

Adopted Levels, Gammas

$Q(\beta^-) = -11874.4$ 9; $S(n) = 12740.3$ 7; $S(p) = 5896.2$ 7; $Q(\alpha) = -6429.7$ 7 [2021Wa16](#)

$S(2n) = 29805.6$ 8, $S(2p) = 11039.4$ 7, $Q(\varepsilon) = 5966.2$ 7 ([2021Wa16](#)).

Isotope discovery: $^{32}\text{S}(\alpha, n)^{35}\text{Ar}$ at Purdue ([1940Ki12](#), [1941Ki01](#), [1941El04](#)).

Shell-model calculations: [2020RiZX](#), [2020RiZZ](#), [2020Ri06](#).

 ^{35}Ar LevelsCross Reference (XREF) Flags

A	^{35}K ε decay (175 ms)	E	$^{24}\text{Mg}(^{16}\text{O}, \alpha n \gamma)$	I	$^{36}\text{Ar}(\text{d}, \text{t})$
B	^{36}Ca εp decay (100.9 ms)	F	$^{32}\text{S}(\alpha, n)$	J	$^{36}\text{Ar}(^3\text{He}, \alpha)$
C	$^1\text{H}(^{36}\text{Ar}, \text{d})$	G	$^{33}\text{S}(^3\text{He}, n \gamma)$		
D	$^{16}\text{O}(^{24}\text{Mg}, \alpha n \gamma)$	H	$^{36}\text{Ar}(p, \text{d})$		

$E(\text{level})^\dagger$	J^π	$T_{1/2}$	XREF	Comments
0.0	$3/2^+$	1.7756 s <i>14</i>	A B C D E F G H I J	$\% \varepsilon + \% \beta^+ = 100$ $\mu = +0.6322$ 2 (2002Ma41 , 2019StZV) $Q = -0.084$ 15 (1996Ki04 , 2021StZZ) μ : β -NMR (2002Ma41). Others: $+0.633$ 2 (1965Ca04), $+0.633$ 7 (1996Ki04). Measured using β -NMR method. Also from 2019StZV , 1989Ra17 . Q : β -NMR (1996Ki04). Also from 2021StZZ . J^π : $L(p, \text{d}) = L(\text{d}, \text{t}) = L(^3\text{He}, \alpha) = L(^1\text{H}(^{36}\text{Ar}, \text{d}) = 2$ from 0^+ . Allowed $\varepsilon + \beta^+$ feedings to $1/2^+$ levels in ^{35}Cl . Mirror level: $3/2^+$ ^{35}Cl g.s. $T_{1/2}$: weighted average of 1.83 s <i>3</i> (1956Ki29), 1.83 s <i>2</i> (1959Al10), 1.79 s <i>1</i> (1960Ja12), 1.84 s <i>10</i> (1960Wa04), 1.76 s <i>3</i> (1963Ne05), 1.770 s <i>6</i> (1969Wi18), 1.787 s <i>12</i> (1971Ge04), 1.774 s <i>4</i> (1977Az01), and 1.7754 s <i>11</i> (2006Ia05). Evaluated rms charge radius = 3.3636 fm <i>42</i> (2013An02). XREF: F(890) E(level): 1963Ne05 (α, n) observed the first excited state in ^{35}Ar at 890 50 keV. J^π : $L(p, \text{d}) = L(\text{d}, \text{t}) = L(^3\text{He}, \alpha) = 0$ from 0^+ . XREF: F(2030)H(1700)I(1700)J(1738) E(level): 1963Ne05 (α, n) observed the second excited state in ^{35}Ar at 2030 80 keV. J^π : $L(^3\text{He}, \alpha) = 2$ from 0^+ . Mirror level: $5/2^+$ at 1763 keV in ^{35}Cl . J^π : $\Delta J = 2$ γ to $3/2^+$ in ($^{16}\text{O}, \alpha n \gamma$). Mirror level: $7/2^+$ at 2646 keV in ^{35}Cl . XREF: H(2615) J^π : $L(p, \text{d}) = L(^3\text{He}, \alpha) = 2$ from 0^+ with J dependence in (p, d). XREF: H(2970) J^π : $L(p, \text{d}) = L(\text{d}, \text{t}) = L(^3\text{He}, \alpha) = 2$ from 0^+ with J dependence in (p, d). J^π : $L(p, \text{d}) = L(^3\text{He}, \alpha) = 3$ from 0^+ . $\Delta J = 1$ γ to $(5/2)^+$ and $\Delta J = 2$ γ to $3/2^+$ in ($^{16}\text{O}, \alpha n \gamma$) and ($^{24}\text{Mg}, \alpha n \gamma$). J^π : $L(^3\text{He}, \alpha) = 0$ from 0^+ . J^π : $L(^3\text{He}, \alpha) = 1$ from 0^+ . XREF: A(?) J^π : possibly allowed $\varepsilon + \beta^+$ feeding from $3/2^+$ parent with log $ft = 5.6 + 4 - 2$.
1184.08 25	$1/2^+$		A B C F G H I J	
1750.78 22	$(5/2)^+$		A D E F G H I J	
2603.22 28	$7/2^{(+)}$		D E G	
2638.01 26	$3/2^+$		A H I J	
2982.79 12	$5/2^+$		A C H I J	
3196.98 ‡ 26	$7/2^-$		C D E G H I J	
3884 10	$1/2^+$		J	
4012 10	$1/2^-, 3/2^-$		J	
4065.0? 4	$(1/2^+, 3/2^+, 5/2^+)$		A	
4110 10			J	

