

**3.2.3.2.1 CH<sub>2</sub>**Microwave data for <sup>12</sup>C<sup>1</sup>H<sub>2</sub>

Transition			$\nu$ [MHz]	Ref.
rotational $N' - N''$	fine structure $J' - J''$	Hyperfine <sup>a)</sup> $F' - F''$		
State: electronic $\tilde{X}^3B_1$ ; vibrational zero point level				
$2_{12} \leftarrow 3_{03}$	$3 \leftarrow 4$	<sup>a)</sup>	444 825.666(30) <sup>b)</sup>	95Oze
	$2 \leftarrow 3$	<sup>a)</sup>	439 960.991(30)	
	$1 \leftarrow 2$	<sup>a)</sup>	444 913.930(30)	
$5_{05} \leftarrow 4_{14}$	$6 \leftarrow 5$	<sup>a)</sup>	592 424.998(30)	
	$5 \leftarrow 4$	<sup>a)</sup>	593 662.479(30)	
	$4 \leftarrow 3$	<sup>a)</sup>	593 122.087(30)	

<sup>a)</sup> The rotational levels involved are *para* levels with  $I_T = 0$  where  $I_T$  is the total hydrogen spin. There is therefore no hyperfine structure.<sup>b)</sup> The figures in parentheses are the authors' estimates of experimental uncertainty (1 $\sigma$ ).Molecular parameters for <sup>12</sup>C<sup>1</sup>H<sub>2</sub>

Parameter	Value	Method	Ref.
State: electronic $\tilde{X}^3B_1$ ; vibrational zero point level			
$A$	[GHz] 2 190.285 1(21) <sup>a)</sup>	MW	95Oze
$B$	[GHz] 252.282 602(115)		
$C$	[GHz] 216.457 28(50)		
$\Delta_N$	[MHz] 9.033 <sup>b)</sup>		
$\Delta_{NK}$	[MHz] - 589.392 <sup>b)</sup>		
$\Delta_K$	[GHz] 59.690 147 <sup>b)</sup>		
$\delta_N$	[MHz] 3.034 <sup>b)</sup>		
$\delta_K$	[MHz] 0.0 <sup>b)</sup>		
$\phi_N$	[kHz] 7.52 <sup>b)</sup>		
$\phi_{NK}$	[MHz] 0.384 <sup>b)</sup>		
$\phi_{KN}$	[MHz] -58.210 7 <sup>b)</sup>		
$\phi_K$	[MHz] 0.0 <sup>b)</sup>		
$\phi_N$	[kHz] 5.85 <sup>b)</sup>		
$a_0$	[MHz] 112.6(37)		
$a$	[MHz] - 41.76(135)		
$b$	[MHz] 8.31(84)		
$\alpha$	[MHz] 7 833.4(47)		
$\beta$	[MHz] 1 307.3(76)		
$\alpha_K^s$	[MHz] - 54.2(23)		
$a_c$	[MHz] - 13.62(86)		
$T_{aa}$	[MHz] 43.68(87)		
$(T_{bb} - T_{cc})$	[MHz] 0.13(45)		

<sup>a)</sup> The numbers in parentheses are 1 standard deviation of the least-squares fit, in units of the last quoted decimal place.<sup>b)</sup> Parameter constrained to this value, derived by Sears *et al* [82Sea], in the least-squares fit.Microwave data for <sup>12</sup>C<sup>2</sup>H<sub>2</sub> (CD<sub>2</sub>)

Transition				$\nu$	Ref.
rotational $N' - N''$	fine structure $J' - J''$	hyperfine $F' - F''$	$I_{\text{T}}^{\text{a})}$	[MHz]	
State: electronic $\tilde{X}^3\text{B}_1$ ; vibrational zero point level					
$5_{05} \leftarrow 4_{13}$	$6 \leftarrow 5$	$8 \leftarrow 7$	2	$257\,669.164(30)^{b,c)}$	96Oze
		$7 \leftarrow 6$	2	$257\,669.164(30)^{\text{c})}$	
		$6 \leftarrow 5$	2	$257\,669.994(30)^{\text{c})}$	

		5 ← 4	2	257 669.994(30) <sup>γ</sup>
		4 ← 3	2	257 669.994(30) <sup>γ</sup>
		6 ← 5	0	257 669.994(30) <sup>γ</sup>
	5 ← 4	7 ← 6	2	258 770.773(30) <sup>γ</sup>
		6 ← 5	2	258 770.773(30) <sup>γ</sup>
		5 ← 4	2	258 770.773(30) <sup>γ</sup>
		4 ← 3	2	258 770.773(30) <sup>γ</sup>
		3 ← 2	2	258 770.773(30) <sup>γ</sup>
		5 ← 4	0	258 770.773(30) <sup>γ</sup>
	4 ← 3	6 ← 5	2	258 157.091(30) <sup>γ</sup>
		5 ← 4	2	258 157.091(30) <sup>γ</sup>
		4 ← 3	2	258 157.091(30) <sup>γ</sup>
		3 ← 2	2	258 157.091(30) <sup>γ</sup>
		2 ← 1	2	258 157.091(30) <sup>γ</sup>
		4 ← 3	0	258 157.091(30) <sup>γ</sup>
2 <sub>12</sub> ← 3 <sub>03</sub>	3 ← 4	5 ← 6	2	265 053.607(30)
		4 ← 5	2	265 052.775(30)
		3 ← 4	2	265 051.760(30) <sup>γ</sup>
		3 ← 4	0	265 051.760(30) <sup>γ</sup>
		2 ← 3	2	265 050.876(30)
	2 ← 3	4 ← 5	2	265 332.514(30)
		3 ← 4	2	260 333.749(30) <sup>γ</sup>
		2 ← 3	0	260 333.749(30) <sup>γ</sup>
		2 ← 3	2	260 335.068(30) <sup>γ</sup>
		1 ← 2	2	260 335.068(30) <sup>γ</sup>
		0 ← 1	2	260 335.068(30) <sup>γ</sup>
	1 ← 2	3 ← 4	2	265 444.279(30)
		2 ← 3	2	265 445.603(30)
		1 ← 2	2	265 447.371(30)
1 <sub>11</sub> ← 2 <sub>02</sub>	2 ← 3	3 ← 4	1	518 346.527(30)
		2 ← 3	1	518 344.454(30)
		1 ← 2	1	518 342.386(30)
6 <sub>06</sub> ← 5 <sub>15</sub>	5 ← 4	6 ← 5	1	526 852.321(30) <sup>γ</sup>
		5 ← 4	1	526 852.321(30) <sup>γ</sup>
		4 ← 3	1	526 852.321(30) <sup>γ</sup>
	6 ← 5	7 ← 6	1	526 949.698(30) <sup>γ</sup>
		6 ← 5	1	526 949.698(30) <sup>γ</sup>
		5 ← 4	1	526 949.698(30) <sup>γ</sup>
	7 ← 6	8 ← 7	1	526 386.078(30) <sup>γ</sup>
		7 ← 6	1	526 386.078(30) <sup>γ</sup>
		6 ← 5	1	526 386.078(30) <sup>γ</sup>

<sup>a</sup>)  $I_T = I_1 + I_2$  is the total deuterium spin angular momentum.

<sup>b</sup>) The figures in parentheses are the authors' estimates of experimental uncertainty ( $1\sigma$ ).

<sup>γ</sup>) Unresolved hyperfine structure.

Molecular parameters for $^{12}\text{C}^2\text{H}_2$ (CD <sub>2</sub> )				
Parameter		Value	Method	Ref.
State: electronic $\tilde{X}^3\text{B}_1$ ; vibrational zero point level				
$A$	[GHz]	1 132.834 44(168) <sup>a,b)</sup>	MW	96Oze
$\frac{1}{2}(B+C)$	[GHz]	118.784 64(47)		
$\frac{1}{2}(B-C)$	[MHz]	8 012.77(116)		
$\Delta_{\text{N}}$	[MHz]	2.771 <sup>b)</sup>		
$\Delta_{\text{NK}}$	[MHz]	-145.10(33)		
$\Delta_{\text{K}}$	[GHz]	16.795.21 <sup>b)</sup>		
$\delta_{\text{N}}$	[MHz]	0.669 <sup>b)</sup>		
$\delta_{\text{K}}$	[MHz]	83.4 <sup>b)</sup>		
$\phi_{\text{N}}$	[kHz]	0.0 <sup>b)</sup>		
$\phi_{\text{NK}}$	[MHz]	-0.057 <sup>b)</sup>		
$\phi_{\text{KN}}$	[MHz]	-7.294 <sup>b)</sup>		
$\phi_{\text{K}}$	[MHz]	588. <sup>b)</sup>		
$\varepsilon_{aa}$	[MHz]	112.6(37)		
$\varepsilon_{bb}$	[MHz]	-75.89(120)		
$\varepsilon_{cc}$	[MHz]	-61.2(24)		
$\alpha$	[MHz]	7 776.46(27)		
$\beta$	[MHz]	1 235.89(29)		
$\alpha_{\text{K}}^s$	[MHz]	-14.5(23)		
$a_{\text{C}}$	[MHz]	-3.38(30)		
$T_{aa}$	[MHz]	5.20(20)		
$(T_{bb} - T_{cc})$	[MHz]	-0.265(142)		

<sup>a)</sup> The numbers in parentheses represent 3 standard deviations of the least-squares fit, in units of the last quoted decimal place.

<sup>b)</sup> Parameter constrained to this value, derived by Evenson *et al.* [84Eve], in the least-squares fit.

#### References for CH<sub>2</sub>

- 82Sea      Sears, T.J., Bunker, P.R., McKellar, A.R.W., Evenson, K.M., Jennings, D.A., Brown, J.M. : J. Chem. Phys. **77** (1982) 5348.  
 84Eve      Evenson, K.M., Sears, T.J., McKellar, A.R.W. : J. Opt. Soc. Am. **B1** (1984) 15.  
 95Oze      Ozeki, H., Saito, S. : Astrophys. J. Letts. **451** (1995) L97.  
 96Oze      Ozeki, H., Saito, S. : J. Chem. Phys. **104** (1996) 2167.

#### 3.2.3.2.2 NH<sub>2</sub>

##### Microwave data for $^{14}\text{N}^1\text{H}_2$

Transition				$\nu$ [MHz]	Ref.	
rotational $N' - N''$	fine structure $J' - J''$	Hyperfine <sup>a)</sup>				
		$F' - F''$	$F' - F''$			
State: electronic $\tilde{X}^3\text{B}_1$ ; vibrational zero point level						
$1_{10} \leftarrow 1_{01}$	$1\frac{1}{2} \leftarrow \frac{1}{2}$	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	<sup>b)</sup>	461 464.970	97Ton	
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	<sup>b)</sup>	461 399.538		
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	<sup>b)</sup>	461 456.616		
		$\frac{1}{2} \leftarrow \frac{1}{2}$	<sup>b)</sup>	461 392.569		
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	<sup>b)</sup>		462 433.531
			$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	<sup>b)</sup>		462 455.660
			$\frac{1}{2} \leftarrow \frac{1}{2}$	<sup>b)</sup>		462 467.132
	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	<sup>b)</sup>	462 464.231		
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	<sup>b)</sup>	462 474.125		

		$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	$b)$	462 424.916
		$\frac{1}{2} \leftarrow 1\frac{1}{2}$	$b)$	462 448.679
	$\frac{1}{2} \leftarrow \frac{1}{2}$	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$b)$	469 440.507
		$\frac{1}{2} \leftarrow \frac{1}{2}$	$b)$	469 309.462
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	$b)$	469 383.519
		$\frac{1}{2} \leftarrow 1\frac{1}{2}$	$b)$	469 366.333
	$\frac{1}{2} \leftarrow 1\frac{1}{2}$	$\frac{1}{2} \leftarrow 1\frac{1}{2}$	$b)$	470 365.501
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$b)$	470 439.696
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	$b)$	470 458.306
		$\frac{1}{2} \leftarrow \frac{1}{2}$	$b)$	470 383.909
$3_{13} \leftarrow 2_{20}$	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	229 409.857
			$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	229 387.038
			$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	229 384.967
			$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	229 374.374
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	229 494.219
			$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	229 481.444
			$1\frac{1}{2} \leftarrow \frac{1}{2}$	229 451.775
			$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	229 458.961
			$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	229 456.994
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	229 527.993
			$\frac{1}{2} \leftarrow \frac{1}{2}$	229 508.799
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	229 462.344
			$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	229 474.996
			$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	229 464.383
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	229 519.742
			$1\frac{1}{2} \leftarrow \frac{1}{2}$	229 514.353
		$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	229 515.771
			$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	229 502.671
		$3\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	229 379.546
			$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	229 406.322
	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	241 591.219
			$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	241 595.938
			$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	241 634.478
			$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	241 626.808
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	241 557.252
			$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	241 558.071
			$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	241 561.757
			$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	241 600.773
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	241 533.200
			$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	241 534.571
			$1\frac{1}{2} \leftarrow \frac{1}{2}$	241 538.296
			$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	241 577.863
			$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	241 568.482
		$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	241 550.384
			$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	241 551.222
			$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	241 554.123

		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	241 527.392	
			$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	241 529.318	
			$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	241 533.200	
$4_{14} \leftarrow 3_{21}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	<sup>b)</sup>	379 219.565	
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	<sup>b)</sup>	379 277.255	
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	<sup>b)</sup>	379 326.429	
		$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	<sup>b)</sup>	379 273.064	
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	<sup>b)</sup>	379 321.667	
	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	<sup>b)</sup>	388 140.056	
		$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	<sup>b)</sup>	388 104.021	
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	<sup>b)</sup>	388 078.764	
		$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	<sup>b)</sup>	388 095.759	
		$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	<sup>b)</sup>	388 070.494	
$5_{15} \leftarrow 4_{22}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	293 180.628	
		$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	293 233.917	
			$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	293 236.211	
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	293 283.324	
			$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	293 284.704	
	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	300 790.221	
			$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	300 787.694	
		$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	300 751.440	
			$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	300 748.965	
		$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	300 723.616	
			$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	300 721.477	
$5_{33} \leftarrow 4_{40}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	614 496.881(250) <sup>°)</sup>	99Mül
			$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	614 504.716(150)	
			$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	614 512.795(150)	
		$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	614 517.645(150)	
			$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	614 523.998(150)	
		$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	614 532.623(150)	
		$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	614 532.623(150)	
		$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	614 539.472(150)	
			$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	614 549.030(250)	
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	629 258.758(250)	
			$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	629 263.861(150)	
		$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	629 268.824(250)	
		$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	629 268.824(250)	
		$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	629 273.600(150)	
		$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	629 279.028(250)	
		$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	629 279.028(250)	
		$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	629 284.178(150)	
			$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	629 289.598(250)	
$2_{11} \leftarrow 2_{02}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	642 518.631(50)	
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	642 545.535(150)	
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	642 554.997(50)	
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	642 567.923(100)	

	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	642 597.050(150)
	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	642 606.473(50)
	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	642 612.201(100)
	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	642 633.653(50)
	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	642 633.653(50)
	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	642 641.616(50)
	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	642 646.305(100)
	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	642 655.090(100)
	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	642 675.867(100)
	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	642 686.521(150)
	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	642 693.499(100)
		$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	642 728.658(50)
	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	642 742.728(150)
	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	642 753.471(50)
$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3\frac{1}{2} \leftarrow 4\frac{1}{2}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	644 267.200(50)
	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	644 276.645(50)
	$3\frac{1}{2} \leftarrow 4\frac{1}{2}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	644 279.763(150)
	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	644 289.207(50)
	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	644 289.207(50)
	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	644 298.337(50)
	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	644 304.583(50)
	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	644 309.720(50)
	$3\frac{1}{2} \leftarrow 4\frac{1}{2}$	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	644 313.960(150)
	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	644 324.461(100)
		$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	644 324.461(100)
		$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	644 324.461(100)
	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3\frac{1}{2} \leftarrow 4\frac{1}{2}$	644 336.345(100)
		$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	644 338.656(100)
		$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	644 338.656(100)
	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	644 346.214(50)
		$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	644 346.214(50)
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	644 346.214(50)
	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	644 355.246(50)
	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	644 359.164(50)
		$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	644 359.164(50)
	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	644 367.852(100)
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	644 367.852(100)
		$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	644 367.852(100)
	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	$4\frac{1}{2} \leftarrow 5\frac{1}{2}$	644 372.613(50)
	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	644 380.975(50)
	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	644 393.878(100)
	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3\frac{1}{2} \leftarrow 4\frac{1}{2}$	644 393.878(100)
	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	644 401.745(150)
	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	644 408.438(50)
	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	644 416.906(50)
$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	648 638.860(50)

	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	648 663.704(50)
	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	648 674.484(50)
	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	648 683.110(50)
	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	648 694.950(50)
	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	648 702.581(150)
	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	648 708.622(50)
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	648 708.622(50)
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	648 712.136(50)
	$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	648 723.197(150)
	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	648 729.246(150)
	$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	648 729.246(150)
	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	648 731.838(100)
	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	648 735.937(100)
	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	648 738.627(150)
		$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	648 742.251(100)
	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3\frac{1}{2} \leftarrow 4\frac{1}{2}$	648 742.251(100)
	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	648 747.877(100)
	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	648 754.882(50)
	$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	648 767.855(100)
	$1\frac{1}{2} \leftarrow 3\frac{1}{2}$	$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	648 771.125(50)
	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	648 774.287(100)
	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	648 780.374(50)
		$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	648 780.374(50)
		$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	648 784.194(100)
	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	648 795.855(100)
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	648 800.091(50)
	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	648 805.417(50)
	$1\frac{1}{2} \leftarrow 3\frac{1}{2}$	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	648 810.073(150)
	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	648 816.312(50)
	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	648 822.502(50)
	$1\frac{1}{2} \leftarrow 3\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	648 834.831(50)
	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	648 841.091(50)
$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3\frac{1}{2} \leftarrow 4\frac{1}{2}$	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	650 350.732(50)
	$2\frac{1}{2} \leftarrow 4\frac{1}{2}$	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	650 370.966(100)
	$1\frac{1}{2} \leftarrow 3\frac{1}{2}$	$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	650 375.596(150)
	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	650 384.051(100)
	$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	650 396.165(50)
	$3\frac{1}{2} \leftarrow 4\frac{1}{2}$	$3\frac{1}{2} \leftarrow 4\frac{1}{2}$	650 412.445(50)
	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	650 417.725(50)
	$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	650 429.996(50)
	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	650 438.263(50)
	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	650 443.483(150)
	$2\frac{1}{2} \leftarrow 4\frac{1}{2}$	$3\frac{1}{2} \leftarrow 4\frac{1}{2}$	650 448.185(250)
	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	650 454.814(100)
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	650 459.072(50)
	$3\frac{1}{2} \leftarrow 4\frac{1}{2}$	$4\frac{1}{2} \leftarrow 5\frac{1}{2}$	650 501.718(50)

		$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3\frac{1}{2} \leftarrow 4\frac{1}{2}$	650 526.718(50)
		$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	650 532.918(50)
		$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	650 543.080(50)
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	650 549.467(50)
$5_{32} \leftarrow 4_{41}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$^b)$	773 764.179(50)
		$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$^b)$	773 777.866(50)
		$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$^b)$	773 786.944(100)
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$^b)$	788 855.699(50)
		$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$^b)$	788 861.493(100)
		$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	$^b)$	788 866.224(100)
$2_{02} \leftarrow 1_{11}$	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	902 145.280(50)
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	902 172.720(100)
			$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	902 178.640(50)
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	902 185.360(50)
			$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	902 191.600(100)
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	902 191.600(100)
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	902 208.480(50)
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	902 216.880(50)
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	902 229.560(50)
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	902 235.000(100)
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	902 235.000(100)
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	902 239.720(100)
			$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	902 272.160(50)
	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	907 401.551(50)
			$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	907 401.551(50)
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	907 406.707(100)
			$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	907 406.707(100)
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	907 418.461(50)
			$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	907 424.050(100)
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	907 430.206(100)
		$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	907 430.206(100)
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	907 460.647(80)
		$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	907 466.236(50)
$1_{11} \leftarrow 0_{00}$	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	952 514.418(50)
			$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	952 528.983(50)
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	952 542.105(70)
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	952 549.800(80)
			$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	952 600.559(50)
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	952 615.382(50)
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	952 628.018(100)
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	952 628.018(100)
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	952 639.196(50)
	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	959 401.252(50)
			$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	959 425.714(50)
		$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	959 464.985(100)
			$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	959 476.229(50)



			$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	959 482.223(100)	
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	959 498.666(50)	
			$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	959 511.612(50)	
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	959 520.279(150)	
			$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	959 525.868(50)	
			$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	959 531.700(100)	
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	959 595.580(50)	
			$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	959 601.007(100)	
$2_{20} \leftarrow 2_{11}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	993 274.000(150)	
		$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	993 285.200(100)	
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	993 288.550(150)	
		$3\frac{1}{2} \leftarrow 4\frac{1}{2}$	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	993 304.700(100)	
		$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	993 312.100(200)	
			$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	993 322.700(100)	
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	993 322.700(100)	
			$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	993 328.600(100)	
			$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	993 353.100(100)	
		$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	$4\frac{1}{2} \leftarrow 5\frac{1}{2}$	993 365.200(100)	
	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3\frac{1}{2} \leftarrow 4\frac{1}{2}$	1 002 966.050(100)	
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	1 002 966.050(100)	
		$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	1 002 985.100(200)	
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	1 002 985.100(200)	
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	1 002 991.100(100)	
			$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	1 002 997.700(200)	
			$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	1 003 007.400(200)	
		$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	1 003 007.400(200)	
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	1 003 019.700(200)	
		$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	1 003 019.700(200)	
$2_{21} \leftarrow 2_{12}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	<sup>b)</sup>	1 383 074.34	98Oze
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	<sup>b)</sup>	1 383 100.21	
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	<sup>b)</sup>	1 383 117.12	
	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	<sup>b)</sup>	1 394 558.76	
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	<sup>b)</sup>	1 394 493.53	
		$\frac{1}{2} \leftarrow \frac{1}{2}$	<sup>b)</sup>	1 394 452.63	
$4_{13} \leftarrow 4_{04}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	1 432 228.60 <sup>d)</sup>	
			$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	1 432 228.60 <sup>d)</sup>	
			$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	1 432 228.60 <sup>d)</sup>	
		$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	1 432 254.83 <sup>d)</sup>	
			$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	1 432 254.83 <sup>d)</sup>	
			$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	1 432 254.83 <sup>d)</sup>	
		$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	1 432 272.23 <sup>d)</sup>	
			$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	1 432 272.23 <sup>d)</sup>	
			$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	1 432 272.23 <sup>d)</sup>	
	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	1 435 772.43 <sup>d)</sup>	
			$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	1 435 772.43 <sup>d)</sup>	
			$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	1 435 772.43 <sup>d)</sup>	

		$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	1 435 730.35 <sup>d)</sup>
			$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	1 435 730.35 <sup>d)</sup>
			$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	1 435 730.35 <sup>d)</sup>
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	1 435 693.57 <sup>d)</sup>
			$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	1 435 693.57 <sup>d)</sup>
			$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	1 435 693.57 <sup>d)</sup>
$2_{12} \leftarrow 1_{01}$	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	<sup>b)</sup>	1 443 626.57
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	<sup>b)</sup>	1 443 618.43
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	<sup>b)</sup>	1 443 611.43
	$1\frac{1}{2} \leftarrow \frac{1}{2}$	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	<sup>b)</sup>	1 447 015.65 <sup>d)</sup>
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	<sup>b)</sup>	1 447 015.65 <sup>d)</sup>
$5_{32} \leftarrow 5_{23}$	$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	<sup>b)</sup>	1 494 767.89 <sup>d)</sup>
		$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	<sup>b)</sup>	1 494 767.89 <sup>d)</sup>
		$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	<sup>b)</sup>	1 494 767.89 <sup>d)</sup>
$3_{03} \leftarrow 2_{12}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	<sup>b)</sup>	1 543 338.04 <sup>d)</sup>
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	<sup>b)</sup>	1 543 338.04 <sup>d)</sup>
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	<sup>b)</sup>	1 543 338.04 <sup>d)</sup>
	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	<sup>b)</sup>	1 541 290.90
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	<sup>b)</sup>	1 541 282.66 <sup>d)</sup>
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	<sup>b)</sup>	1 541 282.66 <sup>d)</sup>
$6_{24} \leftarrow 6_{15}$	$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	$7\frac{1}{2} \leftarrow 7\frac{1}{2}$	$8\frac{1}{2} \leftarrow 8\frac{1}{2}$	1 614 121.19 <sup>d)</sup>
			$7\frac{1}{2} \leftarrow 7\frac{1}{2}$	1 614 121.19 <sup>d)</sup>
			$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	1 614 121.19 <sup>d)</sup>
		$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	$7\frac{1}{2} \leftarrow 7\frac{1}{2}$	1 614 136.19 <sup>d)</sup>
			$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	1 614 136.19 <sup>d)</sup>
			$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	1 614 136.19 <sup>d)</sup>
		$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	1 614 147.81 <sup>d)</sup>
			$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	1 614 147.81 <sup>d)</sup>
			$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	1 614 147.81 <sup>d)</sup>
	$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	$7\frac{1}{2} \leftarrow 7\frac{1}{2}$	1 616 821.88 <sup>d)</sup>
			$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	1 616 821.88 <sup>d)</sup>
			$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	1 616 821.88 <sup>d)</sup>
		$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	1 616 802.15 <sup>d)</sup>
			$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	1 616 802.15 <sup>d)</sup>
			$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	1 616 802.15 <sup>d)</sup>
		$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	1 616 782.78 <sup>d)</sup>
			$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	1 616 782.78 <sup>d)</sup>
			$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	1 616 782.78 <sup>d)</sup>
$3_{22} \leftarrow 3_{13}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	1 620 842.55 <sup>d)</sup>
			$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	1 620 842.55 <sup>d)</sup>
			$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	1 620 842.55 <sup>d)</sup>
		$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	1 620 865.16 <sup>d)</sup>
			$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	1 620 865.16 <sup>d)</sup>
			$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	1 620 865.16 <sup>d)</sup>
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	1 620 881.51 <sup>d)</sup>

			$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	1 620 881.51 <sup>d)</sup>
			$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	1 620 881.51 <sup>d)</sup>
	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	1 629 514.71 <sup>d)</sup>
			$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	1 629 514.71 <sup>d)</sup>
			$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	1 629 514.71 <sup>d)</sup>
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	1 629 475.57 <sup>d)</sup>
			$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	1 629 475.57 <sup>d)</sup>
			$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	1 629 475.57 <sup>d)</sup>
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	1 629 443.14 <sup>d)</sup>
			$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	1 629 443.14 <sup>d)</sup>
			$\frac{1}{2} \leftarrow \frac{1}{2}$	1 629 443.14 <sup>d)</sup>
$4_{31} \leftarrow 4_{22}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	1 638 180.64 <sup>e)</sup>
			$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	1 638 180.64 <sup>e)</sup>
			$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	1 638 180.64 <sup>e)</sup>
		$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	1 638 180.64 <sup>e)</sup>
			$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	1 638 180.64 <sup>e)</sup>
			$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	1 638 180.64 <sup>e)</sup>
		$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	1 638 180.64 <sup>e)</sup>
			$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	1 638 180.64 <sup>e)</sup>
			$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	1 638 180.64 <sup>e)</sup>
	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	1 647 151.94 <sup>d)</sup>
		$3\frac{1}{2} \leftarrow 4\frac{1}{2}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	1 647 151.94 <sup>d)</sup>
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	1 647 151.94 <sup>d)</sup>
		$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	1 647 160.97 <sup>e)</sup>
			$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	1 647 160.97 <sup>e)</sup>
		$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	1 647 160.97 <sup>e)</sup>
			$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	1 647 160.97 <sup>e)</sup>
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	1 647 160.97 <sup>e)</sup>
			$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	1 647 160.97 <sup>e)</sup>
$2_{20} \leftarrow 1_{11}$	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	2 545 077.19

<sup>a)</sup> Coupling scheme:  $J = N + S$ ;  $F_1 = J + I_1$ ;  $F = F_1 + I_2$  where  $I_1$  is the <sup>14</sup>N nuclear spin and  $I_2$  is the <sup>1</sup>H total nuclear spin (1 or 0).

<sup>b)</sup> *Para* rotational levels, with  $I_2 = 0$ .

<sup>c)</sup> The figures in parentheses are the authors' estimates of experimental uncertainty (1σ).

<sup>d)</sup> <sup>1</sup>H hyperfine structure not resolved.

<sup>e)</sup> <sup>14</sup>N and <sup>1</sup>H hyperfine structure not resolved.

Molecular parameters for <sup>14</sup>N<sup>1</sup>H<sub>2</sub>

Parameter	Value	Method	Ref.
State: electronic $\tilde{X}^2B_1$ ; vibrational zero point level			
$A$	[GHz]	710.302 131 9 (250) <sup>a)</sup>	MW
$B$	[GHz]	388.288.871 8(1491)	99Mül
$C$	[GHz]	245.013 954 4(1316)	
$\Delta_K$	[MHz]	659.756 23(1561)	
$\Delta_{NK}$	[MHz]	− 125.045 19(1631)	
$\Delta_N$	[MHz]	31.664 38(428)	
$\delta_K$	[MHz]	29.375 5(761)	
$\delta_N$	[MHz]	12.701 85(208)	
$\phi_K$	[MHz]	1.991 49(350)	

$\Phi_{KN}$	[MHz]	– 0.267 88(472)
$\Phi_{NK}$	[kHz]	– 48.98(139)
$\Phi_N$	[kHz]	12.518 3(1195)
$\phi_K$	[kHz]	490.64(778)
$\phi_{NK}$	[kHz]	– 18.655(1194)
$\phi_N$	[kHz]	6.294 3(432)
$L_K$	[kHz]	– 10.156(278)
$L_{KKN}$	[kHz]	2.472(290)
$L_{NK}$	[kHz]	– 0.736 9(1070)
$L_{NNK}$	[Hz]	70.39(1281)
$L_N$	[Hz]	– 4.786(792)
$l_K$	[kHz]	2.501(208)
$l_{KN}$	[kHz]	0.044 3(432)
$l_{NK}$	[Hz]	45.87(818)
$l_{NNK}$	[Hz]	– 3.043(295)
$P_K^{d)}$	[Hz]	49.01(426)
$S_K^{e)}$	[Hz]	– 0.184 4(299)
$\mathcal{E}_{aa}$	[MHz]	– 9 267.972 1(325)
$\mathcal{E}_{bb}$	[MHz]	– 1 354.273 9(215)
$\mathcal{E}_{cc}$	[MHz]	12.292 5(237)
$\Delta_K^s$	[MHz]	34.119 9(122)
$\Delta_{KN}^s + \Delta_{NK}^s$	[MHz]	– 3.503 4(89)
$\Delta_{NK}^s$	[MHz]	0.665(116)
$\Delta_N^s$	[MHz]	0.316 64(62)
$\delta_K^s$	[MHz]	0.549 5(63)
$\delta_N^s$	[MHz]	0.160 580(294)
$\Phi_K^s$	[kHz]	– 179.62(169)
$\Phi_{NKK}^s$	[kHz]	7.02(222)
$\Phi_{NNK}^s$	[kHz]	3.383(287)
$L_K^s$	[kHz]	0.728 1(267)
$a_f(N)$	[MHz]	28.050 2(106)
$T_{aa}(N)$	[MHz]	– 43.188 1(173)
$T_{bb}(N)$	[MHz]	– 44.464 2(190)
$T_{cc}(N)$	[MHz]	87.652 2(162) <sup>b)</sup>
$\chi_{aa}(N)$	[MHz]	0.366(31)
$\chi_{bb}(N)$	[MHz]	– 3.833(37)
$\chi_{cc}(N)$	[MHz]	3.466(24) <sup>b)</sup>
$C_{aa}(N)$	[MHz]	0.464 8(81)
$C_{bb}(N)$	[MHz]	0.098 6(57)
$C_{cc}(N)$	[MHz]	0.011 1(39)
$a_f(H)$	[MHz]	– 67.170 2(116)
$T_{aa}(H)$	[MHz]	18.358 5(221)
$T_{bb}(H)$	[MHz]	– 13.210 8(247)
$T_{cc}(H)$	[MHz]	– 5.147 7(192) <sup>b)</sup>
$T_{ab}^*(H)$	[MHz]	58.5 <sup>c)</sup>
$C_{aa}(H)$	[MHz]	0.209 9(100)
$C_{bb}(H)$	[MHz]	– 0.005 9(65)
$C_{cc}(H)$	[MHz]	– 0.023 9(51)

<sup>a)</sup> The numbers in parentheses represent 1 standard deviation of the least-squares fit, in units of the last quoted decimal place.

