

Table 17.25 from (1993TI07): Resonances in  $^{16}\text{O}(p, p)^{16}\text{O}$  and  $^{16}\text{O}(p, \alpha)^{13}\text{N}$  <sup>a</sup>

$E_p$ (MeV $\pm$ keV)	$\Gamma_{\text{c.m.}}$ (keV)	Particles out	$\Gamma_{p_0}/\Gamma$	$^{17}\text{F}^*(\text{MeV})$	$J^\pi; T$
2.663 $\pm$ 7	19 $\pm$ 1	p <sub>0</sub>		3.105	$\frac{1}{2}^-$
3.47	1.53 $\pm$ 0.2	p <sub>0</sub>		3.86	$\frac{5}{2}^-$
4.304 $\pm$ 20 <sup>b</sup>	225	p <sub>0</sub>		4.649	$\frac{3}{2}^-$
4.672 $\pm$ 20 <sup>b</sup>	1530	p <sub>0</sub>		4.995	$\frac{3}{2}^+$
5.231 $\pm$ 20	68	p <sub>0</sub>		5.521	$\frac{3}{2}^-$
5.392 $\pm$ 20	40	p <sub>0</sub>		5.672	$\frac{7}{2}^-$
5.402 $\pm$ 20	< 0.6	p <sub>0</sub>		5.682	$\frac{1}{2}^+$
5.546 $\pm$ 20	180	p <sub>0</sub>		5.817	$\frac{3}{2}^+$
5.779 $\pm$ 20	30	p <sub>0</sub>		6.036	$\frac{1}{2}^-$
6.332 $\pm$ 20	200	p <sub>0</sub>		6.556	$\frac{1}{2}^+$
6.482 $\pm$ 7 <sup>c</sup>	$\leq 1.6 \pm 0.2$	p <sub>0</sub>	$\geq 0.25 \pm 0.04$	6.697	$\frac{3}{2}^+$
6.564 $\pm$ 20	4.5	p <sub>0</sub>		6.774	$\frac{3}{2}^+$
6.833 $\pm$ 20	3.8	p <sub>0</sub> , $\gamma_{6.13}$		7.027	$\frac{5}{2}^-$
7.183 $\pm$ 20	10 $\pm$ 2	p <sub>0</sub> , p <sub>2</sub> , $\alpha_0$		7.356	$\frac{3}{2}^+$
7.280 $\pm$ 20	$\leq 5$	p <sub>0</sub>		7.448	
7.287 $\pm$ 20	7 $\pm$ 2	p <sub>0</sub> , p <sub>1</sub> , p <sub>2</sub> , $\alpha$		7.454	
7.305 $\pm$ 20	5 $\pm$ 2	p <sub>0</sub> , p <sub>2</sub>		7.471	
7.313 $\pm$ 20	795	p <sub>0</sub>		7.479	$\frac{3}{2}^+$
7.385 $\pm$ 20	30	p <sub>0</sub> , p <sub>2</sub> , $\gamma_{6.13}$		7.546	$\frac{7}{2}^-$
7.60 $\pm$ 40	179 $\pm$ 30	p <sub>0</sub> , p <sub>1</sub> , $\alpha_0$		7.75	$\frac{1}{2}^+$
7.81 $\pm$ 30	10 $\pm$ 3	p <sub>2</sub>		7.95	$(\frac{11}{2}^-)$
7.88 $\pm$ 40	50 $\pm$ 20	p <sub>0</sub> , $\gamma_{6.13}$ , $\gamma_{6.92}$ , $\alpha_0$		8.01	
7.94 $\pm$ 30	100 $\pm$ 20	p <sub>0</sub> , p <sub>1</sub> , $\alpha_0$		8.07	$\frac{5}{2}^+$
8.1	700 $\pm$ 250	(p <sub>0</sub> ), p <sub>1</sub> , $\alpha_0$		8.2	$\frac{3}{2}^-$
8.275 $\pm$ 10	11 $\pm$ 5	p <sub>0</sub> -p <sub>3</sub> , $\alpha_0$		8.383	$\frac{5}{2}^-$
8.310 $\pm$ 20	45 $\pm$ 10	p <sub>0</sub> -p <sub>3</sub> , $\gamma_{6.13}$ , $\gamma_{6.92}$ , $\alpha_0$		8.416	$(\frac{7}{2}^+)$
8.66 $\pm$ 60	170 $\pm$ 30	p <sub>2</sub> , p <sub>3</sub> , p <sub>4</sub> , $\alpha_0$		8.75	$\frac{5}{2}^+$
8.68	90 $\pm$ 20	p <sub>0</sub>	0.2	8.76	$\frac{3}{2}^+$
8.91	165 $\pm$ 30	p <sub>0</sub> -p <sub>4</sub> , $\gamma_{6.13}$ , $\gamma_{6.92}$ , $\alpha_0$	0.34 $\pm$ 0.05	8.98 $\pm$ 0.02	$\frac{7}{2}^-$
9.11	140 $\pm$ 30	p <sub>0</sub> -p <sub>4</sub> , $\gamma_{6.13}$ , $\gamma_{6.92}$ , $\alpha_0$	0.55 $\pm$ 0.05	9.17 $\pm$ 0.06	$\frac{3}{2}^+$
9.91	90 $\pm$ 30	p <sub>0</sub> , p <sub>2</sub> , $\alpha_0$	0.095 $\pm$ 0.005	9.92	$\frac{9}{2}^+$
10.04 $\pm$ 40	280 $\pm$ 100	p <sub>0</sub> , p <sub>1</sub>		10.04	$\frac{7}{2}^-$
10.23 $\pm$ 40	250 $\pm$ 80	$\alpha_0$		10.22	
10.42 $\pm$ 40	160 $\pm$ 40	p <sub>0</sub> , p <sub>1</sub> , p <sub>3</sub>		10.40	$(\frac{5}{2}^+)$
10.525 $\pm$ 30	165 $\pm$ 25	p <sub>0</sub> , p <sub>2</sub> , $\alpha_0$	0.28 $\pm$ 0.03	10.499	$\frac{7}{2}^-$
(10.75 $\pm$ 50)		p <sub>0</sub> , p <sub>1</sub> , $\alpha_0$		(10.71)	$(\frac{7}{2}^-)$
10.83 $\pm$ 40	120 $\pm$ 40	p <sub>0</sub> , p <sub>2</sub> , (p <sub>3</sub> ), ( $\alpha_0$ )		10.79	
10.96 $\pm$ 100	560 $\pm$ 100	p <sub>0</sub>	0.25 $\pm$ 0.07	10.91	$\frac{1}{2}^-$

