

Table 16.11 from (1982AJ01): Energy Levels of ^{16}O ^a

| E_x (MeV \pm keV) | $J^\pi; T$ | K^π | $\Gamma_{\text{c.m.}}$ or τ_m (keV) | Decay | Reactions |
|--------------------------|------------|---------|---|------------------|---|
| 0 | $0^+; 0$ | | stable | | 2, 3, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 25, 26, 27, 28, 30, 31, 38, 40, 42, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98 |
| 6.0494 ± 1.0 | $0^+; 0$ | 0^+ | $\tau_m = 96 \pm 7$ psec | π | 2, 3, 9, 10, 14, 38, 40, 49, 52, 57, 60, 61, 68, 80, 82, 84, 88 |
| 6.13043 ± 0.05 | $3^-; 0$ | | $\tau_m = 26.6 \pm 0.7$ psec $ g = 0.55 \pm 0.03$ | γ | 2, 3, 9, 10, 14, 18, 26, 38, 39, 40, 48, 49, 52, 57, 59, 60, 61, 63, 64, 68, 80, 81, 82, 84, 88, 89 |
| 6.9171 ± 0.6 | $2^+; 0$ | 0^+ | $\tau_m = 6.6 \pm 0.4$ fsec | γ | 2, 3, 9, 10, 14, 38, 39, 40, 48, 49, 56, 57, 60, 61, 63, 64, 81, 82, 84, 85, 88, 89 |
| 7.11685 ± 0.14 | $1^-; 0$ | | $\tau_m = 11.6 \pm 1.0$ fsec | γ | 2, 3, 9, 10, 38, 39, 40, 48, 49, 52, 56, 57, 60, 61, 64, 80, 81, 82, 84, 85, 88, 89 |
| 8.8719 ± 0.5 | $2^-; 0$ | | $\tau_m = 180 \pm 16$ fsec | γ, α | 2, 3, 7, 9, 10, 11, 17, 26, 38, 39, 42, 48, 49, 52, 60, 61, 63, 64, 80, 81, 82, 84, 88, 89, 92, 96 |
| 9.632 ± 21 | $1^-; 0$ | 0^- | $\Gamma_{\text{c.m.}} = 400 \pm 10$ | γ, α | 3, 7, 9, 10, 38, 49, 52, 64 |
| 9.847 ± 3 | $2^+; 0$ | | 0.625 ± 0.100 | γ, α | 2, 3, 7, 9, 10, 11, 26, 38, 39, 42, 48, 49, 52, 57, 60, 61, 63, 64, 82, 84, 88, 92, 96 |
| 10.355 ± 3 | $4^+; 0$ | 0^+ | 25 ± 4 | γ, α | 2, 3, 7, 9, 10, 11, 13, 16, 17, 26, 27, 38, 39, 49, 57, 60, 61, 63, 64, 80, 82, 84, 85, 88, 92, 96 |
| 10.957 ± 1 | $0^-; 0$ | | $\tau_m = 8 \pm 5$ fsec | | 2, 38, 48, 49, 60, 61, 82 |
| 11.080 ± 3 | $3^+; 0$ | | $\Gamma < 12$ | γ | 2, 38, 48, 49, 82, 88 |
| 11.096 ± 2 | $4^+; 0$ | | 0.28 ± 0.05 | γ, α | 2, 3, 7, 9, 11, 13, 17, 26, 38, 39, 60, 61, 63, 64 |
| $(11.26)^b$ | $(0^+; 0)$ | | (2500) | (α) | 7, 49, 82, 84 |

