

Table 14.12 from (1986AJ01): Energy levels of ^{14}N ^a

E_x in ^{14}N ^b (Mev \pm keV)	$J^\pi; T$	τ_m or $\Gamma_{c.m.}$ (keV)	Decay	Reactions
g.s.	$1^+; 0$	stable	—	1, 6, 7, 8, 9, 18, 19, 20, 21, 24, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67
2.312798 ± 0.011	$0^+; 1$	$\tau_m = 92 \pm 10$ fsec	γ	1, 9, 18, 19, 21, 24, 30, 31, 32, 33, 36, 37, 38, 39, 44, 45, 46, 47, 48, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66
3.94810 ± 0.20	$1^+; 0$	8.0 ± 1.0 fsec	γ	1, 6, 7, 9, 18, 19, 20, 21, 24, 30, 31, 32, 33, 37, 38, 39, 43, 44, 45, 46, 47, 48, 57, 58, 59, 60, 62, 63, 64, 65, 66
4.9151 ± 1.4	$0^-; 0$	7.6 ± 1.4 fsec	γ	1, 6, 7, 18, 19, 20, 21, 24, 30, 31, 32, 38, 43, 44, 45, 46, 47, 48, 59, 60, 65
5.10589 ± 0.10	$2^-; 0$	6.27 ± 0.07 psec $ g = 0.66 \pm 0.04$	γ	1, 6, 7, 18, 19, 20, 21, 24, 30, 31, 32, 33, 38, 39, 43, 44, 45, 46, 47, 48, 58, 59, 60, 62, 64, 65
5.69144 ± 0.13	$1^-; 0$	16 ± 8 fsec	γ	6, 7, 18, 19, 20, 21, 24, 30, 31, 33, 38, 43, 44, 45, 46, 47, 48, 59, 60, 65
5.83425 ± 0.14	$3^-; 0$	11.98 ± 0.23 psec	γ	1, 6, 7, 11, 18, 19, 20, 21, 23, 30, 31, 33, 38, 39, 43, 44, 45, 46, 47, 48, 58, 59, 60, 62, 65
6.2035 ± 0.6	$1^+; 0$	160 ± 20 fsec	γ	1, 6, 7, 18, 19, 20, 21, 24, 30, 31, 38, 39, 45, 46, 47, 48, 59, 60, 65

Table 14.12 from (1986AJ01): Energy levels of $^{14}\text{N}^a$ (continued)

E_x in $^{14}\text{N}^b$ (MeV \pm keV)	$J^\pi; T$	τ_m or $\Gamma_{c.m.}$ (keV)	Decay	Reactions
6.44617 ± 0.10	$3^+; 0$	620 ± 60 fsec	γ	1, 6, 7, 18, 19, 20, 21, 24, 30, 31, 38, 44, 45, 46, 48, 59, 60, 65
7.02912 ± 0.12	$2^+; 0$	5.4 ± 0.5 fsec	γ	6, 7, 18, 19, 20, 21, 24, 30, 31, 33, 38, 39, 43, 44, 45, 46, 47, 48, 58, 59, 60, 64, 65
7.9669 ± 0.5	$2^-; 0$	$\Gamma = (2.5 \pm 0.7) \times 10^{-3}$	γ, p	6, 7, 18, 19, 20, 21, 24, 30, 31, 45, 48, 59, 64, 65
8.062 ± 1.0	$1^-; 1$	30 ± 1	γ, p	18, 19, 24, 25, 30, 31, 41, 45, 59, 60
8.4899 ± 1.2	$4^-; 0$	$\tau_m = 19 \pm 3$ fsec	γ, p	6, 7, 18, 19, 20, 21, 24, 30, 31, 39, 43, 45, 48, 65
8.6197 ± 1.4	$0^+; 1$	$\Gamma = 3.8 \pm 0.3$	γ, p	18, 19, 24, 25, 30, 31, 45, 59, 60, 65
8.776 ± 7	$0^-; 1$	410 ± 20	γ, p	24, 25, 31
8.9118 ± 2.0	$3^-; 1$	16 ± 2	γ, p	19, 24, 25, 30, 31, 33, 42, 45, 59, 60
8.9638 ± 1.2	$5^+; 0$	$\tau_m = 105 \pm 17$ fsec	γ, p	7, 11, 19, 20, 21, 22, 23, 24, 52, 59
8.9804 ± 2.4	$2^+; (0)$	$\Gamma = 8 \pm 2$	γ, p	6, 7, 19, 24, 25, 30, 31, 59
9.1289 ± 0.5^c	$3^+; 0$	$\tau_m = 13 \pm 5$ fsec	γ, p	6, 7, 19, 20, 24, 30, 31, 48
9.17250 ± 0.28	$2^+; 1$	$\Gamma = 0.135 \pm 0.008$	γ, p	19, 24, 30, 31, 41, 42, 45, 59, 60, 64
9.3893 ± 1.4	$2^-; 0$	13 ± 3	p	6, 7, 19, 20, 21, 25, 30, 31, 45, 48, 59, 60, 65
9.509 ± 3	$2^-; 1$	41 ± 2	γ, p	19, 24, 25, 30, 31, 45, 59, 60, 65
9.703 ± 4	$1^+; 0$	15 ± 3	p	6, 19, 20, 21, 25, 30, 31, 45, 60, 65
10.079 ± 10	(3^+)	< 10		6, 7, 10, 19, 21, 31
10.101 ± 15	$2^+, 1^+; 0$	12 ± 3	γ, p	19, 20, 21, 24, 25, 31, 45, 65