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Adopted Levels, Gammas (continued) ^{35}Ar Levels (continued)

E(level) [†]	J ^π	XREF	Comments
4142 10	1/2 ⁻ , 3/2 ⁻	J	J ^π : L(³ He,α)=1 from 0 ⁺ .
4359.0 5	(9/2 ⁻)	DE J	J ^π : ΔJ=(1) γ to 7/2 ⁻ in (¹⁶ O,αnγ). γ to 7/2 ⁽⁺⁾ in (²⁴ Mg,αnγ) and (¹⁶ O,αnγ). Possible mirror level: 9/2 ⁻ at 4348 keV in ³⁵ Cl.
4528.3 4	(1/2 ⁺ , 3/2 ⁺ , 5/2 ⁺)	A J	J ^π : possibly allowed ε+β ⁺ feeding from 3/2 ⁺ parent with log ft=5.4 +4-2.
4725.9 6	1/2 ⁺	A h J	XREF: h(4756)
4785.8 11	1/2 ⁺ , 3/2 ⁺ , 5/2 ⁺	A h J	J ^π : L(³ He,α)=L(p,d)=0 from 0 ⁺ . XREF: h(4756)
5048 10		J	J ^π : possibly allowed ε+β ⁺ feeding from 3/2 ⁺ parent with log ft=5.2 2. L(p,d)=0 from 0 ⁺ .
5113 10	3/2 ⁺ , 5/2 ⁺	H J	E(level): weighted average of 5102 20 from (p,d) and 5116 10 from (³ He,α). J ^π : L(³ He,α)=2 from 0 ⁺ . Discrepancy: L(p,d)=3 from 0 ⁺ (1968Jo04).
5205 10		J	
5384.2 [‡] 4	11/2 ⁻	DE H J	XREF: H(5400)
5484 10	3/2 ⁺ , 5/2 ⁺	J	J ^π : ΔJ=2 γ to 7/2 ⁻ in (¹⁶ O,αnγ) and (²⁴ Mg,αnγ). γ to (9/2 ⁻) in (¹⁶ O,αnγ) and (²⁴ Mg,αnγ).
5572.67 15	3/2 ⁺	A C GH J	J ^π : L(³ He,α)=2 from 0 ⁺ . T=3/2 XREF: G(5537)H(5598)J(5591)
5613.6 9	(11/2 ⁻)	E	J ^π : isobaric analog state of 3/2 ⁺ ³⁵ K g.s. with log ft=3.31 4. L(p,d)=L(³ He,α)=2 from 0 ⁺ . L(³ He,n)=(0) from 3/2 ⁺ .
5765.8 5	(13/2 ⁻)	DE	J ^π : Possible mirror level: 11/2 ⁻ at 5927 keV in ³⁵ Cl. J ^π : ΔJ=1 γ to 11/2 ⁻ in (¹⁶ O,αnγ) and (²⁴ Mg,αnγ). ΔJ=(2) γ to (9/2 ⁻) in (¹⁶ O,αnγ).
5913 5		IJ	E(level): from (d,t). Other: 5911 10 from (³ He,α).
5991 3		I	
6037 3	3/2 ⁺ , 5/2 ⁺	HIJ	XREF: H(6024)J(6033)
6055? 3		I	J ^π : L(p,d)=L(³ He,α)=2 from 0 ⁺ . XREF: I(?)
6076 3		I	
6163 3		IJ	E(level): weighted average of 6164 3 from (d,t) and 6153 10 from (³ He,α).
6253 3		IJ	E(level): from (d,t). Other: 6258 10 from (³ He,α).
6273 3		I	
6302 3		I	
6332 3		I	
6345 3	1/2, 3/2, 5/2	A I	E(level): from (d,t). Other: 6348 11 from ³⁵ K ε decay. J ^π : possibly allowed ε+β ⁺ feeding from 3/2 ⁺ parent with log ft=7.2 1.
6415 2		I	
6439? 4		I	XREF: I(?)
6460 3		I	
6523 3		I	
6557 3		I	
6585 3		I	
6606 3		hIj	XREF: h(6620)j(6631)
6617 2	1/2 ⁺	hIj	XREF: h(6620)j(6631) J ^π : L(p,d)=L(³ He,α)=0 from 0 ⁺ . E(level): probable doublet in (³ He,α).
6644 3		hIj	XREF: h(6620)j(6631)
6651 3		hIj	XREF: h(6620)j(6631)
6673 4	5/2 ⁻ , 7/2 ⁻	HI	XREF: H(6700)
6826 10	3/2 ⁺ , 5/2 ⁺	H J	E(level): weighted average of 6700 20 from (p,d) and 6672 3 from (d,t). J ^π : L(p,d)=3 from 0 ⁺ . E(level): weighted average of 6820 30 from (p,d) and 6827 10 from (³ He,α).

