Reaction : ^{25}Mg(p,γ)^{26}Al

Three reaction rates, $N_A\langle\sigma v\rangle^g$, $N_A\langle\sigma v\rangle^m$ and $N_A\langle\sigma v\rangle^t$ have to be evaluated. They correspond to the production of the ^{26}Al ground (g) state, ^{26}Al isomeric (m) state, and to the sum over all possible exit channels, respectively. The contribution of 89 resonances ranging from 37.5 to 1920.5 keV is considered. For the low energy resonances ($E_r \leq 130.4$ keV), the strengths of IL96, obtained by a new analysis of the CH89 and RO90 data, are adopted. For resonances above 130.4 keV, the adopted resonance strengths are the weighted averages of the values reported in EN66, DE74, EL79b, AN80, KE80, AN82, CH83, KA84, CH86b, EN86, EN87, CH89, KA89, IL90, and RO90. The relative resonance strengths in DE74 are renormalized, taking as a standard the strength of the $E_r = 658.4$ keV resonance in KE80. The data of CH83 and KA84 differ substantially from the data of the other authors, and are neglected. The non-resonant contribution from the direct capture process into the bound states of ^{26}Al and the contribution of the subthreshold state at $E_r = -25.7$ keV are calculated with the S-factors given by EN87. The branching ratios for forming the ^{26}Al ground state reported by EN87 and CH89 are used. Above $T_9 = 2$, HF rates are used for $N_A\langle\sigma v\rangle^t$ (see Sect. 2.5). For the calculation of $N_A\langle\sigma v\rangle^g$ and $N_A\langle\sigma v\rangle^m$, the total rate has been multiplied by the corresponding branching ratios at $T_9 = 2$. The present rates at low temperatures are smaller than the CA88 ones. This is mainly due to the smaller strengths of the resonances at $E_r = 37.5$ and 58 keV. Our thermalization effects reduce the ratio by a factor $r_{tt} = 0.92 - 0.69$ for $T_9 = 4$ to 10. (CA88 adopt $r_{tt} = 1$ at all temperatures).

E_r (keV)	J^π	$\omega\gamma$ (eV)						
		CH86b	EN87	CH89	RO90	IL96	adopt	
37.5 ± 0.5	4^-		1.9×10^{-18}	$\leq 2.1\ 10^{-20}$	$(3.1 \pm 0.8) \times 10^{-20}$	$\leq 2.4 \times 10^{-20}$	$2.4^{+21.6}_{-2.4} \times 10^{-21}$	I
58.0 ± 0.5	3^+	$(1.6 \pm 0.6)10^{-13}$	1.2×10^{-12}	2.6×10^{-13}	$(2.6 \pm 0.3) \times 10^{-13}$	$2.82^{+1.41}_{-0.94} \times 10^{-13}$	$2.82^{+1.41}_{-0.94} \times 10^{-13}$	I
		EL79b						
92.6 ± 0.5	2^-	$\leq 4 \times 10^{-8}$	4.3×10^{-10}	8.5×10^{-11}	$(2.2 \pm 0.5) \times 10^{-10}$	$1.16^{+1.16}_{-0.39} \times 10^{-10}$	$1.16^{+1.16}_{-0.39} \times 10^{-10}$	I
108.5 ± 0.5	0^+	$\leq 4 \times 10^{-8}$	$\leq 1.9 \times 10^{-10}$	$\leq 2.0 \times 10^{-12}$	$(6.3 \pm 0.5) \times 10^{-12}$	2.1×10^{-11}	$2.1^{+2.1}_{-0.7} \times 10^{-11}$	M
130.4 ± 0.5	4^-	$\leq 4 \times 10^{-8}$	1.7×10^{-7}	$\leq 1.3 \times 10^{-9}$	$\leq 5.0 \times 10^{-9}$	$\leq 1.4 \times 10^{-10}$	$1.4^{+13}_{-1.4} \times 10^{-11}$	M
Res. 189.9 – 1920.5 keV			see comments					

$N_A\langle\sigma v\rangle^t$:

