Reaction : ^{22}Ne(p,γ)^{23}Na

The contribution of 55 resonances between $E_r = 36$ and 1822 keV [PI71, DU71, DU72, ME73, SM79, GÖ82, GÖ83] is calculated. For the resonances between 1096.2 and 1208.5 keV, weighted averages of the strengths given by PI71 and SM79 are selected, while these averages are based on the data of DU71 and SM79 for the resonances between 1223.9 and 1821.8 keV. The standard values from MO60 and KE77 are used to normalize the relative resonance strengths. The contributions of the direct capture process and of the subthreshold resonance at $E_r = -129$ keV are calculated using the S-factors given by RO75b and GÖ83 and are found to be negligible. Above $T_9 = 2$, HF estimates are used (see Sect. 2.5). Our rates are significantly different from the CA88 ones at $T_9 < 0.3$. This is mainly due to the contribution of the resonance at $E_r = 36.3$ keV. With respect to CA88, the energy of this resonance is different and its adopted strength [GÖ83] is two orders of magnitude larger. The tentative states at $E_r = 69.8$ and 102.3 keV are also taken into account here with a weighting factor of 0.1. The resonance at $E_r = 153$ keV has a measured strength [GÖ83], while only an upper limit is selected by CA88. Our thermalization factor r_{tt} is 0.89 to 0.73 between $T_9 = 5$ to 10, reducing the ratio between our adopted rates and those of CA88, who adopt $r_{tt} = 1$ at all temperatures.

E_r (keV)	J^π	$\omega\gamma$ (eV)					
		GÖ82	GÖ83	adopt			
36.3±2.9	$1/2^+$	6.0×10^{-17}	6.8×10^{-15}	$(6.8 \pm 1.0) \times 10^{-15}$			I
(69.8)		$\leq 3.2 \times 10^{-6}$	$\leq 4.2 \times 10^{-9}$	$4.2^{+38}_{-4.2} \times 10^{-10}$			I
(102.3)		$\leq 6.0 \times 10^{-7}$	$\leq 6.0 \times 10^{-7}$	$6.0^{+54}_{-6.0} \times 10^{-8}$			I
153.0±2.9	$7/2^-$	$\leq 1.0 \times 10^{-6}$	6.5×10^{-7}	$(6.5 \pm 1.9) \times 10^{-7}$			I
179.8±2.9		$\leq 2.6 \times 10^{-6}$	$\leq 2.6 \times 10^{-6}$	$2.6^{+23}_{-2.6} \times 10^{-7}$			M
207.5±2.9		$\leq 1.4 \times 10^{-6}$	$\leq 1.4 \times 10^{-6}$	$1.4^{+13}_{-1.4} \times 10^{-7}$			M
248.6±2.9		$\leq 2.6 \times 10^{-6}$		$2.6^{+23}_{-2.6} \times 10^{-7}$			M
280.2±2.9		$\leq 2.2 \times 10^{-6}$		$2.2^{+9.8}_{-2.2} \times 10^{-7}$			M
310.8±4.8		$\leq 2.2 \times 10^{-6}$		$2.2^{+9.8}_{-2.2} \times 10^{-7}$			M
321.3±2.9		$\leq 3.0 \times 10^{-6}$		$3.0^{+27}_{-3.0} \times 10^{-7}$			M
		PI71	DU71	DU72	ME73	adopt	
416.9±1.0	$3/2^-$				0.07 ± 0.02	0.07 ± 0.02	M
458.0±1.0	$1/2^+$	0.50 ± 0.25			0.49 ± 0.15	0.49 ± 0.13	M
603.3±1.0	$7/2^-$				0.03 ± 0.01	0.03 ± 0.01	M
612 ± 1	1/2	2.70 ± 0.25		2.15 ± 0.85	2.70 ± 0.25	2.70 ± 0.25	M
630±1	$(1/2 - 5/2^+)$	0.30 ± 0.15			0.35 ± 0.10	0.34 ± 0.09	M
693.3±0.8	3/2	0.10 ± 0.05			0.14 ± 0.04	0.12 ± 0.04	M
813.7±0.7	$3/2^+$	5.25 ± 2.50			7.35 ± 2.20	6.45 ± 1.65	M
857.7±1.0	$(3/2,5/2)^+$	1.6 ± 0.8			1.90 ± 0.95	1.75 ± 0.60	M
861.5±1.0	$1/2^+$	0.70 ± 0.35			1.10 ± 0.55	0.8 ± 0.3	M
879.7±1.0	$(3/2^+, 5/2)$	0.45 ± 0.25			0.85 ± 0.25	0.65 ± 0.20	M
887.3±1.0	$3/2^+$	0.4 ± 0.2			0.38 ± 0.12	0.4 ± 0.1	M
906.5±1.0	$3/2^+$	3.1 ± 1.6		4.6 ± 1.6	6.1 ± 1.9	4.5 ± 0.9	M
938.3±0.5	7/2	0.25 ± 0.15			0.43 ± 0.13	0.35 ± 0.10	M
961.1 ± 0.4	$3/2^+$	1.90 ± 0.95			2.50 ± 0.75	2.20 ± 0.55	M
1021.1 ± 0.8	$5/2^+$	0.65 ± 0.35	0.95 ± 0.40		0.85 ± 0.25	0.8 ± 0.2	M
1041.1 ± 1.0	$3/2^+$	1.8 ± 0.9	1.65 ± 0.60		2.95 ± 0.90	2.00 ± 0.45	M
		PI71		SM79			
1056.4 ± 1.0	$1/2^+$	1.45 ± 0.75	2.4 ± 0.9	2.05 ± 0.55		1.9 ± 0.3	M
Res. 1096 – 1822 keV			see comments				

