^{48}Sc β^- decay 1990Me15

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 179, 1 (2022)	30-Nov-2021

Parent: ^{48}Sc: E=0.0; $J^\pi=6^+$; $T_{1/2}$=43.71 h *9*; $Q(\beta^-)$=3989 *5*; $\%\beta^-$ decay=100.0

^{48}Sc-J^π,$T_{1/2}$: From Adopted Levels of ^{48}Sc. Adopted $T_{1/2}$ is weighted average of 43.67 h *9* (1969Ra16), 44.1 h *3* (1300γ) and 43.9 h *6* and 45.2 h *15* (175γ) (1963Hi02), 44.0 h 9 (1959Po64), 43.4 h *5* (1945Hi04), and 44 h *1* (1940Wa01, Quartz-fibre electroscope). Other: 43.2 h (1963Ho17).

^{48}Sc-$Q(\beta^-)$: From 2021Wa16.

1990Me15,1976Ja07: ^{48}Sc activity from $^{51}V(n,\alpha)$ at the Lawrence Livermore Laboratory. Measured Eγ, Iγ with Ge(Li) detectors. Eγ and Iγ values in 1976Ja07 are superseded by those in 1990Me15.

1970Ei07: ^{48}Sc activity from $^{48}Ca(p,n)$ at the Naval Research Laboratory. Measured Eγ, Iγ with a Ge(Li) detector.

1968KeZZ: ^{48}Sc activity from $^{48}Ti(n,p)$ at the University of Kentucky. Measured Eγ, $\gamma\gamma$-coin with Ge(Li) and NaI(Tl) detectors.

1967Ko01: ^{48}Sc activity from $^{51}V(d,\alpha p)$ at the IKO in Amsterdam. Measured Eγ, Iγ with a Ge detector.

1963Hi02: ^{48}Sc activity from $^{51}V(n,\alpha)$ at BNL. γ rays were detected with NaI(Tl) crystals and β particles were detected with an iron-free intermediate-image beta-ray spectrometer. Measured Eγ, Eβ, $\gamma\gamma$-coin, $\beta\gamma$-coin, $\beta\gamma$(t).

1957Va08: ^{48}Sc activity from $^{51}V(d,\alpha p)$ at the Philips synchro-cyclotron in Amsterdam. Measured Eβ, Iβ, E(ce), I(ce) with a magnetic beta-ray spectrometer.

1956Va06: ^{48}Sc activity from $^{51}V(d,\alpha p)$ at the Philips synchro-cyclotron in Amsterdam. Measured $\gamma\gamma$-coin and $\gamma\gamma(\theta)$ with two NaI scintillation spectrometers.

Others: 1972Si37,1971ChXL, 1969Ra16, 1966Va14, 1963Ho17, 1959Po64, 1953Ca43, 1945Hi04, 1942Sm01, 1940Wa01.

^{48}Ti Levels

E(level)†	J^π‡	$T_{1/2}$	Comments
0.0	0^+	stable	
983.536 *12*	2^+		
2295.674 *17*	4^+		
3333.208 *20*	6^+		J^π: spin=6 from $\gamma\gamma(\theta)$ in 1956Va06.
3508.569 *20*	6^+		

† From a least-squares fit to γ-ray energies.

‡ From Adopted Levels. Supporting arguments from this dataset are given under comments where available.

β^- radiations

E(decay)	E(level)	Iβ^-†	Log *ft*	Comments
475 *23*	3508.569	9.88 *22*	6.996 *21*	av Eβ=158.6 *23* E(decay): from 1963Hi02. Iβ^-: from I(γ+ce) intensity balance at this level.
644 *5*	3333.208	90.12 *22*	5.527 *15*	av Eβ=227.3 *25* E(decay): weighted average of 654 *7* (1957Va08), 640 *4* (1942Sm01), and 658 *26* (1963Hi02). Iβ^-: from 100-Iβ^-(3509).

† Absolute intensity per 100 decays.

$^{48}Sc\ \beta^-$ decay 1990Me15 (continued)

$\gamma(^{48}Ti)$

Iγ normalization: From %I(γ+ce)(983γ)=100. A 2% uncertainty due to efficiency calibration as noted in 1976Ja07 is added. States below 3333 are not directly fed since ΔJ≥2, Δπ=+.

