^{31}Na β^-n decay   2005Ma96,1993Kl02,1984Gu19

History

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

Parent: ^{31}Na: E=0; J^π=3/2$^+$; T$_{1/2}$=17.0 ms 4; Q(β^-n)=13056 14; %β^-n decay=39 5

^{31}Na-Q(β^-n): From 2021Wa16.

^{31}Na-J^π,T$_{1/2}$: From ^{31}Na Adopted Levels (2022Ch37).

^{31}Na-%β^-n decay: From ^{31}Na Adopted Levels (2022Ch37).

Other: 1981ZiZW.

2005Ma96: ^{31}Na was produced at ISOLDE facility, CERN. Thin plastic scintillator detector, two BaF$_2$ detectors and two HPGe detectors; Measured: Eγ, level t, $\beta\gamma\gamma$ (t) coin, deduced level scheme.

1993Kl02: ^{31}Na was produced bombarding a uranium carbide target with 600 MeV protons from the CERN synchrocyclotron, mass separated in the ISOLDE facility; NE102 plastic scintillator, two HPGe detectors and one neutron detector; Measured: Eγ, Iγ, β-γ coin, β-$\gamma\gamma$ coin, β-γ- n coin, deduced level scheme.

1984Gu19: ^{31}Na 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: Eγ, β-$\gamma\gamma$ coin, absolute Iγ.

^{30}Mg Levels

E(level)[†]	J^{π}[‡]	T$_{1/2}$[#]	Comments
0	0$^+$	319 ms 6	
1482.1 3	2$^+$	1.53 ps 20	T$_{1/2}$: other: 2.0 ps 5 (2005Ma96).
1787.6 5	0$^+$	3.8 ns 4	T$_{1/2}$: other: 3.9 ns 4 from time-delayed $\beta\gamma$ (t) spectrum, gated by the 305γ in HPGe and the 1482γ recorded in BaF$_2$ detector (2005Ma96).
2467.3 5	(2$^+$)	<5 ps	
3302.6 6	(1,2,3)		
3460.3 6	(2)		E(level): this level reported in 1993Kl02 and 1984Gu19, not in 2005Ma96.
4966	1$^+$		
5092	2$^+$		

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

[‡] From the Adopted Levels.

[#] From the Adopted Levels. Data from 2005Ma96 are listed in the comments, except where otherwise noted.

γ(^{30}Mg)

Iγ normalization: From %Iγ(1482.1γ)=15 4: weighted average of 14.3 43 (1984Gu19) and 15 5 (1993Kl02) and branching datum.

E$_\gamma$[†]	I$_\gamma$[#]	E$_i$(level)	J_i^π	E$_f$	J_f^π	Mult.	Comments
305.6 3	13.3 13	1787.6	0$^+$	1482.1	2$^+$		E$_\gamma$: weighted average of 305.6 3 (1993Kl02) and 305.4 5 (1984Gu19). I$_\gamma$: weighted average of 13.6 13 (1993Kl02) and 13.0 14 (1984Gu19).
985.1 4	12.0 22	2467.3	(2$^+$)	1482.1	2$^+$		I$_\gamma$: from 1984Gu19. Mult.: 2005Ma96 argue 985.1γ to be of dominant M1 character from the B(E2) values.
1482.2 4	100	1482.1	2$^+$	0	0$^+$		E$_\gamma$: weighted average of 1482.0 3 (1993Kl02) and 1482.8 5 (1984Gu19).
1788		1787.6	0$^+$	0	0$^+$	E0	E$_\gamma$,Mult.: from adopted gammas.
1789[‡]		5092	2$^+$	3302.6	(1,2,3)		
1820.4 6	20.0 22	3302.6	(1,2,3)	1482.1	2$^+$		E$_\gamma$: weighted average of 1820.2 6 (1993Kl02) and 1820.7 9 (1984Gu19). I$_\gamma$: from 1984Gu19.

^{31}Na β^- n decay   **2005Ma96,1993Kl02,1984Gu19 (continued)**

$\gamma(^{30}$Mg) (continued)

E_γ[†]	I_γ[#]	E_i(level)	J^π_i	E_f	J^π_f	Comments
						Placement of 1820γ is shown from the 1820 keV level in 1993Kl02. In 2005Ma96, it is placed from the 3303 keV level based on the 1789-1820-1482 cascade γ-rays.
1978.1 6	26 4	3460.3	(2)	1482.1	2$^+$	E_γ: weighted average of 1978.0 6 (1993Kl02) and 1978.4 9 (1984Gu19). 1987γ is not reported in 2005Ma96.
						I_γ: weighted average of 29.2 26 (1993Kl02) and 22 3 (1984Gu19).
3178[‡]		4966	1$^+$	1787.6	0$^+$	

[†] From 1993Kl02, except otherwise noted.
[‡] From 2005Ma96.
[#] For absolute intensity per 100 decays, multiply by 0.15 4.

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Decay Scheme

Intensities: Relative I_γ

Legend

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

$3/2^+$ 0   17.0 ms *4*

$\%\beta^-n$=39   Q=13056 *14*

$^{31}_{11}\text{Na}_{20}$

2^+	5092
1^+	4966

1789
3178

1978.1 26
1820.4 20.0

(2)	3460.3
(1,2,3)	3302.6

985.1 12.0

(2^+)	2467.3	<5 ps

1788 E0
305.6 13.3
1482.2 100

0^+	1787.6	3.8 ns *4*
2^+	1482.1	1.53 ps *20*

0^+	0	319 ms *6*

$^{30}_{12}\text{Mg}_{18}$