Elestronic Supplementary Information for

Task Specific Ionic Liquids and Ultrasounds Irradiation: A Successful Strategy to Drive the Alcoholysis of Polycarbonate

Francesca D'Anna, Giovanna Raia, Gianluca Di Cara, Patrizia Cancemi, Salvatore Marullo*

[a]Università degli Studi di Palermo, Dipartimento STEBICEF, Sezione di Chimica. Viale delle Scienze, Ed. 17 90128 Palermo (Italy)

[a]Università degli Studi di Palermo, Dipartimento STEBICEF, Sezione di Biologia Cellulare, Viale delle Scienze, Ed. 16 90128 Palermo

Email: francesca.danna@unipa.it

Experimental Section

Task specific ionic Liquids Characterization

Tetramethylguanidinium imidazolate [TMG][Im]

Yellow oil. Yield: 90%. ^{1}H NMR, (300 MHz, $CDCl_3$) δ = 2.76 (s, 12H); 7.08 (s, 1H); 7.28 (s, 1H); 7.67 (s, 1H) ppm. ^{13}C NMR, (300 MHz, $CDCl_3$) δ = 39.3, 121.9, 135.2, 167.5 ppm.

Tetramethylguanidinium succinimidate [TMG][Succ]

Yellow oil. Yield: 92%. ^{1}H NMR (300 MHz, D_2O) δ = 2.51 (s, 4 H); 2.84 (s, 12 H) ppm. ^{13}C NMR (300 MHz, D_2O) δ = 29.4, 30.1, 31.4, 32.6, 39.0, 161.2, 178.9, 181.0 ppm.

Tetramethylguanidinium Lysinate [TMG][Lys]

Yellow solid. Yield: 87%. ^{1}H NMR, (300 MHz, D_2O) δ= 1.27 (m, 2H), 1.51 (m, 4H), 2.80 (s, 1H), 2.84 (s, 12 H), 3.19 (t, 1H, J=6Hz) ppm. ^{13}C NMR, (300 MHz, D_2O) δ= 21.89, 27.49, 33.26, 38.82, 39.42, 55.51, 161.63, 182.16 ppm.

Tetramethylguanidinium Glycinate [TMG][Gly]

Yellow solid. Yield: 73%. ^{1}H NMR (300 MHz, D_2O) δ = 2.80 (s, 12H); 2.90 (s, 2H); 3.22 (s, 2H); 3.67 (s, 2H) ppm.

N-methyl-N-(2-hydroxyethyl)pyrrolidinium Bromide

Colorless oil. Yield: 78%. ^{1}H NMR (300 MHz, DMSO) δ= 2.07 (s, 4H), 3.04 (s, 3H), 3.44 (t, 2H, J=3 Hz), 3.52 (m, 4H), 3.82 (s, 2H), 5.29 (m, 1H) ppm.

N-methyl-N-(2-hydroxyethyl)piperidinium Bromide

Colorless oil. Yields: 82%. ^{1}H NMR (300 MHz, D_2O) δ= 1.50 (s, 2H), 1.72 (s, 4H), 2.98 (s, 3H), 3.26 (m, 4H), 3.37 (m, 2H) 3.90 (s, 2H) ppm.

N,N,N-triethyl-(2-hydroxyethyl)ammomium Bromide

White solid. Yield: 61%. ^{1}H NMR, (300 MHz, DMSO) δ= 1.20 (m, 9H), 3.31 (m, 8H), 3.77 (m, 2H), 5.26 (t, 1H, J=6Hz) ppm.

N-methyl-N-(2-hydroxyethyl)morpholinium Bromide

Colorless oil. Yield: 83%. ^{1}H NMR, (300 MHz, D_2O) δ= 3.24 (s, 3H), 3.35 (s, 1H), 3.49 (m, 3H), 3.62 (m, 2H), 3.86 (m, 2H), 3.93 (m, 3H), 5.32 (t, 1H, J=6Hz) ppm.

N-methyl-N-(2-hydroxyethyl)imidazolium Bromide

Orange solid. Yield: 94%. ^{1}H NMR, (300 MHz, DMSO) δ= 3.71(s, 2H), 3.87 (s, 3H), 4.23 (s, 2H), 5.17 (s, 1H), 7.74 (d, 2H), 9.18 (s, 1H) ppm.

N,N-bis(2-hydroxyethyl)1,4-diazabicyclo[2.2.2]octane Bromide

White solid. Yield: 84% ^{1}H NMR, (300 MHz, DMSO) δ= 3.66 (m, 4H), 3.89 (s, 4H), 4.02 (s,12H) ppm.

N-methyl-N-ethylmorpholinium Iodide

Colorless solid. Yield: 85% ^{1}H NMR, (300 MHz, DMSO) δ= 1.25 (t, 3H, J= 6 Hz), 3.10 (s, 3H), 3.39 (m, 4H), 3.50 (m, 2H), 3.91 (m, 4H) ppm. ^{13}C (400 MHz, DMSO) δ= 7.2, 46.0, 58.9, 59.8, 60.3 ppm.

N-methyl-N-(2-hydroxy)ethylpyrrolidinium Imidazolate [C_1C_2OHPyrr][Im]

Yellow oil. Yield: 72% ^{1}H NMR, (300 MHz, DMSO) δ= 2.06 (s, 3H), 3.04 (s, 2H), 3.40 (t, 2H, J=6Hz), 3.51 (d, 3H, J=6Hz), 3.84 (s, 2H), 5.16 (s,3H), 6.74 (s, 2H), 7.21 (s, 1H) ppm. ^{13} CNMR, (300 MHz, DMSO) δ = 21.3, 48.3, 55.4, 64.6, 65.5, 124.1, 140.7 ppm.

N-methyl-N-(2-hydroxy)ethylpyrrolidinium Succinimidate [C_1C_2OHPyrr][Im]

Yellow oil. Quantitative yield. ^{1}H NMR, (300 MHz, D_2O) δ= 2.17 (s, 4H), 2.41 (s, 1H), 2.67 (s, 3H), 2.90 (s, 1H), 3.00 (s, 3H), 3.50 (m, 5H) 3.98 (s, 2H) ppm. ^{13}C NMR, (300 MHz, D_2O) δ = 21.3, 30.4, 48.28, 55.7, 64.5, 65.1, 175.9, 182.1 ppm.

N-methyl-N-(2-hydroxyethyl)-piperidinium Imidazolate [C_1C_2OHPip][Im]

Yellow oil. Quantitative yield. ^{1}H NMR, (300 MHz, DMSO) δ= 1.52 (m, 2H), 1.78 (m, 4H), 3.09 (s, 3H), 3.35 (quint., 2H), 3.41 (m, 4H) 3.85 (s, 2H), 6.76 (s, 2H) 7.24 (s, 1H) ppm. ^{13}C NMR (300 MHz, DMSO) δ =19.8, 21.0, 49.12, 54.35, 61.24, 64.89, 124.16, 140.7 ppm.

N-methyl-N-(2-hydroxyethyl)-morpholinium Imidazolate [C_1C_2OHMor][Im]

Yellow oil. Quantitative yield. ^{1}H NMR, (300 MHz, DMSO) δ=3.22 (s, 3H), 3.46 (m, 2H), 3.57 (m, 4H), 3.91 (s, 6H), 5.93 (s, 1H), 6.80 (s, 2H), 7.31 (s, 1H) ppm.^{13}C NMR, (300 MHz, DMSO) δ = 48.3, 54,5, 60.2, 60.3, 65.3, 124.5, 140.7 ppm.

N-methyl-N-(2-hydroxyethyl)-morpholinium succinimidate [C_1C_2OHMor][Succ]

Colorless oil. Quantitative yield. ^{1}H NMR, (300 MHz, CD_3OD) δ= 1.69 (s, 2H), 1.93 (s, 1H), 2.56 (s, 3H), 2.78 (m, 2H), 2.92 (m, 3H), 3.28 (m, 5H), 4.13 (s, 3H). ^{13}C NMR, (300 MHz, DMSO) δ= 30.1, 33.4, 34.5, 48.2, 54.9, 60.3, 176.3, 180.9 ppm.

N-methyl-N-(2-hydroxyethyl)-morpholinium phosphate [$C_1C_2OHMor]_3[PO_4$]

Colorless oil. Quantitative yield ^{1}H NMR, (300 MHz, CD_3OD) δ= 3.18 (s, 9H), 3.40 (m, 6H), 3.53 (m, 12H), 3.86 (s, 18H) ppm. ^{13}C NMR, (300 MHz, DMSO) δ = 47.8, 54.6, 59.9, 60.3, 65.5 ppm.

Triethyl-(2-hydroxyethyl)-ammonium imidazolate [$C_{222}C_2OHN][Im]$

Yellow oil. Quantitative yield. ^{1}H NMR, (300 MHz, CD_3OD) δ= 1.33 (t, 9H, J_1=7 Hz), 3.44 (m, 5H), 3.96 (m, 2H), 5.02 (s, 3H), 7.06 (s, 2H), 7.69 (s,1H) ppm. ^{13}C NMR, (300 MHz, DMSO) δ= 12.5, 57.9, 59.2, 63.6, 128.5, 144.7 ppm.

N-methyl-N-ethylmorpholinium imidazolate [$C_1C_2Mor][Im]$

Orange oil. Quantitative yield. ^{1}H NMR, (300 MHz, DMSO) δ = 1.22 (s, 3H), 3.09 (s, 3H), 3.38 (s, 4H), 3.50 (q, 2H), 3.88 (s, 4H), 6.45 (s, 1H), 6.82 (s, 1H), 7.34 (s, 1H) ppm. ^{13}C NMR, (300 MHz, DMSO) δ = 7.3, 45.2, 58.8, 59.7, 60.2, 123.6, 139.4 ppm.

1-ethyl-3-methylimidazolium chloride [$C_1C_2Im][Cl]$

Colorless oil. Yield: 99% ^{1}H NMR, (300 MHz, DMSO) δ= 1.40 (t, 3H, J=7 Hz), 3.87 (s, 3H), 4.21 (m, 2H), 7.79 (s, 1H), 7.89 (s, 1H), 9.51(s, 1H) ppm. ^{13}C NMR, (300 MHz, DMSO) δ=20.4, 40.9, 49.3, 127.2, 128.8, 141.6 ppm.

1-methyl-3-(2-hydroxyethyl)imidazolium chloride [$C_1C_2OHIm][Cl]$

Yellow oil. Yield: 88%. ^{1}H NMR, (300 MHz, DMSO) δ= 3.71 (t, 2H, J_1=5 Hz), 3.88 (s, 3H), 4.25 (t, 2H, J_1=5 Hz), 7.74 (s, 1H), 7.78 (s,1H), 9.32 (s, 1H exch.) ppm. ^{13}C NMR, (300 MHz, DMSO) δ = 36.1, 52.0, 59.7, 123.1, 123.7, 137.4 ppm.

Table S1. Conversion and Yields values for the methanolysis of BPA-PC, under US irradiation (50 W; 250 kHz), at 30 °C, in the presence of tetramethylguanidinium-based TSILs (n_c/n_{RU} = 1/12). Conversion and yield values were reproducible within ± 3%.

TSIL	$m_{2\text{-MeTHF}}/m_{MeOH}$	Reaction Time (min)	Conversion (%)	Yield (%)
[TMG][Im]	3	105	72	57
	3	120	85	81
	3	135	84	78

Table S2. Conversion and Yields values for the methanolysis of BPA-PC, under US irradiation (50 W; 250 kHz), at 30 °C, for 120 minutes, in the presence of imidazolate-based TSILs (n_c/n_{RU} = 1/12; $m_{2\text{-MeTHF}}/m_{MeOH}$ = 3). Conversion and yield values were reproducible within ± 3%.

TSIL	Conversion (%)	Yield (%)
[TMG][Im]	85	81
[C_1C_2OHPip][Im]	75	67
[C_1C_2OHPyrr][Im]	74	71
[C_1C_2OHMor][Im]	86	82
[$C_{222}C_2$OHN][Im]	79	77
[$(C_2OH)_2$DABCO][Im]$_2$	59	52
[Ch][Im]	83	78

Table S3. Conversion and Yields values for the methanolysis of BPA-PC, under US irradiation (50 W; 250 kHz), at 30 °C, for 120 minutes, in the presence of **[TMG$^+$]-**, **[C_1C_2OHPyrr$^+$]-** and **[C_1C_2OHMor$^+$]-**based TSILs (n_c/n_{RU} = 1/12; $m_{2\text{-MeTHF}}/m_{MeOH}$ = 3). Conversion and yield values were reproducible within ± 3%.

TSIL	Conversion (%)	Yield (%)
[TMG][Im]	85	81
[TMG][Succ]	38	38
[TMG][Lys]	8	8
[TMG][Gly]	0	0
[C_1C_2OHPyrr][Im]	74	71
[C_1C_2OHPyrr][Succ]	59	44
[C_1C_2OHMor][Im]	86	82
[C_1C_2OHMor][Succ]	40	32
[C_1C_2OHMor]$_3$[PO_4]	67	67

Table S4. Hammett basicity function (H_-) determined for TSILs, using *p*-nitrophenol as probe.

TSIL	H_-
[TMG][Gly]	10.53
[TMG][Lys]	10.76
[TMG][Succ]	11.44
[TMG][Im]	10.85
[C1C$_2$OHPyrr][Succ]	10.51
[C1C$_2$OHPyrr][Im]	11.51
[C1C$_2$OHMor][Succ]	10.33
[C1C$_2$OHMor]$_3$[PO$_4$]	10.60
[C1C$_2$OHMor][Im]	10.76

Table S5. Conversion and Yield values for the methanolysis of BPA-PC, under US irradiation (50 W; 250 kHz), at 30 °C, in the presence of **[TMG][Im]** and **[C$_1$C$_2$OHMor][Im]** (n_c/n_{RU} = 1/12; $m_{2\text{-MeTHF}}/m_{MeOH}$ = 3), at different reaction times. Conversion and yield values were reproducible within ± 3%.

	[TMG][Im]		[C$_1$C$_2$OHMor][Im]	
Reaction Time (min)	**Conversion (%)**	**Yield (%)**	**Conversion (%)**	**Yield (%)**
80			68	68
90			88	82
105	72	57	85	84
120	85	81	86	82
135	84	78		

Table S6. Conversion and Yield values for the methanolysis of BPA-PC, under US irradiation (50 W; 250 kHz), at 30 °C, in the presence of **[C$_1$C$_2$OHMor][Im]** ($m_{2\text{-MeTHF}}/m_{MeOH}$ = 3), at different n_c/n_{ru} ratios. Conversion and yield values were reproducible within ± 3%.

n_c/n_{ru}	Conversion (%)	Yield (%)
1/6	88	87
1/12	86	82
1/18	74	74

Table S7. Conversion and Yield values for the methanolysis of BPA-PC, under US irradiation (50 W; 250 kHz), at 30 °C, in the presence of **[C_1C_2OHMor][Im]** (n_c/n_{RU} = 1/12;), at different $m_{2\text{-MeTHF}}/m_{MeOH}$ ratios. Conversion and yield values were reproducible within ± 3%.

