Electronic Supplementary Information

to the manuscript

Novel Highly Efficient Nanostructured Organosilicon Luminophore with Unusually Fast Photoluminescence

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CONTENT

1. GPC curves of TMS-PT, TMS-PTPTP-TMS, (PTPTP)Si_2(2T-Hex)$_6$ and its precursors

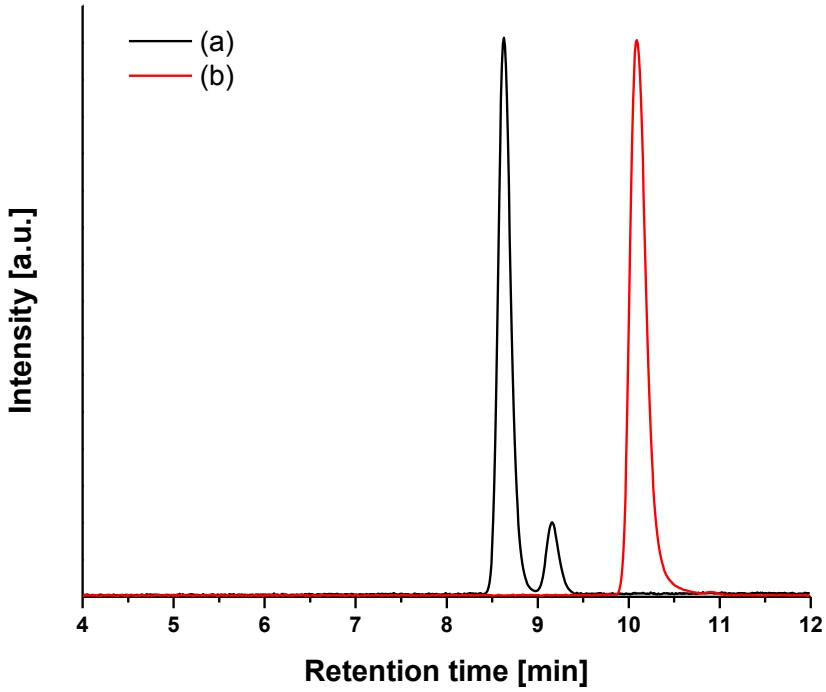


Figure S1. GPC curve of **TPT** (a) and **PinB-TPT-BPin** (b).

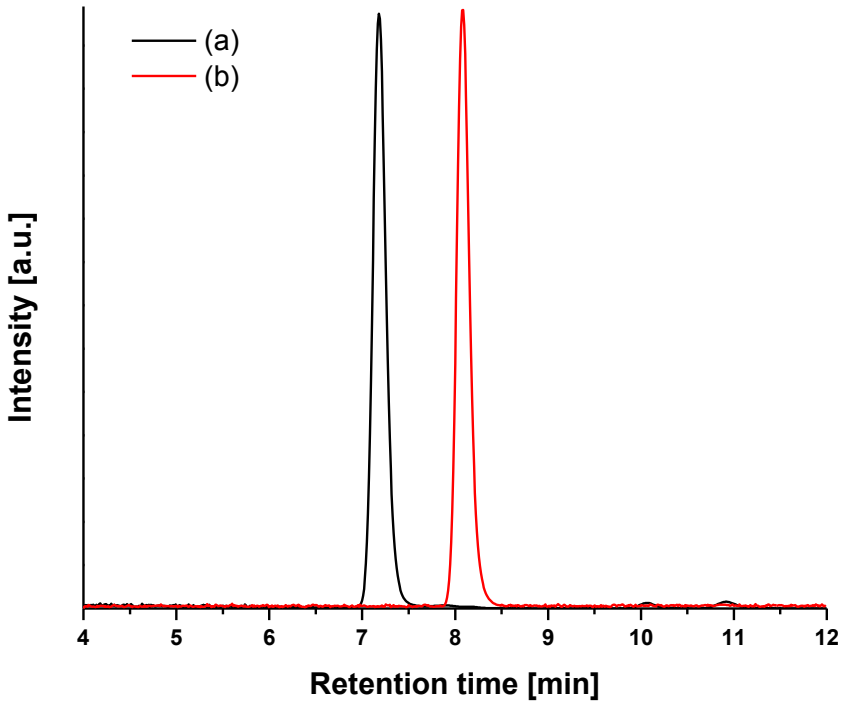


Figure S2. GPC curve of (**PTPTP)Si_2(Hex-2T)$_6$** (a) and **BrPhSi(2T-Hex)$_3$** (b).

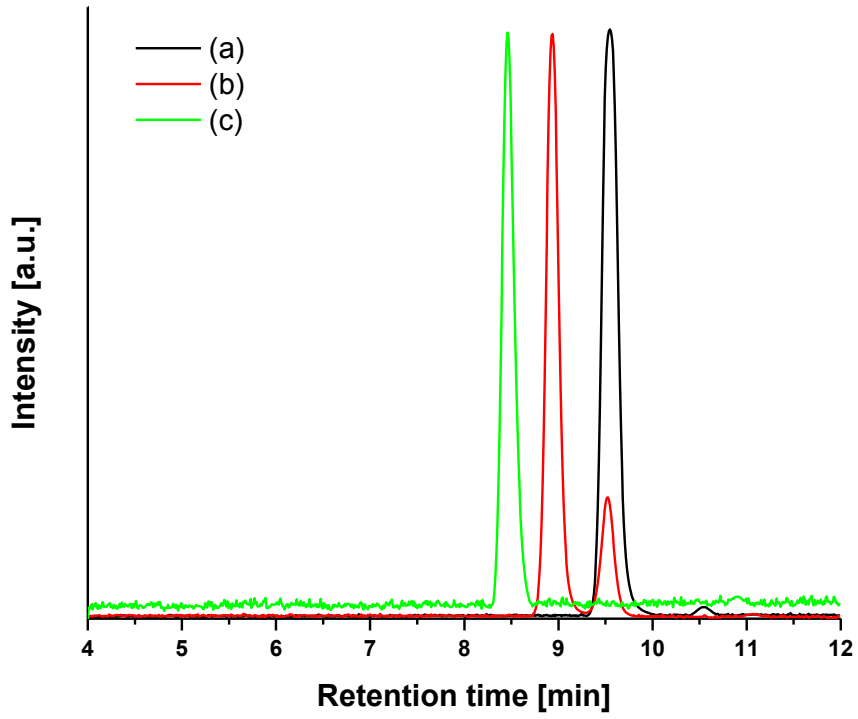
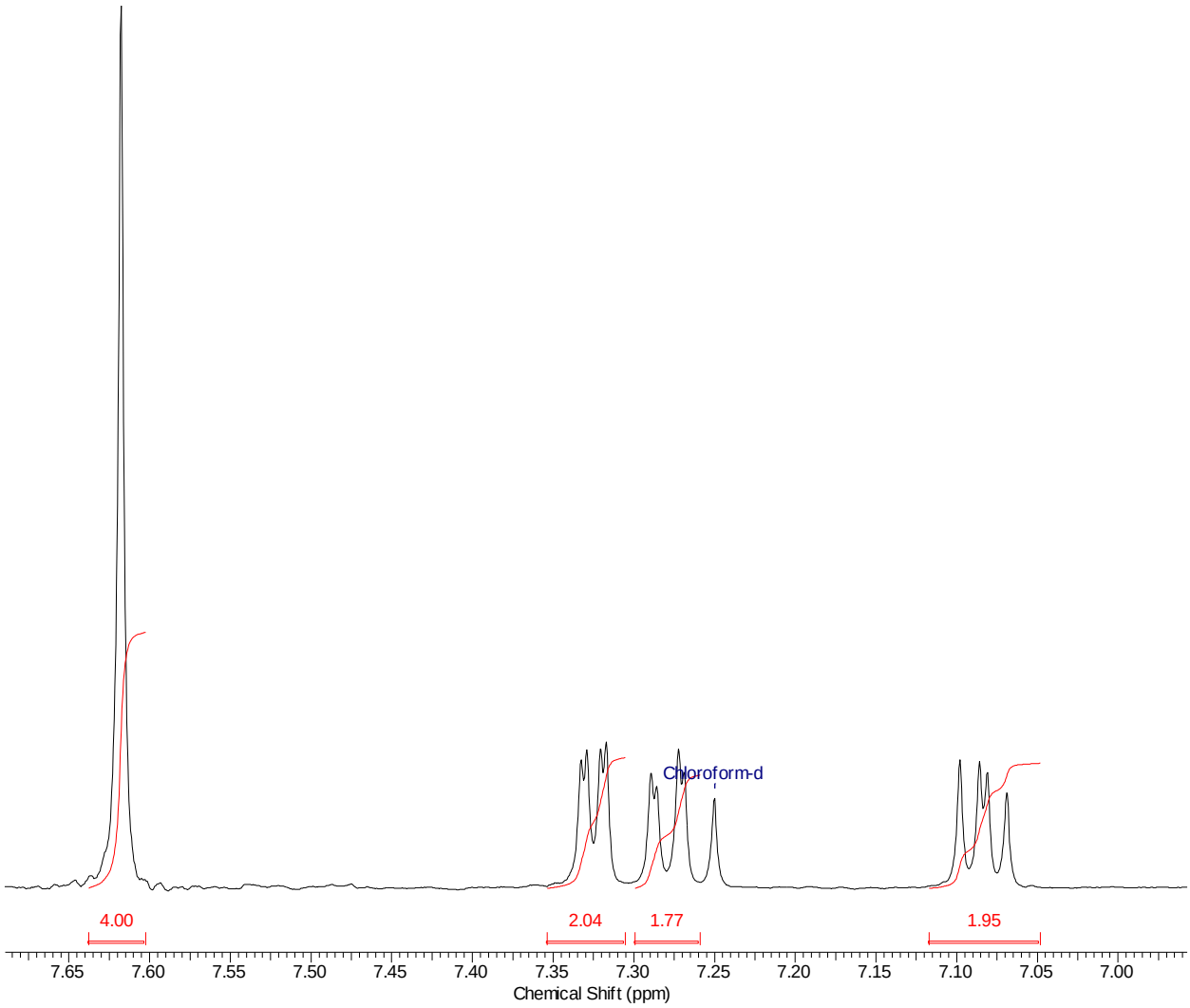


Figure S3. GPC curve of **TMS-TPT (a), TMS-PT-BPin (b), TMS-PTPTP-TMS (c)**.

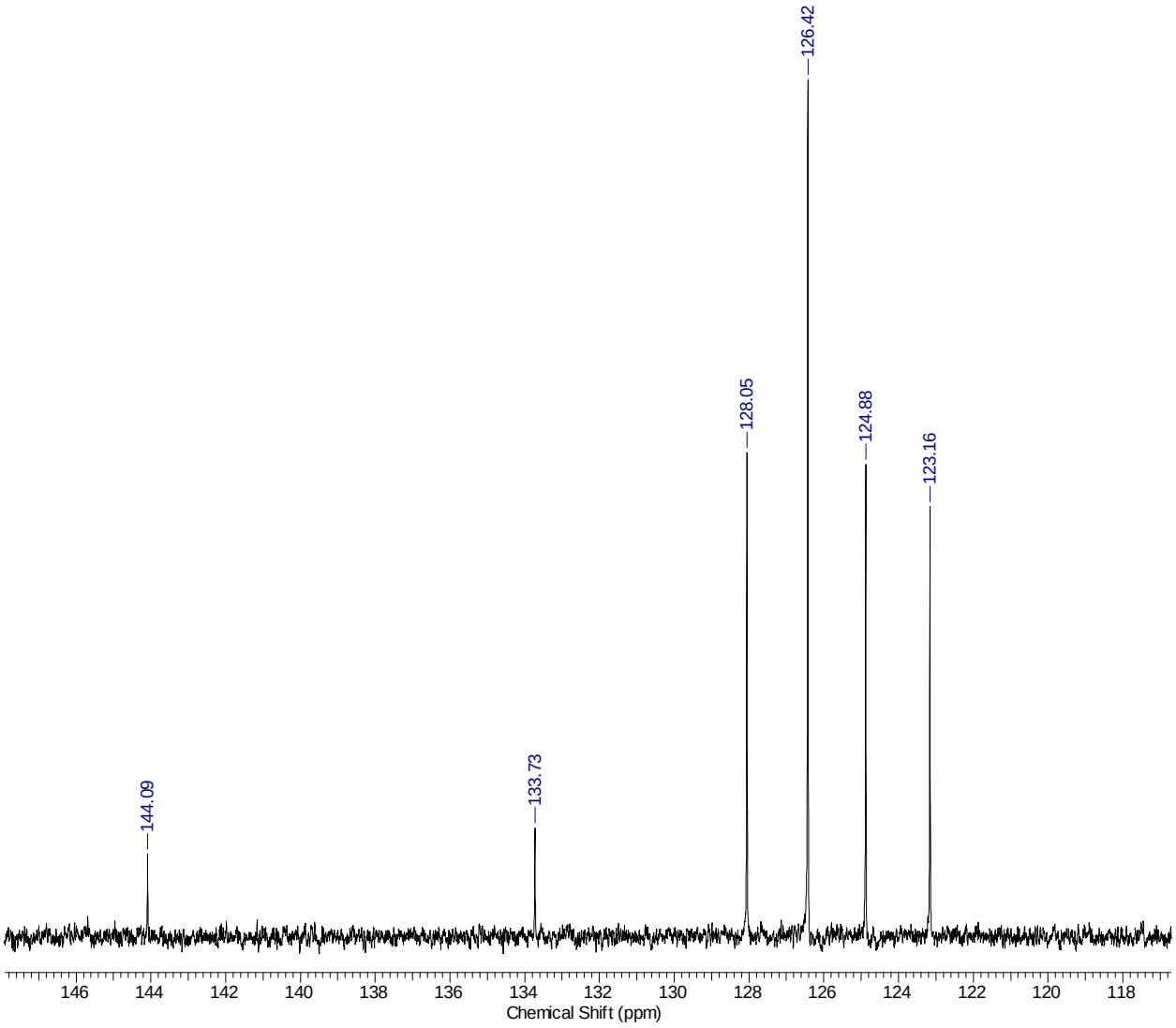
2. NMR spectra of the compounds synthesized



No.	Annotation	(ppm)
1	Chloroform-d	7.25

No.	(ppm)	Value	Absolute Value
1	[7.05 .. 7.12]	1.953	2.02598e+9
2	[7.26 .. 7.30]	1.770	1.83564e+9
3	[7.31 .. 7.35]	2.041	2.11664e+9
4	[7.60 .. 7.64]	4.000	4.14880e+9

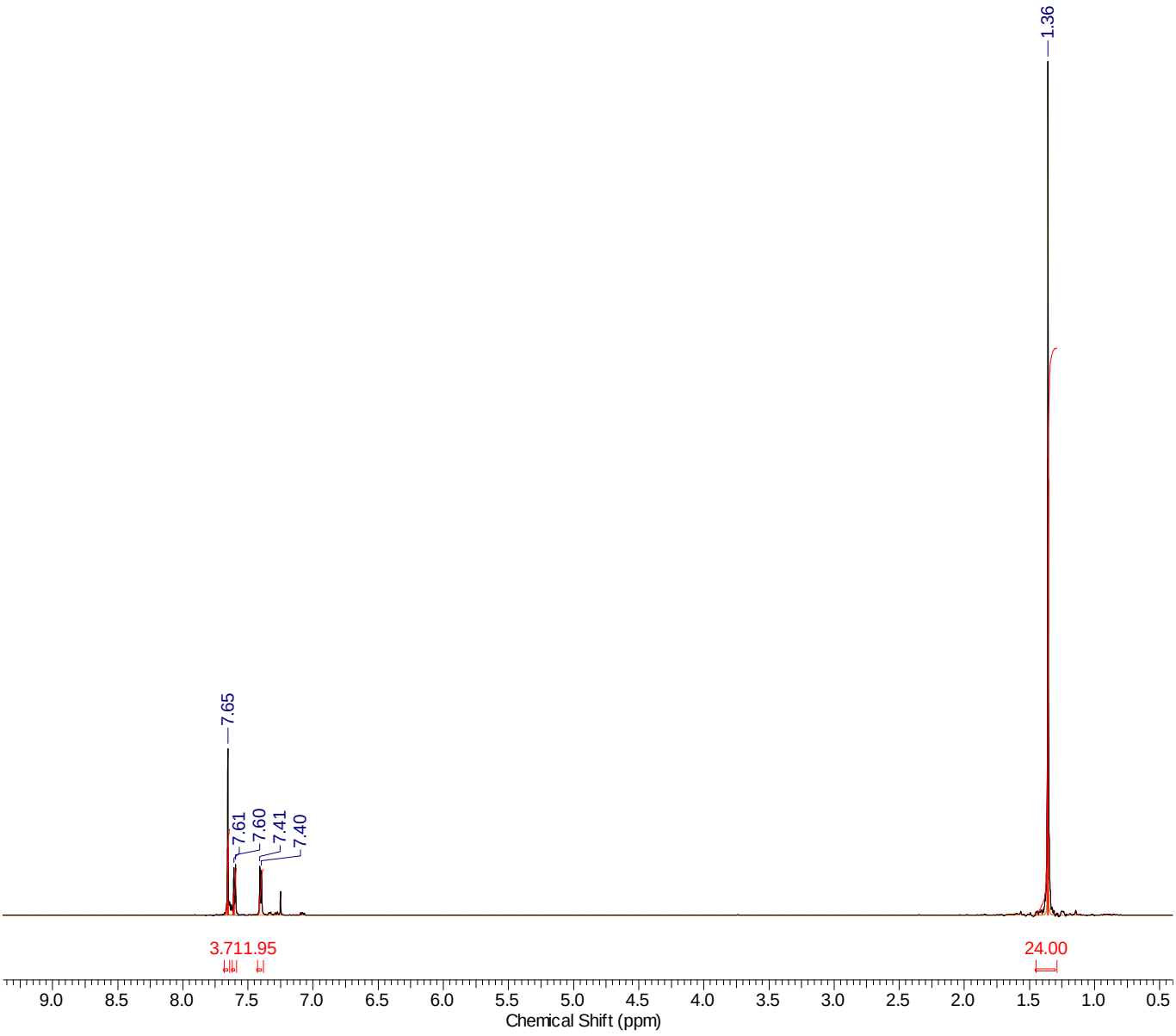
Figure S4. ^{1}H NMR spectrum of **TPT** ($CDCl_3$, 60°C, 250 MHz)**.**