Table 16.11 from (1982AJ01): Energy Levels of ^{16}O ^a (continued)

| E_x (MeV \pm keV) | $J^\pi; T$ | K^π | $\Gamma_{\text{c.m. or } \tau_m}$ (keV) | Decay | Reactions |
|--------------------------|----------------------|----------------|--|----------------------------|---|
| 11.520 \pm 4 | 2 ⁺ ; 0 | | 74 \pm 4 | γ, α | 2, 3, 7, 38, 57, 60, 61, 63, 64 |
| 11.60 \pm 20 | 3 ⁻ ; 0 | 0 ⁻ | 800 \pm 100 | α | 7, 10 |
| 12.049 \pm 2 | 0 ⁺ ; 0 | | 1.5 \pm 0.5 | γ, α | 7, 38, 57, 60, 61, 63, 64, 84 |
| 12.438 \pm 3 | 1 ⁻ ; 0 | | 90 \pm 10 | γ, p, α | 3, 5, 7, 38, 43, 44, 47, 48, 49, 60, 61, 64 |
| 12.530 \pm 1 | 2 ⁻ ; 0 | | 0.8 | γ, p, α | 2, 38, 43, 44, 47, 48, 49, 57, 81 |
| 12.797 \pm 4 | 0 ⁻ ; 1 | | 38 \pm 4 | γ, p | 38, 44, 48, 49 |
| 12.9685 \pm 0.4 | 2 ⁻ ; 1 | | 1.9 \pm 0.2 | γ, p, α | 38, 43, 44, 47, 48, 49, 57, 80, 81, 82 |
| 13.02 \pm 10 | 2 ⁺ ; 0 | | 150 \pm 10 | γ, p, α | 3, 7, 44, 47, 57, 60, 61, 63, 64 |
| 13.090 \pm 5 | 1 ⁻ ; 1 | | 130 \pm 5 | γ, p, α | 3, 5, 7, 9, 38, 43, 44, 47, 48, 57, 82 |
| 13.120 \pm 10 | 3 ⁻ ; 0 | | 130 \pm 30 | γ, p, α | 2, 3, 5, 7, 38, 48 |
| 13.258 \pm 2 | 3 ⁻ ; 1 | | 21 \pm 1 | γ, p, α | 3, 5, 7, 38, 44, 47, 48, 49, 60, 80, 81, 82, 85 |
| 13.664 \pm 3 | 1 ⁺ ; 0 | | 63 \pm 3 | γ, p, α | 38, 43, 44, 47, 61 |
| 13.869 \pm 2 | 4 ⁺ ; 0 | | 84 \pm 2 | p, α | 2, 7, 38, 44, 47, 60, 63 |
| 13.980 \pm 2 | 2 ⁻ | | 20 \pm 2 | p, α | 2, 38, 39, 44, 47 |
| 14.032 \pm 15 | 0 ⁺ | | 200 \pm 50 | α | 7 |
| 14.1 \pm 100 | 3 ⁻ | | 750 \pm 200 | α | 7 |
| 14.302 \pm 3 | | | 34 \pm 12 | | 26, 38, 39 |
| 14.399 \pm 2 | ≥ 5 | | 27 \pm 5 | | 2, 10, 26, 38, 39 |
| 14.620 \pm 11 | (4 ⁺) | | 490 \pm 20 | α | 7, 9 |
| 14.660 \pm 11 | 5 ⁻ | 0 ⁻ | 650 \pm 50 | α | 7, 9, 10, 11, 13 |
| 14.816 \pm 2 | 6 ⁺ ; 0 | | 70 \pm 8 | α | 2, 3, 7, 9, 26, 38, 39, 64 |
| 14.922 \pm 6 | 2 ⁺ | | 65 \pm 5 | p, α | 2, 37, 38, 44, 47 |
| 15.100 \pm 3 | 0 ⁺ | | 166 \pm 30 | p, α | 5, 7, 38 |
| 15.196 \pm 3 | 2 ⁻ | | 58 \pm 10 | p, α | 38, 39, 44, 47, 81 |
| 15.26 \pm 20 | 2 ⁺ ; (0) | | 300 \pm 100 | p, α | 44, 47, 60, 63 |
| 15.408 \pm 2 | 3 ⁻ ; 0 | | 133 \pm 7 | p, α | 5, 7, 37, 38, 39, 44, 47, 60, 64, 80, 81 |
| 15.785 \pm 5 | (3 ⁺) | | 40 \pm 10 | | 38, 39 |
| 15.828 \pm 30 | 3 ⁻ | | 700 \pm 120 | α | 7 |
| (15.9) | (2 ⁺) | | \approx 600 | γ, α | 3 |
| 16.209 \pm 2 | (4 ⁺) | | 40 \pm 10 | | 38, 39 |

