Reaction: ^{18}O(p,γ)^{19}F

The contribution of 20 resonances between $E_r = 20$ and 1893 keV is considered. At higher energies, most data come from WI80, where the reaction has been investigated for $76 \leq E \leq 2083$ keV, while BE82 and VO90 have studied the low energy resonances. The main contribution to the rates comes from the three low energy resonances at $E_r = 20$, 89 and 143.5 keV. In CA88, CH86a is quoted as the source of data for the $E_r = 20$ keV resonance. However, CH86a only gives the proton width $\Gamma_p = 2 \times 10^{-19}$ eV from a DWBA analysis of a ^{18}O(^{3}He,d)^{19}F measurement. Another value, $\Gamma_p = 6.7 \times 10^{-19}$ eV, is reported in WI80 from the analysis of a direct capture transition to that state. No published values of Γ_γ or Γ exist, but $\Gamma_\gamma = 2.3$ eV and $\Gamma_\alpha \sim 2.5$ keV are estimated in WI80. The first value corresponds to 28 Weisskopf units and the second to 1% of the Wigner limit. In the absence of other data, we use these values together with the CH86a data to obtain a rough estimate of $\omega\gamma = 6 \times 10^{-22}$ eV with an uncertainty of a factor 100. Consequently, below $T_9 = 0.02$, the present rates are lower than the CA88 ones by one order of magnitude, but the CA88 rates are within the proposed upper and lower limits. A non-resonant contribution (direct capture [WI80] and low energy tail of the $E_r = 143.5$ keV resonance) is also added, being important between $T_9 = 0.014$ and 0.03. Above $T_9 = 2$, the rates are calculated using HF rates (see Sect. 2.5). Around $T_9 = 0.05$, the adopted rates are higher than the CA88 ones because of the $E_r = 89$ keV isolated resonance, which is missing in CA88.

E_r (keV)	J^π	$\omega\gamma$ (eV)			
		WI80	others	adopt	
20 ± 1	$5/2^+$		$6^{+594}_{-6} \times 10^{-22}$*	$6^{+594}_{-6} \times 10^{-22}$	I
89 ± 3		$\leq 5 \times 10^{-8}$	$(2 \pm 2) \times 10^{-8}$ [VO90]	$(2 \pm 2) \times 10^{-8}$	I
143.5 ± 1.2	$1/2^+$	$(1.0 \pm 0.1) \times 10^{-3}$	$(1.1 \pm 0.1) \times 10^{-3}$ [BE82] $(0.92 \pm 0.06) \times 10^{-3}$ [VO90]	$(0.97 \pm 0.05) \times 10^{-3}$	I
204.8 ± 1.3	$(5/2^+)$	$\geq 0.8 \times 10^{-5}$	$(5.0 \pm 1.0) \times 10^{-6}$ [VO90]	$(5.0 \pm 1.0) \times 10^{-6}$	M
260.0 ± 2.8	$(3/2 - 7/2)^-$	$(3.7 \pm 0.5) \times 10^{-5}$		$(3.7 \pm 0.5) \times 10^{-5}$	M
315.8 ± 1.5	$5/2^+$	$(0.95 \pm 0.08) \times 10^{-3}$		$(0.95 \pm 0.08) \times 10^{-3}$	M
589.2 ± 1.8	$5/2^+$	$(10 \pm 2) \times 10^{-3}$		$(10 \pm 2) \times 10^{-3}$	M
597.7 ± 1.3	$3/2^-$	0.10 ± 0.02		0.10 ± 0.02	M
799.0 ± 1.7	$1/2^+$	1.4 ± 0.2		1.4 ± 0.2	M
932.5 ± 0.7	$3/2^-$	$(1.5 \pm 0.2) \times 10^{-2}$		$(1.5 \pm 0.2) \times 10^{-2}$	M
1105.5 ± 0.7	$7/2^-$	0.31 ± 0.10	0.29 ± 0.03 [BE82]	0.29 ± 0.03	M
1323.8 ± 2.2	$3/2^+$	0.08 ± 0.01		0.08 ± 0.01	M
1542.1 ± 2.2	$5/2^+$	0.025 ± 0.005		0.025 ± 0.005	M
1572 ± 3	$3/2^-$	0.041 ± 0.010		0.041 ± 0.010	M
1581 ± 4	$3/2^-$	0.06 ± 0.01		0.06 ± 0.01	M
1592 ± 3	$7/2$	0.025 ± 0.004		0.025 ± 0.004	M
1673.3 ± 1.5	$3/2^+$	1.2 ± 0.2		1.2 ± 0.2	M
1825.8 ± 1.0	$5/2^-$	2.8 ± 0.7		2.8 ± 0.7	M
1879.8 ± 1.8	$11/2^-$	0.13 ± 0.04		0.13 ± 0.04	M
1893 ± 3	$1/2^+$	0.14 ± 0.05		0.14 ± 0.05	M