No.	(ppm)	(Hz)	Height
1	123.16	9295.7	0.5007
2	124.88	9425.6	0.5497
3	126.42	9542.2	1.0000
4	128.05	9665.2	0.5637
5	133.73	10093.4	0.1243
6	144.09	10875.5	0.0940

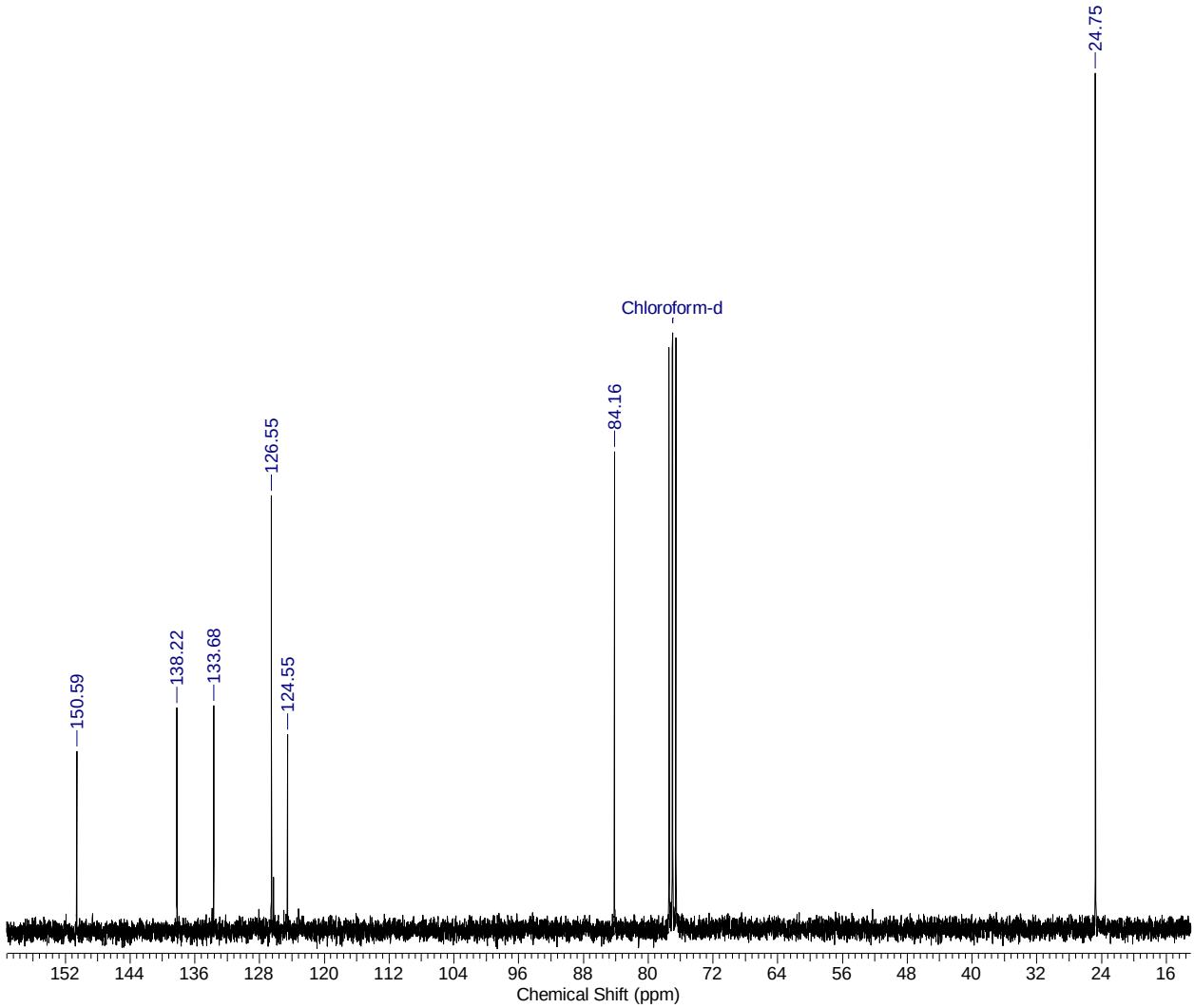
No.	Annotation	(ppm)
1	Chloroform-d	77.00

Figure S5. ^{13}C NMR spectrum of **TPT** ($CDCl_3$, 60°C, 75 MHz)**.**



No.	(ppm)	Value	Absolute Value
1	[1.29 .. 1.45]	24.000	5.61113e+9
2	[7.38 .. 7.43]	1.948	4.55371e+8
3	[7.59 .. 7.62]	1.988	4.64809e+8
4	[7.64 .. 7.68]	3.715	8.68538e+8

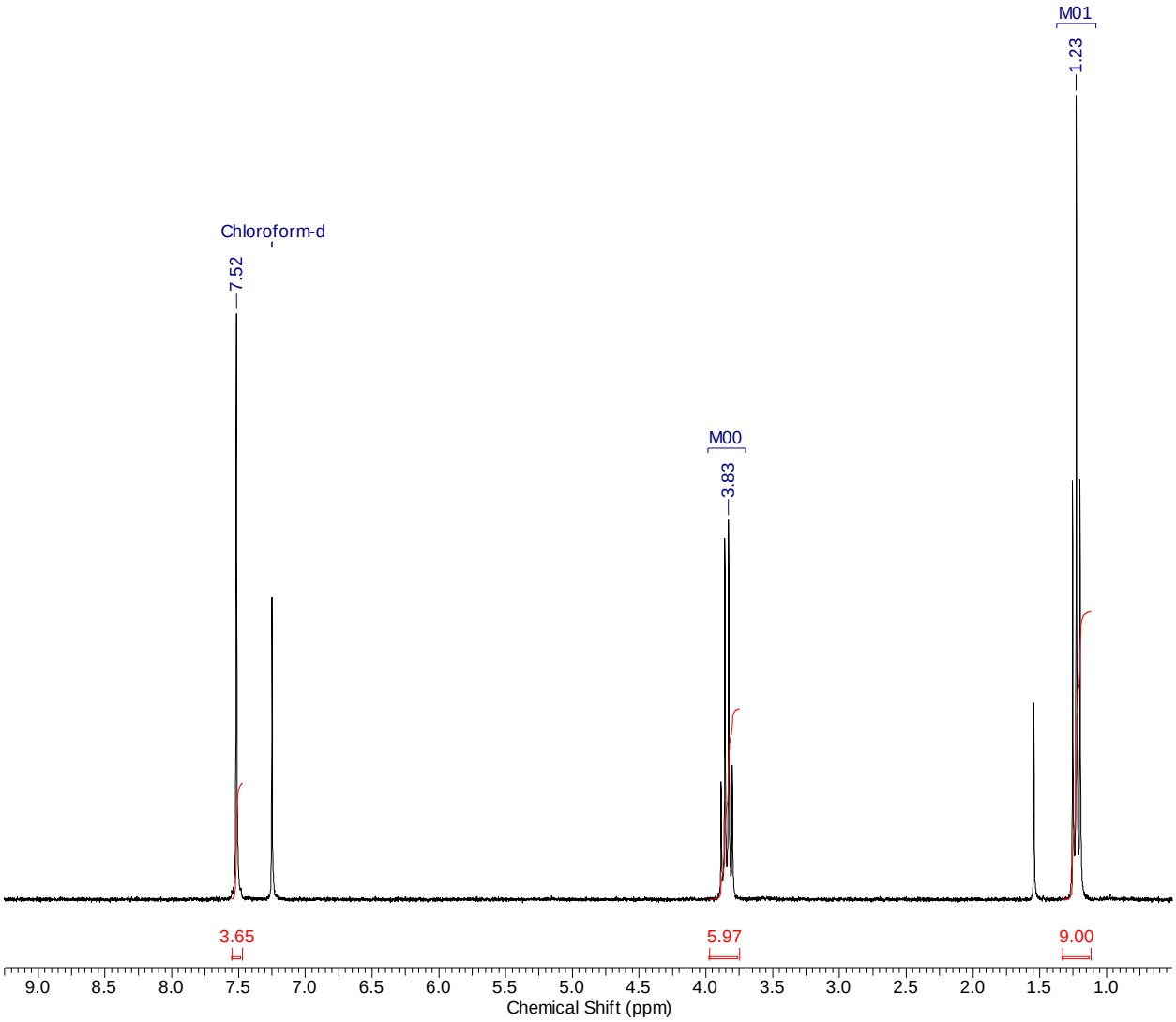
Figure S6. ^{1}H NMR spectrum of **PinB-TPT-BPin** ($CDCl_3$, 24°C, 300 MHz).



No.	(ppm)	(Hz)	Height
1	24.75	1868.4	1.0000
2	84.16	6351.9	0.5607
3	124.55	9400.6	0.2330
4	126.55	9551.7	0.5095
5	133.68	10089.8	0.2661
6	138.22	10432.2	0.2636
7	150.59	11366.0	0.2132

No.	Annotation	(ppm)
1	Chloroform-d	77.00

Figure S7. ^{13}C NMR spectrum of **PinB-TPT-BPin** ($CDCl_3$, 24°C, 75 MHz).

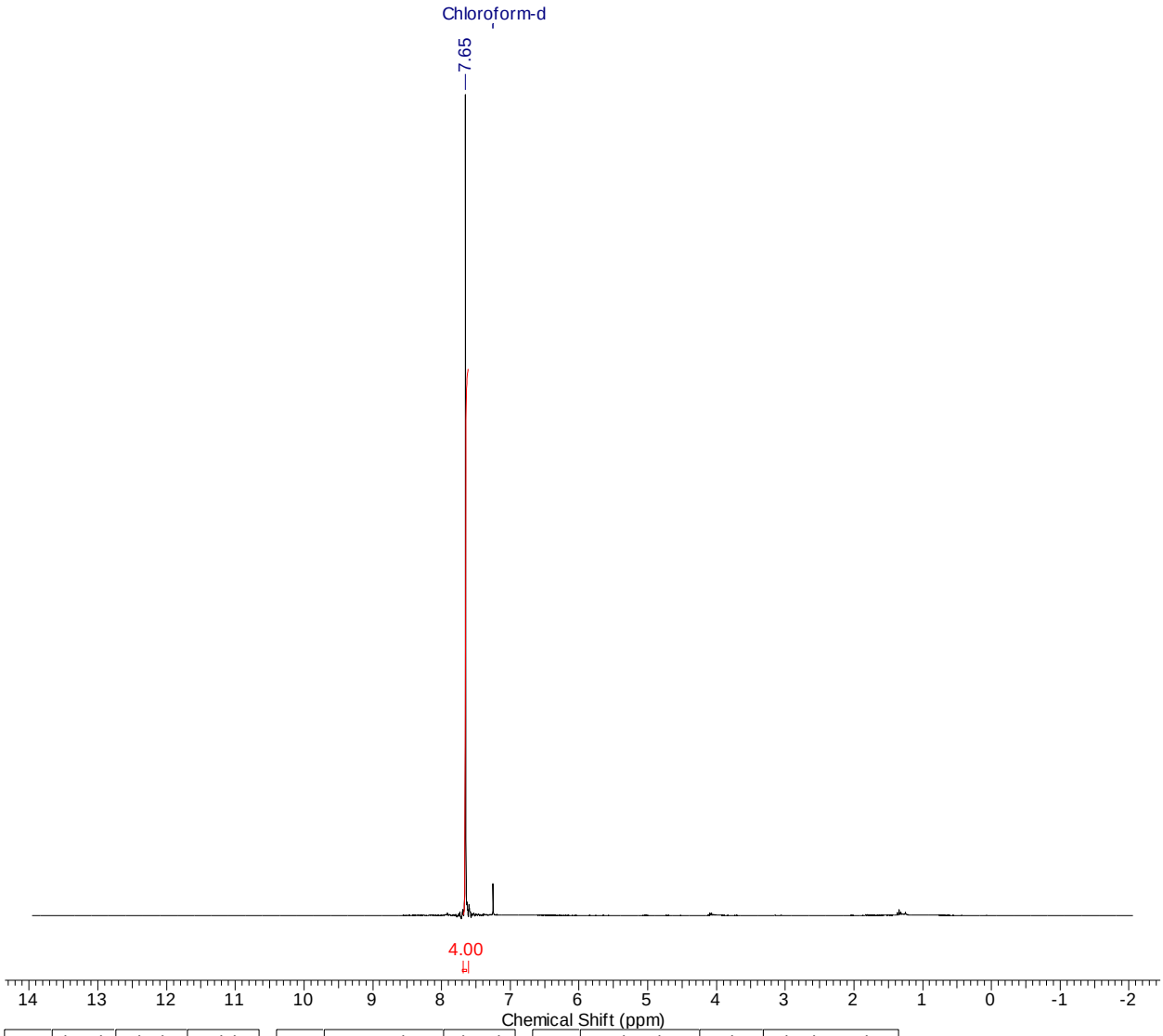


No.	(ppm)	(Hz)	Height
1	1.23	306.7	1.0000
2	3.83	958.0	0.4444
3	7.52	1880.0	0.6857

No.	Annotation	(ppm)
1	Chloroform-d	7.25

No.	(ppm)	Value	Absolute Value
1	[1.12 .. 1.33]	9.000	3.97322e+7
2	[3.75 .. 3.97]	5.968	2.63469e+7
3	[7.47 .. 7.55]	3.651	1.61172e+7

Figure S8. ^{1}H NMR spectrum of **BrPhSi(OEt)$_3$** ($CDCl_3$, 24°C, 250 MHz)**.**