E_γ[‡]	I_γ[‡@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	α[†]	Comments
175.361 *5*	74.7 *9*	3508.569	6^+	3333.208	6^+	M1	0.00449 *6*	%Iγ=7.47 *18* α(K)=0.00407 *6*; α(L)=0.000371 *5*; α(M)=4.74×10^{-5} *7* α(N)=2.54×10^{-6} *4* E_γ: others: 175.0 *4* (1970Ei07), 175 *1* (1968KeZZ), 175.3 *5* (1967Ko01). I_γ: others: 60 *10* (1970Ei07), 94 *5* (1967Ko01).
983.526 *12*	1000 *20*	983.536	2^+	0.0	0^+	E2	0.0001261 *18*	α(exp)=1.24×10^{-4} *12* (1957Va08) %Iγ=100 α=0.0001261 *18*; α(K)=0.0001145 *16*; α(L)=1.025×10^{-5} *14*; α(M)=1.311×10^{-6} *18* α(N)=7.10×10^{-8} *10* E_γ: others: 983.5 *2* (1970Ei07), 987.0 *10* (1968KeZZ), 983.3 *4* (1967Ko01), 986 *3* (1957Va08). I_γ: others: 1000 (1970Ei07,1967Ko01).
1037.522 *12*	975 *5*	3333.208	6^+	2295.674	4^+	E2	0.0001108 *16*	α(exp)=1.06×10^{-4} *7* (1957Va08) %Iγ=97.5 *20* α=0.0001108 *16*; α(K)=0.0001006 *14*; α(L)=9.00×10^{-6} *13*; α(M)=1.151×10^{-6} *16* α(N)=6.23×10^{-8} *9* E_γ: others: 1037.6 *2* (1970Ei07), 1039.9 *10* (1968KeZZ), 1037.1 *5* (1967Ko01), 1040 *3* (1957Va08). I_γ: others: 980 *20* (1970Ei07), 980 *30* (1967Ko01).
1212.880 *12*	23.8 *4*	3508.569	6^+	2295.674	4^+	E2	8.83×10^{-5} *12*	%Iγ=2.38 *6* α=8.83×10^{-5} *12*; α(K)=7.00×10^{-5} *10*; α(L)=6.26×10^{-6} *9*; α(M)=8.00×10^{-7} *11* α(N)=4.34×10^{-8} *6*; α(IPF)=1.120×10^{-5} *16* E_γ: others: 1212.6 *3* (1970Ei07), 1212.5 *10* (1968KeZZ), 1212.3 *7* (1967Ko01). I_γ: others: 22 *5* (1970Ei07), 25 *2* (1967Ko01).
1312.120 *12*	1000 *5*	2295.674	4^+	983.536	2^+	E2	9.66×10^{-5} *14*	α(exp)=0.69×10^{-4} *9* (1957Va08) %Iγ=100 α=9.66×10^{-5} *14*; α(K)=5.89×10^{-5} *8*; α(L)=5.26×10^{-6} *7*; α(M)=6.73×10^{-7} *9* α(N)=3.65×10^{-8} *5*; α(IPF)=3.17×10^{-5} *4* E_γ: others: 1312.1 *3* (1970Ei07),

Continued on next page (footnotes at end of table)

^{48}Sc β^- decay 1990Me15 (continued)

$\gamma(^{48}Ti)$ (continued)

E_γ ‡	E_i(level)	Comments
		1311.2 *5* (1968KeZZ), 1311.4 *6* (1967Ko01), 1314 *4* (1957Va08), 1311.85 *20* (1974HeYW). I_γ: others: 1000 (1970Ei07), 1000 *3* (1967Ko01).

† Additional information 1.

‡ From 1990Me15. Values from other decay studies are in good agreement, but less precise and given under comments. Quoted uncertainties in Iγ from 1990Me15 do not include an additional 2% uncertainty due to efficiency calibration (as noted in 1976Ja07), which is therefore added in quadrature for absolute intensities except for the %I(γ+ce)=100 transition.

From Adopted Gammas. Supporting arguments from $\gamma\gamma(\theta)$ (1956Va06) and α(exp) (1957Va08) are given under comments where available.

@ For absolute intensity per 100 decays, multiply by 0.100 *2*.

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