*see comments

T_9	low	adopt	high	exp	ratio	T_9	low	adopt	high	exp	ratio	T_9	low	adopt	high	exp	ratio
0.009	1.11	8.54	2660	-25	0.1	0.1	3.12	3.32	3.55	-4	1.1	0.9	5.35	5.97	6.61	1	0.8
0.01	0.17	1.01	263	-23	0.1	0.11	1.21	1.28	1.36	-3	1.1	1	7.74	8.81	9.91	1	0.8
0.011	1.79	7.84	1690	-23	0.1	0.12	3.72	3.93	4.16	-3	1.1	1.25	1.96	2.28	2.62	2	0.8
0.012	1.45	4.59	791	-22	0.1	0.13	0.95	1.00	1.06	-3	1.1	1.5	4.17	4.89	5.63	2	0.9
0.013	0.95	2.21	289	-21	0.1	0.14	2.11	2.23	2.35	-2	1.1	1.75	7.39	8.67	9.98	2	0.9
0.014	5.15	9.39	871	-21	0.2	0.15	4.17	4.40	4.64	-2	1.1	2	1.13	1.32	1.51	3	0.9
0.015	2.40	3.64	226	-20	0.2	0.16	7.54	7.96	8.38	-2	1.1	2.5	2.27	2.71	3.14	3	1.0
0.016	0.98	1.31	51.8	-19	0.3	0.18	1.99	2.10	2.21	-1	1.0	3	3.79	4.62	5.46	3	1.1
0.018	1.18	1.39	21.0	-18	0.5	0.2	4.61	4.87	5.12	-1	1.1	3.5	5.64	7.03	8.43	3	1.3
0.02	1.01	1.13	6.90	-17	0.7	0.25	1.59	1.68	1.77	0	1.0	4	7.71	9.86	12.0	3	1.4
0.025	7.55	8.24	12.6	-16	1.0	0.3	3.65	3.85	4.05	0	1.0	5	1.22	1.64	2.07	4	1.6
0.03	2.05	2.30	2.98	-14	1.0	0.35	6.39	6.74	7.10	0	1.0	6	1.65	2.36	3.07	4	1.7
0.04	2.67	5.39	15.1	-12	2.0	0.4	0.95	1.00	1.06	1	1.0	7	2.01	3.08	4.16	4	1.8
0.05	1.50	4.75	14.4	-10	3.6	0.45	1.27	1.34	1.42	1	1.0	8	2.27	3.77	5.27	4	1.9
0.06	1.25	2.07	4.08	-8	2.0	0.5	1.59	1.69	1.78	1	1.0	9	2.40	4.39	6.37	4	1.9
0.07	4.60	5.55	7.40	-7	1.4	0.6	2.22	2.36	2.50	1	1.0	10	2.41	4.93	7.44	4	2.0
0.08	7.06	7.81	8.95	-6	1.2	0.7	2.90	3.11	3.33	1	0.9						
0.09	5.84	6.28	6.85	-5	1.2	0.8	3.84	4.20	4.57	1	0.9						