

**Table B.1.** Observed line parameters towards TMC-1 for the two isomers of CNACY<sup>s</sup>

Transition	$\nu_{obs}^a$ (MHz)	Obs-Cal <sup>b</sup> (kHz)	$\int T_A^* dv^c$ (mK km s <sup>-1</sup> )	$\Delta v^d$ (km s <sup>-1</sup> )	$T_A^{*e}$ (mK)	Notes
<b>1-CNACY</b>						
36 <sub>0,36</sub> – 35 <sub>0,35</sub>	31321.003±0.010	–7	0.77±0.07	0.70±0.07	1.02±0.08	
36 <sub>1,36</sub> – 35 <sub>1,35</sub>	31321.003±0.010	–7				
35 <sub>1,34</sub> – 34 <sub>1,33</sub>	31321.200±0.010	–7	0.49±0.07	0.61±0.13	0.76±0.08	
35 <sub>2,34</sub> – 34 <sub>2,33</sub>	31321.200±0.010	–7				
34 <sub>2,32</sub> – 33 <sub>2,31</sub>	31322.721±0.010	–5	0.81±0.07	0.79±0.11	0.96±0.08	
34 <sub>3,32</sub> – 33 <sub>3,31</sub>	31322.721±0.010	–5				
33 <sub>3,30</sub> – 32 <sub>3,29</sub>	31327.286±0.010	2	1.00±0.09	0.78±0.05	1.20±0.06	
33 <sub>4,30</sub> – 32 <sub>4,29</sub>	31327.286±0.010	2				
32 <sub>4,28</sub> – 31 <sub>4,27</sub>	31338.050±0.010	8	0.90±0.07	0.72±0.07	1.18±0.08	
32 <sub>5,28</sub> – 31 <sub>5,27</sub>	31338.050±0.010	5				
31 <sub>6,26</sub> – 30 <sub>6,25</sub>	31361.167±0.030	6	0.85±0.08	0.80±0.00	0.99±0.12	A
31 <sub>5,26</sub> – 30 <sub>5,25</sub>	31361.263±0.030	–18	0.37±0.08	0.80±0.00	0.41±0.12	A
30 <sub>7,24</sub> – 29 <sub>7,23</sub>	31408.519±0.020	9	0.52±0.07	0.80±0.00	0.60±0.10	A
30 <sub>6,24</sub> – 29 <sub>6,23</sub>	31412.542±0.010	27	0.76±0.11	1.09±0.10	0.65±0.11	
28 <sub>9,20</sub> – 27 <sub>9,19</sub>	31424.864±0.010	22	0.74±0.09	0.90±0.12	0.77±0.10	
27 <sub>8,19</sub> – 26 <sub>8,18</sub>	31478.333±0.010	–4	0.68±0.07	0.96±0.15	0.66±0.08	
29 <sub>8,22</sub> – 28 <sub>8,21</sub>	31483.445±0.020	–1	0.55±0.10	0.96±0.18	0.54±0.11	
29 <sub>7,22</sub> – 28 <sub>7,21</sub>	31564.045±0.020	1	0.29±0.08	0.76±0.28	0.75±0.12	
28 <sub>8,20</sub> – 27 <sub>8,19</sub>	32162.846±0.010	6	0.72±0.12	0.82±0.10	0.83±0.06	
37 <sub>0,37</sub> – 36 <sub>0,36</sub>	32179.095±0.010	–2	0.94±0.10	0.90±0.11	0.98±0.07	
37 <sub>1,37</sub> – 36 <sub>1,36</sub>	32179.095±0.010	–2				
36 <sub>1,35</sub> – 35 <sub>1,34</sub>	32179.264±0.010	–2	0.97±0.10	0.88±0.10	1.06±0.07	
36 <sub>2,35</sub> – 35 <sub>2,34</sub>	32179.264±0.010	–2				
35 <sub>3,33</sub> – 34 <sub>3,32</sub>	32180.666±0.010	–1	1.18±0.12	1.10±0.11	1.00±0.07	
35 <sub>2,33</sub> – 34 <sub>2,32</sub>	32180.666±0.010	–1				
34 <sub>4,31</sub> – 33 <sub>4,30</sub>	32184.869±0.010	1	0.76±0.07	0.68±0.07	1.04±0.06	
34 <sub>3,31</sub> – 33 <sub>3,30</sub>	32184.869±0.010	1				
33 <sub>5,29</sub> – 32 <sub>5,28</sub>	32194.702±0.010	2	0.70±0.07	0.68±0.07	0.97±0.06	
33 <sub>4,29</sub> – 32 <sub>4,28</sub>	32194.702±0.010	1				
32 <sub>6,27</sub> – 31 <sub>6,26</sub>	32215.587±0.020	29	0.87±0.25	1.14±0.30	0.97±0.08	
32 <sub>5,27</sub> – 31 <sub>5,26</sub>	32215.587±0.020	–22				
31 <sub>7,25</sub> – 30 <sub>7,24</sub>	32258.016±0.020	–18	0.38±0.09	0.89±0.30	0.40±0.08	
31 <sub>6,25</sub> – 30 <sub>6,24</sub>	32259.868±0.020	–13	0.30±0.10	0.40±0.15	0.70±0.06	
27 <sub>9,18</sub> – 26 <sub>9,17</sub>	32324.542±0.010	–8	0.65±0.09	0.92±0.15	0.66±0.10	B
30 <sub>8,23</sub> – 29 <sub>8,22</sub>	32333.243±0.010	11	0.46±0.06	0.61±0.11	0.71±0.08	
29 <sub>9,21</sub> – 28 <sub>9,20</sub>	32348.476±0.020	–8	0.40±0.07	0.76±0.16	0.49±0.08	
30 <sub>7,23</sub> – 29 <sub>7,22</sub>	32374.868±0.020	–1	0.31±0.09	0.45±0.20	0.81±0.10	
29 <sub>8,21</sub> – 28 <sub>8,20</sub>	32832.360±0.010	–18	0.53±0.07	0.93±0.10	0.53±0.07	
38 <sub>0,38</sub> – 37 <sub>0,37</sub>	33037.185±0.010	3	0.98±0.14	1.06±0.24	0.87±0.10	B
38 <sub>1,38</sub> – 37 <sub>1,37</sub>	33037.185±0.010	3				
37 <sub>2,36</sub> – 36 <sub>2,35</sub>	33037.320±0.010	–6	0.61±0.14	0.65±0.10	0.88±0.10	B
37 <sub>1,36</sub> – 36 <sub>1,35</sub>	33037.320±0.010	–6				
36 <sub>3,34</sub> – 35 <sub>3,33</sub>	33038.611±0.010	–9	0.93±0.10	1.02±0.14	0.85±0.10	B
36 <sub>2,34</sub> – 35 <sub>2,33</sub>	33038.611±0.010	–9				
35 <sub>4,32</sub> – 34 <sub>4,31</sub>	33042.508±0.010	6	0.74±0.09	0.73±0.09	0.95±0.10	C
35 <sub>3,32</sub> – 34 <sub>3,31</sub>	33042.508±0.010	6				
33 <sub>6,28</sub> – 32 <sub>6,27</sub>	33070.430±0.020	7	1.04±0.13	0.91±0.10	0.99±0.08	
33 <sub>5,28</sub> – 32 <sub>5,27</sub>	33070.430±0.020	–15				
32 <sub>7,26</sub> – 31 <sub>7,25</sub>	33108.522±0.010	17	0.28±0.06	0.49±0.10	0.54±0.06	
32 <sub>6,26</sub> – 31 <sub>6,25</sub>	33109.324±0.010	–19	0.59±0.11	1.05±0.20	0.53±0.06	
31 <sub>8,24</sub> – 30 <sub>8,23</sub>	33179.679±0.010	0	0.55±0.06	0.68±0.08	0.76±0.07	
31 <sub>7,24</sub> – 30 <sub>7,23</sub>	33200.551±0.010	2	0.63±0.06	1.02±0.13	0.58±0.06	
30 <sub>9,22</sub> – 29 <sub>9,21</sub>	33239.665±0.010	5	0.50±0.06	0.88±0.11	0.54±0.06	
28 <sub>9,19</sub> – 27 <sub>9,18</sub>	33402.999±0.010	–14	0.57±0.12	0.67±0.13	0.79±0.08	
30 <sub>8,22</sub> – 29 <sub>8,21</sub>	33532.235±0.010	17	0.36±0.04	0.82±0.07	0.41±0.06	
39 <sub>0,39</sub> – 38 <sub>0,38</sub>	33895.256±0.010	–9	0.55±0.09	0.84±0.20	0.61±0.06	
39 <sub>1,39</sub> – 38 <sub>1,38</sub>	33895.256±0.010	–9				
38 <sub>2,37</sub> – 37 <sub>2,36</sub>	33895.386±0.010	–1	0.47±0.06	0.58±0.07	0.78±0.06	

Table B.1. continued.

