Electronic Supporting Information

A star-shaped D-π-A small molecule based on *tris*(2-methoxyphenyl)amine for highly efficient solution-processed organic solar cells

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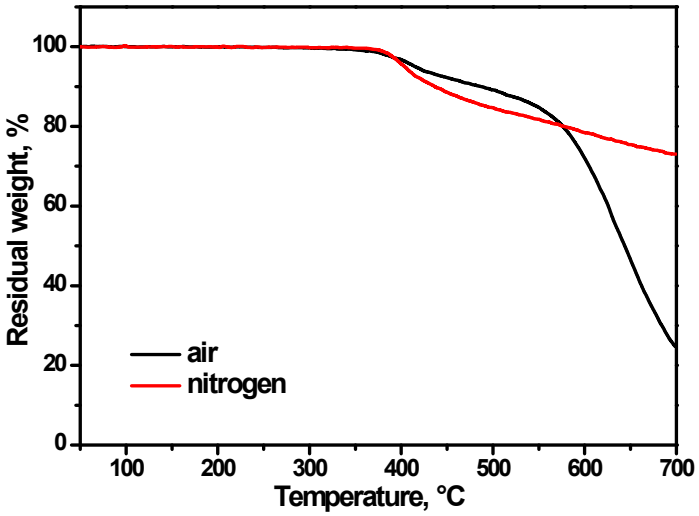


Figure S1. Thermogravimetric analysis of **N(Ph(OMe)-2T-DCN-Me)$_3$** in air and inert atmosphere (nitrogen flow).

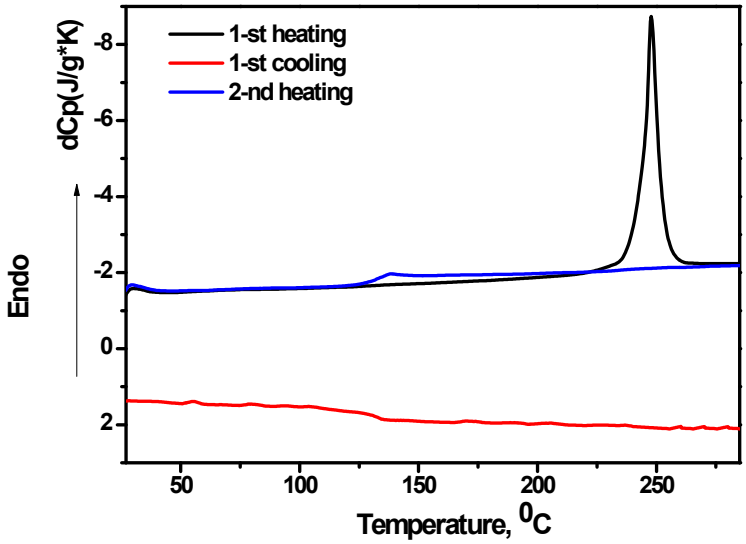


Figure S2. DSC scans of **N(Ph(OMe)-2T-DCV-Me)$_3$**. For the sake of simplicity, curves are shifted along heat flow axis.

