

Table 16.9 from (1971AJ02): Energy Levels of ^{16}O ^a

E_x in ^{16}O (MeV \pm keV)	$J^\pi; T$	$\Gamma_{\text{c.m.}}$ (keV) or τ_m	Decay	Reactions
0	$0^+; 0$	—	stable	1, 3, 5, 11, 12, 13, 14, 15, 16, 17, 18, 24, 25, 26, 27, 28, 35, 36, 37, 38, 39, 43, 44, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81
6.0502 ± 1.0	$0^+; 0$	72 ± 7 psec	π	11, 12, 24, 27, 35, 36, 37, 44, 47, 55, 56, 58, 61, 66, 67, 70, 71, 79, 80
6.13066 ± 0.18	$3^-; 0$	24 ± 2 psec	γ	3, 4, 11, 12, 25, 27, 35, 36, 37, 43, 44, 47, 55, 56, 57, 58, 61, 64, 66, 67, 70, 71, 74, 79, 80
6.9188 ± 0.6	$2^+; 0$	6.8 ± 0.4 fsec	γ	11, 12, 25, 27, 35, 36, 37, 43, 44, 54, 55, 56, 57, 58, 61, 64, 66, 70, 71, 74, 79
7.11867 ± 0.35	$1^-; 0$	10.6 ± 0.9 fsec	γ	9, 11, 12, 25, 27, 35, 36, 37, 43, 44, 47, 54, 56, 57, 58, 61, 64, 66, 67, 70, 71, 74
8.8717 ± 0.5	$2^-; 0$	180 ± 16 fsec	γ	4, 11, 12, 25, 35, 36, 43, 44, 47, 56, 57, 61, 66, 67, 70, 74
9.597 ± 21	$1^-; 0$	$\Gamma = 510 \pm 60$	γ, α	5, 9, 11, 12, 35, 44, 47, 61
9.8469 ± 2.8	$2^+; 0$	1.1	γ, α	5, 9, 11, 12, 25, 35, 36, 43, 44, 47, 55, 57, 61, 70, 74, 79
10.353 ± 4	$4^+; 0$	27 ± 4	γ, α	5, 9, 11, 12, 25, 35, 36, 44, 57, 61, 67, 74
10.952 ± 3	$0^-; 0$	$\tau_m = 8 \pm 5$ fsec	γ	35, 36, 43, 44
11.080 ± 3	$3^+; 0$	57 ± 19 fsec	γ	35, 36, 43, 44, 57, 74
11.096 ± 3	$4^+; 0$	$\Gamma = 0.3 \pm 0.1$	α	9, 11, 12, 25, 35, 36, 43, 44, 57, 74
11.26	$0^+; 0$	2500	α	9, 43, 44
(11.44)	$3^-; 0$	830	α	9
11.521 ± 4	$2^+; 0$	74 ± 4	γ, α	5, 11, 35, 36, 55, 61
11.63	$3^-; 0$	1200	α	9, 11
12.053 ± 3	$0^+; 0$	1.5 ± 0.5	α	9, 11, 35, 36, 55, 57, 61
12.441 ± 4	$1^-; 0$	97 ± 6	γ, p, α	5, 7, 9, 11, 35, 36, 39, 40, 42, 43, 44
12.528 ± 1	$2^-; 0$	≤ 0.5	γ, p, α	11, 35, 36, 39, 40, 42, 43, 44, 55, 57
12.795 ± 5	$0^-; 1$	38 ± 4	γ, p	35, 39, 40, 43, 44

Table 16.9 from (1971AJ02): Energy Levels of ^{16}O ^a (continued)