Transition	$\nu_{obs}^a$ (MHz)	Obs-Cal <sup>b</sup> (kHz)	$\int T_A^* dv^c$ (mK km s <sup>-1</sup> )	$\Delta v^d$ (km s <sup>-1</sup> )	$T_A^{*e}$ (mK)	Notes
38 <sub>1,37</sub> – 37 <sub>1,36</sub>	33895.386±0.010	–1				
37 <sub>3,35</sub> – 36 <sub>3,34</sub>	33896.583±0.010	–1	0.62±0.07	0.73±0.09	0.79±0.06	
37 <sub>2,35</sub> – 36 <sub>2,34</sub>	33896.583±0.010	–1				
36 <sub>4,33</sub> – 35 <sub>4,32</sub>	33900.176±0.010	–4	0.43±0.07	0.64±0.11	0.63±0.06	
36 <sub>3,33</sub> – 35 <sub>3,32</sub>	33900.176±0.010	–4				
35 <sub>5,31</sub> – 34 <sub>5,30</sub>	33908.477±0.010	–2	0.66±0.05	0.80±0.07	0.78±0.07	
35 <sub>4,31</sub> – 34 <sub>4,30</sub>	33908.477±0.010	–2				
34 <sub>6,29</sub> – 33 <sub>6,28</sub>	33925.691±0.010	7	0.86±0.07	0.76±0.05	1.06±0.07	
34 <sub>5,29</sub> – 33 <sub>5,28</sub>	33925.691±0.010	–2				
32 <sub>8,25</sub> – 31 <sub>8,24</sub>	34025.294±0.010	14	0.37±0.07	0.77±0.17	0.46±0.07	
32 <sub>7,25</sub> – 31 <sub>7,24</sub>	34035.477±0.010	–3	0.32±0.04	0.78±0.15	0.38±0.05	
31 <sub>8,23</sub> – 30 <sub>8,22</sub>	34274.392±0.010	–9	0.25±0.07	0.63±0.20	0.37±0.05	
29 <sub>9,20</sub> – 28 <sub>9,19</sub>	34300.576±0.010	1	0.46±0.06	0.68±0.08	0.63±0.07	
40 <sub>1,40</sub> – 39 <sub>1,39</sub>	34753.349±0.010	3	0.43±0.05	0.44±0.08	0.92±0.06	
40 <sub>0,40</sub> – 39 <sub>0,39</sub>	34753.349±0.010	3				
39 <sub>1,38</sub> – 38 <sub>1,37</sub>	34753.443±0.010	–5	0.66±0.06	0.81±0.08	0.77±0.06	
39 <sub>2,38</sub> – 38 <sub>2,37</sub>	34753.443±0.010	–5				
38 <sub>3,36</sub> – 37 <sub>3,35</sub>	34754.567±0.010	11	0.39±0.05	0.66±0.08	0.55±0.06	
38 <sub>2,36</sub> – 37 <sub>2,35</sub>	34754.567±0.010	11				
37 <sub>4,34</sub> – 36 <sub>4,33</sub>	34757.891±0.010	–4	0.55±0.05	0.73±0.08	0.72±0.07	
37 <sub>3,34</sub> – 36 <sub>3,33</sub>	34757.891±0.010	–4				
36 <sub>5,32</sub> – 35 <sub>5,31</sub>	34765.550±0.010	–6	0.65±0.05	0.81±0.08	0.70±0.06	
36 <sub>4,32</sub> – 35 <sub>4,31</sub>	34765.550±0.010	–6				
35 <sub>6,30</sub> – 34 <sub>6,29</sub>	34781.279±0.010	1	0.92±0.08	0.83±0.18	0.94±0.06	
35 <sub>5,30</sub> – 34 <sub>5,29</sub>	34781.279±0.010	–2				
34 <sub>7,28</sub> – 33 <sub>7,27</sub>	34812.162±0.020	22	0.67±0.13	1.04±0.28	0.60±0.05	
34 <sub>6,28</sub> – 33 <sub>6,27</sub>	34812.305±0.020	1	0.50±0.11	0.77±0.18	0.61±0.05	
33 <sub>8,26</sub> – 32 <sub>8,25</sub>	34871.338±0.010	3	0.30±0.06	0.73±0.13	0.39±0.08	
33 <sub>7,26</sub> – 32 <sub>7,25</sub>	34876.213±0.010	1	0.52±0.06	0.83±0.11	0.60±0.08	
30 <sub>9,21</sub> – 29 <sub>9,20</sub>	35047.663±0.010	–6	0.33±0.07	0.65±0.17	0.48±0.07	
32 <sub>8,24</sub> – 31 <sub>8,23</sub>	35052.579±0.010	–12	0.25±0.04	0.68±0.11	0.34±0.06	
41 <sub>0,41</sub> – 40 <sub>0,40</sub>	35611.430±0.020	4	0.69±0.07	0.80±0.00	0.83±0.09	A
41 <sub>1,41</sub> – 40 <sub>1,40</sub>	35611.430±0.020	4				
40 <sub>2,39</sub> – 39 <sub>2,38</sub>	35611.516±0.020	8	0.70±0.07	0.80±0.00	0.88±0.09	A
40 <sub>1,39</sub> – 39 <sub>1,38</sub>	35611.516±0.020	8				
39 <sub>3,37</sub> – 38 <sub>3,36</sub>	35612.532±0.010	3	0.60±0.06	0.75±0.09	0.76±0.09	
39 <sub>2,37</sub> – 38 <sub>2,36</sub>	35612.532±0.010	3				
38 <sub>4,35</sub> – 37 <sub>4,34</sub>	35615.639±0.020	–3	0.81±0.14	1.03±0.20	0.74±0.06	
38 <sub>3,35</sub> – 37 <sub>3,34</sub>	35615.639±0.020	–3				
37 <sub>5,33</sub> – 36 <sub>5,32</sub>	35622.730±0.020	–4	0.81±0.08	1.14±0.12	0.67±0.06	
37 <sub>4,33</sub> – 36 <sub>4,32</sub>	35622.730±0.020	–4				
36 <sub>6,31</sub> – 35 <sub>6,30</sub>	35637.161±0.020	7	0.29±0.04	0.62±0.09	0.44±0.06	
36 <sub>5,31</sub> – 35 <sub>5,30</sub>	35637.161±0.020	5				
35 <sub>7,29</sub> – 34 <sub>7,28</sub>	35665.095±0.020	–9	0.45±0.08	0.80±0.00	0.54±0.07	A
35 <sub>6,29</sub> – 34 <sub>6,28</sub>	35665.175±0.020	–1	0.36±0.07	0.80±0.00	0.44±0.07	A
31 <sub>9,22</sub> – 30 <sub>9,21</sub>	35710.034±0.010	–4	0.28±0.05	0.70±0.14	0.38±0.06	
34 <sub>8,27</sub> – 33 <sub>8,26</sub>	35718.391±0.010	–16	0.37±0.07	0.91±0.22	0.38±0.07	
34 <sub>7,27</sub> – 33 <sub>7,26</sub>	35720.702±0.010	7	0.21±0.05	0.60±0.15	0.33±0.07	
33 <sub>8,25</sub> – 32 <sub>8,24</sub>	35856.143±0.010	–12	0.48±0.09	0.79±0.18	0.56±0.06	
42 <sub>0,42</sub> – 41 <sub>0,41</sub>	36469.535±0.020	32	0.58±0.05	0.80±0.00	0.70±0.06	A
42 <sub>1,42</sub> – 41 <sub>1,41</sub>	36469.535±0.020	–33				A
41 <sub>1,40</sub> – 40 <sub>1,39</sub>	36469.535±0.020	32				A
41 <sub>2,40</sub> – 40 <sub>2,39</sub>	36469.535±0.020	–33				A
40 <sub>3,38</sub> – 39 <sub>3,37</sub>	36470.518±0.010	–5	0.33±0.07	0.98±0.19	0.32±0.06	
40 <sub>2,38</sub> – 39 <sub>2,37</sub>	36470.518±0.010	–5				
39 <sub>4,36</sub> – 38 <sub>4,35</sub>	36473.432±0.010	14	0.75±0.05	0.76±0.05	0.93±0.06	
39 <sub>3,36</sub> – 38 <sub>3,35</sub>	36473.432±0.010	14				
38 <sub>5,34</sub> – 37 <sub>5,33</sub>	36480.015±0.010	16	0.57±0.07	0.88±0.12	0.61±0.09	
38 <sub>4,34</sub> – 37 <sub>4,33</sub>	36480.015±0.010	16				
37 <sub>6,32</sub> – 36 <sub>6,31</sub>	36493.256±0.010	–15	0.37±0.05	0.73±0.12	0.47±0.06	

Table B.1. continued.

Transition	$\nu_{obs}^a$ (MHz)	Obs-Cal <sup>b</sup> (kHz)	$\int T_A^* dv^c$ (mK km s <sup>-1</sup> )	$\Delta v^d$ (km s <sup>-1</sup> )	$T_A^{*e}$ (mK)	Notes
37 <sub>5,32</sub> – 36 <sub>5,31</sub>	36493.256±0.010	–16				
36 <sub>7,30</sub> – 35 <sub>7,29</sub>	36518.718±0.010	27	0.73±0.05	0.76±0.06	0.90±0.07	
36 <sub>6,30</sub> – 35 <sub>6,29</sub>	36518.718±0.010	–3				
35 <sub>8,28</sub> – 34 <sub>8,27</sub>	36566.662±0.010	–1	0.60±0.12	0.97±0.25	0.58±0.08	
35 <sub>7,28</sub> – 34 <sub>7,27</sub>	36567.719±0.010	0	0.40±0.08	0.78±0.17	0.48±0.08	
34 <sub>9,26</sub> – 33 <sub>9,25</sub>	36652.211±0.010	5	0.27±0.04	0.53±0.10	0.47±0.07	
33 <sub>9,24</sub> – 32 <sub>9,23</sub>	37045.547±0.020	–13	0.32±0.06	0.80±0.00	0.36±0.09	A
43 <sub>0,43</sub> – 42 <sub>0,42</sub>	37327.582±0.020	3	0.73±0.05	0.80±0.00	0.47±0.06	A
43 <sub>1,43</sub> – 42 <sub>1,42</sub>	37327.582±0.020	3				
42 <sub>1,41</sub> – 41 <sub>1,40</sub>	37327.635±0.020	7	0.73±0.05	0.80±0.00	0.34±0.06	A
42 <sub>2,41</sub> – 41 <sub>2,40</sub>	37327.635±0.020	7				
41 <sub>2,39</sub> – 40 <sub>2,38</sub>	37328.519±0.010	4	0.26±0.05	0.72±0.14	0.34±0.06	
41 <sub>3,39</sub> – 40 <sub>3,38</sub>	37328.519±0.010	4				
40 <sub>4,37</sub> – 39 <sub>4,36</sub>	37331.196±0.030	–22	0.16±0.06	0.75±0.25	0.20±0.07	
40 <sub>3,37</sub> – 39 <sub>3,36</sub>	37331.196±0.030	–22				
39 <sub>5,35</sub> – 38 <sub>5,34</sub>	37337.325±0.020	–15	0.36±0.07	0.56±0.11	0.60±0.09	C
39 <sub>4,35</sub> – 38 <sub>4,34</sub>	37337.325±0.020	–15				
38 <sub>6,33</sub> – 37 <sub>6,32</sub>	37349.600±0.010	6	0.41±0.05	0.54±0.07	0.71±0.08	
38 <sub>5,33</sub> – 37 <sub>5,32</sub>	37349.600±0.010	6				
37 <sub>7,31</sub> – 36 <sub>7,30</sub>	37372.830±0.010	24	0.51±0.08	0.84±0.16	0.57±0.06	
37 <sub>6,31</sub> – 36 <sub>6,30</sub>	37372.830±0.010	11				
36 <sub>8,29</sub> – 35 <sub>8,28</sub>	37416.056±0.010	–18	0.39±0.07	0.77±0.14	0.48±0.08	B
36 <sub>7,29</sub> – 35 <sub>7,28</sub>	37416.550±0.010	–4	0.60±0.09	1.16±0.23	0.48±0.08	B
35 <sub>9,27</sub> – 34 <sub>9,26</sub>	37494.772±0.020	5	1.09±0.31	1.55±0.30	0.66±0.12	C,D
34 <sub>9,25</sub> – 33 <sub>9,24</sub>	37775.856±0.020	–2	0.15±0.05	0.31±0.10	0.45±0.09	
44 <sub>1,44</sub> – 43 <sub>1,43</sub>	38185.691±0.020	38	0.43±0.07	0.60±0.13	0.68±0.11	
44 <sub>0,44</sub> – 43 <sub>0,43</sub>	38185.691±0.020	38				
43 <sub>1,42</sub> – 42 <sub>1,41</sub>	38185.691±0.020	4				
43 <sub>2,42</sub> – 42 <sub>2,41</sub>	38185.691±0.020	4				
42 <sub>2,40</sub> – 41 <sub>2,39</sub>	38186.501±0.020	–11	0.24±0.09	0.49±0.09	0.47±0.11	C
42 <sub>3,40</sub> – 41 <sub>3,39</sub>	38186.501±0.020	–11				
41 <sub>4,38</sub> – 40 <sub>4,37</sub>	38189.033±0.010	–8	0.39±0.07	0.75±0.16	0.49±0.09	
41 <sub>3,38</sub> – 40 <sub>3,37</sub>	38189.033±0.010	–8				
40 <sub>5,36</sub> – 39 <sub>5,35</sub>	38194.744±0.010	–4	0.33±0.05	0.59±0.10	0.53±0.07	
40 <sub>4,36</sub> – 39 <sub>4,35</sub>	38194.744±0.010	–4				
39 <sub>6,34</sub> – 38 <sub>6,33</sub>	38206.094±0.010	0	0.27±0.06	0.73±0.18	0.35±0.09	
39 <sub>5,34</sub> – 38 <sub>5,33</sub>	38206.094±0.010	0				
38 <sub>7,32</sub> – 37 <sub>7,31</sub>	38227.383±0.010	11	0.20±0.06	0.43±0.11	0.44±0.07	
38 <sub>6,32</sub> – 37 <sub>6,31</sub>	38227.383±0.010	6				
36 <sub>9,28</sub> – 35 <sub>9,27</sub>	38337.985±0.010	1	0.28±0.07	0.57±0.14	0.45±0.09	
45 <sub>1,45</sub> – 44 <sub>1,44</sub>	39043.749±0.020	25	0.44±0.05	0.57±0.08	0.72±0.07	
45 <sub>0,45</sub> – 44 <sub>0,44</sub>	39043.749±0.020	25				
44 <sub>2,43</sub> – 43 <sub>2,42</sub>	39043.749±0.020	4				
44 <sub>1,43</sub> – 43 <sub>1,42</sub>	39043.749±0.020	4				
43 <sub>2,41</sub> – 42 <sub>2,40</sub>	39044.500±0.010	–13	0.31±0.05	0.67±0.12	0.44±0.07	
43 <sub>3,41</sub> – 42 <sub>3,40</sub>	39044.500±0.010	–13				
42 <sub>4,39</sub> – 41 <sub>4,38</sub>	39046.864±0.020	–17	0.26±0.06	0.80±0.00	0.33±0.09	A
42 <sub>3,39</sub> – 41 <sub>3,38</sub>	39046.864±0.020	–17				
46 <sub>1,46</sub> – 45 <sub>1,45</sub>	39901.810±0.020	16	0.13±0.04	0.50±0.12	0.24±0.05	
46 <sub>0,46</sub> – 45 <sub>0,45</sub>	39901.810±0.020	16				
45 <sub>1,44</sub> – 44 <sub>1,43</sub>	39901.810±0.020	8				
45 <sub>2,44</sub> – 44 <sub>2,43</sub>	39901.810±0.020	8				
44 <sub>3,42</sub> – 43 <sub>3,41</sub>	39902.520±0.010	3	0.18±0.04	0.53±0.10	0.33±0.05	
44 <sub>2,42</sub> – 43 <sub>2,41</sub>	39902.520±0.010	3				
43 <sub>4,40</sub> – 42 <sub>4,39</sub>	39904.736±0.010	–3	0.33±0.06	0.62±0.12	0.49±0.09	
43 <sub>3,40</sub> – 42 <sub>3,39</sub>	39904.736±0.010	–3				

Table B.1. continued.