<sup>b)</sup> Derived value for this parameter.

<sup>c)</sup> Constrained to value determined by [80Ste].

<sup>d)</sup> 10-th order centrifugal distortion parameter

<sup>e)</sup> 12-th order centrifugal distortion parameter

Far-infrared data for <sup>14</sup>N<sup>1</sup>H<sub>2</sub>

Transition		$\nu$ [cm <sup>-1</sup> ]	Ref.
rotational $N' - N''$	fine structure $J' - J''$		
State: electronic $\tilde{X}^2B_1$ ; vibrational zero point level			
3 <sub>03</sub> ← 2 <sub>12</sub>	2 $\frac{1}{2}$ ← 1 $\frac{1}{2}$	51.411 56	97Mor
6 <sub>24</sub> ← 6 <sub>15</sub>	6 $\frac{1}{2}$ ← 6 $\frac{1}{2}$	53.842 46	
	5 $\frac{1}{2}$ ← 5 $\frac{1}{2}$	53.931 29	
3 <sub>22</sub> ← 3 <sub>13</sub>	3 $\frac{1}{2}$ ← 3 $\frac{1}{2}$	54.066 21	
	2 $\frac{1}{2}$ ← 2 $\frac{1}{2}$	54.353 63	
4 <sub>31</sub> ← 4 <sub>22</sub>	5 $\frac{1}{2}$ ← 5 $\frac{1}{2}$	54.643 42	
	4 $\frac{1}{2}$ ← 4 $\frac{1}{2}$	54.943 65	
3 <sub>30</sub> ← 3 <sub>21</sub>	3 $\frac{1}{2}$ ← 3 $\frac{1}{2}$	59.451 47	
3 <sub>13</sub> ← 2 <sub>02</sub>	3 $\frac{1}{2}$ ← 2 $\frac{1}{2}$	62.684 69	
	2 $\frac{1}{2}$ ← 1 $\frac{1}{2}$	62.750 49	
4 <sub>13</sub> ← 3 <sub>22</sub>	3 $\frac{1}{2}$ ← 2 $\frac{1}{2}$	64.467 03	
4 <sub>23</sub> ← 4 <sub>14</sub>	4 $\frac{1}{2}$ ← 4 $\frac{1}{2}$	64.605 57	
4 <sub>13</sub> ← 3 <sub>22</sub>	4 $\frac{1}{2}$ ← 3 $\frac{1}{2}$	64.666 59	
4 <sub>23</sub> ← 4 <sub>14</sub>	5 $\frac{1}{2}$ ← 5 $\frac{1}{2}$	64.848 21	
3 <sub>31</sub> ← 3 <sub>22</sub>	3 $\frac{1}{2}$ ← 3 $\frac{1}{2}$	65.056 27	
5 <sub>14</sub> ← 5 <sub>05</sub>	5 $\frac{1}{2}$ ← 5 $\frac{1}{2}$	66.325 11	
	4 $\frac{1}{2}$ ← 4 $\frac{1}{2}$	66.467 87	
4 <sub>32</sub> ← 4 <sub>23</sub>	4 $\frac{1}{2}$ ← 4 $\frac{1}{2}$	68.238 06	
	3 $\frac{1}{2}$ ← 3 $\frac{1}{2}$	68.547 14	
4 <sub>04</sub> ← 3 <sub>13</sub>	4 $\frac{1}{2}$ ← 3 $\frac{1}{2}$	70.930 19	
	3 $\frac{1}{2}$ ← 2 $\frac{1}{2}$	70.958 05	
5 <sub>33</sub> ← 5 <sub>24</sub>	5 $\frac{1}{2}$ ← 5 $\frac{1}{2}$	73.702 55	
	4 $\frac{1}{2}$ ← 4 $\frac{1}{2}$	73.956 58	
4 <sub>14</sub> ← 3 <sub>03</sub>	4 $\frac{1}{2}$ ← 3 $\frac{1}{2}$	76.816 73	
	3 $\frac{1}{2}$ ← 2 $\frac{1}{2}$	76.851 96	
6 <sub>42</sub> ← 6 <sub>33</sub>	6 $\frac{1}{2}$ ← 6 $\frac{1}{2}$	77.167 35	
5 <sub>24</sub> ← 5 <sub>15</sub>	5 $\frac{1}{2}$ ← 5 $\frac{1}{2}$	77.404 66	
	4 $\frac{1}{2}$ ← 4 $\frac{1}{2}$	77.626 42	
2 <sub>21</sub> ← 1 <sub>10</sub>	2 $\frac{1}{2}$ ← 1 $\frac{1}{2}$	78.863 47	
	1 $\frac{1}{2}$ ← $\frac{1}{2}$	79.127 51	
6 <sub>34</sub> ← 6 <sub>25</sub>	6 $\frac{1}{2}$ ← 6 $\frac{1}{2}$	81.707 27	
	5 $\frac{1}{2}$ ← 5 $\frac{1}{2}$	81.926 56	
5 <sub>41</sub> ← 5 <sub>32</sub>	5 $\frac{1}{2}$ ← 5 $\frac{1}{2}$	82.532 64	
	4 $\frac{1}{2}$ ← 4 $\frac{1}{2}$	82.877 36	
2 <sub>20</sub> ← 1 <sub>11</sub>	2 $\frac{1}{2}$ ← 1 $\frac{1}{2}$	84.895 57	
	1 $\frac{1}{2}$ ← $\frac{1}{2}$	85.191 13	
	1 $\frac{1}{2}$ ← 1 $\frac{1}{2}$	85.422 80	
4 <sub>14</sub> ← 3 <sub>03</sub>	4 $\frac{1}{2}$ ← 3 $\frac{1}{2}$	85.505 43	
6 <sub>15</sub> ← 6 <sub>06</sub>	6 $\frac{1}{2}$ ← 6 $\frac{1}{2}$	85.639 20	
	5 $\frac{1}{2}$ ← 5 $\frac{1}{2}$	85.803 76	
4 <sub>40</sub> ← 4 <sub>31</sub>	3 $\frac{1}{2}$ ← 2 $\frac{1}{2}$	85.922 74	

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$4_{41} \leftarrow 4_{30}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	86.943 63
	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	87.356 66
$5_{42} \leftarrow 5_{33}$	$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	87.542 53
	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	87.879 05
$5_{05} \leftarrow 4_{14}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	88.893 80
	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	88.904 05
$5_{14} \leftarrow 4_{23}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	90.512 44
	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	90.624 29
$8_{08} \leftarrow 8_{17}$	$8\frac{1}{2} \leftarrow 8\frac{1}{2}$	91.047 12
	$7\frac{1}{2} \leftarrow 7\frac{1}{2}$	91.154 00
$5_{15} \leftarrow 4_{04}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	91.578 53
	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	91.595 95
$6_{25} \leftarrow 6_{16}$	$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	91.911 21
	$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	92.122 19
$7_{35} \leftarrow 7_{26}$	$7\frac{1}{2} \leftarrow 7\frac{1}{2}$	92.180 08
	$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	92.376 58
$7_{44} \leftarrow 7_{35}$	$7\frac{1}{2} \leftarrow 7\frac{1}{2}$	92.755 40
	$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	92.995 68
$6_{24} \leftarrow 5_{33}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	94.070 35
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	94.296 54
$3_{22} \leftarrow 2_{11}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	95.257 54
	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	95.464 03
$8_{53} \leftarrow 8_{44}$	$7\frac{1}{2} \leftarrow 7\frac{1}{2}$	100.211 01
$7_{16} \leftarrow 7_{07}$	$7\frac{1}{2} \leftarrow 7\frac{1}{2}$	104.364 07
	$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	104.548 49
$8_{53} \leftarrow 8_{44}$	$8\frac{1}{2} \leftarrow 8\frac{1}{2}$	104.749 90
$7_{52} \leftarrow 7_{43}$	$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	105.242 33
$6_{06} \leftarrow 5_{15}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	105.919 97 °)
	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	105.919 97 °)
$9_{46} \leftarrow 9_{37}$	$9\frac{1}{2} \leftarrow 9\frac{1}{2}$	106.619 16
$6_{16} \leftarrow 5_{05}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	107.045 28
	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	107.054 29
$7_{26} \leftarrow 7_{17}$	$7\frac{1}{2} \leftarrow 7\frac{1}{2}$	107.527 49
$6_{51} \leftarrow 6_{42}$	$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	107.617 63
$7_{26} \leftarrow 7_{17}$	$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	107.735 93
$6_{51} \leftarrow 6_{42}$	$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	107.971 76
$6_{52} \leftarrow 6_{43}$	$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	108.861 12
$7_{53} \leftarrow 7_{44}$	$7\frac{1}{2} \leftarrow 7\frac{1}{2}$	108.877 37
$5_{51} \leftarrow 5_{42}$	$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	109.032 63
$4_{23} \leftarrow 3_{12}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	109.164 87
$7_{53} \leftarrow 7_{44}$	$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	109.180 59
$4_{23} \leftarrow 3_{12}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	109.319 85
$5_{51} \leftarrow 5_{42}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	109.444 30
$6_{16} \leftarrow 5_{24}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	114.095 75
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	114.156 18
$3_{21} \leftarrow 2_{12}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	115.351 08

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	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	115.612 74
$5_{24} \leftarrow 4_{13}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	121.208 76
	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	121.330 77
$7_{07} \leftarrow 6_{16}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	122.466 39 <sup>a)</sup>
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	122.466 39 <sup>a)</sup>
$7_{17} \leftarrow 6_{06}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	122.920 70 <sup>a)</sup>
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	122.920 70 <sup>a)</sup>
$3_{31} \leftarrow 2_{20}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	127.180 73
	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	127.453 93
$4_{22} \leftarrow 3_{13}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	152.504 99
	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	152.744 73
$4_{31} \leftarrow 3_{22}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	153.081 65
	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	153.333 25
$8_{17} \leftarrow 7_{26}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	153.523 29
	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	153.533 84
$9_{09} \leftarrow 8_{18}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	154.979 43 <sup>a)</sup>
	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	154.979 43 <sup>a)</sup>
$9_{19} \leftarrow 8_{08}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	155.049 71 <sup>a)</sup>
	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	155.049 71 <sup>a)</sup>
$8_{27} \leftarrow 7_{16}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	158.358 39
$5_{33} \leftarrow 4_{22}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	161.139 46
	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	161.363 89
$9_{36} \leftarrow 8_{27}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	170.826 74 <sup>a)</sup>
	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	170.826 74 <sup>a)</sup>
$10_{0,10} \leftarrow 9_{19}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	171.100 14 <sup>a)</sup>
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	171.100 14 <sup>a)</sup>
$10_{1,10} \leftarrow 9_{09}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	171.127 62 <sup>a)</sup>
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	171.127 62 <sup>a)</sup>
$9_{28} \leftarrow 8_{17}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	173.046 48
	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	173.060 54
$4_{41} \leftarrow 3_{30}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	173.283 66
$6_{34} \leftarrow 5_{23}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	173.324 90
	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	173.514 25
$4_{40} \leftarrow 3_{31}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	173.530 70
$4_{41} \leftarrow 3_{30}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	173.555 74
$4_{40} \leftarrow 4_{13}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	173.708 92
	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	173.809 97
	$3\frac{1}{2} \leftarrow 4\frac{1}{2}$	174.611 33
$5_{32} \leftarrow 4_{23}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	181.496 00
	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	181.714 84
$7_{35} \leftarrow 6_{24}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	183.145 79
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	183.300 14
$10_{19} \leftarrow 9_{46}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	184.484 06
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	184.630 64
$11_{0,11} \leftarrow 10_{1,10}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	187.158 21 <sup>a)</sup>
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	187.158 21 <sup>a)</sup>

$11_{1,11} \leftarrow 10_{0,10}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	187.168 92 °)
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	187.168 92 °)
$6_{33} \leftarrow 6_{06}$	$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	187.328 95
$10_{37} \leftarrow 9_{28}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	187.408 10 °)
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	187.408 10 °)
$10_{29} \leftarrow 9_{36}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	188.403 56
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	188.403 56
$8_{36} \leftarrow 7_{25}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	191.826 95
	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	191.946 00
$5_{42} \leftarrow 4_{31}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	194.037 96
	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	194.299 59
$5_{41} \leftarrow 4_{32}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	195.789 06
	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	196.044 86
$5_{23} \leftarrow 4_{14}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	196.242 68
	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	196.481 40
$10_{46} \leftarrow 9_{37}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	198.256 73
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	198.286 64
$9_{37} \leftarrow 8_{08}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	200.875 54
	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	200.960 30
$11_{38} \leftarrow 10_{29}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	203.618 38 °)
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	203.618 38 °)
$11_{2,10} \leftarrow 10_{37}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	204.051 78 °)
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	204.051 78 °)
$4_{32} \leftarrow 3_{03}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	209.660 39
	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	210.248 37
$10_{38} \leftarrow 9_{45}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	211.489 70
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	211.543 62
$6_{43} \leftarrow 5_{32}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	212.730 67
	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	212.977 51
$6_{33} \leftarrow 5_{24}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	215.845 96
	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	216.038 10
$11_{47} \leftarrow 10_{38}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	217.141 12
$5_{51} \leftarrow 4_{40}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	217.565 49
$5_{50} \leftarrow 4_{41}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	217.602 47
$5_{51} \leftarrow 4_{40}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	217.821 19
$5_{50} \leftarrow 4_{41}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	217.857 54
$6_{42} \leftarrow 5_{33}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	219.310 40
	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	219.541 40
$12_{39} \leftarrow 11_{2,10}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	219.628 62 °)
	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	219.628 62 °)
$12_{2,11} \leftarrow 11_{38}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	219.817 22 °)
	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	219.817 22 °)
$11_{39} \leftarrow 10_{46}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	223.950 51
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	223.982 72
$7_{44} \leftarrow 6_{33}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	228.053 05
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	228.284 55



$13_{3,10} \leftarrow 12_{2,11}$	$13\frac{1}{2} \leftarrow 12\frac{1}{2}$	235 514.11 <sup>a)</sup>
	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	235 514.11 <sup>a)</sup>
$13_{2,12} \leftarrow 12_{39}$	$13\frac{1}{2} \leftarrow 12\frac{1}{2}$	235.596 81 <sup>a)</sup>
	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	235.596 81 <sup>a)</sup>
$12_{3,10} \leftarrow 11_{47}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	237.820 08
	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	237.839 59
$6_{52} \leftarrow 5_{41}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	239.060 61
	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	239.311 02
$6_{51} \leftarrow 5_{42}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	239.385 97
$8_{45} \leftarrow 7_{34}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	239.570 04
$6_{51} \leftarrow 5_{42}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	239.634 38
$8_{45} \leftarrow 7_{34}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	239.781 78
$5_{33} \leftarrow 4_{04}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	242.685 71
	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	243.178 62
$6_{24} \leftarrow 5_{15}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	245.402 50
$7_{43} \leftarrow 6_{34}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	245.642 56
$6_{24} \leftarrow 5_{15}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	245.653 29
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	245.845 35
$9_{46} \leftarrow 8_{17}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	248.099 55
$10_{47} \leftarrow 9_{18}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	254.311 47
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	254.468 25
$7_{34} \leftarrow 6_{25}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	256.942 28
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	257.120 30
$7_{53} \leftarrow 6_{42}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	259.763 27
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	260.004 41
$6_{60} \leftarrow 5_{51}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	260.210 36 <sup>b)</sup>
$6_{61} \leftarrow 5_{50}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	260.210 36 <sup>b)</sup>
$11_{48} \leftarrow 10_{19}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	260.294 12
$6_{60} \leftarrow 5_{51}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	260.447 32 <sup>b)</sup>
$6_{61} \leftarrow 5_{50}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	260.447 32 <sup>b)</sup>
$7_{52} \leftarrow 6_{43}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	261.307 74
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	261.542 14
$9_{55} \leftarrow 8_{44}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	294.645 14
	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	294.873 06
$7_{70} \leftarrow 6_{61}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	301.144 99 <sup>b)</sup>
$7_{71} \leftarrow 6_{60}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	301.144 99 <sup>b)</sup>
$7_{70} \leftarrow 6_{61}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	301.362 36 <sup>b)</sup>
$7_{71} \leftarrow 6_{60}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	301.362 36 <sup>b)</sup>
$8_{63} \leftarrow 7_{52}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	303.281 55
	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	303.510 73
$8_{62} \leftarrow 7_{53}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	303.581 56
	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	303.809 20
$8_{17} \leftarrow 7_{26}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	304.164 63
	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	304.343 42
$10_{56} \leftarrow 9_{45}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	306.781 44
$9_{54} \leftarrow 8_{45}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	308.348 00

	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	308.542 52
$9_{45} \leftarrow 8_{36}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	314.175 64
	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	314.325 47
$7_{35} \leftarrow 6_{06}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	322.626 78
$8_{71} \leftarrow 7_{62}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	322.990 14
$7_{35} \leftarrow 6_{06}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	323.035 20
$8_{72} \leftarrow 7_{61}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	323.199 67
$8_{71} \leftarrow 7_{62}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	323.209 02
$9_{64} \leftarrow 8_{53}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	323.898 80
	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	324.121 64
$9_{63} \leftarrow 8_{54}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	325.101 83
	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	325.318 62
$7_{44} \leftarrow 6_{15}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	329.742 95
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	330.226 82
$10_{55} \leftarrow 9_{46}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	336.240 75
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	336.408 36
$8_{81} \leftarrow 7_{70}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	340.316 84 <sup>b)</sup>
$8_{80} \leftarrow 7_{71}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	340.316 84 <sup>b)</sup>
$8_{81} \leftarrow 7_{70}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	340.514 34 <sup>b)</sup>
$8_{80} \leftarrow 7_{71}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	340.514 34 <sup>b)</sup>
$10_{65} \leftarrow 9_{54}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	343.097 17
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	343.314 70
$9_{73} \leftarrow 8_{62}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	344.541 19
$9_{72} \leftarrow 8_{63}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	344.593 91
$9_{73} \leftarrow 8_{62}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	344.756 88
$9_{72} \leftarrow 8_{63}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	344.808 84
$10_{64} \leftarrow 9_{55}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	346.885 73
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	347.089 28
$8_{08} \leftarrow 7_{17}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	352.109 43
	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	352.413 23
$9_{18} \leftarrow 8_{27}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	356.125 63
$10_{28} \leftarrow 9_{37}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	358.149 44
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	358.287 25
$11_{66} \leftarrow 10_{55}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	359.805 58
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	360.020 76
$8_{45} \leftarrow 7_{16}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	361.591 37
	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	362.009 04
$9_{81} \leftarrow 8_{72}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	362.245 77 <sup>b)</sup>
$9_{82} \leftarrow 8_{71}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	362.245 77 <sup>b)</sup>
$9_{81} \leftarrow 8_{72}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	362.446 86 <sup>b)</sup>
$9_{82} \leftarrow 8_{71}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	362.446 86 <sup>b)</sup>
$10_{74} \leftarrow 9_{63}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	365.886 21
$10_{73} \leftarrow 9_{64}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	365.916 31
$10_{74} \leftarrow 9_{63}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	365.936 03

<sup>a)</sup> Spin-rotation splitting not resolved.<sup>b)</sup> K-type doubling not resolved.

Microwave data for <sup>14</sup>N<sup>1</sup>H<sup>2</sup>H (NHD)

Transition					$\nu$ [MHz]	Ref.
rotational $N' - N''$	fine structure $J' - J''$	Hyperfine <sup>a)</sup>				
		$F'_1 - F''_1$	$F'_2 - F''_2$	$F' - F''$		
State: electronic $\tilde{X}^2A''$ ; vibrational zero point level						
$1_{10} \leftarrow 0_{00}$	$1\frac{1}{2} \leftarrow \frac{1}{2}$	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1 \leftarrow 1$	$2 \leftarrow 1$	412 652.547(11) <sup>b)</sup>	97Kob
				$2 \leftarrow 2$	412 655.972(39)	
				$1 \leftarrow 2$	412 663.040(32) <sup>c)</sup>	
		$\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1 \leftarrow 2$	$1 \leftarrow 2$		
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 2$	$3 \leftarrow 3$	412 679.720(33) <sup>c)</sup>	
				$2 \leftarrow 2$		
				$1 \leftarrow 1$		
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 1$	$3 \leftarrow 2$	412 685.661(14)	
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 2$	$2 \leftarrow 3$	412 688.006(43)	
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 1$	$2 \leftarrow 1$	412 690.514(12)	
				$1 \leftarrow 0$	412 693.906(9) <sup>c)</sup>	
				$2 \leftarrow 2$		
				$1 \leftarrow 1$	412 696.057(19) <sup>c)</sup>	
		$\frac{1}{2} \leftarrow \frac{1}{2}$	$1 \leftarrow 1$	$1 \leftarrow 1$		
		$\frac{1}{2} \leftarrow \frac{1}{2}$	$1 \leftarrow 0$	$2 \leftarrow 1$	412 701.501(5) <sup>c)</sup>	
			$1 \leftarrow 1$	$0 \leftarrow 1$		
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3 \leftarrow 2$	$4 \leftarrow 3$	412 708.132(14) <sup>c)</sup>	
				$3 \leftarrow 2$		
				$2 \leftarrow 1$	412 709.582(32) <sup>c)</sup>	
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	$2 \leftarrow 1$	$3 \leftarrow 2$		
		$\frac{1}{2} \leftarrow \frac{1}{2}$	$1 \leftarrow 0$	$1 \leftarrow 1$		
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	$2 \leftarrow 1$	$2 \leftarrow 1$	412 712.972(9)	
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3 \leftarrow 2$	$3 \leftarrow 3$	412 716.335(31) <sup>c)</sup>	
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	$2 \leftarrow 1$	$2 \leftarrow 2$		
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1 \leftarrow 2$	$1 \leftarrow 2$		
		$\frac{1}{2} \leftarrow \frac{1}{2}$	$0 \leftarrow 1$	$1 \leftarrow 1$	412 729.322(26) <sup>c)</sup>	
				$1 \leftarrow 0$		
				$1 \leftarrow 2$	412 732.840(27)	
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 2$	$3 \leftarrow 3$	412 747.492(13) <sup>c)</sup>	
				$2 \leftarrow 2$		
				$1 \leftarrow 1$		
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	$1 \leftarrow 1$	$2 \leftarrow 2$		
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	$1 \leftarrow 0$	$2 \leftarrow 1$	412 756.962(40)	
				$1 \leftarrow 1$	412 763.904(26)	
	$\frac{1}{2} \leftarrow \frac{1}{2}$	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1 \leftarrow 1$	$1 \leftarrow 0$	413 474.014(24) <sup>c)</sup>	
				$0 \leftarrow 1$		
			$2 \leftarrow 1$	$2 \leftarrow 1$	413 480.262(42)	
			$1 \leftarrow 1$	$2 \leftarrow 2$	413 489.200(35)	
			$2 \leftarrow 1$	$3 \leftarrow 2$	413 493.468(19)	
			$2 \leftarrow 2$	$1 \leftarrow 2$	413 536.01(14)	
		$\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1 \leftarrow 1$	$2 \leftarrow 1$	413 539.892(23)	
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1 \leftarrow 2$	$2 \leftarrow 2$	413 543.119(9) <sup>c)</sup>	
		$\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1 \leftarrow 1$	$2 \leftarrow 2$		
				$1 \leftarrow 2$		

				0 ← 1	
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	2 ← 2	2 ← 3	413 545.781(21) <sup>°</sup>
		$\frac{1}{2} \leftarrow 1\frac{1}{2}$	0 ← 1	1 ← 1	
				3 ← 3	413 555.213(18)
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	2 ← 1	1 ← 0	413 570.563(20) <sup>°</sup>
				1 ← 1	
			1 ← 1	1 ← 2	
			1 ← 1	2 ← 1	413 576.627(8)
			1 ← 0	1 ← 1	413 580.173(20) <sup>°</sup>
			1 ← 1	2 ← 2	
			2 ← 1	3 ← 2	413 584.684(21)
		$\frac{1}{2} \leftarrow 1\frac{1}{2}$	1 ← 2	1 ← 1	413 592.121(49) <sup>°</sup>
				2 ← 1	
				0 ← 1	413 594.639(47)
				1 ← 2	413 597.251(25) <sup>°</sup>
				2 ← 2	
				2 ← 3	413 605.090(14)
		$\frac{1}{2} \leftarrow \frac{1}{2}$	0 ← 1	1 ← 2	413 640.279(32)
			1 ← 0	2 ← 1	413 644.455(58) <sup>°</sup>
				1 ← 1	
$1_{10} \leftarrow 1_{01}$	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$\frac{1}{2} \leftarrow 1\frac{1}{2}$	1 ← 1	2 ← 2	430 774.926(30) <sup>°</sup>
				1 ← 1	
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	2 ← 1	3 ← 2	430 781.288(16) <sup>°</sup>
				2 ← 1	
				1 ← 0	430 783.931(44) <sup>°</sup>
		$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	1 ← 2	2 ← 2	430 786.519(23)
		$\frac{1}{2} \leftarrow \frac{1}{2}$	1 ← 0	2 ← 1	430 788.967(19) <sup>°</sup>
		$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	2 ← 3	2 ← 3	
				1 ← 2	
			1 ← 2	0 ← 1	
				1 ← 1	
		$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	2 ← 3	3 ← 4	430 791.190(6) <sup>°</sup>
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	3 ← 3	3 ← 2	
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	3 ← 3	3 ← 3	430 796.722(26) <sup>°</sup>
				2 ← 2	
			2 ← 2	2 ← 1	
			1 ← 0	1 ← 1	
				4 ← 4	430 798.363(6)
			2 ← 2	2 ← 2	430 800.574(25) <sup>°</sup>
				1 ← 1	
				3 ← 3	430 803.076(7)
			3 ← 3	3 ← 4	430 805.698(7) <sup>°</sup>
			2 ← 2	1 ← 2	
		$\frac{1}{2} \leftarrow 1\frac{1}{2}$	1 ← 2	2 ← 2	
		$\frac{1}{2} \leftarrow 1\frac{1}{2}$	1 ← 2	1 ← 1	430 807.837(11)
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	2 ← 2	2 ← 3	430 810.185(6)
		$\frac{1}{2} \leftarrow 1\frac{1}{2}$	1 ← 2	2 ← 3	430 812.523(11) <sup>°</sup>
				1 ← 2	
			0 ← 1	1 ← 1	
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	2 ← 2	3 ← 3	430 818.730(8) <sup>°</sup>
				2 ← 2	
				1 ← 1	