E_x in ^{16}O (MeV \pm keV)	$J^\pi; T$	$\Gamma_{c.m.}$ (keV) or τ_m	Decay	Reactions
12.9666 \pm 0.9	$2^-; 1$	2.0 ± 0.2	γ, p, α	35, 39, 40, 42, 43, 44, 55
13.02 \pm 10	2^+	150 ± 11	α	9, 55
13.093 \pm 6	$1^-; 1$	127 ± 8	γ, p, α	5, 7, 9, 11, 34, 35, 39, 40, 42, 44, 55
13.129 \pm 10	$3^-; 0$	128 ± 11	p, α	7, 9, 36, 44
13.14 \pm 100	2^+	≈ 250	γ, p, α	5, 42
13.2582 \pm 2.5	$3^-; 1$	21 ± 1	γ, p, α	5, 7, 9, 11, 35, 40, 42, 43, 44, 67
13.6634 \pm 2.7	$1^+; 0$	64 ± 3	p, α	35, 36, 40, 42, 57
13.869 \pm 10	4^+	85 ± 14	p, α	9, 11, 35, 42, 57
13.9782 \pm 2.4	2^-	22 ± 2	p, α	35, 40, 42, 61
14.00 \pm 50	0^+	170 ± 50	γ	55
14.0	0^+	4800	α	9
14.39 \pm 25 (14.53)	$4^+; 0$	30 ± 30		11, 25, 35, 36 11
14.82 \pm 30	$6^+; 0$	69 ± 30	α	9, 11, 25, 36
14.922 \pm 6	4^+	51 ± 7	p, α	34, 35, 40, 42, 61
15.22 \pm 35	2^-	70 ± 15	p, α	11, 40, 42, 57, 67
15.26 \pm 50	$2^+; (0)$	660 ± 90	γ, p, α	11, 39, 40, 42, 55
15.42 \pm 40	$(1^-, 3^-)$	95 ± 25	p, α	7, 9, 34, 40, 42, 67
15.792 \pm 14	$(T = 0)$	≈ 60		11, 35, 36
16.218 \pm 13	$1^+; 1$	19 ± 6	γ, n, p	35, 39, 40, 41, 48, 55, 57
16.23 \pm 15	$6^+; 0$	125 ± 50	α	9, 11, 12, 34, 35, 36
16.30 \pm 30	$0(-)$	240 ± 30	n, p	41
16.407 \pm 24	2^+	45	γ, n, p, α	5, 6, 7, 9, 55
16.80 \pm 100	(3^+)	≤ 100	γ	55
16.94	2^+	≈ 280	$\alpha, ^8\text{Be}$	10
17.142 \pm 12	$1^-; 1$	33 ± 5	γ, n, p, α	6, 7, 9, 35, 36, 39, 40, 41, 44, 48, 55, 57
17.17	2^+	200	$\alpha, ^8\text{Be}$	10, 44
17.30 \pm 15	$1^-; 1$	90 ± 10	γ, n, p, α	6, 9, 39, 40, 41, 48, 55
17.55	(4^+)	165	$(\gamma), n, \alpha$	6, 9, 48
17.63 \pm 15	$\geq 1; 1$	59 ± 10	$(\gamma), n, p, \alpha$	7, 9, 41, 55, 57
17.755 \pm 15	$0^+, 2^+$	≈ 30	$\alpha, ^8\text{Be}$	10, 35
17.82 \pm 40	4^+	225	$n, \alpha, ^8\text{Be}$	6, 9, 10, 35
17.86 \pm 15	$\geq 1; 1$	101 ± 10	n, p	41
18.018 \pm 15	$4^+; 0$	14	$(n), p, \alpha, ^8\text{Be}$	7, 9, 10, 35, 41
18.05 \pm 15	$(4^+); 1$	26 ± 5	γ, n, p, α	6, 9, 35, 39, 41

Table 16.9 from (1971AJ02): Energy Levels of ^{16}O ^a (continued)

E_x in ^{16}O (MeV \pm keV)	$J^\pi; T$	$\Gamma_{\text{c.m.}}$ (keV) or τ_m	Decay	Reactions
18.132 \pm 24		220 \pm 60	n, p, α	6, 41
18.18 \pm 25	2 ⁺	390 \pm 80	n, α	6
18.46 \pm 25		\approx 160	n, p	41
18.6	(1 ⁻ , 5 ⁻)	140	α	9
18.71	0 ⁺ , 2 ⁺	260 \pm 30	n, p, α , ^8Be	10, 41
18.79	(4 ⁺)	220	n, p, α , ^8Be	6, 7, 9, 10
(18.983 \pm 15)		\lesssim 25		35
18.99 \pm 30	1 ⁻ ; 1	300 \pm 100	γ , p	39, 55
19.04 \pm 50	2 ⁻ ; 1	400 \pm 50	γ , α	9, 55
19.06 \pm 60	2 ⁺ ; 1	\approx 120	γ , p	39, 40, 48
19.12	(2 ⁺ , 4 ⁺)	41	(n), α	6, 9
19.24 \pm 25	2 ⁻ ; 1	90 \pm 10	γ , n, p	39, 41
19.25	(5 ⁻)	23	(n), α	6, 9
19.34	6 ⁺	50	α , ^8Be	10
(19.382 \pm 15)	$\pi = +$	\approx 30	α	9, 35
19.48 \pm 30	1 ⁻ ; 1	300 \pm 80	γ , n, p, α	9, 39, 41, 48, 55
19.62		240	n, α	6
19.80 \pm 150			(α)	9, 57
19.90 \pm 25	(2, 3; 1)	120 \pm 40	γ , n, p, α	9, 35, 39, 41
20.087		310	n, α	6
20.3		\approx 1500	p, α	7
(20.348 \pm 15)		\approx 30	γ , n	35, 48
20.36 \pm 70	2 ⁻	500 \pm 100	γ	55
20.39 \pm 25	\geq 2	150 \pm 30	γ , n, p, α	6, 9, 39, 41
20.55 \pm 25	\geq 1	140 \pm 30	n, p, α	9, 41
20.8	(8 ⁺)	\approx 600	γ	11, 12, 39
20.81		< 25	n, α	6
20.89 \pm 25		\approx 250	γ , n, p	39, 41, 48, 49
(21.0)	(7 ⁻)	750	(γ), α	9, 48
21.01 \pm 20	1 ⁻ ; 1	260 \pm 60	γ , n, α	5, 48, 55
21.02 \pm 20		55	(γ), n, α	6, 48
(21.1)	(5 ⁻)	900	α	9
(21.2)	(6 ⁺)	450	n, α	6, 9, 11
21.68		55	γ , n, α	6, 48
21.79		55	γ , n, p, d, α	6, 29, 39, 48
22.04		60	γ , n, d, α	6, 11, 29, 39
22.07		340	n, α	6, 11