Transition	$\nu_{obs}^a$ (MHz)	Obs-Cal <sup>b</sup> (kHz)	$\int T_A^* dv^c$ (mK km s <sup>-1</sup> )	$\Delta v^d$ (km s <sup>-1</sup> )	$T_A^{*e}$ (mK)	Notes
<b>5-CNACY</b>						
35 <sub>1,35</sub> – 34 <sub>1,34</sub>	31544.693±0.020	29	1.74±0.07	1.14±0.05	1.44±0.06	
34 <sub>1,33</sub> – 33 <sub>1,32</sub>	31544.693±0.020	–21				
35 <sub>0,35</sub> – 34 <sub>0,34</sub>	31544.693±0.020	29				
34 <sub>2,33</sub> – 33 <sub>2,32</sub>	31544.693±0.020	–21				
33 <sub>3,31</sub> – 32 <sub>3,30</sub>	31545.822±0.010	–10	0.53±0.05	0.83±0.10	0.60±0.06	
33 <sub>2,31</sub> – 32 <sub>2,30</sub>	31545.822±0.010	–10				
32 <sub>4,29</sub> – 31 <sub>4,28</sub>	31549.389±0.010	–3	0.97±0.05	0.80±0.05	1.14±0.06	
32 <sub>3,29</sub> – 31 <sub>3,28</sub>	31549.389±0.010	–3				
31 <sub>5,27</sub> – 30 <sub>5,26</sub>	31557.882±0.010	–9	0.83±0.12	0.93±0.16	0.84±0.06	C
31 <sub>4,27</sub> – 30 <sub>4,26</sub>	31557.882±0.010	–9				
30 <sub>6,25</sub> – 29 <sub>6,24</sub>	31576.097±0.010	–10	0.97±0.05	0.80±0.05	0.96±0.09	
30 <sub>5,25</sub> – 29 <sub>5,24</sub>	31576.097±0.010	–30				
29 <sub>7,23</sub> – 28 <sub>7,22</sub>	31613.683±0.010	–11	0.31±0.05	0.62±0.15	0.47±0.07	
29 <sub>6,23</sub> – 28 <sub>6,22</sub>	31614.562±0.010	–2	0.30±0.05	0.73±0.17	0.38±0.07	
28 <sub>8,21</sub> – 27 <sub>8,20</sub>	31685.056±0.010	15	0.41±0.07	0.62±0.13	0.63±0.09	
28 <sub>7,21</sub> – 27 <sub>7,20</sub>	31708.838±0.010	–9	0.21±0.07	0.83±0.26	0.24±0.07	
36 <sub>1,36</sub> – 35 <sub>1,35</sub>	32433.236±0.020	11	0.80±0.08	0.80±0.00	0.99±0.08	A
36 <sub>0,36</sub> – 35 <sub>0,35</sub>	32433.236±0.020	–14				
35 <sub>1,34</sub> – 34 <sub>1,33</sub>	32433.236±0.020	11				
35 <sub>2,34</sub> – 34 <sub>2,33</sub>	32433.236±0.020	–14				
34 <sub>3,32</sub> – 33 <sub>3,31</sub>	32434.268±0.010	–1	0.58±0.09	0.71±0.24	0.76±0.08	
34 <sub>2,32</sub> – 33 <sub>2,31</sub>	32434.268±0.010	–1				
33 <sub>4,30</sub> – 32 <sub>4,29</sub>	32437.548±0.010	13	0.54±0.05	0.74±0.08	0.69±0.07	
33 <sub>3,30</sub> – 32 <sub>3,29</sub>	32437.548±0.010	13				
32 <sub>5,28</sub> – 31 <sub>5,27</sub>	32445.286±0.010	5	0.66±0.06	0.67±0.07	0.91±0.07	
32 <sub>4,28</sub> – 31 <sub>4,27</sub>	32445.286±0.010	5				
31 <sub>6,26</sub> – 30 <sub>6,25</sub>	32461.677±0.010	–9	0.70±0.08	1.06±0.18	0.62±0.06	
31 <sub>5,26</sub> – 30 <sub>5,25</sub>	32461.677±0.010	–2				
29 <sub>8,22</sub> – 28 <sub>8,21</sub>	32560.137±0.010	14	0.42±0.08	0.97±0.16	0.40±0.09	
28 <sub>9,20</sub> – 27 <sub>9,19</sub>	32638.562±0.010	3	0.44±0.09	0.93±0.22	0.45±0.09	
37 <sub>1,37</sub> – 36 <sub>1,36</sub>	33321.787±0.010	4	0.95±0.06	0.71±0.05	1.26±0.06	
37 <sub>0,37</sub> – 36 <sub>0,36</sub>	33321.787±0.010	4				
36 <sub>2,35</sub> – 35 <sub>2,34</sub>	33321.787±0.010	0				
36 <sub>1,35</sub> – 35 <sub>1,34</sub>	33321.787±0.010	0				
35 <sub>3,33</sub> – 34 <sub>3,32</sub>	33322.721±0.010	5	0.72±0.06	0.85±0.08	0.80±0.06	
35 <sub>2,33</sub> – 34 <sub>2,32</sub>	33322.721±0.010	5				
34 <sub>4,31</sub> – 33 <sub>4,30</sub>	33325.715±0.010	–5	0.38±0.07	0.58±0.16	0.62±0.05	
34 <sub>3,31</sub> – 33 <sub>3,30</sub>	33325.715±0.010	–5				
33 <sub>5,29</sub> – 32 <sub>5,28</sub>	33332.809±0.010	4	0.47±0.09	0.62±0.14	0.70±0.07	
33 <sub>4,29</sub> – 32 <sub>4,28</sub>	33332.809±0.010	4				
32 <sub>6,27</sub> – 31 <sub>6,26</sub>	33347.625±0.010	–16	0.47±0.05	0.60±0.07	0.73±0.07	
32 <sub>5,27</sub> – 31 <sub>5,26</sub>	33347.625±0.010	–13				
31 <sub>7,25</sub> – 30 <sub>7,24</sub>	33377.336±0.020	–3	0.36±0.05	0.85±0.16	0.40±0.06	
31 <sub>6,25</sub> – 30 <sub>6,24</sub>	33377.495±0.020	13	0.27±0.05	1.17±0.27	0.22±0.06	
30 <sub>8,23</sub> – 29 <sub>8,22</sub>	33435.620±0.020	8	0.36±0.05	0.75±0.08	0.45±0.05	
38 <sub>0,38</sub> – 37 <sub>0,37</sub>	34210.337±0.010	–3	1.08±0.07	0.76±0.06	1.32±0.06	
38 <sub>1,38</sub> – 37 <sub>1,37</sub>	34210.337±0.010	–3				
37 <sub>1,36</sub> – 36 <sub>1,35</sub>	34210.337±0.010	14				
37 <sub>2,36</sub> – 36 <sub>2,35</sub>	34210.337±0.010	14				
36 <sub>2,34</sub> – 35 <sub>2,33</sub>	34211.171±0.010	–1	0.35±0.05	0.80±0.00	0.42±0.06	A
36 <sub>3,34</sub> – 35 <sub>3,33</sub>	34211.171±0.010	–1				
35 <sub>4,32</sub> – 34 <sub>4,31</sub>	34213.939±0.010	–3	0.43±0.05	0.55±0.09	0.73±0.07	
35 <sub>3,32</sub> – 34 <sub>3,31</sub>	34213.939±0.010	–3				
34 <sub>4,30</sub> – 33 <sub>4,29</sub>	34220.453±0.010	11	0.53±0.05	0.70±0.07	0.71±0.08	
34 <sub>5,30</sub> – 33 <sub>5,29</sub>	34220.453±0.010	11				
33 <sub>5,28</sub> – 32 <sub>5,27</sub>	34233.924±0.010	3	0.59±0.06	0.79±0.09	0.69±0.07	
33 <sub>6,28</sub> – 32 <sub>6,27</sub>	34233.924±0.010	4				
38 <sub>1,37</sub> – 37 <sub>1,36</sub>	35098.879±0.010	19	0.80±0.06	0.79±0.07	0.94±0.08	
38 <sub>2,37</sub> – 37 <sub>2,36</sub>	35098.879±0.010	19				

Table B.1. continued.