	$\frac{1}{2} \leftarrow \frac{1}{2}$	$1 \leftarrow 1$	$2 \leftarrow 1$	430 822.070(10) <sup>°</sup>
	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 2$	$1 \leftarrow 2$	
	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1 \leftarrow 1$	$2 \leftarrow 2$	430 824.669(13) <sup>°</sup>
			$1 \leftarrow 1$	
	$\frac{1}{2} \leftarrow \frac{1}{2}$	$1 \leftarrow 1$	$1 \leftarrow 0$	
	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1 \leftarrow 1$	$0 \leftarrow 1$	
	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3 \leftarrow 2$	$4 \leftarrow 3$	430 826.086(3) <sup>°</sup>
			$3 \leftarrow 2$	
			$2 \leftarrow 1$	
	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 2$	$2 \leftarrow 3$	
	$\frac{1}{2} \leftarrow \frac{1}{2}$	$1 \leftarrow 1$	$2 \leftarrow 2$	430 830.019(5) <sup>°</sup>
			$1 \leftarrow 1$	
	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 1$	$3 \leftarrow 2$	430 832.781(5) <sup>°</sup>
			$2 \leftarrow 1$	
			$1 \leftarrow 0$	430 835.107(11) <sup>°</sup>
	$1\frac{1}{2} \leftarrow \frac{1}{2}$	$2 \leftarrow 1$	$2 \leftarrow 1$	
	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2 \leftarrow 3$	$2 \leftarrow 2$	
	$1\frac{1}{2} \leftarrow \frac{1}{2}$	$2 \leftarrow 1$	$3 \leftarrow 2$	430 836.913(16) <sup>°</sup>
	$\frac{1}{2} \leftarrow \frac{1}{2}$	$1 \leftarrow 1$	$1 \leftarrow 2$	
	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 1$	$1 \leftarrow 1$	
	$1\frac{1}{2} \leftarrow \frac{1}{2}$	$1 \leftarrow 0$	$2 \leftarrow 1$	430 839.387(120) <sup>°</sup>
	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2 \leftarrow 3$	$1 \leftarrow 2$	
	$1\frac{1}{2} \leftarrow \frac{1}{2}$	$2 \leftarrow 1$	$1 \leftarrow 1$	
	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2 \leftarrow 3$	$3 \leftarrow 4$	430 842.282(17)
	$1\frac{1}{2} \leftarrow \frac{1}{2}$	$1 \leftarrow 0$	$1 \leftarrow 1$	430 846.206(14) <sup>°</sup>
			$0 \leftarrow 1$	
	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1 \leftarrow 2$	$2 \leftarrow 2$	430 854.997(29)
			$0 \leftarrow 1$	430 857.513(29) <sup>°</sup>
			$1 \leftarrow 1$	
			$2 \leftarrow 3$	430 862.405(9)
	$\frac{1}{2} \leftarrow \frac{1}{2}$	$0 \leftarrow 1$	$1 \leftarrow 2$	430 874.933(13)
$\frac{1}{2} \leftarrow \frac{1}{2}$	$\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1 \leftarrow 2$	$2 \leftarrow 3$	436 056.088(7)
		$1 \leftarrow 1$	$1 \leftarrow 2$	436 061.620(5)
		$1 \leftarrow 2$	$2 \leftarrow 2$	436 065.607(36)
			$0 \leftarrow 1$	436 068.750(5) <sup>°</sup>
		$0 \leftarrow 1$	$1 \leftarrow 2$	
	$1\frac{1}{2} \leftarrow \frac{1}{2}$	$0 \leftarrow 1$	$0 \leftarrow 1$	
	$1\frac{1}{2} \leftarrow \frac{1}{2}$	$1 \leftarrow 0$	$1 \leftarrow 1$	436 070.453(17) <sup>°</sup>
	$\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1 \leftarrow 1$	$2 \leftarrow 1$	
	$1\frac{1}{2} \leftarrow \frac{1}{2}$	$1 \leftarrow 0$	$2 \leftarrow 1$	436 072.907(27) <sup>°</sup>
		$1 \leftarrow 1$	$1 \leftarrow 0$	
		$1 \leftarrow 1$	$2 \leftarrow 2$	436 078.606(6) <sup>°</sup>
	$\frac{1}{2} \leftarrow 1\frac{1}{2}$	$0 \leftarrow 1$	$1 \leftarrow 1$	
	$1\frac{1}{2} \leftarrow \frac{1}{2}$	$1 \leftarrow 1$	$2 \leftarrow 1$	
	$1\frac{1}{2} \leftarrow \frac{1}{2}$	$2 \leftarrow 1$	$1 \leftarrow 0$	436 083.701(33)
			$1 \leftarrow 1$	436 085.982(23) <sup>°</sup>
			$1 \leftarrow 2$	
	$1\frac{1}{2} \leftarrow \frac{1}{2}$	$2 \leftarrow 1$	$2 \leftarrow 1$	436 087.711(13) <sup>°</sup>
			$2 \leftarrow 2$	
			$3 \leftarrow 2$	436 090.001(7)

		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1 \leftarrow 1$	$2 \leftarrow 2$	436 132.692(6)
			$1 \leftarrow 2$	$1 \leftarrow 2$	436 135.424(7) <sup>°</sup>
				$0 \leftarrow 1$	
			$2 \leftarrow 2$	$2 \leftarrow 3$	436 137.637(27) <sup>°</sup>
			$1 \leftarrow 2$	$2 \leftarrow 2$	
				$3 \leftarrow 3$	436 139.808(10) <sup>°</sup>
			$1 \leftarrow 1$	$1 \leftarrow 1$	
			$2 \leftarrow 1$	$2 \leftarrow 2$	436 142.203(12) <sup>°</sup>
			$1 \leftarrow 1$	$2 \leftarrow 1$	
				$1 \leftarrow 0$	
			$2 \leftarrow 2$	$2 \leftarrow 2$	436 146.930(12) <sup>°</sup>
				$1 \leftarrow 1$	
				$3 \leftarrow 2$	436 149.404(14)
			$2 \leftarrow 1$	$2 \leftarrow 1$	436 151.981(32)
$2_{02} \leftarrow 1_{11}$	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2 \leftarrow 2$	$3 \leftarrow 2$	457 410.741(33)
				$3 \leftarrow 3$	457 416.672(7)
				$2 \leftarrow 2$	457 419.094(42) <sup>°</sup>
				$1 \leftarrow 1$	
			$3 \leftarrow 3$	$4 \leftarrow 4$	457 429.065(9) <sup>°</sup>
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1 \leftarrow 1$	$1 \leftarrow 0$	
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3 \leftarrow 3$	$3 \leftarrow 3$	457 430.867(19) <sup>°</sup>
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1 \leftarrow 1$	$1 \leftarrow 1$	
			$2 \leftarrow 2$	$3 \leftarrow 2$	
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	$1 \leftarrow 0$	$2 \leftarrow 1$	457 440.368(5)
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3 \leftarrow 2$	$4 \leftarrow 3$	457 447.030(8) <sup>°</sup>
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 1$	$3 \leftarrow 2$	
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3 \leftarrow 2$	$3 \leftarrow 2$	457 449.424(7) <sup>°</sup>
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 1$	$2 \leftarrow 1$	
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	$1 \leftarrow 0$	$1 \leftarrow 1$	
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3 \leftarrow 2$	$2 \leftarrow 1$	457 451.323(14)
			$4 \leftarrow 3$	$5 \leftarrow 4$	457 458.256(9) <sup>°</sup>
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3 \leftarrow 2$	$4 \leftarrow 3$	
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	$2 \leftarrow 1$	$1 \leftarrow 0$	
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4 \leftarrow 3$	$4 \leftarrow 3$	457 460.534(9) <sup>°</sup>
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3 \leftarrow 2$	$3 \leftarrow 2$	
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	$2 \leftarrow 1$	$1 \leftarrow 1$	
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4 \leftarrow 3$	$3 \leftarrow 2$	457 462.435(10) <sup>°</sup>
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3 \leftarrow 2$	$2 \leftarrow 1$	
	$1\frac{1}{2} \leftarrow \frac{1}{2}$	$1\frac{1}{2} \leftarrow \frac{1}{2}$	$1 \leftarrow 0$	$0 \leftarrow 1$	453 494.296(31)
				$1 \leftarrow 1$	453 496.600(17)
			$1 \leftarrow 1$	$1 \leftarrow 2$	453 505.567(10) <sup>°</sup>
				$1 \leftarrow 1$	
				$1 \leftarrow 0$	
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 2$	$1 \leftarrow 1$	453 508.444(16) <sup>°</sup>
				$1 \leftarrow 2$	
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	$1 \leftarrow 1$	$2 \leftarrow 2$	453 511.377(6) <sup>°</sup>
				$2 \leftarrow 1$	
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 2$	$2 \leftarrow 2$	453 513.830(29) <sup>°</sup>
				$2 \leftarrow 3$	
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	$2 \leftarrow 1$	$1 \leftarrow 0$	453 519.217(7) <sup>°</sup>
				$1 \leftarrow 1$	

		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 2$	$3 \leftarrow 3$	453 521.501(7)
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	$2 \leftarrow 1$	$2 \leftarrow 1$	453 523.641(9) <sup>°</sup>
				$2 \leftarrow 2$	
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3 \leftarrow 2$	$2 \leftarrow 1$	453 526.633(7)
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	$2 \leftarrow 1$	$3 \leftarrow 2$	453 529.606(10)
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3 \leftarrow 2$	$3 \leftarrow 2$	453 532.604(9) <sup>°</sup>
		$\frac{1}{2} \leftarrow \frac{1}{2}$	$0 \leftarrow 1$	$1 \leftarrow 1$	
				$1 \leftarrow 0$	
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3 \leftarrow 2$	$4 \leftarrow 3$	453 540.757(8) <sup>°</sup>
			$2 \leftarrow 1$	$1 \leftarrow 0$	
				$2 \leftarrow 1$	453 545.579(13) <sup>°</sup>
		$\frac{1}{2} \leftarrow \frac{1}{2}$	$1 \leftarrow 0$	$2 \leftarrow 1$	
			$1 \leftarrow 1$	$1 \leftarrow 2$	453 547.761(41) <sup>°</sup>
				$1 \leftarrow 1$	
				$1 \leftarrow 0$	
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 1$	$3 \leftarrow 2$	453 553.897(10) <sup>°</sup>
		$\frac{1}{2} \leftarrow \frac{1}{2}$	$1 \leftarrow 1$	$2 \leftarrow 2$	
				$2 \leftarrow 1$	
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1 \leftarrow 2$	$2 \leftarrow 3$	453 561.238(13)
			$2 \leftarrow 2$	$1 \leftarrow 1$	453 567.309(11) <sup>°</sup>
				$1 \leftarrow 2$	
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 2$	$2 \leftarrow 2$	453 572.129(6) <sup>°</sup>
				$2 \leftarrow 1$	
			$2 \leftarrow 2$	$3 \leftarrow 3$	453 579.294(2)
			$1 \leftarrow 1$	$0 \leftarrow 1$	453 584.517(22)
				$1 \leftarrow 1$	453 587.206(32) <sup>°</sup>
				$1 \leftarrow 2$	
			$1 \leftarrow 1$	$2 \leftarrow 2$	453 593.230(8) <sup>°</sup>
				$2 \leftarrow 1$	
			$2 \leftarrow 1$	$2 \leftarrow 2$	453 605.668(30)
$2_{11} \leftarrow 2_{12}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3 \leftarrow 3$	$4 \leftarrow 4$	218 441.228(3)
			$4 \leftarrow 4$	$5 \leftarrow 5$	218 446.303(6)
				$4 \leftarrow 4$	218 447.606(9)
				$3 \leftarrow 3$	218 448.521(13) <sup>°</sup>
			$3 \leftarrow 3$	$2 \leftarrow 3$	
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 1$	$3 \leftarrow 2$	
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2 \leftarrow 2$	$3 \leftarrow 3$	218 468.901(5)
			$3 \leftarrow 3$	$4 \leftarrow 4$	218 473.515(6)
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3 \leftarrow 2$	$4 \leftarrow 3$	218 478.643(46)
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1 \leftarrow 1$	$2 \leftarrow 2$	218 484.029
			$2 \leftarrow 2$	$3 \leftarrow 3$	218 489.326(4)
				$2 \leftarrow 2$	218 490.619(10)
				$1 \leftarrow 1$	218 491.709(25)
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3 \leftarrow 3$	$3 \leftarrow 3$	218 474.930(5) <sup>°</sup>
			$2 \leftarrow 2$	$1 \leftarrow 2$	
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 1$	$3 \leftarrow 2$	218 492.892(13) <sup>°</sup>
				$2 \leftarrow 1$	
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1 \leftarrow 1$	$1 \leftarrow 2$	
	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$\frac{1}{2} \leftarrow 1\frac{1}{2}$	$0 \leftarrow 1$	$1 \leftarrow 2$	219 873.504(25)
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 2$	$2 \leftarrow 2$	219 875.532(45) <sup>°</sup>
		$\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1 \leftarrow 2$	$2 \leftarrow 3$	

		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 2$	$1 \leftarrow 1$	219 877.175(23) <sup>°</sup>
		$\frac{1}{2} \leftarrow 1\frac{1}{2}$	$0 \leftarrow 1$	$1 \leftarrow 1$	
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3 \leftarrow 2$	$2 \leftarrow 2$	219 881.934(8) <sup>°</sup>
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1 \leftarrow 1$	$2 \leftarrow 2$	
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3 \leftarrow 2$	$3 \leftarrow 3$	219 883.348(8)
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1 \leftarrow 1$	$2 \leftarrow 1$	219 885.522(23)
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 1$	$2 \leftarrow 2$	219 890.979(23) <sup>°</sup>
				$1 \leftarrow 1$	
		$\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1 \leftarrow 1$	$1 \leftarrow 2$	
				$0 \leftarrow 1$	
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 1$	$3 \leftarrow 2$	219 894.283(6) <sup>°</sup>
				$2 \leftarrow 1$	
		$\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1 \leftarrow 1$	$1 \leftarrow 1$	
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2 \leftarrow 3$	$3 \leftarrow 4$	219 922.821(10)
		$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	$1 \leftarrow 2$	$2 \leftarrow 3$	219 938.383(25)
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3 \leftarrow 3$	$2 \leftarrow 2$	219 939.912(36)
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3 \leftarrow 3$	$3 \leftarrow 4$	219 942.084(7) <sup>°</sup>
				$3 \leftarrow 3$	
			$2 \leftarrow 2$	$3 \leftarrow 3$	219 950.525(15)
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2 \leftarrow 2$	$2 \leftarrow 2$	219 951.845(19) <sup>°</sup>
				$1 \leftarrow 1$	
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2 \leftarrow 2$	$3 \leftarrow 2$	219 954.896(27) <sup>°</sup>
				$2 \leftarrow 1$	
		$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2 \leftarrow 2$	$3 \leftarrow 3$	219 961.880(5)
$2_{11} \leftarrow 2_{02}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3 \leftarrow 4$	$4 \leftarrow 5$	514 026.242(39) <sup>°</sup>
				$3 \leftarrow 4$	514 026.242(39) <sup>°</sup>
				$2 \leftarrow 3$	
			$2 \leftarrow 3$	$3 \leftarrow 4$	
				$2 \leftarrow 3$	
		$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4 \leftarrow 4$	$4 \leftarrow 3$	514 030.244(49) <sup>°</sup>
			$3 \leftarrow 3$	$3 \leftarrow 2$	
		$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4 \leftarrow 4$	$5 \leftarrow 5$	514 036.251(13) <sup>°</sup>
				$4 \leftarrow 4$	
				$3 \leftarrow 3$	
			$3 \leftarrow 3$	$4 \leftarrow 4$	
				$3 \leftarrow 3$	
				$2 \leftarrow 2$	
		$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4 \leftarrow 4$	$4 \leftarrow 5$	514 044.215(34) <sup>°</sup>
				$3 \leftarrow 4$	
		$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	$1 \leftarrow 2$	$1 \leftarrow 1$	
		$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2 \leftarrow 3$	$3 \leftarrow 4$	514 048.157(20) <sup>°</sup>
				$2 \leftarrow 3$	
				$1 \leftarrow 2$	
			$1 \leftarrow 2$	$2 \leftarrow 3$	
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3 \leftarrow 3$	$4 \leftarrow 3$	
			$2 \leftarrow 2$	$3 \leftarrow 2$	
		$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	$1 \leftarrow 2$	$1 \leftarrow 2$	
				$0 \leftarrow 1$	
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3 \leftarrow 3$	$4 \leftarrow 4$	514 056.497(30) <sup>°</sup>
				$3 \leftarrow 3$	
				$2 \leftarrow 2$	



		2 ← 2	3 ← 3	
			2 ← 2	
			1 ← 1	
$3\frac{1}{2} \leftarrow 2\frac{1}{2}$		4 ← 3	5 ← 4	514 066.091(37) <sup>°</sup>
			4 ← 3	
			3 ← .2	
		3 ← .2	4 ← 3	
			3 ← .2	
$1\frac{1}{2} \leftarrow 1\frac{1}{2}$		2 ← 2	3 ← 3	514 068.556(27) <sup>°</sup>
			2 ← 2	
			1 ← 1	
		1 ← 1	2 ← 2	
			1 ← 1	
$2\frac{1}{2} \leftarrow 1\frac{1}{2}$		3 ← .2	4 ← 3	514 076.924(14) <sup>°</sup>
			3 ← .2	
			2 ← 1	
		2 ← 1	3 ← .2	
$1\frac{1}{2} \leftarrow 1\frac{1}{2}$		2 ← 2	2 ← 3	
		1 ← 1	1 ← 2	
$2\frac{1}{2} \leftarrow 1\frac{1}{2}$		2 ← 1	1 ← 0	
$2\frac{1}{2} \leftarrow 2\frac{1}{2}$		2 ← 3	3 ← .4	514 091.206(51) <sup>°</sup>
			2 ← 3	
			1 ← 2	
$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$\frac{1}{2} \leftarrow \frac{1}{2}$	1 ← 1	2 ← 2	517 492.721(14) <sup>°</sup>
			1 ← 0	
$1\frac{1}{2} \leftarrow \frac{1}{2}$	$\frac{1}{2} \leftarrow \frac{1}{2}$	1 ← 0	0 ← 1	
$1\frac{1}{2} \leftarrow \frac{1}{2}$		1 ← 0	2 ← 1	517 495.149(25) <sup>°</sup>
		2 ← 1	2 ← 1	
$\frac{1}{2} \leftarrow 1\frac{1}{2}$		0 ← 1	1 ← 2	517 507.421(40) <sup>°</sup>
$2\frac{1}{2} \leftarrow 1\frac{1}{2}$		2 ← 2	2 ← 3	
$1\frac{1}{2} \leftarrow 1\frac{1}{2}$		2 ← 2	2 ← 3	517 513.045(20) <sup>°</sup>
$\frac{1}{2} \leftarrow 1\frac{1}{2}$		1 ← 2	1 ← 2	
			0 ← 1	
		0 ← 1	1 ← 1	
$1\frac{1}{2} \leftarrow 1\frac{1}{2}$		2 ← 2	3 ← 3	517 521.901(51) <sup>°</sup>
			1 ← 1	
$2\frac{1}{2} \leftarrow 1\frac{1}{2}$		2 ← 1	1 ← 2	
$1\frac{1}{2} \leftarrow 1\frac{1}{2}$		1 ← 1	1 ← 1	
			2 ← 1	
$2\frac{1}{2} \leftarrow 1\frac{1}{2}$		3 ← 2	3 ← 3	517 524.834(33) <sup>°</sup>
			2 ← 2	
		2 ← 1	2 ← 2	
$1\frac{1}{2} \leftarrow 1\frac{1}{2}$		1 ← 1	1 ← 0	
$\frac{1}{2} \leftarrow 1\frac{1}{2}$		1 ← 1	1 ← 2	
$2\frac{1}{2} \leftarrow 1\frac{1}{2}$		2 ← 1	3 ← 2	517 527.979(25) <sup>°</sup>
			1 ← 1	
$1\frac{1}{2} \leftarrow 1\frac{1}{2}$			3 ← 2	
$2\frac{1}{2} \leftarrow 2\frac{1}{2}$		2 ← 3	3 ← 4	517 548.844(41)
$2\frac{1}{2} \leftarrow 2\frac{1}{2}$		3 ← 3	4 ← 4	517 567.985(7) <sup>°</sup>
		2 ← 2	3 ← 3	
		3 ← 3	3 ← 3	517 570.611(29) <sup>°</sup>

$3_{12} \leftarrow 2_{21}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2 \leftarrow 2$	$2 \leftarrow 2$	
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 1$	$2 \leftarrow 3$	
		$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4 \leftarrow 3$	$3 \leftarrow 2$	268 004.795(13)
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3 \leftarrow 2$	$5 \leftarrow 4$	268 007.335(8) <sup>°</sup>
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 1$	$4 \leftarrow 3$	
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4 \leftarrow 4$	$2 \leftarrow 1$	268 008.977(10) <sup>°</sup>
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3 \leftarrow 3$	$5 \leftarrow 5$	
		$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4 \leftarrow 3$	$4 \leftarrow 4$	268 010.540(9) <sup>°</sup>
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3 \leftarrow 2$	$4 \leftarrow 3$	
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 1$	$3 \leftarrow 2$	
		$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4 \leftarrow 3$	$1 \leftarrow 0$	268 013.218(8) <sup>°</sup>
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3 \leftarrow 2$	$3 \leftarrow 2$	
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 1$	$2 \leftarrow 1$	
		$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4 \leftarrow 3$	$1 \leftarrow 1$	268 015.354(21) <sup>°</sup>
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3 \leftarrow 2$	$4 \leftarrow 4$	
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3 \leftarrow 3$	$3 \leftarrow 3$	
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3 \leftarrow 2$	$2 \leftarrow 2$	268 017.361(5)
		$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$5 \leftarrow 4$	$4 \leftarrow 3$	268 019.624(6) <sup>°</sup>
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4 \leftarrow 3$	$6 \leftarrow 5$	
		$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$5 \leftarrow 4$	$5 \leftarrow 4$	268 022.837(4) <sup>°</sup>
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4 \leftarrow 3$	$5 \leftarrow 4$	
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3 \leftarrow 2$	$5 \leftarrow 4$	
	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4 \leftarrow 3$	$4 \leftarrow 3$	260 751.712(10) <sup>°</sup>
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4 \leftarrow 3$	$3 \leftarrow 2$	
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3 \leftarrow 2$	$3 \leftarrow 3$	260 757.461(7)
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	$1 \leftarrow 1$	$4 \leftarrow 3$	260 761.393(23) <sup>°</sup>
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 2$	$2 \leftarrow 1$	
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4 \leftarrow 3$	$2 \leftarrow 2$	
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3 \leftarrow 2$	$2 \leftarrow 2$	
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	$2 \leftarrow 1$	$1 \leftarrow 1$	260 764.384(11)
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3 \leftarrow 3$	$5 \leftarrow 4$	260 767.095(28) <sup>°</sup>
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 2$	$3 \leftarrow 2$	
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4 \leftarrow 3$	$1 \leftarrow 1$	
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3 \leftarrow 2$	$4 \leftarrow 4$	
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	$2 \leftarrow 1$	$2 \leftarrow 2$	
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3 \leftarrow 3$	$2 \leftarrow 1$	260 770.989(18) <sup>°</sup>
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 2$	$2 \leftarrow 2$	
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4 \leftarrow 3$	$2 \leftarrow 1$	260 772.889(8) <sup>°</sup>
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3 \leftarrow 2$	$2 \leftarrow 1$	
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	$2 \leftarrow 1$	$1 \leftarrow 1$	260 774.295(5) <sup>°</sup>
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3 \leftarrow 3$	$4 \leftarrow 3$	
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 2$	$3 \leftarrow 3$	
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4 \leftarrow 3$	$3 \leftarrow 2$	260 776.070(16)
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3 \leftarrow 2$	$3 \leftarrow 2$	260 779.862(5)
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	$2 \leftarrow 1$	$3 \leftarrow 2$	
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3 \leftarrow 3$	$1 \leftarrow 0$	260 781.875(109)
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 2$	$4 \leftarrow 3$	260 783.656(32)
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4 \leftarrow 3$	$2 \leftarrow 1$	260 786.222(34) <sup>°</sup>
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3 \leftarrow 2$	$2 \leftarrow 1$	

				2 ← 2	
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	2 ← 2	3 ← 3	
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	1 ← 1	1 ← 2	
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	1 ← 0	1 ← 1	260 790.700(22) <sup>°</sup>
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	3 ← 2	2 ← 2	
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	2 ← 1	3 ← 2	260 794.681(10) <sup>°</sup>
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	1 ← 1	2 ← 2	
				2 ← 1	
		$1\frac{1}{2} \leftarrow \frac{1}{2}$	1 ← 0	2 ← 1	260 799.372(9)
$2_{20} \leftarrow 3_{13}$	$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3\frac{1}{2} \leftarrow 4\frac{1}{2}$	4 ← 5	3 ← 4	177 844.937(16)
				4 ← 5	177 846.384(20) <sup>°</sup>
			3 ← 4	3 ← 3	
			4 ← 5	5 ← 6	177 848.054(11)
			3 ← 4	2 ← 3	177 850.609(27)
				3 ← 4	177 852.185(13)
			3 ← 4	4 ← 5	177 853.863(17)
		$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	3 ← 4	2 ← 3	177 876.787(27)
				3 ← 4	177 878.244(17)
				4 ← 5	177 879.869(10)
			2 ← 3	1 ← 2	177 882.466(29)
				2 ← 3	177 884.209(18)
				3 ← 4	177 885.879(10) <sup>°</sup>
		$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	4 ← 4	3 ← 3	
		$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	2 ← 3	1 ← 2	177 899.274(29)
				2 ← 3	177 900.713(12) <sup>°</sup>
				2 ← 2	
			2 ← 3	3 ← 4	177 902.318(13)
			1 ← 2	0 ← 1	177 904.841(31)
				1 ← 2	177 906.540(34)
				2 ← 3	177 908.111(23)
	$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	$\frac{1}{2} \leftarrow 1\frac{1}{2}$	0 ← 1	1 ← 2	187 131.168(40)
			1 ← 2	2 ← 3	187 139.889(10) <sup>°</sup>
			0 ← 1	1 ← 0	
		$\frac{1}{2} \leftarrow 1\frac{1}{2}$	1 ← 2	1 ← 2	187 143.988(36) <sup>°</sup>
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	1 ← 1	0 ← 1	
				1 ← 1	
		$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	1 ← 2	2 ← 3	187 177.508(39)
			2 ← 3	3 ← 4	187 189.295(13)
				2 ← 3	187 193.332(22)
				1 ← 2	187 196.614(13)
		$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	2 ← 3	3 ← 4	187 244.616(5)
				2 ← 3	187 249.149(30)
			3 ← 4	4 ← 5	187 253.149(8) <sup>°</sup>
			2 ← 3	1 ← 2	
				2 ← 2	
			3 ← 4	3 ← 4	187 257.454(15)
				2 ← 3	187 261.069(18)
$3_{12} \leftarrow 3_{13}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	4 ← 4	5 ← 5	435 894.209(9)
				4 ← 4	435 896.429(46) <sup>°</sup>
				3 ← 3	
			5 ← 5	6 ← 6	435 900.107(17)
				5 ← 5	435 902.489(23) <sup>°</sup>
				4 ← 4	

		$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3 \leftarrow 3$	$4 \leftarrow 4$	435 923.873(13)
				$3 \leftarrow 3$	435 926.026(29) <sup>°</sup>
				$2 \leftarrow 2$	
			$4 \leftarrow 4$	$5 \leftarrow 5$	435 929.513(15)
			$4 \leftarrow 4$	$4 \leftarrow 4$	435 931.928(28) <sup>°</sup>
				$3 \leftarrow 3$	
	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2 \leftarrow 2$	$3 \leftarrow 3$	435 942.341(29)
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 2$	$2 \leftarrow 2$	437 882.085(18) <sup>°</sup>
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3 \leftarrow 2$	$3 \leftarrow 2$	
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 2$	$3 \leftarrow 3$	437 884.391(32) <sup>°</sup>
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3 \leftarrow 2$	$4 \leftarrow 3$	
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1 \leftarrow 1$	$2 \leftarrow 2$	437 894.981(34) <sup>°</sup>
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 1$	$3 \leftarrow 2$	
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$1 \leftarrow 1$	$1 \leftarrow 0$	
		$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 2$	$1 \leftarrow 1$	437 879.523(45) <sup>°</sup>
		$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3 \leftarrow 2$	$2 \leftarrow 1$	
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3 \leftarrow 3$	$2 \leftarrow 2$	437 919.423(30) <sup>°</sup>
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4 \leftarrow 3$	$4 \leftarrow 3$	
		$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2 \leftarrow 3$	$1 \leftarrow 2$	
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3 \leftarrow 3$	$3 \leftarrow 3$	437 921.781(45) <sup>°</sup>
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4 \leftarrow 3$	$5 \leftarrow 4$	
		$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2 \leftarrow 3$	$2 \leftarrow 3$	
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3 \leftarrow 3$	$4 \leftarrow 4$	437 924.496(14) <sup>°</sup>
			$2 \leftarrow 2$	$2 \leftarrow 3$	
			$2 \leftarrow 2$	$1 \leftarrow 2$	
		$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2 \leftarrow 3$	$3 \leftarrow 4$	
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2 \leftarrow 2$	$2 \leftarrow 2$	437 930.725(66)
		$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$2 \leftarrow 2$	$3 \leftarrow 3$	437 933.733(15) <sup>°</sup>
				$2 \leftarrow 1$	
		$1\frac{1}{2} \leftarrow 2\frac{1}{2}$	$1 \leftarrow 2$	$2 \leftarrow 3$	
		$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4 \leftarrow 4$	$3 \leftarrow 3$	437 969.508(39)
				$4 \leftarrow 4$	437 971.629(21)
			$4 \leftarrow 4$	$5 \leftarrow 5$	437 973.947(14) <sup>°</sup>
		$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3 \leftarrow 4$	$3 \leftarrow 4$	
		$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3 \leftarrow 4$	$4 \leftarrow 5$	437 976.408(54) <sup>°</sup>
		$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4 \leftarrow 4$	$4 \leftarrow 3$	
			$3 \leftarrow 3$	$2 \leftarrow 2$	437 980.091(61)
				$3 \leftarrow 3$	437 981.753(34)
				$4 \leftarrow 4$	437 984.388(31)
$3_{30} \leftarrow 4_{23}$	$3\frac{1}{2} \leftarrow 4\frac{1}{2}$	$4\frac{1}{2} \leftarrow 5\frac{1}{2}$	$5 \leftarrow 6$	$4 \leftarrow 5$	325 238.115(6)
				$5 \leftarrow 6$	325 240.242(4)
				$6 \leftarrow 7$	325 242.797(16)
			$4 \leftarrow 5$	$3 \leftarrow 4$	325 246.587(14)
				$4 \leftarrow 5$	325 248.806(5)
				$5 \leftarrow 6$	325 251.370(6)
		$3\frac{1}{2} \leftarrow 4\frac{1}{2}$	$4 \leftarrow 5$	$3 \leftarrow 4$	325 253.877(19)
				$4 \leftarrow 5$	325 256.013(8)
				$5 \leftarrow 6$	325 258.601(22)
		$3\frac{1}{2} \leftarrow 4\frac{1}{2}$	$3 \leftarrow 4$	$2 \leftarrow 3$	325 262.535(15) <sup>°</sup>
		$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5 \leftarrow 5$	$5 \leftarrow 5$	

		$3\frac{1}{2} \leftarrow 4\frac{1}{2}$	$3 \leftarrow 4$	$3 \leftarrow 4$	325 264.668(10) <sup>°</sup>
		$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3 \leftarrow 4$	$4 \leftarrow 4$	
		$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5 \leftarrow 5$	$6 \leftarrow 6$	
		$3\frac{1}{2} \leftarrow 4\frac{1}{2}$	$3 \leftarrow 4$	$4 \leftarrow 5$	325 266.967(12) <sup>°</sup>
		$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3 \leftarrow 4$	$2 \leftarrow 3$	
				$3 \leftarrow 4$	325 268.848(19)
				$4 \leftarrow 5$	325 271.335(4)
			$2 \leftarrow 3$	$1 \leftarrow 2$	325 275.207(39)
				$2 \leftarrow 3$	325 277.242(25)
				$3 \leftarrow 4$	325 279.944(5)
$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	$1\frac{1}{2} \leftarrow 2\frac{1}{2}$		$1 \leftarrow 2$	$2 \leftarrow 3$	335 524.754(13)
				$1 \leftarrow 2$	335 529.615(19)
			$2 \leftarrow 3$	$3 \leftarrow 4$	335 536.919(14)
				$2 \leftarrow 3$	335 541.518(25)
				$1 \leftarrow 2$	335 545.385(17)
		$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	$2 \leftarrow 3$	$3 \leftarrow 4$	335 547.420(23)
				$2 \leftarrow 3$	335 552.189(18)
				$1 \leftarrow 1$	335 556.031(19) <sup>°</sup>
				$2 \leftarrow 2$	
		$2\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3 \leftarrow 4$	$4 \leftarrow 5$	335 560.631(23)
				$3 \leftarrow 4$	335 565.189(41)
				$2 \leftarrow 3$	335 569.058(20)
		$3\frac{1}{2} \leftarrow 4\frac{1}{2}$	$3 \leftarrow 4$	$4 \leftarrow 5$	335 577.976(20)
				$3 \leftarrow 4$	335 582.760(6)
				$2 \leftarrow 3$	335 586.608(27)
			$4 \leftarrow 5$	$5 \leftarrow 6$	335 590.158(13)
				$4 \leftarrow 5$	335 594.809(20)
				$3 \leftarrow 4$	335 598.833(24)
$5_{23} \leftarrow 4_{32}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$6 \leftarrow 5$	$7 \leftarrow 6$	344 694.546(12)
				$6 \leftarrow 5$	344 696.999(7) <sup>°</sup>
		$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5 \leftarrow 4$	$6 \leftarrow 5$	
		$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4 \leftarrow 3$	$5 \leftarrow 4$	
		$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$6 \leftarrow 5$	$5 \leftarrow 4$	344 699.281(8) <sup>°</sup>
		$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5 \leftarrow 4$	$5 \leftarrow 4$	
		$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4 \leftarrow 3$	$4 \leftarrow 3$	
		$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$7 \leftarrow 6$	$8 \leftarrow 7$	344 701.697(17) <sup>°</sup>
		$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5 \leftarrow 4$	$4 \leftarrow 3$	
		$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4 \leftarrow 3$	$3 \leftarrow 2$	
		$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$7 \leftarrow 6$	$7 \leftarrow 6$	344 704.305(10) <sup>°</sup>
		$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$6 \leftarrow 5$	$7 \leftarrow 6$	
		$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$5 \leftarrow 4$	$6 \leftarrow 5$	
		$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$7 \leftarrow 6$	$6 \leftarrow 5$	344 706.560(15) <sup>°</sup>
		$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$6 \leftarrow 5$	$6 \leftarrow 5$	
		$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$5 \leftarrow 4$	$5 \leftarrow 4$	
		$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$6 \leftarrow 5$	$5 \leftarrow 4$	344 708.741(10) <sup>°</sup>
		$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$5 \leftarrow 4$	$4 \leftarrow 3$	
$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$		$6 \leftarrow 5$	$5 \leftarrow 4$	337 765.214(12) <sup>°</sup>
		$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$5 \leftarrow 4$	$4 \leftarrow 3$	
		$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$6 \leftarrow 5$	$6 \leftarrow 5$	337 768.288(18) <sup>°</sup>
		$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$5 \leftarrow 4$	$5 \leftarrow 4$	

$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$6 \leftarrow 5$	$7 \leftarrow 6$	337 771.611(21) <sup>°)</sup>
$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$5 \leftarrow 4$	$6 \leftarrow 5$	
$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5 \leftarrow 4$	$4 \leftarrow 3$	337 775.094(27) <sup>°)</sup>
$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4 \leftarrow 3$	$3 \leftarrow 2$	
$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5 \leftarrow 4$	$5 \leftarrow 4$	337 778.128(21) <sup>°)</sup>
$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4 \leftarrow 3$	$4 \leftarrow 3$	
$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5 \leftarrow 4$	$6 \leftarrow 5$	337 781.562(13) <sup>°)</sup>
$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4 \leftarrow 3$	$5 \leftarrow 4$	

<sup>a)</sup> Coupling scheme:  $J = N + S$ ;  $F_1 = J + I_1$ ;  $F_2 = F_1 + I_2$ ;  $F = F_2 + I_3$  where  $I_1$  is the <sup>14</sup>N nuclear spin,  $I_2$  is the <sup>1</sup>H nuclear spin and  $I_3$  is the <sup>2</sup>H nuclear spin.

