

$^{24}\text{Mg(d,p),(pol d,p)}$ 1961Hi11,1975Me12,1977Be48

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	M. Shamsuzzoha Basunia, Anagha Chakraborty		NDS 205,1 (2025)	31-May-2025

1961Hi11: $^{24}\text{Mg(d,p)}$, $E=5.5\text{--}6.0$ MeV; Ilford C2 nuclear plates were used to record the ejected particles. Deduced excited levels.

1975Me12: $^{24}\text{Mg(d,p)}$, $E=12.0$ MeV; 99.9% enriched target; measured $\sigma(\text{Ep},\theta)$ in the range $5^\circ\text{--}120^\circ$ in steps of 5° with seven position sensitive detectors placed in the focal plane of an Enge split-pole magnetic spectrograph. Deduced levels, L, S. FWHM (average)=7 keV.

1977Be48: $^{24}\text{Mg(pol d,p)}$, $E=10\text{--}12$ MeV and $8\text{--}13$ MeV. 99.96% enriched target; measured $iT_{11}(E_d, E_p, \theta)$ in the range 15° to 165° and $\sigma(E, \text{Ep}, \theta)$ at 105° , 138° , 160° ; deduced excited levels, spin, parity, spectroscopic factor. FWHM=50-200 keV.

1978Bo14 (other): $^{24}\text{Mg(d,p)}$, $E=10.5$ MeV; measured $\sigma(\text{Ep}, \theta_p; \text{En}, \theta_n)$; deduced levels, spin, parity, Γ . Enriched target.

1976Bo18 (other): $^{24}\text{Mg(d,p)}$, $E=12$ MeV; 99.9% enriched target; Buechner type magnetic spectrograph loaded with Ilford L4 emulsions; measured $\sigma(\text{Ep}, \theta)$ at 10° or 12.5° ; Deduced energy levels, spin, parity, L, Γ .

Other references:

(d,p): 1960Ha27, 1961Hi04, 1961Is08, 1961Lu03, 1962Bu04, 1962Is04, 1962Mi03 (also 1961Mi11), 1964Cu05, 1964Da05, 1964Re04, 1966Ga17, 1968Ho23, 1968Le19, 1970Me28, 1971Ho31, 1971Om02, 1973Sc05, 1974Bo34, 1974Sc22, 1974Vo01, 1975To11.

(pol d,p): 1968Yu01, 1972Br12, 1977An31, 1984Ha26.

($^7\text{Li}, ^6\text{Li}$): 1975Mo07.

($^{19}\text{F}, ^{18}\text{F}$): 1976Ts03.

 ^{25}Mg Levels

Γ_n listed in Table 1 (1978Bo14), probably a typo. The evaluators list as Γ_p .

E(level) [†]	J^π	L^a	S^d	Comments
0	$5/2^{+ \#}$	2	0.220	L: also in 1968Yu01, 1960Ha27, 1962Mi03, 1974Sc22. S: Other: 0.53 (1975Me12), 0.32 (1976Ts03 ($^{19}\text{F}, ^{18}\text{F}$)).
579 10	$1/2^{+ \#}$	0	0.350	L: also in 1962Mi03, 1968Yu01, 1974Sc22. S: Other: 0.49 (1975Me12), 0.64 (1976Ts03 ($^{19}\text{F}, ^{18}\text{F}$)).
973 10	$3/2^{+ \#}$	2	0.200	L: also in 1962Mi03, 1968Ho23, 1974Sc22. S: Other: 0.37 (1975Me12).
1609 10	$7/2^{+ \#}$	4^c		
1962 10	$5/2^{+ \#}$	2	0.074	L: also L=2 in 1960Ha27, 1962Mi03, 1968Ho23, and 1974Sc22. S: Other: 0.10 (1975Me12).
2564 10	$1/2^{+ \#}$	0	0.140	L: also in 1962Mi03, 1974Sc22. S: Other: 0.16 (1975Me12).
2737 10	$7/2^{+}$	4^c		
2800 $\ddagger$ 10	$3/2^{+}$	2	0.330	J^π, L : from 1962Mi03, 1968Yu01 (pol d,p). S: Other: 0.31 (1975Me12).
3398 7	$9/2^{+}$			J^π : from 1961Hi04. Weakly populated in (d,p) and strongly in (d, α). Population cross section ratio of this level to 3407-keV level is 1:2.5 (4) (1961Hi04).
3407 7	$3/2^{- \#}$	1	0.230	E(level): from 1961Hi04. Other: 3407 10 (1961Hi11). J^π : also from L=1 based on polarized p(θ) measurements (1962Is04). L=1 (1962Mi03). S: Other: 0.30 (1975Me12).
3900 10	$(5/2)^{+}$	2	0.017	S: from 1975Me12 for 5/2 and 0.031 for 3/2.
3965 $\ddagger$ 10	$(7/2)^{- \#}$	3^b	0.280	L: also 2 or 3 in 1962Mi03, 3 in 1964Cu05. L=2 was not supported in 1977Be48. S: Other: 0.43 (1975Me12).
4054 10				
4268 10	$1/2^{- \#}$	1	0.190	L: from 1962Mi03. S: Other: 0.21 (1975Me12).
4351 10	$(3/2)^{+}$	2	0.011 ^e	