Table 17.25 from (1993TI07): Resonances in  $^{16}\text{O}(p, p)^{16}\text{O}$  and  $^{16}\text{O}(p, \alpha)^{13}\text{N}$  <sup>a</sup> (continued)

$E_p$ (MeV $\pm$ keV)	$\Gamma_{c.m.}$ (keV)	Particles out	$\Gamma_{p_0}/\Gamma$	$^{17}\text{F}^*(\text{MeV})$	$J^\pi; T$
11.00 $\pm$ 40	190 $\pm$ 50	(p <sub>2</sub> ), p <sub>3</sub> , ( $\alpha_0$ )		10.95	
11.2636 $\pm$ 2.0 <sup>d</sup>	0.20 $\pm$ 0.04	p <sub>0</sub> , p <sub>2</sub> , p <sub>4</sub> , $\alpha_0$	0.093 $\pm$ 0.013	11.1929 $\pm$ 2.1	$\frac{1}{2}^-; \frac{3}{2}$
11.52 $\pm$ 40	240 $\pm$ 50	p <sub>2</sub> , $\alpha_0$		11.43	
11.67 $\pm$ 50	160 $\pm$ 30	p <sub>0</sub> , p <sub>3</sub>		11.58	
12.12 $\pm$ 40	120 $\pm$ 40	p <sub>2</sub> , $\alpha_0$		12.00	
12.39 $\pm$ 40	300 $\pm$ 30	p <sub>0</sub> , p <sub>2</sub>	0.26 $\pm$ 0.03	12.25	$\frac{3}{2}^-$
12.500 $\pm$ 20	190 $\pm$ 20	p <sub>0</sub> , p <sub>1</sub> , p <sub>4</sub>	0.31 $\pm$ 0.03	12.355	$\frac{1}{2}^-$
$\approx$ 12.65	$\approx$ 600	p <sub>0</sub>	$\approx$ 0.09	$\approx$ 12.50	$\frac{7}{2}^-$
12.7077 $\pm$ 2.0 <sup>e</sup>	2.83 $\pm$ 0.12	p <sub>0</sub> , p <sub>2</sub> , p <sub>4</sub> , p <sub>5</sub> , $\alpha_0$ , $\alpha_1$	0.332 $\pm$ 0.018	12.5505 $\pm$ 2.3	$\frac{3}{2}^-; \frac{3}{2}$
(13.06 $\pm$ 100)		p <sub>0</sub>		(12.88)	$(\frac{7}{2}^-)$
(13.06 $\pm$ 50)		p <sub>0</sub>		(12.88)	$(\frac{1}{2}^+)$
13.250 $\pm$ 4	2 $\pm$ 1	p <sub>0</sub> , p <sub>1+2</sub> , p <sub>3+4</sub> , p <sub>5</sub> , $\alpha_0$	0.15 $\pm$ 0.04	13.060	$\frac{5}{2}^-; \frac{3}{2}$
13.271 $\pm$ 4	2 $\pm$ 1	p <sub>0</sub> -p <sub>4</sub>	0.04 $\pm$ 0.02	13.080	$(\frac{1}{2}^+); \frac{3}{2}$
13.32 $\pm$ 100	520 $\pm$ 50	p <sub>0</sub>	0.163 $\pm$ 0.016	13.13	$\frac{5}{2}^-$
14.017 $\pm$ 4	12 $\pm$ 5	p <sub>0</sub> , p <sub>1+2</sub> , p <sub>3+4</sub> , $\alpha_0$	0.02 $\pm$ 0.01	13.781	$\frac{5}{2}^+; \frac{3}{2}$
(14.20 $\pm$ 50)		p <sub>0</sub>		(13.95)	$(\frac{1}{2}^+)$
14.25 $\pm$ 50	260 $\pm$ 30	p <sub>0</sub>	0.08 $\pm$ 0.01	14.00	$\frac{7}{2}^-$
14.438 $\pm$ 6	27 $\pm$ 5	p <sub>0</sub> , p <sub>3+4</sub>	0.04 $\pm$ 0.02	14.177	$\frac{3}{2}^-; \frac{3}{2}^+$