<sup>b)</sup> The figures in parentheses are the authors' estimates of experimental uncertainty (1σ).

<sup>c)</sup> Line assigned to more than one hyperfine transition.

Far-infrared data for <sup>14</sup>N<sup>1</sup>H<sup>2</sup>H(NHD)

Transition		$\nu$ [cm <sup>-1</sup> ]	Ref.
rotational $N' - N''$	fine structure $J' - J''$		
State: electronic $\tilde{X}^2B_1$ ; vibrational zero point level			
$6_{25} \leftarrow 5_{14}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	103.902 36	97Mor
	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	103.963 25	
$4_{22} \leftarrow 3_{13}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	106.274 87	
	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	106.474 92	
$3_{31} \leftarrow 2_{20}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	106.543 54	
	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	106.759 20	
$3_{30} \leftarrow 2_{21}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	106.904 91	
	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	107.123 20	
$7_{26} \leftarrow 6_{15}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	111.248 25	
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	111.292 00	
$8_{54} \leftarrow 8_{45}$	$8\frac{1}{2} \leftarrow 8\frac{1}{2}$	113.477 55	
	$7\frac{1}{2} \leftarrow 7\frac{1}{2}$	113.685 40	
$6_{51} \leftarrow 6_{42}$	$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	114.559 74	
$6_{52} \leftarrow 6_{43}$	$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	114.648 59	
$6_{51} \leftarrow 6_{42}$	$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	114.831 24	
$6_{52} \leftarrow 6_{43}$	$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	114.918 94	
$5_{50} \leftarrow 5_{41}$	$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	115.029 49	
$5_{51} \leftarrow 5_{42}$	$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	115.046 16	
$5_{50} \leftarrow 5_{41}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	115.351 09	
$5_{51} \leftarrow 5_{42}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	115.367 70	
$8_{27} \leftarrow 7_{16}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	118.549 32	
	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	118.577 38	
$10_{0,10} \leftarrow 9_{19}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	118.650 79 <sup>a)</sup>	
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	118.650 79 <sup>a)</sup>	
$10_{1,10} \leftarrow 9_{09}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	119.011 07 <sup>a)</sup>	
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	119.011 07 <sup>a)</sup>	
$4_{32} \leftarrow 3_{21}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	119.523 94	
	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	119.717 19	

$4_{32} \leftarrow 3_{21}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	121.547 70
$9_{28} \leftarrow 8_{17}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	126.317 86
	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	126.336 75
$10_{19} \leftarrow 9_{28}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	126.504 30 <sup>a)</sup>
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	126.504 30 <sup>a)</sup>
$11_{0,11} \leftarrow 10_{1,10}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	129.920 82 <sup>a)</sup>
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	129.920 82 <sup>a)</sup>
$5_{23} \leftarrow 4_{14}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	129.948 84
$11_{1,11} \leftarrow 10_{0,10}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	130.099 32 <sup>a)</sup>
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	130.099 32 <sup>a)</sup>
$5_{23} \leftarrow 4_{14}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	130.150 06
$5_{33} \leftarrow 4_{22}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	131.304 07
	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	131.468 96
$10_{29} \leftarrow 9_{18}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	134.878 61
$5_{32} \leftarrow 4_{23}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	136.698 10
	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	136.879 86
$11_{1,10} \leftarrow 10_{29}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	139.363 88 <sup>a)</sup>
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	139.363 88 <sup>a)</sup>
$12_{0,12} \leftarrow 11_{1,11}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	141.118 47 <sup>a)</sup>
	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	141.118 47 <sup>a)</sup>
$12_{1,12} \leftarrow 11_{0,11}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	141.205 65 <sup>a)</sup>
	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	141.205 65 <sup>a)</sup>
$6_{34} \leftarrow 5_{23}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	141.482 24
	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	141.619 67
$11_{2,10} \leftarrow 10_{19}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	144.218 45
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	144.227 54
$4_{41} \leftarrow 3_{30}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	145.891 75
$4_{40} \leftarrow 3_{31}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	145.922 08
$4_{41} \leftarrow 3_{30}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	146.103 97
$4_{40} \leftarrow 3_{31}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	146.134 49
$7_{35} \leftarrow 6_{24}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	149.983 89
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	150.096 85
$12_{1,11} \leftarrow 11_{2,10}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	151.491 33 <sup>a)</sup>
	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	151.491 33 <sup>a)</sup>
$6_{33} \leftarrow 5_{24}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	153.611 89
	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	153.782 11
$12_{2,11} \leftarrow 11_{1,10}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	154.211 30 <sup>a)</sup>
	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	154.211 30 <sup>a)</sup>
$8_{36} \leftarrow 7_{25}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	157.087 23
$6_{24} \leftarrow 5_{15}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	157.174 89
	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	157.378 74
$5_{42} \leftarrow 4_{31}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	159.473 17
	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	159.671 31
$5_{41} \leftarrow 4_{32}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	159.691 63
	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	159.889 62
$8_{71} \leftarrow 8_{62}$	$8\frac{1}{2} \leftarrow 8\frac{1}{2}$	161.756 48 <sup>b)</sup>

$8_{72} \leftarrow 8_{63}$	$8\frac{1}{2} \leftarrow 8\frac{1}{2}$	161.756 48 <sup>b)</sup>
$8_{71} \leftarrow 8_{62}$	$7\frac{1}{2} \leftarrow 7\frac{1}{2}$	162.027 24 <sup>b)</sup>
$8_{72} \leftarrow 8_{63}$	$7\frac{1}{2} \leftarrow 7\frac{1}{2}$	162.027 24 <sup>b)</sup>
$9_{37} \leftarrow 8_{26}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	162.860 27
	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	162.930 38
$13_{1,12} \leftarrow 12_{2,11}$	$13\frac{1}{2} \leftarrow 12\frac{1}{2}$	163.145 35 <sup>a)</sup>
	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	163.145 35 <sup>a)</sup>
$14_{1,14} \leftarrow 13_{0,13}$	$14\frac{1}{2} \leftarrow 13\frac{1}{2}$	163.382 00 <sup>a)</sup>
	$13\frac{1}{2} \leftarrow 12\frac{1}{2}$	163.382 00 <sup>a)</sup>
$13_{2,12} \leftarrow 12_{1,11}$	$13\frac{1}{2} \leftarrow 12\frac{1}{2}$	164.623 43 <sup>a)</sup>
	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	164.623 43 <sup>a)</sup>
$10_{38} \leftarrow 9_{27}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	168.021 88
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	168.074 27
$6_{43} \leftarrow 5_{32}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	172.680 48
	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	172.863 48
$7_{34} \leftarrow 6_{25}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	172.887 59
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	173.053 26
$6_{42} \leftarrow 5_{33}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	173.543 56
	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	173.729 40
$5_{50} \leftarrow 4_{41}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	184.367 74 <sup>b)</sup>
$5_{51} \leftarrow 4_{40}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	184.367 74 <sup>b)</sup>
$5_{50} \leftarrow 4_{41}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	184.571 31 <sup>b)</sup>
$5_{51} \leftarrow 4_{40}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	184.571 31 <sup>b)</sup>
$7_{44} \leftarrow 6_{33}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	185.145 49
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	185.311 79
	$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	185.406 24
$5_{50} \leftarrow 4_{41}$	$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	185.406 24 <sup>b)</sup>
$5_{51} \leftarrow 4_{40}$	$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	185.406 24 <sup>b)</sup>
$7_{43} \leftarrow 6_{34}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	187.691 58
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	187.862 48
$7_{25} \leftarrow 6_{16}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	187.743 73
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	187.962 53
$8_{35} \leftarrow 7_{26}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	195.267 24
	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	195.432 32
$8_{45} \leftarrow 7_{34}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	196.520 62
$6_{52} \leftarrow 5_{41}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	197.944 67
$6_{51} \leftarrow 5_{42}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	197.964 97
$6_{52} \leftarrow 5_{41}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	198.141 70
$6_{51} \leftarrow 5_{42}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	198.162 02
$8_{44} \leftarrow 7_{35}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	202.495 19
	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	202.652 45
$9_{46} \leftarrow 8_{35}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	205.900 68
	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	206.031 65
$7_{53} \leftarrow 6_{42}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	211.391 01
$7_{52} \leftarrow 6_{43}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	211.491 29
$7_{53} \leftarrow 6_{42}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	211.573 81



$7_{52} \leftarrow 6_{43}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	211.672 11
$10_{47} \leftarrow 9_{36}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	213.486 59
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	213.598 73
$9_{45} \leftarrow 8_{36}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	218.512 52
	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	218.663 92
$11_{48} \leftarrow 10_{37}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	219.223 05
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	219.318 93
$8_{26} \leftarrow 7_{17}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	221.197 05
$9_{36} \leftarrow 8_{27}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	221.197 05
$6_{61} \leftarrow 5_{50}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	221.977 38 <sup>b)</sup>
$6_{60} \leftarrow 5_{51}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	221.977 38 <sup>b)</sup>
$6_{61} \leftarrow 5_{50}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	222.169 92 <sup>b)</sup>
$6_{60} \leftarrow 5_{51}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	222.169 92 <sup>b)</sup>
$12_{49} \leftarrow 11_{38}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	223.463 51
	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	223.541 92
$8_{54} \leftarrow 7_{43}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	224.589 96
	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	224.763 21
$8_{53} \leftarrow 7_{44}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	224.945 77
	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	225.119 72
$7_{61} \leftarrow 6_{52}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	235.443 35 <sup>b)</sup>
$7_{62} \leftarrow 6_{51}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	235.443 35 <sup>b)</sup>
$7_{61} \leftarrow 6_{52}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	235.632 38 <sup>b)</sup>
$7_{62} \leftarrow 6_{51}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	235.632 38 <sup>b)</sup>
$10_{46} \leftarrow 9_{37}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	236.469 17
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	236.616 14
$9_{55} \leftarrow 8_{44}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	237.526 58
$9_{54} \leftarrow 8_{45}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	238.410 26
	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	238.573 30
$8_{63} \leftarrow 7_{52}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	248.806 26
$8_{62} \leftarrow 7_{53}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	248.816 73
$8_{63} \leftarrow 7_{52}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	248.990 01
$8_{62} \leftarrow 7_{53}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	249.000 04
$10_{56} \leftarrow 9_{45}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	249.400 16
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	249.550 67
$10_{37} \leftarrow 9_{28}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	250.697 09
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	250.879 82
$10_{55} \leftarrow 9_{46}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	252.032 92
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	252.187 03
$11_{47} \leftarrow 10_{38}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	257.154 99
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	257.301 89
$7_{71} \leftarrow 6_{60}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	258.641 38 <sup>b)</sup>
$7_{70} \leftarrow 6_{61}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	258.641 38 <sup>b)</sup>
$7_{71} \leftarrow 6_{60}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	258.822 38 <sup>b)</sup>
$7_{70} \leftarrow 6_{61}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	258.822 38 <sup>b)</sup>
$11_{57} \leftarrow 10_{46}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	260.270 11
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	260.407 33

$8_{36} \leftarrow 7_{07}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	260.882 83
	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	261.194 56
$9_{64} \leftarrow 8_{53}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	262.038 99
$9_{63} \leftarrow 8_{54}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	262.078 22
$9_{64} \leftarrow 8_{53}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	262.213 09
$9_{63} \leftarrow 8_{54}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	262.252 05
$11_{56} \leftarrow 10_{47}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	266.103 81
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	266.248 37
$12_{58} \leftarrow 11_{47}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	269.485 59
	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	269.609 90
$8_{72} \leftarrow 7_{61}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	271.956 92 <sup>b)</sup>
$8_{71} \leftarrow 7_{62}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	271.956 92 <sup>b)</sup>
$8_{72} \leftarrow 7_{61}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	272.137 64 <sup>b)</sup>
$8_{71} \leftarrow 7_{62}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	272.137 64 <sup>b)</sup>
$10_{65} \leftarrow 9_{54}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	275.081 30
$10_{64} \leftarrow 9_{55}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	275.216 70
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	275.244 06
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	275.380 49
$13_{59} \leftarrow 12_{48}$	$13\frac{1}{2} \leftarrow 12\frac{1}{2}$	276.666 43
	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	276.777 71
$12_{57} \leftarrow 11_{48}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	281.073 58
	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	281.211 16
$11_{38} \leftarrow 10_{29}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	283.416 27
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	283.609 90
$9_{72} \leftarrow 8_{63}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	285.178 00 <sup>b)</sup>
$9_{73} \leftarrow 8_{62}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	285.178 00 <sup>b)</sup>
$9_{72} \leftarrow 8_{63}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	285.353 94 <sup>b)</sup>
$9_{73} \leftarrow 8_{62}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	285.353 94 <sup>b)</sup>
$11_{66} \leftarrow 10_{55}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	287.839 68
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	287.990 40
$11_{65} \leftarrow 10_{56}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	288.236 44
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	288.387 33
$10_{28} \leftarrow 9_{19}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	293.960 39
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	294.224 91
$8_{80} \leftarrow 7_{71}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	294.299 03 <sup>b)</sup>
$8_{81} \leftarrow 7_{70}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	294.299 03 <sup>b)</sup>
$8_{80} \leftarrow 7_{71}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	294.467 93 <sup>b)</sup>
$8_{81} \leftarrow 7_{70}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	294.467 93 <sup>b)</sup>
$10_{73} \leftarrow 9_{64}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	298.289 87 <sup>b)</sup>
$10_{74} \leftarrow 9_{63}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	298.289 87 <sup>b)</sup>
$10_{73} \leftarrow 9_{64}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	298.453 27 <sup>b)</sup>
$10_{74} \leftarrow 9_{63}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	298.453 27 <sup>b)</sup>
$12_{67} \leftarrow 11_{56}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	300.162 75
	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	300.306 80
$12_{68} \leftarrow 11_{57}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	301.188 21
	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	301.333 80

$9_{46} \leftarrow 8_{17}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	303.737 00
	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	304.051 16
$9_{81} \leftarrow 8_{72}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	307.441 89 <sup>b)</sup>
$9_{82} \leftarrow 8_{71}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	307.441 89 <sup>b)</sup>
$9_{81} \leftarrow 8_{72}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	307.610 01 <sup>b)</sup>
$9_{82} \leftarrow 8_{71}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	307.610 01 <sup>b)</sup>
$11_{75} \leftarrow 10_{64}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	311.248 42
$11_{74} \leftarrow 10_{65}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	311.263 11
$11_{75} \leftarrow 10_{64}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	311.409 00
$11_{74} \leftarrow 10_{65}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	311.423 42
$10_{82} \leftarrow 9_{73}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	320.485 45 <sup>b)</sup>
$10_{83} \leftarrow 9_{72}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	320.485 45 <sup>b)</sup>
$10_{82} \leftarrow 9_{73}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	320.650 31 <sup>b)</sup>
$10_{83} \leftarrow 9_{72}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	320.650 31 <sup>b)</sup>
$12_{76} \leftarrow 11_{65}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	324.038 65
$12_{75} \leftarrow 11_{66}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	324.086 91
$12_{76} \leftarrow 11_{65}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	324.191 43
$12_{75} \leftarrow 11_{66}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	324.24 34
$9_{90} \leftarrow 8_{81}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	328.918 96 <sup>b)</sup>
$9_{91} \leftarrow 8_{80}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	328.918 96 <sup>b)</sup>
$9_{90} \leftarrow 8_{81}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	329.075 55 <sup>b)</sup>
$9_{91} \leftarrow 8_{80}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	329.075 55 <sup>b)</sup>
$11_{83} \leftarrow 10_{74}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	333.415 31 <sup>b)</sup>
$11_{84} \leftarrow 10_{73}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	333.415 31 <sup>b)</sup>
$11_{83} \leftarrow 10_{74}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	333.575 99 <sup>b)</sup>
$11_{84} \leftarrow 10_{73}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	333.575 99 <sup>b)</sup>
$13_{77} \leftarrow 12_{66}$	$13\frac{1}{2} \leftarrow 12\frac{1}{2}$	336.605 15
$13_{76} \leftarrow 12_{67}$	$13\frac{1}{2} \leftarrow 12\frac{1}{2}$	336.747 25
$13_{77} \leftarrow 12_{66}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	336.747 25
$13_{76} \leftarrow 12_{67}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	336.889 45
$10_{91} \leftarrow 9_{82}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	341.862 45 <sup>b)</sup>
$10_{92} \leftarrow 9_{81}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	341.862 45 <sup>b)</sup>
$10_{91} \leftarrow 9_{82}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	342.019 11 <sup>b)</sup>
$10_{92} \leftarrow 9_{81}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	342.019 11 <sup>b)</sup>
$12_{84} \leftarrow 11_{75}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	346.221 16 <sup>b)</sup>
$12_{85} \leftarrow 11_{74}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	346.221 16 <sup>b)</sup>
$12_{84} \leftarrow 11_{75}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	346.371 48 <sup>b)</sup>
$12_{85} \leftarrow 11_{74}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	346.371 48 <sup>b)</sup>
$11_{92} \leftarrow 10_{83}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	354.701 97 <sup>b)</sup>
$11_{93} \leftarrow 10_{82}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	354.701 97 <sup>b)</sup>

<sup>a)</sup> Spin-rotation splitting not resolved.

<sup>b)</sup> K-type doubling not resolved.

Molecular parameters for <sup>14</sup>N<sup>1</sup>H<sup>2</sup>H(NHD)

Parameter	Value	Method	Ref.
State: electronic $\tilde{X}^2A''$ ; vibrational zero point level			
$A$	[GHz]	602.873 269 (53) <sup>a)</sup>	MW
$B$	[GHz]	243.150 415(86)	97Kob
$C$	[GHz]	169.875 877(79)	
$\Delta_K$	[MHz]	250.825(30)	
$\Delta_{NK}$	[MHz]	30.303(39)	
$\Delta_N$	[MHz]	9.283 3(28)	
$\delta_K$	[MHz]	46.854(41)	
$\delta_N$	[MHz]	3.040 88(35)	
$\Phi_K$	[MHz]	0.592 13(76)	
$\Phi_{NK}$	[kHz]	− 90.1(33)	
$\mathcal{E}_{aa}$	[MHz]	− 7 043.180(82)	
$\mathcal{E}_{bb}$	[MHz]	− 1 149.38(26)	
$\mathcal{E}_{cc}$	[MHz]	7.82(25)	
$ (\mathcal{E}_{ab} + \mathcal{E}_{ba})  / 2$	[MHz]	1 093.9(33)	
$\Delta_K^s$	[MHz]	16.245(35)	
$\Delta_{KN}^s + \Delta_{NK}^s$	[MHz]	0.234(38)	
$\Delta_N^s$	[MHz]	0.118 7(61)	
$\delta_K^s$	[MHz]	0.96(13)	
$\delta_N^s$	[MHz]	0.064 0(22)	
$\Phi_K^s$	[kHz]	− 0,063 4(21)	
$a_r(N)$	[MHz]	28.124(29)	
$T_{aa}(N)$	[MHz]	− 43.329(24)	
$T_{bb}(N)$	[MHz]	− 44.218(32)	
$ T_{ab}(N) $	[MHz]	0.55 <sup>b)</sup>	
$\chi_{aa}(N)$	[MHz]	− 0.297(42)	
$\chi_{bb}(N)$	[MHz]	− 3.214(62)	
$ \chi_{ab}(N) $	[MHz]	1.37 <sup>b)</sup>	
$C_{aa}(N)$	[MHz]	0.350 5(111)	
$C_{bb}(N)$	[MHz]	0.074 2(111)	
$C_{cc}(N)$	[MHz]	0.011 1(39)	
$a_r(H)$	[MHz]	− 67.116(38)	
$T_{aa}(H)$	[MHz]	− 23.254(73)	
$T_{bb}(H)$	[MHz]	28.434(65)	
$ T_{ab}(H) $	[MHz]	48.7 <sup>b)</sup>	
$\Delta T_{aa}(H)$	[MHz]	− 0.062 1(152)	
$C_{aa}(H)$	[MHz]	0.115 2(194)	
$C_{bb}(H)$	[MHz]	0.104 2(179)	
$a_r(D)$	[MHz]	− 10.229(39)	
$T_{aa}(D)$	[MHz]	8.052(29)	
$T_{bb}(D)$	[MHz]	− 7.251(41)	
$ T_{ab}(D) $	[MHz]	6.7(41)	
$\chi_{aa}(D)$	[MHz]	0.143(40)	
$C_{aa}(D)$	[MHz]	0.049 1(107)	

<sup>a)</sup> The numbers in parentheses represent 3 standard deviations of the least-squares fit, in units of the last quoted decimal place.

<sup>b)</sup> Parameter constrained to this value.

Far-infrared data for <sup>14</sup>N<sup>2</sup>H<sub>2</sub> (ND<sub>2</sub>)

Transition		$\nu$ [cm <sup>-1</sup> ]	Ref.
rotational $N' - N''$	fine structure $J' - J''$		
State: electronic $\tilde{X}^2B_1$ ; vibrational zero point level			
$7_{35} \leftarrow 6_{24}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	102.501 43	97Mor
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	102.593 00	
$11_{38} \leftarrow 10_{29}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	106.947 37 <sup>a)</sup>	
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	106.947 37 <sup>a)</sup>	
$12_{0,12} \leftarrow 11_{1,11}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	106.975 88 <sup>a)</sup>	
	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	106.975 88 <sup>a)</sup>	
$12_{1,12} \leftarrow 11_{0,11}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	106.985 82 <sup>a)</sup>	
	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	106.985 82 <sup>a)</sup>	
$6_{42} \leftarrow 6_{15}$	$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	107.150 60	
$8_{36} \leftarrow 7_{25}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	107.222 62	
	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	107.295 78	
$11_{2,10} \leftarrow 10_{37}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	107.713 52	
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	107.717 18	
$5_{42} \leftarrow 4_{31}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	108.497 58	
$5_{41} \leftarrow 4_{32}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	108.952 73	
	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	109.100 63	
$11_{47} \leftarrow 10_{38}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	111.448 65	
	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	111.465 91	
$9_{37} \leftarrow 8_{26}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	111.528 38	
	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	111.586 91	
$6_{33} \leftarrow 5_{24}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	112.426 58	
	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	112.717 15	
$12_{39} \leftarrow 11_{2,10}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	115.582 63 <sup>a)</sup>	
	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	115.582 63 <sup>a)</sup>	
$12_{39} \leftarrow 11_{2,10}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	115.757 99	
	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	115.812 29	
$12_{2,11} \leftarrow 11_{38}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	115.947 47 <sup>a)</sup>	
	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	115.947 47 <sup>a)</sup>	
$10_{38} \leftarrow 9_{09}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	116.044 07	
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	116.086 43	
$6_{43} \leftarrow 5_{32}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	118.603 20	
	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	118.742 70	
$6_{42} \leftarrow 5_{33}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	120.382 20	
	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	120.517 25	
$5_{51} \leftarrow 4_{40}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	123.459 66	
$5_{50} \leftarrow 4_{41}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	123.468 38	
$5_{51} \leftarrow 4_{40}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	123.612 74	
$5_{50} \leftarrow 4_{41}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	123.620 48	
$13_{3,10} \leftarrow 12_{2,11}$	$13\frac{1}{2} \leftarrow 12\frac{1}{2}$	124.104 96 <sup>a)</sup>	
	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	124.104 96 <sup>a)</sup>	
$13_{2,12} \leftarrow 12_{39}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	124.275 63	

$12_{3,10} \leftarrow 11_{47}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	127.502 01
	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	127.519 35
$7_{44} \leftarrow 6_{33}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	127.550 42
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	127.679 25
$7_{34} \leftarrow 6_{25}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	131.062 64
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	131.166 26
$13_{49} \leftarrow 12_{3,10}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	131.550 30
$7_{43} \leftarrow 6_{34}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	132.572 36
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	132.695 67
$6_{52} \leftarrow 5_{41}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	134.391 18
$6_{51} \leftarrow 5_{42}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	134.452 73
$6_{52} \leftarrow 5_{41}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	134.539 13
$6_{51} \leftarrow 5_{42}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	134.600 67
$8_{45} \leftarrow 7_{34}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	134.867 08
	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	134.984 44
$9_{46} \leftarrow 8_{35}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	140.445 82
	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	140.554 45
$10_{47} \leftarrow 9_{18}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	144.570 86
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	144.664 69
$7_{53} \leftarrow 6_{42}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	145.133 69
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	145.273 93
$7_{52} \leftarrow 6_{43}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	145.444 56
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	145.582 93
$8_{44} \leftarrow 7_{35}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	146.217 04
	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	146.327 04
$11_{48} \leftarrow 10_{19}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	147.734 13
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	147.815 08
$6_{61} \leftarrow 5_{50}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	148.580 98 <sup>b)</sup>
$6_{60} \leftarrow 5_{51}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	148.580 98 <sup>b)</sup>
$6_{61} \leftarrow 5_{50}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	148.727 85 <sup>b)</sup>
$6_{60} \leftarrow 5_{51}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	148.727 85 <sup>b)</sup>
$7_{25} \leftarrow 6_{16}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	149.783 66
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	149.921 03
$6_{34} \leftarrow 5_{05}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	150.696 42
$8_{35} \leftarrow 7_{26}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	152.762 20
$8_{54} \leftarrow 7_{43}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	155.448 97
	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	155.580 94
$8_{53} \leftarrow 7_{44}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	156.541 42
	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	156.672 91
$7_{62} \leftarrow 6_{51}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	159.570 80
$7_{61} \leftarrow 6_{52}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	159.577 67
$7_{62} \leftarrow 6_{51}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	159.713 71
$7_{61} \leftarrow 6_{52}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	159.721 71
$9_{45} \leftarrow 8_{36}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	162.159 16
	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	162.257 28
$9_{55} \leftarrow 8_{44}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	164.050 10

