Table 16.22 from (1993TI07): Levels of ^{16}O from ^{15}N(p, γ), ^{15}N(p, p) and ^{15}N(p, α)

E_p (keV)	Γ_{γ_0} (eV)	Γ_{γ_1} (eV)	Γ_p (keV)	$\Gamma_p\Gamma_\gamma/\Gamma$ (eV)	Γ_{α_0} (keV)	Γ_{α_1} (keV)	Γ_{lab} (keV)	$J^\pi; T$	E_x (MeV ± keV)
335 ± 4 [a]	12 ± 2	0.12 ± 0.04	0.9 ± 0.1		102 ± 4	0.025	110 ± 4	$1^-; 0$	12.442
429.57 ± 0.09 [b]	$(33 \pm 5) \times 10^{-3}$ c	2.1 ± 0.2	0.016 ± 0.003 [c]		nr	0.092 ± 0.010 [c]	0.103 ± 0.011	$2^-; 0$	12.530
710 ± 7			40		nr		40 ± 40	$0^-; 1$	12.793
897.37 ± 0.29	$(34 \pm 9) \times 10^{-3}$ [c]		1.04 ± 0.07 [c]		nr	0.30 ± 0.06 [c]	1.47 ± 0.04	$2^-; 1$	12.9686
1028 ± 10	32 ± 5		100		40	r	140 ± 10	$1^-; 1$	13.091
1050 ± 150					$\Gamma_p\Gamma_{\alpha_0} =$ 500 keV^2			2^+	13.1
1210 ± 3			4.1		r	8.2 ± 1.1	22.5 ± 1	$3^-; 1$	13.262
1640 ± 3	< 1 [d]		10		nr	59 ± 6	68 ± 3	$1^+; 0$	13.664
1890 ± 20			0.5		r	(r)	90 ± 2		13.90
1979 ± 3			r		nr	r	23 ± 2	2^-	13.982
2982 ± 6 [e]			20 ± 3 [f]		1.5	30 [g]	55 ± 5 [e]	2^+	14.921 [l]
3170 [h]			12 [i]		152	163	330 ± 100	0^+	15.10 [l]
3264 ± 11 [e]			[j]		nr	7 [k]	67 ± 4 [e]	2^-	15.186 [l]
3340 [h,m]			15 [i]		12	182	315 ± 100	2^+; (0)	15.26 [l]
3499 ± 8 [e,m]			15 ± 5 [f]		103	1	131 ± 18 [e]	3^-	15.406 [l]
4350 ± 90 [f]			210 ± 38 [f]				620 ± 60 [f]	$1^-; 0$	16.20
4357 ± 5 [e]	3.7 ± 0.5 [n]	0.44 ± 0.06 [n]	7 ± 3 [f]	2.70 ± 0.25 [d]			20 ± 3 [e]	$1^+; 1$	16.210
4505 ± 12 [f]			53 ± 12 [f]				65 ± 8 [f]	$0^+; 0$	16.349
4612 ± 9 [d]			r	1.11 ± 0.24 [o]	r	r	26 ± 8 [d]	$1-4; 1$ [d]	16.449
5001 ± 5 [e,m]			7 ± 2 [f]	[p]	nr	r	28 ± 4 [e]	$3^+; 0+1$ [d]	16.813
5300 ± 40 [f]	r		[q]				405 ± 43 [e]	1^-;1	17.09
5329 ± 5 [e]	6.7 ± 1.0	1.00 ± 0.17 [n]	22 [d]	3.90 ± 0.50 [d]			33 ± 4 [e]	1^+;1	17.120
5487 ± 9 [e]	67		45	[r]			80 ± 8 [e]	$1^-; 1$	17.268
5848 ± 8 [f]			37 ± 8 [f]				117 ± 15 [f]	2^+; (1)	17.607
6100 ± 100 [f]			500 ± 100 [f]				875 ± 110 [f]	2^-	17.84
6137 ± 6 [e]			6 [d]	(r)		r	26 ± 3 [e]	$1^-; 2^-; 1$	17.877
6297 ± 6 [e]	nr	4.8 ± 1.9 [t]	13 ± 3 [f,u]			8.9 ± 3.2 [d]	28 ± 6	$3^-; 1$ [y]	18.027
6490 ± 15 [f]			33 ± 12 [f]				150 ± 26	2^+	18.208
6727 ± 15 [f]			11 ± 6				97 ± 41	2^+	18.430
6785 ± 6 [f]			17 ± 3				37 ± 6	1^-	18.484
7100 ± 100 [d]	≥ 3.6 [n]		[v]					$1^+; 1$	18.78
7313 ± 9 [d]		7.1 ± 3.1 [w]	[x]	[x]		0.57 ± 0.49 [d]	8.7 ± 4.1 [d]	$4^-; 1$ [y]	18.979
7330 ± 30	38		≤ 130	$\geq 1.8 \pm 0.3$			≈ 260	1^+	18.99
7420	r		≈ 30				≈ 130	2^+; (1)	19.08
7600 ± 30 [z]	nr	1.5 [aa]					100	(2, 3; 1)	19.25

