

^{50}V ϵ decay (2.65×10^{17} y) [2019La09](#),[2011Do08](#),[1989Si07](#)

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

Parent: ^{50}V : $E=0.0$; $J^\pi=6^+$; $T_{1/2}=2.65 \times 10^{17}$ y +16-18; $Q(\epsilon)=2207.6$ 4; $\% \epsilon + \% \beta^+$ decay=99.3 7

^{50}V - $J^\pi, T_{1/2}$: From ^{50}V Adopted Levels.

^{50}V - $Q(\epsilon)$: From [2017Wa10](#).

^{50}V - $\% \epsilon + \% \beta^+$ decay: $\% \epsilon = 99.3$ 7 based on $\% \epsilon > 98.6$ deduced from $T_{1/2}(\epsilon + \beta^+) = 2.67 \times 10^{17}$ y +16-18 (68% confidence interval)

and $T_{1/2}(\beta^-) > 1.9 \times 10^{19}$ y (90% confidence interval) in [2019La09](#). Others: 96.5 35 based on > 92.9 deduced by [2011Do08](#) from non-observation of β^- decay activity through the 783 γ in ^{52}Cr ; $\% \epsilon = 83$ 11 in [1989Si07](#) was based on observed $\% \beta^- = 17$ 11. No β^- decay has yet been confirmed, as e.g. in [2019La09](#) and [2011Do08](#). See also comment for ^{50}V g.s. in Adopted Levels.

[2019La09](#): ^{50}V sample was produced from vanadium flakes by multifold electron beam melting (EBM) at the Gran Sasso Underground Laboratory (LNGS). The γ rays were detected with ultra-low background (ULB) HPGe detectors. Measured activities. Deduced parent partial half-life.

[2011Do08](#): natural 255.82 g ^{50}V sample measured for 97.8 d (total detector mass measuring time product=185.8 kg.d). Ultralow background Ge-detector (ULB detector) at the underground laboratory for dosimetry and spectrometry of the PTB in Germany. Detector calibrated with solutions of known activity provided by PTB. Results corrected for contaminations from ^{238}U and ^{232}Th , mass of water (determined at PTB) and oxygen (determined at German Federal Institute for Materials Research) in sample resulting from exposure to air subtracted when calculating activity concentration. Measured partial half-life of ^{50}V ϵ decay.

[1989Si07](#): measured 1554 γ and deduced $T_{1/2}(\epsilon)$; three large Ge detectors in a salt mine; 337.5 g of natural V, 1109 h and a background run of 4206 h; corrections were made for Th and U contaminants.

[1985Si02](#) (same group as [1989Si07](#)): measured 1554 γ and deduced $T_{1/2}(\epsilon)$; intrinsic Ge; 100.6 g of natural V, 193.3 h and background run of 100 d; correction for U contaminants.

[1984A110](#): measured 1554 γ and deduced $T_{1/2}(\epsilon)$; Ge(HP); 4250 g of natural V, 135.5 d.

 ^{50}Ti Levels

E(level)	J^π	Comments
0.0	0^+	
1553.77 6	2^+	J^π : from the Adopted Levels.

 ϵ, β^+ radiations

E(decay)	E(level)	I_ϵ^\dagger	Log ft	$I(\epsilon + \beta^+)^\dagger$	Comments
(653.8 4)	1553.77	99.3 7	23.63 6	99.3 7	$\epsilon_K=0.8925$; $\epsilon_L=0.09170$; $\epsilon_{M+}=0.01581$ I_ϵ : deduced from partial $T_{1/2}$ of ϵ and β^- decay modes in 2019La09 . Others: $\% \epsilon > 92.9$ measured by 2011Do08 from observation of no β^- activity; $\% \epsilon = 83$ 11 (1989Si07). Log ft : calculated for allowed decay.

† Absolute intensity per 100 decays.

 $\gamma(^{50}\text{Ti})$

I_γ normalization: From $I_\gamma(1554\gamma)=100$. From $Q(\epsilon)$ only the g.s. and 1554 state may be populated. $\Delta J=6$, $\Delta \pi=\text{no to g.s.}$ and $\Delta J=4$, $\Delta \pi=\text{no to 1554 state}$; therefore, only the 1554 state is expected to be fed in this decay.

Continued on next page (footnotes at end of table)

^{50}V ε decay (2.65×10^{17} y) 2019La09,2011Do08,1989Si07 (continued) $\gamma(^{50}\text{Ti})$ (continued)

E_γ	I_γ^\dagger	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult.	Comments
1553.77 6	100	1553.77	2^+	0.0	0^+	E2	E_γ : from 1984A110. Mult.: from the Adopted Gammas.

† For absolute intensity per 100 decays, multiply by 0.993 7.

 ^{50}V ε decay (2.65×10^{17} y) 2019La09,2011Do08,1989Si07Decay Scheme

Intensities: I_γ per 100 parent decays