	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	165.050 10
$9_{54} \leftarrow 8_{45}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	167.998 72
	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	168.118 59
$8_{63} \leftarrow 7_{52}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	170.476 62
$8_{62} \leftarrow 7_{53}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	170.521 95
$8_{63} \leftarrow 7_{52}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	170.615 33
$8_{62} \leftarrow 7_{53}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	170.659 96
$10_{56} \leftarrow 9_{45}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	173.026 07
$7_{70} \leftarrow 6_{61}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	173.089 27 <sup>b)</sup>
$7_{71} \leftarrow 6_{60}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	173.089 27 <sup>b)</sup>
$10_{56} \leftarrow 9_{45}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	173.146 45
$7_{70} \leftarrow 6_{61}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	173.228 80 <sup>b)</sup>
$7_{71} \leftarrow 6_{60}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	173.228 80 <sup>b)</sup>
$7_{70} \leftarrow 6_{61}$	$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	174.139 45 <sup>b)</sup>
$7_{71} \leftarrow 6_{60}$	$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	174.139 45 <sup>b)</sup>
$11_{57} \leftarrow 10_{46}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	179.431 80
$10_{56} \leftarrow 9_{45}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	180.272 26
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	180.381 66
$10_{46} \leftarrow 9_{37}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	181.114 08
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	181.200 37
$9_{64} \leftarrow 8_{53}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	181.221 06
	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	181.353 86
$9_{63} \leftarrow 8_{54}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	181.407 77
	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	181.539 82
$12_{58} \leftarrow 11_{47}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	183.710 66
	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	183.819 51
$8_{72} \leftarrow 7_{61}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	184.115 68 <sup>b)</sup>
$8_{71} \leftarrow 7_{62}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	184.115 68 <sup>b)</sup>
$8_{72} \leftarrow 7_{61}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	184.254 04 <sup>b)</sup>
$8_{71} \leftarrow 7_{62}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	184.254 04 <sup>b)</sup>
$10_{65} \leftarrow 9_{54}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	191.657 10
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	191.783 88
$10_{64} \leftarrow 9_{55}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	192.277 88
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	192.402 36
$11_{56} \leftarrow 10_{47}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	194.038 05
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	194.136 47
$9_{72} \leftarrow 8_{63}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	195.084 06
	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	195.219 03
$8_{80} \leftarrow 7_{71}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	196.931 45 <sup>b)</sup>
$8_{81} \leftarrow 7_{70}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	196.931 45 <sup>b)</sup>
$8_{80} \leftarrow 7_{71}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	197.063 86 <sup>b)</sup>
$8_{81} \leftarrow 7_{70}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	197.063 86 <sup>b)</sup>
$8_{45} \leftarrow 7_{16}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	197.805 74
	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	198.053 30
$11_{66} \leftarrow 10_{55}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	201.520 56
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	201.642 44

$11_{65} \leftarrow 10_{56}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	203.257 05
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	203.374 53
$10_{19} \leftarrow 9_{28}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	204.502 33
$10_{74} \leftarrow 9_{63}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	205.945 12
$10_{73} \leftarrow 9_{64}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	205.972 53
$10_{74} \leftarrow 9_{63}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	206.075 16
$10_{73} \leftarrow 9_{64}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	206.102 50
$9_{09} \leftarrow 8_{18}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	206.206 18
$9_{81} \leftarrow 8_{72}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	207.990 18 <sup>b)</sup>
$9_{82} \leftarrow 8_{71}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	207.990 18 <sup>b)</sup>
$9_{81} \leftarrow 8_{72}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	208.121 88 <sup>b)</sup>
$9_{82} \leftarrow 8_{71}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	208.121 88 <sup>b)</sup>
$12_{57} \leftarrow 11_{48}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	210.106 62
	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	210.193 76
$12_{67} \leftarrow 11_{56}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	210.402 24
	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	210.521 14
$9_{46} \leftarrow 8_{17}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	214.434 22
$12_{66} \leftarrow 11_{57}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	214.720 65
	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	214.720 65
$11_{75} \leftarrow 10_{64}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	216.661 31
$11_{74} \leftarrow 10_{65}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	216.766 14
$11_{75} \leftarrow 10_{64}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	216.786 00
$11_{74} \leftarrow 10_{65}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	216.890 16
$10_{82} \leftarrow 9_{73}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	218.990 22 <sup>b)</sup>
$10_{83} \leftarrow 9_{72}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	218.990 22 <sup>b)</sup>
$10_{82} \leftarrow 9_{73}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	219.119 77 <sup>b)</sup>
$10_{83} \leftarrow 9_{72}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	219.119 77 <sup>b)</sup>
$9_{90} \leftarrow 8_{81}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	220.066 37 <sup>b)</sup>
$9_{91} \leftarrow 8_{80}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	220.066 37 <sup>b)</sup>
$9_{90} \leftarrow 8_{81}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	220.189 91 <sup>b)</sup>
$9_{91} \leftarrow 8_{80}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	220.189 91 <sup>b)</sup>
$13_{67} \leftarrow 12_{58}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	226.888 93
$12_{76} \leftarrow 11_{65}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	227.138 04
	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	227.258 79
$12_{75} \leftarrow 11_{66}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	227.471 63
	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	227.592 06
$13_{58} \leftarrow 12_{49}$	$13\frac{1}{2} \leftarrow 12\frac{1}{2}$	229.164 36
	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	229.240 54
$11_{83} \leftarrow 10_{74}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	229.910 48 <sup>b)</sup>
$11_{84} \leftarrow 10_{73}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	229.910 48 <sup>b)</sup>
$11_{83} \leftarrow 10_{74}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	230.036 66 <sup>b)</sup>
$11_{84} \leftarrow 10_{73}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	230.036 66 <sup>b)</sup>
$10_{91} \leftarrow 9_{82}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	231.156 90 <sup>b)</sup>
$10_{92} \leftarrow 9_{81}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	231.156 90 <sup>b)</sup>
$10_{91} \leftarrow 9_{82}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	231.281 64 <sup>b)</sup>
$10_{92} \leftarrow 9_{81}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	231.281 64 <sup>b)</sup>



$11_{1,10} \leftarrow 10_{29}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	233.084 14
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	233.202 45
$13_{77} \leftarrow 12_{66}$	$13\frac{1}{2} \leftarrow 12\frac{1}{2}$	237.222 39
	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	237.334 36
$13_{76} \leftarrow 12_{67}$	$13\frac{1}{2} \leftarrow 12\frac{1}{2}$	238.144 38
	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	238.258 16
$10_{38} \leftarrow 9_{09}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	240.653 03
$12_{85} \leftarrow 11_{74}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	240.716 14
$12_{84} \leftarrow 11_{75}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	240.732 37
$12_{85} \leftarrow 11_{74}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	240.838 68
$12_{84} \leftarrow 11_{75}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	240.855 61
$11_{92} \leftarrow 10_{83}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	242.187 92 <sup>b)</sup>
$11_{93} \leftarrow 10_{82}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	242.187 92 <sup>b)</sup>
$11_{92} \leftarrow 10_{83}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	242.311 28 <sup>b)</sup>
$11_{93} \leftarrow 10_{82}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	242.311 28 <sup>b)</sup>
$10_{10,0} \leftarrow 9_{91}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	242.468 81 <sup>b)</sup>
$10_{10,1} \leftarrow 9_{90}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	242.468 81 <sup>b)</sup>
$10_{10,0} \leftarrow 9_{91}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	242.583 91 <sup>b)</sup>
$10_{10,1} \leftarrow 9_{90}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	242.583 91 <sup>b)</sup>
$10_{36} \leftarrow 9_{09}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	248.899 02
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	249.165 72
$13_{86} \leftarrow 12_{75}$	$13\frac{1}{2} \leftarrow 12\frac{1}{2}$	251.379 15
$13_{85} \leftarrow 12_{76}$	$13\frac{1}{2} \leftarrow 12\frac{1}{2}$	251.433 94
	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	251.552 51
$12_{93} \leftarrow 11_{84}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	253.139 46 <sup>b)</sup>
$12_{94} \leftarrow 11_{83}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	253.139 46 <sup>b)</sup>
$12_{93} \leftarrow 11_{84}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	253.260 37 <sup>b)</sup>
$12_{94} \leftarrow 11_{83}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	253.260 37 <sup>b)</sup>
$11_{10,1} \leftarrow 10_{92}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	253.591 46 <sup>b)</sup>
$11_{10,2} \leftarrow 10_{91}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	253.591 46 <sup>b)</sup>
$11_{10,1} \leftarrow 10_{92}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	253.708 04 <sup>b)</sup>
$11_{10,2} \leftarrow 10_{91}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	253.708 04 <sup>b)</sup>
$11_{47} \leftarrow 10_{1,10}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	262.089 52
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	262.279 39
$13_{94} \leftarrow 12_{85}$	$13\frac{1}{2} \leftarrow 12\frac{1}{2}$	263.993 86 <sup>b)</sup>
$13_{95} \leftarrow 12_{84}$	$13\frac{1}{2} \leftarrow 12\frac{1}{2}$	263.993 86 <sup>b)</sup>
$13_{94} \leftarrow 12_{85}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	264.112 50 <sup>b)</sup>
$13_{95} \leftarrow 12_{84}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	264.112 50 <sup>b)</sup>
$12_{10,2} \leftarrow 11_{93}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	264.649 01 <sup>b)</sup>
$12_{10,3} \leftarrow 11_{92}$	$12\frac{1}{2} \leftarrow 11\frac{1}{2}$	264.649 01 <sup>b)</sup>
$12_{10,2} \leftarrow 11_{93}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	264.765 45 <sup>b)</sup>
$12_{10,3} \leftarrow 11_{92}$	$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	264.765 45 <sup>b)</sup>

<sup>a)</sup> Spin-rotation splitting not resolved.

<sup>b)</sup> K-type doubling not resolved.

Molecular parameters for <sup>14</sup>N<sup>2</sup>H<sub>2</sub> (ND<sub>2</sub>)

Parameter	Value	Method	Ref.
State: electronic $\tilde{X}^2B_1$ ; vibrational zero point level			
<i>A</i>	[cm <sup>-1</sup> ]	13.342 361 (63) <sup>a)</sup>	FTIR
<i>B</i>	[cm <sup>-1</sup> ]	6.487 761(34)	97Mor
<i>C</i>	[cm <sup>-1</sup> ]	4.289 970(42)	
$\Delta_K$	[cm <sup>-1</sup> ]	0.663 07(28)×10 <sup>-2</sup>	
$\Delta_{NK}$	[cm <sup>-1</sup> ]	- 0.111 37(14)×10 <sup>-2</sup>	
$\Delta_N$	[cm <sup>-1</sup> ]	0.026 149(36)×10 <sup>-2</sup>	
$\delta_K^s$	[cm <sup>-1</sup> ]	0.276 15(98)×10 <sup>-3</sup>	
$\delta_N^s$	[cm <sup>-1</sup> ]	0.102 93(12)×10 <sup>-3</sup>	
$\Phi_K$	[cm <sup>-1</sup> ]	0.107 10(77)×10 <sup>-4</sup>	
$\Phi_{KN}$	[cm <sup>-1</sup> ]	- 0.145 1(32)×10 <sup>-5</sup>	
$\Phi_{NK}$	[cm <sup>-1</sup> ]	- 0.187(12)×10 <sup>-7</sup>	
$\Phi_N$	[cm <sup>-1</sup> ]	0.459(12)×10 <sup>-7</sup>	
$\phi_K$	[cm <sup>-1</sup> ]	0.111 3(22)×10 <sup>-5</sup>	
$\phi_{NK}$	[cm <sup>-1</sup> ]	- 0.336(71)×10 <sup>-7</sup>	
$\phi_N$	[cm <sup>-1</sup> ]	0.246 9(50)×10 <sup>-7</sup>	
$L_K$	[cm <sup>-1</sup> ]	- 0.231 5(87)×10 <sup>-7</sup>	
$L_{KKN}$	[cm <sup>-1</sup> ]	0.236(13)×10 <sup>-8</sup>	
$l_K$	[cm <sup>-1</sup> ]	- 0.103 6(56)×10 <sup>-8</sup>	
$P_K^b)$	[cm <sup>-1</sup> ]	0.360(34)×10 <sup>-10</sup>	
$\varepsilon_{aa}$	[cm <sup>-1</sup> ]	- 0.171 042(14)	
$\varepsilon_{bb}$	[cm <sup>-1</sup> ]	- 0.022 307 2(55)	
$\varepsilon_{cc}$	[cm <sup>-1</sup> ]	0.107 6(42)×10 <sup>-3</sup>	
$\Delta_K^s$	[cm <sup>-1</sup> ]	0.316 1(33)×10 <sup>-3</sup>	
$\Delta_{KN}^s + \Delta_{NK}^s$	[cm <sup>-1</sup> ]	- 0.292 0(99)×10 <sup>-4</sup>	
$\Delta_N^s$	[cm <sup>-1</sup> ]	0.260(10)×10 <sup>-5</sup>	
$\delta_K^s$	[cm <sup>-1</sup> ]	0.50(12)×10 <sup>-5</sup>	
$\delta_N^s$	[cm <sup>-1</sup> ]	0.118 0(54)×10 <sup>-5</sup>	
$\Phi_K^s$	[cm <sup>-1</sup> ]	- 0.512(24)×10 <sup>-6</sup>	

<sup>a)</sup> The numbers in parentheses represent 1 standard deviation of the least-squares fit, in units of the last quoted decimal place.

<sup>b)</sup> 10-th order centrifugal distortion constant.

References for NH<sub>2</sub>

- 80Ste Steimle, T.C., Brown, J.M., Curl, R.F. : J. Chem. Phys. **73** (1980) 2552.  
 97Ton Tonooka, M., Yamamoto, S., Kobayashi, K., Saito, S. : J. Chem. Phys. **106** (1997) 2563.  
 97Mor Morino, I., Kawaguchi, K. : J. Molec. Spectrosc. **182** (1997) 428.  
 97Kob Kobayashi, K., Ozeki, H., Saito, S., Tonooka, M., Yamamoto, S. : J. Chem. Phys. **107** (1997) 9289.  
 98Oze Ozeki, H., Saito, S. : J. Molec. Spectrosc. **192** (1998) 183.  
 99Mül Müller, H.S.P., Klein, H., Belov, S.P., Winniewisser, G., Morino, I., Yamada, K.M.T., Saito, S.: J. Molec. Spectrosc. **195** (1999) 177.

**3.2.3.2.3 PH<sub>2</sub>**Microwave data for <sup>31</sup>P<sup>3</sup>H<sub>2</sub> (PD<sub>2</sub>)

Transition					$\nu$ [MHz]	Ref.
rotational $N' - N''$	fine structure $J' - J''$	Hyperfine <sup>a)</sup>				
		$F_1' - F_1''$	$F' - F''$	$I_T$		
State: electronic $\tilde{X}^2B_1$ ; vibrational zero point level						
$1_{11} \leftarrow 0_{00}$	$1\frac{1}{2} \leftarrow \frac{1}{2}$	$2 \leftarrow 1$	$3 \leftarrow 2$	1	209 773.737	98Hir
			$2 \leftarrow 1$	1	209 771.686 <sup>b)</sup>	
			$1 \leftarrow 0$	1	209 771.686 <sup>b)</sup>	
			$1 \leftarrow 1$	1	209 775.424	
		$1 \leftarrow 0$	$2 \leftarrow 1$	1	209 797.597	
			$1 \leftarrow 1$	1	209 803.551	
		$1 \leftarrow 1$	$2 \leftarrow 2$	1	209 592.841	
			$1 \leftarrow 0$	1	209 587.730	
			$0 \leftarrow 1$	1	209 594.265	
			$2 \leftarrow 1$	1	209 585.227	
			$1 \leftarrow 2$	1	209 598.734	
	$\frac{1}{2} \leftarrow \frac{1}{2}$		$2 \leftarrow 2$	1	213 000.799	
			$1 \leftarrow 1$	1	212 991.439	
			$1 \leftarrow 0$	1	212 987.685	
			$0 \leftarrow 1$	1	212 990.384	
			$2 \leftarrow 1$	1	212 993.258	
			$1 \leftarrow 2$	1	212 998.895	
		$1 \leftarrow 0$	$2 \leftarrow 1$	1	213 205.517	
			$1 \leftarrow 1$	1	213 203.611	
		$0 \leftarrow 1$	$1 \leftarrow 2$	1	213 282.390	
			$1 \leftarrow 1$	1	213 274.829	
$2_{02} \leftarrow 1_{11}$	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$3 \leftarrow 2$	$4 \leftarrow 3$	1	311 436.758 <sup>b)</sup>	
			$3 \leftarrow 2$	1	311 436.758 <sup>b)</sup>	
			$2 \leftarrow 1$	1	311 436.758 <sup>b)</sup>	
			$3 \leftarrow 3$	1	311 441.975	
			$2 \leftarrow 2$	1	311 440.169	
		$2 \leftarrow 1$	$3 \leftarrow 2$	1	311 392.179	
			$2 \leftarrow 1$	1	311 391.162	
			$1 \leftarrow 0$	1	311 391.162	
			$2 \leftarrow 2$	1	311 397.043	
			$1 \leftarrow 1$	1	311 394.657	
	$1\frac{1}{2} \leftarrow \frac{1}{2}$	$2 \leftarrow 1$	$3 \leftarrow 2$	1	309 795.097	
			$2 \leftarrow 1$	1	309 793.836	
			$2 \leftarrow 2$	1	309 792.092	
		$1 \leftarrow 0$	$2 \leftarrow 1$	1	309 831.384	
			$1 \leftarrow 1$	1	309 828.016	
			$0 \leftarrow 1$	1	309 826.261	
		$1 \leftarrow 1$	$1 \leftarrow 0$	1	310 112.932 <sup>b)</sup>	
			$2 \leftarrow 2$	1	310 112.932 <sup>b)</sup>	
		$2 \leftarrow 2$	$3 \leftarrow 3$	1	313 022.104	
$3_{13} \leftarrow 2_{02}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4 \leftarrow 3$	$5 \leftarrow 4$	1	462 671.818 <sup>b)</sup>	
			$4 \leftarrow 3$	1	462 671.818 <sup>b)</sup>	
			$3 \leftarrow 2$	1	462 671.818 <sup>b)</sup>	
		$3 \leftarrow 2$	$4 \leftarrow 3$	1	462 633.014 <sup>b)</sup>	
			$3 \leftarrow 2$	1	462 633.014 <sup>b)</sup>	
			$2 \leftarrow 1$	1	462 633.014 <sup>b)</sup>	

$4_{31} \leftarrow 4_{22}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3 \leftarrow 2$	$4 \leftarrow 3$	1	463 157.192 <sup>b)</sup>
			$3 \leftarrow 2$	1	463 157.192 <sup>b)</sup>
			$2 \leftarrow 1$	1	463 157.192 <sup>b)</sup>
			$6 \leftarrow 6$	1	174 231.510 <sup>b)</sup>
			$5 \leftarrow 5$	1	174 231.510 <sup>b)</sup>
	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5 \leftarrow 5$	$4 \leftarrow 4$	1	174 231.510 <sup>b)</sup>
			$4 \leftarrow 4$	1	174 268.293 <sup>b)</sup>
			$4 \leftarrow 4$	1	174 268.293 <sup>b)</sup>
			$3 \leftarrow 3$	1	174 268.293 <sup>b)</sup>
			$5 \leftarrow 5$	1	176 747.014 <sup>b)</sup>
$2_{11} \leftarrow 2_{02}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4 \leftarrow 4$	$4 \leftarrow 4$	1	176 747.014 <sup>b)</sup>
			$3 \leftarrow 3$	1	176 747.014 <sup>b)</sup>
			$4 \leftarrow 4$	1	176 689.868 <sup>b)</sup>
			$3 \leftarrow 3$	1	176 689.868 <sup>b)</sup>
			$2 \leftarrow 2$	1	176 689.868 <sup>b)</sup>
	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3 \leftarrow 3$	$4 \leftarrow 4$	1	173 327.501 <sup>b)</sup>
			$3 \leftarrow 3$	1	173 327.501 <sup>b)</sup>
			$2 \leftarrow 2$	1	173 327.501 <sup>b)</sup>
			$3 \leftarrow 3$	1	173 478.111 <sup>b)</sup>
			$2 \leftarrow 2$	1	173 478.111 <sup>b)</sup>
$4_{40} \leftarrow 4_{31}$	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 2$	$3 \leftarrow 3$	1	175 646.530 <sup>b)</sup>
			$2 \leftarrow 2$	1	175 646.530 <sup>b)</sup>
			$1 \leftarrow 1$	1	175 646.530 <sup>b)</sup>
			$2 \leftarrow 2$	1	175 275.652 <sup>b)</sup>
			$1 \leftarrow 1$	1	175 275.652 <sup>b)</sup>
	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5 \leftarrow 5$	$6 \leftarrow 6$	1	240 418.608 <sup>b)</sup>
			$5 \leftarrow 5$	1	240 418.608 <sup>b)</sup>
			$4 \leftarrow 4$	1	240 418.608 <sup>b)</sup>
			$4 \leftarrow 4$	1	240 427.753 <sup>b)</sup>
			$4 \leftarrow 4$	1	240 427.753 <sup>b)</sup>
$3_{31} \leftarrow 3_{22}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4 \leftarrow 4$	$3 \leftarrow 3$	1	240 427.753 <sup>b)</sup>
			$5 \leftarrow 5$	1	246 864.770 <sup>b)</sup>
			$4 \leftarrow 4$	1	246 864.770 <sup>b)</sup>
			$3 \leftarrow 3$	1	246 864.770 <sup>b)</sup>
			$4 \leftarrow 4$	1	246 853.181 <sup>b)</sup>
	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4 \leftarrow 4$	$3 \leftarrow 3$	1	246 853.181 <sup>b)</sup>
			$2 \leftarrow 2$	1	246 853.181 <sup>b)</sup>
			$5 \leftarrow 5$	1	277 251.203 <sup>b)</sup>
			$4 \leftarrow 4$	1	277 251.203 <sup>b)</sup>
			$3 \leftarrow 3$	1	277 251.203 <sup>b)</sup>
$4_{22} \leftarrow 4_{13}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3 \leftarrow 3$	$4 \leftarrow 4$	1	277 335.417 <sup>b)</sup>
			$3 \leftarrow 3$	1	277 335.417 <sup>b)</sup>
			$2 \leftarrow 2$	1	277 335.417 <sup>b)</sup>
			$4 \leftarrow 4$	1	282 854.338 <sup>b)</sup>
			$3 \leftarrow 3$	1	282 854.338 <sup>b)</sup>
	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5 \leftarrow 5$	$6 \leftarrow 6$	1	282 854.338 <sup>b)</sup>
			$5 \leftarrow 5$	1	282 701.211 <sup>b)</sup>
			$4 \leftarrow 4$	1	282 701.211 <sup>b)</sup>
			$1 \leftarrow 1$	1	282 701.211 <sup>b)</sup>
			$5 \leftarrow 5$	1	288 562.806 <sup>b)</sup>
$4_{22} \leftarrow 4_{13}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5 \leftarrow 5$	$6 \leftarrow 6$	1	288 562.806 <sup>b)</sup>
			$5 \leftarrow 5$	1	288 562.806 <sup>b)</sup>
			$4 \leftarrow 4$	1	288 562.806 <sup>b)</sup>
			$4 \leftarrow 4$	1	288 661.257 <sup>b)</sup>
			$5 \leftarrow 5$	1	288 661.257 <sup>b)</sup>
	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5 \leftarrow 5$	$6 \leftarrow 6$	1	288 661.257 <sup>b)</sup>
			$5 \leftarrow 5$	1	288 661.257 <sup>b)</sup>
			$4 \leftarrow 4$	1	288 661.257 <sup>b)</sup>
			$4 \leftarrow 4$	1	288 661.257 <sup>b)</sup>
			$5 \leftarrow 5$	1	288 661.257 <sup>b)</sup>

			4 ← 4	1	288 661.257 <sup>b)</sup>
			3 ← 3	1	288 661.257 <sup>b)</sup>
	3 $\frac{1}{2}$ ← 3 $\frac{1}{2}$	4 ← 4	5 ← 5	1	289 912.878 <sup>b)</sup>
			4 ← 4	1	289 912.878 <sup>b)</sup>
			3 ← 3	1	289 912.878 <sup>b)</sup>
		3 ← 3	4 ← 4	1	289 752.346 <sup>b)</sup>
			3 ← 3	1	289 752.346 <sup>b)</sup>
			2 ← 2	1	289 752.346 <sup>b)</sup>
3 <sub>22</sub> ← 3 <sub>13</sub>	3 $\frac{1}{2}$ ← 3 $\frac{1}{2}$	4 ← 4	5 ← 5	1	341 888.811 <sup>b)</sup>
			4 ← 4	1	341 888.811 <sup>b)</sup>
			3 ← 3	1	341 888.811 <sup>b)</sup>
		3 ← 3	4 ← 4	1	342 032.923 <sup>b)</sup>
			3 ← 3	1	342 032.923 <sup>b)</sup>
			2 ← 2	1	342 032.923 <sup>b)</sup>
	2 $\frac{1}{2}$ ← 2 $\frac{1}{2}$	3 ← 3	4 ← 4	1	346 436.670 <sup>b)</sup>
			3 ← 3	1	346 436.670 <sup>b)</sup>
			2 ← 2	1	346 436.670 <sup>b)</sup>
		2 ← 2	3 ← 3	1	346 169.643 <sup>b)</sup>
			2 ← 2	1	346 169.643 <sup>b)</sup>
			1 ← 1	1	346 169.643 <sup>b)</sup>
5 <sub>42</sub> ← 5 <sub>33</sub>	5 $\frac{1}{2}$ ← 5 $\frac{1}{2}$	6 ← 6	7 ← 7	1	382 914.859 <sup>b)</sup>
			6 ← 6	1	382 914.859 <sup>b)</sup>
			5 ← 5	1	382 914.859 <sup>b)</sup>
		5 ← 5	6 ← 6	1	382 971.963 <sup>b)</sup>
			5 ← 5	1	382 971.963 <sup>b)</sup>
			4 ← 4	1	382 971.963 <sup>b)</sup>
	4 $\frac{1}{2}$ ← 4 $\frac{1}{2}$	5 ← 5	6 ← 6	1	387 246.014 <sup>b)</sup>
			5 ← 5	1	387 246.014 <sup>b)</sup>
			4 ← 4	1	387 246.014 <sup>b)</sup>
		4 ← 4	5 ← 5	1	387 162.486 <sup>b)</sup>
			4 ← 4	1	387 162.486 <sup>b)</sup>
			3 ← 3	1	387 162.486 <sup>b)</sup>
5 <sub>51</sub> ← 5 <sub>42</sub>	5 $\frac{1}{2}$ ← 5 $\frac{1}{2}$	6 ← 6	7 ← 7	1	392 252.142 <sup>b)</sup>
			6 ← 6	1	392 252.142 <sup>b)</sup>
			5 ← 5	1	392 252.142 <sup>b)</sup>
		5 ← 5	6 ← 6	1	392 287.541 <sup>b)</sup>
			5 ← 5	1	392 287.541 <sup>b)</sup>
			4 ← 4	1	392 287.541 <sup>b)</sup>
	4 $\frac{1}{2}$ ← 4 $\frac{1}{2}$	5 ← 5	6 ← 6	1	398 695.912 <sup>b)</sup>
			5 ← 5	1	398 695.912 <sup>b)</sup>
			4 ← 4	1	398 695.912 <sup>b)</sup>
		4 ← 4	5 ← 5	1	398 554.610 <sup>b)</sup>
			4 ← 4	1	398 554.610 <sup>b)</sup>
			3 ← 3	1	398 554.610 <sup>b)</sup>
2 <sub>12</sub> ← 1 <sub>01</sub>	2 $\frac{1}{2}$ ← 1 $\frac{1}{2}$	3 ← 2	3 ← 2	0	340 963.054 <sup>b)</sup>
			5 ← 4	2	340 963.054 <sup>b)</sup>
			1 ← 1	2	340 963.054 <sup>b)</sup>
			4 ← 3	2	340 961.650 <sup>b)</sup>
			1 ← 0	2	340 961.650 <sup>b)</sup>
			3 ← 2	2	340 960.913 <sup>b)</sup>
			2 ← 1	2	340 960.913 <sup>b)</sup>
			4 ← 4	2	340 969.088
			3 ← 3	2	340 966.493
			2 ← 2	2	340 964.690
		2 ← 1	2 ← 1	0	340 914.775 <sup>b)</sup>

			1 ← 1	2	340 914.775 <sup>b)</sup>
			4 ← 3	2	340 913.842
			3 ← 2	2	340 911.989 <sup>b)</sup>
			2 ← 1	2	340 911.989 <sup>b)</sup>
			3 ← 3	2	340 920.488 <sup>b)</sup>
			1 ← 2	2	340 920.488 <sup>b)</sup>
			2 ← 2	2	340 916.995
		2 ← 2	2 ← 2	0	340 732.358 <sup>b)</sup>
		2 ← 2	4 ← 4	2	340 732.358 <sup>b)</sup>
			3 ← 3	2	340 732.358 <sup>b)</sup>
			0 ← 1	2	340 732.358 <sup>b)</sup>
	1 $\frac{1}{2}$ ← $\frac{1}{2}$	2 ← 1	2 ← 1	0	342 346.808 <sup>b)</sup>
		2 ← 1	2 ← 1	2	342 346.808 <sup>b)</sup>
			4 ← 3	2	342 348.832
			3 ← 2	2	342 347.783
			3 ← 3	2	342 344.848 <sup>b)</sup>
			2 ← 2	2	342 344.848 <sup>b)</sup>
			1 ← 1	2	342 344.848 <sup>b)</sup>
		1 ← 0	1 ← 0	0	342 413.130
		1 ← 0	2 ← 2	2	342 411.403
			1 ← 2	2	342 408.070
		1 ← 1	1 ← 1	0	342 677.878
		1 ← 1	2 ← 1	2	342 679.571 <sup>b)</sup>
			3 ← 3	2	342 679.571 <sup>b)</sup>
			2 ← 3	2	342 674.412 <sup>b)</sup>
			1 ← 2	2	342 674.412 <sup>b)</sup>
		2 ← 2	2 ← 2	0	343 133.890 <sup>b)</sup>
		2 ← 2	3 ← 3	2	343 133.890 <sup>b)</sup>
			4 ← 4	2	343 145.193
3 <sub>03</sub> ← 2 <sub>12</sub>	3 $\frac{1}{2}$ ← 2 $\frac{1}{2}$	4 ← 3	4 ← 3	0	455 450.471 <sup>b)</sup>
		4 ← 3	6 ← 5	2	455 450.471 <sup>b)</sup>
			5 ← 4	2	455 450.471 <sup>b)</sup>
			4 ← 3	2	455 450.471 <sup>b)</sup>
			3 ← 2	2	455 450.471 <sup>b)</sup>
			2 ← 1	2	455 450.471 <sup>b)</sup>
		3 ← 2	3 ← 2	0	455 417.823 <sup>b)</sup>
		3 ← 2	5 ← 4	2	455 417.823 <sup>b)</sup>
			4 ← 3	2	455 417.823 <sup>b)</sup>
			3 ← 2	2	455 417.823 <sup>b)</sup>
			2 ← 1	2	455 417.823 <sup>b)</sup>
			1 ← 0	2	455 417.823 <sup>b)</sup>
	2 $\frac{1}{2}$ ← 1 $\frac{1}{2}$	3 ← 2	3 ← 2	0	455 208.262 <sup>b)</sup>
		3 ← 2	5 ← 4	2	455 208.262 <sup>b)</sup>
			4 ← 3	2	455 208.262 <sup>b)</sup>
			3 ← 2	2	455 208.262 <sup>b)</sup>
			2 ← 1	2	455 208.262 <sup>b)</sup>
			1 ← 0	2	455 208.262 <sup>b)</sup>
		2 ← 1	4 ← 3	2	455 228.238 <sup>b)</sup>
			3 ← 2	2	455 228.238 <sup>b)</sup>
			2 ← 1	2	455 228.238 <sup>b)</sup>
3 <sub>21</sub> ← 3 <sub>12</sub>	3 $\frac{1}{2}$ ← 3 $\frac{1}{2}$	4 ← 4	4 ← 4	0	164 597.172 <sup>b)</sup>
		4 ← 4	6 ← 6	2	164 597.172 <sup>b)</sup>
			5 ← 5	2	164 597.172 <sup>b)</sup>
			4 ← 4	2	164 597.172 <sup>b)</sup>
			3 ← 3	2	164 597.172 <sup>b)</sup>
			2 ← 2	2	164 597.172 <sup>b)</sup>