Table 14.12 from (1986AJ01): Energy levels of ^{14}N ^a (continued)

E_x in ^{14}N ^b (MeV \pm keV)	$J^\pi; T$	τ_m or $\Gamma_{c.m.}$ (keV)	Decay	Reactions
10.226 \pm 8	1 ⁽⁻⁾ ; 0	80 \pm 15	γ , p	19, 21, 24, 25, 31, 65
10.432 \pm 7	2 ⁺ ; 1	33 \pm 3	γ , p	10, 19, 24, 25, 38, 42, 59, 65
10.534 \pm 20	(1 ⁻)	140	p	19, 25, 31
10.812 \pm 15	5 ⁺ ; 0	(0.39 \pm 0.16) $\times 10^{-3}$	γ	6, 7, 10, 19, 20, 21, 31, 59, 65
11.00 \pm 30		165 \pm 30	γ , p	24, 48
11.050 \pm 5	3 ⁺	1.2 \pm 0.4	γ , p	6, 7, 10, 19, 21, 24, 31, 59, 64
11.07	1 ⁺ ; 0	100	n, p, d	7, 13, 20, 25, 26, 65
11.21 \pm 30	$T = 1$	220 \pm 30	γ , p, d	13, 24, 31, 65
11.24 \pm 15	3 ⁻ ; 0	11	γ , n, p	10, 19, 23, 25, 26, 31, 42, 45, 46, 47, 48
11.27 \pm 15	2 ⁻ ; 0	180	n, p, d	6, 13, 14, 20, 21, 25, 31
11.357 \pm 15	1 ⁺ ; 0	30	n, p, d	13, 14, 19, 20, 25, 26, 65
11.5135 \pm 1.5	2 ⁺ , 3 ⁺	7.0 \pm 0.5	p, d	6, 7, 10, 13, 14, 19, 20, 21, 31, 65
11.676 \pm 18	1 ⁻ , 2 ⁻	150 \pm 20	n, p, d	13, 14, 26, 31
11.741 \pm 6	1 ⁻ , 2 ⁻	40 \pm 9	(γ), p, d	13, 24
11.761 \pm 6	3 ⁻ , 4 ⁻	78 \pm 6	(γ), p, d	13, 24
11.807 \pm 7	2 ⁻ , (1 ⁺)	119 \pm 9	n, p, d	6, 13, 14
11.874 \pm 6	2 ⁻ , (1 ⁻)	101 \pm 9	n, p, d	13, 26
12.20 \pm 19	1 ⁻ , 2 ⁻	300 \pm 30	n, p, d	13, 14, 20, 26, 59
12.408 \pm 3	(4 ⁻)	34 \pm 3	n, p, d, α	3, 4, 6, 7, 10, 13, 14, 19, 20, 21
12.418 \pm 3	3 ⁻ , 4 ⁻	41 \pm 4	p, d	6, 7, 10, 13, 19, 21
12.495 \pm 9		39 \pm 5	γ , n, p, d, α	3, 13, 19, 24, 38, 42, 59, 64
12.594 \pm 3	3 ⁺	48 \pm 2	(n), p, d, α	3, 13, 14, 19, 20, 59
12.690 \pm 5	3 ⁻	18 \pm 5	n, p, d, α	2, 3, 4, 5, 6, 10, 13, 14, 19, 20, 21, 26, 48
(12.708 \pm 9)		(43 \pm 15)	p, d	13

Table 14.12 from (1986AJ01): Energy levels of ^{14}N ^a (continued)

