

^{30}Mg β^- decay (319 ms) 2016OI06,2008Hi05,1984Gu19

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. S. Basunia, A. Chakraborty	NDS 197,1 (2024)	31-May-2024

Parent: ^{30}Mg : $E=0.0$; $J^\pi=0^+$; $T_{1/2}=319$ ms 6; $Q(\beta^-)=6982.7$ 23; $\% \beta^-$ decay=100

^{30}Mg - $T_{1/2}$: From ^{30}Mg Adopted Levels.

^{30}Mg - $Q(\beta^-)$: From 2021Wa16.

Other: 1979De02.

2016OI06: ^{30}Mg produced by bombarding $\text{UC}_x/\text{graphite}$ target (thickness a 45 g/cm^2) with 1.4-GeV protons pulses. The fragments were mass-separated and deposited onto a thin aluminum stopper directly in front of a β detector. β particles were detected with a fast-timing 3-mm-thick plastic scintillator and γ rays were detected with two fast-response scintillating BaF_2 crystals and two HPGe detectors. Measured E_γ , I_γ , $E\beta$, $I\beta$, $\gamma\gamma$ -coin, $\beta\gamma\gamma(t)$, $\beta\gamma(t)$. Deduced levels, J , π , half-lives, decay branching ratios, transition strengths.

2008Hi05: ^{30}Mg produced in reaction $^9\text{Be}(^{48}\text{Ca}, X)$, $E=140 \text{ MeV/u}$ at NSCL; A1900 fragment separator; Particles implanted in double-sided silicon strip detector, segmented array of 12 Ge detectors; Measured: E_γ , I_γ , β - $\gamma\gamma$ coin, deduced level scheme.

1984Gu19: ^{30}Mg was produced in the fragmentation of iridium target by 10 GeV protons from the CERN synchrotron, recoiled fragments were thermalized, ionized and mass-separated; Ge(Li) detector, Measured: E_γ , β - $\gamma\gamma$ coin, absolute I_γ . The sum of the $I\beta$ was only 73% (1984Gu19).

The decay scheme of 1984Gu19 and 2008Hi05 is the same, 2008Hi05 reports the additional 2413 keV level. 2165 γ was reported by 1979De02 without placement, however the 2170 γ is placed from 2413 keV level by 2008Hi05.

 ^{30}Al Levels

E(level) [†]	J^π [‡]	$T_{1/2}$ [‡]	Comments
0	3^+	3.62 s 6	
243.81 9	2^+	15 ps 4	$T_{1/2}$: same from $\beta\gamma\gamma(t)$ using centroid-shift method (2016OI06).
687.70 11	1^+	0.7 ps 2	
1801.55 21	($2, 3^+$)		
2412.68 15	1^+		
3164.2 4	1^+		J^π : other: (1^+) in 2016OI06.
3362.78 22	1^+		J^π : other: (1^+) in 2016OI06.

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

[‡] From Adopted Levels.

 β^- radiations

E(decay)	E(level)	$I\beta^-$ ^{†‡}	Log ft	Comments
(3619.9 25)	3362.78	0.54 11	4.95 9	av $E\beta=1608.5$ 12
(3818.5 26)	3164.2	0.31 9	5.29 13	av $E\beta=1705.0$ 12
(4570.0 25)	2412.68	6.7 16	4.31 11	av $E\beta=2071.4$ 12
(6295.0 25)	687.70	73 10	3.91 6	av $E\beta=2918.4$ 12

[†] From γ -ray intensity balance by the evaluators. $\Sigma I\beta=81$ 11 implies of missing E_γ or incomplete decay scheme. Decay scheme normalization has been done based on measured $\%I_\gamma(443.8)$.

[‡] Absolute intensity per 100 decays.

$^{30}\text{Mg } \beta^-$ decay (319 ms) 2016OI06,2008Hi05,1984Gu19 (continued) $\gamma(^{30}\text{Al})$

I_γ normalization: From $\%I_\gamma(443.8)=74$ 10 [weighted average of $\%I_\gamma=71$ 10 (1984Gu19) and $\%I_\gamma=81$ 16 (1979De02)] and the relative intensity of 96 2 (2008Hi05).

E_γ	$I_\gamma^{\ddagger\#}$	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult.	Comments
243.8 1	100	243.81	2 ⁺	0	3 ⁺	M1	E_γ : weighted average of 244.3 5 (1984Gu19), 243.9 5 (2008Hi05), 242.9 7 (1979De02), 243.8 1 (2016OI06). I_γ : others: $\%I_\gamma=73.5$ 12 (1979De02), $\%I_\gamma(244.3) > 71$ (1984Gu19).
443.8 1	96 2	687.70	1 ⁺	243.81	2 ⁺		E_γ : weighted average of 444.0 5 (1984Gu19), 443.9 5 (2008Hi05), 443.2 7 (1979De02), 443.8 1 (2016OI06). I_γ : other: 94 6 (2016OI06). I_γ : $\%I_\gamma=71$ 10 (1984Gu19) and $\%I_\gamma=81$ 16 (1979De02).
611.1 [†] 6	0.4 [†] 1	2412.68	1 ⁺	1801.55	(2,3 ⁺)		
687.7 2	4.2 19	687.70	1 ⁺	0	3 ⁺		E_γ : weighted average of 688.0 10 (1984Gu19), 686.8 20 (2008Hi05), 684.6 13 (1979De02), 687.7 1 (2016OI06). I_γ : unweighted average of 2.3 3 (2008Hi05), and 6.0 3 (2016OI06). Other: $\%I_\gamma=3.5$ 6 (1979De02).
1557.7 [†] 2	0.6 [†] 1	1801.55	(2,3 ⁺)	243.81	2 ⁺		
1724.6 2	4.8 17	2412.68	1 ⁺	687.70	1 ⁺		E_γ : weighted average of 1724.9 15 (2008Hi05) and 1724.6 2 (2016OI06). I_γ : unweighted average of 6.4 8 (2008Hi05), and 3.1 4 (2016OI06).
2169.1 2	3.2 3	2412.68	1 ⁺	243.81	2 ⁺		E_γ : weighted average of 2168.9 12 (1984Gu19), 2169.8 15 (2008Hi05), 2165.0 16 (1979De02), 2169.1 1 (2016OI06). I_γ : weighted average of 3.5 5 (2008Hi05), and 3.1 3 (2016OI06). Others: $\%I_\gamma=3.0$ 5 (1979De02), $\%I_\gamma=3.0$ 10 (1984Gu19).
2412.6 [†] 3	0.3 [†] 1	2412.68	1 ⁺	0	3 ⁺		
2476.4 [†] 3	0.4 [†] 1	3164.2	1 ⁺	687.70	1 ⁺		
3118.8 [†] 2	0.7 [†] 1	3362.78	1 ⁺	243.81	2 ⁺		

[†] From 2016OI06.

[‡] From 2008Hi05, except where otherwise noted.

[#] For absolute intensity per 100 decays, multiply by 0.77 10.

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Decay Scheme

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

Legend

- $I_{\gamma} < 2\% \times I_{\gamma}^{max}$
- $I_{\gamma} < 10\% \times I_{\gamma}^{max}$
- $I_{\gamma} > 10\% \times I_{\gamma}^{max}$
- Coincidence