Transition	$\nu_{obs}^a$ (MHz)	Obs-Cal <sup>b</sup> (kHz)	$\int T_A^* dv^c$ (mK km s <sup>-1</sup> )	$\Delta v^d$ (km s <sup>-1</sup> )	$T_A^{*e}$ (mK)	Notes
39 <sub>1,39</sub> – 38 <sub>1,38</sub>	35098.879±0.010	–16				
39 <sub>0,39</sub> – 38 <sub>0,38</sub>	35098.879±0.010	–16				
37 <sub>3,35</sub> – 36 <sub>3,34</sub>	35099.628±0.010	–7	0.32±0.06	0.80±0.00	0.39±0.08	A
37 <sub>2,35</sub> – 36 <sub>2,34</sub>	35099.628±0.010	–7				
36 <sub>4,33</sub> – 35 <sub>4,32</sub>	35102.194±0.010	2	0.39±0.11	0.79±0.13	0.57±0.08	C
36 <sub>3,33</sub> – 35 <sub>3,32</sub>	35102.194±0.010	2				
35 <sub>5,31</sub> – 34 <sub>5,30</sub>	35108.185±0.010	8	0.48±0.11	0.87±0.20	0.52±0.07	
35 <sub>4,31</sub> – 34 <sub>4,30</sub>	35108.185±0.010	8				
34 <sub>6,29</sub> – 33 <sub>6,28</sub>	35120.466±0.010	–7	0.37±0.05	0.73±0.11	0.47±0.07	
34 <sub>5,29</sub> – 33 <sub>5,28</sub>	35120.466±0.010	–8				
33 <sub>7,27</sub> – 32 <sub>7,26</sub>	35144.448±0.010	29	0.25±0.06	0.73±0.21	0.31±0.09	
33 <sub>6,27</sub> – 32 <sub>6,26</sub>	35144.448±0.010	7				
40 <sub>1,40</sub> – 39 <sub>1,39</sub>	35987.434±0.020	–13	0.75±0.10	0.95±0.14	0.75±0.07	
39 <sub>2,38</sub> – 38 <sub>2,37</sub>	35987.434±0.020	38				
40 <sub>0,40</sub> – 39 <sub>0,39</sub>	35987.434±0.020	–13				
39 <sub>1,38</sub> – 38 <sub>1,37</sub>	35987.434±0.020	38				
37 <sub>3,34</sub> – 36 <sub>3,33</sub>	35990.488±0.010	18	0.42±0.08	1.29±0.30	0.30±0.07	
37 <sub>4,34</sub> – 36 <sub>4,33</sub>	35990.488±0.010	18				
36 <sub>4,32</sub> – 35 <sub>4,31</sub>	35995.984±0.010	–10	0.27±0.04	0.52±0.10	0.50±0.06	
36 <sub>5,32</sub> – 35 <sub>5,31</sub>	35995.984±0.010	–10				
35 <sub>6,30</sub> – 34 <sub>6,29</sub>	36007.250±0.020	–4	0.42±0.16	0.53±0.20	0.74±0.07	E
35 <sub>5,30</sub> – 34 <sub>5,29</sub>	36007.250±0.020	–4				
34 <sub>7,28</sub> – 33 <sub>7,27</sub>	36028.917±0.010	0	0.63±0.08	0.75±0.10	0.80±0.08	
34 <sub>6,28</sub> – 33 <sub>6,27</sub>	36028.917±0.010	–8				
40 <sub>1,39</sub> – 39 <sub>1,38</sub>	36875.970±0.020	39	0.45±0.05	0.49±0.08	0.61±0.08	
41 <sub>0,41</sub> – 40 <sub>0,40</sub>	36875.970±0.020	–28				
40 <sub>2,39</sub> – 39 <sub>2,38</sub>	36875.970±0.020	39				
41 <sub>1,41</sub> – 40 <sub>1,40</sub>	36875.970±0.020	–28				
39 <sub>2,37</sub> – 38 <sub>2,36</sub>	36876.575±0.010	–3	0.24±0.07	0.63±0.15	0.35±0.08	
39 <sub>3,37</sub> – 38 <sub>3,36</sub>	36876.575±0.010	–3				
38 <sub>4,35</sub> – 37 <sub>4,34</sub>	36878.774±0.020	3	0.40±0.05	0.72±0.10	0.52±0.08	
38 <sub>3,35</sub> – 37 <sub>3,34</sub>	36878.774±0.020	3				
37 <sub>4,33</sub> – 36 <sub>4,32</sub>	36883.879±0.010	–3	0.31±0.10	0.56±0.20	0.51±0.09	E
37 <sub>5,33</sub> – 36 <sub>5,32</sub>	36883.879±0.010	–3				
36 <sub>6,31</sub> – 35 <sub>6,30</sub>	36894.230±0.010	1	0.31±0.04	0.64±0.10	0.45±0.06	
36 <sub>5,31</sub> – 35 <sub>5,30</sub>	36894.230±0.010	1				
35 <sub>7,29</sub> – 34 <sub>7,28</sub>	36913.905±0.010	–11	0.50±0.14	0.83±0.20	0.57±0.07	E
35 <sub>6,29</sub> – 34 <sub>6,28</sub>	36913.905±0.010	–14				
34 <sub>8,27</sub> – 33 <sub>8,26</sub>	36950.678±0.020	1	0.32±0.07	0.45±0.20	0.67±0.07	C,F
34 <sub>7,27</sub> – 33 <sub>7,26</sub>	36950.818±0.020	–5	0.28±0.08	0.50±0.20	0.51±0.07	C,F
41 <sub>2,40</sub> – 40 <sub>2,39</sub>	37764.495±0.020	30	0.73±0.05	1.05±0.15	0.65±0.07	
42 <sub>1,42</sub> – 41 <sub>1,41</sub>	37764.495±0.020	–52				
41 <sub>1,40</sub> – 40 <sub>1,39</sub>	37764.495±0.020	30				
42 <sub>0,42</sub> – 41 <sub>0,41</sub>	37764.495±0.020	–52				
40 <sub>3,38</sub> – 39 <sub>3,37</sub>	37765.043±0.020	–13	0.15±0.09	0.54±0.18	0.25±0.07	E
40 <sub>2,38</sub> – 39 <sub>2,37</sub>	37765.043±0.020	–13				
39 <sub>4,36</sub> – 38 <sub>4,35</sub>	37767.083±0.020	–10	0.16±0.08	0.50±0.18	0.29±0.07	
39 <sub>3,36</sub> – 38 <sub>3,35</sub>	37767.083±0.020	–10				
38 <sub>5,34</sub> – 37 <sub>5,33</sub>	37771.823±0.020	–9	0.37±0.06	0.92±0.15	0.37±0.07	
38 <sub>4,34</sub> – 37 <sub>4,33</sub>	37771.823±0.020	–9				
37 <sub>6,32</sub> – 36 <sub>6,31</sub>	37781.373±0.020	4	0.15±0.08	0.52±0.25	0.27±0.07	F
37 <sub>5,32</sub> – 36 <sub>5,31</sub>	37781.373±0.020	4				
36 <sub>7,30</sub> – 35 <sub>7,29</sub>	37799.322±0.020	–13	0.30±0.08	0.94±0.25	0.31±0.08	E
36 <sub>6,30</sub> – 35 <sub>6,29</sub>	37799.322±0.020	–14				
35 <sub>8,28</sub> – 34 <sub>8,27</sub>	37832.455±0.020	35	0.68±0.11	1.03±0.17	0.62±0.09	E
35 <sub>7,28</sub> – 34 <sub>7,27</sub>	37832.455±0.020	–23				
34 <sub>9,26</sub> – 33 <sub>9,25</sub>	37893.465±0.020	–1	0.68±0.11	1.03±0.17	0.62±0.09	E
34 <sub>8,26</sub> – 33 <sub>8,25</sub>	37895.449±0.020	13				

**Notes.**

<sup>(S)</sup> All uncertainties correspond to  $1\sigma$ .

<sup>(a)</sup> Measured frequency assuming a  $v_{LSR}$  of  $5.83 \text{ km s}^{-1}$  for TMC-1 (Cernicharo et al. 2020).

<sup>(b)</sup> Observed minus calculated frequencies in kHz. The calculated frequencies are those resulting from the molecular constants obtained from a fit of an  $A$ -reduced Hamiltonian (representation  $I'$ ) to the observed frequencies. The derived rotational and distortion constants are given in Table 1. Unresolved doublets are fitted to the averaged frequency of the two transitions.

<sup>(c)</sup> Integrated line intensity (in  $\text{mK km s}^{-1}$ ).

<sup>(d)</sup> Linewidth at half intensity derived by fitting a Gaussian function to the observed line profile (in  $\text{km s}^{-1}$ ).

<sup>(e)</sup> Antenna temperature (in milli Kelvin).

<sup>(A)</sup> Partially blended with another feature. A fixed linewidth of  $0.80 \text{ km s}^{-1}$  has been adopted.

<sup>(B)</sup> Only data from the observations with frequency throw of 8 MHz.

<sup>(C)</sup> Only data from the observations with frequency throw of 10 MHz.

<sup>(D)</sup> Line too broad. Probably blended with another feature. Parameters are uncertain.

<sup>(E)</sup> Line probably blended with another feature. Parameters can be derived but are uncertain. <sup>(F)</sup> Narrow line. Parameters are uncertain

**Table E.3.** Laboratory-observed transition frequencies for 1-CNACY.

$J'$	$K'_a$	$K'_c$	$F'$	$J''$	$K''_a$	$K''_c$	$F''$	$\nu_{obs}$ (MHz)	Obs-Calc (MHz)
2	0	2	2	1	0	1	2	2103.611	-0.003
2	0	2	1	1	0	1	0	2103.731	-0.002
2	0	2	3	1	0	1	2	2104.897	0.012
2	0	2	1	1	0	1	1	2106.827	-0.001
2	1	1	2	1	1	0	1	2369.877	-0.001
2	1	1	2	1	1	0	2	2370.450	-0.000
2	1	1	1	1	1	0	1	2370.990	0.002
2	1	1	3	1	1	0	2	2371.162	-0.000
2	1	1	1	1	1	0	0	2372.418	-0.000
9	3	6	9	9	3	7	9	2769.378	-0.002
9	3	6	10	9	3	7	10	2769.593	-0.001
9	3	6	8	9	3	7	8	2769.593	-0.001
3	1	3	3	2	1	2	3	2873.588	-0.000
3	1	3	3	2	1	2	2	2874.204	0.003
3	1	3	2	2	1	2	1	2874.551	0.001
3	1	3	2	2	1	2	1	2874.551	0.001
3	1	3	4	2	1	2	3	2874.551	0.001
3	1	3	2	2	1	2	2	2875.507	0.003
3	0	3	3	2	0	2	3	3049.776	0.000
3	0	3	2	2	0	2	1	3050.760	0.000
3	0	3	4	2	0	2	3	3051.032	-0.001
3	0	3	3	2	0	2	2	3051.032	-0.001
3	0	3	2	2	0	2	2	3052.736	0.000
7	2	5	7	7	2	6	7	3058.435	-0.003
7	2	5	8	7	2	6	8	3058.605	-0.003
7	2	5	6	7	2	6	6	3058.605	-0.003
5	1	4	4	5	1	5	4	3100.196	0.012
5	1	4	6	5	1	5	6	3100.196	0.012
3	2	2	3	3	0	3	2	3161.164	0.002
3	2	2	2	3	0	3	2	3161.164	0.002
3	2	2	4	3	0	3	4	3161.603	0.000
3	2	2	3	3	0	3	4	3161.603	0.000
3	2	2	4	3	0	3	3	3162.850	-0.001
3	2	2	3	3	0	3	3	3162.850	-0.001
3	2	2	2	3	0	3	3	3162.850	-0.001
3	2	2	3	2	2	1	2	3228.004	0.004
3	2	2	2	2	2	1	2	3228.004	0.004
3	2	2	4	2	2	1	3	3229.326	0.002
3	2	2	3	2	2	1	3	3229.326	0.002
3	2	2	2	2	2	1	3	3229.326	0.002
3	2	2	2	2	2	1	1	3230.064	0.003
3	2	1	3	2	2	0	2	3405.978	-0.002
3	2	1	2	2	2	0	2	3406.149	-0.000
3	2	1	4	2	2	0	3	3407.375	-0.000
3	2	1	2	2	2	0	3	3407.375	-0.000
3	2	1	2	2	2	0	1	3408.119	-0.005
4	2	3	3	4	0	4	3	3507.072	-0.001
4	2	3	5	4	0	4	5	3507.248	-0.000
4	2	3	4	4	0	4	4	3507.928	-0.002
3	1	2	3	2	1	1	3	3521.402	-0.001
3	1	2	3	2	1	1	2	3522.117	0.000
3	1	2	2	2	1	1	1	3522.475	0.020
3	1	2	4	2	1	1	3	3522.475	0.020
3	1	2	2	2	1	1	2	3523.543	-0.003
4	1	4	4	3	1	3	4	3789.023	0.001
4	1	4	4	3	1	3	3	3789.983	-0.002
4	1	4	3	3	1	3	2	3790.126	0.014
4	1	4	5	3	1	3	4	3790.126	0.014
4	1	4	3	3	1	3	3	3791.383	0.002

Table E.3. continued.