Table 16.11 from (1982AJ01): Energy Levels of ^{16}O ^a (continued)

| E_x (MeV \pm keV) | $J^\pi; T$ | K^π | $\Gamma_{\text{c.m.}}$ or τ_m (keV) | Decay | Reactions |
|--------------------------|------------------------------------|----------------|---|------------------------------|--|
| 16.22 \pm 20 | 1 ⁺ ; 1 | | 18 \pm 3 | γ , n, p | 37, 44, 45, 57 |
| 16.275 \pm 7 | 6 ⁺ ; 0 | 0 ⁺ | 420 \pm 20 | α | 2, 7, 9, 10, 11, 13, 27, 39 |
| 16.350 \pm 13 | (0 ⁺ , 1 ⁻) | | 65 \pm 45 | p, α | 5, 7, 38, 84 |
| 16.442 \pm 2 | 2 ⁺ ; (1) | | 22 \pm 3 | γ , n, p, α | 3, 4, 5, 7, 38, 44, 47, 57, 60, 63, 64 |
| 16.817 \pm 2 | 3 ⁺ | | 70 \pm 10 | γ , p, α | 38, 44, 47, 57 |
| 16.844 \pm 21 | 4 ⁺ | | 570 \pm 60 | α | 7 |
| 16.93 \pm 50 | 2 ⁺ | | \approx 280 | α | 7, 8, 60 |
| 17.0 | 1 ⁻ ; 1 | | \approx 1500 | γ , p | 43 |
| 17.129 \pm 5 | 2 ⁺ | | 107 \pm 14 | n, p, α | 4, 5, 7 |
| 17.14 \pm 20 | 1 ⁻ ; 1 | | 36 \pm 5 | γ , n, p, α | 7, 39, 43, 44, 45, 49, 57 |
| 17.20 \pm 20 | 2 ⁺ | | 160 \pm 60 | α | 2, 7, 8, 49, 60, 63, 64 |
| 17.27 \pm 20 | 1 ⁻ ; 1 | | 90 \pm 10 | γ , n, p, α | 4, 43, 44, 45 |
| 17.510 \pm 26 | 1 ⁻ | | 180 \pm 60 | α | 7 |
| 17.555 \pm 21 | (6 ⁺) | | 180 \pm 70 | n, α | 4, 7 |
| 17.618 \pm 20 | (0 ⁺ , 1 ⁻) | | 175 \pm 60 | p, α | 5, 7 |
| 17.72 | (0 ⁺ , 2 ⁺) | | \approx 75 | (p), α | 5, 8 |
| 17.784 \pm 15 | 4 ⁺ | | 400 \pm 40 | n, α | 4, 7, 8 |
| 17.788 \pm 16 | 4 ⁻ ; 0 | | 150 \pm 60 | | 57, 58, 60, 63, 64, 81, 82 |
| 18.016 \pm 1 | 4 ⁺ ; (0) | | 14 \pm 2 | (n), p, α | 4, 5, 7, 8 |
| 18.033 \pm 10 | 3 ⁺ ; 1 | | 26 \pm 5 | γ , n, p | 43, 44, 45, 81, 82 |
| 18.11 \pm 30 | (0, 2) ⁺ ; 0 | | 300 \pm 50 | (γ), n, p, α | 3, 5, 7, 45, 60, 64 |
| 18.29 | | | \approx 300 | γ , p, α | 3, 5, 7 |
| 18.404 \pm 12 | 5 ⁻ | | 550 \pm 40 | α | 7 |
| 18.46 \pm 25 | 2 ⁺ ; 0 | | 60 \pm 10 | n, p | 45, 57, 60, 63, 64 |
| 18.6 | (1 ⁻ , 5 ⁻) | | \approx 150 | α | 7 |
| 18.6 | (4 ⁺) | | \approx 300 | α | 7, 8 |
| 18.69 \pm 30 | | | 260 \pm 30 | n, p | 2, 45, 60, 64 |
| 18.773 \pm 22 | 1 ⁻ | | 215 \pm 45 | p, α | 5, 7 |
| 18.785 \pm 6 | 4 ⁺ | | 260 \pm 20 | n, p, α | 4, 5, 7, 8 |
| 18.975 \pm 10 | 4 ⁻ ; 1 | | \leq 40 | p | 44, 57, 58, 60, 63, 81, 82 |
| 18.99 \pm 30 | 1 ⁺ | | \approx 250 | γ , p | 43 |
| 19.0 | (5 ⁻) | | \approx 550 | α | 7 |
| 19.08 \pm 30 | 2 ⁺ ; (1) | | \approx 120 | γ , p | 43, 44 |
| 19.206 \pm 12 | 3 ⁻ ; 1 | | 68 \pm 10 | | 81, 82 |
| 19.25 \pm 20 | (2 ⁻ ; 1) | | 90 \pm 10 | n, p, (α) | 7, 45 |
| 19.257 \pm 9 | 2 ⁺ | | 155 \pm 25 | γ , p, α | 5, 7, 43 |