$m_{2\text{-MeTHF}}/m_{MeOH}$	Conversion (%)	Yield (%)
5/3	69	63
6/2	88	82
7/1	62	62

Table S8. Conversion and Yield values for the methanolysis of BPA-PC, under US irradiation (50 W; 250 kHz), at 30 °C, in the presence of **[C_1C_2OHMor][Im]** (n_c/n_{RU} = 1/12; $m_{2\text{-MeTHF}}/m_{MeOH}$ = 3), at different temperatures. Conversion and yield values were reproducible within ± 3%.

T (°C)	Conversion (%)	Yield (%)
20	78	78
30	88	82
40	78	72

Table S9. Conversion and Yield values for the methanolysis of BPA-PC, under US irradiation (50 W; 250 kHz), at 30 °C, in the presence of different catalysts (n_c/n_{RU} = 1/12; $m_{2\text{-MeTHF}}/m_{MeOH}$ = 3). Conversion and yield values were reproducible within ± 3%.

Catalyst	Conversion (%)	Yield (%)
[C_1C_2OHIm]Cl	63	63
[C_1C_2Im]Cl	0	0
[C_1C_2OHMor][Im]	88	82
[C_1C_2Mor][Im]	83	77
[C_1C_2OHPip][Im]	82	66

Table S10. Chemical shift values of imidazolate anion in **[C_1C_2OHPip][Im]** and **[C_1C_2OHMor][Im]** and **corresponding** mixture in the presence of MeOH (n_{MeOH}/n_c = 4.2).

	[C_1C_2OHPip][Im]	**[C_1C_2OHPip][Im]+ MeOH**	**MeOH**
δ (ppm) Imidazolate anion	7.24 6.76	7.46 6.89	
δ (ppm) MeOH		4.14	4.01
	[C_1C_2OHMor][Im]	**[C_1C_2OHMor][Im]+ MeOH**	**MeOH**
δ (ppm) Imidazolate anion	7.31 6.80	7.41 6.86	
δ (ppm) MeOH		4.10	4.01

Table S11. Conversion and Yield values for the methanolysis of BPA-PC, under US irradiation (50 W; 250 kHz), at 30 °C, in the presence of different nucleophiles (n_c/n_{RU} = 1/12; $m_{2\text{-MeTHF}}/m_{MeOH}$ = 3). Conversion and yield values were reproducible within ± 3%.

Nucleophile	**Conversion (%)**	**Yield (%)**
MeOH	88	82
EtOH	52	52
PrOH	75	73
i-PrOH	48	38
BuOH	43	43
EG	42	33

Table S12. Evaluation of methanolysis of BPA-PC, according to the holistic approach to Green Chemistry, performed using different catalysts, under under US irradiation (50 W; 250 kHz), at 30 °C, (n_c/n_{RU} = 1/12; $m_{2\text{-MeTHF}}/m_{MeOH}$ = 3). Colors account for: red:< 70%; yellow: 70-89%; green: > 89%.

Catalyst	Conversion (%)	Yield (%)	Selectivity (%)
[TMG][Im]			
[TMG][Succ]			
[C_1C_2OHPyrr][Im]			
[C_1C_2OHPyrr][Succ]			
[C_1C_2OHPip][Im]			
[(C_2OH)$_2$DABCO][Im]$_2$			
[$C_{222}C_2$OHN][Im]			
[C_1C_2OHMor][Im]			
[C_1C_2OHMor][Succ]			
[C_1C_2OHMor]$_3$[PO_4]			

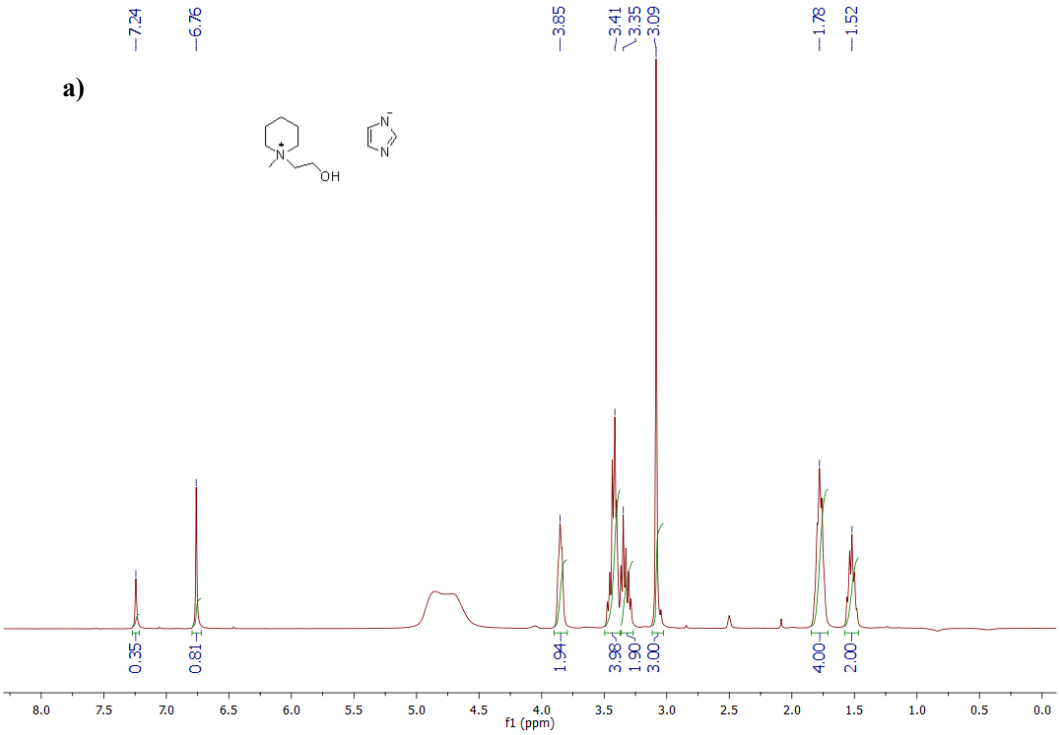
Table S13. IC_{50} values obtained after 48h of treatment with **[TMG][Im]**, **[C_1C_2OHMor][Im]** and **[$C_{222}C_2$OH][Im]** in HB2 and hTERT RPE-1epithelial normal cell lines.

Catalyst	HB2 (mM)	hTERT-RPE-1 (mM)
[TMG][Im]	2.83 ± 0.19	2.52 ± 0.27
[C_1C_2OHMor][Im]	0.97 ± 0.14	0.84 ± 0.04
[C222C_2OHN][Im]	1.15 ± 0.07	0.90 ± 0.03

Table S14. Conversion and yield values for the methanolysis of BPA-PC, under US irradiation (50 W; 250 kHz), at 30 °C, in the presence of **[C_1C_2OHMor][Im]** (n_c/n_{RU} = 1/12; $m_{2\text{-MeTHF}}/m_{MeOH}$ = 3), as a function of sample nature. Conversion and yield values were reproducible within ± 3%.

Sample	Conversion (%)	Yield (%)
Digital CD	90	70
BPA-PC sheet	94	83
BPA-PC grains	86	82

a)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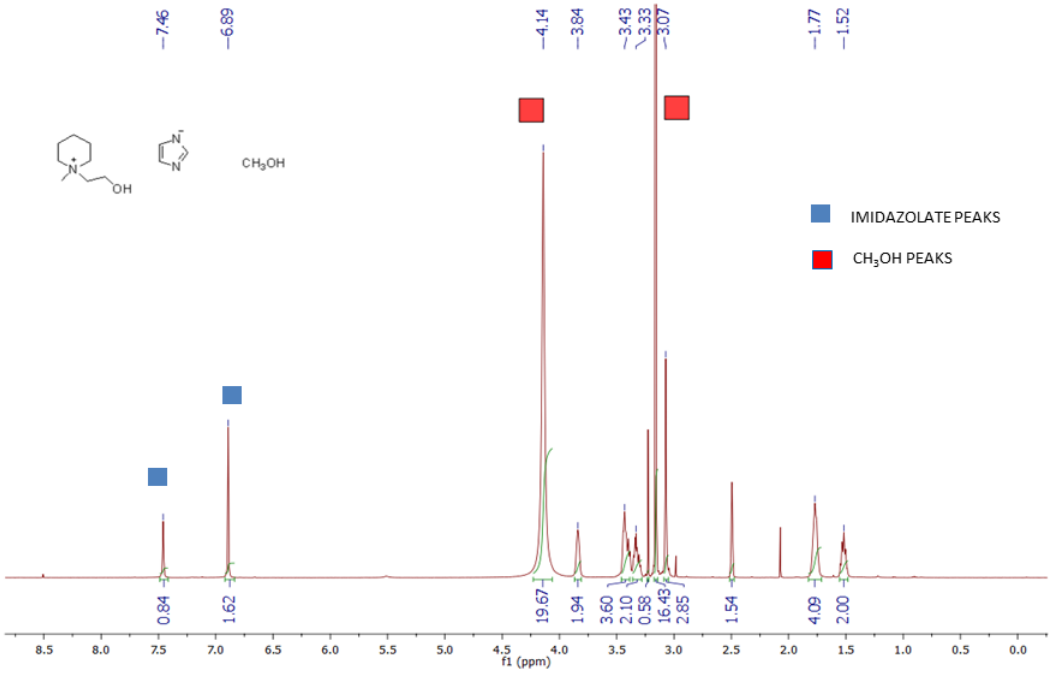
4.00
2.00
f1 (ppm)

b)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CH3OH PEAKS
0.84
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4.09
2.00
f1 (ppm)

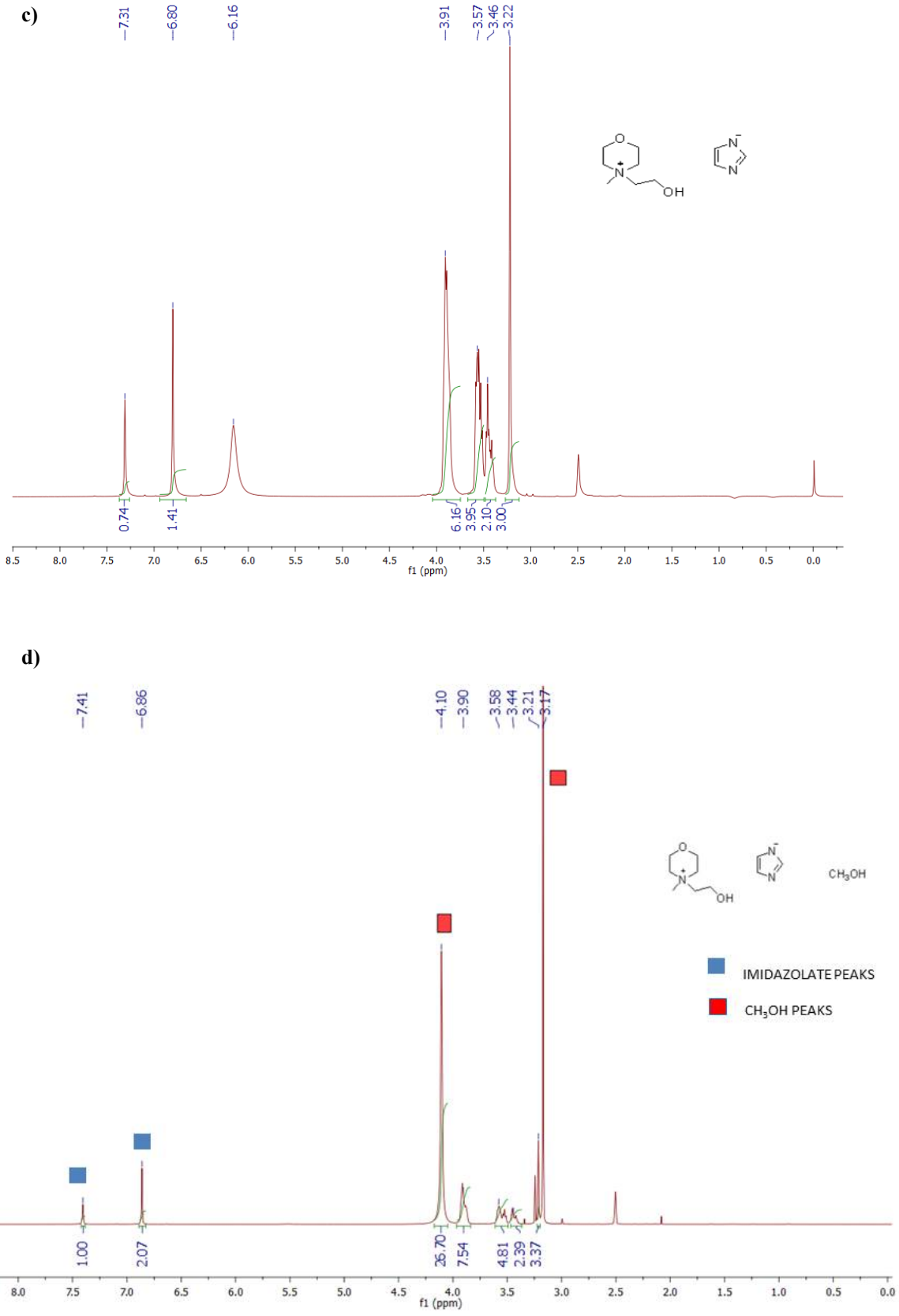
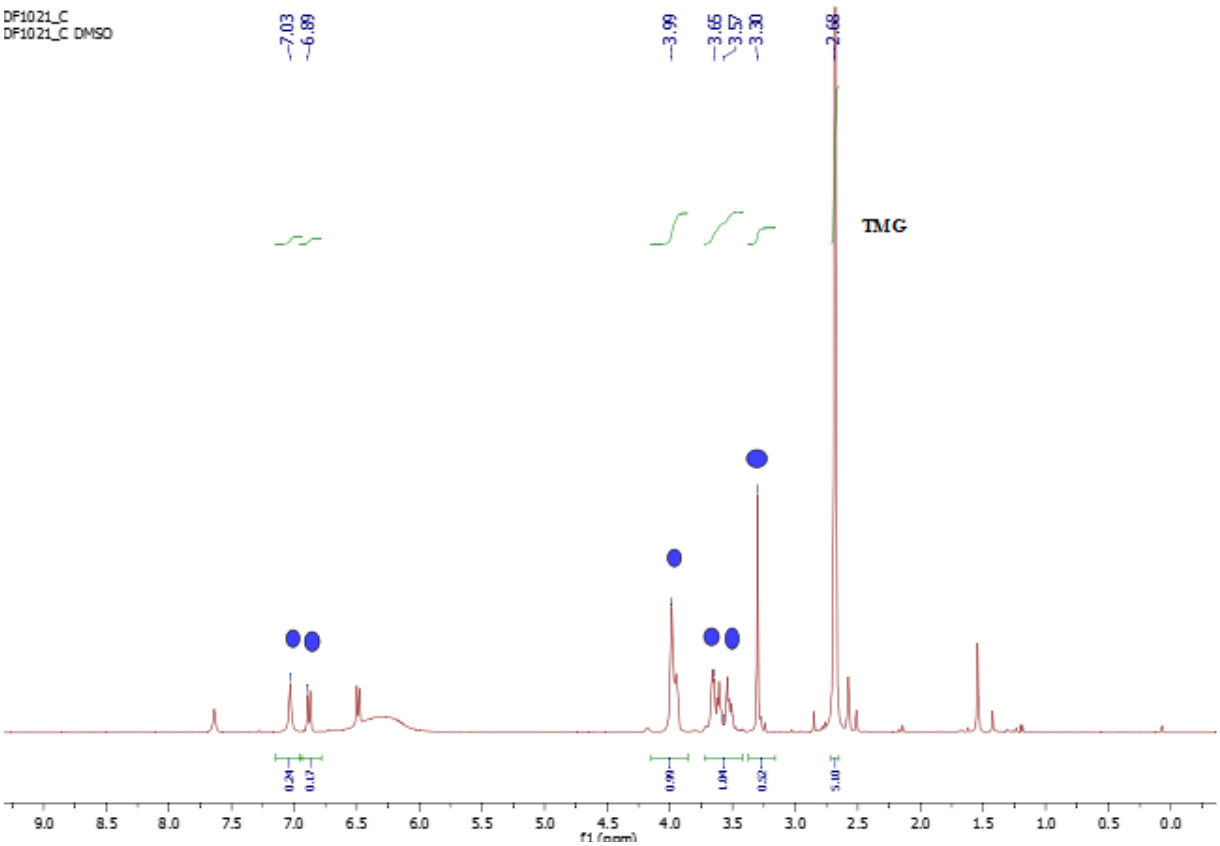