		$3 \leftarrow 3$	$3 \leftarrow 3$	0	164 671.865 <sup>b)</sup>
		$3 \leftarrow 3$	$5 \leftarrow 5$	2	164 671.865 <sup>b)</sup>
			$4 \leftarrow 4$	2	164 671.865 <sup>b)</sup>
			$3 \leftarrow 3$	2	164 671.865 <sup>b)</sup>
			$2 \leftarrow 2$	2	164 671.865 <sup>b)</sup>
			$1 \leftarrow 1$	2	164 671.865 <sup>b)</sup>
$2\frac{1}{2} \leftarrow 2\frac{1}{2}$		$3 \leftarrow 3$	$3 \leftarrow 3$	0	166 440.120 <sup>b)</sup>
		$3 \leftarrow 3$	$5 \leftarrow 5$	2	166 440.120 <sup>b)</sup>
			$4 \leftarrow 4$	2	166 440.120 <sup>b)</sup>
			$3 \leftarrow 3$	2	166 440.120 <sup>b)</sup>
			$2 \leftarrow 2$	2	166 440.120 <sup>b)</sup>
			$1 \leftarrow 1$	2	166 440.120 <sup>b)</sup>
		$2 \leftarrow 2$	$2 \leftarrow 2$	0	166 301.909 <sup>b)</sup>
		$2 \leftarrow 2$	$4 \leftarrow 4$	2	166 301.909 <sup>b)</sup>
			$3 \leftarrow 3$	2	166 301.909 <sup>b)</sup>
			$2 \leftarrow 2$	2	166 301.909 <sup>b)</sup>
			$1 \leftarrow 1$	2	166 301.909 <sup>b)</sup>
$3\frac{1}{2} \leftarrow 3\frac{1}{2}$		$4 \leftarrow 4$	$4 \leftarrow 4$	0	162 585.046 <sup>b)</sup>
		$4 \leftarrow 4$	$6 \leftarrow 6$	2	162 585.046 <sup>b)</sup>
			$5 \leftarrow 5$	2	162 585.046 <sup>b)</sup>
			$4 \leftarrow 4$	2	162 585.046 <sup>b)</sup>
			$3 \leftarrow 3$	2	162 585.046 <sup>b)</sup>
			$2 \leftarrow 2$	2	162 585.046 <sup>b)</sup>
		$3 \leftarrow 3$	$3 \leftarrow 3$	0	162 604.819 <sup>b)</sup>
		$3 \leftarrow 3$	$5 \leftarrow 5$	2	162 604.819 <sup>b)</sup>
			$4 \leftarrow 4$	2	162 604.819 <sup>b)</sup>
			$3 \leftarrow 3$	2	162 604.819 <sup>b)</sup>
			$2 \leftarrow 2$	2	162 604.819 <sup>b)</sup>
			$1 \leftarrow 1$	2	162 604.819 <sup>b)</sup>
$2\frac{1}{2} \leftarrow 2\frac{1}{2}$		$3 \leftarrow 3$	$3 \leftarrow 3$	0	167 712.463 <sup>b)</sup>
		$3 \leftarrow 3$	$5 \leftarrow 5$	2	167 712.463 <sup>b)</sup>
			$4 \leftarrow 4$	2	167 712.463 <sup>b)</sup>
			$3 \leftarrow 3$	2	167 712.463 <sup>b)</sup>
			$2 \leftarrow 2$	2	167 712.463 <sup>b)</sup>
			$1 \leftarrow 1$	2	167 712.463 <sup>b)</sup>
		$2 \leftarrow 2$	$2 \leftarrow 2$	0	167 682.085 <sup>b)</sup>
		$2 \leftarrow 2$	$4 \leftarrow 4$	2	167 682.085 <sup>b)</sup>
			$3 \leftarrow 3$	2	167 682.085 <sup>b)</sup>
			$2 \leftarrow 2$	2	167 682.085 <sup>b)</sup>
			$1 \leftarrow 1$	2	167 682.085 <sup>b)</sup>
$2_{21} \leftarrow 2_{12}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$3 \leftarrow 3$	$3 \leftarrow 3$	0	238 081.259 <sup>b)</sup>
		$3 \leftarrow 3$	$5 \leftarrow 5$	2	238 081.259 <sup>b)</sup>
			$4 \leftarrow 4$	2	238 081.259 <sup>b)</sup>
			$3 \leftarrow 3$	2	238 081.259 <sup>b)</sup>
			$2 \leftarrow 2$	2	238 081.259 <sup>b)</sup>
			$1 \leftarrow 1$	2	238 081.259 <sup>b)</sup>
		$2 \leftarrow 2$	$2 \leftarrow 2$	0	238 236.150 <sup>b)</sup>
		$2 \leftarrow 2$	$4 \leftarrow 4$	2	238 236.150 <sup>b)</sup>
			$3 \leftarrow 3$	2	238 236.150 <sup>b)</sup>
			$2 \leftarrow 2$	2	238 236.150 <sup>b)</sup>
			$1 \leftarrow 1$	2	238 236.150 <sup>b)</sup>
	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$	$2 \leftarrow 2$	$2 \leftarrow 2$	0	243 855.863 <sup>b)</sup>
		$2 \leftarrow 2$	$4 \leftarrow 4$	2	243 855.863 <sup>b)</sup>
			$3 \leftarrow 3$	2	243 855.863 <sup>b)</sup>
			$2 \leftarrow 2$	2	243 855.863 <sup>b)</sup>

			1 ← 1	2	243 855.863 <sup>b)</sup>
		1 ← 1	1 ← 1	0	243 484.077 <sup>b)</sup>
		1 ← 1	3 ← 3	2	243 484.077 <sup>b)</sup>
			2 ← 2	2	243 484.077 <sup>b)</sup>
			1 ← 1	2	243 484.077 <sup>b)</sup>
3 <sub>12</sub> ← 3 <sub>03</sub>	3 $\frac{1}{2}$ ← 3 $\frac{1}{2}$	4 ← 4	4 ← 4	0	314 287.555 <sup>b)</sup>
		4 ← 4	6 ← 6	2	314 287.555 <sup>b)</sup>
			5 ← 5	2	314 287.555 <sup>b)</sup>
			4 ← 4	2	314 287.555 <sup>b)</sup>
			3 ← 3	2	314 287.555 <sup>b)</sup>
			2 ← 2	2	314 287.555 <sup>b)</sup>
		3 ← 3	3 ← 3	0	314 441.204 <sup>b)</sup>
		3 ← 3	5 ← 5	2	314 441.204 <sup>b)</sup>
			4 ← 4	2	314 441.204 <sup>b)</sup>
			3 ← 3	2	314 441.204 <sup>b)</sup>
			2 ← 2	2	314 441.204 <sup>b)</sup>
			1 ← 1	2	314 441.204 <sup>b)</sup>
	2 $\frac{1}{2}$ ← 2 $\frac{1}{2}$	3 ← 3	3 ← 3	0	317 145.174 <sup>b)</sup>
		3 ← 3	5 ← 5	2	317 145.174 <sup>b)</sup>
			4 ← 4	2	317 145.174 <sup>b)</sup>
			3 ← 3	2	317 145.174 <sup>b)</sup>
			2 ← 2	2	317 145.174 <sup>b)</sup>
			1 ← 1	2	317 145.174 <sup>b)</sup>
		2 ← 2	2 ← 2	0	316 857.446 <sup>b)</sup>
		2 ← 2	4 ← 4	2	316 857.446 <sup>b)</sup>
			3 ← 3	2	316 857.446 <sup>b)</sup>
			2 ← 2	2	316 857.446 <sup>b)</sup>
			1 ← 1	2	316 857.446 <sup>b)</sup>
4 <sub>41</sub> ← 4 <sub>32</sub>	4 $\frac{1}{2}$ ← 4 $\frac{1}{2}$	5 ← 5	5 ← 5	0	329 246.737 <sup>b)</sup>
		5 ← 5	7 ← 7	2	329 246.737 <sup>b)</sup>
			6 ← 6	2	329 246.737 <sup>b)</sup>
			5 ← 5	2	329 246.737 <sup>b)</sup>
			4 ← 4	2	329 246.737 <sup>b)</sup>
			3 ← 3	2	329 246.737 <sup>b)</sup>
		4 ← 4	4 ← 4	0	329 298.717 <sup>b)</sup>
		4 ← 4	6 ← 6	2	329 298.717 <sup>b)</sup>
			5 ← 5	2	329 298.717 <sup>b)</sup>
			4 ← 4	2	329 298.717 <sup>b)</sup>
			3 ← 3	2	329 298.717 <sup>b)</sup>
			2 ← 2	2	329 298.717 <sup>b)</sup>
	3 $\frac{1}{2}$ ← 3 $\frac{1}{2}$	4 ← 4	4 ← 4	0	335 177.234 <sup>b)</sup>
		4 ← 4	6 ← 6	2	335 177.234 <sup>b)</sup>
			5 ← 5	2	335 177.234 <sup>b)</sup>
			4 ← 4	2	335 177.234 <sup>b)</sup>
			3 ← 3	2	335 177.234 <sup>b)</sup>
			2 ← 2	2	335 177.234 <sup>b)</sup>
		3 ← 3	3 ← 3	0	335 095.156 <sup>b)</sup>
		3 ← 3	5 ← 5	2	335 095.156 <sup>b)</sup>
			4 ← 4	2	335 095.156 <sup>b)</sup>
			3 ← 3	2	335 095.156 <sup>b)</sup>
			2 ← 2	2	335 095.156 <sup>b)</sup>
			1 ← 1	2	335 095.156 <sup>b)</sup>
5 <sub>50</sub> ← 5 <sub>41</sub>	5 $\frac{1}{2}$ ← 5 $\frac{1}{2}$	6 ← 6	6 ← 6	0	333 924.856 <sup>b)</sup>
		6 ← 6	8 ← 8	2	333 924.856 <sup>b)</sup>
			7 ← 7	2	333 924.856 <sup>b)</sup>



			6 ← 6	2	333 924.856 <sup>b)</sup>
			5 ← 5	2	333 924.856 <sup>b)</sup>
			4 ← 4	2	333 924.856 <sup>b)</sup>
		5 ← 5	5 ← 5	0	333 933.363 <sup>b)</sup>
		5 ← 5	7 ← 7	2	333 933.363 <sup>b)</sup>
			6 ← 6	2	333 933.363 <sup>b)</sup>
			5 ← 5	2	333 933.363 <sup>b)</sup>
			4 ← 4	2	333 933.363 <sup>b)</sup>
			3 ← 3	2	333 933.363 <sup>b)</sup>
	4 $\frac{1}{2}$ ← 4 $\frac{1}{2}$	5 ← 5	5 ← 5	0	341 166.628 <sup>b)</sup>
		5 ← 5	7 ← 7	2	341 166.628 <sup>b)</sup>
			6 ← 6	2	341 166.628 <sup>b)</sup>
			5 ← 5	2	341 166.628 <sup>b)</sup>
			4 ← 4	2	341 166.628 <sup>b)</sup>
			3 ← 3	2	341 166.628 <sup>b)</sup>
		4 ← 4	4 ← 4	0	341 155.249 <sup>b)</sup>
		4 ← 4	6 ← 6	2	341 155.249 <sup>b)</sup>
			5 ← 5	2	341 155.249 <sup>b)</sup>
			4 ← 4	2	341 155.249 <sup>b)</sup>
			3 ← 3	2	341 155.249 <sup>b)</sup>
			2 ← 2	2	341 155.249 <sup>b)</sup>
4 <sub>32</sub> ← 4 <sub>23</sub>	4 $\frac{1}{2}$ ← 4 $\frac{1}{2}$	5 ← 5	5 ← 5	0	356 704.172 <sup>b)</sup>
		5 ← 5	7 ← 7	2	356 704.172 <sup>b)</sup>
			6 ← 6	2	356 704.172 <sup>b)</sup>
			5 ← 5	2	356 704.172 <sup>b)</sup>
			4 ← 4	2	356 704.172 <sup>b)</sup>
			3 ← 3	2	356 704.172 <sup>b)</sup>
		4 ← 4	4 ← 4	0	356 792.297 <sup>b)</sup>
		4 ← 4	6 ← 6	2	356 792.297 <sup>b)</sup>
			5 ← 5	2	356 792.297 <sup>b)</sup>
			4 ← 4	2	356 792.297 <sup>b)</sup>
			3 ← 3	2	356 792.297 <sup>b)</sup>
			2 ← 2	2	356 792.297 <sup>b)</sup>
	3 $\frac{1}{2}$ ← 3 $\frac{1}{2}$	4 ← 4	4 ← 4	0	360 866.119 <sup>b)</sup>
		4 ← 4	6 ← 6	2	360 866.119 <sup>b)</sup>
			5 ← 5	2	360 866.119 <sup>b)</sup>
			4 ← 4	2	360 866.119 <sup>b)</sup>
			3 ← 3	2	360 866.119 <sup>b)</sup>
			2 ← 2	2	360 866.119 <sup>b)</sup>
		3 ← 3	3 ← 3	0	360 725.029 <sup>b)</sup>
		3 ← 3	5 ← 5	2	360 725.029 <sup>b)</sup>
			4 ← 4	2	360 725.029 <sup>b)</sup>
			3 ← 3	2	360 725.029 <sup>b)</sup>
			2 ← 2	2	360 725.029 <sup>b)</sup>
			1 ← 1	2	360 725.029 <sup>b)</sup>

<sup>a)</sup> Coupling scheme:  $\mathbf{J} = \mathbf{N} + \mathbf{S}$ ;  $\mathbf{F}_1 = \mathbf{J} + \mathbf{I}_1$ ;  $\mathbf{F} = \mathbf{F}_1 + \mathbf{I}_T$  where  $\mathbf{I}_1$  is the <sup>31</sup>P nuclear spin and  $\mathbf{I}_T$  is the <sup>2</sup>H total nuclear spin (1 or 2 and 0).

<sup>b)</sup> <sup>2</sup>H hyperfine structure not resolved.

Molecular parameters for <sup>31</sup> P <sup>2</sup> H <sub>2</sub> (PD <sub>2</sub> )				
Parameter		Value	Method	Ref.
State: electronic $\tilde{X}^2B_1$ ; vibrational zero point level				
<i>A</i>	[MHz]	145 536.057 (24) <sup>a)</sup>	MW	98Hir
<i>B</i>	[MHz]	121 346.943(34)		
<i>C</i>	[MHz]	65 353.104(25)		
<i>Δ<sub>K</sub></i>	[MHz]	23.107 5(47)		
<i>Δ<sub>NK</sub></i>	[MHz]	− 13.525 7(61)		
<i>Δ<sub>N</sub></i>	[MHz]	4.101 8(43)		
<i>δ<sub>K</sub></i>	[MHz]	− 0.415 5(23)		
<i>δ<sub>N</sub></i>	[MHz]	1.824 5(15)		
<i>φ<sub>K</sub></i>	[kHz]	3.20(51)		
<i>φ<sub>KN</sub></i>	[kHz]	6.60(87)		
<i>φ<sub>NK</sub></i>	[kHz]	− 6.92(47)		
<i>φ<sub>N</sub></i>	[kHz]	1.22(23)		
<i>φ<sub>K</sub></i>	[kHz]	2.59(20)		
<i>φ<sub>NK</sub></i>	[kHz]	0.0 <sup>b)</sup>		
<i>φ<sub>N</sub></i>	[kHz]	0.208(53)		
<i>ε<sub>aa</sub></i>	[MHz]	− 4 465.040(60)		
<i>ε<sub>bb</sub></i>	[MHz]	− 1 217.417(77)		
<i>ε<sub>cc</sub></i>	[MHz]	− 5.575(44)		
<i>Δ<sub>K</sub><sup>s</sup></i>	[MHz]	1.887 9(100)		
<i>Δ<sub>KN</sub><sup>s</sup> + Δ<sub>NK</sub><sup>s</sup></i>	[MHz]	− 0.536 4(130)		
<i>Δ<sub>NK</sub><sup>s</sup></i>	[MHz]	− 0.536 4 <sup>b)</sup>		
<i>Δ<sub>N</sub><sup>s</sup></i>	[MHz]	0.119 4(36)		
<i>δ<sub>K</sub><sup>s</sup></i>	[MHz]	0.078 2(65)		
<i>δ<sub>N</sub><sup>s</sup></i>	[MHz]	0.060 8(21)		
<i>a<sub>F</sub>(<sup>31</sup>P)</i>	[MHz]	208.376(48)		
<i>T<sub>aa</sub>(<sup>31</sup>P)</i>	[MHz]	− 300.093(84)		
<i>T<sub>bb</sub>(<sup>31</sup>P)</i>	[MHz]	− 321.63(16)		
<i>C<sub>aa</sub>(<sup>31</sup>P)</i>	[MHz]	0.483(27)		
<i>C<sub>bb</sub>(<sup>31</sup>P)</i>	[MHz]	0.247(31)		
<i>C<sub>cc</sub>(<sup>31</sup>P)</i>	[MHz]	0.056(22)		
<i>a<sub>F</sub>(D)</i>	[MHz]	− 7.450(38)		
<i>T<sub>aa</sub>(D)</i>	[MHz]	− 0.172(91)		
<i>T<sub>bb</sub>(D)</i>	[MHz]	− 0.67(17)		

<sup>a)</sup> The numbers in parentheses represent 3 standard deviations of the least-squares fit, in units of the last quoted decimal place.

<sup>b)</sup> Parameter constrained to this value.

Reference for PH<sub>2</sub>

98Hir Hirao, T., Hayakashi, S., Yamamoto, S., Saito, S. : J. Mol. Spectrosc. **187** (1998) 153.

**3.2.3.2.4 AsH<sub>2</sub>**Microwave data for <sup>75</sup>AsH<sub>2</sub>

Transition					$\nu$ [MHz]	Ref.			
rotational $N' - N''$	fine structure $J' - J''$	Hyperfine <sup>a)</sup>							
		$F_1' - F_1''$	$F' - F''$	$I_{\text{T}}$					
State: electronic $\tilde{X}^2\text{B}_1$ ; vibrational zero point level									
$1_{11} \leftarrow 0_{00}$	$1\frac{1}{2} \leftarrow \frac{1}{2}$	$3 \leftarrow 2$	$4 \leftarrow 3$	1	326 258.257(29) <sup>b)</sup>	98Fuj1			
			$3 \leftarrow 2$	1	326 243.817(17)				
			$2 \leftarrow 1$	1	326 249.817(22)				
			$2 \leftarrow 1$	1	326 212.995(13)				
			$1 \leftarrow 1$	1	326 207.532(10)				
			$2 \leftarrow 1$	1	326 187.146(28)				
			$0 \leftarrow 1$	1	326 173.002(20)				
			$1 \leftarrow 1$	1	326 168.436(22)				
			$2 \leftarrow 2$	1	326 124.034(24)				
			$2 \leftarrow 2$	1	326 107.382(25)				
	$\frac{1}{2} \leftarrow \frac{1}{2}$	$2 \leftarrow 2$	$1 \leftarrow 1$	1	326 104.039(13)				
			$3 \leftarrow 3$	1	351 004.801(17)				
			$2 \leftarrow 2$	1	350 943.787(18)				
			$2 \leftarrow 1$	1	351 101.008(24) <sup>c)</sup>				
			$1 \leftarrow 0$	1	351 101.008(24) <sup>c)</sup>				
			$3 \leftarrow 2$	1	351 093.683(6) <sup>c)</sup>				
			$1 \leftarrow 1$	1	351 093.683(6) <sup>c)</sup>				
			$2 \leftarrow 2$	1	351 082.370(30)				
			$1 \leftarrow 2$	1	351 460.908(13)				
			$1 \leftarrow 2$	1	351 418.764(28)				
$2_{11} \leftarrow 2_{02}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4 \leftarrow 4$	$5 \leftarrow 5$	1	313 170.066(22)				
			$4 \leftarrow 4$	1	313 167.278(21) <sup>c)</sup>				
			$3 \leftarrow 3$	1	313 167.278(21) <sup>c)</sup>				
			$4 \leftarrow 4$	1	313 434.669(27)				
			$3 \leftarrow 3$	1	313 439.393(22)				
			$3 \leftarrow 3$	1	313 550.337(15) <sup>c)</sup>				
			$2 \leftarrow 2$	1	313 550.337(15) <sup>c)</sup>				
			$1 \leftarrow 1$	1	313 557.204(32)				
			$3 \leftarrow 3$	1	330 360.461(28)				
			$3 \leftarrow 3$	1	330 359.143(21)				
	$1\frac{1}{2} \leftarrow 1\frac{1}{2}$		$2 \leftarrow 2$	1	330 357.053(19)				
			$1 \leftarrow 2$	1	329 692.629(28)				
			$2 \leftarrow 1$	1	329 562.073(23)				
			$3 \leftarrow 2$	1	329 562.073(23)				
$2_{21} \leftarrow 2_{12}$	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4 \leftarrow 4$		0	336 514.314(15)				
			$3 \leftarrow 3$	0	336 733.122(14)				
			$2 \leftarrow 2$	0	336 874.198(36)				
			$1 \leftarrow 1$	0	336 957.464(18)				
			$1\frac{1}{2} \leftarrow 1\frac{1}{2}$		$3 \leftarrow 3$	0	378 630.565(23)		
					$2 \leftarrow 2$	0	378 101.973(15)		
	$3_{31} \leftarrow 3_{22}$				$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	$5 \leftarrow 5$	$6 \leftarrow 6$	1	353 602.002(16)
							$5 \leftarrow 5$	1	353 599.436(25)
			$4 \leftarrow 4$	1			353 600.242(20)		
			$4 \leftarrow 4$	1			353 705.173(9)		
$4 \leftarrow 4$	1	353 698.652(20) <sup>c)</sup>							
$3 \leftarrow 3$	1	353 698.652(20) <sup>c)</sup>							
$3 \leftarrow 3$	1	353 790.296(28)							

			3 ← 3	1	353 779.640(26) <sup>c)</sup>
			2 ← 2	1	353 779.640(26) <sup>c)</sup>
		2 ← 2	2 ← 2	1	353 852.219(23)
3 <sub>21</sub> ← 3 <sub>12</sub>	3 $\frac{1}{2}$ ← 3 $\frac{1}{2}$	5 ← 5		0	304 158.137(12)
		4 ← 4		0	304 298.804(22)
		3 ← 3		0	304 369.710(27)
		2 ← 2		0	304 398.436(25)
	2 $\frac{1}{2}$ ← 2 $\frac{1}{2}$	4 ← 4		0	310 624.317(13)
		3 ← 3		0	310 448.651(18)
		2 ← 2		0	310 275.658(19)
		1 ← 1		0	310 1409.750(16)

<sup>a)</sup> Coupling scheme:  $J = N + S$ ;  $F_1 = J + I_1$ ;  $F = F_1 + I_T$  where  $I_1$  is the <sup>75</sup>As nuclear spin and  $I_T$  is the <sup>1</sup>H total nuclear spin (1 or 0).

<sup>b)</sup> The figures in parentheses are the authors' estimates of experimental uncertainty (1σ).

<sup>c)</sup> Hyperfine components not fully resolved.

Far-infrared data for <sup>75</sup>As<sup>1</sup>H<sub>2</sub>

Laser			Rotational transition <sup>a)</sup>		Ref.
Gas	$\lambda$ [μm]	$\nu$ [GHz]	$N_{K_a K_c}$	spin	
State: electronic $\tilde{X}^2B_1$ ; vibrational zero point level					
CH <sub>2</sub> CF <sub>2</sub>	889.078	337.191 9	$1_{11} \leftarrow 0_{00}$	$F_1 \leftarrow F_1$	00Hug
CH <sub>2</sub> CF <sub>2</sub>	888.854	337.277 0	$1_{11} \leftarrow 0_{00}$	$F_1 \leftarrow F_1$	
				$F_2 \leftarrow F_2$	
CD <sub>3</sub> I	556.871	538.347 3	$2_{02} \leftarrow 1_{11}$	$F_1 \leftarrow F_1$	
			$2_{12} \leftarrow 1_{01}$	$F_1 \leftarrow F_1$	
				$F_2 \leftarrow F_1$	
CH <sub>2</sub> F <sub>2</sub>	540.986	540.159 0	$2_{02} \leftarrow 1_{11}$	$F_2 \leftarrow F_1$	
			$2_{12} \leftarrow 1_{01}$	$F_2 \leftarrow F_1$	
				$F_2 \leftarrow F_2$	
			$3_{12} \leftarrow 3_{03}$	$F_1 \leftarrow F_1$	
				$F_2 \leftarrow F_2$	
			$3_{22} \leftarrow 3_{13}$	$F_1 \leftarrow F_1$	
CH <sub>2</sub> F <sub>2</sub>	382.636	783.486 0	$4_{32} \leftarrow 4_{23}$	$F_1 \leftarrow F_1$	
			$2_{21} \leftarrow 1_{10}$	$F_1 \leftarrow F_1$	
			$3_{03} \leftarrow 2_{12}$	$F_2 \leftarrow F_1$	
			$3_{12} \leftarrow 2_{02}$	$F_2 \leftarrow F_1$	
			$4_{13} \leftarrow 4_{04}$	$F_1 \leftarrow F_1$	
				$F_2 \leftarrow F_2$	
			$4_{23} \leftarrow 4_{14}$	$F_1 \leftarrow F_1$	
				$F_2 \leftarrow F_2$	
			$5_{33} \leftarrow 5_{24}$	$F_2 \leftarrow F_2$	
CH <sub>2</sub> DOH	308.038	973.224 3	$2_{20} \leftarrow 1_{11}$	$F_1 \leftarrow F_1$	
			$3_{22} \leftarrow 2_{11}$	$F_1 \leftarrow F_1$	
			$3_{31} \leftarrow 2_{20}$	$F_2 \leftarrow F_2$	
<sup>13</sup> CH <sub>3</sub> OH	238.523	1 256.872 0	$4_{23} \leftarrow 3_{12}$	$F_2 \leftarrow F_1$	
			$3_{31} \leftarrow 2_{20}$	$F_2 \leftarrow F_1$	
			$3_{31} \leftarrow 2_{20}$	$F_2 \leftarrow F_1$	
CH <sub>3</sub> OH	232.937	1 286.999 5	$3_{31} \leftarrow 2_{20}$	$F_2 \leftarrow F_1$	
CH <sub>2</sub> F <sub>2</sub>	230.106	1 302.845 8	$3_{31} \leftarrow 2_{20}$	$F_2 \leftarrow F_1$	
CH <sub>2</sub> F <sub>2</sub>	214.577	1 397.118 6	$3_{30} \leftarrow 2_{21}$	$F_1 \leftarrow F_1$	
			$6_{06} \leftarrow 5_{15}$	$F_1 \leftarrow F_1$	
			$6_{16} \leftarrow 5_{05}$	$F_1 \leftarrow F_1$	
			$7_{16} \leftarrow 7_{07}$	$F_1 \leftarrow F_2$	
			$7_{26} \leftarrow 7_{17}$	$F_1 \leftarrow F_2$	
CH <sub>3</sub> OH	211.261	1 419.049 3	$5_{14} \leftarrow 4_{23}$	$F_1 \leftarrow F_1$	
				$F_2 \leftarrow F_2$	
			$5_{24} \leftarrow 4_{13}$	$F_1 \leftarrow F_1$	

			$6_{06} \leftarrow 5_{15}$	$F_2 \leftarrow F_2$
			$6_{16} \leftarrow 5_{05}$	$F_2 \leftarrow F_1$
$\text{CH}_2\text{F}_2$	184.306	1 626.602 6	$5_{23} \leftarrow 4_{32}$	$F_2 \leftarrow F_1$
$^{13}\text{CD}_3\text{OD}$	173.637	1 726.548 5	$3_{31} \leftarrow 2_{02}$	$F_1 \leftarrow F_1$
			$4_{41} \leftarrow 3_{30}$	$F_2 \leftarrow F_2$
				$F_3 \leftarrow F_3$

<sup>a)</sup> The levels with  $K_a K_c$  ee or oo are *ortho* and with eo or oe are *para*.

Molecular parameters for  $^{75}\text{As}^1\text{H}_2$

Parameter	Value	Method	Ref.
State: electronic $\tilde{X}^2\text{B}_1$ ; vibrational zero point level			
$A$	[MHz] 226 333.337 (17) <sup>a)</sup>	MW, FIR	00Hug
$B$	[MHz] 214 737.992(17)		
$C$	[MHz] 108 372.098(31)		
$\Delta_K$	[MHz] 68.074(14)		
$\Delta_{\text{NK}}$	[MHz] -46.996(14)		
$\Delta_N$	[MHz] 14.172 6(22)		
$\delta_K$	[MHz] -4.135 1(58)		
$\delta_N$	[MHz] 6.445 7(20)		
$\Phi_K$	[kHz] 0.0 <sup>b)</sup>		
$\Phi_{\text{KN}}$	[kHz] 16.87(14)		
$\Phi_{\text{NK}}$	[kHz] 0.0 <sup>b)</sup>		
$\Phi_N$	[kHz] 0.0 <sup>b)</sup>		
$\varepsilon_{aa}$	[MHz] -33 132.60(11)		
$\varepsilon_{bb}$	[MHz] -11 842.493(73)		
$\varepsilon_{cc}$	[MHz] 128.050(73)		
$\Delta_K^s$	[MHz] 25.53(17)		
$\Delta_{\text{KN}}^s + \Delta_{\text{NK}}^s$	[MHz] -9.93(18)		
$\Delta_{\text{NK}}^s$	[MHz] 0.0 <sup>b)</sup>		
$\Delta_N^s$	[MHz] 2.436(28)		
$\delta_K^s$	[MHz] 1.067(20)		
$\delta_N^s$	[MHz] 1.271(14)		
$a_f(^{75}\text{As})$	[MHz] 57.823(11)		
$T_{aa}(^{75}\text{As})$	[MHz] -287.698(19)		
$T_{bb}(^{75}\text{As})$	[MHz] -322.157(14)		
$\chi_{aa}(^{75}\text{As})$	[MHz] 5.96 7(72)		
$\chi_{bb}(^{75}\text{As})$	[MHz] -23.492 8(71)		
$C_{aa}(^{75}\text{As})$	[MHz] 0.673 1(50)		
$C_{bb}(^{75}\text{As})$	[MHz] 0.483 7(49)		
$a_f(^1\text{H})$	[MHz] -50.800(14)		
$T_{aa}(^1\text{H})$	[MHz] -0.855(50)		
$T_{bb}(^1\text{H})$	[MHz] -3.107(32)		
$g_{aa}^s$	-2.072 895(69)		
$g_{bb}^s$	-2.027 805(58)		
$g_{cc}^s$	-1.999 932(58)		
$g_{aa}^r$	-0.981(21)×10 <sup>-3</sup>		
$g_{bb}^r$	-0.251(15)×10 <sup>-3</sup>		
$g_{cc}^r$	-0.18(15)×10 <sup>-4</sup>		

<sup>a)</sup> The numbers in parentheses represent 1 standard deviation of the least-squares fit, in units of the last quoted decimal place.

