

^{34}Al β^- n decay:mixed [2019Li41,2001Nu01](#)

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh		NDS 199,1 (2025)	30-Sep-2024

Parent: ^{34}Al : E=0.0; $J^\pi=(4^-)$; $T_{1/2}=53.78$ ms 23; $Q(\beta^-n)=9445.4$ 22; $\% \beta^-n$ decay=22 5

Parent: ^{34}Al : E=46.6; $J^\pi=(1^+)$; $T_{1/2}=22.1$ ms 2; $Q(\beta^-n)=9445.4$ 22; $\% \beta^-n$ decay=11 4

$^{34}\text{Al}(0.0)-J^\pi$: From the Adopted Levels of ^{34}Al in the ENSDF database (May 2012 update).

$^{34}\text{Al}(0.0)-T_{1/2}$: weighted average (NRM) of 53.73 ms 13 ([2019Li41](#), 929.1 γ decay); 51.5 ms 9 ([2017Ha23](#)), 54.4 ms 5 ([2012Ro25](#)), 56.4 ms 6 and 55.6 ms 13 ([2001Nu01](#)). In the NRM weighted average procedure, the uncertainty increased to 0.98 ms for value in [2017Ha23](#), and to 1.1 ms in one of the values from [2001Nu01](#). Reduced χ^2 of 3.6 in this procedure is somewhat larger than $\chi^2=2.4$ at 95% confidence level. Others: 42 ms 6 ([1989Ba50](#)), 70 ms +30-20 ([1988Mu08](#)), 50 ms 20 ([1986Du07,1988DuZT](#)), 41.6 ms 61 ([1995ReZZ,2008ReZZ](#)).

$^{34}\text{Al}(0.0)-Q(\beta^-n)$: From [2021Wa16](#).

$^{34}\text{Al}(0.0)-\% \beta^-n$ decay: $\% \beta^-n=22$ 5 for the decay of ^{34}Al decay ([2019Li41](#), based on measured number of implanted ^{34}Mg and ^{34}Al and γ -ray intensities, using the known values of $\% \beta^-n(^{33}\text{Mg})=14$ 2 ([2006AnZW](#)), $\% \beta^-n(^{33}\text{Al})=8.5$ 7 ([1995ReZZ,2008ReZZ](#)), $\% I_\gamma=16$ 2 for 1618 γ in ^{33}Al from ^{33}Mg decay). Others: 26 4 ([2001Nu01](#)); 27 5 ([1989Ba50](#)); 30 8 ([1999YoZW](#), preliminary value), 12.5 5 ([1995ReZZ,2008ReZZ](#)), 54 12 ([1988Mu08](#)).

$^{34}\text{Al}(46.6)-E, J^\pi$: From [2017Li03](#).

$^{34}\text{Al}(46.6)-T_{1/2}$: weighted average (NRM) of 22.1 ms 2 ([2019Li41](#), time distribution of electrons from internal pair formation towards 0^+ g.s. from 2178, 0^+ level in ^{34}Al), and 21.6 ms 15 ([2017Ha23](#), $\gamma\beta$ decay). Other: 26 ms 1 ([2012Ro25](#), β decay curve in coincidence 511-keV annihilation radiation).

$^{34}\text{Al}(46.6)-\% \beta^-n$ decay: $\% \beta^-n=11$ 4 ([2019Li41](#), from measured number of implanted ^{34}Mg and ^{34}Al and γ -ray intensities, using the known values of $\% \beta^-n$ values for daughter products).

[2019Li41](#), [2017Li03](#): ^{34}Mg ions were produced by fragmentation of a 1.4 GeV proton beam from the Proton Synchrotron-Booster on a UC_x target at the ISOLDE facility of CERN. Fragments were separated by the ISOLDE General Purpose Separator and implanted on a movable table at the center of the ISOLDE Decay Station (IDS). β particles were detected with a plastic scintillator and γ rays were detected with five HPGe detectors. Measured E_γ , I_γ , $\beta\gamma$ -coin, $\beta\gamma\gamma$ -coin, $\gamma(t)$, $\beta(t)$. Deduced parent $T_{1/2}$, β -delayed neutron emission probabilities. Report data mostly for ^{34}Si from decays of ^{34}Al g.s. and isomer.

[2001Nu01](#): measured E_γ , I_γ , γn coin, $\% \beta^-n$, half-life at ISOLDE facility of CERN.

[2017Ha23](#): measured E_γ , I_γ , $\gamma\beta(t)$, half-life at HIRFL, Lanzhou.

[2012Ro25](#): measured E_γ , I_γ , half-life at GANIL.

[1989Ba50](#): measured delayed neutrons, half-life, $\% \beta^-n$ at CERN.

[1988Mu08](#): measured $\% \beta^-n$, half-life at GANIL.

[Additional information 1](#).

[1986Du07](#): measured E_γ , I_γ , half-life at GANIL.

 ^{33}Si Levels

E(level) [†]	J^π [‡]	$T_{1/2}$	Comments
0.0	(3/2) ⁺	6.11 s 21	$T_{1/2}$: from the Adopted Levels.
1009.7? 4			
1434.9 5	7/2 ⁻		

[†] From E_γ data.

[‡] From the Adopted Levels.

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γ(³³Si)

<u>E_γ[†]</u>	<u>I_γ[†]</u>	<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Comments</u>
1009.7 4	1.5 2	1009.7?		0.0	(3/2) ⁺	E _γ : other: 1010.2 (2019Li41). I _γ : 2.7 4, relative to 3326γ in ³⁴ Al from ³⁴ Mg decay (2001Nu01); 4.4 15 per 100 ³⁴ Mg decays (³⁴ Mg to ³⁴ Al to ³³ Si) (2019Li41).
1434.9 5	7.6 8	1434.9	7/2 ⁻	0.0	(3/2) ⁺	I _γ : 13.9 14, relative to 3326γ in ³⁴ Al from ³⁴ Mg decay (2001Nu01).

[†] From 2001Nu01. Intensity is per 100 decays of ³⁴Al parent in 2001Nu01, which is likely a mixed source of ³⁴Al g.s. and isomer with the latter not identified in 2001Nu01.

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Decay Scheme