Figure S1. [1]HNMR spectra of: a) **[C$_1$C$_2$OHPip][Im]**; b) **[C$_1$C$_2$OHPip][Im]** in the presence of methanol (n_{MeOH}/n_C = 4.2); c) **[C$_1$C$_2$OHMor][Im]**; d) **[C$_1$C$_2$OHPip][Im]** in the presence of methanol (n_{MeOH}/nc = 4.2).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0.99
1.04
0.92
5.00
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
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1.5
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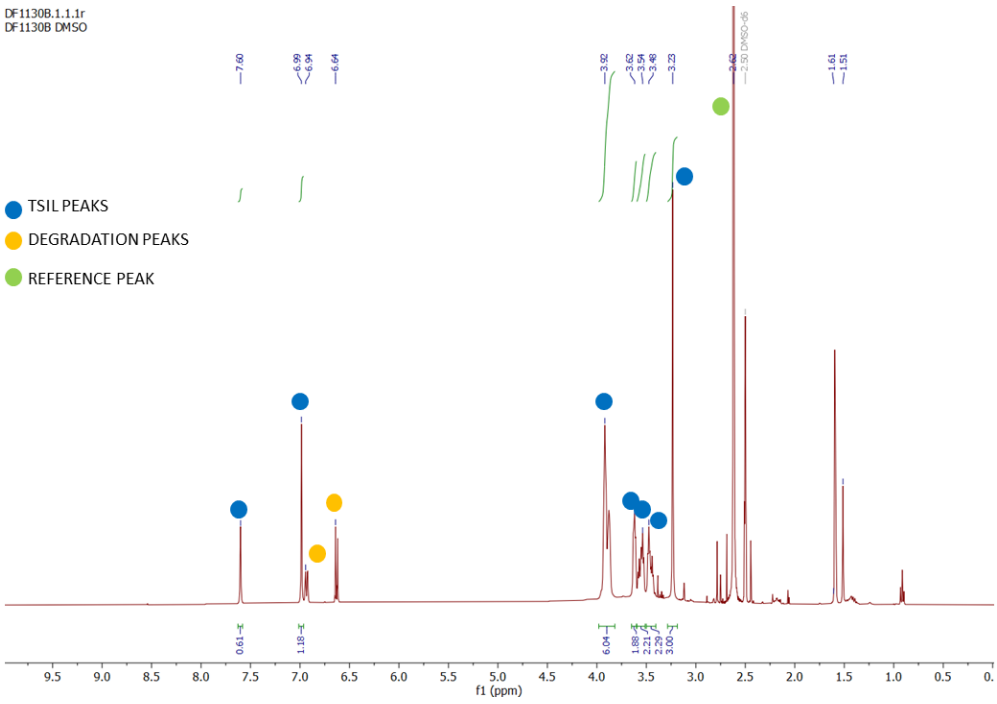
0.5
0.0
f1 (ppm)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DF1130B DMSO
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2.62
2.50 DMSO-d6
1.61
1.51
TSIL PEAKS
DEGRADATION PEAKS
REFERENCE PEAK
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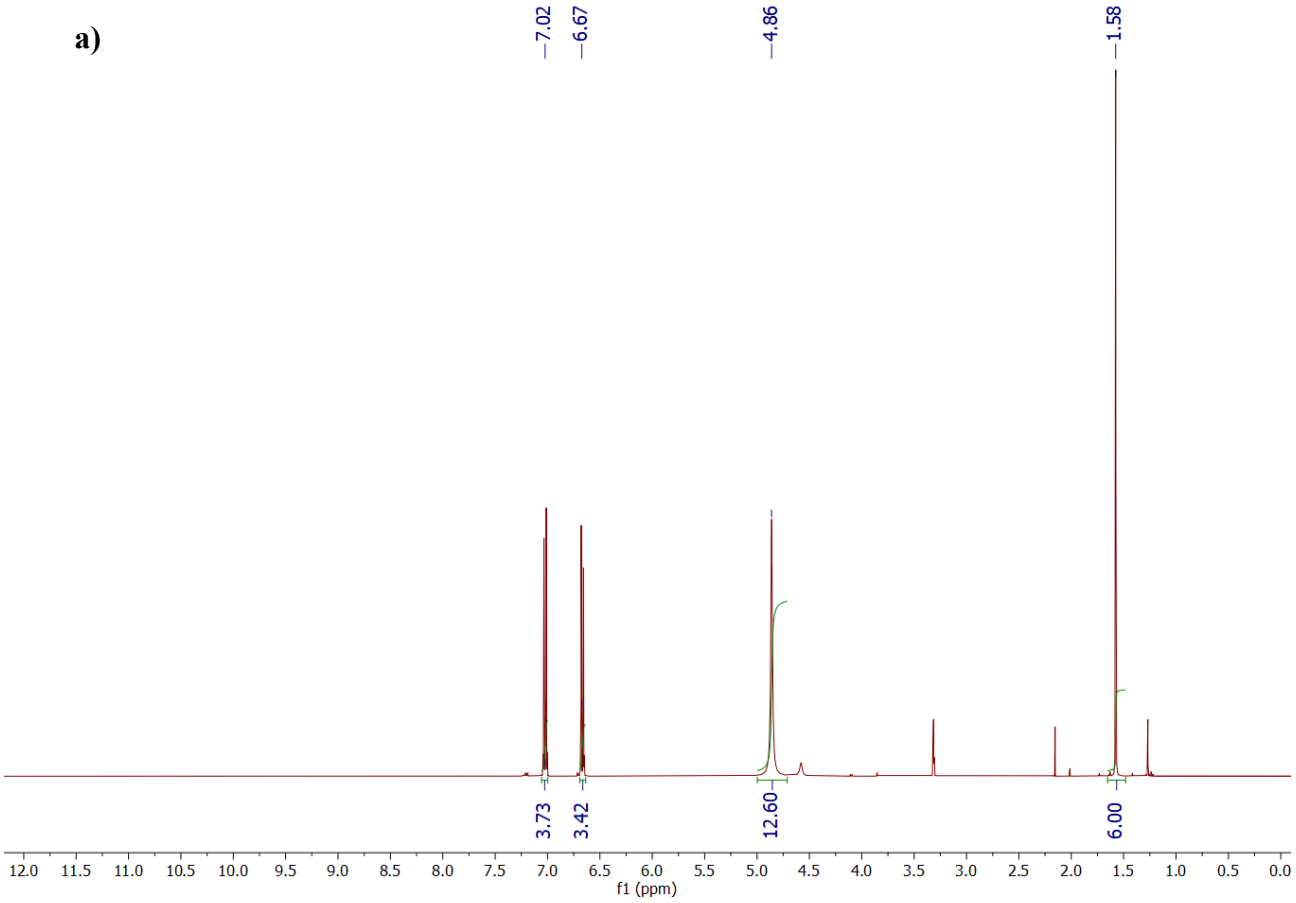
1.18
6.04
1.88
2.21
2.26
3.00
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)

Figure S2. ^{1}H NMR spectra of [C_1C_2OHMor][Im] after sonication (top) and after reaction (bottom).



c)

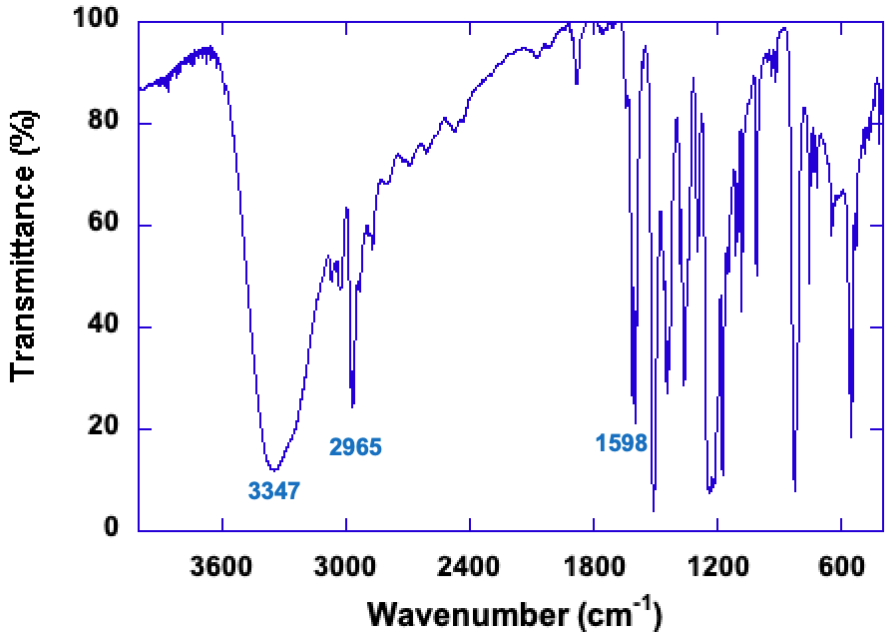
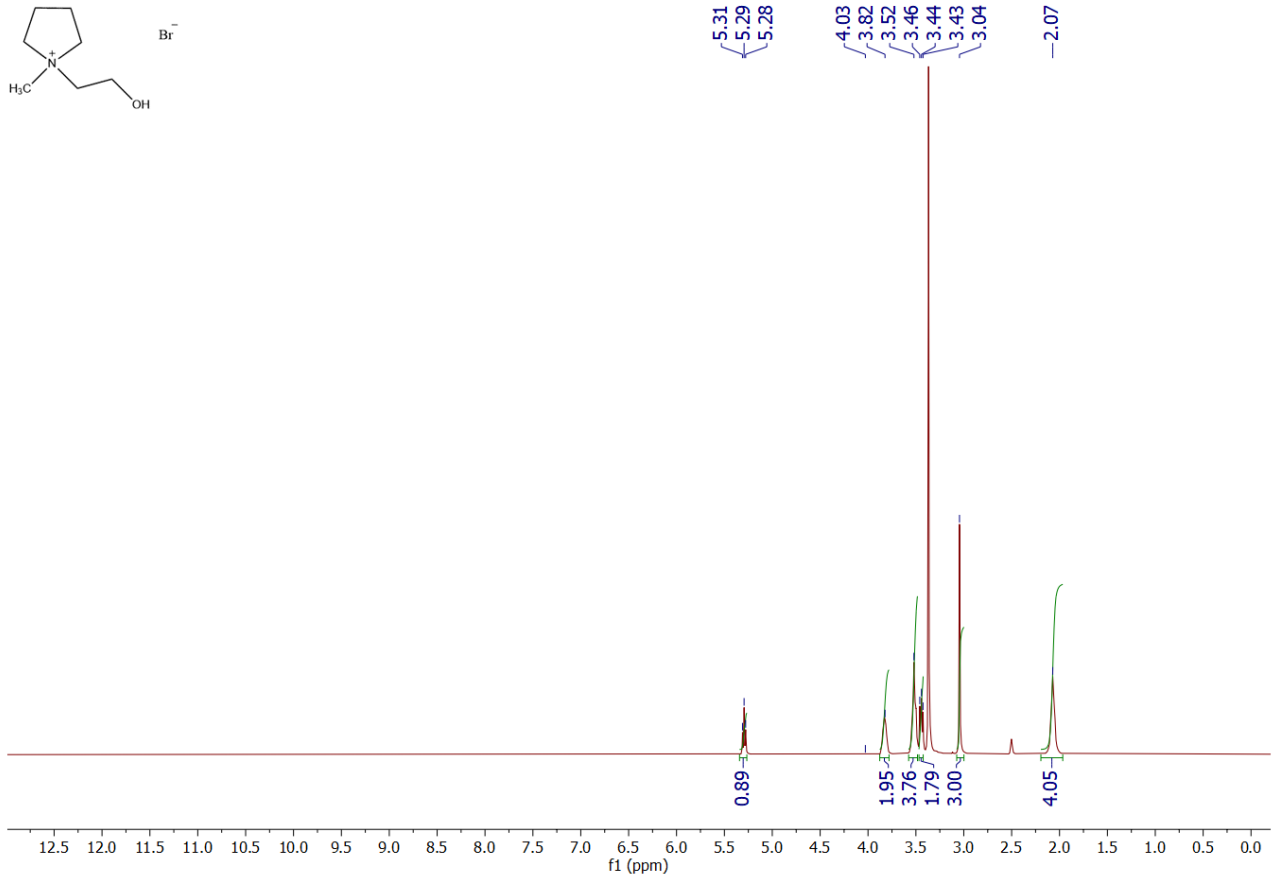
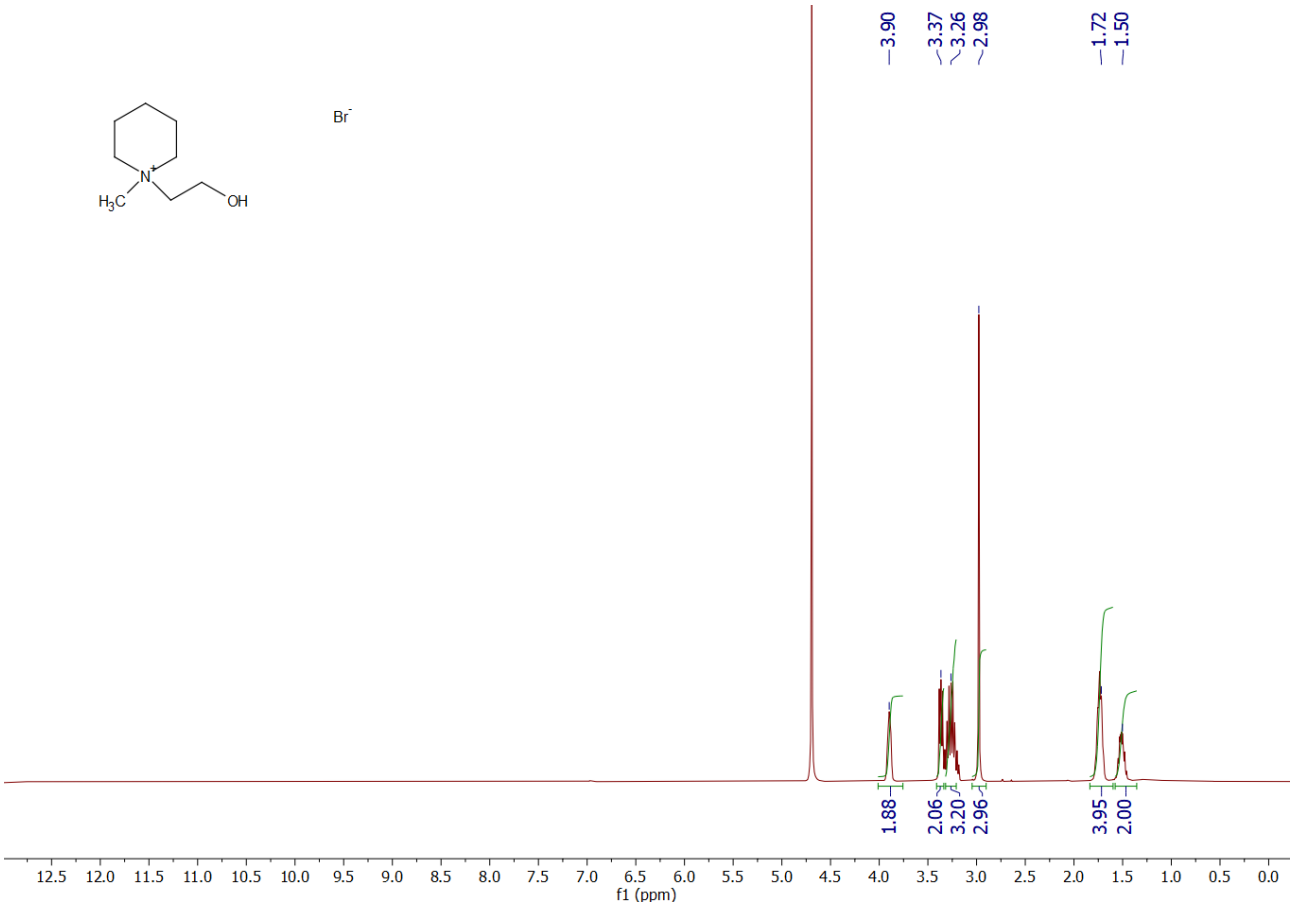