<sup>b)</sup> Parameter constrained to this value.

Microwave data for <sup>75</sup>As<sup>2</sup>H<sub>2</sub> (AsD<sub>2</sub>)

Transition					$\nu$ [MHz]	Ref.
rotational $N' - N''$	fine structure $J' - J''$	Hyperfine <sup>a)</sup>				
		$F_1' - F_1''$	$F' - F''$	$I_{\text{T}}$		
State: electronic $\tilde{X}^3\text{B}_1$ ; vibrational zero point level						
$2_{12} \leftarrow 1_{01}$	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$4 \leftarrow 3$	$3 \leftarrow 2$	0, 2	279 691.706(17) <sup>b,c)</sup>	98Fuj2
			$4 \leftarrow 3$	0, 2		
			$2 \leftarrow 1$	0, 2		
			$5 \leftarrow 4$	0, 2		
		$4 \leftarrow 3$	$6 \leftarrow 5$	0, 2	279 692.834(20) <sup>c)</sup>	
				0		
		$4 \leftarrow 3$	$4 \leftarrow 3$	0, 2	279 593.207(32) <sup>c)</sup>	
			$5 \leftarrow 4$	0, 2		
		$3 \leftarrow 2$	$2 \leftarrow 1$	0, 2	279 594.446(21) <sup>c)</sup>	
			$3 \leftarrow 2$	0		
		$3 \leftarrow 2$	$4 \leftarrow 3$		279 554.281(33)	
			$3 \leftarrow 2$	0, 2		
	$1\frac{1}{2} \leftarrow \frac{1}{2}$	$3 \leftarrow 2$	$3 \leftarrow 2$	0, 2	284 748.358(27) <sup>c)</sup>	
				0		
		$3 \leftarrow 2$	$5 \leftarrow 4$	0, 2	284 750.348(5)	
			$4 \leftarrow 3$	0, 2		
		$4 \leftarrow 3$	$6 \leftarrow 5$	0, 2	397 525.752(7) <sup>c)</sup>	
				0		
		$4 \leftarrow 3$	$4 \leftarrow 3$	0, 2	397 524.292(18) <sup>c)</sup>	
			$3 \leftarrow 2$	0, 2		
$2_{21} \leftarrow 1_{10}$	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	$4 \leftarrow 3$	$5 \leftarrow 4$	0, 2	397 455.265(33)	
			$4 \leftarrow 3$	0, 2		
			$6 \leftarrow 5$	0, 2		
				0		
		$4 \leftarrow 3$	$4 \leftarrow 3$	0, 2	397 524.292(18) <sup>c)</sup>	
			$3 \leftarrow 2$	0, 2		
		$3 \leftarrow 2$	$5 \leftarrow 4$	0, 2	397 455.265(33)	
			$2 \leftarrow 1$	0, 2		
		$2 \leftarrow 1$	$4 \leftarrow 3$	0, 2	397 460.164(15) <sup>c)</sup>	
			$3 \leftarrow 2$	0, 2		
		$3 \leftarrow 2$	$4 \leftarrow 3$	0, 2	397 455.265(33)	
			$2 \leftarrow 1$	0, 2		
		$3 \leftarrow 2$	$3 \leftarrow 2$	0, 2	397 460.164(15) <sup>c)</sup>	
				0		
		$3 \leftarrow 2$	$4 \leftarrow 3$	0, 2	397 455.265(33)	
			$2 \leftarrow 1$	0, 2		
	$3_{03} \leftarrow 2_{12}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$5 \leftarrow 4$	$4 \leftarrow 3$	0, 2	387 033.963(8) <sup>c)</sup>
				$5 \leftarrow 4$	0, 2	
				$3 \leftarrow 2$	0, 2	
				$6 \leftarrow 5$	0, 2	
$5 \leftarrow 4$			$7 \leftarrow 6$	0, 2	386 988.978(15) <sup>c)</sup>	
				0		
$4 \leftarrow 3$			$4 \leftarrow 3$	0, 2	386 988.978(15) <sup>c)</sup>	
			$5 \leftarrow 4$	0, 2		
$4 \leftarrow 3$			$3 \leftarrow 2$	0, 2	386 948.272(12) <sup>c)</sup>	
			$6 \leftarrow 5$	0, 2		
$4 \leftarrow 3$			$2 \leftarrow 1$	0, 2	386 915.132(17)	
				0		
$3 \leftarrow 2$	$4 \leftarrow 3$	0, 2	386 913.424(8) <sup>c)</sup>			
	$3 \leftarrow 2$	0, 2				
$3 \leftarrow 2$	$5 \leftarrow 4$	0, 2	386 915.132(17)			
	$2 \leftarrow 1$	0, 2				
$2 \leftarrow 1$	$4 \leftarrow 3$	0, 2	386 915.132(17)			
	$2 \leftarrow 1$	0, 2				

			3 ← 2	0, 2	
	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	4 ← 3	3 ← 2	0, 2	386 860.665(19) <sup>°</sup>
			4 ← 3	0, 2	
			5 ← 4	0, 2	
			6 ← 5	0, 2	
		4 ← 3		0	
		3 ← 2	4 ← 3	0, 2	386 832.262(14) <sup>°</sup>
			5 ← 4	0, 2	
		3 ← 2	3 ← 2	0, 2	386 830.986(29) <sup>°</sup>
		3 ← 2		0	
$3_{03} \leftarrow 2_{12}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	3 ← 3	3 ← 3	0, 2	386 829.010(18) <sup>°</sup>
			4 ← 4	0, 2	
			2 ← 2	0, 2	
			1 ← 1	0, 2	
			5 ← 5	0, 2	
	$2\frac{1}{2} \leftarrow 1\frac{1}{2}$	3 ← 2	1 ← 1	0, 2	386 829.010(18) <sup>°</sup>
			2 ← 2	0, 2	
			4 ← 4	0, 2	
			3 ← 3	0, 2	
			1 ← 0	0, 2	
$3_{12} \leftarrow 3_{03}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	5 ← 5	7 ← 7	0, 2	272 559.279(22) <sup>°</sup>
			6 ← 6	0, 2	
			5 ← 5	0, 2	
			4 ← 4	0, 2	
			3 ← 3	0, 2	
		5 ← 5		0	
		4 ← 4	6 ← 6	0, 2	272 780.893(12) <sup>°</sup>
			5 ← 5	0, 2	
			4 ← 4	0, 2	
			3 ← 3	0, 2	
			2 ← 2	0, 2	
		4 ← 4		0	
		3 ← 3	5 ← 5	0, 2	272 909.924(16) <sup>°</sup>
			4 ← 4	0, 2	
			3 ← 3	0, 2	
			2 ← 2	0, 2	
			1 ← 1	0, 2	
		3 ← 3		0	
		2 ← 2	4 ← 4	0, 2	272 978.942(17) <sup>°</sup>
			3 ← 3	0, 2	
			2 ← 2	0, 2	
			1 ← 1	0, 2	
		2 ← 2		0	
	$2\frac{1}{2} \leftarrow 2\frac{1}{2}$	4 ← 4	5 ← 5	0, 2	287 032.291(32) <sup>°</sup>
			4 ← 4	0, 2	
			3 ← 3	0, 2	
			2 ← 2	0, 2	
		4 ← 4		0	
$4_{32} \leftarrow 4_{23}$	$3\frac{1}{2} \leftarrow 3\frac{1}{2}$	5 ← 5	7 ← 7	0, 2	294 929.389(10) <sup>°</sup>
			6 ← 6	0, 2	
			5 ← 5	0, 2	
			4 ← 4	0, 2	
			3 ← 3	0, 2	
		5 ← 5		0	
		4 ← 4	6 ← 6	0, 2	294 769.181(65) <sup>°</sup>

			5 ← 5	0, 2	
			4 ← 4	0, 2	
			3 ← 3	0, 2	
			2 ← 2	0, 2	
		4 ← 4		0	
		3 ← 3	5 ← 5	0, 2	294 621.028(28) <sup>°</sup>
			4 ← 4	0, 2	
			3 ← 3	0, 2	
			2 ← 2	0, 2	
			1 ← 1	0, 2	
		3 ← 3		0	
	4 $\frac{1}{2}$ ← 4 $\frac{1}{2}$	6 ← 6	8 ← 8	0, 2	280 162.440(15) <sup>°</sup>
			7 ← 7	0, 2	
			6 ← 6	0, 2	
			5 ← 5	0, 2	
			4 ← 4	0, 2	
		6 ← 6		0	
		5 ← 5	7 ← 7	0, 2	280 286.181(12) <sup>°</sup>
			6 ← 6	0, 2	
			5 ← 5	0, 2	
			4 ← 4	0, 2	
			3 ← 3	0, 2	
		5 ← 5		0	
2 <sub>02</sub> ← 1 <sub>11</sub>	1 $\frac{1}{2}$ ← $\frac{1}{2}$	3 ← 2	3 ← 2	1	268 497.401(33)
			4 ← 3	1	268 498.863(14)
	2 $\frac{1}{2}$ ← 1 $\frac{1}{2}$	2 ← 1	3 ← 2	1	272 892.488(14) <sup>°</sup>
			2 ← 1	1	
		3 ← 2	4 ← 3	1	272 966.356(25) <sup>°</sup>
			3 ← 2	1	
		4 ← 3	3 ← 2	1	273 026.389(12) <sup>°</sup>
			4 ← 3	1	
			5 ← 4	1	
3 <sub>13</sub> ← 2 <sub>02</sub>	3 $\frac{1}{2}$ ← 2 $\frac{1}{2}$	2 ← 1	2 ← 1	1	387 674.944(12) <sup>°</sup>
			3 ← 2	1	
			1 ← 0	1	
		3 ← 2	4 ← 3	1	387 706.023(17) <sup>°</sup>
			3 ← 2	1	
			2 ← 1	1	
		4 ← 3	4 ← 3	1	387 745.462(18) <sup>°</sup>
			5 ← 4	1	
			3 ← 2	1	
		5 ← 4	4 ← 3	1	387 793.963(18) <sup>°</sup>
			5 ← 4	1	
			6 ← 5	1	
	2 $\frac{1}{2}$ ← 1 $\frac{1}{2}$	3 ← 2	3 ← 2	1	388 840.481(26) <sup>°</sup>
			4 ← 3	1	
		4 ← 3	3 ← 2	1	388 864.514(21) <sup>°</sup>
			4 ← 3	1	
			5 ← 4	1	
3 <sub>22</sub> ← 3 <sub>13</sub>	3 $\frac{1}{2}$ ← 3 $\frac{1}{2}$	5 ← 5	6 ← 6	1	276 429.643(35) <sup>°</sup>
			5 ← 5	1	
			4 ← 4	1	
		4 ← 4	5 ← 5	1	276 641.535(26) <sup>°</sup>
			4 ← 4	1	
			3 ← 3	1	



		3 ← 3	4 ← 4	1	276 771.103(29) <sup>c)</sup>
			3 ← 3	1	
			2 ← 2	1	
	2 ← 2	3 ← 3	3 ← 3	1	276 845.639(19) <sup>c)</sup>
			2 ← 2	1	
			1 ← 1	1	
	2 $\frac{1}{2}$ ← 2 $\frac{1}{2}$	4 ← 4	3 ← 3	1	294 377.955(13) <sup>c)</sup>
			4 ← 4	1	
			5 ← 5	1	
4 <sub>22</sub> ← 4 <sub>13</sub>	3 $\frac{1}{2}$ ← 3 $\frac{1}{2}$	5 ← 5	6 ← 6	1	276 161.750(11) <sup>c)</sup>

<sup>a)</sup> Coupling scheme:  $\mathbf{J} = \mathbf{N} + \mathbf{S}$ ;  $\mathbf{F}_1 = \mathbf{J} + \mathbf{I}_1$ ;  $\mathbf{F} = \mathbf{F}_1 + \mathbf{I}_T$  where  $\mathbf{I}_1$  is the <sup>75</sup>As nuclear spin and  $\mathbf{I}_T$  is the <sup>2</sup>H total nuclear spin (2 and 0 or 1).

<sup>b)</sup> The figures in parentheses are the authors' estimates of experimental uncertainty (1σ).

<sup>c)</sup> Hyperfine components not fully resolved.

#### Molecular parameters for <sup>75</sup>As<sup>2</sup>H<sub>2</sub> (AsD<sub>2</sub>)

Parameter	Value	Method	Ref.
State: electronic $\tilde{X}^2B_1$ ; vibrational zero point level			
<i>A</i>	[MHz] 116 364.00(46) <sup>a)</sup>	MW	98Fuj2
<i>B</i>	[MHz] 107 523.95(38)		
<i>C</i>	[MHz] 55 224.776(65)		
<i>Δ<sub>K</sub></i>	[MHz] 17.133(31)		
<i>Δ<sub>NK</sub></i>	[MHz] – 11.514(64)		
<i>Δ<sub>N</sub></i>	[MHz] 3.493 0(24)		
<i>δ<sub>K</sub><sup>s</sup></i>	[MHz] – 1.033(26)		
<i>δ<sub>N</sub><sup>s</sup></i>	[MHz] 1.589 2(81)		
<i>ε<sub>aa</sub></i>	[MHz] – 17 011.39(75)		
<i>ε<sub>bb</sub></i>	[MHz] – 5 875.41(77)		
<i>ε<sub>cc</sub></i>	[MHz] 58.02(27)		
<i>Δ<sub>K</sub><sup>s</sup></i>	[MHz] 5.858(116)		
<i>Δ<sub>KN</sub><sup>s</sup> + Δ<sub>NK</sub><sup>s</sup></i>	[MHz] – 1.624(54)		
<i>Δ<sub>NK</sub><sup>s</sup></i>	[MHz] 0.0 <sup>b)</sup>		
<i>Δ<sub>N</sub><sup>s</sup></i>	[MHz] 0.0 <sup>b)</sup>		
<i>δ<sub>K</sub><sup>s</sup></i>	[MHz] 0.0 <sup>b)</sup>		
<i>δ<sub>N</sub><sup>s</sup></i>	[MHz] 0.383(25)		
<i>a<sub>F</sub></i> ( <sup>75</sup> As)	[MHz] 59.60(41)		
<i>T<sub>aa</sub></i> ( <sup>75</sup> As)	[MHz] – 287.49(14)		
<i>T<sub>bb</sub></i> ( <sup>75</sup> As)	[MHz] – 321.86 (15)		
<i>χ<sub>aa</sub></i> ( <sup>75</sup> As)	[MHz] 5.265(63)		
<i>χ<sub>bb</sub></i> ( <sup>75</sup> As)	[MHz] – 23.840(62)		
<i>C<sub>aa</sub></i> ( <sup>75</sup> As)	[MHz] 0.324(53)		
<i>C<sub>bb</sub></i> ( <sup>75</sup> As)	[MHz] 0.202(54)		
<i>C<sub>cc</sub></i> ( <sup>75</sup> As)	[MHz] 0.027(37)		
<i>a<sub>F</sub></i> ( <sup>2</sup> H)	[MHz] – 7.96(18)		
<i>T<sub>aa</sub></i> ( <sup>2</sup> H)	[MHz] – 0.124 <sup>b)</sup>		
<i>T<sub>bb</sub></i> ( <sup>2</sup> H)	[MHz] – 0.55(17)		

<sup>a)</sup> The numbers in parentheses represent 3 standard deviations of the least-squares fit, in units of the last quoted decimal place.

<sup>b)</sup> Parameter constrained to this value.

#### References for AsH<sub>2</sub>

- 98Fuj1 Fujiwara, H., Kobayashi, K., Ozeki, H., Saito, S. : J. Chem. Phys. **109** (1998) 5351.  
 98Fuj2 Fujiwara, H., Saito, S. : J. Mol. Spectrosc. **192** (1998) 399.  
 00Hug Hughes, R.A., Brown, J.M., Evenson, K.M. : J. Mol. Spectrosc. **200** (2000) 210.

**3.2.3.2.5 H<sub>2</sub>O<sup>+</sup>**Far-infrared data for <sup>1</sup>H<sub>2</sub><sup>16</sup>O<sup>+</sup>

Laser			Rotational transition <sup>a)</sup>		Ref.
Gas	$\lambda$ [μm]	$\nu$ [GHz]	$N_{K_a K_c}$	spin	
State: electronic $\tilde{X}^2B_1$ ; vibrational zero point level					
<sup>13</sup> CH <sub>3</sub> OH	115.823	2 588.361 7	$5_{24} \leftarrow 5_{15}$	$F_1 \leftarrow F_1$ $F_2 \leftarrow F_2$	98Mür
CH <sub>3</sub> OH	100.806	2 973.940 6	$2_{20} \leftarrow 1_{11}$ $6_{25} \leftarrow 6_{16}$	$F_1 \leftarrow F_1$ $F_2 \leftarrow F_2$	
<sup>13</sup> CH <sub>3</sub> OH	88.948	3 370.404 93	$5_{15} \leftarrow 3_{22}$ $7_{26} \leftarrow 7_{17}$	$F_1 \leftarrow F_1$ $F_1 \leftarrow F_2$	
			$3_{22} \leftarrow 2_{11}$ $4_{04} \leftarrow 2_{11}$	$F_2 \leftarrow F_1$ $F_1 \leftarrow F_2$	
CH <sub>3</sub> OH	81.917	3 659.704 49	$4_{40} \leftarrow 4_{31}$ $5_{42} \leftarrow 5_{33}$	$F_1 \leftarrow F_1$ $F_1 \leftarrow F_1$	
CD <sub>3</sub> OH	81.557	3 675.859 9	$4_{40} \leftarrow 4_{31}$ $5_{42} \leftarrow 5_{33}$	$F_2 \leftarrow F_1$ $F_1 \leftarrow F_1$	
CH <sub>3</sub> OH	77.905	3 848.185 5	$3_{21} \leftarrow 2_{12}$ $4_{23} \leftarrow 3_{12}$	$F_2 \leftarrow F_1$ $F_2 \leftarrow F_1$	
<sup>13</sup> CH <sub>3</sub> OH	63.096	4 751.340 9	$4_{22} \leftarrow 3_{13}$	$F_1 \leftarrow F_1$	
CH <sub>3</sub> OH	62.966	4 761.182 4	$4_{22} \leftarrow 3_{13}$	$F_1 \leftarrow F_1$	
CH <sub>3</sub> OH	56.728	5 284.711 86	$4_{31} \leftarrow 3_{22}$	$F_3 \leftarrow F_2$	

<sup>a)</sup> The levels with  $K_a K_c$  ee or oo are *ortho* and with eo or oe are *para*.Molecular parameters for <sup>1</sup>H<sub>2</sub><sup>16</sup>O<sup>+</sup>

Parameter	Value	Method	Ref.
State: electronic $\tilde{X}^2B_1$ ; vibrational zero point level			
<i>A</i>	[cm <sup>-1</sup> ]	FIR	98Mür
<i>B</i>	[cm <sup>-1</sup> ]		
<i>C</i>	[cm <sup>-1</sup> ]		
$\Delta_K$	[cm <sup>-1</sup> ]		
$\Delta_{NK}$	[cm <sup>-1</sup> ]		
$\Delta_N$	[cm <sup>-1</sup> ]		
$\delta_K$	[cm <sup>-1</sup> ]		
$\delta_N$	[cm <sup>-1</sup> ]		
$\phi_K$	[cm <sup>-1</sup> ]		
$\phi_{KN}$	[cm <sup>-1</sup> ]		
$\phi_{NK}$	[cm <sup>-1</sup> ]		
$\phi_N$	[cm <sup>-1</sup> ]		
$\phi_K$	[cm <sup>-1</sup> ]		
$\phi_{NK}$	[cm <sup>-1</sup> ]		
$\phi_N$	[cm <sup>-1</sup> ]		
$L_K$	[cm <sup>-1</sup> ]		
$\mathcal{E}_{aa}$	[cm <sup>-1</sup> ]		
$\mathcal{E}_{bb}$	[cm <sup>-1</sup> ]		
$\mathcal{E}_{cc}$	[cm <sup>-1</sup> ]		
$\Delta_K^s$	[cm <sup>-1</sup> ]		
$\Delta_{KN}^s + \Delta_{NK}^s$	[cm <sup>-1</sup> ]		
$\Delta_{NK}^s$	[cm <sup>-1</sup> ]		
$\Delta_N^s$	[cm <sup>-1</sup> ]		

$\delta_K^s$	[cm <sup>-1</sup> ]	0.0 <sup>b)</sup>
$\delta_N^s$	[cm <sup>-1</sup> ]	0.112 8(81)×10 <sup>-4</sup>
$\Phi_K^s$	[cm <sup>-1</sup> ]	- 0.696(13)×10 <sup>-4</sup>
$a_F(^1\text{H})$	[cm <sup>-1</sup> ]	- 0.250 62(91)×10 <sup>-2</sup>
$T_{aa}(^1\text{H})$	[cm <sup>-1</sup> ]	0.129 8(29)×10 <sup>-2</sup>
$T_{bb}(^1\text{H})$	[cm <sup>-1</sup> ]	- 0.600(26)×10 <sup>-3</sup>
$g_{s_{aa}}^{aa}$		- 2.018 86(15)
$g_{s_{bb}}^{bb}$		- 2.006 57(13)
$g_{s_{cc}}^{cc}$		- 2.002 11(13)
$g_{r_{aa}}^{aa}$		- 0.674 2(43)×10 <sup>-2</sup>
$g_{r_{bb}}^{bb}$		- 0.586(30)×10 <sup>-3</sup>
$g_{r_{cc}}^{cc}$		0.421(30)×10 <sup>-3</sup>

<sup>a)</sup> The numbers in parentheses represent 1 standard deviation of the least-squares fit, in units of the last quoted decimal place.

<sup>b)</sup> Parameter constrained to this value.

Reference for H<sub>2</sub>O<sup>+</sup>

98Mür Mürztz, P., Zink, L.R., Evenson, K.M., Brown, J.M. : J. Chem. Phys. **109** (1998) 9744.

### 3.2.3.2.6 HCS

Microwave data for <sup>1</sup>H<sup>12</sup>C<sup>32</sup>S

Transition			$\nu$ [MHz]	Ref.
rotational $N' - N''$	fine structure $J' - J''$	Hyperfine <sup>a)</sup>		
		$F' - F''$		
State: electronic $\tilde{X}^2A'$ ; vibrational (0,0,0)				
$1_{01} \leftarrow 0_{00}$	$1\frac{1}{2} \leftarrow \frac{1}{2}$	$1 \leftarrow 0$	40 282.098(3) <sup>a)</sup>	98Hab
		$1 \leftarrow 1$	40 154.665(3)	
		$2 \leftarrow 1$	40 262.996(3)	
	$\frac{1}{2} \leftarrow \frac{1}{2}$	$0 \leftarrow 1$	40 337.535(3)	
		$1 \leftarrow 0$	40 458.131(3)	
		$1 \leftarrow 1$	40 330.713(3)	

<sup>a)</sup> Coupling scheme:  $J = N + S$ ;  $F = J + I$  where  $I$  is the <sup>1</sup>H nuclear spin.

Molecular parameters for <sup>1</sup>H<sup>12</sup>C<sup>32</sup>S

Parameter	Value	Method	Ref.
State: electronic $\tilde{X}^2A'$ ; vibrational (0,0,0)			
$B_{\text{eff}}$	[MHz] 20 145.455 0(36) <sup>a)</sup>	MW	98Hab
$\gamma_{\text{eff}}$	[MHz] - 54.292 2(127)		
$b(^1\text{H})$	[MHz] 119.755(24)		
$c(^1\text{H})$	[MHz] 23.014(43)		
$\mu_a$	[D] 0.4 <sup>b)</sup>	Theory	98 Kai

<sup>a)</sup> The numbers in parenthesis are 3 standard deviations of the least-squares fit, in units of the last quoted decimal place.

<sup>b)</sup> This is a calculated value for the component along the  $a$ -inertial axis; the total dipole moment is calculated to have a magnitude of 1.02 Debye [99Och].

References for HCS

- 98Hab Habara, H., Yamamoto, S., Ochsenfeld, C., Head-Gordon, M., Kaiser, R.I., Lee, Y.T. : J. Chem. Phys. **108** (1998) 8859.  
 98Kai Kaiser, R.I., Ochsenfeld, C., Head-Gordon, M., Lee, Y.T. : Science **279** (1998) 1181.  
 99Och Ochsenfeld, C., Kaiser, R.I., Lee, Y.T., Head-Gordon, M.: J. Chem. Phys.. **110** (1999) 9982.

**3.2.3.2.7 HSC**Microwave data for  $^1\text{H}^{33}\text{S}^{12}\text{C}$ 

Transition			$\nu$ [MHz]	Ref.
rotational $N' - N''$	fine structure $J' - J''$	Hyperfine <sup>a)</sup>		
		$F' - F''$		
State: electronic $\tilde{X}^2A'$ ; vibrational (0,0,0)				
$1_{01} \leftarrow 0_{00}$	$1\frac{1}{2} \leftarrow \frac{1}{2}$	$1 \leftarrow 0$	40 599.864(2) <sup>b)</sup>	00Hab
		$2 \leftarrow 1$	40 606.608(2)	
	$\frac{1}{2} \leftarrow \frac{1}{2}$	$0 \leftarrow 1$	40 584.337(2)	
$3_{03} \leftarrow 2_{02}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$1 \leftarrow 1$	40 595.040(2)	
		$4 \leftarrow 3$	121 779.448(14)	
	$4_{04} \leftarrow 3_{03}$	$3\frac{1}{2} \leftarrow 2\frac{1}{2}$	$4 \leftarrow 3$	
$5_{05} \leftarrow 4_{04}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$3 \leftarrow 2$	162 325.094(14)	
		$5 \leftarrow 4$	162 338.197(14)	
	$4 \leftarrow 3$	162 332.832(14)		
	$5 \leftarrow 4$	202 861.053(14)		
	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$4 \leftarrow 3$	202 855.813(14)	
$5_{15} \leftarrow 4_{14}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$6 \leftarrow 5$	202 869.334(14)	
		$5 \leftarrow 4$	202 864.107(14)	
	$5 \leftarrow 4$	199 330.587(14)		
	$4 \leftarrow 3$	199 339.611(14)		
	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$6 \leftarrow 5$	199 209.850(14)	
$5_{14} \leftarrow 4_{13}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$5 \leftarrow 4$	199 218.921(14)	
		$5 \leftarrow 4$	206 677.606(14)	
	$4 \leftarrow 3$	206 683.906(14)		
	$6 \leftarrow 5$	206 581.850(14)		
	$5 \leftarrow 4$	206 588.269(14)		
$6_{06} \leftarrow 5_{05}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$6 \leftarrow 5$	243 356.221(14)	
		$5 \leftarrow 4$	243 350.429(14)	
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$7 \leftarrow 6$	243 366.041(14)	
	$6 \leftarrow 5$	243 360.309(14)		
	$7 \leftarrow 6$	239 051.810(14)		
$6_{16} \leftarrow 5_{15}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$6 \leftarrow 5$	239 058.810(14)	
		$7 \leftarrow 6$	247 950.721(14)	
	$6_{15} \leftarrow 5_{14}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$6 \leftarrow 5$	
$6_{25} \leftarrow 5_{24}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$7 \leftarrow 6$	247 935.688(14)	
		$6 \leftarrow 5$	243 666.374(14)	
	$5 \leftarrow 4$	243 669.792(14)		
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$7 \leftarrow 6$	243 321.344(14)	
	$6 \leftarrow 5$	243 325.053(14)		
$6_{24} \leftarrow 5_{23}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$6 \leftarrow 5$	243 871.241(14)	
		$5 \leftarrow 4$	243 874.664(14)	
	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$7 \leftarrow 6$	243 527.633(14)	
	$6 \leftarrow 5$	243 531.307(14)		
	$6_{42} \leftarrow 5_{41}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$6 \leftarrow 5$	
$6_{43} \leftarrow 5_{42}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$6 \leftarrow 5$	244 159.627(14) <sup>c)</sup>	
$7_{07} \leftarrow 6_{06}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$7 \leftarrow 6$	283 785.954(14)	
		$6 \leftarrow 5$	283 765.482(14)	