$J'$	$K'_a$	$K'_c$	$F'$	$J''$	$K''_a$	$K''_c$	$F''$	$\nu_{obs}$ (MHz)	Obs-Calc (MHz)
4	0	4	4	3	0	3	4	3920.956	0.001
4	0	4	3	3	0	3	2	3922.064	0.003
4	0	4	5	3	0	3	4	3922.191	-0.001
4	0	4	4	3	0	3	3	3922.191	-0.001
4	0	4	3	3	0	3	3	3923.749	-0.002
10	3	7	10	10	3	8	10	3933.970	-0.001
10	3	7	11	10	3	8	11	3934.161	0.000
10	3	7	9	10	3	8	9	3934.161	0.000
5	2	4	4	5	0	5	4	4021.855	0.029
5	2	4	6	5	0	5	6	4021.855	0.029
5	2	4	5	5	0	5	5	4022.267	-0.000
6	1	5	7	6	1	6	7	4115.000	-0.014
6	1	5	5	6	1	6	5	4115.000	-0.014
8	2	6	8	8	2	7	8	4167.232	-0.003
8	2	6	9	8	2	7	9	4167.352	-0.000
8	2	6	7	8	2	7	7	4167.352	-0.000
4	2	3	4	3	2	2	3	4267.284	0.000
4	2	3	4	3	2	2	4	4267.284	0.000
4	2	3	5	3	2	2	4	4267.830	-0.001
4	2	3	3	3	2	2	2	4267.970	-0.002
4	2	3	3	3	2	2	3	4267.970	-0.002
4	2	3	3	3	2	2	4	4267.970	-0.002
4	3	2	3	3	3	1	3	4382.708	0.007
4	3	2	4	3	3	1	3	4383.280	0.004
4	3	2	5	3	3	1	4	4384.523	0.002
4	3	2	4	3	3	1	4	4385.003	0.004
4	3	2	3	3	3	1	2	4385.003	0.004
4	3	1	3	3	3	0	3	4421.907	-0.004
4	3	1	4	3	3	0	3	4422.445	-0.002
4	3	1	5	3	3	0	4	4423.715	-0.000
4	3	1	3	3	3	0	2	4424.191	-0.009
4	1	3	4	3	1	2	4	4622.644	-0.001
4	1	3	4	3	1	2	3	4623.709	0.004
4	1	3	5	3	1	2	4	4623.817	-0.010
4	1	3	3	3	1	2	3	4625.188	-0.002
4	2	2	4	3	2	1	4	4649.534	-0.004
4	2	2	4	3	2	1	3	4649.662	-0.001
4	2	2	5	3	2	1	4	4650.261	-0.000
4	2	2	3	3	2	1	2	4650.402	-0.001
4	2	2	3	3	2	1	3	4650.574	0.001
6	2	5	5	6	0	6	5	4671.236	0.021
6	2	5	7	6	0	6	7	4671.236	0.021
6	2	5	6	6	0	6	6	4671.500	-0.004
5	1	5	5	4	1	4	5	4682.688	0.000
5	1	5	5	4	1	4	4	4683.858	0.026
5	1	5	4	4	1	4	3	4683.858	0.026
5	1	5	6	4	1	4	5	4683.858	0.026
5	1	5	4	4	1	4	4	4685.217	-0.000
5	0	5	5	4	0	4	5	4760.005	0.000
5	0	5	4	4	0	4	3	4761.226	0.009
5	0	5	6	4	0	4	5	4761.226	0.009
5	0	5	5	4	0	4	4	4761.226	0.009
5	0	5	4	4	0	4	4	4762.712	-0.002
5	3	3	4	5	1	4	4	4878.997	0.001
5	3	3	6	5	1	4	6	4879.204	-0.001
5	3	3	5	5	1	4	5	4880.231	-0.000
6	3	4	5	6	1	5	5	4880.603	-0.006
6	3	4	7	6	1	5	7	4880.721	0.002
6	3	4	6	6	1	5	6	4881.367	0.002
4	3	2	3	4	1	3	3	5038.175	0.000



Table E.3. continued.

$J'$	$K'_a$	$K'_c$	$F'$	$J''$	$K''_a$	$K''_c$	$F''$	$\nu_{obs}$ (MHz)	Obs-Calc (MHz)
4	3	2	5	4	1	3	5	5038.594	-0.001
4	3	2	4	4	1	3	4	5040.235	-0.000
7	3	5	6	7	1	6	6	5095.807	-0.004
7	3	5	8	7	1	6	8	5095.807	-0.004
7	3	5	7	7	1	6	7	5096.237	-0.000
7	1	6	8	7	1	7	8	5112.168	0.001
7	1	6	6	7	1	7	6	5112.168	0.001
2	2	0	1	1	0	1	0	5133.519	0.001
2	2	0	3	1	0	1	2	5136.082	0.001
2	2	0	1	1	0	1	1	5136.616	0.003
2	2	0	2	1	0	1	2	5137.354	0.004
2	2	0	2	1	0	1	1	5138.589	0.001
11	3	8	11	11	3	9	11	5181.108	0.008
11	3	8	12	11	3	9	12	5181.247	0.002
11	3	8	10	11	3	9	10	5181.247	0.002
5	2	4	5	4	2	3	5	5275.021	-0.002
5	2	4	5	4	2	3	4	5275.567	-0.004
5	2	4	6	4	2	3	5	5275.838	-0.016
5	2	4	4	4	2	3	3	5275.838	-0.016
5	2	4	4	4	2	3	4	5276.558	-0.001
3	3	1	2	3	1	2	2	5276.936	0.002
3	3	1	4	3	1	2	4	5277.907	0.005
3	3	1	3	3	1	2	3	5280.673	0.007
9	2	7	9	9	2	8	9	5295.634	0.009
9	2	7	10	9	2	8	10	5295.634	0.009
9	2	7	8	9	2	8	8	5295.634	0.009
5	4	2	5	4	4	1	4	5486.815	0.002
5	3	3	5	4	3	2	4	5487.718	-0.002
5	3	3	4	4	3	2	4	5487.952	0.011
5	4	2	6	4	4	1	5	5487.952	0.005
5	3	3	6	4	3	2	5	5488.357	-0.003
5	3	3	4	4	3	2	3	5488.514	-0.001
5	4	1	5	4	4	0	4	5492.975	-0.001
5	4	1	6	4	4	0	5	5494.113	-0.001
5	4	1	4	4	4	0	3	5494.461	0.010
8	3	6	8	8	1	7	8	5522.872	-0.002
6	1	6	6	5	1	5	6	5560.351	0.000
6	1	6	6	5	1	5	5	5561.509	-0.021
6	1	6	5	5	1	5	4	5561.509	-0.028
6	1	6	7	5	1	5	6	5561.601	0.029
6	1	6	5	5	1	5	5	5562.959	0.000
6	0	6	6	5	0	5	6	5598.937	-0.007
6	0	6	6	5	0	5	5	5600.190	0.010
6	0	6	7	5	0	5	6	5600.190	0.010
6	0	6	5	5	0	5	5	5601.615	-0.007
5	3	2	5	4	3	1	4	5614.813	-0.008
5	3	2	6	4	3	1	5	5615.499	-0.007
5	3	2	4	4	3	1	3	5615.664	-0.004
5	1	4	5	4	1	3	5	5646.540	-0.001
5	1	4	4	4	1	3	3	5647.755	0.028
5	1	4	5	4	1	3	4	5647.755	0.028
5	1	4	6	4	1	3	5	5647.755	0.028
5	1	4	4	4	1	3	4	5649.177	-0.002
5	2	3	5	4	2	2	5	5889.160	-0.002
5	2	3	5	4	2	2	4	5889.883	-0.002
5	2	3	6	4	2	2	5	5890.179	-0.006
5	2	3	4	4	2	2	3	5890.179	-0.006
5	2	3	4	4	2	2	4	5891.101	-0.006
8	1	7	7	8	1	8	7	6064.403	-0.006
8	1	7	9	8	1	8	9	6064.403	-0.006

Table E.3. continued.

$J'$	$K'_a$	$K'_c$	$F'$	$J''$	$K''_a$	$K''_c$	$F''$	$\nu_{obs}$ (MHz)	Obs-Calc (MHz)
8	1	7	8	8	1	8	8	6064.522	0.002
9	3	7	8	9	1	8	8	6119.068	-0.002
9	3	7	10	9	1	8	10	6119.068	-0.002
9	3	7	9	9	1	8	9	6119.242	-0.002
8	2	7	7	8	0	8	7	6214.042	-0.001
8	2	7	9	8	0	8	9	6214.042	-0.001
8	2	7	8	8	0	8	8	6214.212	-0.002
6	2	5	6	5	2	4	6	6248.588	-0.001
6	2	5	6	5	2	4	5	6249.406	-0.003
6	2	5	5	5	2	4	4	6249.554	-0.003
6	2	5	7	5	2	4	6	6249.554	-0.003
10	2	8	10	10	2	9	10	6376.602	-0.000
10	2	8	11	10	2	9	11	6376.602	-0.000
10	2	8	9	10	2	9	9	6376.602	-0.000
12	3	9	13	12	3	0	13	6420.136	-0.003
12	3	9	11	12	3	0	11	6420.136	-0.003
7	1	7	7	6	1	6	7	6428.106	-0.001
7	1	7	7	6	1	6	6	6429.319	-0.019
7	1	7	6	6	1	6	5	6429.319	-0.019
7	1	7	8	6	1	6	7	6429.319	-0.019
3	2	1	2	2	0	2	1	6437.908	-0.000
3	2	1	3	2	0	2	3	6438.437	-0.010
3	2	1	4	2	0	2	3	6438.570	-0.001
3	2	1	3	2	0	2	2	6439.714	-0.002
3	2	1	2	2	0	2	2	6439.887	0.001
7	0	7	7	6	0	6	7	6445.578	0.002
7	0	7	6	6	0	6	5	6446.804	-0.013
7	0	7	7	6	0	6	6	6446.804	-0.013
7	0	7	8	6	0	6	7	6446.804	-0.013
9	4	6	8	9	2	7	8	6471.079	0.020
9	4	6	10	9	2	7	10	6471.079	0.020
9	4	6	9	9	2	7	9	6471.528	-0.004
6	1	5	6	5	1	4	6	6575.210	-0.001
6	1	5	5	5	1	4	4	6576.414	0.015
6	1	5	7	5	1	4	6	6576.414	0.015
6	1	5	6	5	1	4	5	6576.414	0.015
6	3	4	6	5	3	3	6	6577.361	-0.010
6	3	4	6	5	3	3	5	6577.553	-0.000
6	3	4	7	5	3	3	6	6577.930	-0.013
6	3	4	5	5	3	3	4	6577.930	-0.013
6	5	2	6	5	5	1	5	6579.362	0.004
6	5	1	6	5	5	0	5	6580.174	0.001
6	5	2	7	5	5	1	6	6580.380	-0.004
6	5	2	5	5	5	1	4	6580.632	-0.000
6	5	1	7	5	5	0	6	6581.197	-0.003
6	5	1	5	5	5	0	4	6581.451	0.003
10	4	7	9	10	2	8	9	6583.196	0.003
10	4	7	11	10	2	8	11	6583.196	0.003
10	4	7	11	10	2	8	11	6583.196	0.003
10	4	7	10	10	2	8	10	6583.486	-0.005
8	4	5	7	8	2	6	7	6611.884	0.014
8	4	5	9	8	2	6	9	6611.884	0.014
6	4	3	6	5	4	2	5	6612.284	0.008
8	4	5	8	8	2	6	8	6612.571	-0.002
6	4	3	7	5	4	2	6	6612.949	0.006
6	4	3	5	5	4	2	4	6613.092	0.008
6	4	2	6	5	4	1	5	6638.925	-0.000
6	4	2	7	5	4	1	6	6639.602	-0.002
6	4	2	6	5	4	1	6	6639.746	0.004
10	3	8	9	10	1	9	9	6833.639	-0.002

Table E.3. continued.

$J'$	$K'_a$	$K'_c$	$F'$	$J''$	$K''_a$	$K''_c$	$F''$	$\nu_{obs}$ (MHz)	Obs-Calc (MHz)
10	3	8	11	10	1	9	11	6833.639	-0.002
10	3	8	10	10	1	9	10	6833.770	0.002
6	3	3	6	5	3	2	6	6870.915	-0.006
6	3	3	6	5	3	2	5	6871.183	0.002
6	3	3	7	5	3	2	6	6871.626	-0.003
6	3	3	5	5	3	2	4	6871.626	-0.003
6	3	3	5	5	3	2	5	6871.971	-0.007
11	4	8	10	11	2	9	10	6941.939	-0.003
11	4	8	12	11	2	9	12	6941.939	-0.003
11	4	8	11	11	2	9	11	6942.131	-0.002
7	4	4	6	7	2	5	6	6952.756	-0.001
7	4	4	8	7	2	5	8	6952.890	-0.003
7	4	4	7	7	2	5	7	6953.839	0.000
9	1	8	8	9	1	9	8	6977.506	-0.003
9	1	8	10	9	1	9	10	6977.506	-0.003
9	1	8	9	9	1	9	9	6977.633	0.001
9	2	8	8	9	0	9	8	7047.081	-0.001
9	2	8	10	9	0	9	10	7047.081	-0.001
9	2	8	9	9	0	9	9	7047.230	-0.001
6	2	4	6	5	2	3	6	7079.618	-0.000
6	2	4	6	5	2	3	5	7080.636	0.001
6	2	4	5	5	2	3	4	7080.775	0.004
6	2	4	7	5	2	3	6	7080.775	0.004
6	2	4	5	5	2	3	5	7081.983	-0.003
7	2	6	7	6	2	5	7	7188.238	0.003
7	2	6	7	6	2	5	6	7189.268	0.009
7	2	6	6	6	2	5	5	7189.268	0.009
7	2	6	8	6	2	5	7	7189.268	0.009
7	2	6	6	6	2	5	6	7190.415	0.002
8	1	8	8	7	1	7	8	7290.524	-0.009
8	1	8	7	7	1	7	6	7291.788	-0.000
8	1	8	8	7	1	7	7	7291.788	-0.000
8	1	8	9	7	1	7	8	7291.788	-0.000
8	1	8	7	7	1	7	7	7293.219	0.009
8	0	8	8	7	0	7	8	7297.975	0.008
8	0	8	7	7	0	7	6	7299.225	-0.000
8	0	8	8	7	0	7	7	7299.225	-0.000
8	0	8	9	7	0	7	8	7299.225	-0.000
8	0	8	7	7	0	7	7	7300.656	0.003
6	4	3	5	6	2	4	5	7404.040	-0.010
6	4	3	7	6	2	4	7	7404.260	-0.011
6	4	3	6	6	2	4	6	7405.576	-0.006
7	1	6	7	6	1	5	7	7425.335	-0.002
7	1	6	8	6	1	5	7	7426.540	0.018
7	1	6	7	6	1	5	6	7426.540	0.018
7	1	6	6	6	1	5	6	7427.869	-0.007
12	4	9	11	12	2	0	11	7498.523	-0.002
12	4	9	13	12	2	0	13	7498.523	-0.002
12	4	9	12	12	2	0	12	7498.648	-0.000
11	3	9	10	11	1	0	10	7622.410	0.002
11	3	9	12	11	1	0	12	7622.410	0.002
7	3	5	7	6	3	4	7	7640.853	-0.004
7	3	5	7	6	3	4	6	7641.406	-0.000
7	3	5	8	6	3	4	7	7641.637	-0.001
7	3	5	6	6	3	4	5	7641.637	-0.001
7	3	5	6	6	3	4	6	7642.295	0.003
7	5	3	7	6	5	2	6	7706.158	-0.002
7	5	3	8	6	5	2	7	7706.819	0.001
7	5	3	6	6	5	2	5	7706.943	0.003
7	5	2	7	6	5	1	6	7710.522	-0.000