Figure S3. ^{1}H NMR (a), ^{13}C NMR (b) and IR (c) spectra of BPA obtained from methanolysis of PC from CD.

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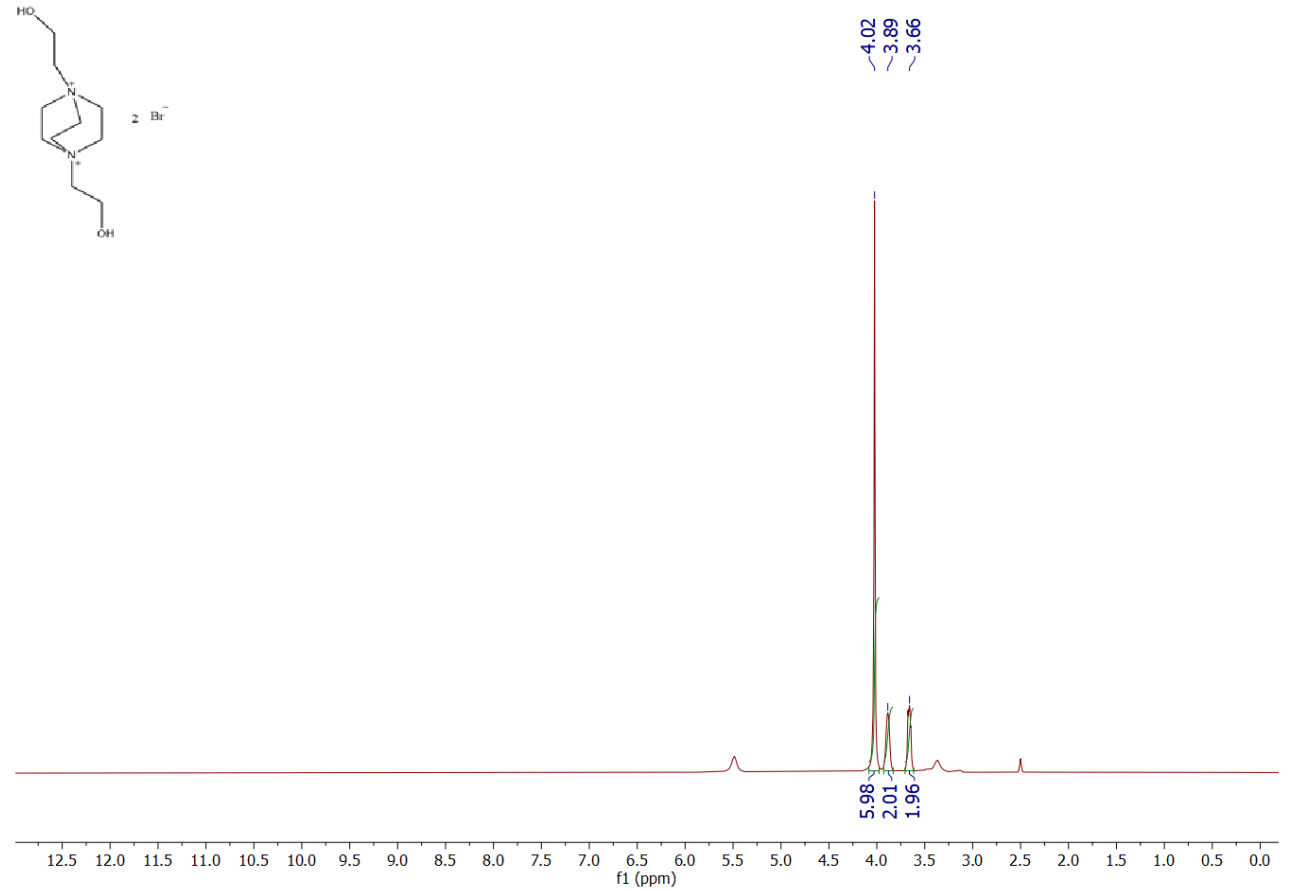
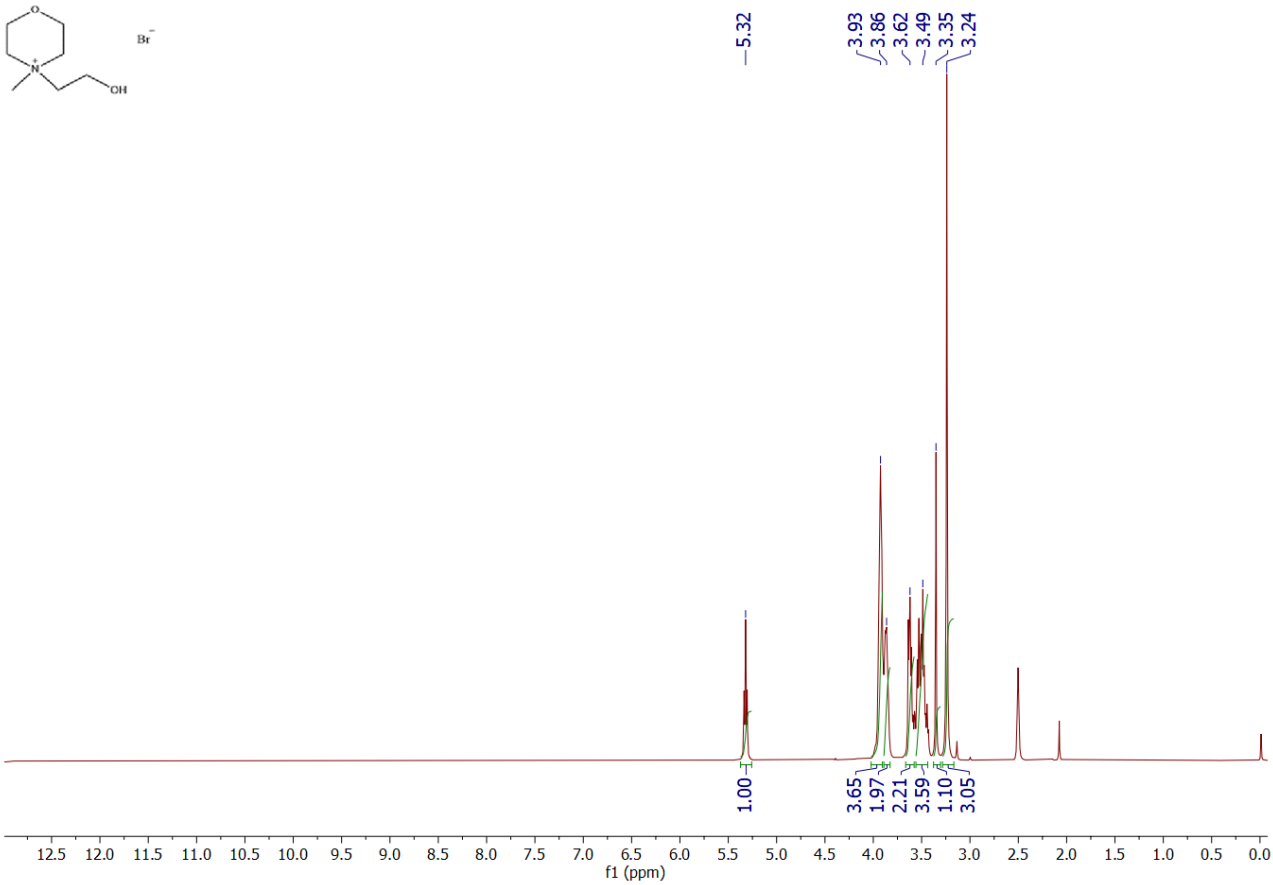
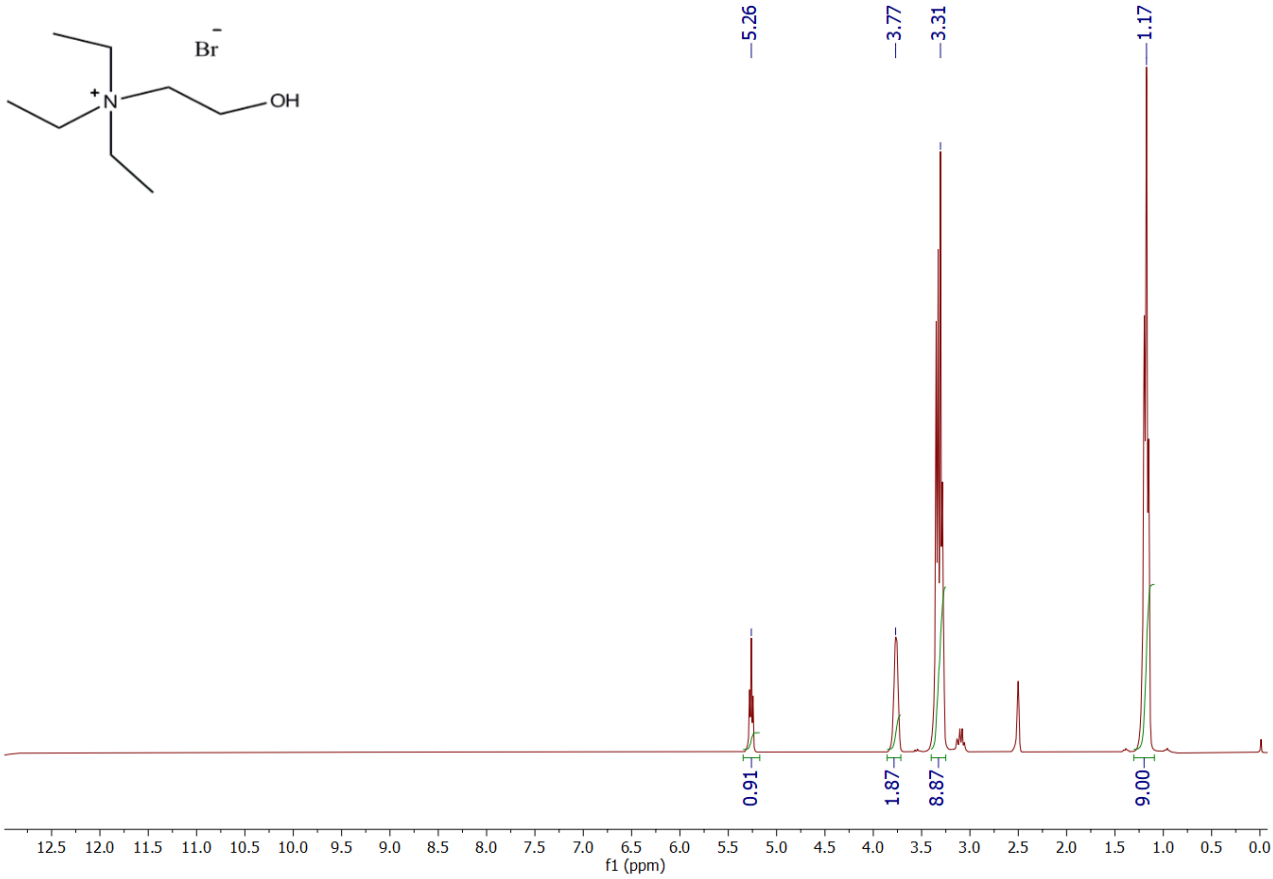
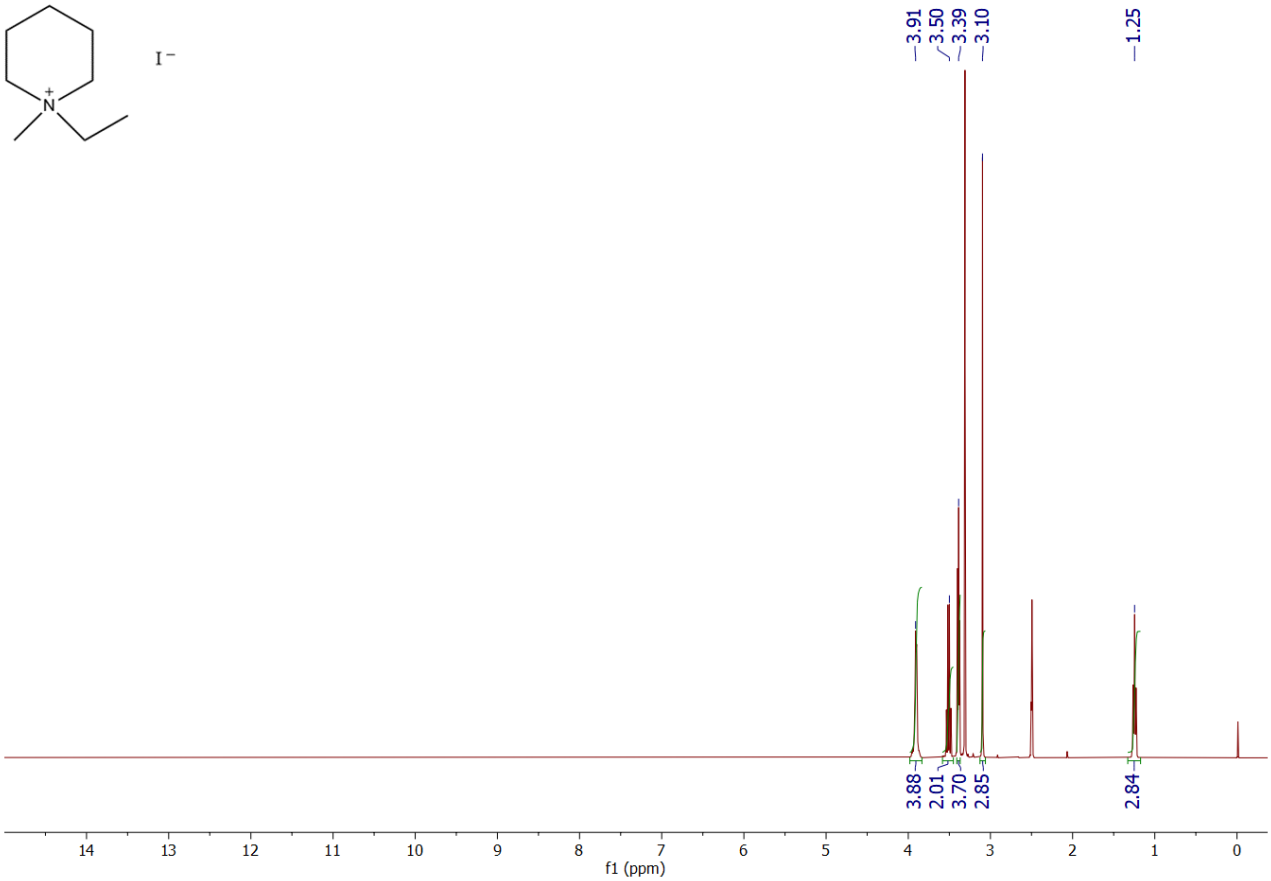
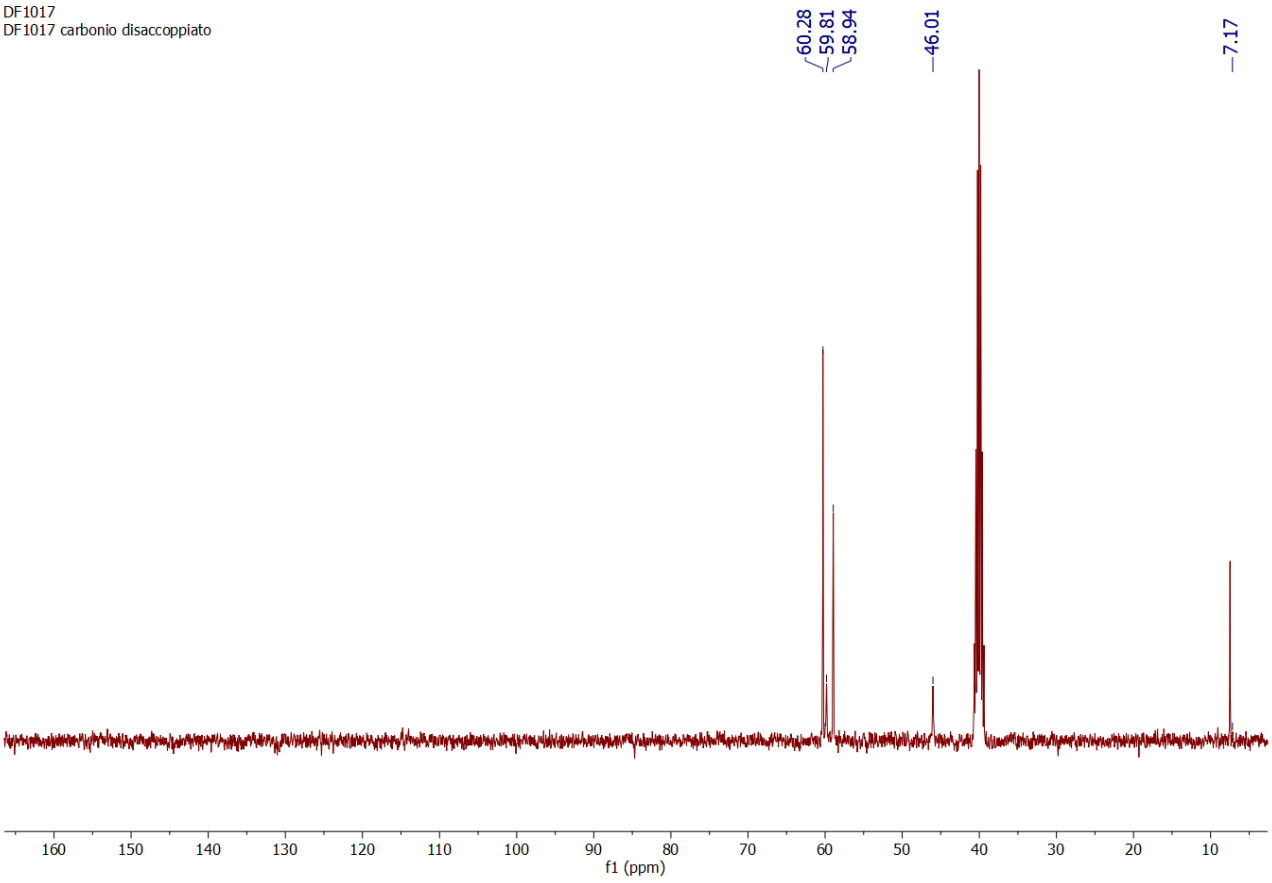
2.98
1.72
1.50
Br⁻
H3C
OH
1.88
2.06
3.20
2.96
3.95
2.00
12.5 12.0 11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

