⁴⁸Ca(¹³C,3nγ) **1978Na06,2000ApZW**

	History		
Туре	Author	Citation	Literature Cutoff Date
Full Evaluation	Caroline D. Nesaraja, Scott D. Geraedts and Balraj Singh	NDS 111, 897 (2010)	12-Jan-2010

⁵⁸Fe Levels

1978Na06: E=40 MeV. Measured E γ , I γ , $\gamma\gamma$, $\gamma(\theta)$, lifetimes by DSAM and recoil-distance method. Shell-model calculations. Additional information 1.

2000ApZW: E=40 MeV. Measured E γ , I γ , $\gamma\gamma$, and $\gamma\gamma(\theta)$ (DCO) using the 8π array of 20 Compton-suppressed high purity Ge detectors and 70-element BGO detectors. Shell-model calculations.

Most of the uncertain levels and associated γ rays reported only by 2000ApZW have not been included in the 'Adopted Levels, gammas' dataset.

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E(level) [†]	J π ‡	T _{1/2} #	E(level) [†]	$J^{\pi \ddagger}$	T _{1/2} #
0.0 ^C	0^{+}		6033.8 ^b 6	9(+)	
810.82 ^C 23	2^{+}		6282.9 ^e 6	9(+)	<0.14 ps
1674.8 ^a 3	2+		6840.5? 8	(9 ⁺)	
2076.6 ^c 4	4+		7032.5? 7	(10^{+})	
2134.0 ^{<i>a</i>} 3	3+		7242.8 ^e 9	$10^{(+)}$	<0.14 ps
2600.5 ^a 4	4+		7458.0 ^b 6	$10^{(+)}$	
2780.8? 11	(1^{+})		7730.8 ^d 6	$11^{(+)}$	<0.14 ps
2864.8 4	$5^{(+)}$	3.1 [@] ps 14	8026.6? ^{&e} 12	(11^{+})	
2875.9? 11	(2^{+})	-	8600.5? 10	(10^{+})	
3450.2 5	(4^{+})		9447.5 ^b 8	$12^{(+)}$	
3549.1? 6	(5^+)		9938.5 10	(12^{+})	
3597.0 ^c 4	6+	<3 [@] ps	9983.9 8	$12^{(+)}$	
3886.5 ^e 4	6+	11.8 [@] ps <i>14</i>	10074.8 ^d 10	$13^{(+)}$	<0.14 ps
4214.9 ^d 4	5+		10353.2 10	(12^{+})	
4669.7 <mark>d</mark> 4	$7^{(+)}$		10592? 5	(13^{+})	
5087.2? 6	(7^{+})		10837.0? 13	(12^{+})	
5343.5 ^e 5	8+		11859.7 ^b 10	$14^{(+)}$	
5504.4 [°] 8	(8 ⁺)	<0.14 ps	11910.5 10	(13 ⁺)	
5832.4 ^d 5	9(+)	0.8 ps 3	12812.7 ^d 17	(15^{+})	

[†] From least-squares fit to $E\gamma'$ s. The 1710.6 γ was excluded from the fitting procedure due to disagreement (by ≈ 3 keV) with corresponding level-energy difference.

[‡] As proposed by 2000ApZW and 1978Na06 based on $\gamma(\theta)$ and $\gamma\gamma(\theta)$ data and earlier assignments for low-spin levels. These assignments are consistent with those in 'Adopted Levels', except that several are in parentheses there due to lack of strong arguments.

[#] Mainly from DSAM and some from recoil-distance method (RDM) (1978Na06).

- & From table 1 of 2000ApZW, not shown in authors' figure 1.
- ^{*a*} Band(A): Structure based on $2^{(+)}$.
- ^{*b*} Band(B): structure based on $9^{(+)}$.
- ^c Band(C): Yrast structure.
- ^d Band(D): Structure based on (5^+) .
- ^{*e*} Band(E): Structure based on (6^+) .

[@] Probably from RDM.

⁴⁸Ca(¹³C,3nγ) **1978Na06,2000ApZW** (continued)

$\gamma(^{58}\text{Fe})$

A₂ and A₄ values are from $\gamma(\theta)$ data of 1978Na06. The DCO values are from 2000ApZW and correspond to gates on $\Delta J=2$, quadrupole transitions, unless specified otherwise.

