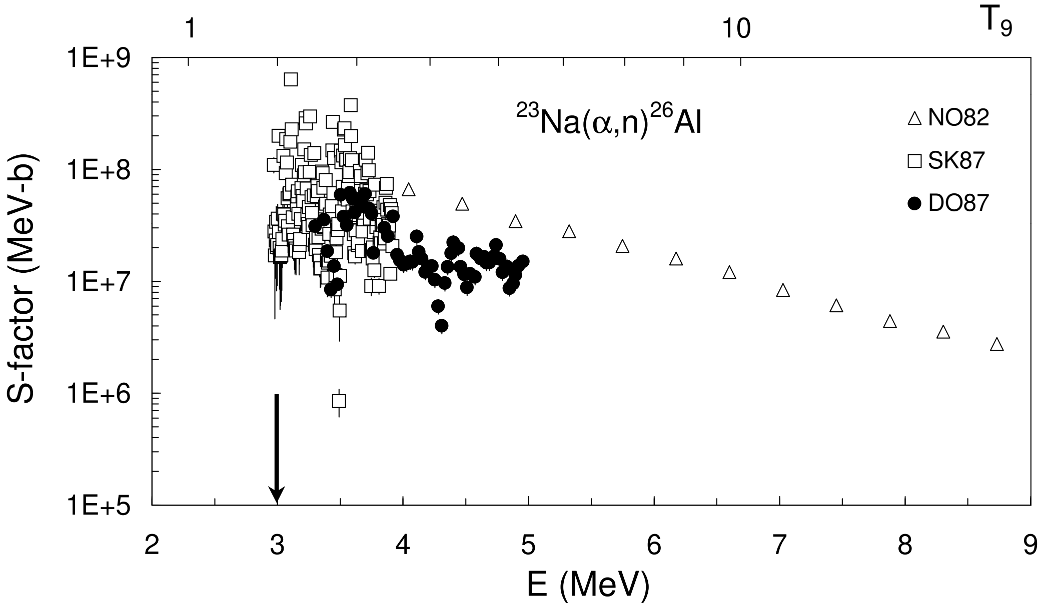
Reaction : ^{23}Na(α,n)^{26}Al

Depending upon the astrophysical situation, it is necessary to evaluate either the production of the ^{26}Al ground (g) and isomeric (m) states separately, or the total production of ^{26}Al, irrespective of its state [WA80]. The three corresponding reaction rates are noted $N_A\langle\sigma v\rangle^{\rm g}$, $N_A\langle\sigma v\rangle^{\rm m}$ and $N_A\langle\sigma v\rangle^{\rm t}$. They are calculated by numerical integration of the cross section data of SK87 ($E = 2.97 - 3.83$ MeV), NO82 ($E = 3.0 - 8.9$ MeV), and DO87 ($E = 3.3 - 5.0$ MeV) from threshold energies ($Q^{\rm g} = -2.968$ MeV and $Q^{\rm m} = -3.196$ MeV) up to $E = 8.9$ MeV. The NO82 data are divided by a factor of 3 in order to normalize them to the DO87 data. The DO87 time of flight experiment is indeed considered to be more reliable than the NO82 thick target measurements. Total S-factor data are shown in the figure. As experimental data are available down to threshold and up to more than 8.5 MeV, neither low energy nor high energy extrapolations are required. The upper and lower limits of the rates are set by the experimental uncertainties. Our rates differ from the CA88 ones by up to a factor of 6.5.



$N_{\rm A}\langle\sigma v\rangle^{\rm t}_{\rm gs}$:

T_9	low	adopt	high	exp	ratio	T_9	low	adopt	high	exp	ratio	T_9	low	adopt	high	exp	ratio
0.5	1.02	1.36	1.71	-23	6.5	1.5	1.26	1.45	1.65	-3	4.8	5	2.26	2.47	2.68	4	2.0
0.6	1.03	1.34	1.65	-18	6.3	1.75	3.61	4.11	4.61	-2	4.5	6	7.96	8.76	9.55	4	1.6
0.7	3.89	4.95	6.01	-15	6.0	2	4.55	5.11	5.67	-1	4.3	7	2.02	2.24	2.45	5	1.4
0.8	1.89	2.36	2.83	-12	5.8	2.5	1.61	1.78	1.95	1	3.8	8	4.18	4.63	5.09	5	1.2
0.9	2.33	2.87	3.41	-10	5.6	3	1.76	1.93	2.10	2	3.4	9	7.49	8.32	9.15	5	1.2
1	1.11	1.34	1.58	-8	5.5	3.5	0.98	1.07	1.16	3	2.9	10	1.21	1.35	1.48	6	1.3
1.25	1.18	1.39	1.60	-5	5.1	4	3.59	3.92	4.25	3	2.6						

$N_{\rm A}\langle\sigma v\rangle^{\rm g}_{\rm gs}$:

T_9	low	adopt	high	exp	ratio	T_9	low	adopt	high	exp	ratio	T_9	low	adopt	high	exp	ratio
0.5	1.02	1.36	1.71	-23	6.5	1.5	1.16	1.37	1.58	-3	5.2	5	1.75	1.99	2.23	4	2.1
0.6	1.03	1.33	1.65	-18	6.3	1.75	3.24	3.78	4.33	-2	5.0	6	6.19	7.10	8.02	4	1.7
0.7	3.86	4.93	6.01	-15	6.1	2	3.97	4.59	5.21	-1	4.8	7	1.58	1.83	2.08	5	1.4
0.8	1.87	2.34	2.83	-12	6.0	2.5	1.34	1.53	1.72	1	4.3	8	3.28	3.83	4.39	5	1.2
0.9	2.29	2.84	3.39	-10	5.8	3	1.42	1.61	1.81	2	3.8	9	5.88	6.94	8.01	5	1.2
1	1.08	1.32	1.57	-8	5.7	3.5	7.77	8.79	9.81	2	3.3	10	0.95	1.13	1.31	6	1.3
1.25	1.12	1.34	1.57	-5	5.4	4	2.81	3.17	3.54	3	2.8						

$N_{\rm A}\langle\sigma v\rangle^{\rm m}_{\rm gs}$:

T_9	low	adopt	high	exp	ratio	T_9	low	adopt	high	exp	ratio	T_9	low	adopt	high	exp	ratio
0.5	4.21	5.39	7.14	-27	0.8	1.5	2.25	2.63	3.04	-5	0.7	5	1.32	1.52	1.71	3	0.5
0.6	1.12	1.40	1.79	-21	0.8	1.75	8.30	9.59	11.0	-4	0.7	6	5.31	6.11	6.92	3	0.5
0.7	0.83	1.03	1.29	-17	0.8	2	1.25	1.43	1.63	-2	0.6	7	1.50	1.73	1.97	4	0.5
0.8	6.69	8.17	10.0	-15	0.8	2.5	5.61	6.40	7.23	-1	0.6	8	3.38	3.92	4.46	4	0.6
0.9	1.22	1.48	1.79	-12	0.8	3	7.16	8.15	9.17	0	0.6	9	6.49	7.55	8.62	4	0.6
1	7.91	9.49	11.4	-11	0.8	3.5	4.48	5.10	5.73	1	0.5	10	1.11	1.29	1.48	5	0.6
1.25	1.47	1.73	2.03	-7	0.7	4	1.80	2.05	2.31	2	0.5						