

Table 19.6 from (1972AJ02): Energy levels of  $^{19}\text{F}$  <sup>a</sup>

$E_x$ (MeV $\pm$ keV)	$J^\pi; T$	$K^\pi$	$\tau_m$ or $\Gamma_{c.m.}$ (keV)	Decay	Reactions
0	$\frac{1}{2}^+; \frac{1}{2}$	$\frac{1}{2}^+$			1, 3, 4, 9, 11, 12, 13, 23, 27, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 49, 50, 52
$0.109893 \pm 0.004$	$\frac{1}{2}^-$	$\frac{1}{2}^-$	$\tau_m = 0.849 \pm 0.010$ nsec	$\gamma$	9, 11, 12, 13, 23, 25, 26, 27, 32, 33, 34, 36, 37, 38, 40, 41, 50
$0.197147 \pm 0.012$	$\frac{5}{2}^+$	$\frac{1}{2}^+$	$\tau_m = 128.8 \pm 1.5$ nsec $\mu = 3.69 \pm 0.04$ nm $Q = -(0.10 \pm 0.02)$ bn	$\gamma$	7, 11, 12, 13, 23, 26, 31, 32, 33, 34, 38, 40, 41, 50
$1.34572 \pm 0.11$	$\frac{5}{2}^-$	$\frac{1}{2}^-$	$\tau_m = 4.8 \pm 0.4$ psec	$\gamma$	9, 11, 12, 13, 23, 31, 32, 33, 34, 37
$1.4585 \pm 0.4$	$\frac{3}{2}^-$	$\frac{1}{2}^-$	$\tau_m = 78 \pm 12$ fsec	$\gamma$	9, 11, 12, 13, 23, 27, 32, 33, 34
$1.5541 \pm 0.2$	$\frac{3}{2}^+$	$\frac{1}{2}^+$	$\tau_m = 4.4_{-2.0}^{+2.4}$ fsec	$\gamma$	11, 12, 13, 23, 26, 31, 32, 33, 34, 40
$2.7798 \pm 0.6$	$\frac{9}{2}^+$	$\frac{1}{2}^+$	$\tau_m = 261 \pm 24$ fsec	$\gamma$	5, 7, 11, 12, 13, 18, 22, 23, 32, 33, 46, 47, 49
$3.9071 \pm 1.0$	$\frac{3}{2}^+$	$\frac{3}{2}^+$	$\tau_m \leq 20$ fsec	$\gamma$	12, 13, 18, 23, 33, 47
$3.9985 \pm 0.8$	$\frac{7}{2}^-$	$\frac{1}{2}^-$	$\tau_m = 23 \pm 10$ fsec	$\gamma$	9, 12, 13, 23, 33
$4.0325 \pm 1.0$	$\frac{9}{2}^-$	$\frac{1}{2}^-$	$\tau_m = 73 \pm 11$ fsec	$\gamma$	9, 12, 13, 23, 33, 47
$4.3777 \pm 1.0$	$\frac{7}{2}^+$	$\frac{1}{2}^+$		$\gamma$	7, 12, 13, 23, 26, 33, 47, 49
$4.555 \pm 5$	$\frac{5}{2}^+$	$\frac{3}{2}^+$	$\tau_m \leq 20$ fsec	$\gamma$	12, 23, 47
$4.5575 \pm 1.0$	$\frac{3}{2}^-$		$\tau_m \leq 20$ fsec	$\gamma$	12, 33, 46, 47
4.648	$\frac{13}{2}^+$	$\frac{1}{2}^+$	$\tau_m = 2.2 \pm 0.3$ psec	$\gamma$	12, 37
$4.683 \pm 1$	$\frac{5}{2}^-$		$\tau_m = 15.4 \pm 3.0$ fsec	$\gamma, \alpha$	7, 23, 33, 47
$5.106 \pm 3$	$\frac{5}{2}^-$			$\gamma, \alpha$	7, 12, 22, 23, 33, 47, 49
$5.340 \pm 5$	$\frac{1}{2}^-$		$\tau_m \leq 15$ fsec $\Gamma < 2$ keV	$\gamma, \alpha$	7, 12, 23, 33, 47
$5.428 \pm 8$	$\frac{7}{2}^-$			$\gamma, \alpha$	7, 9, 12, 23, 33