Table 16.22 from (1993TI07): Levels of ^{16}O from ^{15}N(p, γ), ^{15}N(p, p) and ^{15}N(p, α) (continued)

E_p (keV)	Γ_{γ_0} (eV)	Γ_{γ_1} (eV)	Γ_p (keV)	$\Gamma_p\Gamma_\gamma/\Gamma$ (eV)	Γ_{α_0} (keV)	Γ_{α_1} (keV)	Γ_{lab} (keV)	$J^\pi; T$	E_x (MeV $\pm$ keV)
7840 ± 30 [z]			(r)				350	$1^-; 1$	19.47
8289 ± 7 [d]	nr	17 ± 6 [bb]	25 ± 10 [cc]	[dd]		r	45 ± 10	3; 1 [d]	19.893
8843 ± 17 [d]	nr	38 [ee]	[ee]	[ee]			200 ± 20	$1 - 4$; 1	20.412
8990			[ff]				160		20.55
9410 [h]	170		[ff]	21 ± 1			320 ± 10	$1^-; 1$	20.945 ± 20
10000 [h]			[hh]				130	$1 \rightarrow 4$	21.50
10180 [h]			[ii]		r		< 45	$T = 0$	21.66
10700 [h,gg]	r		[hh]	488 ± 20			730 ± 10	$1^-; 1$	22.150 ± 10
11490 [h]	120	27 [aa]	[hh]	69 ± 5			320 ± 10	$1^-; 1$	22.89 ± 10
12740 [h]	r			130 ± 13			590 ± 40	$1^-; 1$	24.07 ± 30
13490 ± 60		230 ± 90, or 130 ± 50 [jj]	85 [cc]				360 ± 60	$(2,4)^+; 1$	24.76
13870 [h]	r			651 ± 117		[kk]	3150 ± 320	$1^-; 1$	25.12 ± 60
15250 ± 80		740 ± 240, or 410 ± 140 [jj]	122 [cc]			[kk]	565 ± 85 [ll]	$(2,4)^+; 1$	26.41
16250 ± 100		1070 ± 380, or 590 ± 10 [jj]	206 [cc]			[kk]	880 ± 125	$(2,4)^+; 1$	27.35

nr = non-resonant; r = resonant.

For earlier references see Tables 16.21 in (1971AJ02), 16.19 in (1977AJ02), 16.18 in (1982AJ01) and 16.18 in (1986AJ04) .

[a] (1982RE06).

[b] (1987OS01). See also the result $E_p = 429.88 \pm 0.14$ from the ^{1}H(^{15}N, $\alpha\gamma$) reaction.

[c] (1986ZI08).

[d] See (1983SN03).

[e] Weighted mean of values obtained by (1983SN03, 1984DA18) and in earlier work [see (1982AJ01)].

[f] (1984DA18). See also for calculated Γ_n.

[g] $\Gamma_p\Gamma_{\alpha_1}/\Gamma = 16.4$ keV (1983SN03).

[h] Nominal E_p calculated from E_x.

[i] Not observed in p_0 channel.

[j] 35 ± 3 keV ($s = 1$), 15 ± 2 keV ($s = 0$); $\Gamma_p/\Gamma = 0.78$ (1984DA18).

[k] $\Gamma_p\Gamma_{\alpha_1}/\Gamma = 10.9$ keV (1983SN03).

[l] See also footnote [c] in Table 16.18 (1982AJ01).

[m] Broad structures have also been observed at $E_p \approx 3.5$ MeV in ($\alpha_1\gamma$) and at 5.7 MeV in ($\alpha_1\gamma$) and (γ_{1+2}) (1983SN03).

[n] Γ_γ uncertainties neglect the error in Γ_p/Γ (1983SN03).

[o] $\Gamma_p\Gamma_{\gamma_2}/\Gamma$; also $\Gamma_{\gamma_2} \approx 11$ eV (1983SN03).