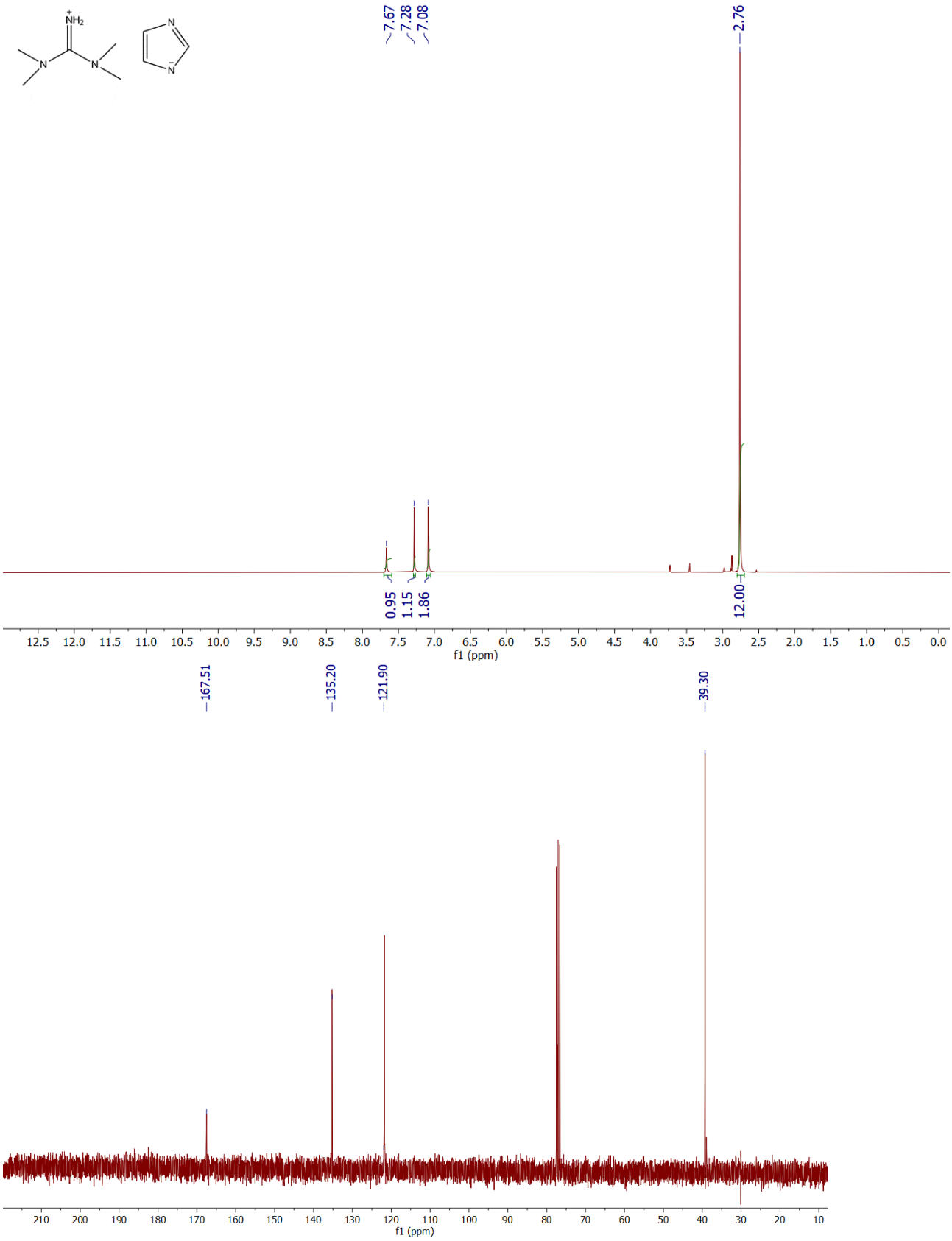

HO
2 Br⁻
OH
4.02
3.89
3.66
5.98
2.01
1.96
12.5 12.0 11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

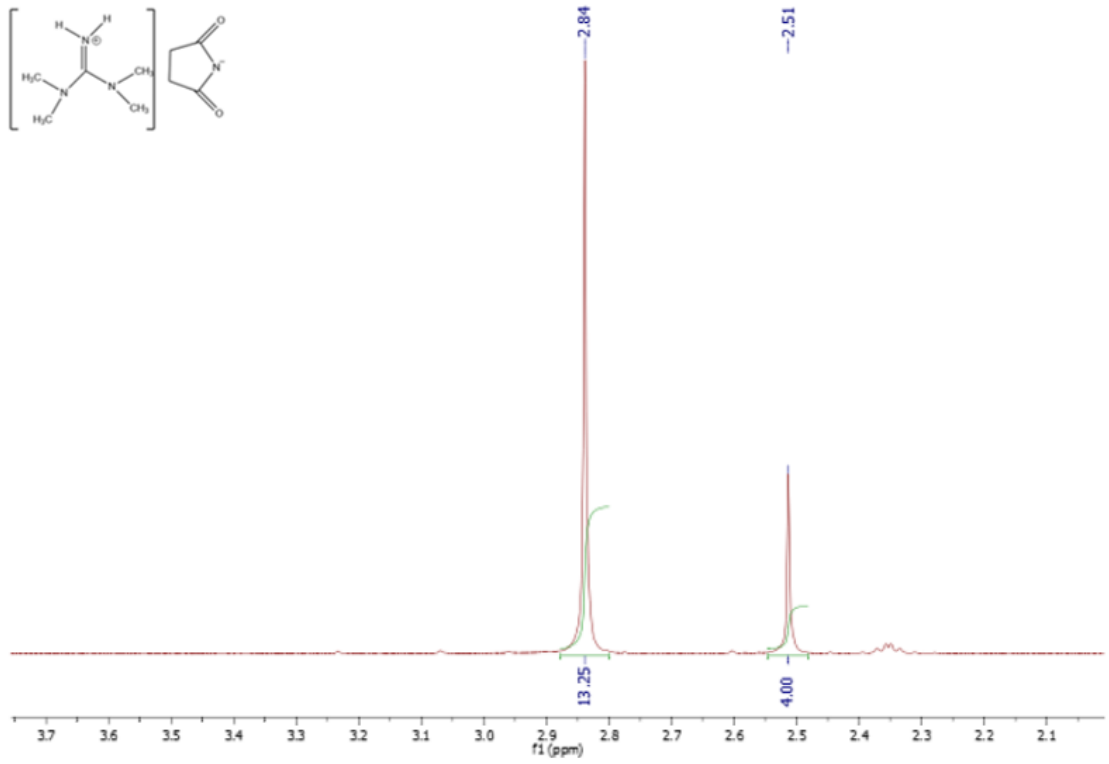

Br⁻
OH
5.32
3.93
3.86
3.62
3.49
3.35
3.24
1.00
3.65
1.97
2.21
3.59
1.10
3.05
12.5 12.0 11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

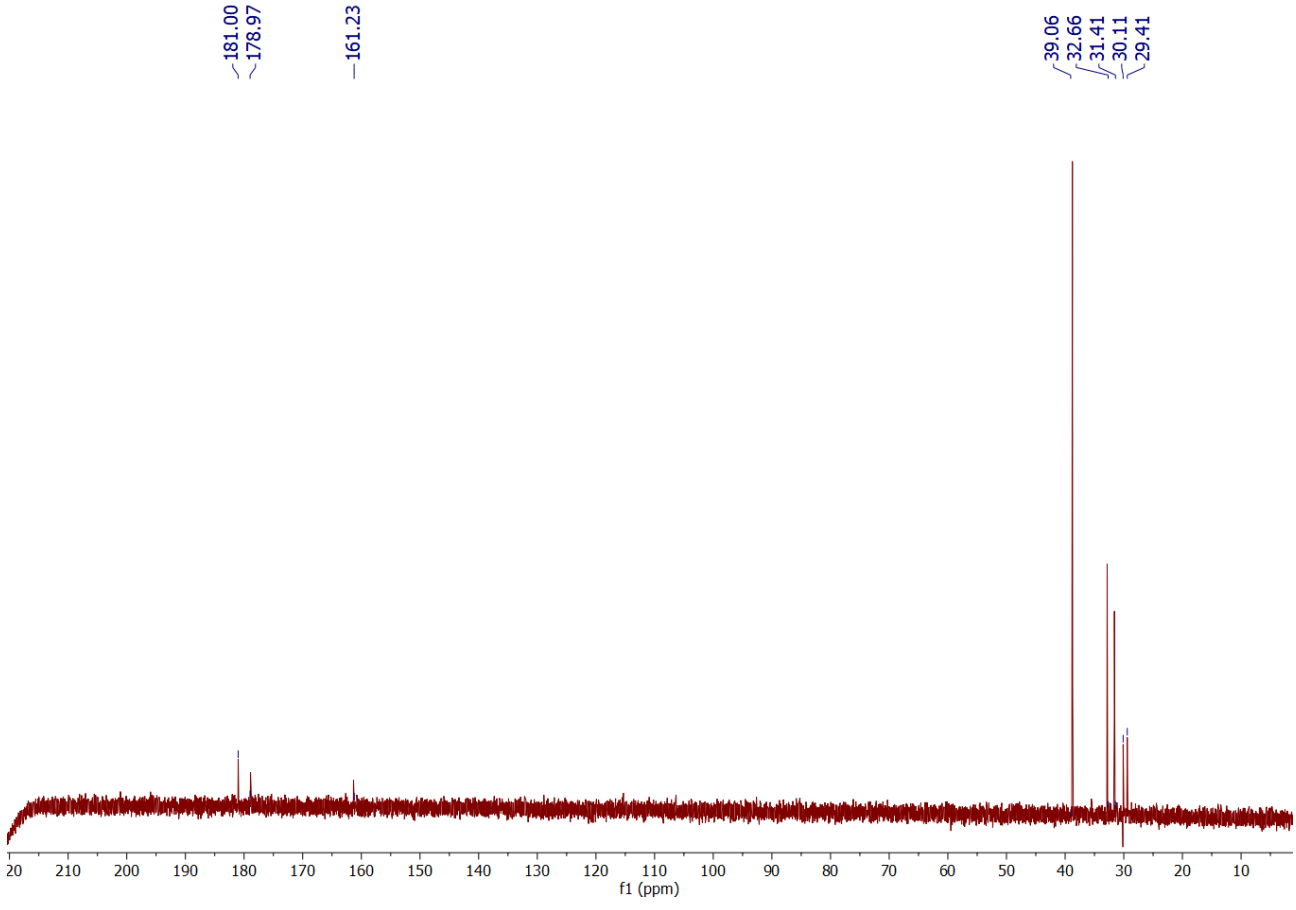

Br⁻
N⁺
OH
5.26
3.77
3.31
1.17
0.91
1.87
8.87
9.00
12.5 12.0 11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

