-6} *8*; α(M)=6.44×10^{-7} *9* α(N)=3.65×10^{-8} *5*; α(IPF)=2.000×10^{-6} *28* E_γ: weighted average of 1126.092 *40* (1990Me15), 1126.079 *20* (1983Gu11), 1126.18 *15* (1974HeYW), 1127.2 *6* (1970Ei07), 1125.7 *5* (1968Wa21). Iγ(1126)/Iγ(1157γ)=12.3 *1*/100=0.0123 *1* from the decay of g.s.+isomer mixture (1990Me15,1976Co06), 0.01254 *22* (1983Gu11), 0.0108 *20* (1974HeYW), 0.0120 *7* (1968Wa21), <0.027 (1973Si05).
1157.002 *15*	100	1157.018	2+	0.0	0+	E2	6.92×10^{-5} *10*	α(K)=5.93×10^{-5} *8*; α(L)=5.09×10^{-6} *7*; α(M)=6.05×10^{-7} *8* α(N)=3.43×10^{-8} *5*; α(IPF)=4.15×10^{-6} *6* E_γ: weighted average of 1157.031 *15* (1990Me15), 1157.015 *15* (1983Gu11), 1156.92 *15* (1974HeYW), 1156.9 *6* (1973Si05), 1157.0 *3* (1970Ei07), 1156.6 *5* (1968Wa21).

† From decay scheme of ε decay of this isomer, assuming all $\varepsilon+\beta^+$ feedings go to 3285 level. The intensity ratios in the decay of the g.s.+isomer mixture are given under comments.

‡ From the Adopted Gammas.

For absolute intensity per 100 decays, multiply by 0.0123 *1*.

@ 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.

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Decay Scheme

Intensities: I_γ per 100 parent decays