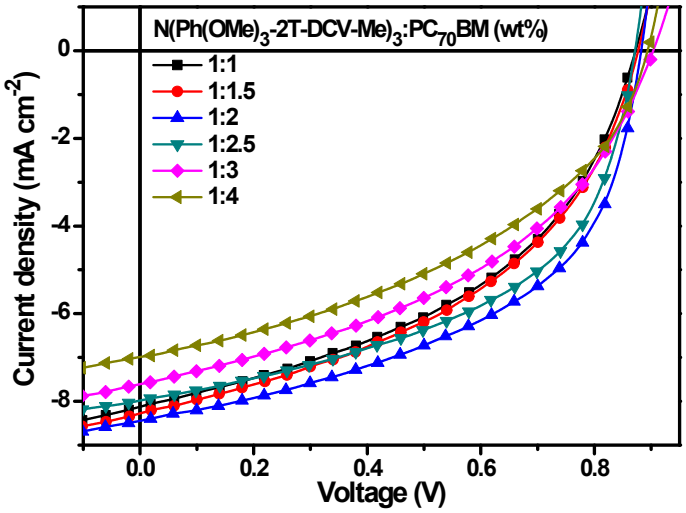
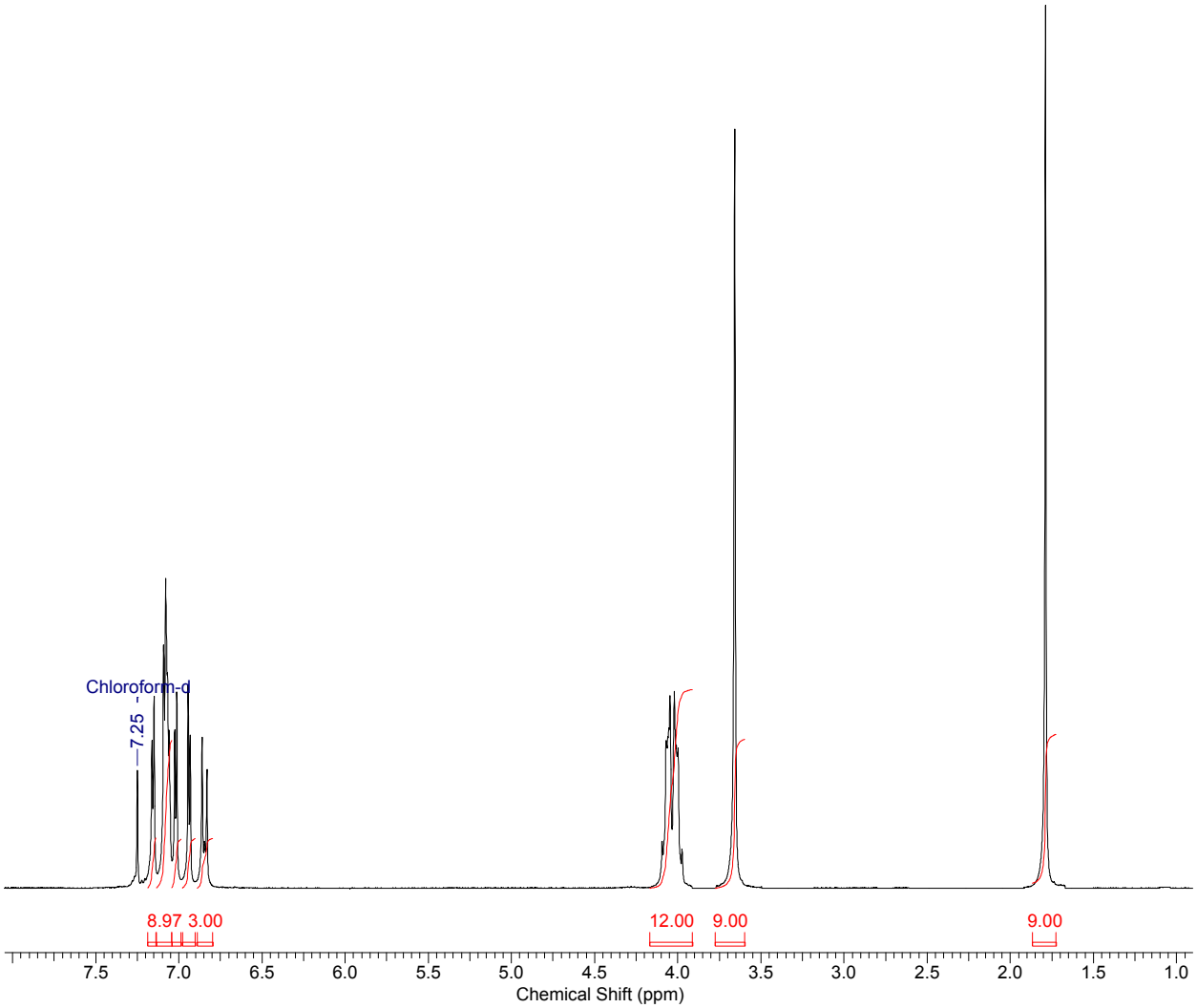


Figure S3. *J–V* curves for **N(Ph(OMe)-2T-DCV-Me)$_3$**:$PC_{70}BM$ (wt%) OSCs with various D:A ratios, under the illumination of AM 1.5G at 100 mW cm^{-2}.

