

Table 16.14 from (1982AJ01): States of  $^{16}\text{O}$  from  $^{12}\text{C}(^6\text{Li}, d)$  and  $^{12}\text{C}(^7\text{Li}, t)$ 

$E_x$ <sup>a</sup> (MeV $\pm$ keV)	$\Gamma_{\text{c.m.}}$ <sup>b</sup> (keV)	$\theta_\alpha^2/\theta_\alpha^2(2^+)$ <sup>c</sup>	$\Gamma_{\alpha_0}/\Gamma$ <sup>d</sup>	$J^\pi; K^\pi$
0		0.93, 0.18		$0^+$
6.05		0.38, 1.10		$0^+; 0^+$
6.13		0.23, 0.22		$3^-$
6.92		$\equiv 1.0$		$2^+; 0^+$
7.12		0.53, 0.39		$1^-$
8.87	$< 20$			$2^-$
$9.63 \pm 30$ <sup>i</sup>	$400 \pm 10$ <sup>i</sup>	0.30, 0.60		$1^-; 0^-$
9.85	$< 20$	$\lesssim 0.05, \lesssim 0.01$		$2^+$
$10.346 \pm 6$ <sup>e,j</sup>	$35 \pm 5$	0.25, 0.47	$0.86 \pm 0.09$	$4^+; 0^+$
10.95				$0^-$
$11.09$ <sup>j</sup>	$< 30$	$\lesssim 0.06, \lesssim 0.03$	$0.31 \pm 0.03$ ( $J = 4^+$ )	$3^+ + 4^+$
$11.59 \pm 20$	$700 \pm 100$	$\approx 0.4$		$3^-; 0^-$
13.09	$\approx 230$			$1^-$
$14.363 \pm 15$ <sup>h</sup>	$< 120$			$> 5, \pi = \text{nat.}$
$14.66 \pm 20$	$500 \pm 50$		$1.03 \pm 0.1$	$5^-; 0^-$
14.82	$45 \pm 10$			( $6^+$ )
$16.30 \pm 20$ <sup>e,k</sup>	$300 \pm 50$		$1.07 \pm 0.11$	$6^+; 0^+$
$17.65 \pm 50$	$100 \pm 50$			
$17.85 \pm 50$	$\approx 200$			
(18.6) <sup>f</sup>				( $5^-$ )
$19.30 \pm 50$	$\approx 200$			
$20.8 \pm 100$ <sup>e</sup>	$500 \pm 100$		$1.16 \pm 0.23$	$7^-; 0^-$
$21.6 \pm 100$	$\lesssim 100$		$0.67 \pm 0.14$	$6^+$ <sup>g</sup>
$23.0 \pm 100$	$\approx 200$			( $6^+$ )
$23.8 \pm 100$	$1980 \pm 250$			( $6^+$ ) <sup>g</sup>
$26.9 \pm 100$	$1700 \pm 250$			( $7^-$ ) <sup>g</sup>
(29.3) <sup>g</sup>				( $7^-$ ) <sup>g</sup>

<sup>a</sup>  $E_x$  quoted without errors are from [Table 16.11](#). The others are from ([1978BE43](#):  $E(^6\text{Li}) = 42.1$  MeV) and ([1980BE33](#):  $E(^6\text{Li}) = 90.2$  MeV). The states with  $E_x < 11.1$  MeV have also been studied by ([1978BE42](#):  $E(^7\text{Li}) = 34$  MeV). Angular distributions are reported in both reactions for the first nine states. See also ([1978CU03](#)).

<sup>b</sup> See ([1978BE42](#), [1978BE43](#), [1980BE33](#)): line widths, not corrected for  $\alpha$ -penetrabilities.

<sup>c</sup> Ratio of dimensionless reduced  $\alpha$ -width calculated at a channel radius of 5.4 fm, relative to that for  $^{16}\text{O}^*(6.92)$ . ( $N, L$ ) here are taken to be (2, 0) and (4, 1), respectively, for  $^{16}\text{O}^*(0, 7.12)$ . The first number listed is the value reported at  $E(^6\text{Li}) = 42$  MeV ([1978BE43](#)), the second at  $E(^6\text{Li}) = 90.2$  MeV ([1980BE33](#)).

<sup>d</sup> ([1980CU08](#)); d- $\alpha$  angular correlations. See also ([1977CU1B](#), [1978CU03](#), [1978AR01](#)).

<sup>e</sup> ([1971BA31](#)).

<sup>f</sup> ([1979AR05](#)); d- $\alpha$  angular correlations.

<sup>g</sup> ([1976AR04](#), [1976AR10](#)); d- $\alpha$  angular correlations.

<sup>h</sup> Observed at  $E(^7\text{Li}) = 38$  MeV ([1976CO23](#)) and M.E. Cobern, private communication.

<sup>i</sup> On the basis of studies of the  $^{12}\text{C}(^6\text{Li}, \text{d})$ ,  $^{12}\text{C}(^7\text{Li}, \text{t})$ ,  $^{12}\text{C}(^{10}\text{B}, ^6\text{Li})$  and  $^{19}\text{F}(\text{p}, \alpha)$  reactions, the energy of  $^{16}\text{O}^*(9.6)$  is  $9619 \pm 15$  keV,  $\Gamma = 400 \pm 10$  keV (line width).  $\Gamma_{\text{R}} = 430 \pm 10$  keV as inferred from the best fit BW line shape. This value is corrected for penetrability ([1981OV02](#) and F. Becchetti, private communication).

<sup>j</sup> Angular distributions are reported at  $E(^6\text{Li}) = 35.5 - 35.6$  MeV to  $^{16}\text{O}^*(10.35)$  and to the unresolved  $3^+$  and  $4^+$  states at 11.1 MeV. It appears that the  $4^+$  state is dominantly populated, and that two-step processes may be important in this reaction ([1978CL08](#), [1980KE10](#)). See also ([1978CU03](#)).

<sup>k</sup> Angular distributions at  $E(^6\text{Li}) = 35.5$  MeV ([1978CL08](#)) and 28 and 34 MeV ([1978CU03](#)).