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$^{24}\text{Mg}(\text{d,p}),(\text{pol d,p})$ [1961Hi11](#),[1975Me12](#),[1977Be48](#) (continued) ^{25}Mg Levels (continued)

E(level) [†]	J ^π	Γ&	L ^a	S ^d	Comments
4701 10					
4711 [‡] 10			1,(2)	0.004	S: from 1975Me12 for 3/2 and 0.008 for 1/2.
5004 10					
5108 10	1/2 ⁻ #		1	0.014	J ^π ,L: other: 3/2 ⁺ and L=2 in 1975Me12 , refuted in 1977Be48 . S: other: 0.004 for 3/2 ⁺ (1975Me12).
5243 10					
5454 10					
5465 10	1/2 ⁺ #		0	0.170	L: also in 1962Mi03 . S: also 0.17 in 1975Me12 .
5511 10			(2)	(0.006) ^e	
5520 10					
5738 10					
5786 10					
5851 10				<0.001	
5969 10					
6040 10					
6074 10					
6159 10					
6350 10			(2)		L: from 1961Hi11 .
6409 10					
6423 10					
6458 10					
6668 10					
6768 10					
6825 10					
6871 10					
6903 10					
6944 10					
7026 10					
7078 10	3/2 ⁺ ,5/2 ⁺		2		J ^π ,L: from 1962Mi03 .
7170 10					
7215 10	3/2 ⁺ ,5/2 ⁺		2		J ^π ,L: from 1962Mi03 .
7271 10	(7/2) ⁻		3		L: from 1962Mi03 .
7364 10	(3/2,5/2) ⁺		2		L: from 1962Mi03 .
7411 2	3/2 ⁻	9 keV 2	1		E(level): from En(c.m.)=80 2 (1976Bo18). Other: 7399 10 (1961Hi11). J ^π ,L: from 1962Mi03 . Also 3/2 in 1976Bo18 extracted from total neutron cross section.
7490 10					
7513 10					
7563 10					
7583 6	1/2 [@]	85 keV 15			E(level): from En(c.m.)=252 6 (1976Bo18). Other: 7570 20 (1961Hi11).
7623 10					
7640 10					
7748 5	(3/2) [@]	30 keV 10			E(level): from En(c.m.)=417 5 (1976Bo18). E(level): from En(c.m.)=450 5 (1976Bo18).
7782 5					
7966 7	1/2 [@]	25 keV 5			E(level): from En(c.m.)=635 7 (1976Bo18).
8120 [‡] 20					Γ _p to g.s.=80 keV for 3/2 ⁻ and 6 keV for 3/2 ⁺ (1978Bo14).
8142 3	3/2 [@]	13 keV			E(level): from En(c.m.)=810 3 (1976Bo18).
8260 [‡] 20					Γ _p to g.s.=50 keV for 3/2 ⁻ (1978Bo14).
8323 3	1/2 [@]	14 keV 4			E(level): from En(c.m.)=992 3 (1976Bo18).
8340 [‡] 20					

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$^{24}\text{Mg}(\text{d,p}),(\text{pol d,p})$ 1961Hi11,1975Me12,1977Be48 (continued) ^{25}Mg Levels (continued)