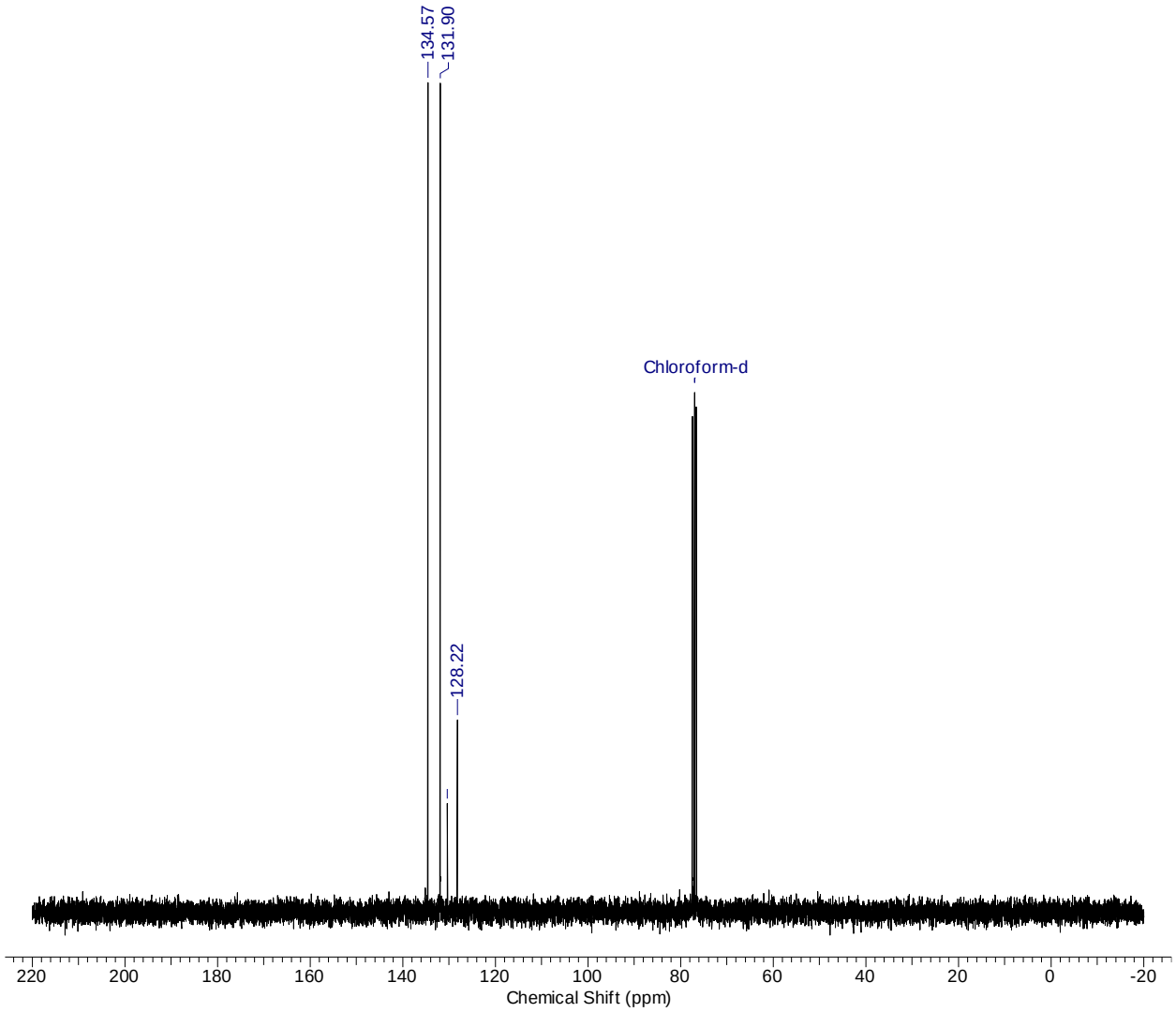


No.	(ppm)	(Hz)	Height
1	7.65	2297.1	1.0000

No.	Annotation	(ppm)
1	Chloroform-d	7.25

No.	(ppm)	Value	Absolute Value
1	[7.61 .. 7.68]	4.000	4.38020e+9

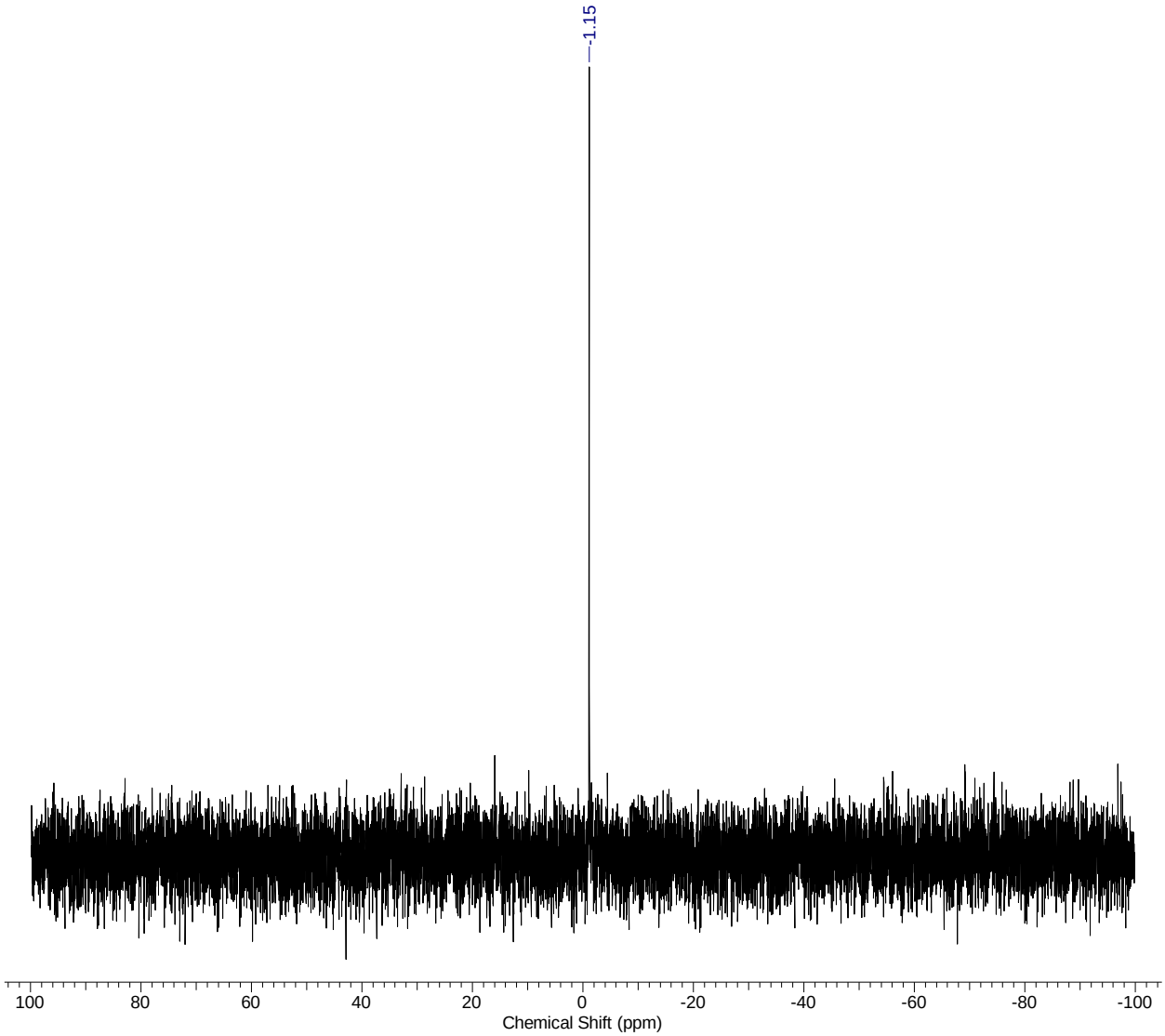
Figure S9. ^{1}H NMR spectrum of **$BrPhSiCl_3$** ($CDCl_3$, 24°C, 300 MHz)**.**



No.	(ppm)	(Hz)	Height
1	128.22	9677.7	0.2344
2	130.32	9836.1	0.1342
3	131.90	9955.2	0.9991
4	134.57	10157.0	1.0000

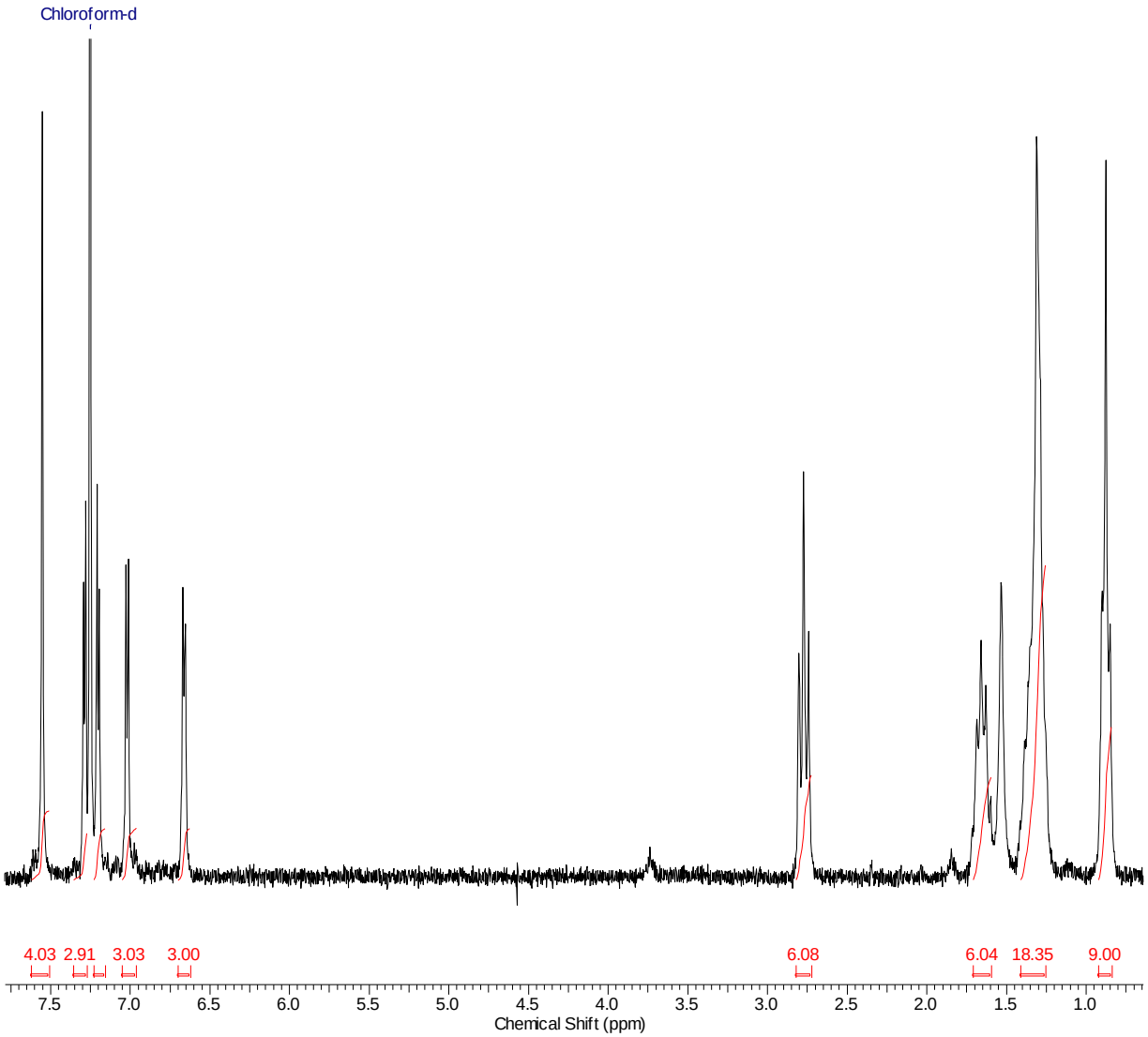
No.	Annotation	(ppm)
1	Chloroform-d	77.00

Figure S10. ^{13}C NMR spectrum of **$BrPhSiCl_3$**($CDCl_3$, 24°C, 75 MHz)**.**



No.	(ppm)	(Hz)	Height
1	-1.15	-68.5	1.0000

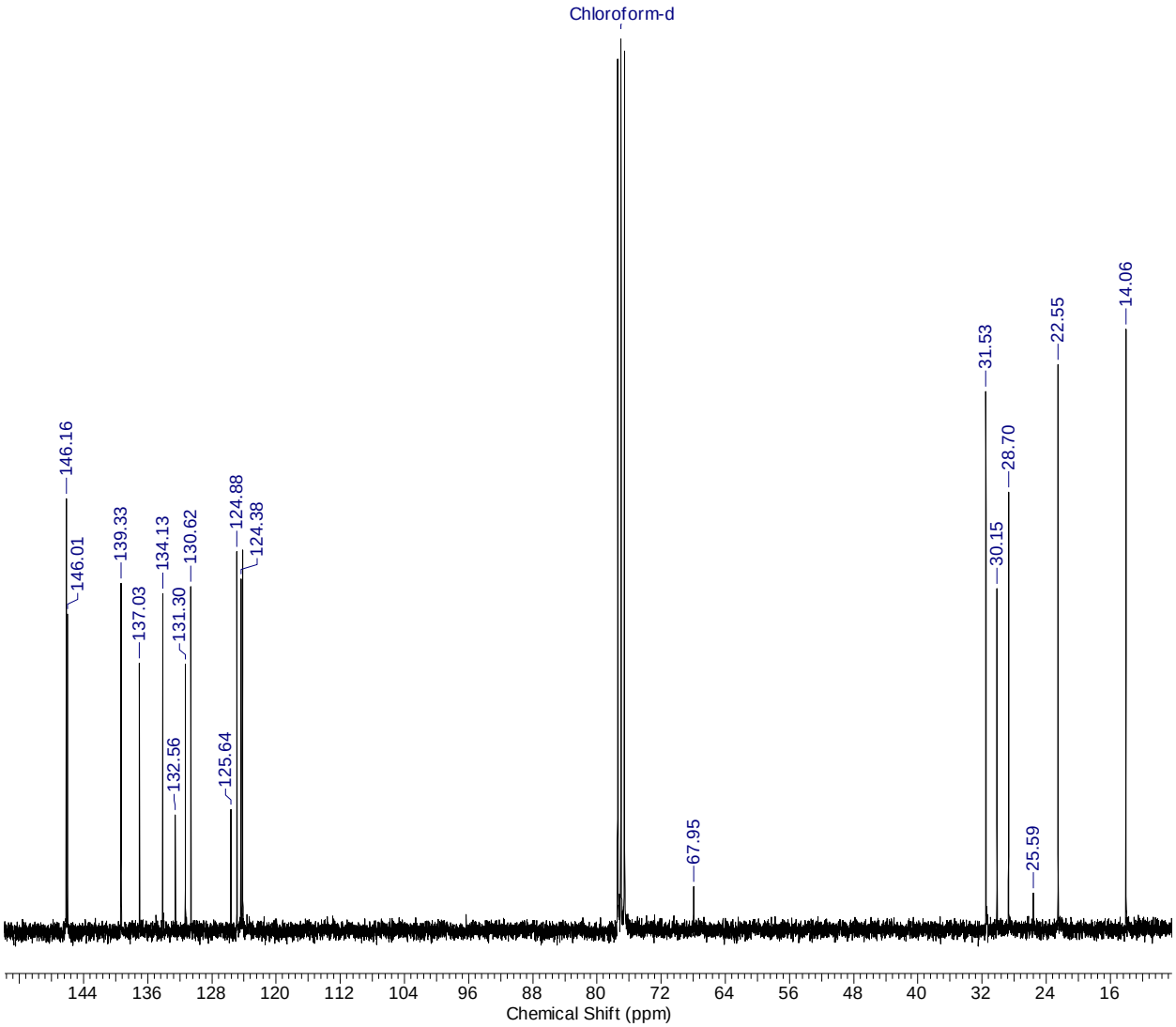
Figure S11. ^{29}Si NMR spectrum of **$BrPhSiCl_3$**($CDCl_3$, 24°C, 60 MHz)**.**



No.	Annotation	(ppm)
1	Chloroform-d	7.25

No.	(ppm)	Value	Absolute Value
1	[0.84 .. 0.92]	9.000	3.72570e+7
2	[1.25 .. 1.41]	18.348	7.59572e+7
3	[1.59 .. 1.71]	6.041	2.50090e+7
4	[2.72 .. 2.82]	6.075	2.51509e+7
5	[6.62 .. 6.70]	3.000	1.24196e+7
6	[6.96 .. 7.05]	3.029	1.25393e+7
7	[7.15 .. 7.23]	3.017	1.24900e+7
8	[7.27 .. 7.35]	2.909	1.20443e+7
9	[7.51 .. 7.62]	4.033	1.66956e+7