Table 1. The photovoltaic performance of the OSCs based on **N(Ph(OMe)-2T-DCV-Me)$_3$**:$PC_{70}BM$ blends, under the illumination of AM 1.5G at 100 mW cm^{-2}

N(Ph(OMe)-2T-DCV-Me)$_3$:$PC_{70}BM$ (wt%)	V_{oc} [V]	J_{sc} [mA cm^{-2}]	FF [%]	PCE_{max} (PCE_{ave}[a])[%]
1:1	0.87	8.12	45.0	3.18 (3.10)
1:1.5	0.88	8.28	44.8	3.26 (3.12)
1:2	0.88	8.45	52.7	3.92 (3.80)
1:2.5	0.87	7.99	52.3	3.64 (3.51)
1:3	0.90	7.61	53.1	3.64 (3.46)
1:4	0.89	6.99	42.4	2.64 (2.45)

[a]The average PCE is obtained from six cells.

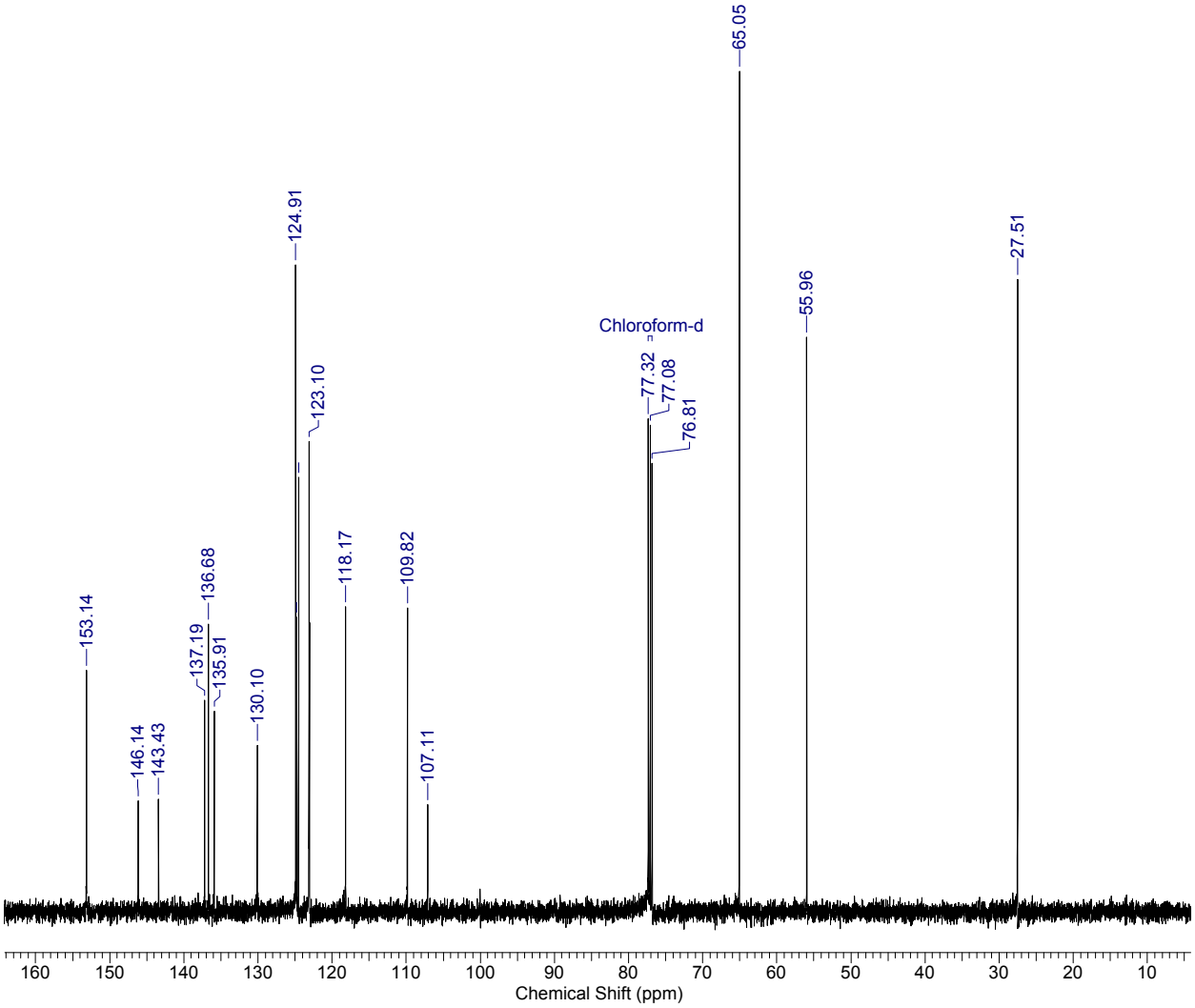


No.	(ppm)	(Hz)	Height
1	7.25	2175.9	0.1335

No.	Annotation	(ppm)
1	Chloroform-d	7.25

No.	(ppm)	Value	Absolute Value
1	[1.72 .. 1.87]	8.998	6.38225e+9
2	[3.60 .. 3.78]	8.996	6.38142e+9
3	[3.91 .. 4.17]	12.000	8.51194e+9
4	[6.80 .. 6.89]	2.995	2.12451e+9
5	[6.90 .. 6.98]	2.995	2.12460e+9
6	[6.99 .. 7.04]	2.954	2.09561e+9
7	[7.04 .. 7.13]	8.966	6.36006e+9
8	[7.14 .. 7.19]	3.036	2.15368e+9

Figure S4. ^{1}H NMR spectrum of **3** in $CDCl_3$.