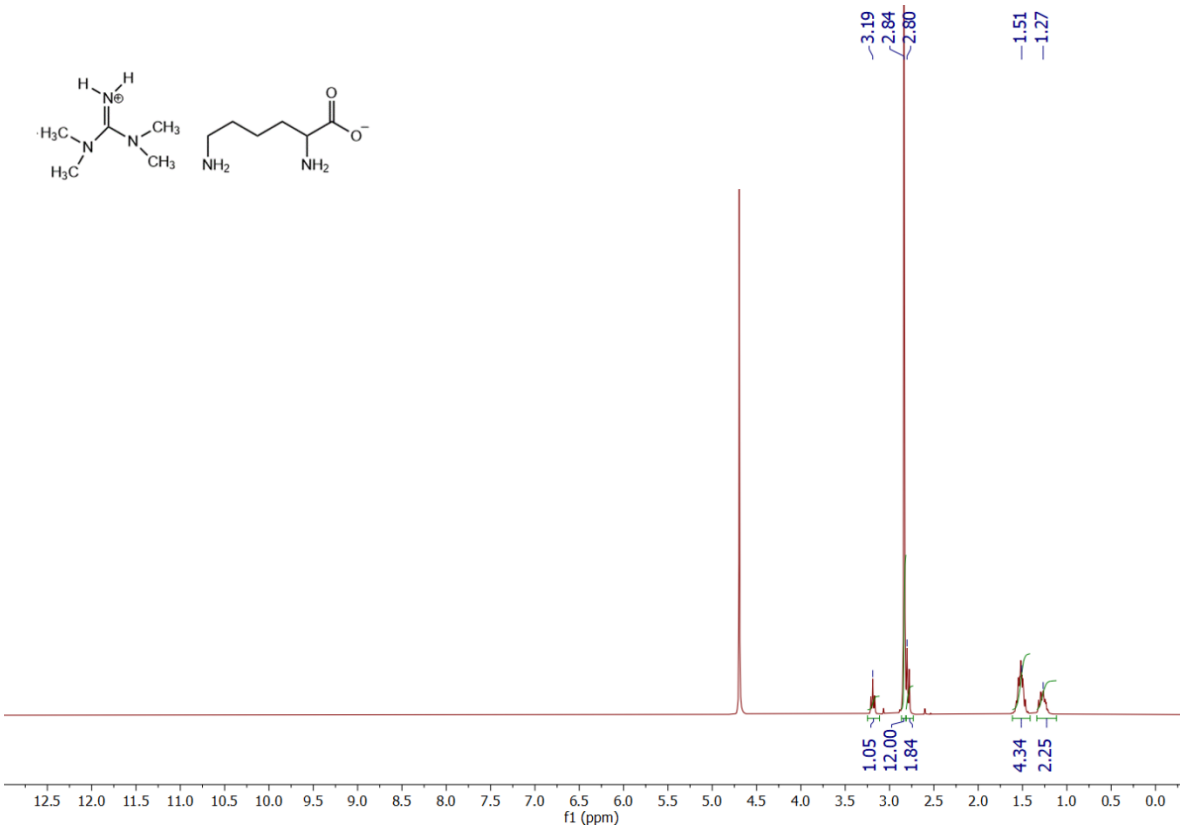

I⁻
3.91
3.50
3.39
3.10
1.25
3.88
2.01
3.70
2.85
2.84
f1 (ppm)

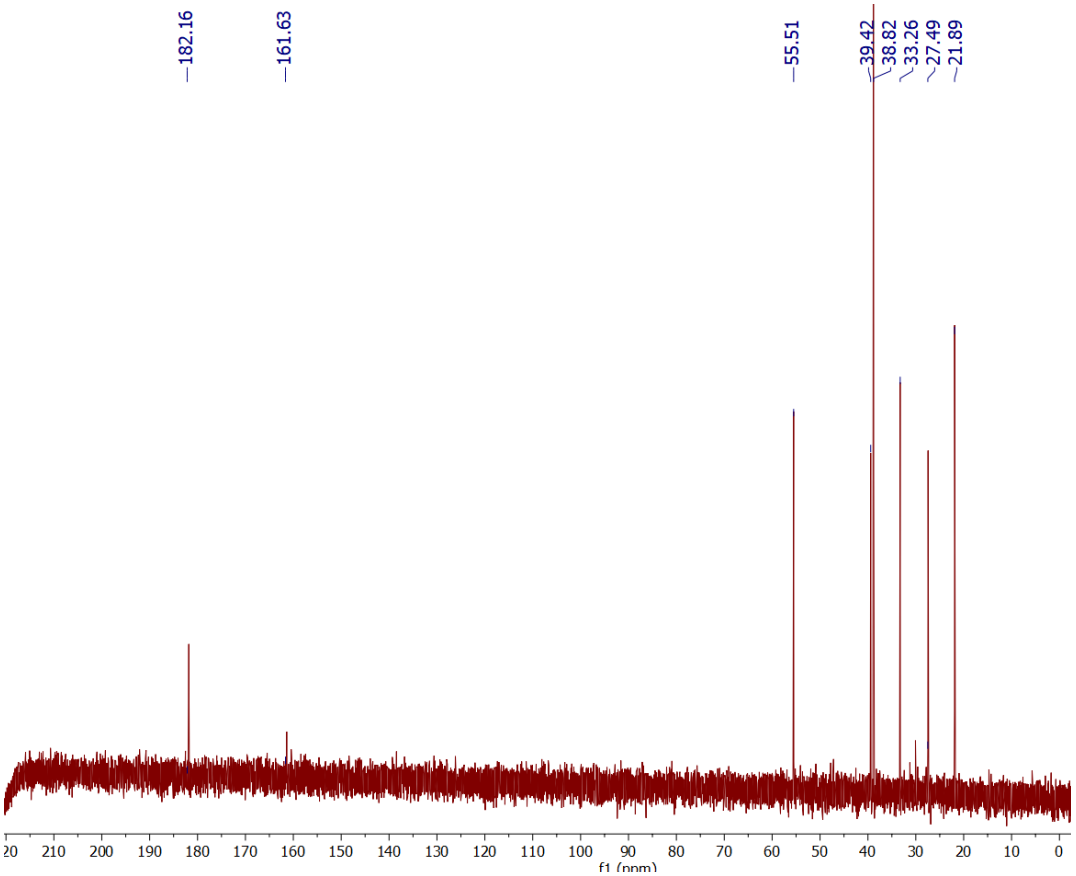

DF1017
DF1017 carbonio disaccoppiato
60.28
59.81
58.94
46.01
7.17
f1 (ppm)

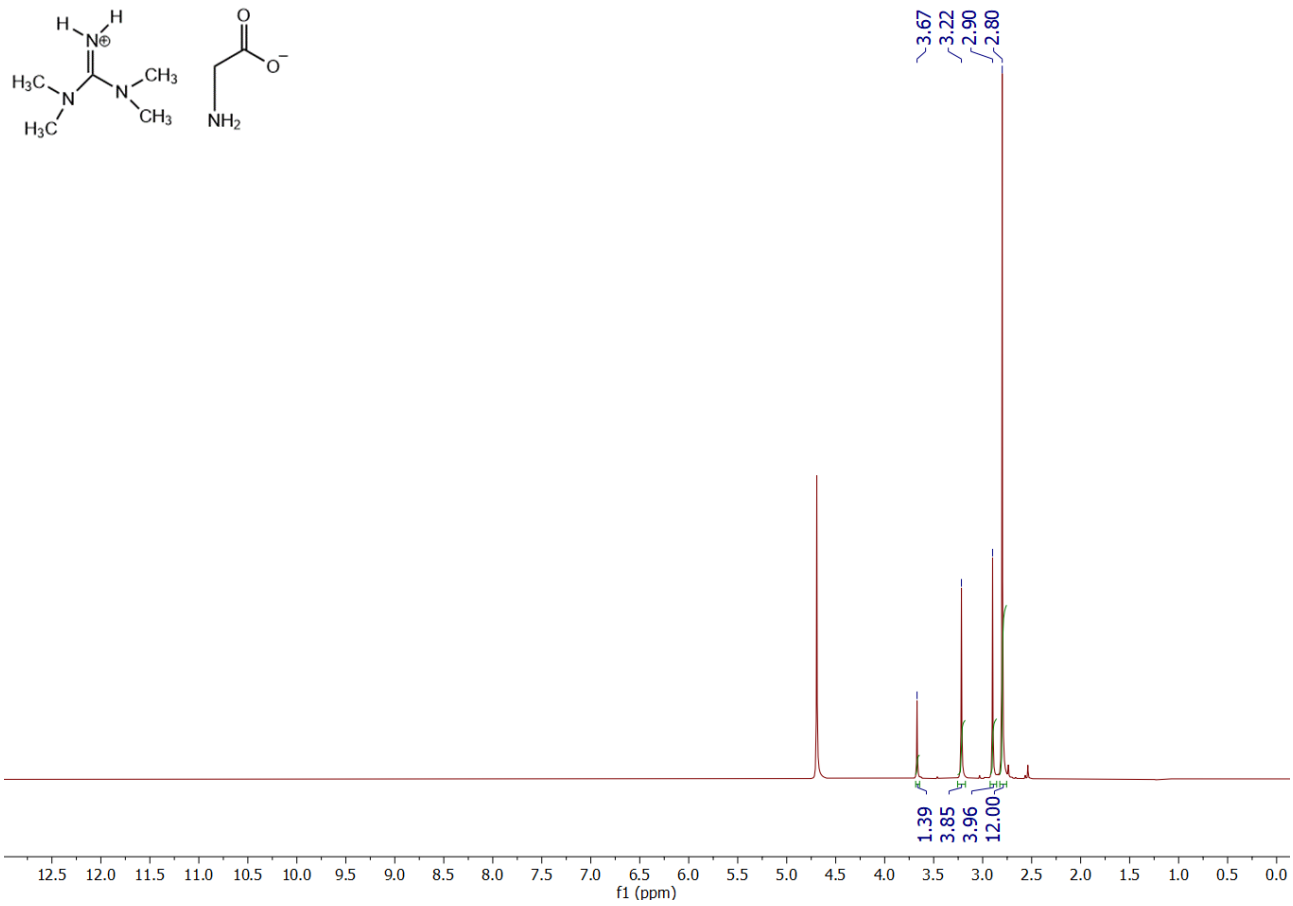

7.67
7.28
7.08
2.76
0.95
1.15
1.86
12.00
f1 (ppm)
167.51
135.20
121.90
39.30
f1 (ppm)

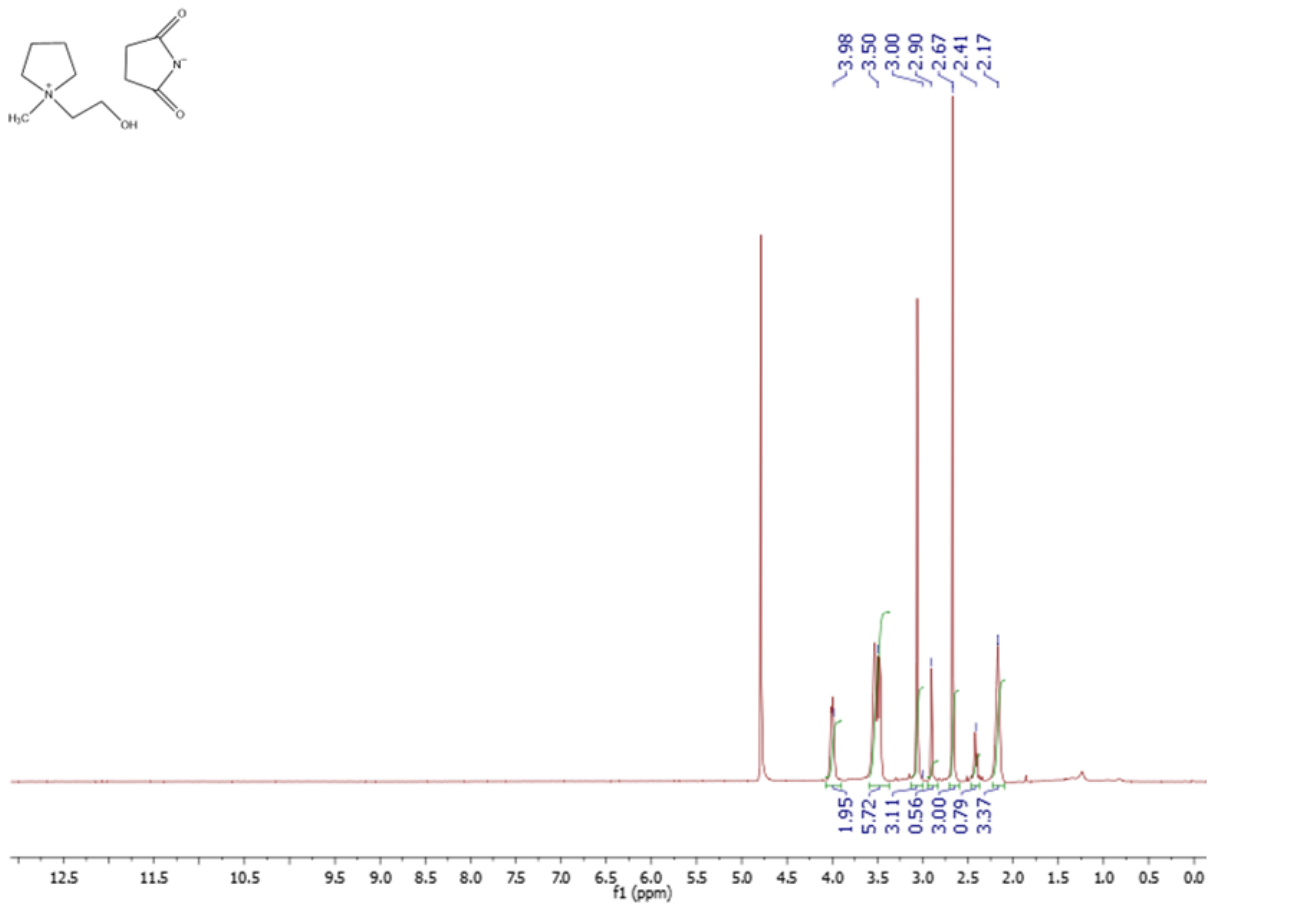

2.84
2.51
13.25
4.00
f1 (ppm)