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Adopted Levels, Gammas (continued) ^{35}Ar Levels (continued)

E(level) [†]	J ^π	XREF	Comments
6959 10			J ^π : L(p,d)=2 from 0 ⁺ .
7051 10	3/2 ⁺ , 5/2 ⁺	A H J	XREF: H(7030) E(level): weighted average of 7053 11 from ^{35}K ε decay, 7030 20 from (p,d), and 7055 10 from (^3He , α). J ^π : L(p,d)=2 from 0 ⁺ .
7117 10			J
7255 11		A	
7289 10		A J	E(level): weighted average of 7283 11 from ^{35}K ε decay and 7293 10 from (^3He , α).
7427 10		A J	E(level): weighted average of 7431 11 from ^{35}K ε decay and 7423 10 from (^3He , α).
7509 10	1/2 ⁺ , 3/2 ⁺ , 5/2 ⁺	A J	E(level): weighted average of 7518 11 from ^{35}K ε decay and 7502 10 from (^3He , α). J ^π : possibly allowed ε+β ⁺ feeding from 3/2 ⁺ parent with log ft<5.0.
7840 10			J
8019 10			J
8109.7 [‡] 13	(15/2 ⁻)	E	J ^π : γ to 11/2 ⁻ and 13/2 ⁻ in (^{16}O , αnγ). Possible mirror level: 15/2 ⁻ at 8319 keV in ^{35}Cl .
8212.6 8	(15/2 ⁻)	E	J ^π : ΔJ=2 γ to 11/2 ⁻ and γ to 13/2 ⁻ in (^{16}O , αnγ). Possible mirror level: 15/2 ⁻ at 8319 keV in ^{35}Cl .
8393? 20	1/2 ⁺ , 3/2 ⁺ , 5/2 ⁺	A	XREF: A(?) E(level): from (^{35}K ε decay). J ^π : possibly allowed ε+β ⁺ feeding from 3/2 ⁺ parent with log ft=4.6 +3-2.
9906.0 [‡] 20	(19/2 ⁻)	E	J ^π : ΔJ=2 γ to 15/2 ⁻ in (^{16}O , αnγ). Possible mirror level: 19/2 ⁻ at 10180 keV in ^{35}Cl .
12277.0 [‡] 32	(23/2 ⁻)	E	J ^π : ΔJ=2 γ to 19/2 ⁻ in (^{16}O , αnγ). Possible mirror level: 23/2 ⁻ at 12571 keV in ^{35}Cl .

[†] From a least-squares fit to γ-ray energies for levels connected with γ transitions, from particle-transfer reactions or ^{35}K ε decay for other levels.

[‡] Band(A): Band based on f_{7/2} orbital.

