Reaction : $^{14}N(\alpha,\gamma)^{18}F$

Below $T_9 = 2$, the calculation of the reaction rates is performed by adding the contribution of 15 resonances at energies $E_r \leq 2.232$ MeV [PA68, CO72, RO73b, BE82]. Among these resonances, only the ones at $E_r = 0.237$, 0.435, 0.883, 1.088, 1.189 and 1.258 MeV make a significant contribution to the total reaction rates. Only an upper limit of 8×10^{-15} eV for the strength of the $E_r = 0.237$ MeV resonance is known [CO72]; the adopted value, the upper limit and the lower limit are taken as a factor 0.1, 1.0 and 0 of this upper limit, respectively. It should be pointed out that the Wigner limit strongly depends on the nuclear radius. We obtain 2.56×10^{-19} MeV for $a = 4.5$ fm, while for $a = 6$ fm, the Wigner limit is 4.60×10^{-18} MeV. For the resonance at $E_r = 0.535$ MeV, the adopted value is a factor 0.1 of the upper limit of CO72 (see table), while the upper and lower limit are a factor 1 and 0, respectively. The $\omega\gamma$ values cited as PA68 are the numbers revised by RO73b taking into account stopping power corrections. Also the CO72 values are corrected here taken into account new values of the stoppping power. Above $E_r = 1.373$ MeV, the adopted resonance strength are from RO73b. A non-resonant contribution with $S_0 = 0.7$ keV b [CO72], arising from the direct capture process and the tails of the low energy resonances, has a negligible effect on the total reaction rates. Above $T_9 = 2$, HF estimates are used, following the procedure explained in Sect. 2.5. Below $T_9 = 2$, the differences between the adopted rates and the CA88 ones arise from different resonance parameters. Above $T_9 = 2$, there are larger differences between the CA88 rates and the HF calculations.

E_r (MeV)	J^π	$\omega\gamma$ (eV)				
		PA68[1]	CO72[2]	RO73b	adopt	
0.237	4^+		$< 8 \times 10^{-15}$		$8^{+72}_{-8} \times 10^{-16}$	I
0.435	1		$(0.6 \pm 0.1) \times 10^{-4}$		$(0.6 \pm 0.1) \times 10^{-4}$	I
0.535	2^+		$< 1 \times 10^{-5}$		$1^{+9}_{-1} \times 10^{-6}$	M
0.883 ± 0.002	4^+	0.024±0.001	0.024±0.003	0.020±0.007	0.024±0.001	M
1.088 ± 0.003	$3^{(-)}$	0.008±0.001		0.006±0.001	0.007±0.001	M
1.189 ± 0.002	1^-	1.3±0.1		1.3±0.1	1.3±0.1	M
1.258 ± 0.002	1^-	0.38±0.04	0.45±0.02 [BE82]	0.5±0.1	0.44±0.02	M
Res. 1.373 – 2.232 MeV		see comments				

[1] values revised by RO73b

[2] including stopping power corrections

T_9	low	adopt	high	exp	ratio	T_9	low	adopt	high	exp	ratio	T_9	low	adopt	high	exp	ratio
0.07	4.E-4	1.05	10.5	-26	0.2	0.3	4.25	5.10	5.96	-7	0.9	2	1.69	1.84	2.00	1	1.2
0.08	0.03	1.19	11.7	-24	0.2	0.35	3.72	4.47	5.24	-6	0.9	2.5	3.82	5.14	5.97	1	1.1
0.09	2.36	7.27	47.7	-23	0.2	0.4	1.85	2.22	2.61	-5	0.8	3	0.67	1.05	1.29	2	1.1
0.1	5.47	7.37	1.57	-21	0.6	0.45	6.31	7.58	8.92	-5	0.9	3.5	1.00	1.81	2.31	2	1.2
0.11	4.65	5.67	7.36	-19	0.8	0.5	1.67	2.00	2.36	-4	0.9	4	1.36	2.77	3.66	2	1.3
0.12	1.87	2.24	2.67	-17	0.9	0.6	7.31	8.73	10.3	-4	0.9	5	2.12	5.30	7.31	2	1.6
0.13	4.20	5.04	5.91	-16	0.9	0.7	2.41	2.83	3.32	-3	1.0	6	2.90	8.59	12.2	2	1.9
0.14	6.00	7.21	8.42	-15	0.9	0.8	7.62	8.75	10.0	-3	1.1	7	0.37	1.27	1.84	3	2.3
0.15	5.98	7.18	8.38	-14	0.9	0.9	2.41	2.71	3.04	-2	1.2	8	0.45	1.77	2.59	3	2.9
0.16	4.44	5.33	6.22	-13	0.9	1	7.03	7.81	8.66	-2	1.2	9	0.54	2.36	3.51	3	3.5
0.18	1.24	1.48	1.73	-11	0.9	1.25	5.98	6.57	7.18	-1	1.2	10	0.64	3.07	4.60	3	4.2
0.2	1.74	2.09	2.44	-10	0.9	1.5	2.65	2.90	3.15	0	1.2						
0.25	1.93	2.32	2.71	-8	0.9	1.75	7.65	8.36	9.09	0	1.2						