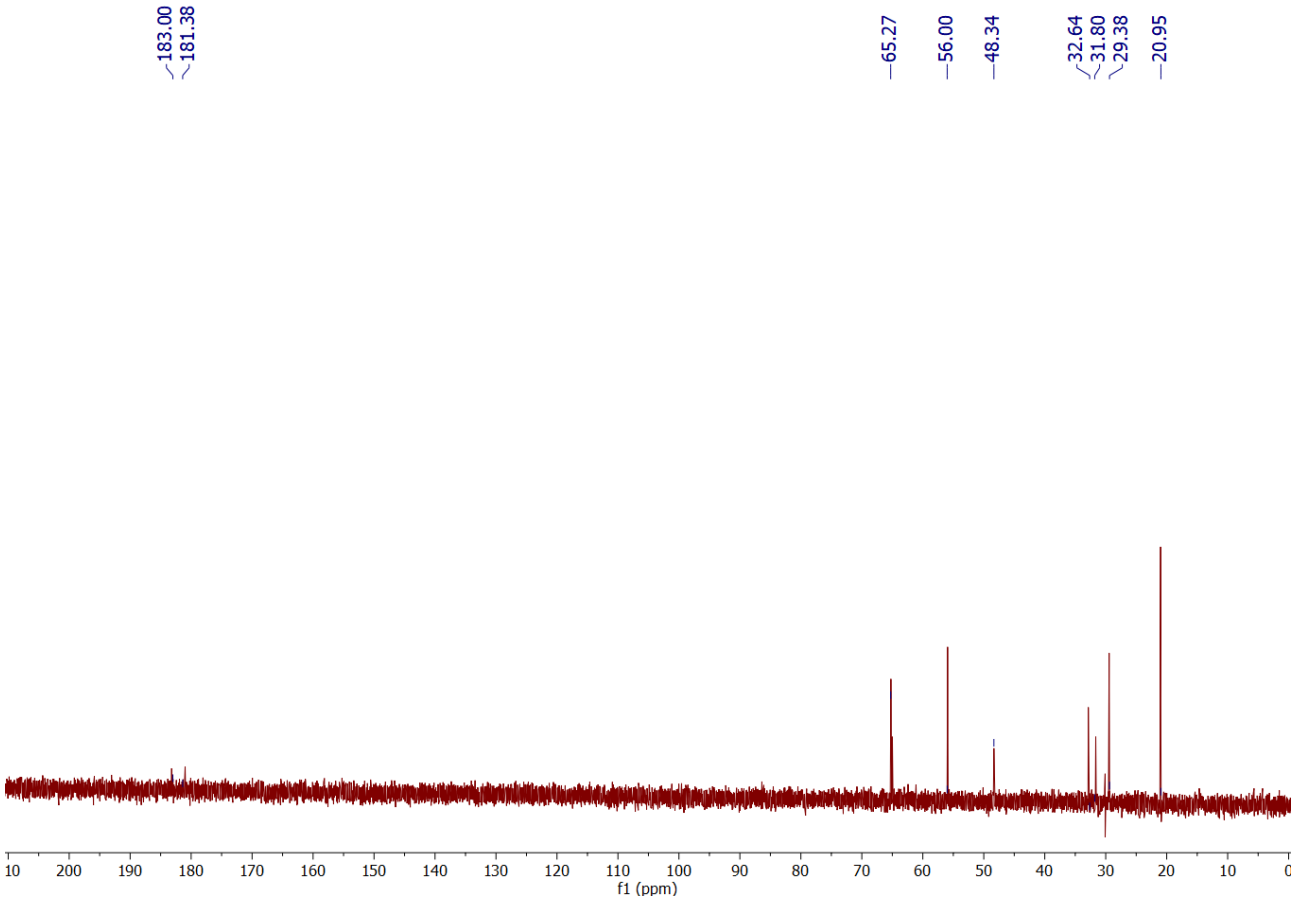

181.00
178.97
161.23
39.06
32.66
31.41
30.11
29.41
f1 (ppm)

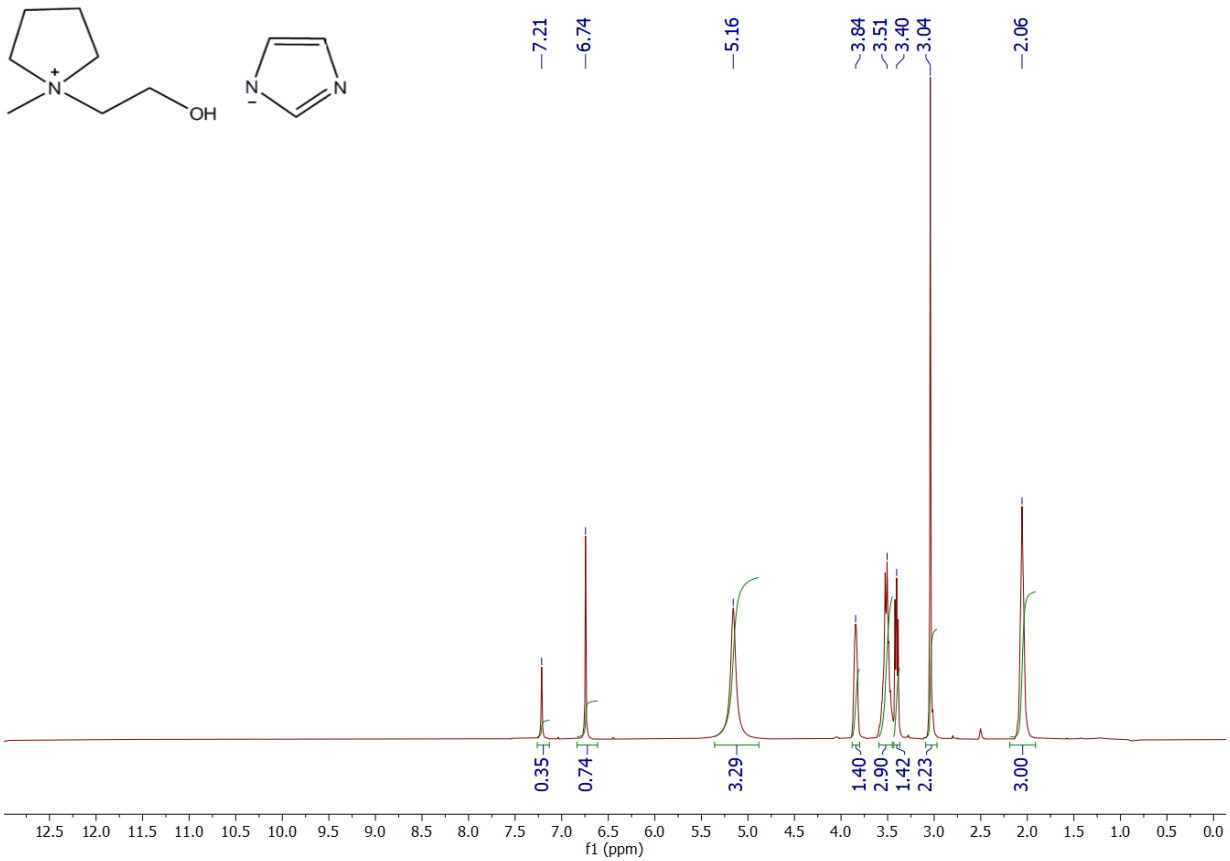

3.19
2.84
2.80
1.51
1.27
1.05
12.00
1.84
4.34
2.25
f1 (ppm)

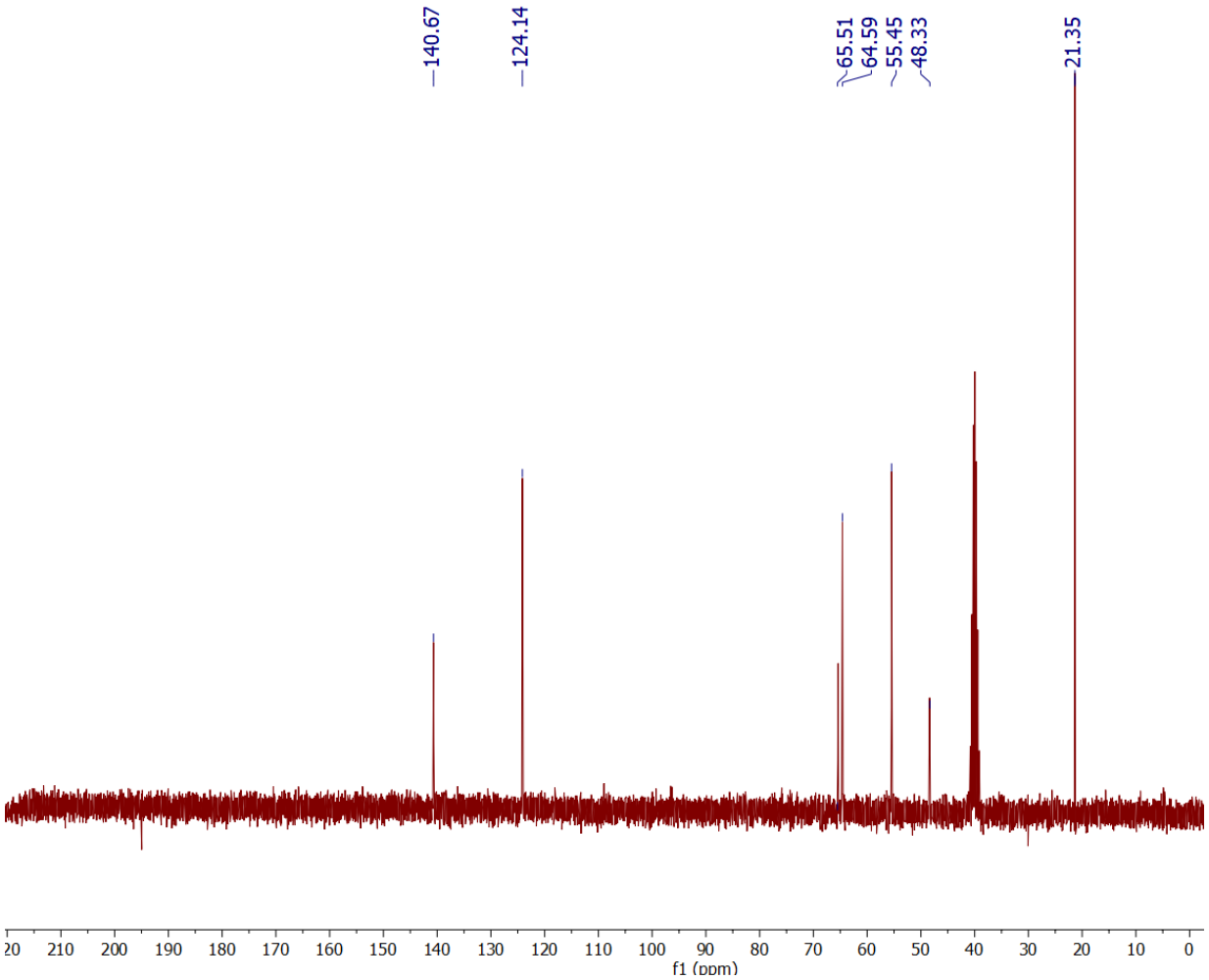

182.16
161.63
55.51
39.42
38.82
33.26
27.49
21.89
f1 (ppm)

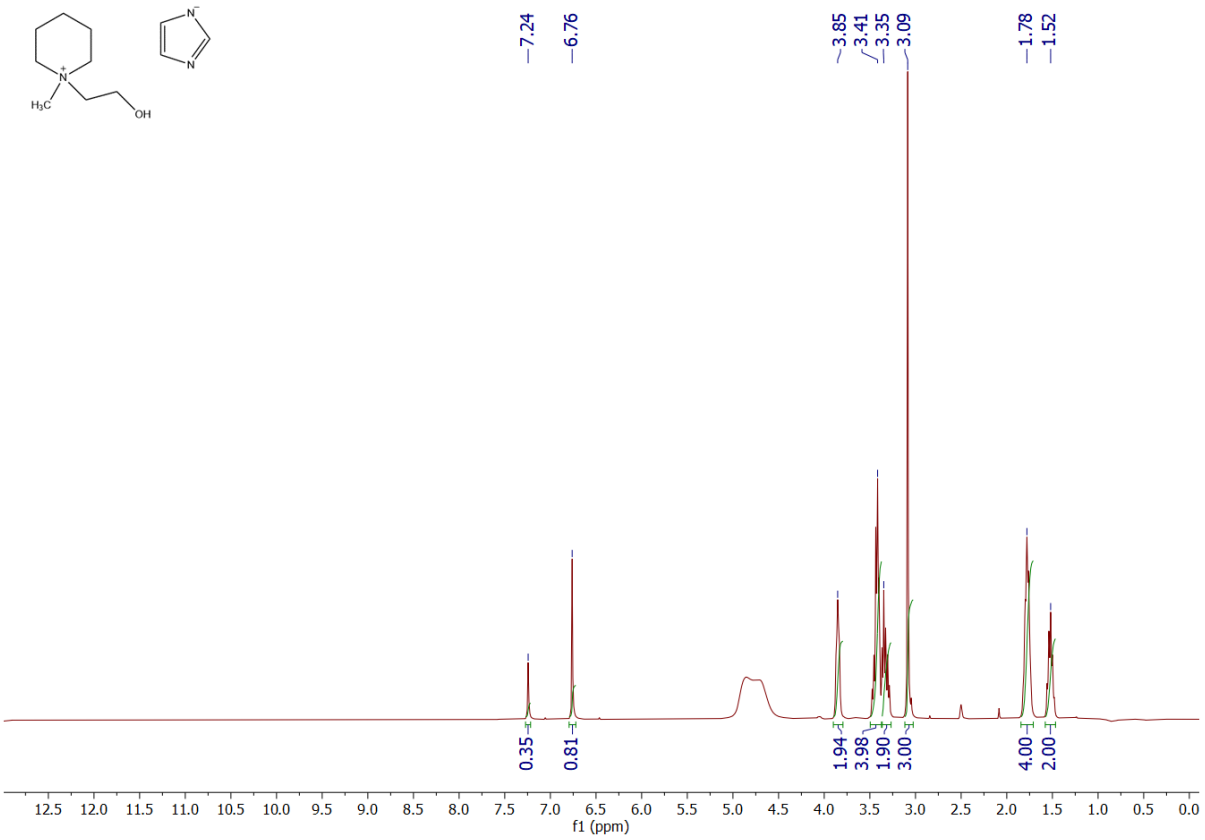

3.67
3.22
2.90
2.80
1.39
3.85
3.96
12.00
12.5 12.0 11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