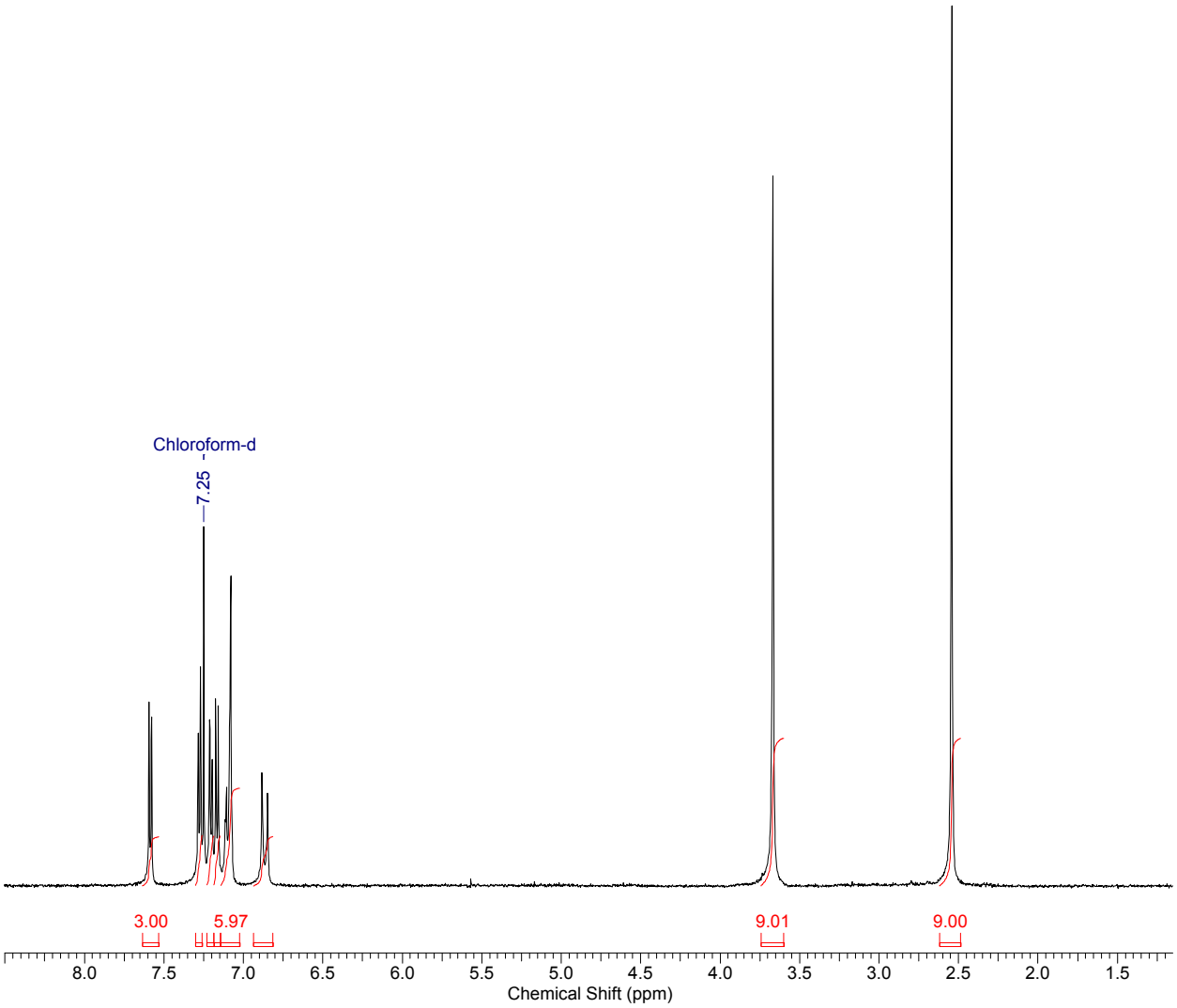


No.	(ppm)	(Hz)	Height
1	27.51	3459.8	0.7516
2	55.96	7037.8	0.6833
3	65.05	8181.6	1.0000
4	76.81	9660.8	0.5327
5	77.08	9693.8	0.5783
6	77.32	9725.0	0.5857
7	107.11	13471.6	0.1259
8	109.82	13812.6	0.3604
9	118.17	14862.9	0.3620
10	123.04	15475.1	0.3430
11	123.10	15482.4	0.5585

No.	(ppm)	(Hz)	Height
12	124.51	15660.2	0.5159
13	124.76	15691.4	0.3497
14	124.91	15709.7	0.7690
15	130.10	16362.3	0.1965
16	135.91	17093.7	0.2372
17	136.68	17190.8	0.3409
18	137.19	17255.0	0.2507
19	143.43	18039.5	0.1325
20	146.14	18380.4	0.1306
21	153.14	19260.3	0.2859

No.	Annotation	(ppm)
1	Chloroform-d	[76.81 .. 77.32]

Figure S5. ^{13}C NMR spectrum of **3** in $CDCl_3$.

