^{25}Al $\varepsilon+\beta^+$ decay (7.168 s) 1976Ma14,1977Az01,1982Al27

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. Shamsuzzoha Basunia, Anagha Chakraborty	NDS 205,1 (2025)	31-May-2025

Parent: ^{25}Al: E=0; $J^\pi=5/2^+$; $T_{1/2}$=7.168 s *4*; Q(ε)=4276.81 *4*; %ε+%β^+ decay=100

^{25}Al-Q($\varepsilon+\beta^+$): From 2021Wa16.

1976Ma14: Source from ^{24}Mg(d,n), E not mentioned, natural Mg target; Ge(Li) detector; measured delayed Iγ, deduced Iε. Also reported %Iε<0.0046, <0.0011, and <0.00031 limits for 2736 $(7/2^+)$, 2801 $(3/2^+)$, and 3901 $(3/2,5/2)^+$ keV levels, respectively.

1977Az01: Ge(Li) detector, measured Iγ, deduced Iε. ^{25}Al production reaction was not mentioned.

1982Al27: Source produced by ^{24}Mg(d,n) E=2.8 MeV, natural Mg target; measured Eγ(1611) relative to Eγ(1620) of ^{228}Th.

Other: 1980Wi13: Source from ^{24}Mg(d,n), E=7.1 MeV, 99.96% enriched ^{24}Mg target; Ge(Li) detector, measured Iγ of 1611γ and 511γ, deduced %Iγ(1611) with respect to Iγ(511) trapping the positrons. Same laboratory of the reported work in 1976Ma14.

Other references: 1958Ar15, 1960Ta14, 1964Ar18, 1971Ju03, 1971Mo23, 1976Ma14, 1977Az01.

In weighted average value, uncertainty is the lowest input value (assuming the reported total uncertainty represents both statistical and systematic uncertainties).

^{25}Mg Levels

E(level)†	J^π‡	$T_{1/2}$	Comments
0.0	$5/2^+$	stable	
585.04 *3*	$1/2^+$	3.38 ns *7*	
974.76 *3*	$3/2^+$	11.2 ps *7*	
1611.764 *11*	$7/2^+$	17 fs *3*	E(level): other:1611.5 *2* (1971Ju03).
1964.58 *5*	$5/2^+$	0.69 ps *6*	

† From least squares fit to Eγ.

‡ From Adopted Levels.

ε,β^+ radiations

I_β<0.03 (1971Ju03) to the 585 keV $J^\pi=1/2^+$.

E(decay)	E(level)	Iβ^+ †	Iε†	Log *ft*	I($\varepsilon+\beta^+$)†	Comments
(2312.2 *10*)	1964.58	0.006 *4*	8×10^{-5} *5*	6.05 *29*	0.006 *4*	av Eβ=538.871 *27*; εK=0.0116 *7*; εL=9.0×10^{-4} *6*; εM=1.10×10^{-4} *8* Iβ^+: from reported Iγ(1965)=0.006 *4* (1977Az01). Others: <0.12 (1971Ju03), <0.0022 (1976Ma14).
(2665.1 *10*)	1611.764	0.783 *28*	0.00475 *34*	4.373 *15*	0.788 *28*	av Eβ=698.416 *19*; εK=0.00555 *35*; εL=4.32×10^{-4} *27*; εM=5.27×10^{-5} *39* I($\varepsilon+\beta^+$): weighted average of 0.84 *7* (1971Ju03), 0.776 *28* (1980Wi13), and 0.794 *35* (1977Az01).
(3302.1 *10*)	974.76	0.047 *6*	1.06×10^{-4} *15*	6.21 *6*	0.047 *6*	av Eβ=993.384 *23*; εK=0.00207 *13*; εL=1.62×10^{-4} *10*; εM=1.97×10^{-5} *15* Iβ^+: From 1976Ma14. Other: <0.05 (1971Ju03).
(4276.8 *14*)	0.0	99.07 *4*	0.0888 *49*	3.5739 *7*	99.16 *4*	av Eβ=1455.304 *19*; εK=7.21×10^{-4} *45*; εL=5.62×10^{-5} *35*; εM=6.8×10^{-6} *5* Iβ^+: weighted average of 99.16 *4* (1977Az01) and 99.16 *7* (1971Ju03). Other: 99.11 *8* (1976Ma14) with respect to Iε(1611)=0.84 *7* of 1971Ju03. Other: >99.1% (1960Ta14).

† Absolute intensity per 100 decays.

^{25}Al $\varepsilon+\beta^+$ decay (7.168 s) 1976Ma14,1977Az01,1982Al27 (continued)

$\gamma(^{25}Mg)$

E_γ [†]	I_γ [‡&]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [#]	δ [#]	α [@]	Comments
389.710 *35*	0.023 *4*	974.76	$3/2^+$	585.04	$1/2^+$	M1+E2	+0.13 *3*	9.71×10^{-5} *27*	α(K)=9.10×10^{-5} *25*; α(L)=5.86×10^{-6} *16*; α(M)=2.17×10^{-7} *6* I_γ: central value is that of Iγ(585). Uncertainty is based on the ΔI_β=0.006 of Iβ feeding the 974.76 keV level, deconvoluted for ΔIγ(389.710) and ΔIγ(974.742).
585.028 *30*	0.023 *4*	585.04	$1/2^+$	0.0	$5/2^+$	E2		9.44×10^{-5} *13*	α(K)=8.85×10^{-5} *12*; α(L)=5.69×10^{-6} *8*; α(M)=2.101×10^{-7} *29* I_γ: central value based on I_β<0.03 (1971Ju03) to the 585 keV and Iγ=0.03 *1* (1977Az01): (0.015 *15*+0.03 *1*)/2. Uncertainty is that of Iγ(585) from 974.76 keV level.
974.742 *35*	0.024 *4*	974.76	$3/2^+$	0.0	$5/2^+$	M1+E2	+0.34 *12*	1.52×10^{-5} *6*	α(K)=1.42×10^{-5} *5*; α(L)=9.15×10^{-7} *35*; α(M)=3.39×10^{-8} *13* E_γ: other: 975 *2* (1971Mo23). I_γ: from subtraction of the Iγ(389) from Iβ feeding to the 974.76 keV level. Other: 0.01 *1* (1977Az01).
1611.708 *11*	0.788 *28*	1611.764	$7/2^+$	0.0	$5/2^+$	M1+E2	−0.207 *13*	1.05×10^{-4} *2*	α(K)=5.59×10^{-6} *8*; α(L)=3.59×10^{-7} *5*; α(M)=1.331×10^{-8} *19* α(IPF)=9.94×10^{-5} *14* E_γ: from 1982Al27. I_γ: from Iβ.
1964.501 *45*	0.006 *4*	1964.58	$5/2^+$	0.0	$5/2^+$	M1+E2	−0.58 *7*	2.51×10^{-4} *5*	α(K)=4.14×10^{-6} *6*; α(L)=2.66×10^{-7} *4*; α(M)=9.86×10^{-9} *15* α(IPF)=0.000246 *5* I_γ: from 1977Az01.

[†] From Adopted Gammas except as noted.
[‡] Based on the γ-ray intensity balance and experimental beta feedings, except wher noted otherwise.
[#] From Adopted Gammas.
[@] Additional information 1.
[&] Absolute intensity per 100 decays.

^{25}Al $\varepsilon+\beta^+$ decay (7.168 s) 1976Ma14,1977Az01,1982Al27

Decay Scheme

Intensities: I_γ per 100 parent decays