^{48}Cr ε decay (21.56 h)   1979PrZU,1968We01,1967Au02

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

Parent: ^{48}Cr: E=0.0; J$^\pi$=0$^+$; T$_{1/2}$=21.56 h 3; Q(ε)=1657 7; %ε+%β^+ decay=100.0

^{48}Cr-T$_{1/2}$: From Adopted Levels of ^{48}Cr.

^{48}Cr-Q(ε): From 2021Wa16.

1979PrZU: measured Eγ, Iγ, γ(t), Eβ^+, Iβ^+, E(ce), I(ce). Deduced parent T$_{1/2}$, conversion coefficients, γ-ray multipolarities. Orange β spectrometer for conversion electrons and other unspecified detectors.

1968We01: source was prepared by ^{50}Cr(d,4n) with ≈45 MeV deuteron beam from the isochronous cyclotron at the Kernforschungszentrum Karlsruhe. Measured $\gamma\gamma(\theta)$ and $\gamma\gamma$-polarization correlation with NaI(Tl) scintillators and plastic scintillator. Deduced parity for the 308 level, multipolarity and mixing ratio for 112γ.

1967Au02: source was prepared by ^{47}Ti(α,3n) with ≈50 MeV alpha beam from the Bonn synchrocyclotron. Measured $\gamma\gamma(\theta,$H,t) using NaI(Tl) and Ge(Li) detectors. Deduced T$_{1/2}$, μ for the 308 level.

Others:

1987Ra19: source was prepared by ^{46}Ti(α,2n) at the Physikalisches Institut. measured $\gamma\gamma(\theta,$H,t). Deduced g factor for the 308 level.

1971Bo13: source was prepared by ^{47}Ti(α,3n) at the Lewis Research Center. Measured $\gamma\gamma$(t). Deduced lifetime of the 308 level.

1969PaZT: source was prepared by ^{46}Ti(α,2n) and ^{56}Fe(p,xnyp) at Carnegie-Mellon University. Measured $\gamma\gamma(\theta,$H,t). Deduced T$_{1/2}$ and μ for the 308 level, mixing ratio for 112γ.

^{48}V Levels

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$[‡]	Comments
0.0	4$^+$	15.974 d 3	%ε+%β^+=100
308.24 6	2$^+$	7.11 ns 4	μ=+0.444 16 (1987Ra19)
			T$_{1/2}$: values from this dataset: 7.09 ns 7 (1967Au02), 7.21 ns 21 (1971Bo13), 7.07 ns 14 (1969PaZT).
			μ: from g-factor=+0.222 8 using differential perturbed angular correlations, with ^{51}V as standard (1987Ra19). Other: +0.376 34 (1967Au02) and 0.44 19 (1969PaZT) using integral perturbed angular correlation; 0.51 23 from a fixed angle, reversed field measurement (1969PaZT).
420.55 10	1$^+$		

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

[‡] From Adopted Levels. Supporting arguments or other values from this dataset are given under comments.

ε,β^+ radiations

The decay scheme is considered incomplete due to a large gap (≈1.2 MeV) between Q-value=1657 keV 7(2021Wa16) and the highest observed level at E=421 keV.

E(decay)	E(level)	Iβ^+[‡]	Iε[‡]	Log ft	I($\varepsilon+\beta^+$)[†‡]	Comments
(1236 7)	420.55	1.47 19	96.1 21	4.31 1	97.6 21	av Eβ=91.3 29; εK=0.8790 18; εL=0.09087 19; εM+=0.01510 3 Iβ^+: 1.2% (1979PrZU; preliminary).
(1349[#] 7)	308.24					I($\varepsilon+\beta^+$): 3 3 from γ+ce intensity balance would result in a log ft=5.9 5, which seems low for a second forbidden non-unique transition.

[†] The total feeding is 97.6% 21 and the missing feeding of 2.4% 21, if significant, could be due to unobserved transitions from

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ε,β^+ radiations (continued)

higher levels not seen in the decay measurements.
‡ Absolute intensity per 100 decays.
# Existence of this branch is questionable.

$\gamma(^{48}V)$

E_γ‡	I_γ‡@	E_i(level)	J_i^π	E_f	J_f^π	Mult.#	δ#	α†	Comments
112.31 8	96 2	420.55	1^+	308.24	2^+	M1+E2	0.016 +29−15	0.0164 5	α(exp)=0.0154 17 (1979PrZU) α(K)=0.0148 4; α(L)=0.00139 4; α(M)=0.000182 5 α(N)=9.31×10^{-6} 25 δ: from $\gamma\gamma(\theta)$ in 1968We01. Other: −3.05 45 or 0.045 45 from $\gamma\gamma(\theta)$ in 1969PaZT.
308.24 6	100 2	308.24	2^+	0.0	4^+	E2		0.00515 7	α(exp)=0.0059 4 (1979PrZU) α(K)=0.00466 7; α(L)=0.000432 6; α(M)=5.64×10^{-5} 8 α(N)=2.85×10^{-6} 4 Mult.: from ce data in 1979PrZU and $\gamma\gamma(\theta,pol)$ in 1968We01. A$_2$=−0.057 15, A$_4$=−0.055 22 (1969PaZT), for 112γ-308$\gamma(\theta)$. A$_2$=−0.060 6, A$_4$=+0.002 4 (1967Au02).
420.5&	<0.03	420.55	1^+	0.0	4^+				

† Additional information 1.
‡ From 1979PrZU, using ^{152}Eu as standard. ^{48}Cr activity determined from the decay of ^{48}V.
# From α(exp) (1979PrZU) and/or $\gamma\gamma(\theta,pol)$ (1968We01). Values are adopted in Adopted Gammas.
@ Absolute intensity per 100 decays.
& Placement of transition in the level scheme is uncertain.

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Legend

Decay Scheme

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

I$_\gamma <$ 2%$\times$I$_\gamma^{max}$
I$_\gamma <$ 10%$\times$I$_\gamma^{max}$
I$_\gamma >$ 10%$\times$I$_\gamma^{max}$
γ Decay (Uncertain)

● Coincidence

0^+ 0.0   21.56 h *3*

%ε + %β^+=100   Q$_\varepsilon$=1657 *7*

$^{48}_{24}$Cr$_{24}$

420.5 <0.03

112.31 M1+E2 97.6

308.24 E2 100.5

	Iβ^+	Iε	Log ft

1^+ 420.55   1.47   96.1   4.31

2^+ 308.24   7.11 ns *4*

4^+ 0.0   15.974 d *3*

$^{48}_{23}$V$_{25}$