$5.464 \pm 2$	$\frac{7}{2}^+$	$\frac{3}{2}^+$	$\tau_m \leq 19$ fsec $\Gamma < 1$ keV	$\gamma, \alpha$	7, 12, 22, 23
$5.499 \pm 3$	$\frac{3}{2}^+$			$\gamma, \alpha$	7, 8, 22, 23, 33
$5.540 \pm 5$	$\frac{5}{2}^+, \frac{7}{2}^-$			$\gamma, \alpha$	7, 23, 33, 47
$5.630 \pm 10$	$(\frac{1}{2}, \frac{3}{2})^-$			$\gamma, \alpha$	7, 22, 33, 46, 47
$5.943 \pm 5$	$\frac{1}{2}^+$			$\gamma, \alpha$	7, 22, 23, 33, 47
$6.076 \pm 6$	$(\frac{7}{2}^+)$		1.2	$\gamma, \alpha$	7, 8, 22, 33
$6.093 \pm 4$	$(\frac{3}{2}^-)$		4	$\gamma, \alpha$	7, 8, 22, 23, 33, 47
$6.167 \pm 5$	$\frac{7}{2}^-$			$\gamma, \alpha$	7, 23, 33, 47
$6.250 \pm 5$	$\frac{1}{2}^+$		8	$\alpha$	8, 22, 23, 33, 47
$6.290 \pm 7$	$\frac{5}{2}^+$		2.4	$\gamma, \alpha$	7, 8, 22, 33

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$E_x$ (MeV $\pm$ keV)	$J^\pi; T$	$K^\pi$	$\Gamma_{\text{c.m.}}$ (keV)	Decay	Reactions
6.332 $\pm$ 7	$\frac{7}{2}^+$		2.4	$\gamma, \alpha$	7, 8, 33
6.43	$\frac{1}{2}^-$		280	$\alpha$	8
6.497 $\pm$ 2	$\frac{3}{2}^+(+)$			$\gamma, \alpha$	7, 23
6.499 $\pm$ 2	$\frac{11}{2}^+$	$\frac{1}{2}^+$		$\gamma, \alpha$	7
6.525 $\pm$ 2	$\frac{3}{2}^+$		4	$\gamma, \alpha$	7, 8
6.553 $\pm$ 2	$\frac{7}{2}^+$		1.6	$\gamma, \alpha$	7, 8
6.592 $\pm$ 2	$\frac{9}{2}^+$	$\frac{3}{2}^+$		$\gamma, \alpha$	7, 23
6.788 $\pm$ 3	$\frac{3}{2}^-$		2.4	$\gamma, \alpha$	7, 8, 22, 23, 46
6.838 $\pm$ 5	$(\frac{5}{2}, \frac{3}{2})^+$		1.2	$\gamma, \alpha$	7, 8
6.890 $\pm$ 10	$\frac{5}{2}^-$		28	$\alpha$	8, 22
6.926 $\pm$ 5	$\frac{7}{2}^-(+)$		2.4	$\gamma, \alpha$	7, 8, 22, 23
6.99	$\frac{1}{2}^-$		51	$\alpha$	8
7.11	$\frac{7}{2}^+$		$\approx 32$	$\alpha$	8, 23
7.167 $\pm$ 3	$\frac{11}{2}^- (\frac{7}{2}^-)$			$\gamma, \alpha$	7
7.12	$\frac{3}{2}^+$		$\approx 8$	$\alpha$	8, 23
7.257 $\pm$ 5			$\approx 6$	$\gamma, \alpha$	7, 8, 22, 23
7.364 $\pm$ 5	$\frac{1}{2}^+$		( $\approx 63$ )	( $\alpha$ )	8, 22, 23
7.539 $\pm$ 2	$\frac{5}{2}^+; \frac{3}{2}^+$			$\gamma, \alpha$	7, 23
7.660 $\pm$ 2	$\frac{3}{2}^+; \frac{3}{2}^+$			$\gamma, \alpha$	7, 23, 31, 49
7.702 $\pm$ 5	$(\frac{3}{2}^-)$		$\approx 24$	$\alpha$	8, 22, 23
7.762 $\pm$ 5			$\approx 6$	$\gamma, \alpha$	7, 8
7.90			$\approx 210$	$\alpha$	8