γ(^{35}Ar)

E _i (level)	J _i ^π	E _γ	I _γ	E _f	J _f ^π	Mult.	Comments
1184.08	1/2 ⁺	1184.1 3	100	0.0	3/2 ⁺		E _γ : weighted average of 1184.0 3 from ^{35}K ε decay and 1184.3 4 from ^{36}Ca εp decay.
1750.78	(5/2) ⁺	1750.6 3	100	0.0	3/2 ⁺		E _γ : weighted average of 1750.5 3 from ^{35}K ε decay, 1750.7 4 from (^{24}Mg , αnγ), and 1750.8 5 from (^{16}O , αnγ).
2603.22	7/2 ⁽⁺⁾	851.9 9	12.3 33	1750.78	(5/2) ⁺		E _γ : weighted average of 852 1 from (^{24}Mg , αnγ) and 851.8 9 from (^{16}O , αnγ). I _γ : weighted average of 10 5 from (^{24}Mg , αnγ) and 13.3 33 from (^{16}O , αnγ).
		2603.0 5	100 10	0.0	3/2 ⁺	Q	E _γ : from (^{24}Mg , αnγ). Other: 2602.6 15 from (^{16}O , αnγ). I _γ : from (^{16}O , αnγ). Other: 100 22 from (^{24}Mg , αnγ). Mult.: from (^{16}O , αnγ).
2638.01	3/2 ⁺	886.8 5	16 6	1750.78	(5/2) ⁺		E _γ , I _γ : from ^{35}K ε decay.
		2638.0 4	100 13	0.0	3/2 ⁺		E _γ , I _γ : from ^{35}K ε decay.

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Adopted Levels, Gammas (continued)

$\gamma(^{35}\text{Ar})$ (continued)						
$E_i(\text{level})$	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.
2982.79	5/2 ⁺	1798.9 5	3.5 6	1184.08	1/2 ⁺	
		2982.68 13	100 4	0.0	3/2 ⁺	
3196.98	7/2 ⁻	593.7 2	16.4 30	2603.22	7/2 ⁽⁺⁾	
		1446.2 2	100 8	1750.78	(5/2) ⁺	D
		3197.0 7	21 5	0.0	3/2 ⁺	Q
4065.0?	(1/2 ⁺ , 3/2 ⁺ , 5/2 ⁺)	1426.8 4	100	2638.01	3/2 ⁺	
4359.0	(9/2 ⁻)	1162.0 8	65 24	3196.98	7/2 ⁻	(D)
		1756 1	100 15	2603.22	7/2 ⁽⁺⁾	
4528.3	(1/2 ⁺ , 3/2 ⁺ , 5/2 ⁺)	4527.9 7	100	0.0	3/2 ⁺	
4725.9	1/2 ⁺	3542.0 6	100 21	1184.08	1/2 ⁺	
		4724.5 11	41 17	0.0	3/2 ⁺	
4785.8	1/2 ⁺ , 3/2 ⁺ , 5/2 ⁺	4785.4 11	100	0.0	3/2 ⁺	
5384.2	11/2 ⁻	1025.2 4	14 4	4359.0	(9/2 ⁻)	
		2187.1 4	100 6	3196.98	7/2 ⁻	Q
5572.67	3/2 ⁺	1044.4 4	2.5 8	4528.3	(1/2 ⁺ , 3/2 ⁺ , 5/2 ⁺)	
		1507.4 5	3.7 8	4065.0?	(1/2 ⁺ , 3/2 ⁺ , 5/2 ⁺)	
		2589.8 1	100 4	2982.79	5/2 ⁺	
		2934.5 5	6.7 12	2638.01	3/2 ⁺	
		3821.7 7	6.7 14	1750.78	(5/2) ⁺	