14.5730 $\pm$ 3.0 <sup>f</sup>	19.3 $\pm$ 1.6	p <sub>0</sub> , p <sub>1+2</sub> , p <sub>3+4</sub> , p <sub>5</sub> , $\alpha_0$	0.085 $\pm$ 0.008	14.3038 $\pm$ 3.1	$\frac{7}{2}^-; \frac{3}{2}$
14.65 $\pm$ 50	610 $\pm$ 50	p <sub>0</sub>	0.10 $\pm$ 0.01	14.38	$\frac{5}{2}^-$
(14.94 $\pm$ 100)		p <sub>0</sub>			$(\frac{3}{2}^-)$
15.00 $\pm$ 100	470 $\pm$ 100	p <sub>0</sub>	0.25 $\pm$ 0.03	14.71	$\frac{1}{2}^-$
15.110 $\pm$ 20	190 $\pm$ 25	p <sub>0</sub>	0.150 $\pm$ 0.015	14.809	$\frac{1}{2}^+$
(15.245 $\pm$ 100)		p <sub>0</sub>		(14.94)	$(\frac{5}{2}^+)$
(15.30 $\pm$ 50)		p <sub>0</sub>		(14.98)	$(\frac{3}{2}^+)$
(15.37 $\pm$ 100)		p <sub>0</sub>		(15.05)	$(\frac{5}{2}^-)$
(15.545 $\pm$ 100)		p <sub>0</sub>		(15.22)	$(\frac{7}{2}^-)$
15.9 <sup>g</sup>	$\approx$ 550	p <sub>0</sub> , p <sub>1+2</sub>		15.6	
17.6	1500	p <sub>0</sub> , p <sub>3+4</sub>		17.1	$\frac{5}{2}^-$
20.4	600	p <sub>0</sub>		19.8	$\frac{3}{2}^+$
21.6	600	p <sub>0</sub> , ( $\alpha$ )		20.9	$\frac{3}{2}^+$
22.6	400	p <sub>0</sub> , ( $\alpha$ )		21.8	$(\frac{5}{2}^+)$
23.5	600	p <sub>0</sub> , p <sub>5</sub>		22.7	$\frac{7}{2}^+$
24.7	600	p <sub>0</sub> , ( $\alpha$ )		23.8	$\frac{7}{2}^+$
26.4	1500	p <sub>0</sub> , ( $\alpha$ )		25.4	$\frac{7}{2}^-$
28.3	1500	p <sub>0</sub>		27.2	$\frac{5}{2}^-$
30.1	2000	p <sub>0</sub>		28.9	$\frac{5}{2}^+$

<sup>a</sup> See earlier references and comments in Tables 17.20 (1971AJ02), 17.19 (1977AJ02) and 17.21 (1982AJ01). See also Table 17.24 here. Uncertainties in  $E_p$  (below 12.7 MeV) have been increased because of a possible error in calibrating the magnet used in many of the measurements reported in (1971AJ02). See also (1964DA02), and see comments in (1986AJ04).

<sup>b</sup>  $E_r$ , not  $E_\lambda$ , is used for calculating  $E_x$ .

<sup>c</sup> (1982SE01). Uncertainty in  $E_p$  estimated by reviewer (1986AJ04). See also (1982AJ01).

<sup>d</sup>  $\Gamma_{p_0} = 19 \pm 3$  eV (1976HI09).

<sup>e</sup>  $\Gamma_{p_0} = 0.94 \pm 0.06$  keV,  $\Gamma_{\alpha_0} = 62 \pm 16$  eV,  $\Gamma_{\alpha_1} = 53 \pm 22$  eV (1976HI09). See also (1986AJ04).

<sup>f</sup>  $\Gamma_{p_0} = 1.65 \pm 0.12$  keV,  $\Gamma_{\alpha_0} = 2.6 \pm 0.7$  keV (1976HI09).

<sup>g</sup> See also Table 17.20 of (1971AJ02) for possible other resonances.