Table 16.11 from (1982AJ01): Energy Levels of ^{16}O ^a (continued)

| E_x (MeV \pm keV) | $J^\pi; T$ | K^π | $\Gamma_{\text{c.m.}}$ or τ_m (keV) | Decay | Reactions |
|--------------------------|---------------------------------------|-------------------|---|----------------------------------|--------------------------|
| 19.319 \pm 14 | 6 ⁺ | | 65 \pm 35 | n, α | 5, 7, 8 |
| 19.375 \pm 2 | 4 ⁺ | | 23 \pm 4 | p, α | 5, 7 |
| 19.48 \pm 25 | 1 ⁻ ; 1 | | 250 \pm 50 | γ , n, p | 43, 44, 45, 57 |
| 19.53 \pm 30 | 2 ⁺ ; 0 | | 255 \pm 75 | n, p, α | 2, 4, 7, 45, 60, 64 |
| 19.754 \pm 16 | 2 ⁺ | | 290 \pm 50 | p, α | 5, 7 |
| 19.802 \pm 16 | 4 ⁻ ; 0 | | 36 \pm 5 | | 57, 58, 81, 82 |
| 19.90 \pm 20 | 3; 0 | | 100 \pm 30 | γ , n, p, α | 2, 7, 43, 44, 45, 58, 60 |
| 20.055 \pm 13 | 2 ⁺ ; 0 | | 350 \pm 50 | γ , n, (p), α | 3, 4, 5, 7, 64 |
| 20.43 \pm 30 | 2 ⁻ ; 1 | | 190 \pm 40 | γ , n, p | 43, 44, 45, 57, 81 |
| (20.5) | | | (\approx 300) | α | 7 |
| 20.541 \pm 2 | 5 ⁻ | | 11 \pm 2 | p, α | 2, 5, 7 |
| 20.560 \pm 2 | | | < 5 | α | 7 |
| 20.615 \pm 3 | | | < 10 | α | 7, 27 |
| (20.8) | | | (\approx 60) | n, (p), α | 4, 5 |
| 20.857 \pm 14 | 7 ⁻ | 0 ⁻ | 900 \pm 100 | α | 7, 9, 10, 11, 13 |
| 20.945 \pm 20 | 1 ⁻ ; 1 | | 300 \pm 10 | γ , n, p | 3, 43, 44, 45, 57 |
| 21.05 \pm 50 | (2 ⁺ ; 0) | | 320 \pm 50 | | 60, 64 |
| 21.052 \pm 6 | 6 ⁺ | | 205 \pm 20 | α | 7 |
| 21.175 \pm 15 | | | | | 2 |
| 21.50 | (1 \rightarrow 4) | | 120 | p | 44 |
| 21.52 | 7 ⁻ | | 61 \pm 32 | (n), α | 4, 7 |
| 21.648 \pm 3 | 6 ⁺ | | 115 \pm 8 | n, α | 4, 7, 9 |
| 21.776 \pm 9 | 3 ⁻ | | 43 \pm 20 | n, p, α | 2, 4, 5, 7 |
| 22.04 | | | 60 | n, d, α | 4, 32 |
| 22.150 \pm 10 | 1 ⁻ ; 1 | | 730 \pm 10 | γ , n, p, d | 31, 36, 43, 44, 45 |
| 22.44 \pm 100 | (1 ⁻ ; 1) | | 300 \pm 100 | n, p, d, α | 32, 36, 45, 60 |
| 22.5 \pm 500 | (8 ⁺) | (0 ⁺) | | | 13 |
| 22.65 \pm 30 | | | | n, α | 2, 4, 8 |
| 22.720 \pm 5 | 0 ⁺ ; T = 2 | | 12.5 \pm 2.5 | n, p, d, α | 4, 5, 7, 29, 33, 36, 84 |
| 22.89 \pm 10 | 1 ⁻ ; 0 | | 300 \pm 10 | γ , p, d | 31, 43, 44 |
| 23.0 \pm 100 | 6 ⁺ | | \leq 500 | α | 8, 9 |
| 23.11 | | | \approx 20 | α | 7, 8 |
| 23.2 \pm 80 | (1 ⁻ ; 1) | | 550 \pm 150 | n, p | 45, 60 |
| 23.51 \pm 30 | | | 300 | p, d, α | 2, 7, 33, 34, 36 |
| 23.879 \pm 6 | 6 ⁺ | | 26 \pm 4 | p, α | 5, 7, 8, 9 |
| 24.07 \pm 30 | 1 ⁻ ; 1 | | 550 \pm 50 | γ , (n), p, ^3He | 18, 19, 43, 44, 60 |
| 24.35 \pm 70 | (2 ⁺ , 3 ⁻); 0 | | 400 \pm 50 | n, p | 45, 64 |