**Table E.3.** continued.

$J'$	$K'_a$	$K'_c$	$F'$	$J''$	$K''_a$	$K''_c$	$F''$	$\nu_{obs}$ (MHz)	Obs-Calc (MHz)
7	5	2	8	6	5	1	7	7711.189	0.008
7	5	2	6	6	5	1	5	7711.306	0.002
7	4	4	7	6	4	3	6	7742.170	0.007
7	4	4	8	6	4	3	7	7742.610	-0.004
7	4	4	6	6	4	3	5	7742.610	-0.004
7	4	3	7	6	4	2	6	7824.945	0.002
7	4	3	8	6	4	2	7	7825.413	-0.008
7	4	3	6	6	4	2	5	7825.413	-0.008
10	1	9	9	10	1	0	9	7865.967	-0.001
10	1	9	11	10	1	0	11	7865.967	-0.001
10	1	9	10	10	1	0	10	7866.093	0.000
10	2	9	9	10	0	0	9	7896.817	-0.002
10	2	9	11	10	0	0	11	7896.817	-0.002
10	2	9	10	10	0	0	10	7896.960	0.006

**Table E.4.** Laboratory-observed transition frequencies for 5-CNACY.

$J'$	$K'_a$	$K'_c$	$F'$	$J''$	$K''_a$	$K''_c$	$F''$	$\nu_{obs}$ (MHz)	Obs-Calc (MHz)
2	1	2	2	1	1	1	1	2022.170	-0.001
2	1	2	2	1	1	1	2	2022.628	-0.004
2	1	2	3	1	1	1	2	2023.243	-0.001
2	1	2	1	1	1	1	0	2024.266	-0.000
2	0	2	2	1	0	1	2	2202.717	-0.000
2	0	2	1	1	0	1	0	2202.844	-0.008
2	0	2	2	1	0	1	1	2203.789	0.012
2	0	2	3	1	0	1	2	2203.789	0.012
2	0	2	1	1	0	1	1	2205.419	-0.004
4	1	3	3	4	1	4	3	2382.989	0.016
4	1	3	5	4	1	4	5	2382.989	0.016
4	1	3	4	4	1	4	4	2383.141	0.000
4	1	3	3	4	0	4	3	2477.967	0.004
4	1	3	5	4	0	4	5	2477.967	0.004
4	1	3	4	4	0	4	4	2478.201	0.000
6	2	4	5	6	2	5	5	2488.189	-0.007
6	2	4	6	6	2	5	6	2488.189	-0.007
6	2	4	7	6	2	5	7	2488.189	-0.007
6	3	3	5	6	2	4	5	2499.108	-0.000
6	3	3	7	6	2	4	7	2499.108	-0.006
6	3	3	6	6	2	4	6	2499.495	-0.004
2	1	1	2	1	1	0	1	2513.857	-0.001
2	1	1	2	1	1	0	2	2514.427	-0.000
2	1	1	1	1	1	0	1	2514.623	-0.002
2	1	1	3	1	1	0	2	2514.918	-0.002
2	1	1	1	1	1	0	0	2516.053	0.002
2	1	2	1	1	0	1	0	2578.374	0.019
2	1	2	2	1	0	1	2	2578.926	-0.012
2	1	2	3	1	0	1	2	2579.546	-0.005
2	1	2	2	1	0	1	1	2579.973	0.001
7	3	4	6	7	2	5	6	2654.114	0.002
7	3	4	8	7	2	5	8	2654.114	0.006
2	2	1	1	2	0	2	1	2781.376	0.021
2	2	1	3	2	0	2	3	2782.562	-0.004
2	2	1	2	2	0	2	2	2784.746	0.001
3	0	3	3	2	1	2	3	2791.267	-0.016
3	0	3	3	2	1	2	2	2791.896	0.000
3	0	3	4	2	1	2	3	2792.360	-0.011
3	0	3	2	2	1	2	2	2793.375	0.009
3	2	2	2	3	1	3	2	2811.901	0.003
3	2	2	3	3	1	3	4	2812.223	0.004
3	2	2	4	3	1	3	4	2812.223	0.004
3	2	2	3	3	1	3	3	2813.131	-0.000
3	2	2	4	3	1	3	3	2813.131	-0.000
3	2	2	2	3	1	3	3	2813.131	-0.000
3	1	3	3	2	1	2	3	2997.226	-0.003
3	1	3	3	2	1	2	2	2997.842	0.000
3	1	3	2	2	1	2	1	2998.146	0.010
3	1	3	4	2	1	2	3	2998.146	0.010
3	1	3	2	2	1	2	2	2999.081	0.003
3	2	2	2	3	0	3	2	3017.606	-0.002
3	2	2	3	3	0	3	2	3017.606	-0.002
3	2	2	4	3	0	3	4	3017.989	-0.001
3	2	2	3	3	0	3	4	3017.989	-0.001
3	2	2	2	3	0	3	3	3019.079	0.001
3	2	2	4	3	0	3	3	3019.079	0.001
3	2	2	3	3	0	3	3	3019.079	0.001
3	0	3	3	2	0	2	3	3167.042	-0.001
3	0	3	2	2	0	2	1	3167.916	0.002

Table E.4. continued.

$J'$	$K'_a$	$K'_c$	$F'$	$J''$	$K''_a$	$K''_c$	$F''$	$\nu_{obs}$ (MHz)	Obs-Calc (MHz)
3	0	3	3	2	0	2	2	3168.127	0.001
3	0	3	4	2	0	2	3	3168.127	0.001
3	0	3	2	2	0	2	2	3169.584	-0.004
4	2	3	5	4	1	4	5	3355.794	-0.006
4	2	3	4	4	1	4	4	3356.373	-0.011
3	1	3	4	2	0	2	3	3373.900	-0.002
3	1	3	3	2	0	2	2	3374.062	-0.000
8	4	4	9	8	3	5	9	3396.105	0.001
8	4	4	8	8	3	5	8	3396.416	-0.008
3	2	2	3	2	2	1	2	3402.451	0.000
3	2	2	2	2	2	1	2	3402.451	0.000
3	2	2	4	2	2	1	3	3403.553	-0.002
3	2	2	2	2	2	1	3	3403.553	-0.002
3	2	2	3	2	2	1	3	3403.553	-0.002
3	2	2	2	2	2	1	1	3404.168	-0.000
5	1	4	6	5	1	5	6	3411.982	0.000
5	1	4	5	5	1	5	5	3412.167	0.000
3	3	1	2	3	2	2	3	3433.017	-0.003
3	3	1	4	3	2	2	3	3433.528	0.010
3	3	1	4	3	2	2	4	3433.528	0.010
3	3	1	3	3	2	2	2	3434.935	-0.006
3	3	1	3	3	2	2	3	3434.935	-0.006
3	3	1	3	3	2	2	4	3434.935	-0.006
4	2	3	3	4	0	4	3	3450.628	-0.002
4	2	3	5	4	0	4	5	3450.794	-0.002
5	1	4	5	5	0	5	5	3451.345	0.007
4	2	3	4	4	0	4	4	3451.441	-0.002
5	2	3	5	4	3	2	4	3463.092	-0.005
5	2	3	6	4	3	2	5	3464.237	0.002
5	2	3	4	4	3	2	3	3464.488	0.000
4	1	3	4	3	2	2	3	3512.603	-0.000
4	1	3	4	3	2	2	4	3512.603	-0.000
4	1	3	5	3	2	2	4	3513.495	0.000
4	1	3	3	3	2	2	2	3513.717	-0.006
9	3	6	8	9	3	7	8	3573.936	0.005
9	3	6	9	9	3	7	9	3573.936	0.005
9	3	6	10	9	3	7	10	3573.936	0.005
7	2	5	6	7	2	6	6	3601.540	-0.013
7	2	5	7	7	2	6	7	3601.540	-0.013
7	2	5	8	7	2	6	8	3601.540	-0.013
7	2	5	8	7	2	6	8	3601.540	-0.013
3	2	1	3	2	2	0	2	3637.643	0.000
3	2	1	2	2	2	0	3	3638.772	0.001
3	2	1	4	2	2	0	3	3638.772	0.001
3	2	1	3	2	2	0	3	3638.772	0.001
3	2	1	2	2	2	0	1	3639.389	-0.002
7	4	3	6	7	3	4	6	3720.061	0.004
7	4	3	8	7	3	4	8	3720.061	0.004
7	4	3	7	7	3	4	7	3720.558	-0.000
3	1	2	3	2	1	1	3	3723.625	0.003
3	1	2	3	2	1	1	2	3724.113	-0.002
3	1	2	2	2	1	1	1	3724.404	-0.000
3	1	2	2	2	1	1	1	3724.404	-0.000
3	1	2	4	2	1	1	3	3724.404	-0.000
3	1	2	2	2	1	1	2	3725.169	-0.002
7	2	5	6	7	1	6	6	3758.428	-0.002
7	2	5	8	7	1	6	8	3758.428	-0.002
5	3	3	4	5	2	4	4	3864.553	0.008
5	3	3	6	5	2	4	6	3864.660	0.001
4	1	4	4	3	1	3	4	3941.678	-0.004

Table E.4. continued.