Table 16.9 from (1971AJ02): Energy Levels of ^{16}O ^a (continued)

E_x in ^{16}O (MeV \pm keV)	$J^\pi; T$	$\Gamma_{\text{c.m.}}$ (keV) or τ_m	Decay	Reactions
22.13		< 150	γ, n, d, α	6, 11, 28, 29, 33, 48
22.26 \pm 38	1 ⁻ ; 1	\approx 650	γ, n, p, d, α	28, 29, 33, 39, 41, 48, 49, 55
22.52		375	n, d, α	6, 11, 33
22.720 \pm 4	0 ⁺ ; $T = 2$	15 \pm 6	p, d, α	7, 9, 27, 30, 33, 70
22.75	1 ⁻ ; 1	60	γ, n, d, α	6, 11, 28, 29, 31, 33, 55
23.11		\approx 20	d, α	9, 31, 33
23.15 \pm 34		\approx 500	$\gamma, n, (p), d, \alpha$	9, 33, 48, 49
23.40		< 40	n, d, α	6, 31, 33
23.54		300	n, p, d, α	9, 29, 30, 31, 33
23.75		120	n, α	6
23.89		\approx 25	α	9, 11
23.93		165	n, α	6
(24.05)		\approx 80	n, ^3He	19
24.05 \pm 100		450	$\gamma, n, ^3\text{He}$	18, 48
24.4	($T = 1$)	\approx 250	$\gamma, n, p, d, ^3\text{He}, \alpha$	19, 28, 29, 30, 31, 33, 48, 49, 55
24.522 \pm 11	2 ⁺ ; $T = 2$	< 50		27, 55, 70
24.74	$T = 1$		(γ), p, d, $^3\text{He}, \alpha$	22, 30, 31, 33, 39
25.12 \pm 50		650	$\gamma, n, p, d, ^3\text{He}$	18, 29, 30, 48, 49
25.55 \pm 50	(1 ⁻ ; 1)	1000	$\gamma, n, p, ^3\text{He}, \alpha$	20, 22, 39, 48, 55
25.94	($T = 1$)	600 \pm 200	d, $^3\text{He}, \alpha$	22, 31, 33
(26.38 \pm 180)			(γ, n, p)	39, 48, 49
26.7 \pm 250	(1 ⁺ ; 1)	600 \pm 200	$^3\text{He}, \alpha$	22, 33, 55
27.32 \pm 92	(2 ⁺ ; 1)	\approx 600	(γ, n), d, $^3\text{He}, \alpha, ^8\text{Be}$	22, 23, 31, 48
27.6 \pm 100	(3 ⁻ ; 0)	\approx 500	p, $^3\text{He}, \alpha$	20, 21, 22
(28.1 \pm 100)	($T = 1$)	600 \pm 200	d, $^3\text{He}, \alpha$	22, 33
(28.3 \pm 100)	($T = 0$)		$^3\text{He}, \alpha$	22
(28.9 \pm 100)	($T = 1$)	600 \pm 200	$^3\text{He}, \alpha$	22
29.7 \pm 100	($T = 1$)	600 \pm 200	(γ, n), d, $^3\text{He}, \alpha$	22, 31, 48
(30.4 \pm 100)	($T = 1$)	600 \pm 200	$^3\text{He}, \alpha$	9, 22
31.2 \pm 200	($T = 1$)	600 \pm 200	(γ, n, p), $^3\text{He}, \alpha$	22, 48, 49, 54
(33.0 \pm 300)			(γ, n)	48
44.5	(1 ⁻ ; 1)	2000 – 3000	γ	55
49	(1 ⁻ ; 1)	2000 – 3000	γ	54, 55

^a See also Tables 16.12, 16.19 and 16.26.