E_x in ^{14}N ^b (MeV \pm keV)	$J^\pi; T$	τ_m or $\Gamma_{\text{c.m.}}$ (keV)	Decay	Reactions
12.789 \pm 5	4 ⁺	16 \pm 3	n, p, d, α	2, 3, 4, 5, 7, 10, 13, 14, 19, 59
12.813 \pm 4	4 ⁻	5 \pm 2	γ , p, d, α	3, 4, 6, 7, 13, 19, 42, 43, 45, 46, 47, 48, 59
12.826 \pm 6		11 \pm 3	n, p, d	7, 13, 14
12.857 \pm 6		78 \pm 10	n, p, d	13, 21, 26
12.883 \pm 8		134 \pm 11	p, d	13, 19
12.922 \pm 5	4 ⁺	22 \pm 4	p, d, α	3, 4, 10, 13, 14, 19, 22
13.007 \pm 17		120 \pm 30	γ , p	6, 7, 24
13.167 \pm 5	1 ⁺	15 \pm 5	γ , n, p, d, α	2, 3, 4, 5, 13, 14, 19, 42, 59
13.192 \pm 9	3 ⁺	65 \pm 10	α	5, 6, 10, 59
13.243 \pm 10	2 ⁻	92 \pm 5	γ , n, p, α	2, 3, 26, 42, 48, 59
13.30 \pm 40	(2 ⁻); 1	1000 \pm 150	γ , p	24
13.656 \pm 5	(2 ⁺ , 3 ⁺)	\approx 90	n, p, d, α	2, 3, 5, 13, 14
13.714 \pm 5	2 ⁻ , 3 ⁺	105 \pm 25	γ , n, p, d, α	2, 3, 4, 6, 10, 42, 59
13.74 \pm 10	1 ⁺ ; 1	180 \pm 20	(γ), n, p, d, α	2, 3, 5, 13, 14, 24, 26, 38, 59
13.77 \pm 10	(1 ⁺)	120	p, α	3
14.04 \pm 30		100	n, p, d, α	2, 3, 13, 14, 26
14.16 \pm 30		230	n, p, d, α	2, 3, 13, 14
14.25 \pm 50	3 ⁺	420 \pm 100	p, α	3, 5
14.30 \pm 20		150	p, α	3
14.56 \pm 20		100	n, p, α	2, 3, 6, 10
14.59 \pm 30		50	n, p, α	2, 3, 6, 10
14.66 \pm 10	5 ⁻ ; 0	100 \pm 20	α	5, 43
14.73 \pm 25	(2 ⁻ ; 1)	125	γ , n, p, α	2, 3, 42
14.86 \pm 30		140	n, p, d, α	2, 3, 6, 10, 13, 14, 16, 19, 21, 26
14.92 \pm 30		43 \pm 8	n, p, α	2, 3, 10, 19, 26
15.02 \pm 20	3 ⁻ , 4 ⁻ ; 1	\approx 60	γ , n, p, α	2, 6, 26, 42, 43

Table 14.12 from (1986AJ01): Energy levels of ^{14}N ^a (continued)