7.928 $\pm$ 3	$(\frac{7}{2}^+, \frac{9}{2}^+)$			$\gamma, \alpha$	7
7.935 $\pm$ 3	$\frac{11}{2}^+$	$\frac{3}{2}^+$		$\gamma, \alpha$	7
(7.961)			( $\approx 6$ )	$\alpha$	8
(7.972)			( $\approx 4$ )	$\alpha$	8
8.014 $\pm$ 5	$\frac{5}{2}^+$		$\approx 6$	$\gamma, \alpha$	7, 8, 23
8.086 $\pm$ 5	$(\frac{5}{2}^+)$		$\approx 6$	$\alpha$	8, 23
8.136 $\pm$ 5	$(\frac{1}{2}^+)$		$\approx 5$	$\alpha$	8, 22, 23
8.155			$\approx 51$	$\alpha$	8
8.195 $\pm$ 5	$(\frac{5}{2}^+)$		$\approx 8$	$\alpha$	8, 23
8.255 $\pm$ 5	$(\frac{5}{2}^+)$				23
8.287 $\pm$ 3	$(\frac{13}{2}^-)$				7
8.320 $\pm$ 10			$\approx 8$	$\alpha$	8, 23
8.590 $\pm$ 1	$\frac{3}{2}^+$		2.0 $\pm$ 0.1	$\gamma, p$	18, 20, 23
8.637	$\frac{1}{2}^+$		95	p	20
8.795 $\pm$ 1.3	$\frac{1}{2}^+; \frac{3}{2}^+$		45 $\pm$ 1	$\gamma, p, \alpha$	18, 20, 21, 23
8.928 $\pm$ 0.8	$\frac{3}{2}^-$		3.6 $\pm$ 0.2	p, $\alpha$	20, 21

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$E_x$ (MeV $\pm$ keV)	$J^\pi; T$	$K^\pi$	$\Gamma_{\text{c.m.}}$ (keV)	Decay	Reactions
8.942 $\pm$ 6	$(\frac{11}{2}^-)$				7, 9
9.0984 $\pm$ 0.6	$\frac{7}{2}^+; \frac{3}{2}$		$(20 \pm 19) \times 10^{-3}$	$\gamma, p, \alpha$	18, 20, 21, 23
9.166 $\pm$ 1	$\frac{1}{2}^+$		$5.8 \pm 0.3$	$p, (\alpha)$	20, 21, 23
9.321 $\pm$ 1	$\frac{1}{2}^+$		$4.9 \pm 0.2$	$\gamma, p, \alpha$	18, 20, 21
9.527 $\pm$ 6	$(\frac{5}{2})$		29	$p, \alpha$	20, 21
9.578 $\pm$ 7	$\frac{3}{2}$		26	$p, \alpha$	20, 21, 23
9.668 $\pm$ 2	$\frac{3}{2}^+$		$3.8 \pm 1.0$	$\gamma, p, \alpha$	18, 20, 21, 23
9.819 $\pm$ 0.8	$\frac{5}{2}^-$		$0.29 \pm 0.05$	$\gamma, p, \alpha$	18, 20, 21
9.888 $\pm$ 4	$\frac{1}{2}^+$		31	$p, \alpha$	20, 21
10.136 $\pm$ 0.8	$\frac{3}{2}^-$		$4.7 \pm 1.0$	$\gamma, p, \alpha$	18, 21
10.161 $\pm$ 3	$\frac{1}{2}^+$		31	$p, \alpha$	20, 21
10.231 $\pm$ 3	$\frac{1}{2}^+$		4.3	$(\gamma), p, \alpha$	18, 20, 21
10.253 $\pm$ 3	$\frac{3}{2}^+$		23	$(\gamma), p, \alpha$	18, 20, 21, 23
10.306 $\pm$ 3	$\frac{3}{2}^+$		9.2	$(\gamma), p, \alpha$	18, 20, 21, 23
10.496 $\pm$ 1	$\frac{3}{2}^+$		$6.2 \pm 0.5$	$(\gamma), n, p, \alpha$	18, 19, 20, 21
10.541 $\pm$ 1			$2.5 \pm 0.2$	$n, p$	19, 23
10.554 $\pm$ 3	$(\frac{3}{2}^+; \frac{3}{2})$		$7.6 \pm 2$	$(\gamma), p, \alpha$	18, 20, 21
