^{51}Cr ε decay 2005Ya01,2000He14

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Wang Jimin and Huang Xiaolong	NDS 144, 1 (2017)	1-Mar-2016

Parent: ^{51}Cr: E=0.0; $J^{\pi}=7/2^{-}$; $T_{1/2}$=27.704 d *3*; Q(ε)=752.45 *21*; %ε decay=100.0

Others: 1955Bu01, 1955Co56, 1963MeZZ, 1965Dh01, 1965Le24, 1969Dr01, 1970Ri11, 1973De60, 1973Wi10, 1980Sc07, 1984Fi10, 1985De50, 1986Ca08, 1991Ba11, 1994Ko34.

Source generally produced by ^{51}V(p,n) and ^{50}Cr(n,γ).

2010Mo01: measured x-ray and γ emission probabilities, HPGe planar or REGe spectrometers.

2007Ya02: measured K X-ray intensity ratio, Si(Li).

2005Ya01: measured x-ray and γ emission probabilities, Si(Li).

1994Ko34: measured γ(x-ray)-coin, deduced x-ray emission probabilities and γ emission probability.

1991Ba11: measured γγ-coin, deduced γ emission probability.

1984Fi10: absolute measurement of branching ratio for ε decay of ^{51}Cr to ^{51}V(320γ). ^{51}Cr yields were determined with calibrated 4π neutron counter (activation accuracy 1%). 320γ with calibrated Ge(Li) detector (efficiency accuracy 1%). Deduced Iβ.

1975Bo07: fractometer. Eγ measured.

1980Sc07: γ-ray emission probability for ^{51}Cr ε decay to ^{51}V (320γ) measured. The measurements were carried out with a pressurized 4π proportional counter for the x-radiation, conversion and Auger electrons, and a NaI(Tl) detector for the γ-radiation.

An independent evaluation of this decay was carried out by E. Schonfeld and R. G. Helmer, updated by V.P.Chechev and N.K.Kuzmenko as part of the international Decay Data Evaluation Project (DDEP). Since the results are very similar, they are included in this comment, rather than replacing the data set. From the analysis of 21 half-life values, a result of 27.704 d *4* is obtained. From 9 values, the intensity of the 320-keV γ ray is deduced to be 9.89 *2*. The γ-ray energy reference of 1994HeZZ can be replaced with 2000He14 and the half-life reference of 1991UnZZ,1992Un01 can be replaced by 2002Un02. The details of this evaluation will be published by M.-M. Be in a report from the Laboratoire National Henri Becquerel.

^{51}V Levels

E(level)[†]	J^{π}[‡]	$T_{1/2}$
0.0	$7/2^{-}$	stable
320.0835 *4*	$5/2^{-}$	

[†] From Eγ.
[‡] From Adopted Levels.

ε radiations

E(decay)	E(level)	Iε[†‡]	Log *ft*	Comments
(432.37 *21*)	320.0835	9.930 *10*	5.8631 *7*	εK=0.8910; εL=0.09347; εM+=0.01556
(752.45 *21*)	0.0	90.070 *10*	5.3910 *3*	εK=0.8919; εL=0.09268; εM+=0.01541

[†] From intensity imbalance.
[‡] Absolute intensity per 100 decays.

γ(^{51}V)

I(K x-ray)=22.8% *3* (1991BaZS), 23.2% *3* (1994Ko34), 22.6% *7* (2010Mo01).

Measured V K x ray intensity ratios: Kα$_2$ x ray/Kα$_1$ x ray=0.5026 *13*, Kβ$_1$ x ray/Kα$_1$ x ray=0.1104 *22*; Kβ x ray/Kα x ray=0.1166 *9* (2007Ya02).

X Rays(2005Ya01):

E(x Ray)	I(x Ray)	
4.95	6.99 *1*	Kα$_2$ x ray
4.95	13.37 *1*	Kα$_1$ x ray
5.43	1.56 *1*	Kβ$_1$ x ray

X Rays(2010Mo01):

E(x Ray)	I(x Ray)	
4.95	20.0 *7*	Kα x ray
5.43	2.57 *9*	Kβ x ray

E_γ[†]	I_γ[#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	α[@]	Comments
320.0824 *4*	9.91 *1*	320.0835	5/2⁻	0.0	7/2⁻	M1+E2	+0.47 *3*	0.00181 *5*	α(K)=0.00164 *5*; α(L)=0.000151 *4*; α(M)=1.98×10⁻⁵ *6*; α(N)=1.01×10⁻⁶ *3* α: other: α(K)exp=0.00153 *3*, α(exp)=0.00169 *5* (1984HaZS). See also 1973Wi10, 1970Ri11, 1970Ca17, 1969Dr01, 1968Ri17, and 1969WiZW. E_γ: others: 320.082 *6* (1975Bo07, original value was 320.0761 *55* relative to Eγ=411.794 for the Au standard). I_γ: from weighted average of 9.8 *6* (1955Bu01), 9.72 *15* (1963MeZZ), 10.20 *63* (1965Dh01), 9.75 *20* (average of 2 values, 1965Le24), 10.2 *10* (1970Ri11), 9.85 *9* (1980Sc07), 10.30 *19* (1984Fi10), 9.86 *8* (1991Ba11), 9.96 *9* (1994Ko34), 9.91 *1* (2005Ya01), 9.87 *3* (2010Mo01). Others: AP 2 (1940Wa02), 3 (1945Br02), 8 (1952Ly17), 21 (1952Ma49), 9.8 (1955Bi29), 9 *1* (omitted as outlier, 1955Co56), 10.1 *3* (1980Sc07).

† From 2000He14.
‡ From adopted γ radiations.
# Absolute intensity per 100 decays.
@ 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: $I_{(\gamma+ce)}$ per 100 parent decays