T_9	low	adopt	high	exp	ratio	T_9	low	adopt	high	exp	ratio	T_9	low	adopt	high	exp	ratio
0.015	3.90	8.87	25.9	-25	0.02	0.14	1.37	1.60	2.05	-6	0.4	1.25	1.55	1.70	1.82	3	1.0
0.016	0.59	1.28	3.08	-23	0.04	0.15	5.61	6.37	7.50	-6	0.6	1.5	2.61	2.87	3.08	3	1.0
0.018	0.55	1.12	2.36	-21	0.1	0.16	2.06	2.30	2.61	-5	0.7	1.75	3.82	4.24	4.55	3	1.0
0.02	2.02	4.01	8.01	-20	0.2	0.18	1.91	2.11	2.33	-4	0.8	2	5.16	5.75	6.17	3	1.0
0.025	1.27	2.39	4.48	-17	0.2	0.2	1.16	1.27	1.39	-3	0.8	2.5	0.83	1.00	1.12	4	1.1
0.03	0.89	1.61	2.91	-15	0.2	0.25	2.97	3.24	3.52	-2	0.9	3	1.16	1.51	1.74	4	1.2
0.04	1.67	2.89	5.02	-13	0.2	0.3	2.59	2.81	3.04	-1	0.9	3.5	1.49	2.06	2.45	4	1.3
0.05	3.96	6.66	11.6	-12	0.2	0.35	1.22	1.33	1.43	0	0.9	4	1.80	2.66	3.24	4	1.4
0.06	3.86	6.37	11.7	-11	0.2	0.4	3.97	4.29	4.62	0	0.9	5	2.39	3.95	5.01	4	1.5
0.07	2.38	3.88	7.56	-10	0.2	0.45	1.00	1.08	1.16	1	0.9	6	2.93	5.35	7.00	4	1.7
0.08	1.06	1.71	3.46	-9	0.2	0.5	2.12	2.28	2.46	1	0.9	7	3.41	6.84	9.17	4	1.9
0.09	3.60	5.77	12.0	-9	0.1	0.6	6.67	7.18	7.71	1	0.9	8	3.86	8.40	11.5	4	2.1
0.1	1.03	1.62	3.40	-8	0.1	0.7	1.54	1.66	1.78	2	0.9	9	0.43	1.00	1.39	5	2.3
0.11	2.79	4.22	8.51	-8	0.1	0.8	2.92	3.15	3.39	2	0.9	10	0.46	1.17	1.65	5	2.5
0.12	0.85	1.18	2.12	-7	0.2	0.9	4.85	5.24	5.63	2	0.9						
0.13	3.21	4.03	6.03	-7	0.3	1	7.31	7.92	8.51	2	1.0						

$N_A\langle\sigma v\rangle^g$:

T_9	low	adopt	high	exp	ratio	T_9	low	adopt	high	exp	ratio	T_9	low	adopt	high	exp	ratio
0.015	3.16	7.18	20.9	-25	0.02	0.14	1.15	1.34	1.71	-6	0.5	1.25	1.12	1.21	1.30	3	0.9
0.016	0.48	1.03	2.48	-23	0.04	0.15	4.77	5.40	6.34	-6	0.6	1.5	1.84	2.00	2.14	3	0.9
0.018	4.42	9.09	19.1	-22	0.1	0.16	1.76	1.97	2.23	-5	0.7	1.75	2.66	2.90	3.11	3	0.8
0.02	1.63	3.25	6.48	-20	0.2	0.18	1.64	1.81	2.00	-4	0.8	2	3.51	3.91	4.20	3	0.9
0.025	1.03	1.93	3.63	-17	0.2	0.2	1.00	1.09	1.20	-3	0.9	2.5	5.64	6.80	7.62	3	0.9
0.03	0.72	1.30	2.36	-15	0.2	0.25	2.54	2.78	3.02	-2	0.9	3	0.79	1.03	1.18	4	1.0
0.04	1.36	2.34	4.07	-13	0.2	0.3	2.20	2.39	2.59	-1	0.9	3.5	1.01	1.40	1.67	4	1.1
0.05	3.23	5.43	9.48	-12	0.2	0.35	1.03	1.12	1.21	0	0.9	4	1.22	1.81	2.20	4	1.2
0.06	3.18	5.24	9.65	-11	0.2	0.4	3.33	3.59	3.86	0	0.9	5	1.63	2.69	3.41	4	1.3
0.07	1.98	3.23	6.30	-10	0.2	0.45	8.32	8.97	9.64	0	0.9	6	1.99	3.64	4.76	4	1.4
0.08	0.89	1.43	2.90	-9	0.2	0.5	1.75	1.88	2.02	1	0.9	7	2.32	4.65	6.24	4	1.6
0.09	3.02	4.83	10.1	-9	0.1	0.6	5.39	5.79	6.21	1	0.9	8	2.62	5.71	7.82	4	1.8
0.1	0.86	1.35	2.83	-8	0.1	0.7	1.22	1.31	1.40	2	0.9	9	2.92	6.80	9.45	4	2.0
0.11	2.30	3.48	7.02	-8	0.1	0.8	2.27	2.44	2.61	2	0.9	10	3.13	7.96	11.2	4	2.1
0.12	6.94	9.64	17.3	-8	0.2	0.9	3.69	3.97	4.25	2	0.9						
0.13	2.65	3.32	4.94	-7	0.3	1	5.46	5.89	6.30	2	0.9						