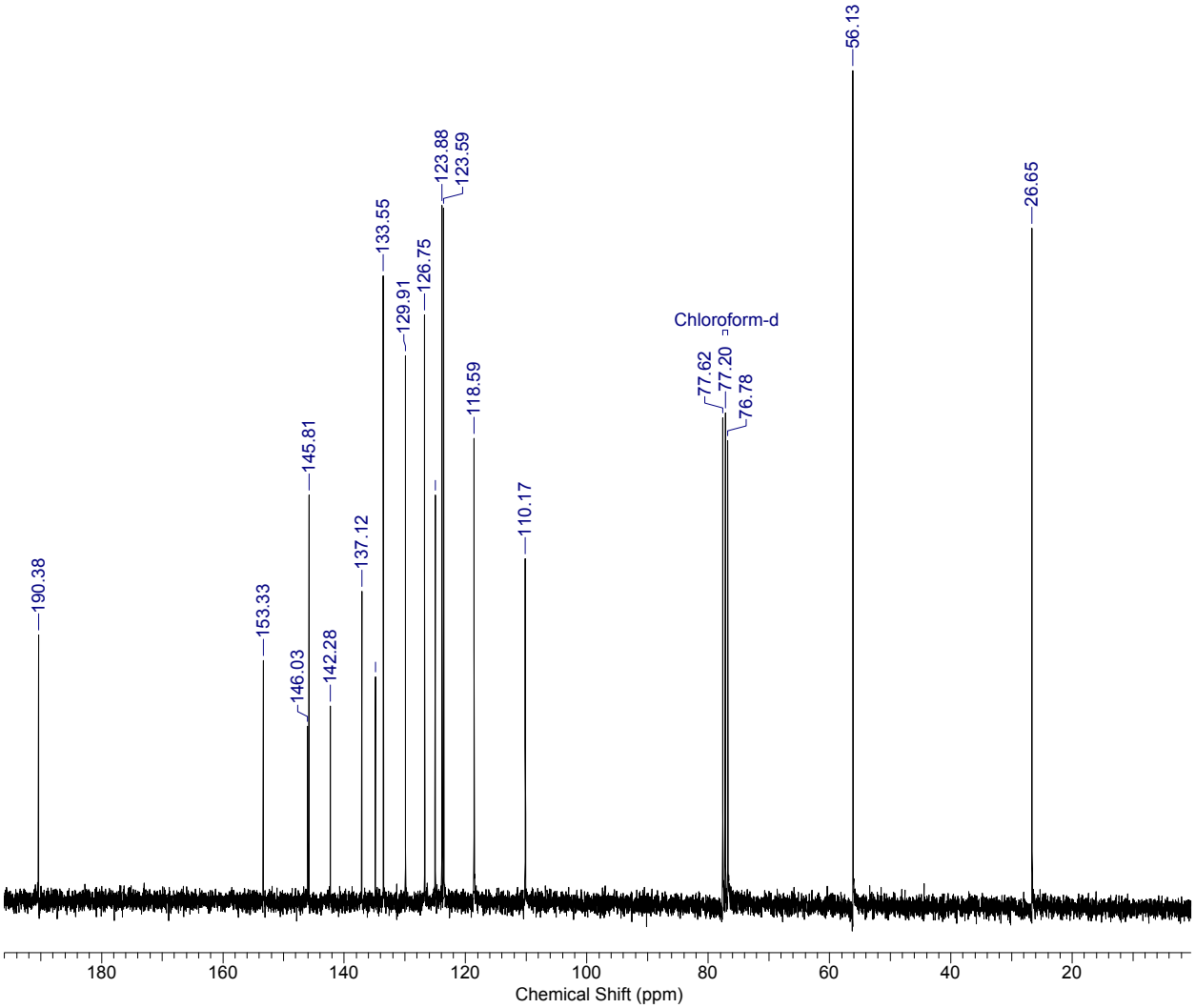


No.	(ppm)	(Hz)	Height
1	7.25	1813.5	0.4084

No.	Annotation	(ppm)
1	Chloroform-d	7.25

No.	(ppm)	Value	Absolute Value
1	[2.49 .. 2.62]	9.000	9.78115e+6
2	[3.60 .. 3.74]	9.006	9.78814e+6
3	[6.81 .. 6.94]	3.007	3.26832e+6
4	[7.02 .. 7.14]	5.969	6.48660e+6
5	[7.15 .. 7.19]	3.051	3.31606e+6
6	[7.19 .. 7.23]	3.047	3.31092e+6
7	[7.26 .. 7.30]	3.061	3.32622e+6
8	[7.53 .. 7.64]	2.996	3.25570e+6

Figure S6. ^{1}H NMR spectrum of **4** in $CDCl_3$.