$J'$	$K'_a$	$K'_c$	$F'$	$J''$	$K''_a$	$K''_c$	$F''$	$\nu_{obs}$ (MHz)	Obs-Calc (MHz)
4	1	4	4	3	1	3	3	3942.604	0.009
4	1	4	3	3	1	3	2	3942.710	0.036
4	1	4	5	3	1	3	4	3942.710	-0.016
4	1	4	3	3	1	3	3	3943.912	0.002
5	2	4	4	5	1	5	4	4021.551	-0.010
5	2	4	6	5	1	5	6	4021.647	0.000
5	2	4	5	5	1	5	5	4022.052	-0.015
4	0	4	4	3	0	3	4	4052.392	-0.002
4	0	4	3	3	0	3	2	4053.406	0.001
4	0	4	4	3	0	3	3	4053.507	0.011
4	0	4	5	3	0	3	4	4053.507	0.011
4	0	4	5	3	0	3	4	4053.507	0.011
4	0	4	3	3	0	3	3	4054.877	0.001
5	2	4	5	5	0	5	4	4059.890	0.020
5	2	4	5	5	0	5	6	4060.117	0.015
5	2	4	4	5	0	5	4	4060.697	-0.009
5	2	4	6	5	0	5	6	4060.793	-0.003
5	2	4	5	5	0	5	5	4061.237	-0.000
6	4	2	5	6	3	3	5	4108.970	0.003
6	4	2	7	6	3	3	7	4109.083	0.007
6	4	2	6	6	3	3	6	4109.723	0.000
4	1	4	4	3	0	3	4	4147.471	0.016
4	1	4	3	3	0	3	2	4148.383	-0.001
4	1	4	4	3	0	3	3	4148.526	0.010
4	1	4	5	3	0	3	4	4148.526	0.010
2	2	1	1	1	1	0	1	4183.041	-0.006
2	2	1	3	1	1	0	2	4184.228	-0.000
2	2	1	1	1	1	0	0	4184.475	0.001
2	2	1	2	1	1	0	1	4184.759	-0.003
2	2	1	2	1	1	0	2	4185.330	-0.002
5	4	1	4	5	3	2	4	4417.997	0.006
5	4	1	6	5	3	2	6	4418.171	0.001
6	1	5	7	6	1	6	7	4452.971	0.011
6	1	5	6	6	1	6	6	4453.165	-0.010
10	5	5	10	10	4	6	10	4460.006	-0.005
6	1	5	7	6	0	6	7	4467.986	0.009
6	1	5	6	6	0	6	6	4468.198	-0.001
5	3	3	4	5	1	4	4	4474.162	-0.002
5	3	3	5	5	1	4	6	4474.162	-0.002
5	3	3	6	5	1	4	6	4474.322	-0.003
5	3	3	5	5	1	4	5	4475.123	0.001
4	2	3	4	3	2	2	3	4485.846	-0.001
4	2	3	4	3	2	2	4	4485.846	-0.001
4	2	3	5	3	2	2	4	4486.306	-0.001
4	2	3	3	3	2	2	2	4486.426	-0.000
4	2	3	3	3	2	2	3	4486.426	-0.000
4	2	3	3	3	2	2	4	4486.426	-0.000
2	2	0	1	1	1	1	1	4494.155	0.004
2	2	0	1	1	1	1	0	4495.207	-0.084
2	2	0	3	1	1	1	2	4495.207	-0.000
2	2	0	2	1	1	1	1	4495.824	0.002
2	2	0	2	1	1	1	2	4496.283	0.000
4	3	2	3	4	1	3	3	4561.074	0.000
4	3	2	5	4	1	3	5	4561.404	-0.001
4	3	2	4	4	1	3	3	4561.580	0.011
4	3	2	4	4	1	3	5	4561.793	-0.007
4	3	2	4	4	1	3	4	4562.688	-0.002
6	3	4	5	6	1	5	5	4609.160	-0.009
6	3	4	7	6	1	5	7	4609.258	0.001
6	3	4	6	6	1	5	6	4609.761	-0.003

Table E.4. continued.

$J'$	$K'_a$	$K'_c$	$F'$	$J''$	$K''_a$	$K''_c$	$F''$	$\nu_{obs}$ (MHz)	Obs-Calc (MHz)
4	3	2	3	3	3	1	3	4639.862	0.005
4	3	2	4	3	3	1	3	4640.356	0.003
4	3	2	5	3	3	1	4	4641.387	0.005
4	3	2	3	3	3	1	2	4641.779	0.000
4	3	2	4	3	3	1	4	4641.779	0.000
5	4	2	4	5	3	3	4	4679.380	0.000
5	4	2	4	5	3	3	5	4679.545	-0.003
5	4	2	6	5	3	3	6	4679.545	-0.003
5	4	2	5	5	3	3	5	4680.367	-0.009
4	3	1	3	3	3	0	3	4704.001	-0.003
4	3	1	4	3	3	0	3	4704.465	-0.003
4	3	1	5	3	3	0	4	4705.513	-0.003
4	3	1	3	3	3	0	2	4705.915	0.000
4	3	1	4	3	3	0	4	4705.915	0.000
6	4	3	5	6	3	4	5	4749.882	-0.010
6	4	3	7	6	3	4	7	4749.995	0.004
6	4	3	6	6	3	4	6	4750.571	0.000
8	2	6	7	8	2	7	7	4762.903	0.007
8	2	6	9	8	2	7	9	4762.903	0.007
3	3	1	2	3	1	2	2	4781.204	-0.000
3	3	1	4	3	1	2	4	4781.967	-0.010
6	2	5	7	6	1	6	7	4782.296	0.002
6	2	5	5	6	0	6	5	4797.290	0.002
6	2	5	7	6	0	6	7	4797.290	0.002
6	2	5	6	6	0	6	6	4797.647	-0.003
5	0	5	5	4	1	4	4	4823.277	0.002
5	0	5	4	4	1	4	3	4823.388	0.005
5	0	5	6	4	1	4	5	4823.388	0.002
5	0	5	5	4	1	4	4	4831.141	0.001
8	2	6	9	8	1	7	9	4831.141	-0.001
8	2	6	8	8	1	7	8	4831.254	0.011
10	3	7	9	10	3	8	9	4850.371	-0.000
10	3	7	10	10	3	8	10	4850.371	-0.000
10	3	7	11	10	3	8	11	4850.371	-0.000
4	1	3	4	3	1	2	4	4861.065	0.001
5	1	5	5	4	1	4	5	4861.404	0.002
4	1	3	4	3	1	2	3	4861.863	0.017
4	1	3	3	3	1	2	2	4861.953	0.015
4	1	3	5	3	1	2	4	4861.953	0.015
5	1	5	6	4	1	4	5	4862.519	0.003
4	1	3	3	3	1	2	3	4862.979	0.012
5	1	5	4	4	1	4	4	4863.789	0.000
5	0	5	5	4	0	4	5	4917.225	-0.002
5	0	5	4	4	0	4	3	4918.308	-0.015
5	0	5	5	4	0	4	4	4918.308	-0.015
5	0	5	6	4	0	4	5	4918.377	0.013
5	0	5	4	4	0	4	4	4919.718	0.014
9	5	4	10	9	4	5	10	4940.318	-0.006
9	5	4	9	9	4	5	9	4940.737	-0.000
5	1	5	4	4	0	4	3	4957.504	0.009
5	1	5	5	4	0	4	4	4957.504	0.009
5	1	5	6	4	0	4	5	4957.504	0.009
4	2	2	4	3	2	1	3	4968.495	-0.010
4	2	2	4	3	2	1	4	4968.495	-0.010
4	2	2	5	3	2	1	4	4968.971	-0.003
4	2	2	3	3	2	1	2	4969.091	0.001
4	2	2	3	3	2	1	4	4969.091	0.001
7	3	5	6	7	1	6	6	4991.556	0.001
7	3	5	8	7	1	6	8	4991.556	0.001
7	3	5	7	7	1	6	7	4991.917	-0.001



Table E.4. continued.

$J'$	$K'_a$	$K'_c$	$F'$	$J''$	$K''_a$	$K''_c$	$F''$	$\nu_{obs}$ (MHz)	Obs-Calc (MHz)
2	2	0	1	1	0	1	0	5049.374	-0.005
2	2	0	3	1	0	1	2	5051.515	0.000
2	2	0	1	1	0	1	1	5051.948	-0.002
2	2	0	2	1	0	1	2	5052.589	-0.000
2	2	0	2	1	0	1	1	5053.621	-0.000
3	2	2	2	2	1	1	1	5072.592	0.001
3	2	2	4	2	1	1	3	5072.864	0.000
3	2	2	3	2	1	1	3	5072.864	0.000
3	2	2	3	2	1	1	2	5073.355	-0.001
3	2	2	2	2	1	1	2	5073.355	-0.001
8	4	5	7	8	3	6	7	5214.575	0.005
8	4	5	9	8	3	6	9	5214.575	0.001
8	4	5	8	8	3	6	8	5214.881	0.015
8	5	3	7	8	4	4	7	5388.201	0.002
8	5	3	9	8	4	4	9	5388.201	0.002
8	5	3	8	8	4	4	8	5388.734	0.000
7	1	6	6	7	1	7	6	5449.740	0.005
7	1	6	8	7	1	7	8	5449.740	0.001
7	1	6	7	7	1	7	7	5449.952	0.002
8	3	6	7	8	2	7	7	5511.892	-0.006
8	3	6	9	8	2	7	9	5512.025	0.003
8	3	6	8	8	2	7	8	5512.207	-0.009
5	2	4	5	4	2	3	5	5527.667	-0.001
5	2	4	5	4	2	3	4	5528.130	0.000
5	2	4	4	4	2	3	3	5528.366	-0.005
5	2	4	6	4	2	3	5	5528.366	-0.005
5	2	4	4	4	2	3	4	5528.965	-0.000
8	3	6	9	8	1	7	9	5580.253	0.011
8	3	6	8	8	1	7	8	5580.487	-0.005
7	2	6	6	7	0	7	6	5612.037	-0.021
7	2	6	8	7	0	7	8	5612.114	0.015
7	2	6	7	7	0	7	7	5612.376	-0.006
9	4	6	8	9	3	7	8	5655.512	0.013
9	4	6	10	9	3	7	10	5655.512	0.013
9	4	6	9	9	3	7	9	5655.770	0.002
7	5	2	6	7	4	3	6	5701.875	0.015
7	5	2	8	7	4	3	8	5701.953	0.003
7	5	2	7	7	4	3	7	5702.567	-0.004
6	1	6	6	5	1	5	6	5765.053	0.000
6	1	6	5	5	1	5	4	5766.155	-0.018
6	1	6	6	5	1	5	5	5766.155	-0.018
6	1	6	7	5	1	5	6	5766.351	0.018
6	1	6	5	5	1	5	5	5767.530	0.006
6	0	6	6	5	0	5	6	5789.177	0.000
6	0	6	5	5	0	5	5	5791.674	-0.003
5	3	3	5	4	3	2	4	5803.903	0.000
5	3	3	6	4	3	2	5	5804.429	-0.000
5	3	3	4	4	3	2	3	5804.558	-0.000
5	4	2	6	4	4	1	5	5816.305	-0.000
5	4	2	4	4	4	1	3	5816.584	-0.000
5	4	1	5	4	4	0	4	5827.778	-0.000
5	4	1	6	4	4	0	5	5828.738	0.017
5	4	1	4	4	4	0	3	5829.008	0.008
4	2	3	4	3	1	2	4	5834.299	-0.007
4	2	3	3	3	1	2	2	5834.612	-0.000
4	2	3	5	3	1	2	4	5834.767	0.000
4	2	3	4	3	1	2	3	5835.086	-0.002
4	2	3	3	3	1	2	3	5835.671	0.001
6	5	1	5	6	4	2	5	5879.819	0.013
6	5	1	7	6	4	2	7	5879.951	0.011

Table E.4. continued.