T_9	low	adopt	high	exp	ratio	T_9	low	adopt	high	exp	ratio	T_9	low	adopt	high	exp	ratio
0.01	0.19	5.39	150	-25	0.1	0.1	0.06	2.90	28.1	-6	220	0.8	2.31	2.97	3.65	2	1.3
0.011	0.11	2.10	44.5	-23	0.1	0.11	0.27	7.04	67.2	-6	130	0.9	4.63	5.90	7.20	2	1.2
0.012	0.29	4.62	74.0	-22	0.2	0.12	0.09	1.50	13.9	-5	83	1	0.82	1.04	1.26	3	1.2
0.013	0.47	6.11	79.1	-21	0.4	0.13	0.25	2.86	25.8	-5	57	1.25	2.35	2.96	3.58	3	1.1
0.014	0.52	5.55	59.8	-20	0.6	0.14	0.59	5.03	43.8	-5	42	1.5	4.87	6.15	7.43	3	1.0
0.015	0.41	3.73	34.3	-19	0.8	0.15	1.27	8.30	69.2	-5	33	1.75	0.83	1.05	1.27	4	1.0
0.016	0.25	1.96	15.7	-18	1.1	0.16	0.25	1.30	10.3	-4	26	2	1.25	1.59	1.93	4	1.0
0.018	0.48	3.07	19.5	-17	1.9	0.18	0.75	2.79	20.1	-4	18	2.5	2.06	2.76	3.46	4	1.0
0.02	0.52	2.73	14.4	-16	2.8	0.2	1.87	5.36	34.4	-4	13	3	2.94	4.14	5.34	4	1.0
0.025	0.38	1.34	5.27	-14	6.0	0.25	1.47	2.60	10.2	-3	3.3	3.5	3.85	5.68	7.51	4	1.0
0.03	0.55	1.92	7.55	-13	11	0.3	1.51	2.19	4.10	-2	1.5	4	4.75	7.33	9.91	4	1.1
0.04	0.16	1.75	14.7	-11	85	0.35	1.21	1.68	2.37	-1	1.3	5	0.64	1.08	1.52	5	1.1
0.05	0.12	6.28	61.0	-10	680	0.4	6.16	8.49	11.2	-1	1.3	6	0.79	1.43	2.08	5	1.2
0.06	0.05	8.15	80.7	-9	2000	0.45	2.23	3.05	3.94	0	1.3	7	0.91	1.78	2.65	5	1.3
0.07	0.03	5.78	57.4	-8	1800	0.5	6.30	8.52	10.9	0	1.3	8	1.02	2.12	3.22	5	1.3
0.08	0.02	2.78	27.5	-7	870	0.6	3.05	4.04	5.08	1	1.3	9	1.10	2.44	3.78	5	1.3
0.09	0.01	1.00	9.87	-6	410	0.7	0.96	1.25	1.55	2	1.3	10	1.17	2.75	4.33	5	1.3