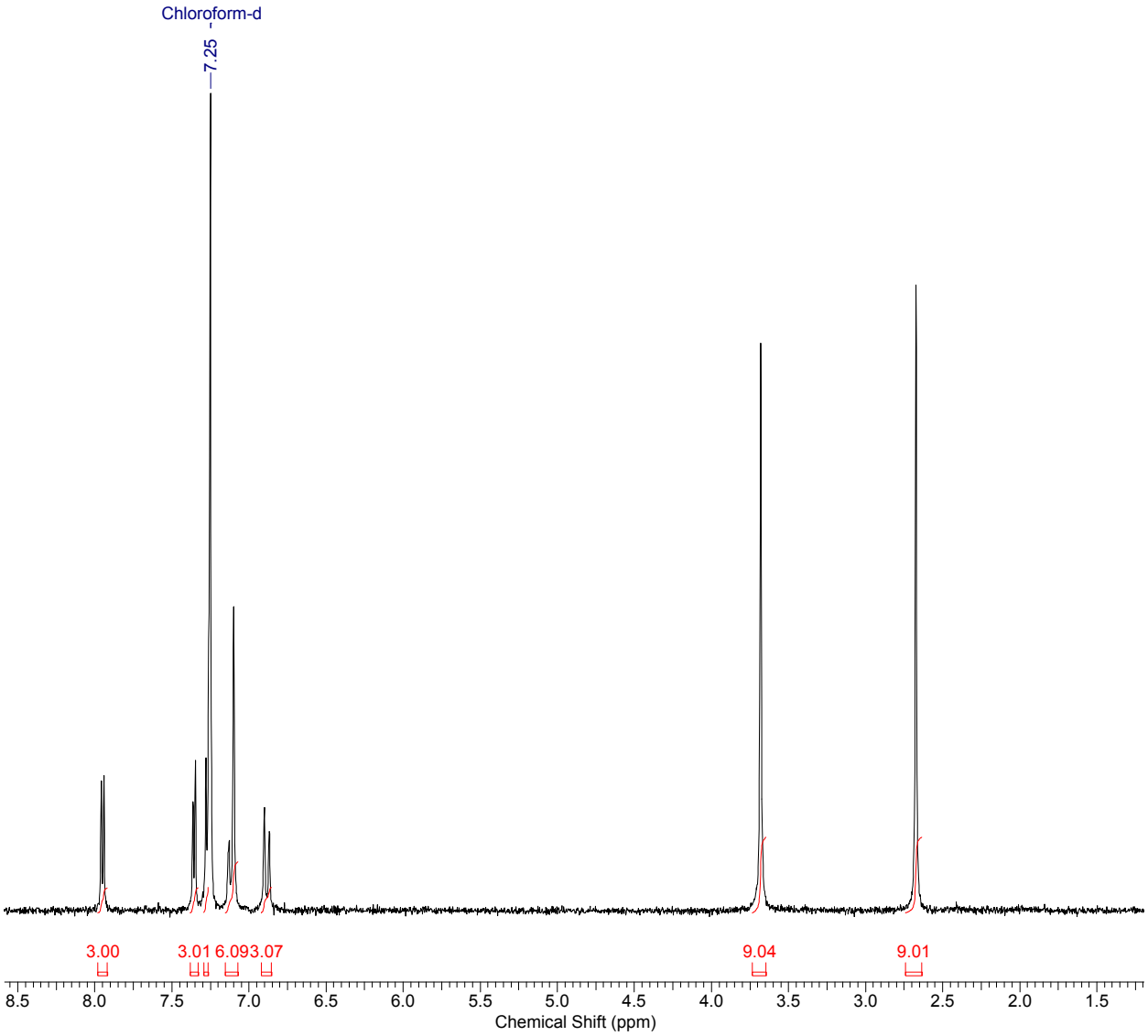


No.	(ppm)	(Hz)	Height
1	26.65	2011.6	0.8277
2	56.13	4236.7	1.0000
3	76.78	5794.6	0.5959
4	77.20	5826.5	0.6261
5	77.62	5858.4	0.6209
6	110.17	8315.2	0.4673
7	118.59	8950.6	0.5984
8	123.59	9327.9	0.8495
9	123.88	9350.1	0.8524
10	124.99	9433.3	0.5370

No.	(ppm)	(Hz)	Height
11	126.75	9566.5	0.7332
12	129.91	9805.1	0.6888
13	133.55	10079.8	0.7757
14	134.88	10179.7	0.3385
15	137.12	10348.9	0.4314
16	142.28	10738.7	0.3065
17	145.81	11005.1	0.5369
18	146.03	11021.7	0.2843
19	153.33	11572.5	0.3560
20	190.38	14369.2	0.3841

No.	Annotation	(ppm)
1	Chloroform-d	[76.78 .. 77.62]

Figure S7. ^{13}C NMR spectrum of **4** in $CDCl_3$.

