

Adopted Levels

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	25-Mar-2019

$Q(\beta^-)=1199\times 10^1$ 89; $S(n)=534\times 10^1$ 92; $S(p)=15470$ SY; $Q(\alpha)=-1194\times 10^1$ 158 [2017Wa10](#)

$Q(\beta^-)=11987$ 890 from mass excess (${}^{61}\text{V}$)= -30510 890 ([2017Wa10](#)) and measured mass excess (${}^{61}\text{Cr}$)= -42496.5 18 ([2018Mo14](#)).

[2017Wa10](#) give mass excess (${}^{61}\text{Cr}$)= -42480 100.

Estimated uncertainty=940 for $S(p)$ ([2017Wa10](#)).

$S(2n)=8820$ 910, $S(2p)=34780$ 980 (syst) ([2017Wa10](#)). $Q(\beta^-n)=8330$ 890 and $Q(\beta^-2n)=1460$ 890 deduced by evaluator from mass excess for ${}^{61}\text{V}$ in [2017Wa10](#), and mass excesses for ${}^{60}\text{Cr}$ and ${}^{59}\text{Cr}$ from measurement by [2018Mo14](#).

[1992We04](#): first identification of ${}^{61}\text{V}$ in fragmentation of a 500 MeV/nucleon ${}^{86}\text{Kr}$ beam incident on a Be target and identified by a zero-degree magnetic spectrometer and separated by FRS at GSI facility. Determined production cross section.

[1999So20](#) (also [2001So07](#) and [1999Le67](#)): ${}^{61}\text{V}$ produced in the fragmentation of 60.4 MeV/nucleon ${}^{86}\text{Kr}$ beam with ${}^{58}\text{Ni}$ target; LISE3 spectrometer at GANIL facility. Measured half-life of decay of ${}^{61}\text{V}$.

[2003So02](#): ${}^{61}\text{V}$ produced in fragmentation of ${}^{76}\text{Ge}^{30+}$ beam on ${}^{58}\text{Ni}$ target. LISE3 achromatic spectrometer used to separate fragments; measured half-life of ${}^{61}\text{V}$ decay and probability of delayed-neutron decay from the observation of 2^+ to 0^+ transition in ${}^{60}\text{Cr}$.

[2011Da08](#) (also [2002MaZN](#) thesis): ${}^{61}\text{Ti}$ produced in the fragmentation of 57.8 MeV/nucleon ${}^{86}\text{Kr}$ beam impinged on 50 mg/cm² thick tantalum target using LISE-2000 spectrometer at GANIL facility. Detector system included a three-element Si-detector telescope containing a double-sided silicon-strip detector (DSSSD) backed by a Si(Li) detector and surrounded by four clover type EXOGAM Ge detectors. Product identified by mass, atomic number, charge, energy loss and time-of-flight methods. Measured half-life.

[2014Su07](#): ${}^{61}\text{V}$ beam produced from fragmentation of 120 MeV/nucleon ${}^{76}\text{Ge}$ beam on ${}^9\text{Be}$ target, followed by mass separation by A1900 separator at NSCL-MSU accelerator facility. The resulting cocktail ion beam was transported to the Beta Counting System and implanted into a 1-mm-thick double-sided silicon strip detector. Measured E_γ , I_γ , $\gamma\gamma$ -coin using SeGA array. Deduced levels J, π , estimate of $\% \beta^-n$ Comparisons made with shell-model calculations.

No information about the decay of ${}^{61}\text{Ti}$ to ${}^{61}\text{V}$ is available.

A very weak γ ray at 126 2 reported by [2002MaZN](#) was seen in coincidence with heavy ions. This may either be an isomeric transition in ${}^{61}\text{Ti}$ or a γ ray in ${}^{61}\text{V}$ emitted by the decay of ${}^{61}\text{Ti}$. But a 127 2 γ has also been reported by [2005Ga01](#) in the decay of ${}^{61}\text{V}$ to ${}^{61}\text{Cr}$.

Mass measurement by time-of-flight method: [2011Es06](#).

Theoretical calculations: [1995Ri05](#) Shell model calculations (predicted spin, binding energy, mass defect).

Theory references: consult the NSR database (www.nndc.bnl.gov/nsr/) for three references for structure calculations.

 ${}^{61}\text{V}$ Levels

E(level)	J π	T _{1/2}	Comments
0	(3/2 ⁻ , 5/2 ⁻)	48.3 ms 10	$\% \beta^- = 100$; $\% \beta^-n > 10$ (2014Su07); $\% \beta^-2n = ?$ $\% \beta^-n > 10$ (2014Su07) from observation and absolute intensity of 644-keV transition in ${}^{60}\text{Cr}$. Other $\% \beta^-n \geq 6$ (2003So02). Theoretical T_{1/2}=27.1 ms, $\% \beta^-n = 12.7$, $\% \beta^-2n = 0.0$ (2003Mo09). Theoretical T_{1/2}=63.1 ms, $\% \beta^-n = 1.5$, $\% \beta^-2n = 0.1$ (2016Ma12). Jπ: possible configuration=$\pi 3/2[321]$ of f_{7/2} orbital (2005Ga01), assuming small quadrupole deformation. 2014Su07 assign 3/2⁻ or 5/2⁻, former is more likely if ground state is prolate deformed, the latter is possible if oblate deformation; further 5/2⁻ is less likely due to lack of observation of population of 4⁺ level in ${}^{60}\text{Cr}$ by β^-n decay mode of ${}^{61}\text{V}$. A 7/2⁻ spherical configuration was predicted in shell-model calculations (1995Ri05), and 5/2⁻ in theoretical calculations by 1997Mo25. T_{1/2}: weighted average of 49 ms 1 (2014Su07, β(fragment) correlations, decay curve, including daughter and grand-daughter decays, fitted with exponential and constant background); 52.6 ms 42 (2011Da08, 2002MaZN, β(fragment) correlations, decay curve, including daughter and grand-daughter decays, fitted with exponential and constant background); and 47.0 ms 12 (2003So02, timing of β and ${}^{61}\text{V}$ correlated events, also 47 ms 1 in 2005Ga01; 41 ms 1 quoted in table 3 of 2005Ga01 is a misprint). Other: 43 ms 7

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Adopted [Levels](#) (continued)

^{61}V Levels (continued)

<u>E(level)</u>	<u>Jπ</u>	<u>T_{1/2}</u>	Comments
			(1999So20 , older value from the same experimental group as 2003So02 , although a different reaction was used to produce the ^{61}V activity).