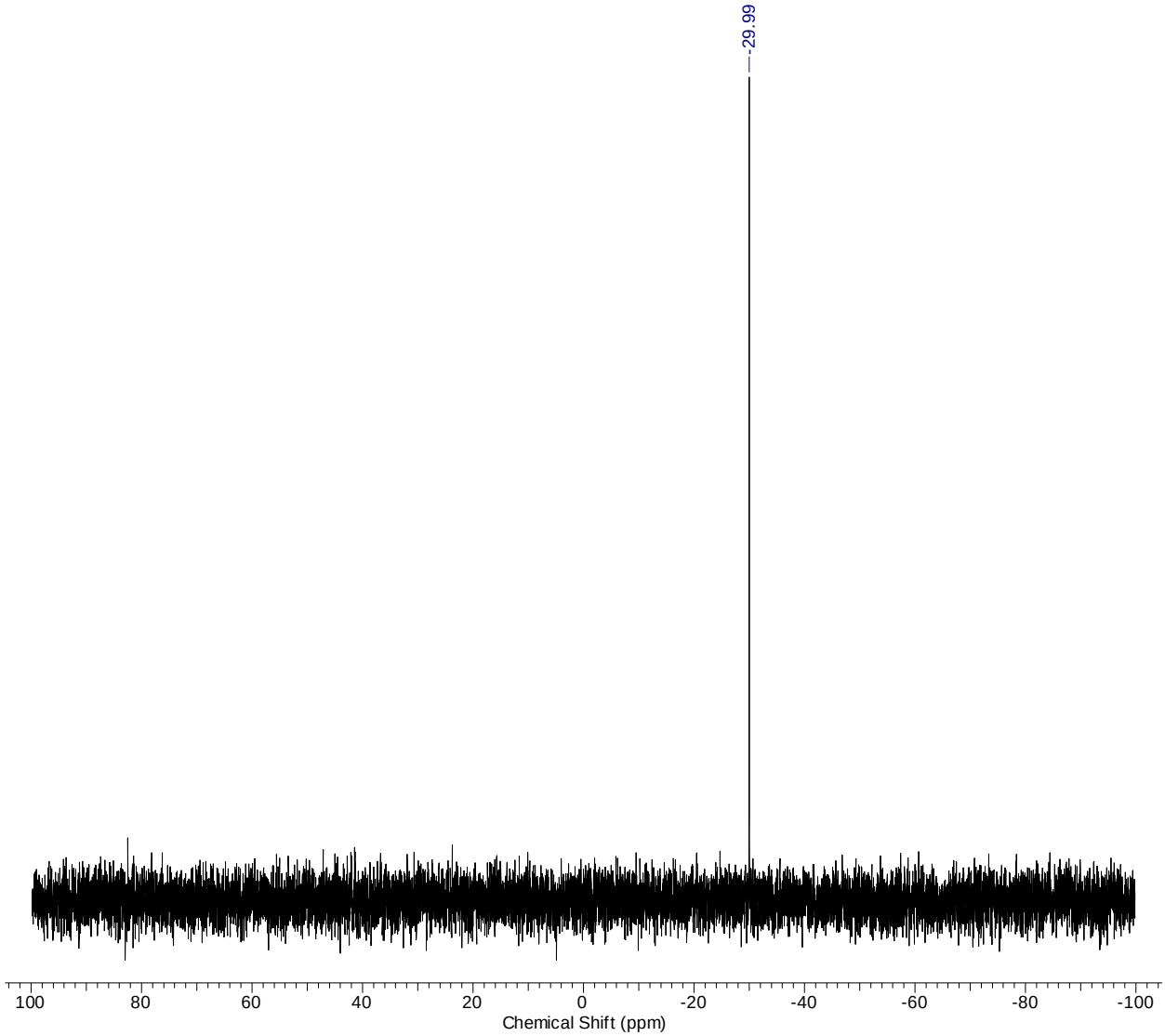
Figure S12. ^{1}H NMR spectrum of **BrPhSi(2T-Hex)$_3$**($CDCl_3$, 24°C, 250 MHz).



No.	(ppm)	(Hz)	Height
1	14.06	1061.3	0.6763
2	22.55	1701.8	0.6370
3	25.59	1931.8	0.0481
4	28.70	2165.9	0.4947
5	30.15	2275.7	0.3877
6	31.53	2380.2	0.6068
7	67.95	5129.0	0.0551
8	124.38	9387.7	0.3981
9	124.88	9425.9	0.4283
10	125.64	9483.1	0.1413
11	130.62	9858.7	0.3898
12	131.30	9910.4	0.3034
13	132.56	10005.0	0.1357
14	134.13	10123.6	0.3822
15	137.03	10342.8	0.3044
16	139.33	10516.7	0.3937
17	146.01	11020.6	0.3593
18	146.16	11031.9	0.4875

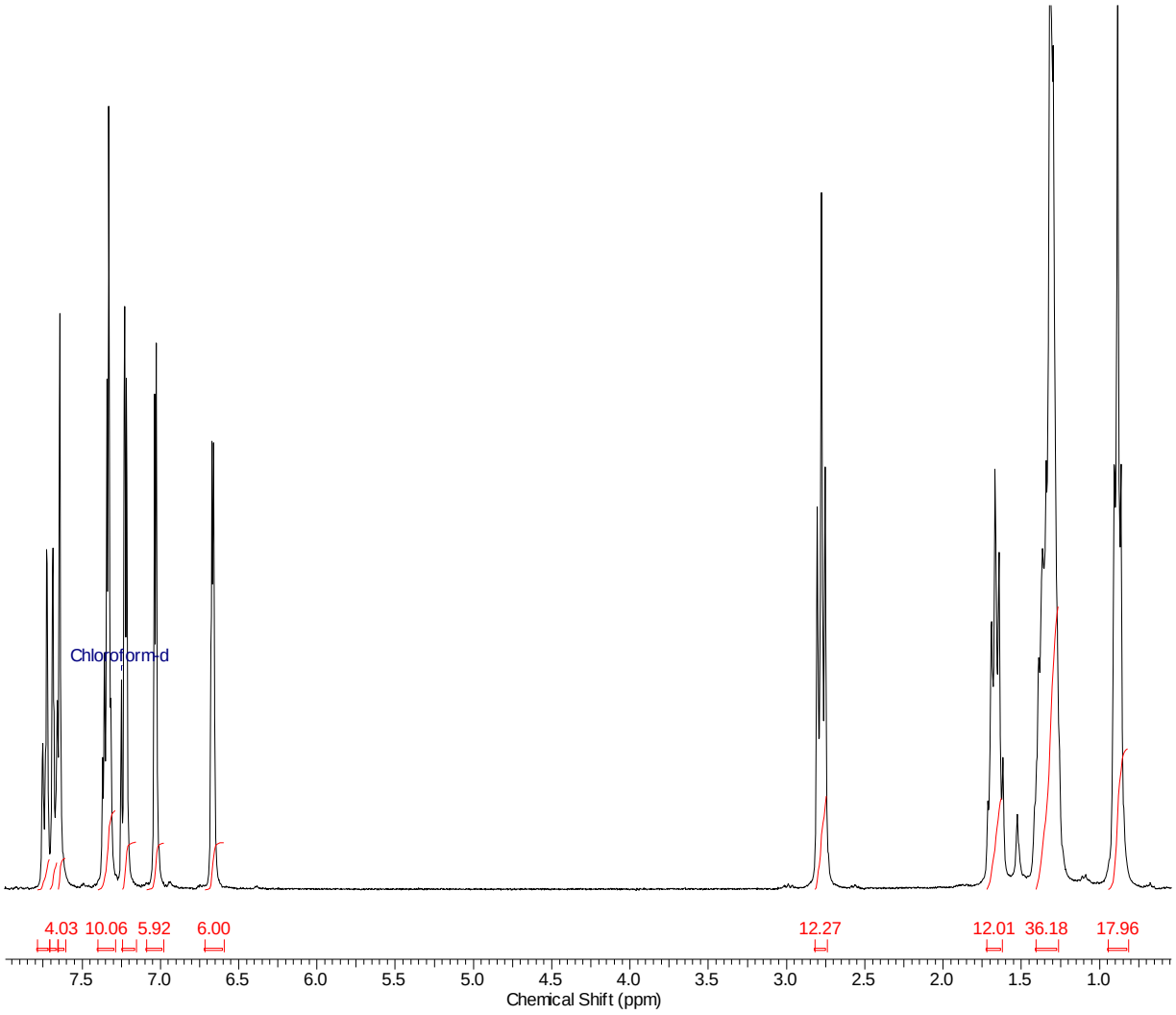
No.	Annotation	(ppm)
1	Chloroform-d	77.00

Figure S13. ^{13}C NMR spectrum of **BrPhSi(2T-Hex)$_3$** ($CDCl_3$, 24°C, 75 MHz).



No.	(ppm)	(Hz)	Height
1	-29.99	-1788.4	1.0000

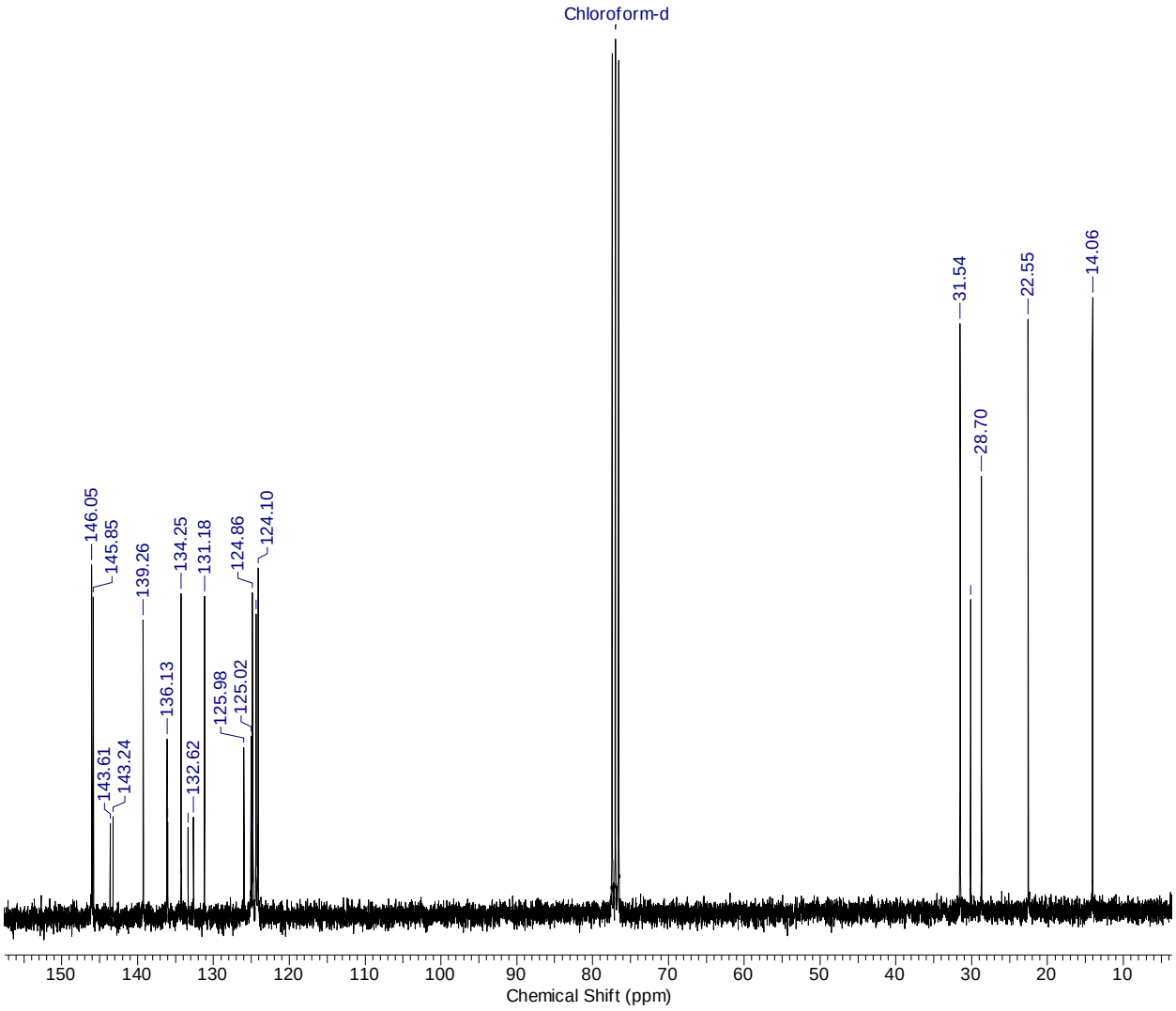
Figure S14. ^{29}Si NMR spectrum of **BrPhSi(2T-Hex)$_3$** ($CDCl_3$, 24°C, 60 MHz).



No.	Annotation	(ppm)
1	Chloroform-d	7.25

No.	(ppm)	Value	Absolute Value
1	[0.81 .. 0.94]	17.960	3.10889e+10
2	[1.26 .. 1.40]	36.179	6.26249e+10
3	[1.62 .. 1.72]	12.013	2.07946e+10
4	[2.74 .. 2.82]	12.269	2.12374e+10
5	[6.59 .. 6.71]	6.000	1.03859e+10
6	[6.98 .. 7.09]	5.919	1.02457e+10
7	[7.15 .. 7.24]	6.054	1.04788e+10
8	[7.29 .. 7.40]	10.059	1.74114e+10
9	[7.61 .. 7.65]	4.034	6.98361e+9
10	[7.66 .. 7.71]	3.964	6.86130e+9
11	[7.71 .. 7.78]	3.924	6.79174e+9

Figure S15. ^{1}H NMR spectrum of **(PTPTP)Si$_2$(2T-Hex)$_6$** ($CDCl_3$, 24°C, 300 MHz).

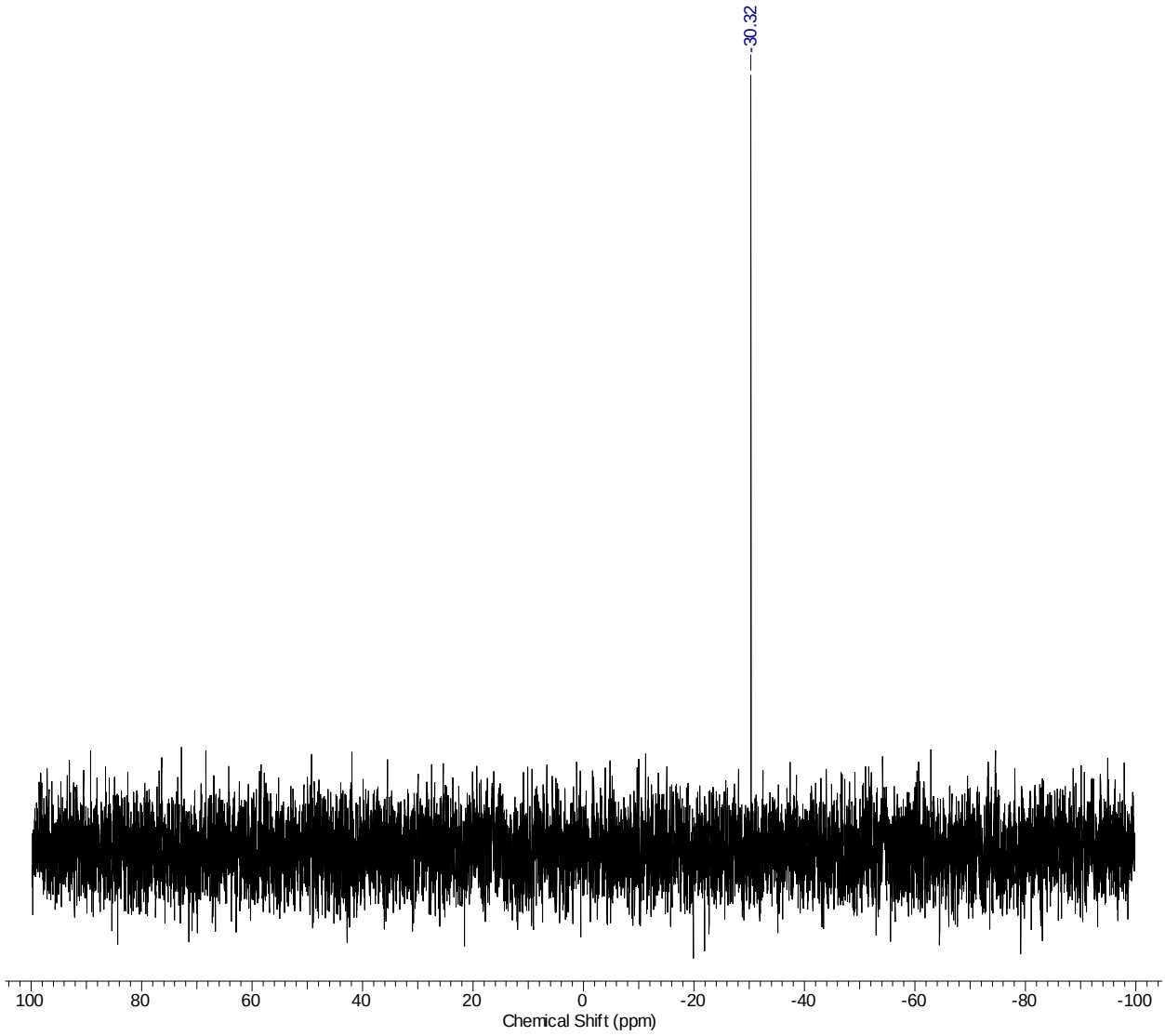


No.	(ppm)	(Hz)	Height
1	14.06	1061.4	0.7068
2	22.55	1701.9	0.6815
3	28.70	2166.5	0.5036
4	30.15	2275.7	0.3635
5	31.51	2378.6	0.4792
6	31.54	2380.2	0.6767
7	124.10	9366.6	0.3994
8	124.17	9371.9	0.1078
9	124.38	9387.7	0.3471
10	124.78	9418.1	0.0991
11	124.86	9424.1	0.3714
12	125.02	9436.6	0.2080