E_x in ^{14}N ^b (MeV \pm keV)	$J^\pi; T$	τ_m or $\Gamma_{c.m.}$ (keV)	Decay	Reactions
15.24 \pm 20		100	p, d, α	3, 6, 7, 10, 13, 14
15.43 \pm 20		100	n, p, d, α	2, 3, 13, 16, 21, 48
15.70 \pm 50		350	γ , n, p, d, α	6, 13, 14, 16, 19, 21, 26, 42
16.21 \pm 20		125	n, p, α	2, 3, 21, 26, 42
16.40 \pm 20		150	p, d, α	3, 16
16.65 \pm 25 ^d	4 ⁺ ; 0 + 1	240 \pm 25	d, α	16
16.91 \pm 20	5 ⁻ ; 1	170 \pm 25	γ	42
16.91 \pm 30	4 ⁺ ; 0 + 1	290 \pm 30	p, d, α	3, 10, 16
16.92 \pm 20 ^e	2 ⁺ ; 0 + 1	830 \pm 170	d, α	16
17.03 \pm 50	3 ⁻ ; 0 + 1	245 \pm 50	d, α	16
17.17 \pm 30	1 ⁻ ; 0 + 1	300 \pm 30	γ , p, d, α	3, 10, 16, 20, 21, 42
17.31 \pm 30	4 ⁺ ; 0 + 1	275 \pm 30	d, α	16, 19
17.40 \pm 25	4 ⁺ ; 0 + 1	245 \pm 25	d, α	16, 19
17.46	5 ⁻ ; 0			43
17.85 \pm 50 ^e	4 ⁺ ; 0 + 1	475 \pm 50	d, α	16
17.85 \pm 50 ^e	3 ⁻ ; 0 + 1	440 \pm 50	d, α	16
17.93 \pm 70 ^e	2 ⁺ ; 0 + 1	340 \pm 70	d, α	16
18.02 \pm 60	3 ⁻ ; 0 + 1	570 \pm 60	d, α	16
18.14 \pm 50	4 ⁺ ; 0 + 1	480 \pm 50	d, α	16, 43
18.35 \pm 60	1 ⁻ ; 0 + 1	560 \pm 60	d, α	16, 43
18.43 \pm 65	4 ⁺ ; 0 + 1	315 \pm 65	d, α	16, 43
18.50 \pm 10	5 ⁻ ; 0 + 1	62 \pm 10	d, α	16, 42
18.53 \pm 80	2 ⁺ ; 0 + 1	410 \pm 80	d, α	16
18.53 \pm 60	3 ⁻ ; 0 + 1	310 \pm 60	d, α	16
18.64 \pm 70	3 ⁻ ; 0 + 1	675 \pm 70	d, α	16, 43
18.78 \pm 35	1 ⁻ ; 0 + 1	315 \pm 35	d, α	16
18.88 \pm 50	4 ⁺ ; 0 + 1	475 \pm 50	d, α	16
18.93 \pm 50	2 ⁺ , 3 ⁻ ; 0 + 1	450 \pm 50	d, α	16
19.10 \pm 90	3 ⁻ ; 0 + 1	870 \pm 90	d, α	16

Table 14.12 from (1986AJ01): Energy levels of ^{14}N ^a (continued)

E_x in ^{14}N ^b (MeV \pm keV)	$J^\pi; T$	τ_m or $\Gamma_{\text{c.m.}}$ (keV)	Decay	Reactions
19.90 \pm 60	2 ⁺ ; 0 + 1	575 \pm 60	d, α	16
19.99 \pm 50	1 ⁻ ; 0 + 1	510 \pm 50	d, α	16
(20.11 \pm 20)	3 ⁻ , 4 ⁻ ; 0 + 1	120 \pm 20	γ	42, 43
20.63 \pm 110	4 ⁺ ; 0 + 1	1100 \pm 110	d, α	16
20.65 \pm 60	5 ⁻ ; 0 + 1	610 \pm 60	d, α	16
21.24 \pm 50	4 ⁺ ; 0 + 1	415 \pm 50	d, α	16
21.51 \pm 25	3 ⁻ ; 0 + 1	235 \pm 25	d, α	16
21.53 \pm 75	5 ⁻ ; 0 + 1	360 \pm 75	d, α	16
21.68 \pm 40	4 ⁺ ; 0 + 1	360 \pm 40	d, α	16
21.8	4 ⁺ ; 0 + 1	650	γ , ^3He	8
22.26 \pm 15	4 ⁺ ; 0 + 1	65 \pm 15	d, α	16
22.31 \pm 60	5 ⁻ ; 0 + 1	570 \pm 60	d, α	16
22.5	2 ⁻ ; $T = 1$		γ , p	24, 40
23.0	2 ⁻ ; $T = 1$	\approx 3000	γ , n, p	24, 40
23.40 \pm 70	5 ⁻ ; 0 + 1	640 \pm 70	d, α	16
24.0		\approx 1000	n, ^3He , α	8

^a See also Tables 14.13 and 14.14.

^b I am indebted to E.K. Warburton for sending me a reanalysis of the E_x of many of the states in ^{14}N with $E_x < 9.4$ MeV: see e.g. footnote ^b in Table 14.18.

^c The present evidence (E.K. Warburton, to be published) only supports the presence of one state at $E_x \approx 9.13$ MeV, with $J^\pi = 3^+$. The only remaining evidence for a doublet is the $^{12}\text{C}(^3\text{He}, \text{p}')^{14}\text{N}(\text{p})^{13}\text{C}_{\text{g.s.}}$ work by (1974NO01).

^d With the exception of $^{14}\text{N}^*(16.9, 17.5, 21.8, 22.5, 23.0, 24.0)$, this state and all the higher states were derived from an S -matrix analysis of the $^{12}\text{C}(\text{d}, \alpha_1)$ reaction by (1981JO02).

^e See, however, Tables 14.22 and 14.23. I am indebted to F.C. Barker for his comments.