$N_A \langle \sigma v \rangle^{m}$:

T_9	low	adopt	high	exp	ratio	T_9	low	adopt	high	exp	ratio	T_9	low	adopt	high	exp	ratio
0.015	0.74	1.69	5.02	-25	0.02	0.14	2.21	2.60	3.43	-7	0.4	1.25	4.30	4.88	5.22	2	1.4
0.016	1.12	2.50	5.98	-24	0.04	0.15	8.37	9.72	11.6	-7	0.4	1.5	7.70	8.72	9.40	2	1.5
0.018	1.04	2.11	4.54	-22	0.12	0.16	2.98	3.30	3.80	-6	0.5	1.75	1.16	1.34	1.44	3	1.5
0.02	3.93	7.62	15.3	-21	0.2	0.18	2.70	3.03	3.33	-5	0.6	2	1.65	1.84	1.97	3	1.6
0.025	2.43	4.56	8.50	-18	0.2	0.2	1.65	1.80	1.91	-4	0.6	2.5	2.66	3.20	3.58	3	1.8
0.03	1.69	3.12	5.48	-16	0.2	0.25	4.31	4.56	5.02	-3	0.6	3	3.71	4.83	5.57	3	1.9
0.04	3.11	5.52	9.53	-14	0.2	0.3	3.89	4.18	4.53	-2	0.7	3.5	4.77	6.59	7.84	3	2.1
0.05	0.73	1.23	2.12	-12	0.2	0.35	1.94	2.10	2.22	-1	0.7	4	5.76	8.51	10.4	3	2.2
0.06	0.68	1.13	2.05	-11	0.2	0.4	6.38	7.04	7.58	-1	0.7	5	0.76	1.26	1.60	4	2.4
0.07	3.95	6.54	12.6	-11	0.2	0.45	1.68	1.83	1.96	0	0.8	6	0.94	1.71	2.24	4	2.7
0.08	1.71	2.82	5.60	-10	0.1	0.5	3.71	4.01	4.42	0	0.8	7	1.09	2.19	2.93	4	3.0
0.09	0.58	9.43	1.92	-10	0.1	0.6	1.28	1.39	1.50	1	0.9	8	1.24	2.69	3.68	4	3.4
0.1	1.71	2.67	5.67	-9	0.1	0.7	3.23	3.52	3.82	1	1.0	9	1.38	3.20	4.45	4	3.7
0.11	4.90	7.38	14.9	-9	0.1	0.8	6.52	7.10	7.78	1	1.0	10	1.47	3.74	5.28	4	4.0
0.12	1.56	2.16	3.91	-8	0.2	0.9	1.16	1.27	1.38	2	1.1						
0.13	5.60	7.11	10.9	-8	0.3	1	1.85	2.03	2.21	2	1.2						