No.	(ppm)	(Hz)	Height
13	125.98	9508.5	0.1951
14	131.18	9901.0	0.3668
15	132.62	10009.6	0.1164
16	133.34	10064.1	0.1047
17	134.25	10133.2	0.3703
18	136.02	10266.4	0.1108
19	136.13	10275.0	0.2051
20	139.26	10510.8	0.3402
21	143.24	10811.5	0.1169
22	143.61	10839.7	0.1089
23	145.85	11008.3	0.3665
24	146.05	11023.3	0.4027

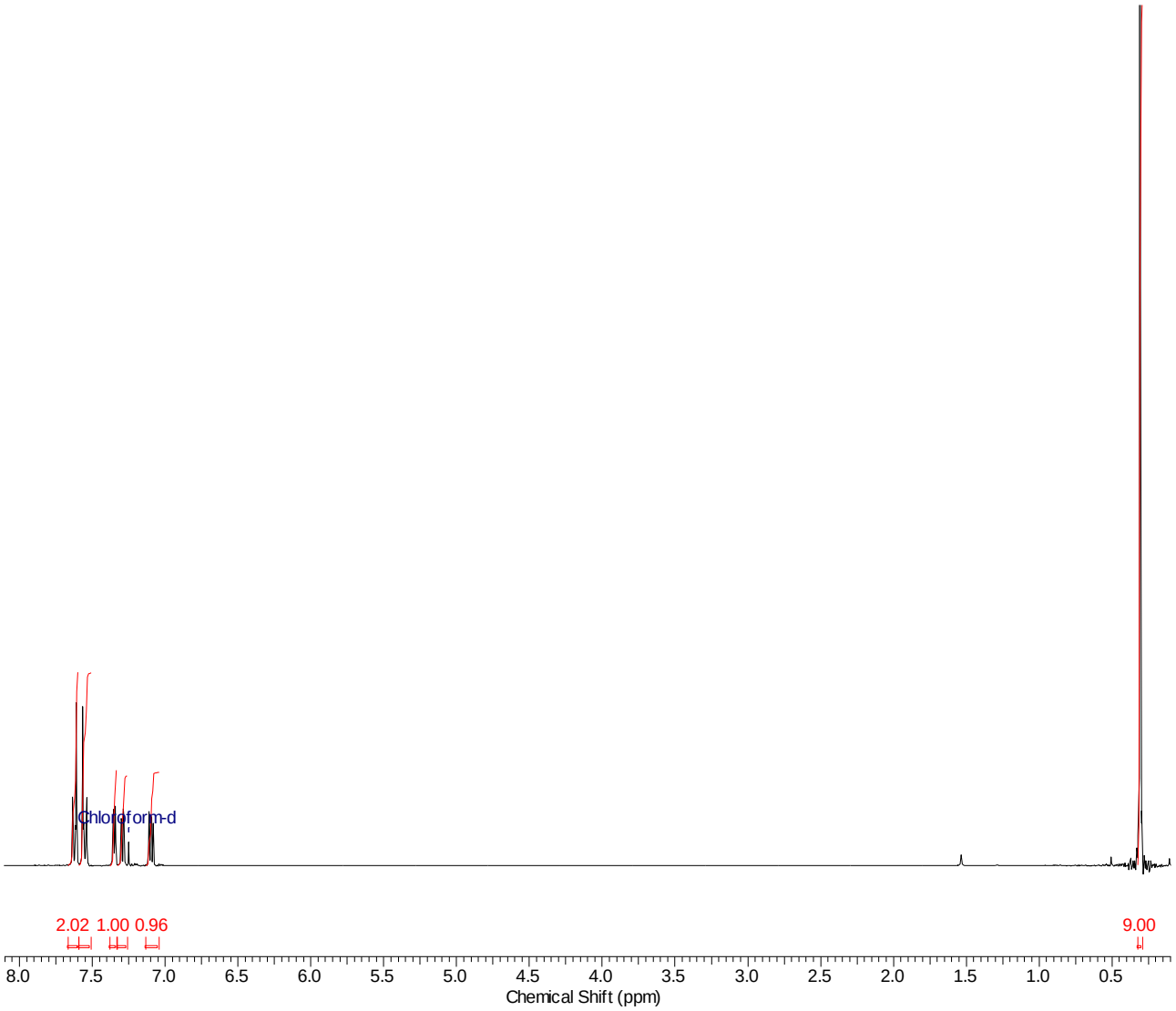
No.	Annotation	(ppm)
1	Chloroform-d	77.00

Figure S16. ^{13}C NMR spectrum of **(PTPTP)Si$_2$(2T-Hex)$_6$** ($CDCl_3$, 24°C, 75 MHz)**.**



No.	(ppm)	(Hz)	Height
1	-30.32	-1808.0	1.0000

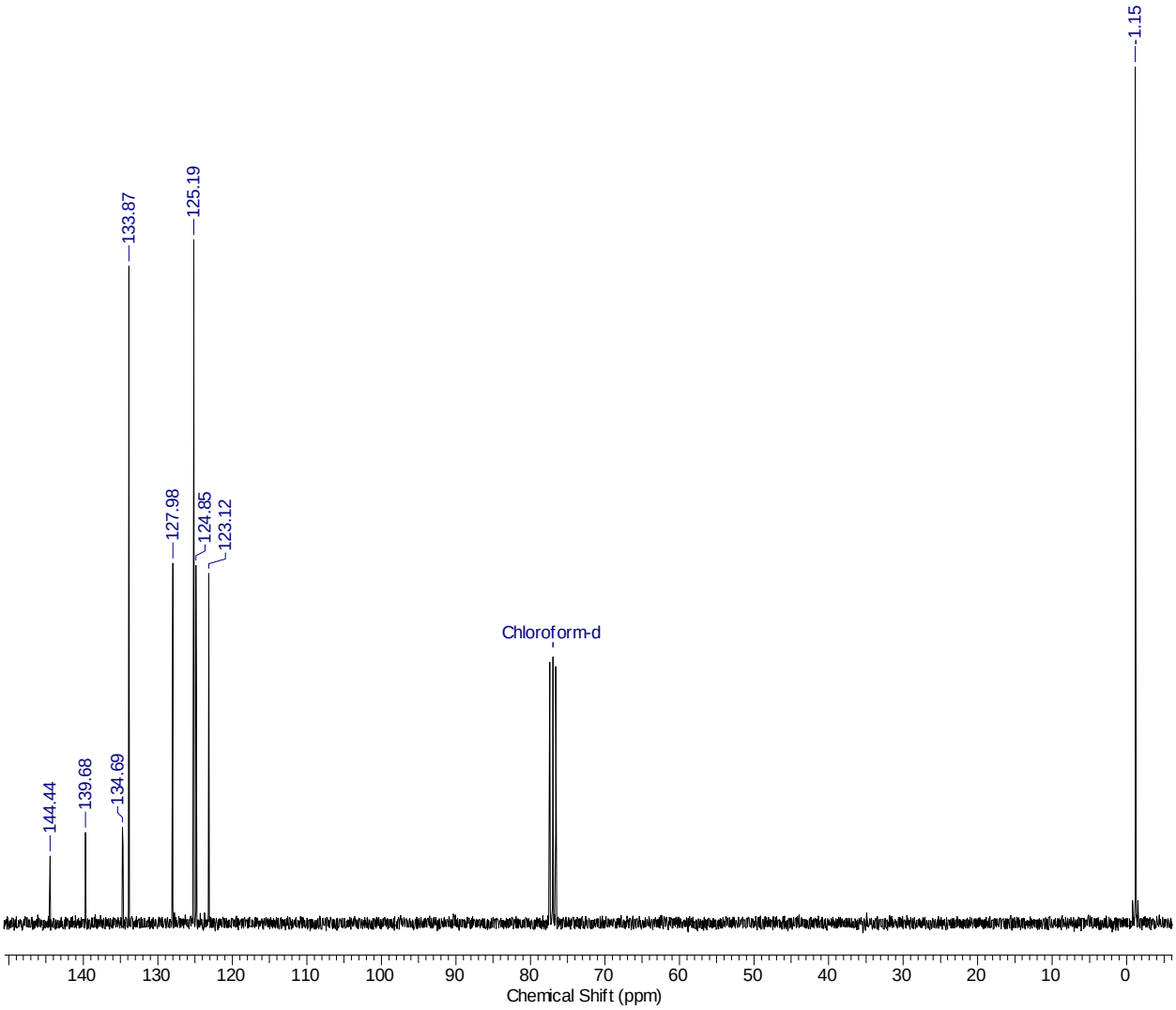
Figure S17. ^{29}Si NMR spectrum of **(PTPTP)Si$_2$(2T-Hex)$_6$** ($CDCl_3$, 24°C, 60 MHz)



No.	Annotation	(ppm)
1	Chloroform-d	7.25

No.	(ppm)	Value	Absolute Value
1	[0.29 .. 0.32]	9.000	4.12594e+9
2	[7.04 .. 7.13]	0.965	4.42227e+8
3	[7.26 .. 7.33]	0.929	4.26051e+8
4	[7.33 .. 7.38]	1.000	4.58586e+8
5	[7.51 .. 7.59]	1.992	9.13225e+8
6	[7.59 .. 7.66]	2.017	9.24832e+8

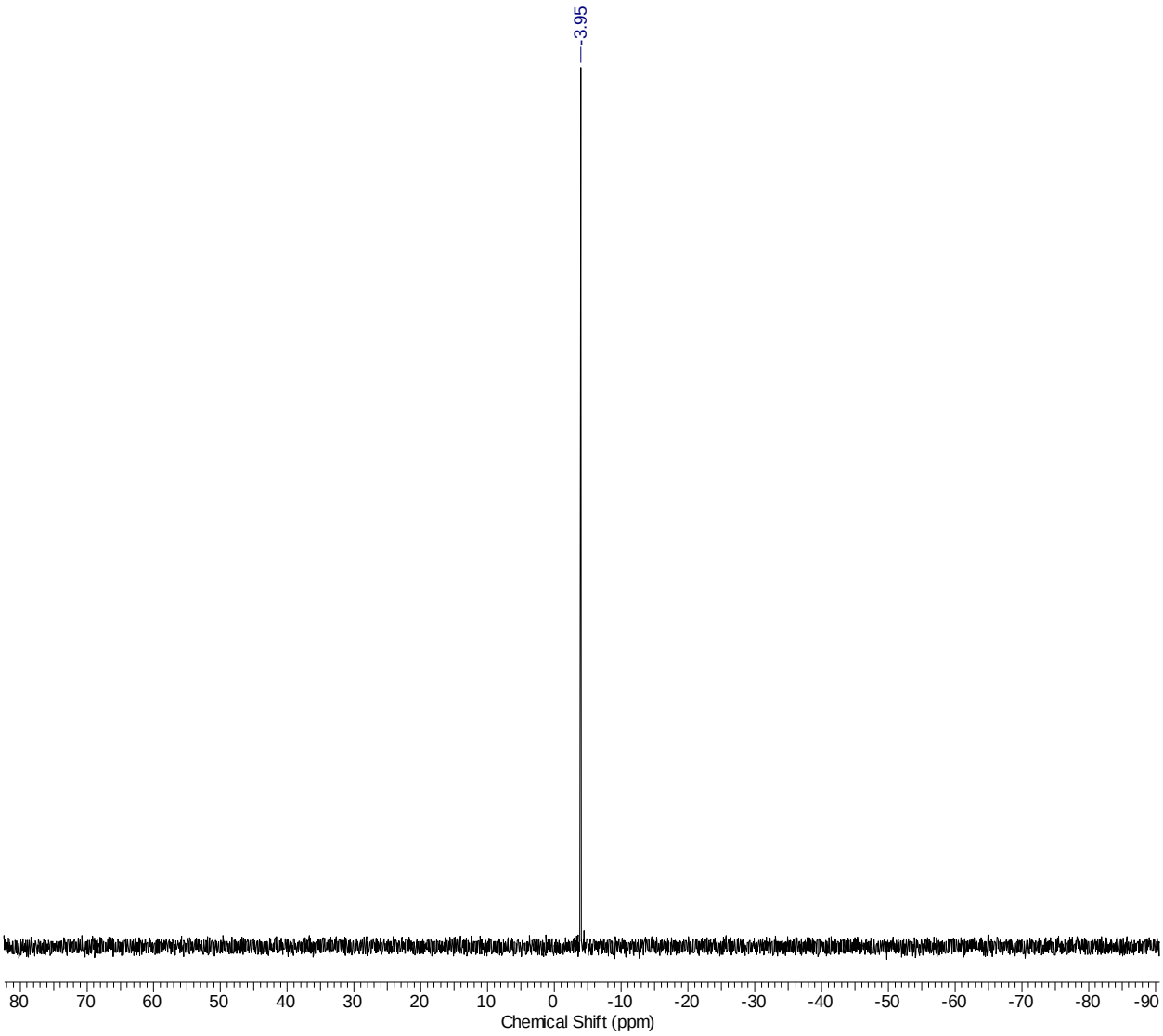
Figure S18. ^{1}H NMR spectrum of **TMS-PT** ($CDCl_3$, 24°C, 300 MHz).



No.	(ppm)	(Hz)	Height
1	-1.15	-87.0	1.0000
2	123.12	9293.2	0.4089
3	124.85	9423.1	0.4179
4	125.19	9448.8	0.7983
5	127.98	9659.4	0.4205
6	133.87	10104.5	0.7673
7	134.69	10166.4	0.1122
8	139.68	10542.4	0.1057
9	144.44	10902.0	0.0787

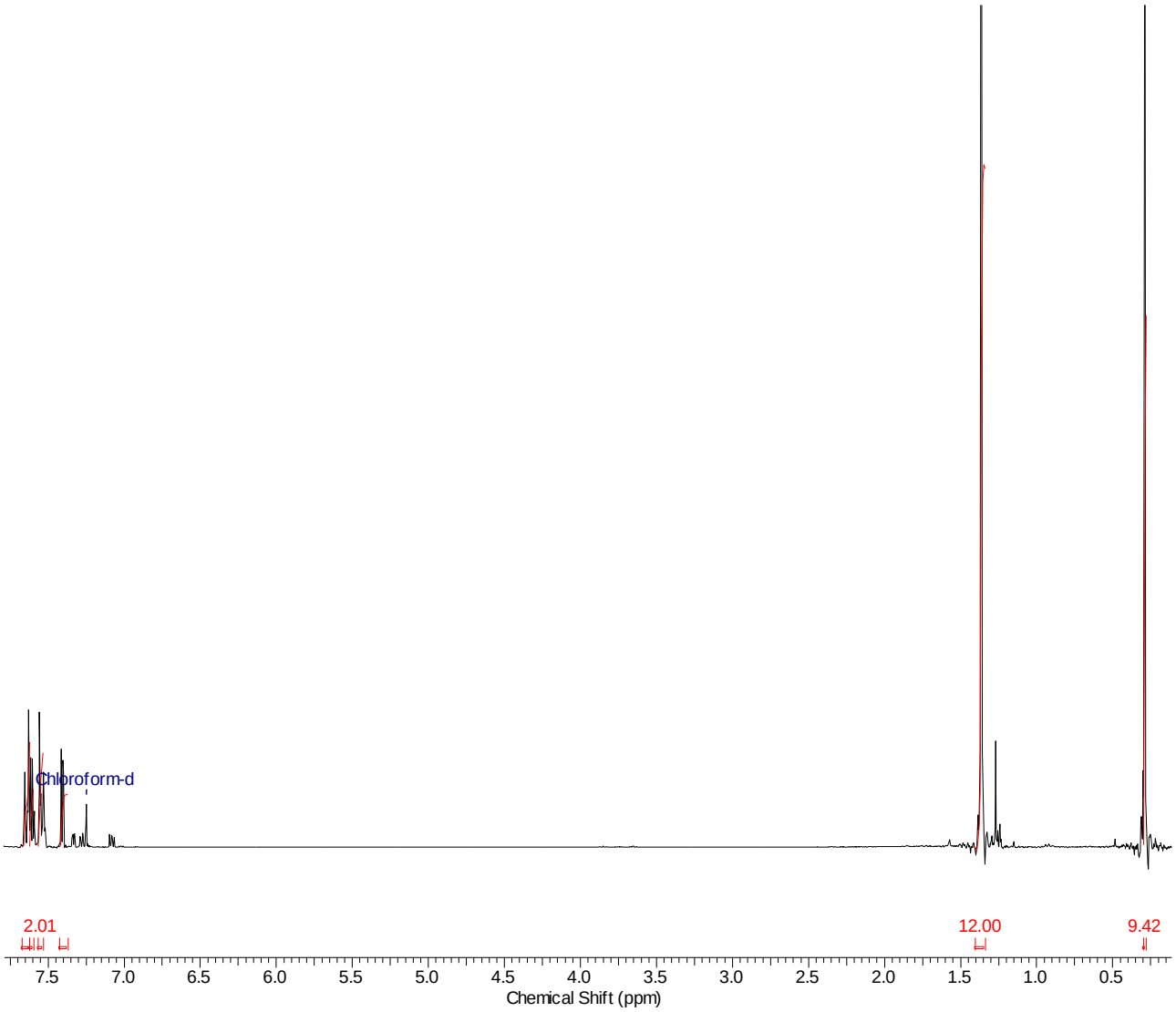
No.	Annotation	(ppm)
1	Chloroform-d	77.00

Figure S19. ^{13}C NMR spectrum of **TMS-PT** ($CDCl_3$, 22°C, 75 MHz).