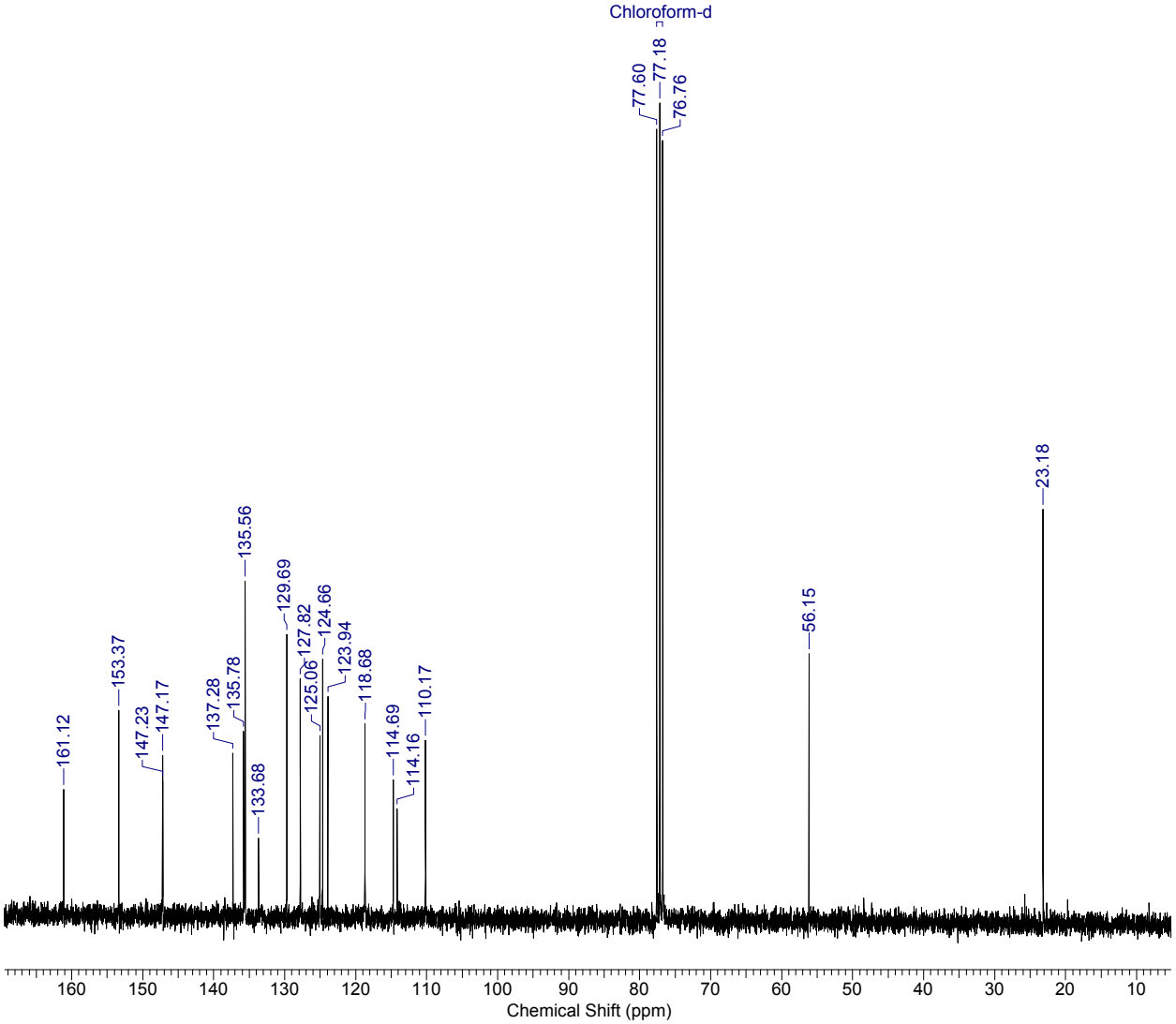


No.	(ppm)	(Hz)	Height
1	7.25	1813.5	1.0000

No.	Annotation	(ppm)
1	Chloroform-d	7.25

No.	(ppm)	Value	Absolute Value
1	[2.64 .. 2.74]	9.007	1.02379e+7
2	[3.65 .. 3.73]	9.040	1.02753e+7
3	[6.85 .. 6.92]	3.072	3.49221e+6
4	[7.07 .. 7.15]	6.089	6.92094e+6
5	[7.26 .. 7.29]	3.081	3.50185e+6
6	[7.33 .. 7.38]	3.014	3.42653e+6
7	[7.92 .. 7.98]	3.000	3.41006e+6

Figure S8. ^{1}H NMR spectrum of **N(Ph(OMe)-2T-DCN-Me)$_3$** in $CDCl_3$.



No.	(ppm)	(Hz)	Height
1	23.18	1749.4	0.5390
2	56.15	4238.1	0.3755
3	76.76	5793.2	0.9571
4	77.18	5825.1	1.0000
5	77.60	5857.0	0.9700
6	110.17	8315.2	0.2772
7	114.16	8616.2	0.1998
8	114.69	8656.5	0.2322
9	118.68	8957.5	0.2960
10	123.94	9354.3	0.3267
11	124.66	9408.4	0.3692

No.	(ppm)	(Hz)	Height
12	125.06	9438.9	0.2826
13	127.82	9647.0	0.3469
14	129.69	9788.5	0.3970
15	133.68	10089.5	0.1661
16	135.56	10231.0	0.4577
17	135.78	10247.7	0.2875
18	137.28	10361.4	0.2624
19	147.17	11107.7	0.2602
20	147.23	11111.9	0.2310
21	153.37	11575.2	0.3109
22	161.12	12160.7	0.2215

No.	Annotation	(ppm)
1	Chloroform-d	[76.76 .. 77.60]

Figure S9. ^{13}C NMR spectrum of **N(Ph(OMe)-2T-DCN-Me)$_3$** in $CDCl_3$.