	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	$8 \leftarrow 7$	283 821.495(14)
		$7 \leftarrow 6$	283 802.951(14)
$7_{17} \leftarrow 6_{16}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$7 \leftarrow 6$	278 930.413(14)
		$6 \leftarrow 5$	278 937.062(14)
	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	$8 \leftarrow 7$	278 872.679(14)
		$7 \leftarrow 6$	278 879.376(14)
$7_{16} \leftarrow 6_{15}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$6 \leftarrow 5$	289 218.222(14)
	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	$8 \leftarrow 7$	289 112.927(14)
		$7 \leftarrow 6$	289 117.941(14)
$7_{26} \leftarrow 6_{25}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$7 \leftarrow 6$	284 153.961(14)
	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	$7 \leftarrow 6$	283 910.223(14)
$7_{25} \leftarrow 6_{24}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$6 \leftarrow 5$	284 484.612(14)
$7_{43} \leftarrow 6_{42}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$7 \leftarrow 6$	284 434.715(14) <sup>°</sup>
$7_{44} \leftarrow 6_{43}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$7 \leftarrow 6$	284 434.715(14) <sup>°</sup>
$7_{43} \leftarrow 6_{42}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$6 \leftarrow 5$	284 436.174(14) <sup>°</sup>
$7_{44} \leftarrow 6_{43}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$6 \leftarrow 5$	284 436.174(14) <sup>°</sup>
$8_{08} \leftarrow 7_{07}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	$8 \leftarrow 7$	324 263.915(14)
		$7 \leftarrow 6$	324 284.848(14)
	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$9 \leftarrow 8$	324 229.079(14)
		$8 \leftarrow 7$	324 248.422(14)
$9_{09} \leftarrow 8_{08}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$9 \leftarrow 8$	364 570.967(14)
		$8 \leftarrow 7$	364 565.132(14)
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$10 \leftarrow 9$	364 582.104(14)
		$9 \leftarrow 8$	364 576.189(14)
$9_{19} \leftarrow 8_{18}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$9 \leftarrow 8$	358 490.010(14)
		$8 \leftarrow 7$	358 495.288(14)
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$10 \leftarrow 9$	358 456.742(14)
		$9 \leftarrow 8$	358 462.076(14)
$9_{18} \leftarrow 8_{17}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$9 \leftarrow 8$	371 704.178(14)
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$10 \leftarrow 9$	371 692.969(14)
		$9 \leftarrow 8$	371 694.580(14)
$9_{28} \leftarrow 8_{27}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$9 \leftarrow 8$	365 144.914(14)
		$8 \leftarrow 7$	365 147.071(14)
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$10 \leftarrow 9$	365 002.837(14)
		$9 \leftarrow 8$	365 005.125(14)
$9_{27} \leftarrow 8_{26}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$9 \leftarrow 8$	365 846.356(14)
		$8 \leftarrow 7$	365 848.474(14)
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$10 \leftarrow 9$	365 707.476(14)
		$9 \leftarrow 8$	365 709.684(14)
$9_{37} \leftarrow 8_{36}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$9 \leftarrow 8$	365 313.546(14)
		$8 \leftarrow 7$	365 315.049(14)
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$10 \leftarrow 9$	364 972.954(14)
		$9 \leftarrow 8$	364 974.701(14)
$9_{36} \leftarrow 8_{35}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$9 \leftarrow 8$	365 320.188(14)
		$8 \leftarrow 7$	365 321.664(14)
$9_{36} \leftarrow 8_{35}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$8 \leftarrow 7$	365 321.664(14)
$9_{45} \leftarrow 8_{44}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$9 \leftarrow 8$	365 235.043(14) <sup>°</sup>
$9_{46} \leftarrow 8_{45}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$9 \leftarrow 8$	365 235.043(14) <sup>°</sup>
$9_{45} \leftarrow 8_{44}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$8 \leftarrow 7$	365 236.177(14) <sup>°</sup>

$9_{46} \leftarrow 8_{45}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$8 \leftarrow 7$	365 236.177(14) <sup>°</sup>
$9_{45} \leftarrow 8_{44}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$10 \leftarrow 9$	364 612.182(14) <sup>°</sup>
$9_{46} \leftarrow 8_{45}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$10 \leftarrow 9$	364 612.182(14) <sup>°</sup>
$9_{45} \leftarrow 8_{44}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$9 \leftarrow 8$	364 613.636(14) <sup>°</sup>
$9_{46} \leftarrow 8_{45}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$9 \leftarrow 8$	364 613.636(14) <sup>°</sup>
$9_{54} \leftarrow 8_{53}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$9 \leftarrow 8$	365 171.118(14) <sup>°</sup>
$9_{55} \leftarrow 8_{54}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$9 \leftarrow 8$	365 171.118(14) <sup>°</sup>
$9_{54} \leftarrow 8_{53}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$8 \leftarrow 7$	365 172.015(14) <sup>°</sup>
$9_{55} \leftarrow 8_{54}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$8 \leftarrow 7$	365 172.015(14) <sup>°</sup>
$9_{54} \leftarrow 8_{53}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$9 \leftarrow 8$	364 180.673(14) <sup>°</sup>
$9_{55} \leftarrow 8_{54}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$9 \leftarrow 8$	364 180.673(14) <sup>°</sup>
$4_{13} \leftarrow 4_{04}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5 \leftarrow 5$	282 449.966(14)
		$4 \leftarrow 4$	282 344.004(14)
$5_{14} \leftarrow 5_{05}$	$4\frac{1}{2} \leftarrow 4\frac{1}{2}$	$4 \leftarrow 4$	285 519.527(14)
	$5\frac{1}{2} \leftarrow 5\frac{1}{2}$	$6 \leftarrow 6$	286 162.574(14)
$6_{15} \leftarrow 6_{06}$	$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	$7 \leftarrow 7$	290 727.928(14)
$7_{16} \leftarrow 7_{07}$	$6\frac{1}{2} \leftarrow 6\frac{1}{2}$	$7 \leftarrow 7$	295 632.961(14)
		$6 \leftarrow 6$	295 574.956(14)
	$7\frac{1}{2} \leftarrow 7\frac{1}{2}$	$8 \leftarrow 8$	296 019.221(14)
		$7 \leftarrow 7$	295 958.487(14)

<sup>a</sup>) Coupling scheme:  $\mathbf{J} = \mathbf{N} + \mathbf{S}$ ;  $\mathbf{F} = \mathbf{J} + \mathbf{I}$  where  $\mathbf{I}$  is the  $^1\text{H}$  nuclear spin.

<sup>b</sup>) The figures in parentheses are the authors' estimates of the experimental uncertainty, in units of the last quoted decimal place. <sup>°</sup>)  $K$ -type doubling not resolved for lines with  $K \geq 4$ .

#### Molecular parameters for $^1\text{H}^{32}\text{S}^{12}\text{C}$

Parameter	Value	Method	Ref.
State: electronic $\tilde{X}^2A'$ ; vibrational (0,0,0)			
$A$	[MHz]	295 038.877(80) <sup>a</sup> )	MW
$B$	[MHz]	21 038.331(30)	00Hab
$C$	[MHz]	19 562.055(30)	
$\Delta_K$	[MHz]	27.2 <sup>b</sup> )	
$\Delta_{NK}$	[MHz]	1.574 35(83)	
$\Delta_N$	[kHz]	42.291(25)	
$\delta_K$	[MHz]	1.082 1(145)	
$\delta_N$	[kHz]	3.162(25)	
$\phi_K$	[MHz]	0.0 <sup>b</sup> )	
$\phi_{KN}$	[kHz]	0.594 3(151)	
$\phi_{NK}$	[Hz]	10.8(55)	
$\phi_N$	[kHz]	0.0 <sup>b</sup> )	
$\phi_K$	[kHz]	0.0 <sup>b</sup> )	
$\phi_{NK}$	[kHz]	0.0 <sup>b</sup> )	
$\phi_N$	[kHz]	0.0 <sup>b</sup> )	
$\varepsilon_{aa}$	[MHz]	3 264.80(53)	
$\varepsilon_{bb}$	[MHz]	37.313(14)	
$\varepsilon_{cc}$	[MHz]	- 10.595(41)	
$\varepsilon_{ab}$	[MHz]	227.968(51) <sup>c</sup> )	
$\Delta_K^s$	[MHz]	- 1.292(29)	
$\Delta_{KN}^s + \Delta_{NK}^s$	[MHz]	- 0.166 9 <sup>b</sup> )	
$\Delta_{NK}^s$	[MHz]	- 0.166 9(100)	
$\Delta_N^s$	[MHz]	0.0 <sup>b</sup> )	

$\delta_K^S$	[MHz]	0.0 <sup>b)</sup>
$\delta_N^S$	[MHz]	0.0 <sup>b)</sup>
$a_F(^1\text{H})$	[MHz]	288.845(185)
$T_{aa}(^1\text{H})$	[MHz]	4.947(25)
$T_{bb}(^1\text{H})$	[MHz]	-62(21)
$T_{ab}(^1\text{H})$	[MHz]	3.24(81) <sup>c)</sup>
$r_e(\text{H-S})$	[nm]	0.137 9(3)
$r_e(\text{S-C})$	[nm]	0.163 43(5)
$\alpha_e(\text{H-S-C})$	[deg]	104.2(2)

<sup>a)</sup> The numbers in parentheses represent 3 standard deviations of the least-squares fit, in units of the last quoted decimal place.

<sup>b)</sup> Parameter constrained to this value.

<sup>c)</sup> Only the relative sign of  $\varepsilon_{ab}$  and  $T_{ab}(^1\text{H})$  was determined.

Microwave data for  $^2\text{H}^{32}\text{S}^{12}\text{C}$  (DSC)

Transition			$\nu$ [MHz]	Ref.
rotational $N' - N''$	fine structure $J' - J''$	Hyperfine <sup>a)</sup>		
		$F' - F''$		
State: electronic $\tilde{X}^2A'$ ; vibrational (0,0,0)				
$6_{15} \leftarrow 5_{14}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	237 520.020(15) <sup>b,c)</sup>	00Hab
		$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	237 520.020(15) <sup>c)</sup>	
		$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	237 484.728(15) <sup>c)</sup>	
$7_{17} \leftarrow 6_{16}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	259 866.658(15) <sup>c)</sup>	
		$7\frac{1}{2} \leftarrow 6\frac{1}{2}$		
		$8\frac{1}{2} \leftarrow 7\frac{1}{2}$		
$7_{17} \leftarrow 6_{16}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	259 826.580(15)	
$7_{35} \leftarrow 6_{34}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	269 130.859(15) <sup>c)</sup>	
		$6\frac{1}{2} \leftarrow 5\frac{1}{2}$		
		$7\frac{1}{2} \leftarrow 6\frac{1}{2}$		
$7_{34} \leftarrow 6_{33}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	268 832.590(15) <sup>c)</sup>	
		$7\frac{1}{2} \leftarrow 6\frac{1}{2}$		
		$8\frac{1}{2} \leftarrow 7\frac{1}{2}$		
$7_{43} \leftarrow 6_{42}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	269 073.346(15) <sup>c,d)</sup>	
		$6\frac{1}{2} \leftarrow 5\frac{1}{2}$		
		$7\frac{1}{2} \leftarrow 6\frac{1}{2}$		
$7_{44} \leftarrow 6_{43}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	269 073.346(15) <sup>c,d)</sup>	
		$6\frac{1}{2} \leftarrow 5\frac{1}{2}$		
		$7\frac{1}{2} \leftarrow 6\frac{1}{2}$		
$7_{43} \leftarrow 6_{42}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	268 470.512(15) <sup>c,d)</sup>	
		$7\frac{1}{2} \leftarrow 6\frac{1}{2}$		
		$8\frac{1}{2} \leftarrow 7\frac{1}{2}$		
$7_{44} \leftarrow 6_{43}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	268 470.512(15) <sup>c,d)</sup>	
		$7\frac{1}{2} \leftarrow 6\frac{1}{2}$		
		$8\frac{1}{2} \leftarrow 7\frac{1}{2}$		
$7_{52} \leftarrow 6_{51}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	269 076.950(15) <sup>c,d)</sup>	
		$6\frac{1}{2} \leftarrow 5\frac{1}{2}$		
		$7\frac{1}{2} \leftarrow 6\frac{1}{2}$		

$7_{53} \leftarrow 6_{52}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	269 076.950(15) <sup>c,d</sup>
		$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	
		$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	
$7_{52} \leftarrow 6_{51}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	268 119.271(15) <sup>c,d</sup>
		$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	
		$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	
$7_{53} \leftarrow 6_{52}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	268 119.271(15) <sup>c,d</sup>
		$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	
		$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	
$9_{09} \leftarrow 8_{08}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	341 777.903(15) <sup>c,e</sup>
		$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	
		$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	
$9_{09} \leftarrow 8_{08}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	341 777.903(15) <sup>c,e</sup>
		$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	
		$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	
$9_{19} \leftarrow 8_{18}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	333 713.701(15)
		$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	333 712.483(15) <sup>e</sup>
		$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	333 688.418(15) <sup>e</sup>
		$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	
		$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	333 687.193(15)
$9_{18} \leftarrow 8_{17}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	355 573.191(15) <sup>e</sup>
		$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	
		$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	355 575.959(15) <sup>e</sup>
		$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	
		$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	
$9_{28} \leftarrow 8_{27}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	344 984.377(15) <sup>e</sup>
		$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	
		$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	344 901.105(15) <sup>e</sup>
		$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	
		$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	
$9_{27} \leftarrow 8_{26}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	348 803.778(15) <sup>e</sup>
		$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	
		$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	348 696.267(15) <sup>e</sup>
		$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	
		$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	
$9_{36} \leftarrow 8_{35}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	345 938.494(15) <sup>e</sup>
		$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	
		$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	
$9_{54} \leftarrow 8_{53}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	345 026.946(15) <sup>c,d</sup>
		$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	
		$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	
$9_{55} \leftarrow 8_{54}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	345 026.946(15) <sup>c,d</sup>



		$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	
		$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	
$10_{0,10} \leftarrow 9_{09}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$378\,790.888(15)^{c,c)}$
		$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	
		$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$378\,790.888(15)^{c,c)}$
		$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	
		$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	
$10_{1,10} \leftarrow 9_{19}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$370\,523.262(15)^{c)}$
		$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	
		$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	$370\,521.988(15)$
$10_{19} \leftarrow 9_{18}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$394\,792.218(15)^{c)}$
		$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	
		$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$394\,759.265(15)^{c)}$
		$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	
		$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	
$10_{29} \leftarrow 9_{28}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$383\,104.577(15)^{c)}$
		$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	
		$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$383\,039.113(15)^{c)}$
		$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	
		$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	
$10_{28} \leftarrow 9_{27}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$388\,281.209(15)^{c)}$
		$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	
		$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$388\,226.681(15)^{c)}$
		$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	
		$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	
$10_{38} \leftarrow 9_{37}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$384\,487.662(15)^{c)}$
		$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	
		$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$384\,330.913(15)^{c)}$
		$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	
		$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	
$10_{37} \leftarrow 9_{36}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$384\,702.426(15)^{c)}$
		$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	
		$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$384\,546.015(15)^{c)}$
		$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	
		$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	
$10_{46} \leftarrow 9_{45}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$383\,889.064(15)^{c)}$
		$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	
		$11\frac{1}{2} \leftarrow 10\frac{1}{2}$	
$10_{56} \leftarrow 9_{55}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$383\,908.937(15)^{c,c)}$
		$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	

$10_{55} \leftarrow 9_{54}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$ $8\frac{1}{2} \leftarrow 7\frac{1}{2}$ $9\frac{1}{2} \leftarrow 8\frac{1}{2}$ $10\frac{1}{2} \leftarrow 9\frac{1}{2}$	383 908.937(15) <sup>c,*)</sup>
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<sup>a)</sup> Coupling scheme:  $\mathbf{J} = \mathbf{N} + \mathbf{S}$ ;  $\mathbf{F} = \mathbf{J} + \mathbf{I}_1$  where  $\mathbf{I}_1$  is the  $^1\text{H}$  nuclear spin.

<sup>b)</sup> The figures in parentheses are the authors' estimates of the experimental uncertainty, in units of the last quoted decimal place.

<sup>c)</sup> D hyperfine structure not resolved.

<sup>d)</sup> K-type doubling not resolved for lines with  $K \geq 4$ .

<sup>e)</sup> Electron spin doubling not resolved for lines with  $K = 0$ .

#### Molecular parameters for $^3\text{H}^{32}\text{S}^{12}\text{C}$ (DSC)

Parameter	Value	Method	Ref.
State: electronic $\tilde{X}^2A'$ ; vibrational (0,0,0)			
$A$	[MHz] 155 927.68(160) <sup>a)</sup>	MW	00Hab
$B$	[MHz] 20 431.716 9(140)		
$C$	[MHz] 17 980.224 7(133)		
$\Delta_K$	[MHz] 8.9 <sup>b)</sup>		
$\Delta_{NK}$	[MHz] 1.208 42(54)		
$\Delta_N$	[kHz] 36.372(31)		
$\delta_K^s$	[MHz] 0.817 0(43)		
$\delta_N^s$	[kHz] 4.880(28)		
$\phi_K$	[MHz] 0.0 <sup>b)</sup>		
$\phi_{KN}$	[kHz] 0.202 8(150)		
$\phi_{NK}$	[Hz] 10.1(22)		
$\phi_N$	[kHz] 0.0 <sup>b)</sup>		
$\phi_K^s$	[kHz] 0.0 <sup>b)</sup>		
$\phi_{NK}^s$	[kHz] 0.0 <sup>b)</sup>		
$\phi_N^s$	[kHz] 0.0 <sup>b)</sup>		
$\mathcal{E}_{aa}$	[MHz] 1 833.47(88)		
$\mathcal{E}_{bb}$	[MHz] 23.503(115)		
$\mathcal{E}_{cc}$	[MHz] - 12.68(23)		
$\mathcal{E}_{ab}$	[MHz] 192.655(140) <sup>c)</sup>		
$\Delta_K^s$	[MHz] - 0.292(28)		
$\Delta_{KN}^s + \Delta_{NK}^s$	[MHz] - 0.097 9 <sup>b)</sup>		
$\Delta_{NK}^s$	[MHz] - 0.097 9(89)		
$\Delta_N^s$	[MHz] 0.0 <sup>b)</sup>		
$\delta_K^s$	[MHz] - 111(64)		
$\delta_N^s$	[MHz] 0.0 <sup>b)</sup>		
$a_F(^1\text{H})$	[MHz] 44.3 <sup>b)</sup>		
$T_{aa}^s(^1\text{H})$	[MHz] 0.76 <sup>b)</sup>		
$T_{bb}^s(^1\text{H})$	[MHz] - 0.1 <sup>b)</sup>		
$T_{ab}^s(^1\text{H})$	[MHz] 0.5 <sup>b)</sup>		

<sup>a)</sup> The numbers in parentheses represent 3 standard deviations of the least-squares fit, in units of the last quoted decimal place.

<sup>b)</sup> Parameter constrained to this value.

<sup>c)</sup> The relative sign of  $\mathcal{E}_{ab}$  and  $T_{ab}^s(^1\text{H})$  is correct.

#### Reference for HSC

00Hab Habara, H., Yamamoto, S. : J. Chem. Phys. **112** (2000) 10 905.

**3.2.3.2.8 HSiO**Microwave data for  $^1\text{H}^{28}\text{Si}^{16}\text{O}$ 

Transition			$\nu$ [MHz]	Ref.
rotational $N' - N''$	fine structure $J' - J''$	Hyperfine <sup>a)</sup>		
		$F' - F''$		
State: electronic $\tilde{X}^2A'$ ; vibrational (0,0,0)				
$5_{05} \leftarrow 4_{04}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$4 \leftarrow 3$	192 386.839	97Izu
		$5 \leftarrow 4$	192 374.264	
		$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	192 358.354	
$5_{15} \leftarrow 4_{14}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$6 \leftarrow 5$	192 345.793	
		$4 \leftarrow 3$	189 383.843	
		$5 \leftarrow 4$	189 333.380	
$5_{14} \leftarrow 4_{13}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5 \leftarrow 4$	189 161.396	
		$6 \leftarrow 5$	189 110.984	
		$4 \leftarrow 3$	195 713.116	
$6_{06} \leftarrow 5_{05}$	$4\frac{1}{2} \leftarrow 3\frac{1}{2}$	$5 \leftarrow 4$	195 700.097	
		$5 \leftarrow 4$	195 557.274	
		$6 \leftarrow 5$	195 544.238	
$6_{16} \leftarrow 5_{15}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5 \leftarrow 4$	230 807.622	
		$6 \leftarrow 5$	230 796.302	
		$7 \leftarrow 6$	230 766.195	
$6_{15} \leftarrow 5_{14}$	$5\frac{1}{2} \leftarrow 4\frac{1}{2}$	$5 \leftarrow 4$	227 175.998	
		$6 \leftarrow 5$	227 102.903	
		$6 \leftarrow 5$	227 033.628	
$6_{25} \leftarrow 5_{24}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$7 \leftarrow 6$	226 960.553	
		$5 \leftarrow 4$	234 779.882	
		$6 \leftarrow 5$	234 769.909	
$6_{24} \leftarrow 5_{23}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$6 \leftarrow 5$	234 683.426	
		$7 \leftarrow 6$	234 673.367	
		$5 \leftarrow 4$	231 168.667	
$7_{07} \leftarrow 6_{06}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$6 \leftarrow 5$	231 161.674	
		$7 \leftarrow 6$	230 623.456	
		$5 \leftarrow 4$	231 310.739	
$7_{17} \leftarrow 6_{16}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$6 \leftarrow 5$	231 303.833	
		$7 \leftarrow 6$	230 771.152	
		$6 \leftarrow 5$	269 196.490	
$7_{16} \leftarrow 6_{15}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$7 \leftarrow 6$	269 187.050	
		$7 \leftarrow 6$	269 167.683	
		$8 \leftarrow 7$	269 158.136	
$7_{26} \leftarrow 6_{25}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	$6 \leftarrow 5$	264 974.938	
		$8 \leftarrow 7$	264 793.007	
		$6 \leftarrow 5$	273 852.446	
$7_{25} \leftarrow 6_{24}$	$6\frac{1}{2} \leftarrow 5\frac{1}{2}$	$7 \leftarrow 6$	273 859.382	
		$7 \leftarrow 6$	273 926.917	
		$8 \leftarrow 7$	273 914.596	
$7_{24} \leftarrow 6_{23}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	$6 \leftarrow 5$	269 539.454	
		$7 \leftarrow 6$	269 533.024	
		$7 \leftarrow 6$	269 139.518	
$7_{23} \leftarrow 6_{22}$	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	$8 \leftarrow 7$	269 133.097	
		$6 \leftarrow 5$	269 767.421	

		$7 \leftarrow 6$	269 761.122
	$7\frac{1}{2} \leftarrow 6\frac{1}{2}$	$7 \leftarrow 6$	269 374.981
		$8 \leftarrow 7$	269 368.702
$9_{09} \leftarrow 8_{08}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$8 \leftarrow 7$	346 088.325
		$9 \leftarrow 8$	346 025.860
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$9 \leftarrow 8$	345 881.607
		$10 \leftarrow 9$	345 837.945
$9_{19} \leftarrow 8_{18}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$8 \leftarrow 7$	340 559.654
		$9 \leftarrow 8$	340 530.021
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$9 \leftarrow 8$	340 442.774
		$10 \leftarrow 9$	340 413.096
$9_{18} \leftarrow 8_{17}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$8 \leftarrow 7$	351 980.555
		$9 \leftarrow 8$	351 975.401
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$9 \leftarrow 8$	351 950.785
		$10 \leftarrow 9$	351 945.943
$9_{28} \leftarrow 8_{27}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$8 \leftarrow 7$	346 337.410
		$9 \leftarrow 8$	346 330.979
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$9 \leftarrow 8$	346 084.790
		$10 \leftarrow 9$	346 078.338
$9_{27} \leftarrow 8_{26}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$8 \leftarrow 7$	346 827.173
		$9 \leftarrow 8$	346 821.198
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$9 \leftarrow 8$	346 586.779
		$10 \leftarrow 9$	346 580.791
$9_{37} \leftarrow 8_{36}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$9 \leftarrow 8$	346 508.689
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$10 \leftarrow 9$	345 980.307
$9_{36} \leftarrow 8_{35}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$8 \leftarrow 7$	346 515.412
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$9 \leftarrow 8$	345 987.273
$9_{46} \leftarrow 8_{45}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$8 \leftarrow 7$	346 535.105 <sup>b)</sup>
		$9 \leftarrow 8$	346 532.822 <sup>b)</sup>
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$9 \leftarrow 8$	345 615.342 <sup>b)</sup>
		$10 \leftarrow 9$	345 613.051 <sup>b)</sup>
$9_{45} \leftarrow 8_{43}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$8 \leftarrow 7$	346 535.105 <sup>b)</sup>
		$9 \leftarrow 8$	346 532.822 <sup>b)</sup>
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$9 \leftarrow 8$	345 615.342 <sup>b)</sup>
		$10 \leftarrow 9$	345 613.051 <sup>b)</sup>
$9_{55} \leftarrow 8_{54}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$8 \leftarrow 7$	346 590.802 <sup>b)</sup>
		$9 \leftarrow 8$	346 588.857 <sup>b)</sup>
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$9 \leftarrow 8$	345 161.872 <sup>b)</sup>
		$10 \leftarrow 9$	345 159.885 <sup>b)</sup>
$9_{54} \leftarrow 8_{53}$	$8\frac{1}{2} \leftarrow 7\frac{1}{2}$	$8 \leftarrow 7$	346 590.802 <sup>b)</sup>
		$9 \leftarrow 8$	346 588.857 <sup>b)</sup>
	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$9 \leftarrow 8$	345 161.872 <sup>b)</sup>
		$10 \leftarrow 9$	345 159.885 <sup>b)</sup>
$10_{0,10} \leftarrow 9_{09}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$9 \leftarrow 8$	384 160.437
		$10 \leftarrow 9$	384 153.474
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	$11 \leftarrow 10$	384 116.788
$10_{1,10} \leftarrow 9_{19}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$9 \leftarrow 8$	378 337.313
		$10 \leftarrow 9$	378 318.122
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	$10 \leftarrow 9$	378 219.873
		$11 \leftarrow 10$	378 200.648

$10_{19} \leftarrow 9_{18}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$9 \leftarrow 8$	391 027.225
		$10 \leftarrow 9$	391 022.303
$10_{29} \leftarrow 9_{28}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	$10 \leftarrow 9$	390 999.648
		$11 \leftarrow 10$	390 994.786
		$9 \leftarrow 8$	384 739.941
$10_{28} \leftarrow 9_{27}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$10 \leftarrow 9$	384 733.061
		$10 \leftarrow 9$	384 529.583
		$11 \leftarrow 10$	384 522.714
$10_{38} \leftarrow 9_{37}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$9 \leftarrow 8$	385 413.528
		$10 \leftarrow 9$	385 407.435
		$10 \leftarrow 9$	385 218.089
$10_{37} \leftarrow 9_{36}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	$11 \leftarrow 10$	385 212.026
		$10 \leftarrow 9$	384 918.959
		$10 \leftarrow 9$	384 490.079
$10_{47} \leftarrow 9_{46}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$11 \leftarrow 10$	384 487.166
		$9 \leftarrow 8$	384 928.259
		$10 \leftarrow 9$	384 925.304
$10_{46} \leftarrow 9_{45}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	$10 \leftarrow 9$	384 925.304
		$10 \leftarrow 9$	384 496.716
		$11 \leftarrow 10$	384 493.789
$10_{56} \leftarrow 9_{55}$	$9\frac{1}{2} \leftarrow 8\frac{1}{2}$	$9 \leftarrow 8$	384 871.584 <sup>b)</sup>
		$10 \leftarrow 9$	384 869.488 <sup>b)</sup>
		$9 \leftarrow 8$	384 871.584 <sup>b)</sup>
$10_{55} \leftarrow 9_{54}$	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	$10 \leftarrow 9$	384 869.488 <sup>b)</sup>
		$9 \leftarrow 8$	384 837.080 <sup>b)</sup>
		$10 \leftarrow 9$	384 835.376 <sup>b)</sup>
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	$10 \leftarrow 9$	383 687.174 <sup>b)</sup>
		$11 \leftarrow 10$	383 685.421 <sup>b)</sup>
		$9 \leftarrow 8$	384 837.080 <sup>b)</sup>
	$10\frac{1}{2} \leftarrow 9\frac{1}{2}$	$10 \leftarrow 9$	384 835.376 <sup>b)</sup>
		$10 \leftarrow 9$	383 687.174 <sup>b)</sup>
		$11 \leftarrow 10$	383 685.421 <sup>b)</sup>

<sup>a)</sup> Coupling scheme:  $\mathbf{J} = \mathbf{N} + \mathbf{S}$ ;  $\mathbf{F} = \mathbf{J} + \mathbf{I}$  where  $\mathbf{I}$  is the  $^1\text{H}$  nuclear spin. <sup>b)</sup>  $K$ -type doubling not resolved.

#### Molecular parameters for $^1\text{H}^{28}\text{Si}^{16}\text{O}$

Parameter	Value	Method	Ref.
State: electronic $\tilde{X}^2A'$ ; vibrational (0,0,0)			
$A$	[MHz]	312 105(20) <sup>a)</sup>	MW
$B$	[MHz]	19 887.009(56)	97Izu
$C$	[MHz]	18 605.416(55)	
$A_K$	[MHz]	146.8(168)	
$A_{NK}$	[MHz]	1.301 94(48)	
$A_N$	[kHz]	24.750 6(167)	
$\delta_K$	[MHz]	1.283(28)	
$\delta_N$	[kHz]	2.195 3(145)	
$\phi_K$	[MHz]	0.0 <sup>b)</sup>	
$\phi_{KN}$	[kHz]	-0.776 1(112)	
$\phi_{NK}$	[Hz]	18.4(25)	
$\phi_N$	[kHz]	0.0 <sup>b)</sup>	
$\phi_K$	[kHz]	0.0 <sup>b)</sup>	
$\phi_{NK}$	[kHz]	0.0 <sup>b)</sup>	
$\phi_N$	[kHz]	0.0 <sup>b)</sup>	

$\varepsilon_{aa}$	[MHz]	4 604.55(75)
$\varepsilon_{bb}$	[MHz]	63.197(61)
$\varepsilon_{cc}$	[MHz]	– 139.685(47)
$\varepsilon_{ab}$	[MHz]	262.797(197) <sup>c)</sup>
$\Delta_K^s$	[MHz]	– 7.015(140)
$\Delta_{KN}^s + \Delta_{NK}^s$	[MHz]	– 0.091 8 <sup>b)</sup>
$\Delta_{NK}^s$	[MHz]	– 0.091 8(126)
$\Delta_N^s$	[MHz]	0.0 <sup>b)</sup>
$\delta_K^s$	[MHz]	0.0 <sup>b)</sup>
$\delta_N^s$	[MHz]	0.0 <sup>b)</sup>
$\Phi_K^s$	[kHz]	18.8(41)
$a_r(^1\text{H})$	[MHz]	451.32(45)
$T_{aa}(^1\text{H})$	[MHz]	1.69(83)
$T_{bb}(^1\text{H})$	[MHz]	2.38(149)
$T_{ab}(^1\text{H})$	[MHz]	3.99(50) <sup>c)</sup>
$r_e(\text{H–Si})$	[nm]	0.149 71 <sup>b)</sup>
$r_e(\text{Si–O})$	[nm]	0.152 86(2)
$\alpha_e(\text{H–Si–O})$	[deg]	116.8(1)

<sup>a)</sup> The numbers in parentheses represent 3 standard deviations of the least-squares fit, in units of the last quoted decimal place.

<sup>b)</sup> Parameter constrained to this value.

<sup>c)</sup> Only the relative sign of  $\varepsilon_{ab}$  and  $T_{ab}(^1\text{H})$  was determined.

#### Reference for HSiO

97Izu Izuha, M., Yamamoto, S., Saito, S. : J. Molec. Struct. **413-414** (1997) 527.