No.	(ppm)	(Hz)	Height
1	-3.95	-235.6	1.0000

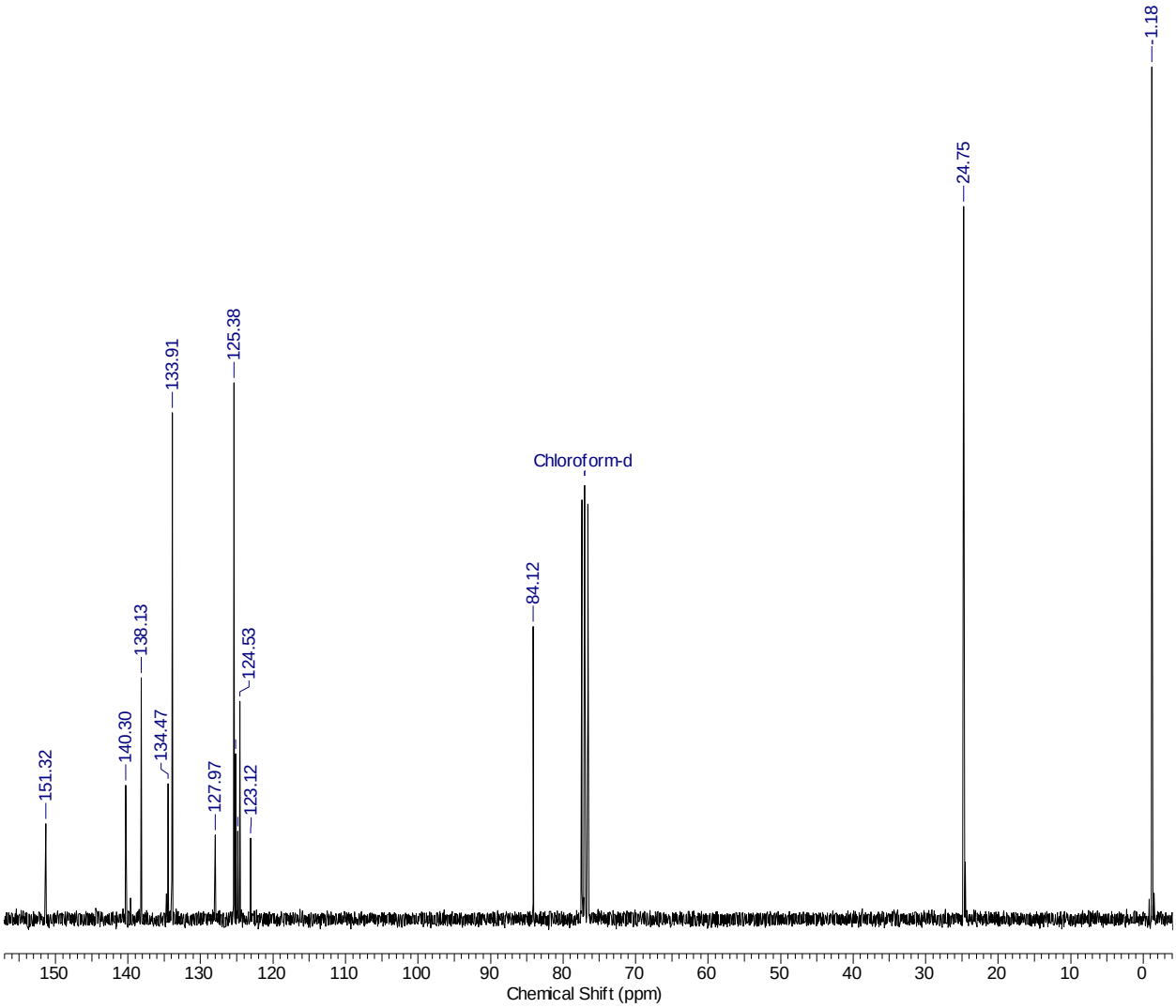
Figure S20. ^{29}Si NMR spectrum of **TMS-PT** ($CDCl_3$, 22°C, 60 MHz).



No.	Annotation	(ppm)
1	Chloroform-d	7.25

No.	(ppm)	Value	Absolute Value
1	[0.28 .. 0.30]	9.419	2.52107e+9
2	[1.34 .. 1.40]	12.000	3.21204e+9
3	[7.37 .. 7.43]	0.933	2.49718e+8
4	[7.53 .. 7.56]	2.007	5.37107e+8
5	[7.59 .. 7.62]	1.076	2.88010e+8
6	[7.62 .. 7.67]	1.877	5.02314e+8

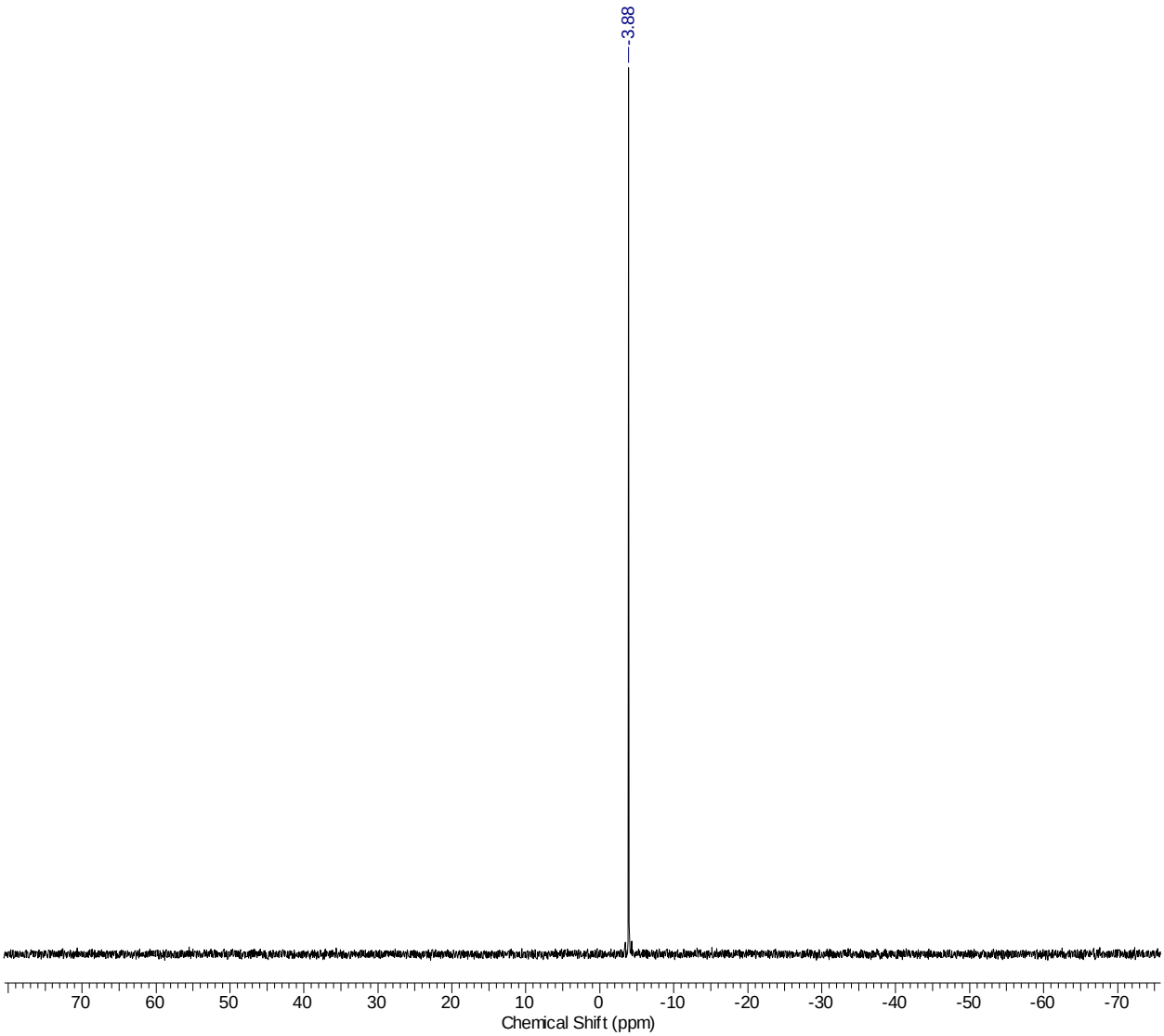
Figure S21. ^{1}H NMR spectrum of **TMS-PT-BPin** ($CDCl_3$, 22°C, 300 MHz).



No.	(ppm)	(Hz)	Height
1	-1.18	-89.2	1.0000
2	24.75	1867.9	0.8363
3	84.12	6349.2	0.3430
4	123.12	9292.6	0.0947
5	124.53	9399.6	0.2551
6	124.84	9422.5	0.1032
7	125.18	9448.0	0.1937
8	125.38	9463.5	0.6295
9	127.97	9659.2	0.0985
10	133.86	10103.7	0.2016
11	133.91	10107.3	0.5941
12	134.47	10149.8	0.1586
13	138.13	10426.0	0.2831
14	140.30	10589.9	0.1567
15	151.32	11421.4	0.1120

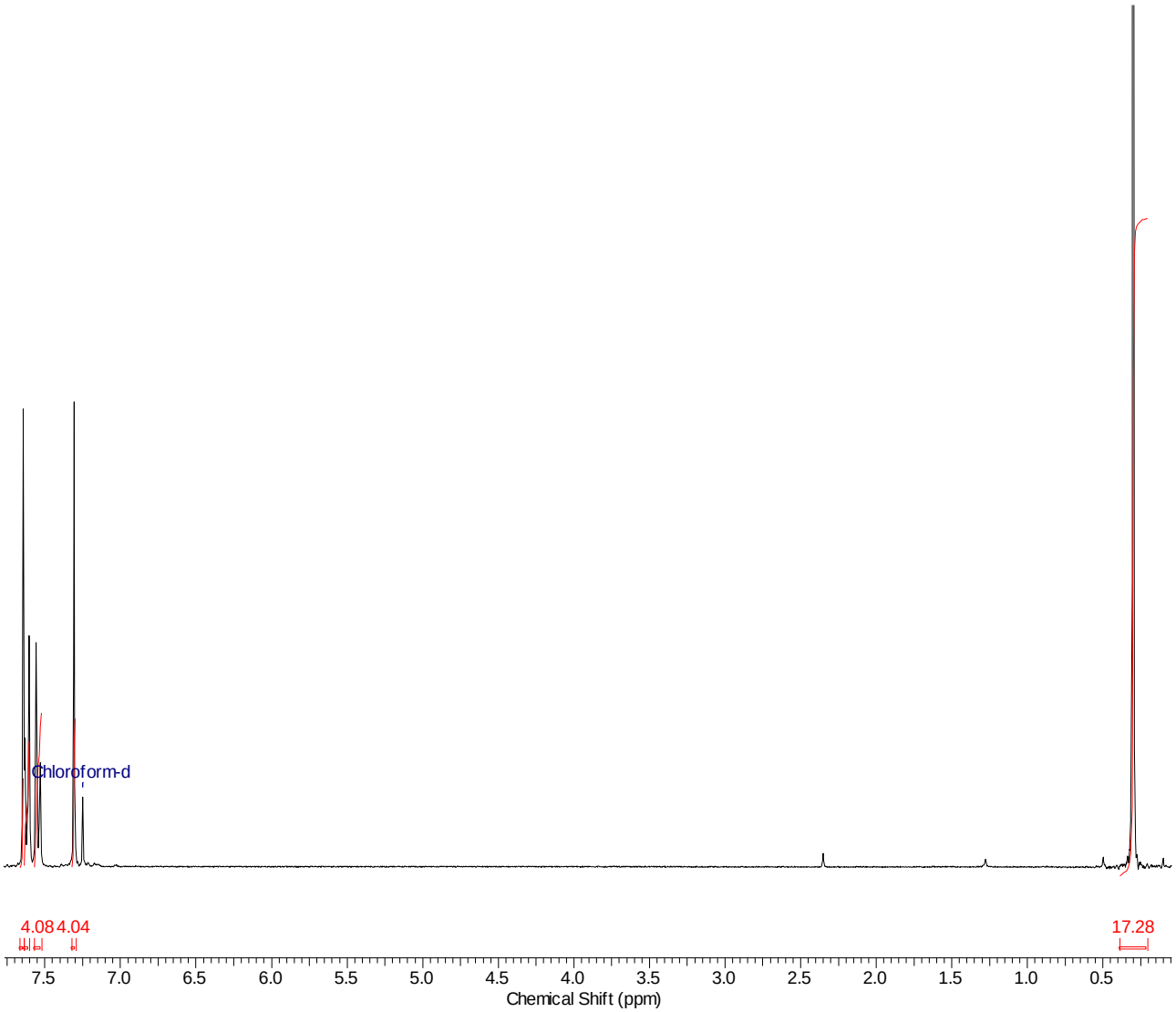
No.	Annotation	(ppm)
1	Chloroform-d	77.00

Figure S22. ^{13}C NMR spectrum of **TMS-PT-BPin** ($CDCl_3$, 22°C, 75 MHz).



No.	(ppm)	(Hz)	Height
1	-3.88	-231.6	1.0000

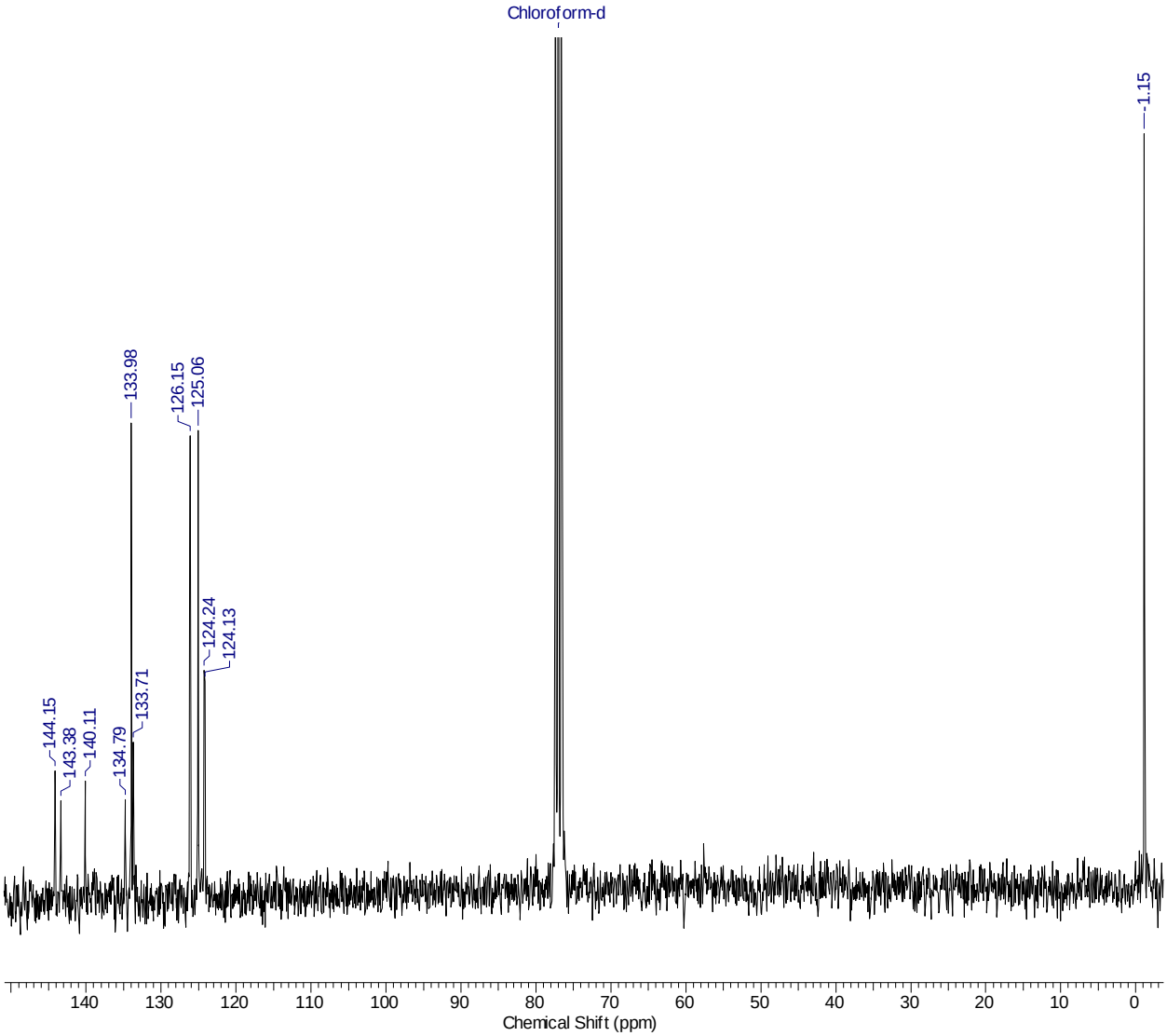
Figure S23. ^{29}Si NMR spectrum of **TMS-PT-BPin** ($CDCl_3$, 22°C, 60 MHz).