E_{γ}^{\dagger}	$I_{\gamma}^{\#}$	E_i (level)	\mathbf{J}_i^{π}	E_f	${ m J}_f^\pi$	Mult. [‡]	Comments
49.6 [@] <i>10</i>	1.1 1	3597.0	6+	3549.1?	(5^{+})		
264.36 12	4.0 3	2864.8	5(+)	2600.5	4+	D	Additional information 11.
			~ 1		~ 1		$A_2 = -0.40 3, A_4 = 0. DCO = 0.68 9.$
289.49 12	15.3 9	3886.5	6+	3597.0	6+	(M1+E2)	Additional information 13.
417 4 @ & 4	0.2.7	5007 00	(7+)	4660 7	7(+)		$A_2 = +0.30 2, A_4 = -0.08 3. DCO = 1.13 3.$
41/.4 - 4	0.3 /	2007.22	(7^{+})	4009.7	(4+)		
437.9 • • 11	0.3 8	3886.5	6' 7(+)	3450.2	(4') 5+	0	Additional information 10
434.80 21	10.7 0	4009.7	100	4214.9	5.	Q	Additional information 18. $\Delta_{2} = \pm 0.27.2$ $\Delta_{4} = -0.12.2$ DCO=1.02.5
459.15 14	2.5 5	2134.0	3+	1674.8	2+	D	Additional information 5.
							$A_2 = -0.39$ 3, $A_4 = +0.09$ 3. DCO=0.51 7.
466.33 17	3.1 2	2600.5	4+	2134.0	3+	D	Additional information 7.
500 55 04	065	a (a a f	4	2076.6	4	5	$A_2 = -0.65 5, A_4 = +0.13 6. DCO = 0.53 5.$
523.75 24	8.6.5	2600.5	4'	2076.6	4'	D	Additional information 8. $A_{1}=10.10.2$, $A_{2}=0$, DCO=1.07.5, AI=0, dipole
							$A_2 = +0.102, A_4 = 0.1000 = 1.075. \Delta 3 = 0, upole transition.$
783.0 <i>3</i>	32.2 8	4669.7	$7^{(+)}$	3886.5	6+	D	Additional information 19.
							$A_2 = -0.28 \ 3, \ A_4 = +0.05 \ 2.$
783.7 ^{@&} 7	1.1 4	8026.6?	(11^{+})	7242.8	$10^{(+)}$		
810.85 24	132	810.82	2+	0.0	0^{+}	Q	I _γ : from 1978Na06. Other: 1.5 2 (2000ApZW),
							probably used As a gating transition for obtaining
							intensities of other γ rays.
840 4@ 5	122	2450.2	(4^{\pm})	2600 5	4+		$A_2 = +0.192, A_4 = -0.002. DCO = 1.015.$
864 0 <i>4</i>	4.55	5450.2 1674 8	(4) 2 ⁺	2000.3	4 2 ⁺	D	Additional information 2
004.0 4	т.) Ј	1074.0	2	010.02	2	D	$A_2 = -0.22$ 6, $A_4 = 0$. DCO=0.65 7.
925.8 <i>3</i>	2.9 3	2600.5	4+	1674.8	2^{+}	Q	Additional information 9.
							A ₂ =+0.33 <i>12</i> , A ₄ =0. DCO=0.92 <i>5</i> .
939.4 4	11.7 7	6282.9	9(+)	5343.5	8+	D	Additional information 27.
			- (1)				$A_2 < 0.$ DCO=0.62 7.
946.6 ^{°°} 7	1.0 2	6033.8	9(+)	5087.2?	(7*)		
948.7 ^{••} 5	2.5 2	3549.1?	(5^+)	2600.5	4 ⁺		
959.9 7	7.4 4	7242.8	$10^{(+)}$	6282.9	9(+)	D	Additional information 28.
1007 8 @ & 0	049	(040 50	(0^{\pm})	5922 4	$0^{(+)}$		$A_2 = -0.22$ 3, $A_4 = 0.$ DCO=0.09 7.
1007.8 0 17	0.4 8	0840.5? 4660.7	(9^{+}) 7(+)	5832.4 3507.0	9 ⁽¹⁾	D	Additional information 20
10/2.00 1/	13.4 9	4009.7	1. 7	5597.0	0	D	Additional information 20. $A_{2}=-0.33.4$ $A_{4}=0$ DCO=0.63.5
1106 0 ^{@&} 10	153	2780.82	(1^{+})	1674.8	2+		11 ₂ 0.55 7, 11 ₄ 0. DOO 0.05 5.
1162.8.3	47.0.8	5832.4	9 ⁽⁺⁾	4669.7	$\frac{2}{7^{(+)}}$	E2	Additional information 25
110210 0	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	000211	-				$A_2 = +0.41$ 6, $A_4 = -0.13$ 5. DCO=1.15 5.
1200.0 [@] 5	1.8 4	7032.5?	(10^{+})	5832.4	9(+)		
1265.9 4	100 2	2076.6	4+	810.82	2+	Q	Additional information 4.
1005 4 3	• • •	2005 -	< ±	2 (0 0 -	4		$A_2 = +0.21$ 3, $A_4 = -0.08$ 4. DCO=0.99 5.
1285.4 3	2.8 3	3886.5	6+	2600.5	4+		Additional information 14.
1316.5 5	3.1 3	3450.2	(4^+)	2134.0	3+ 2+	D	DCO=0.67 9.
1323.14	5.0.5	2134.0	3	810.82	2.	D+Q	Additional information 6. $\Delta_{2} = -0.48.5$ $\Delta_{4} = \pm 0.29.10$ DCO=0.92.1 (AI=1)
							$A_2 = -0.40$ J, $A_4 = +0.25$ IV. DCO=0.92 I ($\Delta J = 1$, dipole gate).