[p] $\Gamma_p\Gamma_{\gamma_2}/\Gamma = 0.48 \pm 0.09$ eV, $\Gamma_p\Gamma_{\gamma_{3+4}}/\Gamma = 0.62 \pm 0.13$ eV, $\Gamma_p\Gamma_{\alpha_1}/\Gamma = 6.8$ eV; $\Gamma_{\gamma_2} = 1.0$ eV, $\Gamma_{\gamma_3} = 1.2$ eV, $\Gamma_p/\Gamma = 0.5$ [see, however, values shown for Γ_p and Γ] (1983SN03).

[q] $\Gamma_p = 24 \pm 6$ ($l = 0$), 246 ± 24 keV ($l = 2$) (1984DA18).

[r] $\Gamma_{\gamma_3} = 8$ eV, $\Gamma_p\Gamma_{\gamma_3}/\Gamma = 3.27 \pm 0.41$ eV (1983SN03).

[s] $\Gamma_{\gamma_4} = 2$ eV, $\Gamma_p\Gamma_{\gamma_4}/\Gamma = 0.69 \pm 0.10$ eV, $\Gamma_p\Gamma_{\alpha_1}/\Gamma = 1.48$ keV (1983SN03).

[t] Γ_{γ_2}; $\Gamma_{\gamma_3} = 0.76 \pm 0.39$ eV: see (1983SN03).

[u] $\Gamma_{p_0} = 7.8 \pm 2.8$ keV, $\Gamma_{p_{1+2}} = 2.7 \pm 1.2$ keV; $\Gamma_p\Gamma_{\gamma_2}/\Gamma = 1.96 \pm 0.27$ eV, $\Gamma_p\Gamma_{\gamma_{3+4}}/\Gamma = 0.31 \pm 0.11$ eV, $\Gamma_p\Gamma_{p_{1+2}}/\Gamma = 1.11 \pm 0.26$ keV, $\Gamma_p\Gamma_{\alpha_1}/\Gamma = 4.25 \pm 1.00$ keV: see (1983SN03).

[v] $\Gamma_p/\Gamma \leq 0.5$, $\Gamma_p\Gamma_{\gamma_0}/\Gamma \geq 1.8 \pm 0.3$ eV (1983SN03).

[w] $\Gamma_p\Gamma_{\gamma_2}$; $\Gamma_p\Gamma_{\gamma_3} < 0.3$ eV: see (1983SN03).

[x] $\Gamma_{p_0} = 0.98 \pm 0.19$ keV, $\Gamma_{p_{1+2}} = 5.2 \pm 2.3$ keV; $\Gamma_p\Gamma_{\gamma_2}/\Gamma = 0.85 \pm 0.01$ eV, $\Gamma_p\Gamma_{\gamma_{3+4}}/\Gamma < 0.03$ eV, $\Gamma_p\Gamma_{p_{1+2}}/\Gamma = 0.62 \pm 0.09$, $\Gamma_p\Gamma_{\alpha_0}/\Gamma < 0.09$ keV: see (1983SN03).

[y] See also Table IV in (1983SN03).

[z] See also (1983SN03).

[aa] $\gamma_1 + \gamma_2$.

[bb] Γ_{γ_0} (1977CH19). See also (1983SN03).

[cc] Γ_{p_0} based on $\Gamma_{c.m.}$ and values of Γ_{p_0}/Γ assumed by (1977CH19).

[dd] $\Gamma_p\Gamma_{\gamma_2}/\Gamma = 3.9 \pm 0.56$ eV, $\Gamma_p\Gamma_{p_{1+2}}/\Gamma = 4.48$ keV, $\Gamma_p\Gamma_{p_3}/\Gamma = 0.52$ keV, $\Gamma_p\Gamma_{\alpha_1}/\Gamma = 1.07$ keV (1983SN03).

[ee] $\Gamma_{\gamma_2} = 38$ eV; $\Gamma_p\Gamma_{\gamma_2}/\Gamma = 18.8 \pm 3.9$ eV, $\Gamma_p\Gamma_{p_{1+2}}/\Gamma = 15.8$ keV, $\Gamma_p\Gamma_{p_3}/\Gamma = 5.8$ keV, $\Gamma_p\Gamma_{n_0}/\Gamma = 22$ keV; the state is probably 4^+; $T = 1$: see (1983SN03).

[ff] Resonant in p_2.

[gg] $\sigma = 12.9$ mb at peak of GDR (1978OC01).

[hh] Resonant in p_1.

[ii] Resonant in p_0, p_1, p_6.

[jj] Γ_{γ_2} (eV).

[kk] Apparent resonance in yield of ($\alpha\gamma_{15.1}$) (1978OC01).

[ll] Average of values obtained in this experiment and in ^{12}C(α, γ_2).