No.	Annotation	(ppm)
1	Chloroform-d	7.25

No.	(ppm)	Value	Absolute Value
1	[0.20 .. 0.39]	17.285	5.03170e+9
2	[7.29 .. 7.32]	4.040	1.17602e+9
3	[7.52 .. 7.57]	4.082	1.18827e+9
4	[7.60 .. 7.64]	4.053	1.17975e+9
5	[7.64 .. 7.67]	4.000	1.16444e+9

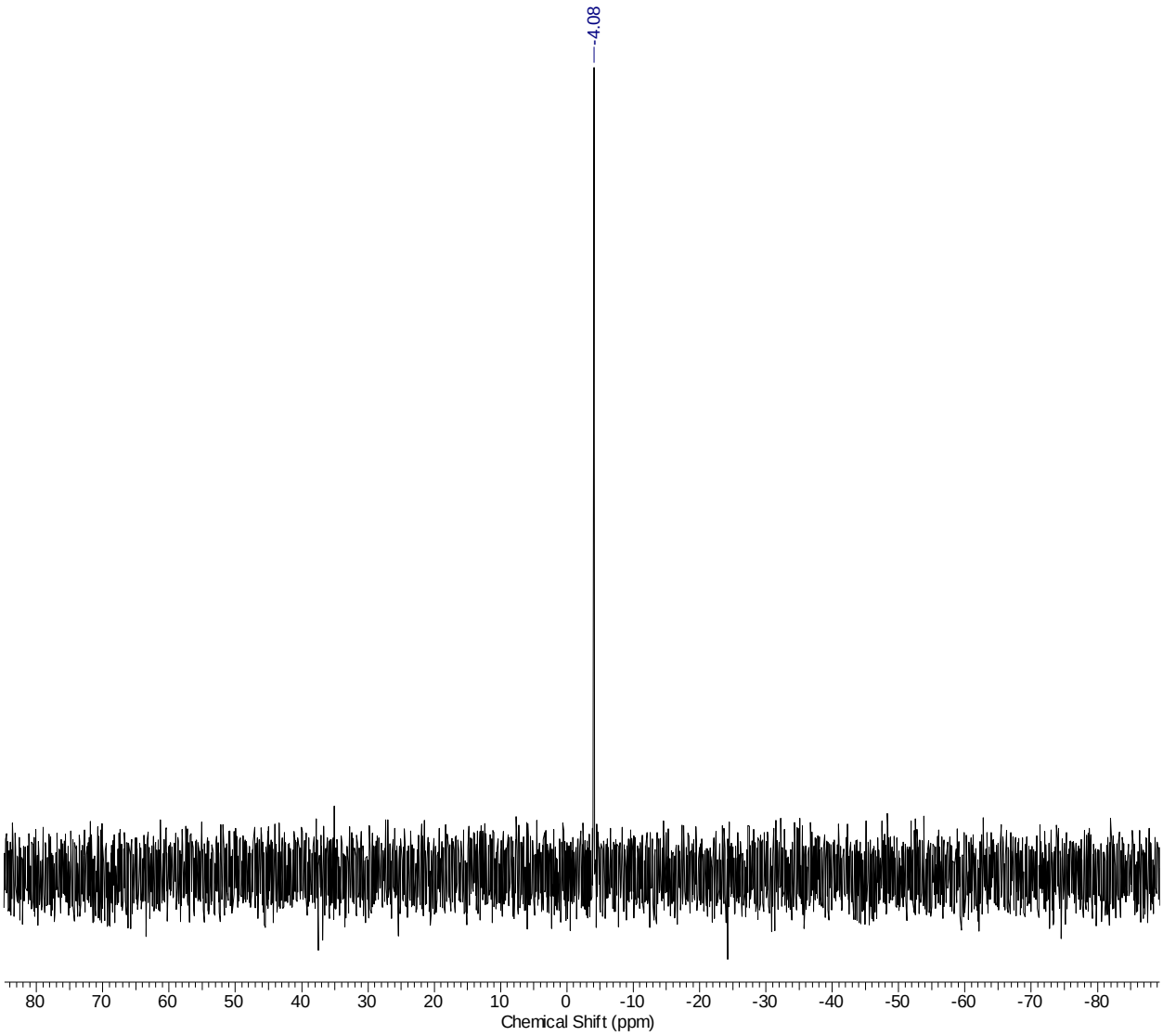
Figure S24. ^{1}H NMR spectrum of **TMS-PTPTP-TMS** ($CDCl_3$, 67°C, 300 MHz).



No.	(ppm)	(Hz)	Height
1	-1.15	-86.4	0.5623
2	124.13	9369.2	0.1573
3	124.24	9377.2	0.1657
4	125.06	9439.1	0.3430
5	126.15	9521.5	0.3391
6	133.71	10092.3	0.1125
7	133.98	10112.5	0.3486
8	134.79	10173.9	0.0699
9	140.11	10575.3	0.0839
10	143.38	10822.1	0.0691
11	144.15	10879.9	0.0911

No.	Annotation	(ppm)
1	Chloroform-d	77.00

Figure S25. ^{13}C NMR spectrum of **TMS-PTPTP-TMS** ($CDCl_3$, 67°C, 75 MHz).



No.	(ppm)	(Hz)	Height
1	-4.08	-243.6	1.0000

Figure S26. ^{29}Si NMR spectrum of **TMS-PTPTP-TMS** ($CDCl_3$, 67°C, 60 MHz).

3. TGA of TMS-PTPTP-TMS and (PTPTP)Si_2(2T-Hex)$_6$

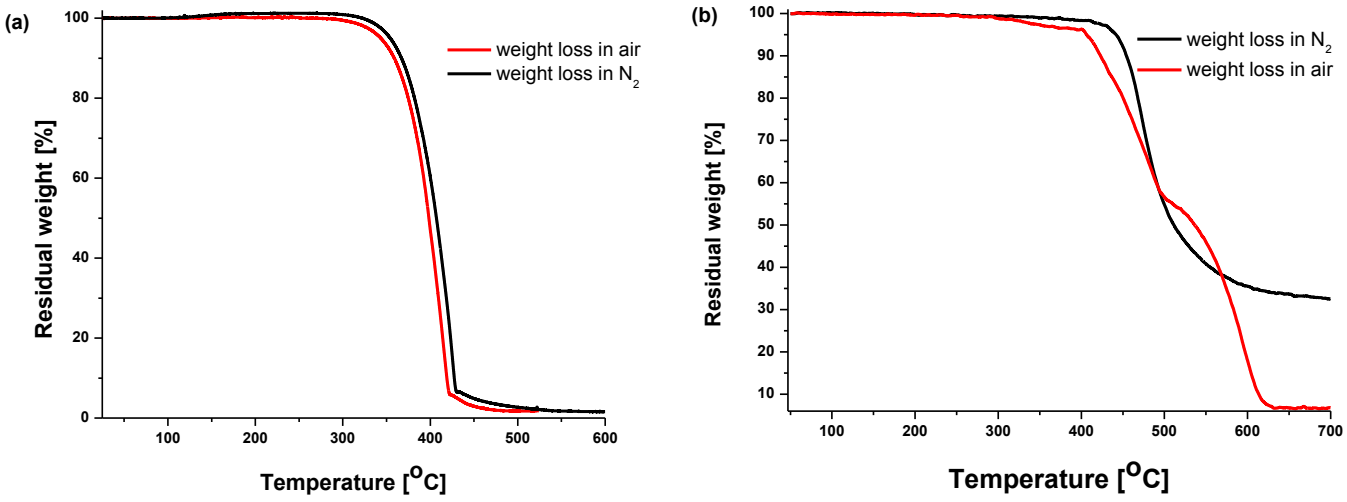


Figure S27. Thermogravimetric analysis (TGA) of **TMS-PTPTP-TMS (a) and (PTPTP)Si_2(2T-Hex)$_6$ (b).**

4. DSC traces of TMS-PTPTP-TMS and (PTPTP)Si_2(2T-Hex)$_6$

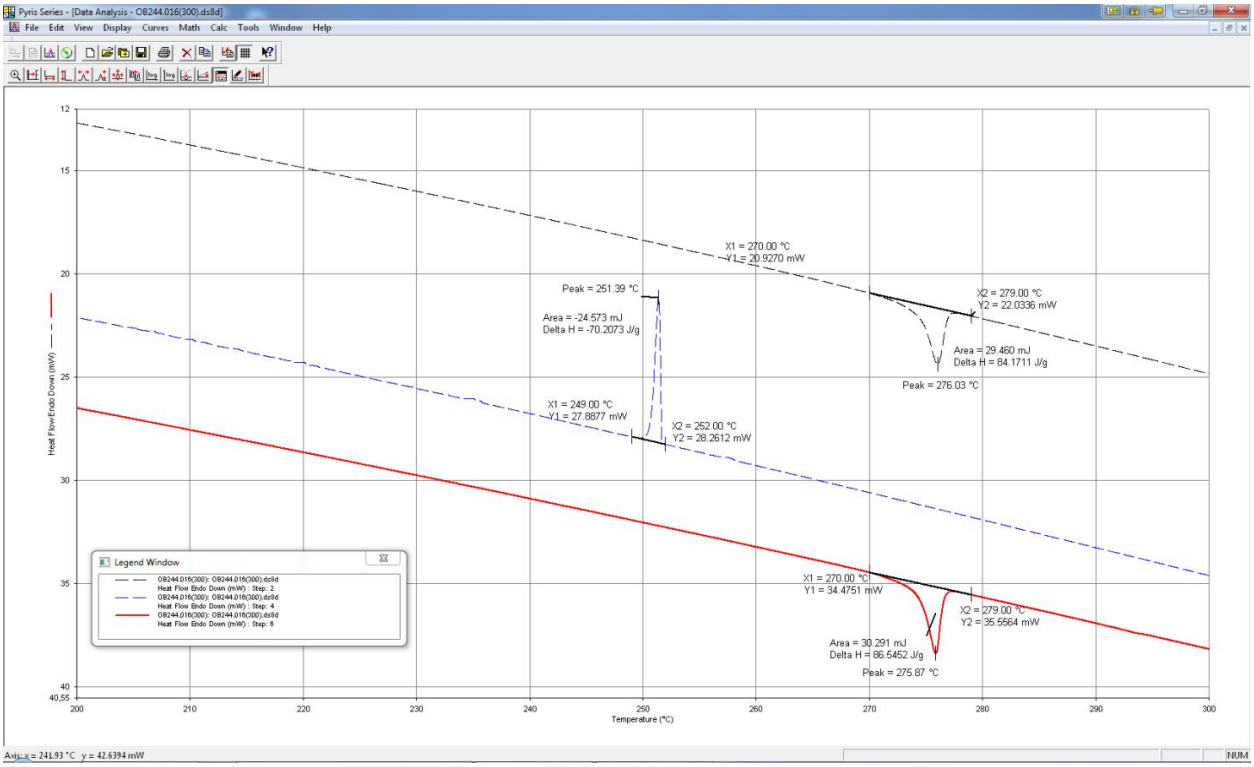


Figure S28. DSC traces of **TMS-PTPTP-TMS**.

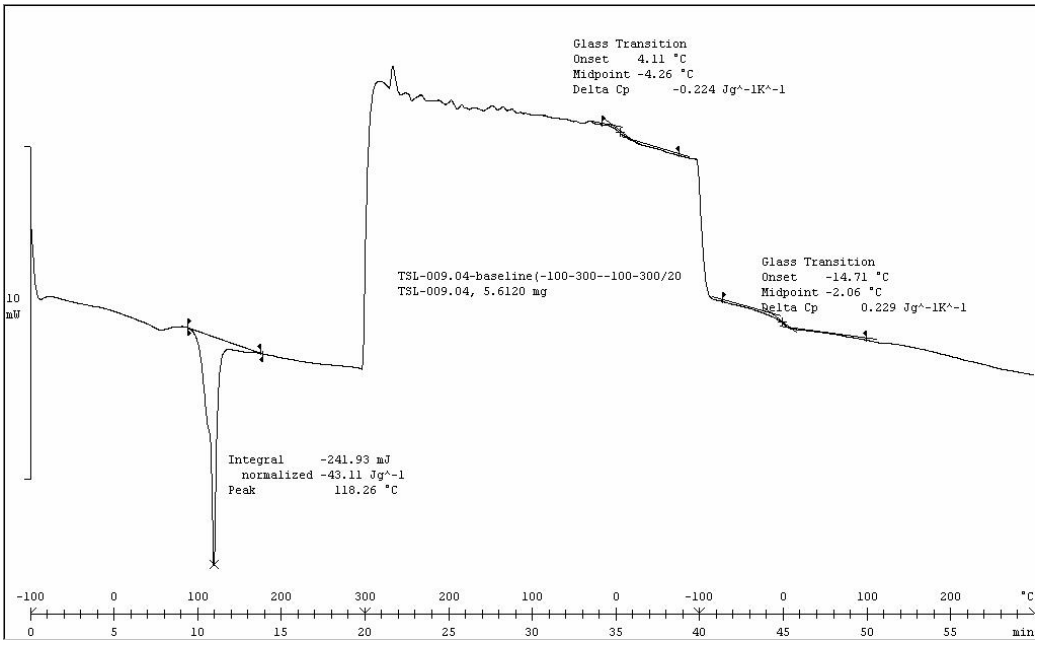


Figure S29. DSC traces of **PTPTPSi_2(2T-Hex)$_6$**.

5. Optical spectra of TMS-2T-Hex, PTPTP and TMS-PTPTP-TMS

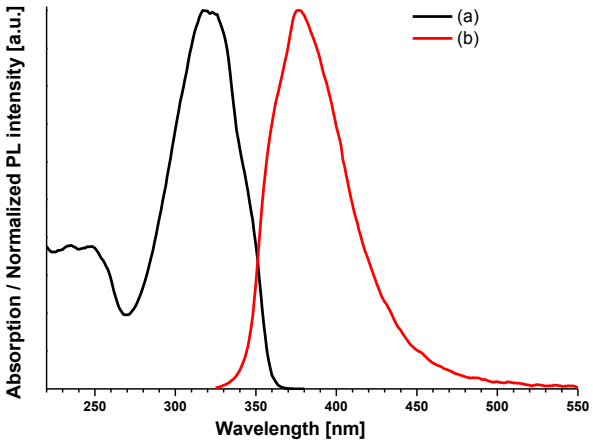


Figure S30. Absorption (a) and emission (b) spectra of **TMS-2T-Hex**.

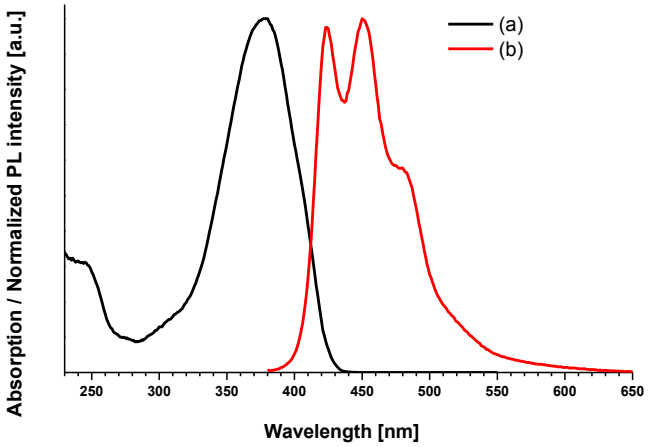


Figure S31. Absorption (a) and emission (b) spectra of **PTPTP**.