Continued on next page (footnotes at end of table)

⁴⁸Ca(¹³C,3n γ) 1978Na06,2000ApZW (continued)

$\gamma(^{58}\text{Fe})$ (continued)

E_{γ}^{\dagger}	$I_{\gamma}^{\#}$	E _i (level)	\mathbf{J}_i^π	E_f	\mathbf{J}_f^π	Mult. [‡]	Comments
1336.2 ^{@&} 6 1364.0 6	0.9 5 6.0 4	6840.5? 6033.8	(9 ⁺) 9 ⁽⁺⁾	5504.4 4669.7	(8 ⁺) 7 ⁽⁺⁾	Q	Additional information 26.
1424.1 [@] 4 1457.02 24	5.8 <i>4</i> 11.4 <i>7</i>	7458.0 5343.5	10 ⁽⁺⁾ 8 ⁺	6033.8 3886.5	9 ⁽⁺⁾ 6 ⁺	D Q	DCO=1.1 I (DJ=1, dipole gate). Additional information 22. $A_2=+0.27 \ 4, A_4=-0.10 \ 5. \ DCO=1.1 \ I.$
1472.2 ^{@&} 7	1.5 3	3549.1?	(5 ⁺)	2076.6	4+		2
1520.7 5	48 2	3597.0	6+	2076.6	4+	(E2)	Additional information 12. $A_{1} = 10.203$ $A_{2} = 0.023$ $DCO=0.005$
1614.5 5	9.3 6	4214.9	5+	2600.5	4+	D	Additional information 16. A ₂ = $-0.31 4$, A ₄ = $+0.10 4$. DCO= $0.67 7$.
1625.7 [@] 5	3.6 3	7458.0	$10^{(+)}$	5832.4	9(+)	D	DCO=0.4 1.
1674.4 8	3.2 4	1674.8	2+	0.0	0^{+}		Additional information 3.
1710.6 [@] 7	1.1 3	9447.5	$12^{(+)}$	7730.8	$11^{(+)}$		E_{γ} : poor fit, quoted energy may be a misprint. Level-energy difference=1716.7.
1746.7 5	4.2 3	5343.5	8+	3597.0	6+	Q	Additional information 23. DCO=1.6 2 (Δ J=1, dipole gated).
1760.0 ^{@&} 5	2.1 2	8600.5?	(10^{+})	6840.5?	(9 ⁺)		
1789.8 5	5.3 4	2600.5	4+	810.82	2+	Q	Additional information 10. $A_2=+0.18$ 5, $A_4=0$. DCO=1.1 1.
1805.0 <i>3</i>	3.1 3	4669.7	7 ⁽⁺⁾	2864.8	5(+)		Additional information 21. DCO=1.6 l (Δ J=1, dipole gated).
1810.3 7	27.9 5	3886.5	6+	2076.6	4+	(E2)	Additional information 15. $A_2=+0.21 \ 3, A_4=-0.04 \ 3. DCO=1.08 \ 5.$
1898.3 4	21.9 6	7730.8	$11^{(+)}$	5832.4	9(+)	(E2)	Additional information 29. DCO=1.1 <i>I</i> .
1907.6 8	8.8 6	5504.4	(8 ⁺)	3597.0	6+		Additional information 24.
1926.5 [@] 6	1.6 4	11910.5	(13^{+})	9983.9	$12^{(+)}$		
1989.4 [@] 5	4.4 <i>3</i>	9447.5	$12^{(+)}$	7458.0	$10^{(+)}$	Q	DCO=1.1 1.
2065.0 ^{@&} 10	1.5 7	2875.9?	(2^{+})	810.82	2^{+}		
2138.4 4	2.1 7	4214.9	5+	2076.6	4+	D	Additional information 17. $A_2 < 0. DCO=0.7 I.$
2207.7 [@] 7	1.3 5	9938.5	(12^{+})	7730.8	$11^{(+)}$		
2236.4 ^{@&} 8	1.1 4	10837.0?	(12^{+})	8600.5?	(10^{+})		
2253.1 [@] 5	3.7 <i>3</i>	9983.9	$12^{(+)}$	7730.8	$11^{(+)}$	D	DCO=0.5 1.
2344.0 8	6.4 4	10074.8	13(+)	7730.8	11 ⁽⁺⁾	(E2)	Additional information 30. $A_2=+0.45$ 14, $A_4=0$. DCO=1.0 3.
2412.2 [@] 6	1.9 7	11859.7	$14^{(+)}$	9447.5	$12^{(+)}$		DCO=0.8 4.
2622.4 [@] 7	0.9 9	10353.2	(12^{+})	7730.8	$11^{(+)}$		
2737.8 [@] 13	0.6 5	12812.7	(15 ⁺)	10074.8	$13^{(+)}$		
2861 ^{@&} 5	>0.3	10592?	(13+)	7730.8	$11^{(+)}$		

[†] From weighted average of 1978Na06 and 2000ApZW for E γ 's which are reported in both the studies. Others are from 2000ApZW.

[‡] From $\gamma(\theta)$ and $\gamma\gamma(\theta)$ data; RUL used when level lifetime is known.

[#] From 2000ApZW, unless otherwise stated. [@] γ from 2000ApZW only.

[&] Placement of transition in the level scheme is uncertain.



 $^{58}_{26}{
m Fe}_{32}$

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