E(level) [†]	J ^π	Γ&	Comments
8359 5	1/2 [@]	18 keV 6	E(level): from En(c.m.)=1028 5 (1976Bo18).
8510 [‡] 20			
8551 3	1/2 [@]	8 keV 4	E(level): from En(c.m.)=1230 3 (1976Bo18).
8573 4	(1/2) [@]	7 keV 3	E(level): from En(c.m.)=1242 4 (1976Bo18). J ^π : 3/2 ⁺ in Adopted Levels.
8581 4	(3/2) [@]	12 keV 5	E(level): from En(c.m.)=1250 4 (1976Bo18). Other: 8580 30 (1978Bo14). Γ _p to g.s.=75 keV for 3/2 ⁻ and 8.5 keV for 3/2 ⁺ (1978Bo14).
8840 7	1/2 [@]	50 keV 10	E(level): from En(c.m.)=1509 7 (1976Bo18). Other: 8840 40 (1978Bo14). Γ _p to g.s.=30 keV for 1/2 ⁺ and 15 keV for 1/2 ⁻ (1978Bo14).
8899 4	1/2 [@]	32 keV 8	E(level): from En(c.m.)=1568 4 (1976Bo18). Other: 8910 20 (1978Bo14).
8974 3	3/2 [@]	16 keV 4	E(level): from En(c.m.)=1642 3 (1976Bo18). Other: 8970 20 (1978Bo14). Γ _p to g.s.=7 keV for 3/2 ⁺ (probably) and 5 keV for 5/2 ⁺ (1978Bo14).
9022 8	(1/2) [@]	≤10 keV	E(level): from En(c.m.)=1685 8 (1976Bo18).
9050 [‡] 20			Γ _p to g.s.=4.5 keV for 3/2 ⁺ (1978Bo14).
9073 3	(1/2) [@]	14 keV	E(level): from En(c.m.)=1742 3 (1976Bo18).
9153 4	(3/2) [@]	22 keV	E(level): from En(c.m.)=1825 4 (1976Bo18). Other: 9120 20 (1978Bo14). Γ _p to g.s.=35 keV for 3/2 ⁻ and 6 keV for 3/2 ⁺ (1978Bo14).
9335 4	(3/2) [@]	24 keV	E(level): from En(c.m.)=2004 4 (1976Bo18). Other: 9350 50 (1978Bo14).
9500 [‡] 20			
10000 [‡] 40			
10050 [‡] 20			Γ _p to g.s.=20 keV for 5/2 ⁺ (1978Bo14).
10200 [‡] 30			Γ _p to g.s.=80 keV for 3/2 ⁻ and 16 keV for 3/2 ⁺ (1978Bo14).
10270 [‡] 40			Γ _p to g.s.=75 keV for 3/2 ⁻ and 14 keV for 3/2 ⁺ (1978Bo14).
10360 [‡] 30			
10520 [‡] 40			
10620 [‡] 40			Γ _p to g.s.=120 keV for 3/2 ⁻ and 25 keV for 3/2 ⁺ ; to excited state: 77 keV for 7/2 ⁻ and 15 keV for 7/2 ⁺ (1978Bo14).
10730 [‡] 40			
10860 [‡] 40			
11070 [‡] 40			
11180 [‡] 40			
11350 [‡] 30			Γ _p to g.s.=120 keV for 3/2 ⁻ and 26 keV for 3/2 ⁺ ; to excited state: 160 keV for 7/2 ⁻ and 35 keV for 7/2 ⁺ (1978Bo14).
11490 [‡] 30			
11590 [‡] 30			

[†] From 1961Hi11, except where otherwise noted.[‡] From 1978Bo14.

From vector analyzing power (pol d,p) (1977Be48).

@ From 1976Bo18, proposed based on the total neutron cross section.

& From 1976Bo18.

^a From 1975Me12, except where otherwise noted. Additional source reference also listed in the comments, if any.^b From 1977Be48.^c From 1962Bu04, based on DWBA analysis and measured $\sigma(\theta)$ data in 1961Hi11.^d From 1977Be48, except where otherwise noted.^e From 1975Me12.