$J'$	$K'_a$	$K'_c$	$F'$	$J''$	$K''_a$	$K''_c$	$F''$	$\nu_{obs}$ (MHz)	Obs-Calc (MHz)
6	5	1	6	6	4	2	6	5880.746	0.007
9	2	7	8	9	2	8	8	5881.549	-0.006
9	2	7	10	9	2	8	10	5881.549	-0.006
9	2	7	9	9	2	8	9	5881.670	0.001
5	1	4	5	4	1	3	5	5890.591	0.009
5	1	4	4	4	1	3	3	5891.451	-0.019
5	1	4	5	4	1	3	4	5891.451	-0.019
5	1	4	6	4	1	3	5	5891.546	0.035
9	2	7	8	9	1	8	8	5909.432	-0.003
9	2	7	10	9	1	8	10	5909.432	-0.003
9	2	7	9	9	1	8	9	5909.557	-0.000
7	5	3	6	7	4	4	6	5912.266	-0.008
7	5	3	8	7	4	4	8	5912.266	-0.008
7	5	3	8	7	4	4	8	5912.266	-0.008
7	5	3	7	7	4	4	7	5912.881	-0.002
8	5	4	7	8	4	5	7	5915.279	0.009
8	5	4	9	8	4	5	9	5915.337	0.011
8	5	4	8	8	4	5	8	5915.774	0.001
8	4	5	7	8	2	6	7	5963.614	-0.003
8	4	5	9	8	2	6	9	5963.614	-0.003
8	4	5	8	8	2	6	8	5964.109	-0.005
5	5	0	4	5	4	1	4	5968.476	-0.002
5	5	0	6	5	4	1	6	5968.702	0.002
5	3	2	5	4	3	1	4	6003.873	-0.002
5	3	2	4	4	3	1	4	6004.097	-0.006
5	3	2	5	4	3	1	5	6004.236	-0.008
5	3	2	6	4	3	1	5	6004.430	-0.003
5	3	2	4	4	3	1	3	6004.564	-0.003
9	4	6	10	9	2	7	10	6057.246	0.018
9	4	6	9	9	2	7	9	6057.542	-0.005
3	2	1	2	2	1	2	1	6110.414	-0.002
3	2	1	3	2	1	2	3	6110.735	0.001
3	2	1	4	2	1	2	3	6110.735	0.001
3	2	1	3	2	1	2	2	6111.295	-0.006
3	2	1	2	2	1	2	2	6111.295	-0.006
7	4	4	6	7	2	5	6	6150.922	-0.007
7	4	4	8	7	2	5	8	6151.025	-0.003
7	4	4	7	7	2	5	7	6151.713	-0.004
6	1	5	6	5	2	4	5	6197.272	-0.002
6	1	5	5	5	2	4	4	6197.525	-0.006
6	1	5	7	5	2	4	6	6197.525	-0.006
3	3	0	2	3	1	3	2	6256.175	-0.002
3	3	0	4	3	1	3	4	6257.002	0.005
3	3	0	3	3	1	3	3	6259.330	0.002
5	2	3	5	4	2	2	5	6269.033	-0.007
5	2	3	5	4	2	2	4	6269.561	-0.003
5	2	3	4	4	2	2	3	6269.784	-0.004
5	2	3	6	4	2	2	5	6269.784	-0.004
5	2	3	4	4	2	2	4	6270.430	-0.028
9	3	7	8	9	2	8	8	6283.267	-0.001
9	3	7	10	9	2	8	10	6283.267	-0.001
9	3	7	9	9	2	8	9	6283.467	-0.005
9	3	7	8	9	1	8	8	6311.146	-0.002
9	3	7	10	9	1	8	10	6311.146	-0.002
9	3	7	9	9	1	8	9	6311.357	-0.004
8	1	7	7	8	1	8	7	6399.639	0.010
8	1	7	9	8	1	8	9	6399.639	0.010
8	1	7	8	8	1	8	8	6399.867	-0.002
10	4	7	9	10	2	8	9	6431.495	0.001
10	4	7	11	10	2	8	11	6431.495	0.001

Table E.4. continued.

$J'$	$K'_a$	$K'_c$	$F'$	$J''$	$K''_a$	$K''_c$	$F''$	$\nu_{obs}$ (MHz)	Obs-Calc (MHz)
10	4	7	10	10	2	8	10	6431.723	-0.002
8	2	7	7	8	1	8	7	6467.897	0.014
8	2	7	9	8	1	8	9	6467.897	0.014
8	2	7	8	8	1	8	8	6468.136	-0.009
8	2	7	7	8	0	8	7	6469.791	-0.016
8	2	7	9	8	0	8	9	6469.851	0.012
8	2	7	8	8	0	8	8	6470.083	-0.004
3	2	1	2	2	0	2	1	6485.917	-0.001
3	2	1	3	2	0	2	3	6486.496	0.002
3	2	1	4	2	0	2	3	6486.496	0.002
3	2	1	3	2	0	2	2	6487.517	0.002
5	2	4	6	4	1	3	5	6501.170	-0.005
5	2	4	5	4	1	3	4	6501.373	0.000
6	2	5	6	5	2	4	6	6526.033	0.002
6	2	5	6	5	2	4	5	6526.719	-0.005
6	2	5	5	5	2	4	4	6526.853	-0.004
6	2	5	7	5	2	4	6	6526.853	-0.004
6	2	5	5	5	2	4	5	6527.680	-0.013
6	4	3	5	6	2	4	5	6541.540	-0.002
6	4	3	7	6	2	4	7	6541.703	-0.007
6	4	3	6	6	2	4	6	6542.701	-0.001
8	3	5	8	7	4	4	7	6570.439	-0.005
8	3	5	9	7	4	4	8	6571.063	-0.002
8	3	5	7	7	4	4	6	6571.158	0.018
7	0	7	6	6	1	6	5	6655.726	-0.016
7	0	7	7	6	1	6	6	6655.726	-0.016
7	1	7	7	6	1	6	7	6660.089	0.015
7	1	7	6	6	1	6	5	6661.227	-0.020
7	1	7	7	6	1	6	6	6661.227	-0.020
7	1	7	8	6	1	6	7	6661.227	-0.020
7	0	7	6	6	0	6	5	6670.759	-0.013
7	0	7	7	6	0	6	6	6670.759	-0.013
7	0	7	8	6	0	6	7	6670.759	-0.013
7	0	7	6	6	0	6	6	6672.149	0.020
7	1	7	7	6	0	6	6	6676.263	-0.006
7	1	7	8	6	0	6	7	6676.263	-0.006
3	3	1	2	2	2	0	2	6770.341	-0.003
3	3	1	4	2	2	0	3	6771.915	-0.001
3	3	1	2	2	2	0	1	6772.001	-0.013
3	3	1	3	2	2	0	2	6772.263	-0.002
3	3	1	3	2	2	0	3	6773.340	-0.000
6	1	5	6	5	1	4	6	6806.248	0.000
6	1	5	5	5	1	4	4	6807.181	0.003
6	1	5	6	5	1	4	5	6807.181	0.003
6	1	5	7	5	1	4	6	6807.181	0.003
3	3	0	2	2	2	1	2	6846.738	0.005
3	3	0	4	2	2	1	3	6848.334	0.002
3	3	0	2	2	2	1	1	6848.456	0.007
3	3	0	3	2	2	1	2	6848.649	0.003
3	3	0	3	2	2	1	3	6849.756	0.006
10	2	8	9	10	2	9	9	6922.967	-0.003
10	2	8	11	10	2	9	11	6922.967	-0.003
10	2	8	10	10	2	9	10	6923.110	0.001
6	3	4	6	5	3	3	6	6941.680	-0.006
6	3	4	6	5	3	3	5	6941.821	0.001
6	3	4	7	5	3	3	6	6942.110	-0.011
6	3	4	5	5	3	3	4	6942.194	0.026
6	5	2	6	5	5	1	5	6973.489	0.023
6	5	2	7	5	5	1	6	6974.314	-0.000
6	5	2	5	5	5	1	4	6974.509	-0.011

Table E.4. continued.

$J'$	$K'_a$	$K'_c$	$F'$	$J''$	$K''_a$	$K''_c$	$F''$	$\nu_{obs}$ (MHz)	Obs-Calc (MHz)
6	5	1	6	5	5	0	5	6975.468	-0.005
6	5	1	7	5	5	0	6	6976.330	0.006
6	5	1	5	5	5	0	4	6976.544	0.014
6	5	1	6	5	5	0	6	6977.290	0.003
6	4	3	5	5	4	2	5	7011.845	-0.000
6	4	3	6	5	4	2	5	7012.019	0.003
6	4	3	7	5	4	2	6	7012.565	0.001
6	4	3	5	5	4	2	4	7012.686	0.005
6	4	3	5	5	4	2	4	7012.686	0.005
6	4	3	6	5	4	2	6	7012.686	0.005
11	4	8	10	11	2	9	10	7026.320	-0.013
11	4	8	12	11	2	9	12	7026.320	-0.013
11	4	8	11	11	2	9	11	7026.506	-0.000
6	4	2	5	5	4	1	5	7064.364	-0.009
6	4	2	6	5	4	1	5	7064.521	-0.001
6	4	2	7	5	4	1	6	7065.079	-0.003
6	4	2	5	5	4	1	4	7065.202	0.000
6	4	2	6	5	4	1	6	7065.202	-0.000
10	3	8	9	10	1	9	9	7128.155	0.008
10	3	8	10	10	1	9	10	7128.333	-0.007
6	2	5	5	5	1	4	4	7136.521	0.016
6	2	5	7	5	1	4	6	7136.521	0.016
6	2	5	6	5	1	4	5	7136.638	0.012
9	1	8	8	9	1	9	8	7319.923	0.002
9	1	8	10	9	1	9	10	7319.923	0.002
9	1	8	9	9	1	9	9	7320.149	-0.000
7	1	6	7	6	2	5	6	7328.555	-0.001
7	1	6	6	6	2	5	5	7328.690	-0.000
7	1	6	8	6	2	5	7	7328.690	-0.000
9	2	8	8	9	0	9	8	7348.472	0.002
9	2	8	10	9	0	9	10	7348.472	0.002
9	2	8	9	9	0	9	9	7348.705	-0.002
6	3	3	6	5	3	2	6	7373.648	-0.010
6	3	3	6	5	3	2	5	7373.845	-0.001
6	3	3	5	5	3	2	4	7374.164	-0.030
6	3	3	7	5	3	2	6	7374.164	-0.012
6	3	3	5	5	3	2	5	7374.469	0.015
7	2	6	7	6	2	5	7	7484.665	-0.000
7	2	6	6	6	2	5	5	7485.561	0.013
7	2	6	7	6	2	5	6	7485.561	0.013
7	2	6	8	6	2	5	7	7485.561	0.013
7	2	6	6	6	2	5	6	7486.552	0.015
6	2	4	6	5	2	3	6	7489.755	0.003
6	2	4	6	5	2	3	5	7490.500	0.006
6	2	4	5	5	2	3	4	7490.595	0.001
6	2	4	7	5	2	3	6	7490.595	0.001
6	2	4	5	5	2	3	5	7491.485	0.002
8	0	8	7	7	1	7	6	7550.361	-0.002
8	0	8	8	7	1	7	7	7550.361	-0.002
8	0	8	9	7	1	7	8	7550.361	-0.002
8	1	8	8	7	1	7	8	7551.099	-0.003
8	1	8	7	7	1	7	6	7552.302	-0.003
8	1	8	8	7	1	7	7	7552.302	-0.003
8	1	8	9	7	1	7	8	7552.302	-0.003
8	1	8	7	7	1	7	7	7553.663	-0.001
8	0	8	8	7	0	7	8	7554.649	-0.004
8	0	8	7	7	0	7	6	7555.854	-0.003
8	0	8	8	7	0	7	7	7555.854	-0.003
8	0	8	9	7	0	7	8	7555.854	-0.003
8	0	8	7	7	0	7	7	7557.223	0.005

**Table E.4.** continued.

$J'$	$K'_a$	$K'_c$	$F'$	$J''$	$K''_a$	$K''_c$	$F''$	$\nu_{obs}$ (MHz)	Obs-Calc (MHz)
8	1	8	7	7	0	7	6	7557.797	-0.003
8	1	8	7	7	0	7	6	7557.797	-0.003
8	1	8	9	7	0	7	8	7557.797	-0.003
7	1	6	7	6	1	5	7	7657.074	0.011
7	1	6	6	6	1	5	5	7658.015	0.001
7	1	6	7	6	1	5	6	7658.015	0.001
7	1	6	8	6	1	5	7	7658.015	0.001
4	3	2	3	3	2	1	2	7774.398	-0.004
4	3	2	3	3	2	1	3	7774.524	0.002
4	3	2	5	3	2	1	4	7774.524	0.002
4	3	2	4	3	2	1	3	7774.973	0.001
4	3	2	4	3	2	1	4	7774.973	0.001
7	2	6	6	6	1	5	5	7814.865	-0.018
7	2	6	7	6	1	5	6	7814.971	0.002
11	2	9	10	11	2	10	10	7900.435	-0.017
11	2	9	12	11	2	10	12	7900.435	-0.017
11	2	9	11	11	2	10	11	7900.621	0.019
11	3	9	10	11	1	10	10	7991.656	0.010
11	3	9	12	11	1	10	12	7991.656	0.010
11	3	9	11	11	1	10	11	7991.793	-0.018