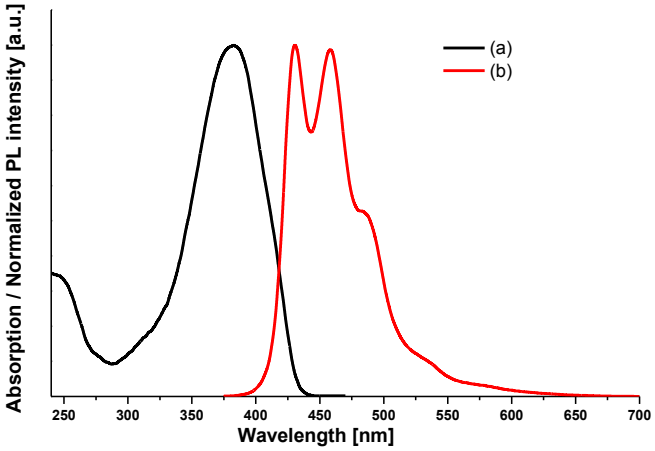
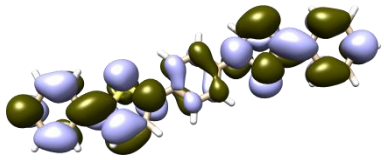
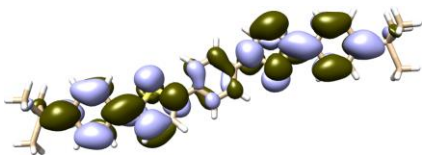
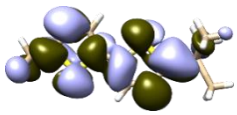
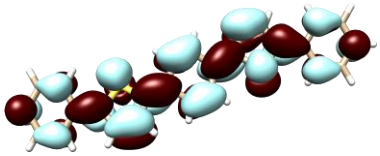
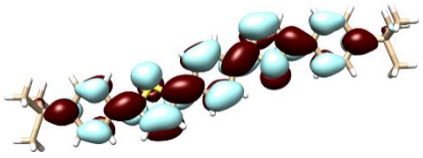
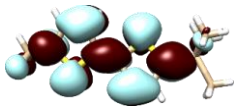
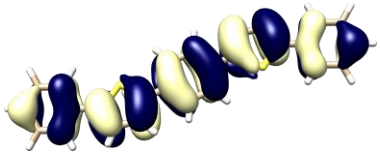
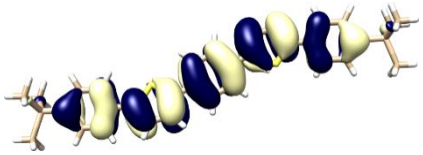
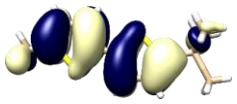
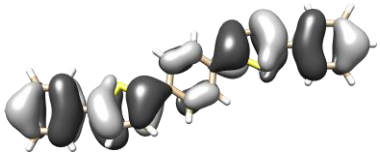
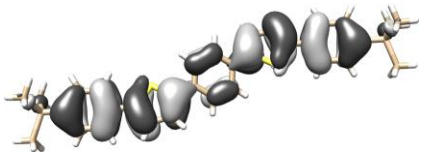
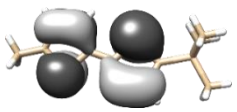


Figure S32. Absorption (a) and emission (b) spectra of **TMS-PTPTP-TMS**.

6. Table S1. Visualization of the frontier molecular orbitals of the structural analogs of NOL's donor and acceptor constituents (isosurfaces at ±0.015).

	PTPTP	**TMS-PTPTP-TMS**	**CH_3-2T-TMS**
LUMO+1			
LUMO			
HOMO			
HOMO-1			

7. Experimental results of PL lifetime measurements

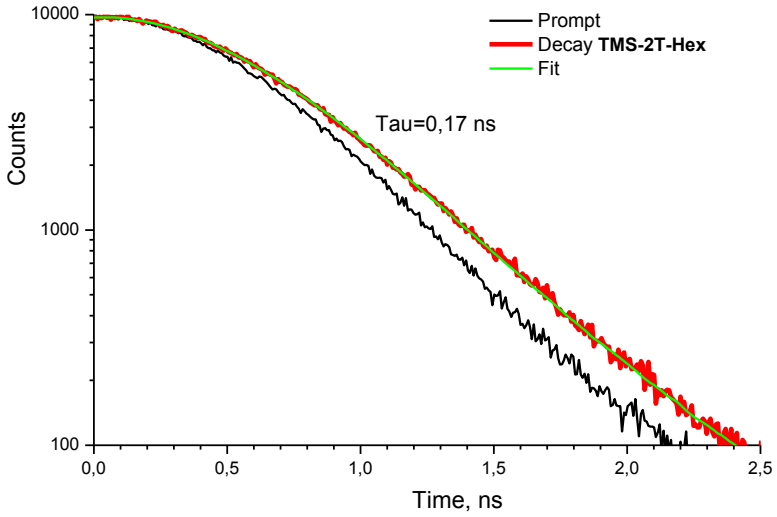


Figure S33. PL decay time measurements of **TMS-2T-Hex** in THF at 310 nm excitation.

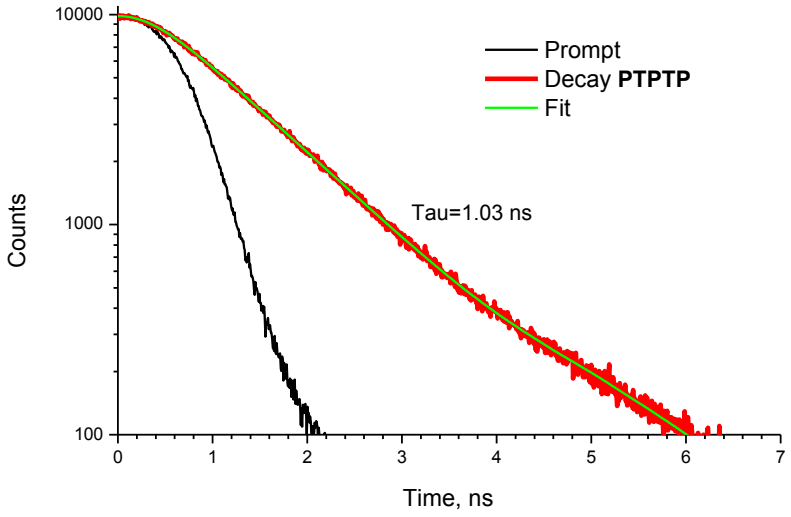


Figure S34. PL decay time measurements of **PTPTP** in THF at 369 nm excitation.

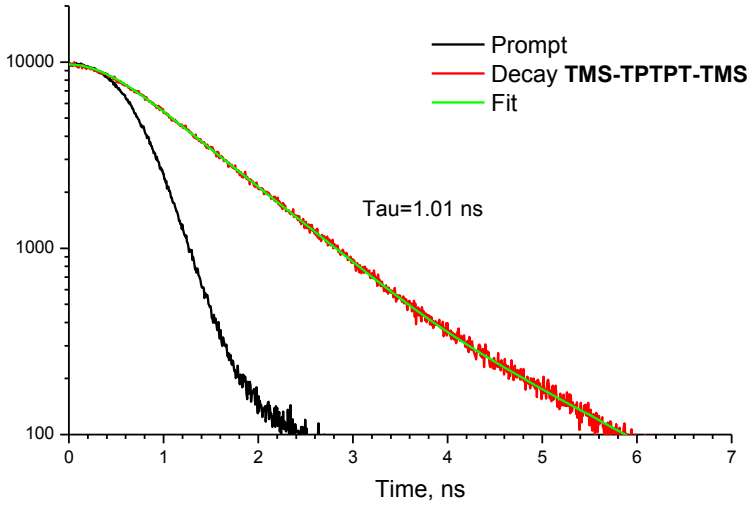


Figure S35. PL decay time measurements of **TMS-PTPTP-TMS** in THF at 369 nm excitation.

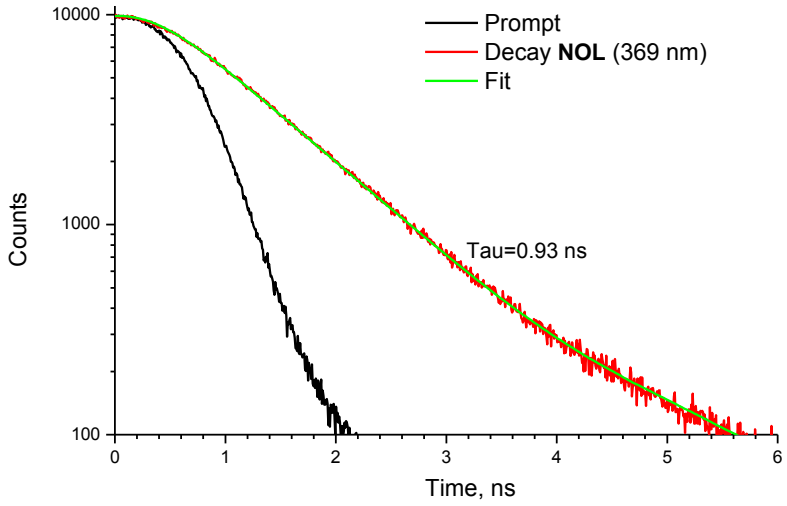


Figure S36. PL decay time measurements of **NOL** in THF at 369 nm excitation.

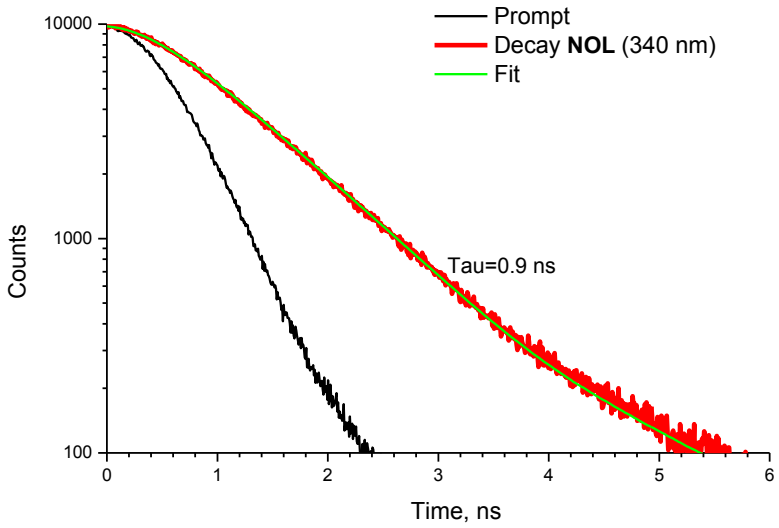


Figure S37. PL decay time measurements of **NOL** in THF at 340 nm excitation.

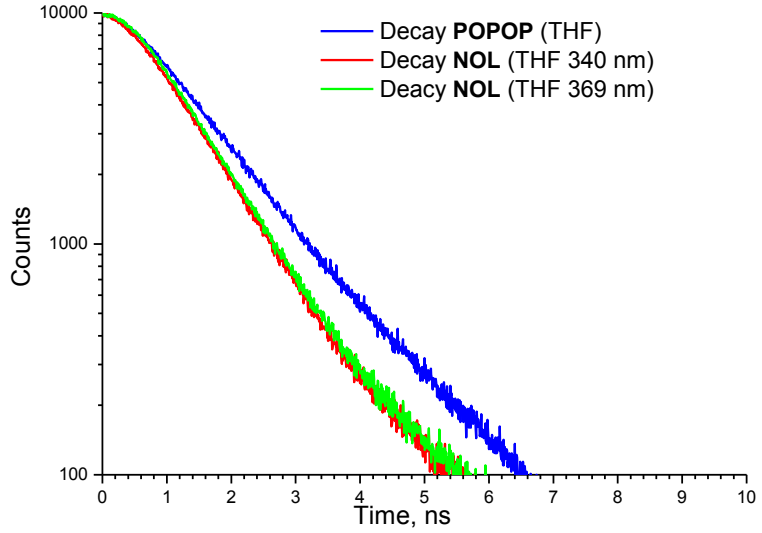


Figure S38. Comparison of PL decay time curves for **POPOP** and **NOL** in THF.

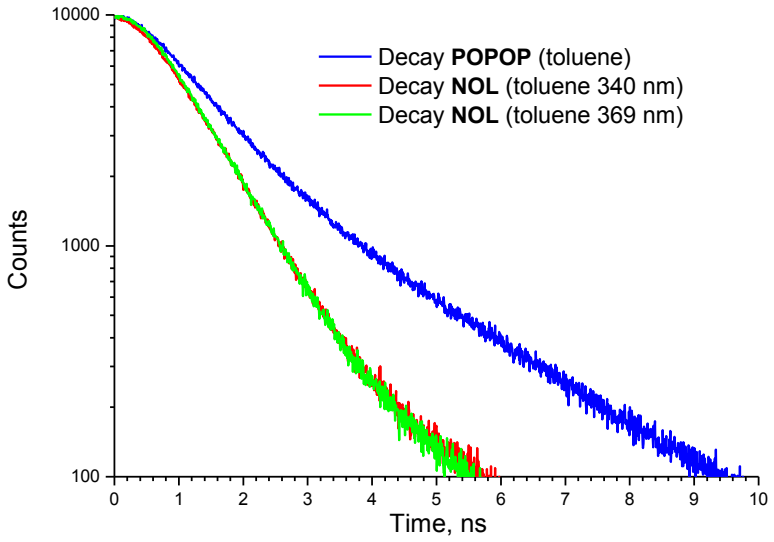


Figure S39. Comparison of PL decay time curves for **POPOP** and **NOL** in toluene.

8. Optimized molecular model of NOL with the distances between donors and acceptor fragments

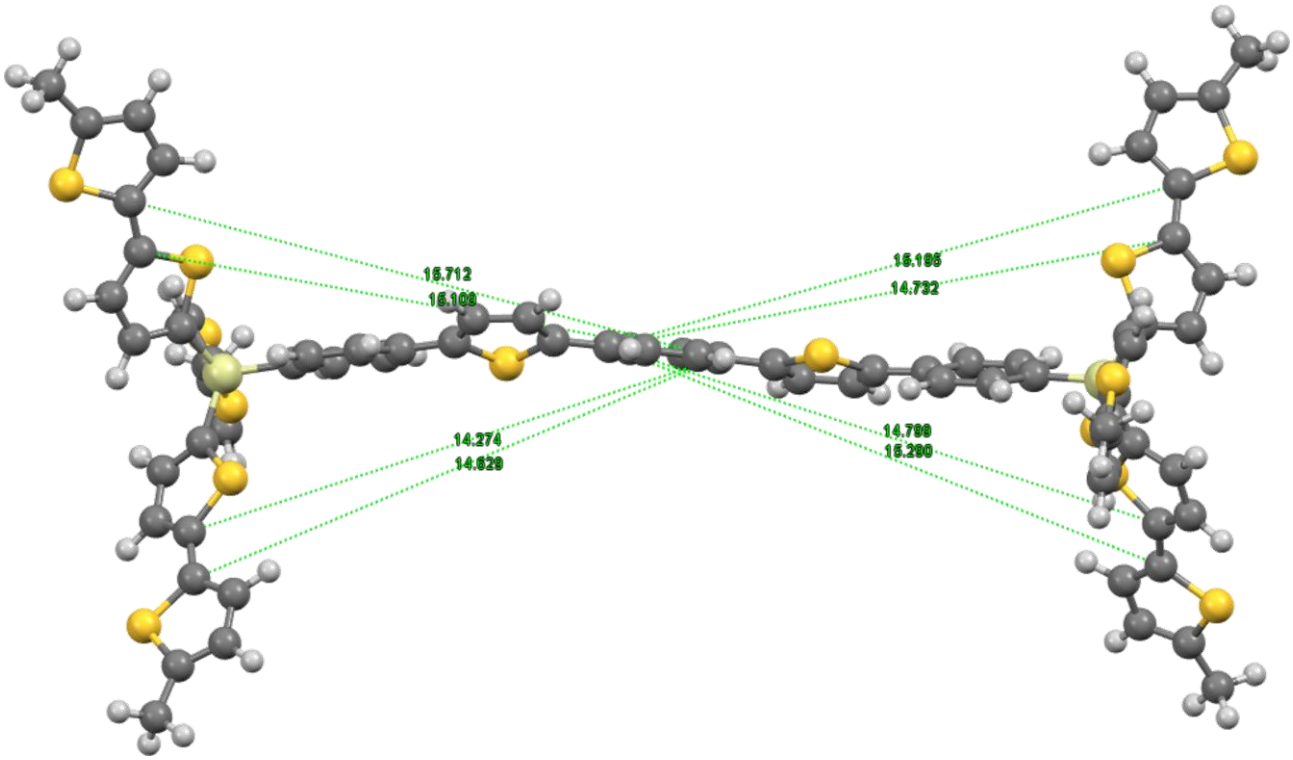


Figure S40. Optimized molecular model of **NOL** with measured distances between the donors **2T** and acceptor **PTPTP** fragments (in Å).

9. List of display items