E_γ, I_γ : from ^{35}K ε decay.
 E_γ, I_γ : from ^{35}K ε decay.
 E_γ : from ($^{16}\text{O}, \alpha n \gamma$). Other: 593 1 from ($^{24}\text{Mg}, \alpha n \gamma$).
 I_γ : from ($^{16}\text{O}, \alpha n \gamma$). Other: 16 8 from ($^{24}\text{Mg}, \alpha n \gamma$).
 E_γ : from ($^{24}\text{Mg}, \alpha n \gamma$). Others: 1446.1 6 from ($^{16}\text{O}, \alpha n \gamma$) and 1446.0 6 from ($^3\text{He}, n \gamma$).
 I_γ : from ($^{16}\text{O}, \alpha n \gamma$). Other: 100 9 from ($^{24}\text{Mg}, \alpha n \gamma$).
Mult.: from ($^{16}\text{O}, \alpha n \gamma$) and ($^{24}\text{Mg}, \alpha n \gamma$).
 E_γ : from ($^{24}\text{Mg}, \alpha n \gamma$). Other: 3197 6 from ($^{16}\text{O}, \alpha n \gamma$).
 I_γ : weighted average of 18 5 from ($^{24}\text{Mg}, \alpha n \gamma$) and 24 5 from ($^{16}\text{O}, \alpha n \gamma$).
Mult.: from ($^{16}\text{O}, \alpha n \gamma$) and ($^{24}\text{Mg}, \alpha n \gamma$).
 E_γ : from ($^{16}\text{O}, \alpha n \gamma$). Other: 1162 1 from ($^{24}\text{Mg}, \alpha n \gamma$).
 I_γ : unweighted average of 41 11 from ($^{24}\text{Mg}, \alpha n \gamma$) and 88 18 from ($^{16}\text{O}, \alpha n \gamma$).
Mult.: from ($^{16}\text{O}, \alpha n \gamma$).
 E_γ : from ($^{24}\text{Mg}, \alpha n \gamma$). Other: 1756.3 14 from ($^{16}\text{O}, \alpha n \gamma$).
 I_γ : from ($^{24}\text{Mg}, \alpha n \gamma$). Other: 1.0E2 5 from ($^{16}\text{O}, \alpha n \gamma$).
 E_γ, I_γ : from ^{35}K ε decay.
 E_γ, I_γ : from ^{35}K ε decay.
 E_γ, I_γ : from ^{35}K ε decay.
 E_γ, I_γ : from ^{35}K ε decay.
 E_γ : from ($^{16}\text{O}, \alpha n \gamma$). Other: 1025 1 from ($^{24}\text{Mg}, \alpha n \gamma$).
 I_γ : weighted average of 21 8 from ($^{24}\text{Mg}, \alpha n \gamma$) and 12 4 from ($^{16}\text{O}, \alpha n \gamma$).
 E_γ : weighted average of 2187.4 4 from ($^{24}\text{Mg}, \alpha n \gamma$) and 2186.8 4 from ($^{16}\text{O}, \alpha n \gamma$).
 I_γ : from ($^{16}\text{O}, \alpha n \gamma$). Other: 100 13 from ($^{24}\text{Mg}, \alpha n \gamma$).
Mult.: from ($^{16}\text{O}, \alpha n \gamma$).

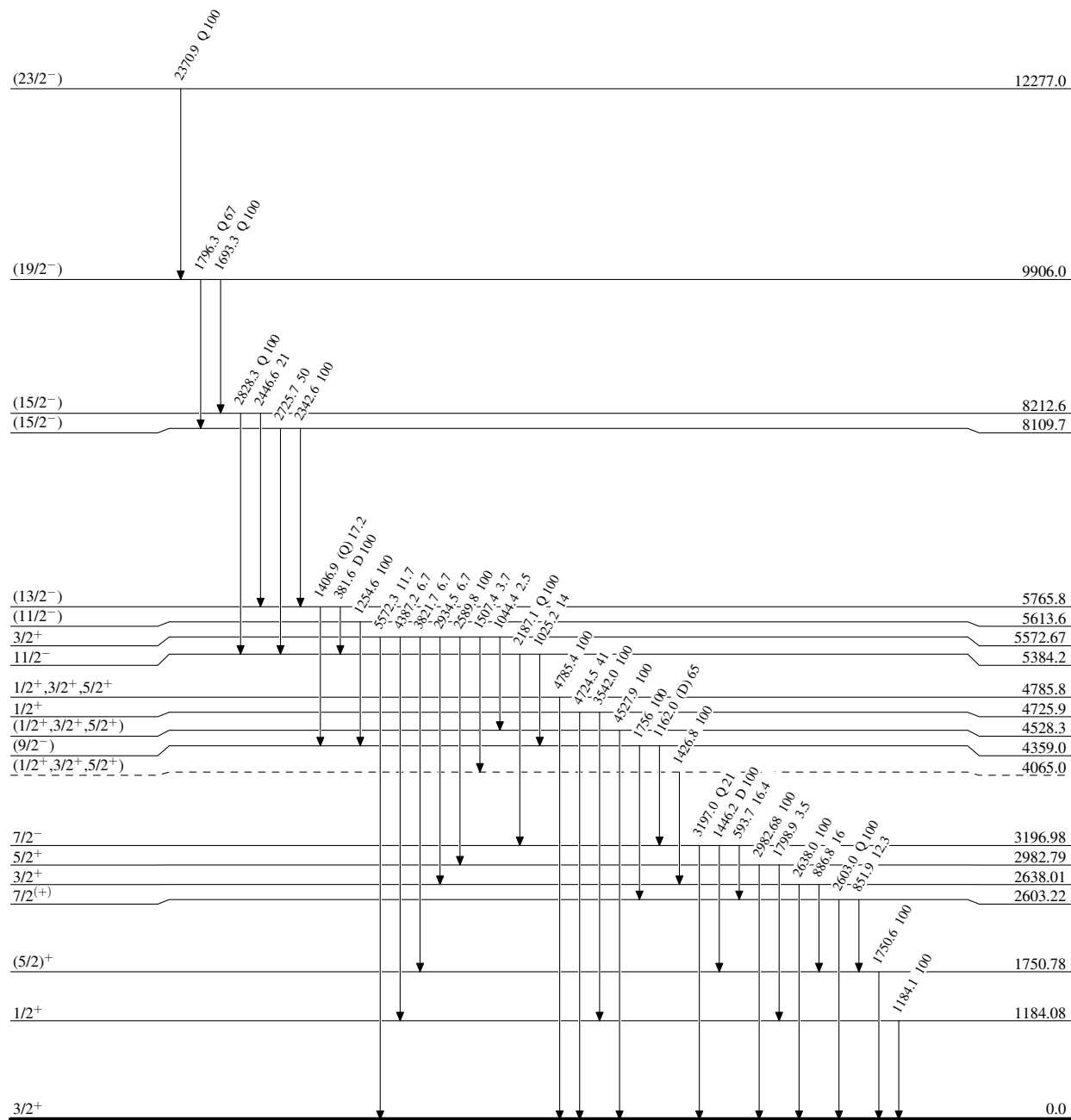
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Adopted Levels, Gammas (continued)