Table 16.11 from (1982AJ01): Energy Levels of ^{16}O ^a (continued)

| E_x (MeV \pm keV) | $J^\pi; T$ | K^π | $\Gamma_{\text{c.m. or } \tau_m}$ (keV) | Decay | Reactions |
|--------------------------|-------------------------|---------|--|---|------------------------|
| 24.522 \pm 11 | 2 ⁺ ; 2 | | < 50 | | 29, 84 |
| 24.76 \pm 60 | (2, 4) ⁺ ; 1 | | 340 \pm 60 | γ , n, p, ^3He , α | 23, 43, 44, 45 |
| 25.12 \pm 50 | 1 ⁻ ; 1 | | 3000 \pm 300 | γ , p, ^3He | 18, 43, 44, 47, 63 |
| 25.5 \pm 150 | 1 ⁻ ; 1 | | 1300 \pm 300 | | 60 |
| 25.6 | (3 ⁻); 1 | | 450 | α | 7 |
| 26.0 \pm 100 | 1 ⁻ ; (1) | | 500 – 1000 | γ , ^3He , α | 18, 23 |
| 26.3 | 2 ⁺ | | 1200 | α | 7 |
| 26.4 \pm 100 | (2, 4) ⁺ ; 1 | | 550 \pm 100 | γ , n, p, ^3He , α | 18, 20, 43, 44, 45, 47 |
| 27.0 \pm 100 | ($T = 1$) | | broad | ^3He , α | 23 |
| 27.3 \pm 70 | (2, 4) ⁺ ; 1 | | 830 \pm 110 | γ , p, ^3He , α | 18, 23, 24, 43, 44, 47 |
| 27.5 | (3 ⁻ ; 0) | | \approx 2500 | γ , ^3He | 18 |
| 28.6 \pm 200 | | | | γ , ^3He | 18 |
| 29.7 \pm 100 | ($T = 1$) | | 470 \pm 150 | n, p, d, ^3He , α | 23, 34, 45 |
| 31.8 \pm 600 | | | | γ | 56 |

^a See also [Table 16.12](#).

^b I am indebted to Professor H.T. Richards for his remarks concerning the existence of this level.