10.566 $\pm$ 1.0			$5.2 \pm 0.5$	$n, p$	19
(10.580 $\pm$ 4)	$(\frac{5}{2}^+)$		$22 \pm 3$	$(\gamma), p, \alpha$	18, 20, 21
10.613 $\pm$ 1.5	$\frac{5}{2}^+; \frac{3}{2}$		$4.8 \pm 0.5$	$n, p, \alpha$	19, 20, 21
10.763 $\pm$ 3	$\frac{1}{2}^-$		5.4	$p, \alpha$	20, 21
10.858 $\pm$ 2	$\frac{5}{2}^+$		$25 \pm 1.5$	$n, p, \alpha$	19, 20, 21
10.972 $\pm$ 3	$(\frac{3}{2}, \frac{5}{2})^+$		$\approx 11$	$n, p, \alpha$	19, 20, 21
10.988 $\pm$ 3			$\approx 10$	$n, p$	19
11.070 $\pm$ 3	$\frac{1}{2}^+$		$31 \pm 5$	$n, p, \alpha$	19, 20, 21
11.199 $\pm$ 2	$(\frac{1}{2}^-)$		$43 \pm 2$	$n, p, \alpha$	19, 20, 21
11.288 $\pm$ 9			24	$n, p, \alpha$	19, 20, 21
11.310 $\pm$ 9				$n, p, \alpha$	19, 21
11.43 $\pm$ 10			$81 \pm 19$	$n, p, \alpha$	19, 21
11.51				$n, p, \alpha$	19, 20, 21
11.56 $\pm$ 10			$< 48$	$n, p, \alpha$	19, 20, 21
11.65 $\pm$ 10			38	$n, p, \alpha$	19, 20, 21
11.68				$p, \alpha$	20, 21
11.78				$n, p, \alpha$	19, 20, 21
11.84 $\pm$ 10			$< 48$	$n, p$	19
11.93 $\pm$ 10			85	$n, p, \alpha$	19, 20, 21
12.05				$p, \alpha$	21
12.09				$n, p, \alpha$	19, 20, 21

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$E_x$ (MeV $\pm$ keV)	$J^\pi; T$	$K^\pi$	$\Gamma_{\text{c.m.}}$ (keV)	Decay	Reactions
12.13 $\pm$ 10	$T = \frac{3}{2}$		95	n, p, $\alpha$	19, 20, 21
12.23			48	n, p, $\alpha$	19, 20, 21
12.33			n, p, $\alpha$	19, 20, 21	
12.44			n, p, t, $\alpha$	10, 19, 20, 21	
12.52			14	p	20
12.57			n, p, $\alpha$	19, 20, 21	
12.63			n, p, $\alpha$	19, 20, 21	
12.69			p, t, $\alpha$	10, 20, 21	
12.75			p, t, $\alpha$	10, 21	
12.77 $\pm$ 10			190	n, p, (t), $\alpha$	10, 19, 20, 21
12.92			n, p, t, $\alpha$	10, 19, 20, 21	
13.06			n, p, t, $\alpha$	10, 19, 20, 21	
13.17 $\pm$ 15			67	n, p, t, $\alpha$	10, 19, 21
13.31 $\pm$ 15			20	n, p, $\alpha$	19, 20, 21
13.45			n, p, $\alpha$	19, 21	
13.58			p, $\alpha$	20, 21	
13.73 $\pm$ 15			95	n, p, $\alpha$	19, 20, 21
14.24 $\pm$ 15			330	n, p	19
14.29			p, $\alpha$	20, 21	
14.78 $\pm$ 20			280	n, p	19
15.00 $\pm$ 20	n, p	19			
15.75 $\pm$ 25	150	n, p	19		
16.32 $\pm$ 25	190	n, p, $\alpha$	19, 21		
16.80 $\pm$ 30	n, p	19			
17.9	p, $\alpha$	20, 21			

<sup>a</sup> See also [Tables 19.9](#) and [19.10](#) and [\(1969BE1V; theor.\)](#).