$\gamma(^{35}\text{Ar})$ (continued)							Comments
$E_i(\text{level})$	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.	
5572.67	3/2 ⁺	4387.2 9	6.7 16	1184.08	1/2 ⁺		
		5572.3 10	11.7 31	0.0	3/2 ⁺		
5613.6	(11/2 ⁻)	1254.6 8	100	4359.0	(9/2 ⁻)		
5765.8	(13/2 ⁻)	381.6 1	100 10	5384.2	11/2 ⁻	D	E_γ : from ($^{24}\text{Mg}, \alpha n \gamma$). Other: 381.5 3 from ($^{16}\text{O}, \alpha n \gamma$). $I_\gamma, \text{Mult.}$: from ($^{16}\text{O}, \alpha n \gamma$). E_γ, I_γ : from ($^{16}\text{O}, \alpha n \gamma$).
		1406.9 7	17.2 35	4359.0	(9/2 ⁻)	(Q)	
8109.7	(15/2 ⁻)	2342.6 28	100 25	5765.8	(13/2 ⁻)		
		2725.7 14	50 13	5384.2	11/2 ⁻		
8212.6	(15/2 ⁻)	2446.6 16	21 7	5765.8	(13/2 ⁻)		
		2828.3 7	100 18	5384.2	11/2 ⁻	Q	
9906.0	(19/2 ⁻)	1693.3 27	100 20	8212.6	(15/2 ⁻)	Q	
		1796.3 25	67 20	8109.7	(15/2 ⁻)	Q	
12277.0	(23/2 ⁻)	2370.9 25	100	9906.0	(19/2 ⁻)	Q	

Adopted Levels, GammasLevel Scheme

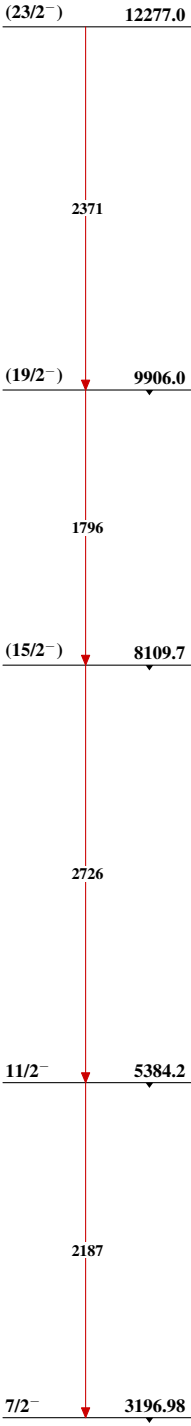
Intensities: Relative photon branching from each level



1.7756 s 14

Adopted Levels, Gammas

Band(A): Band based on f_{7/2}
orbital



³⁵Ar₁₇