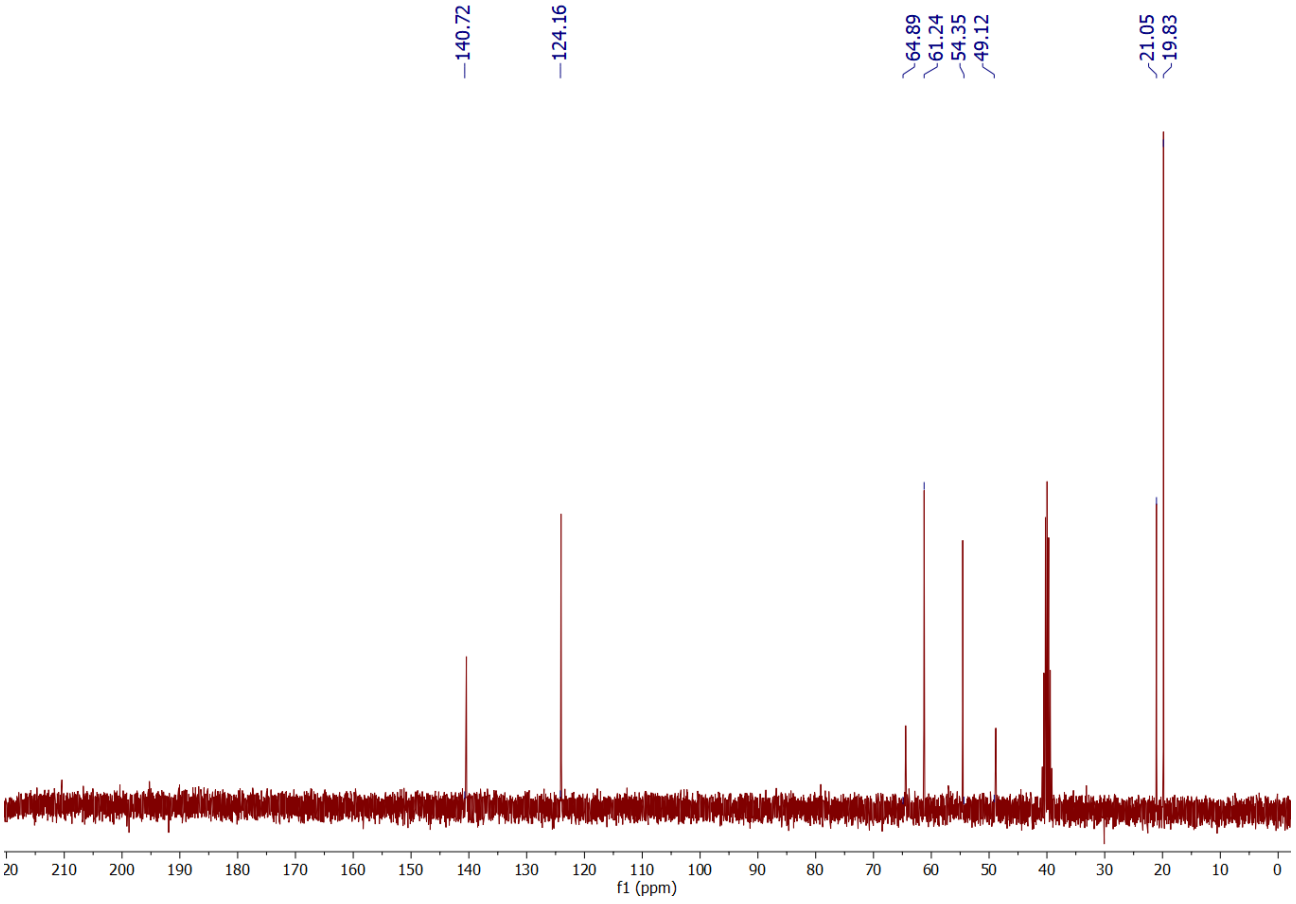

3.98
3.50
3.00
2.90
2.67
2.41
2.17
1.95
5.72
3.11
0.56
3.00
0.79
3.37
f1 (ppm)

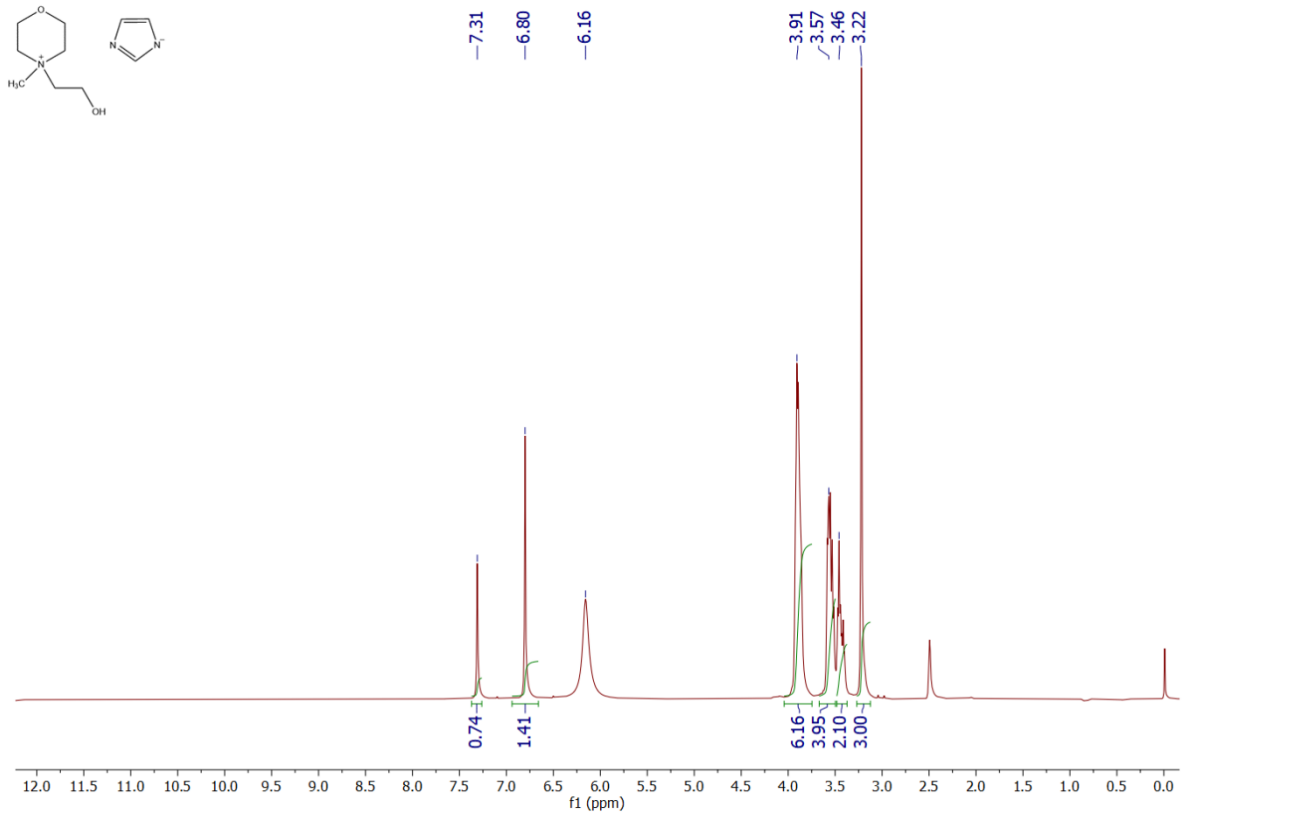

183.00
181.38
65.27
56.00
48.34
32.64
31.80
29.38
20.95
f1 (ppm)

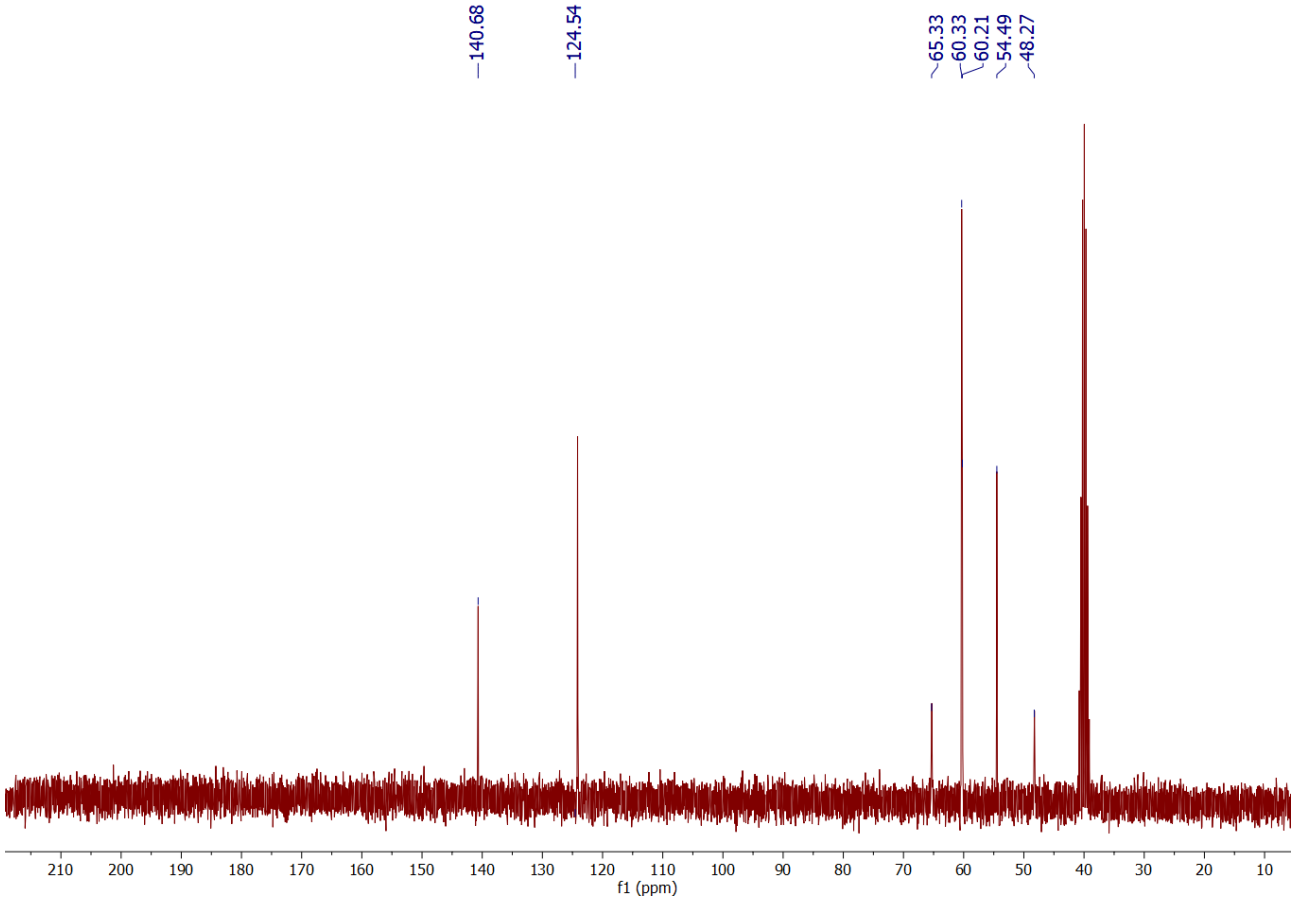

OH
N
N
7.21
6.74
5.16
3.84
3.51
3.40
3.04
2.06
0.35
0.74
3.29
1.40
2.90
1.42
2.23
3.00
12.5 12.0 11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

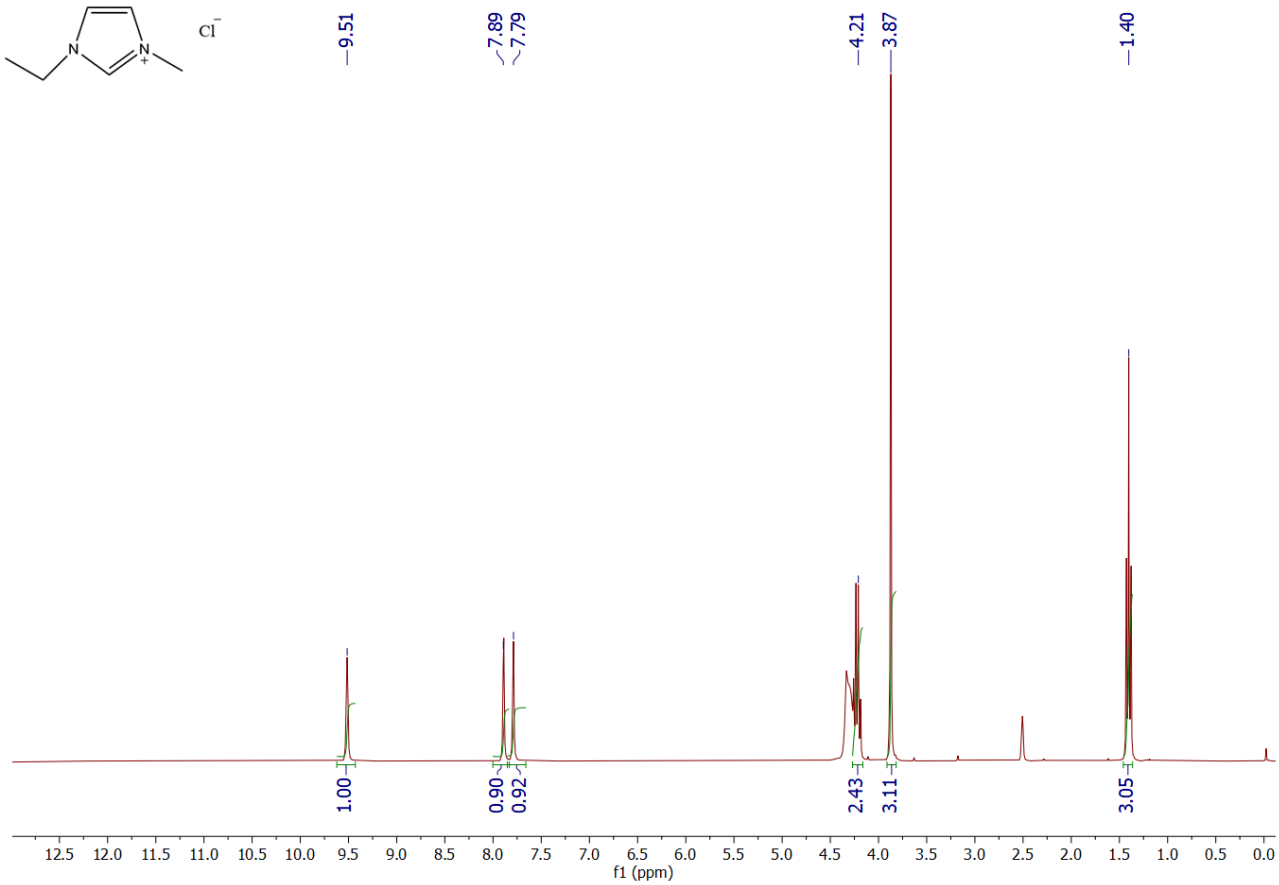

140.67
124.14
65.51
64.59
55.45
48.33
21.35
f1 (ppm)

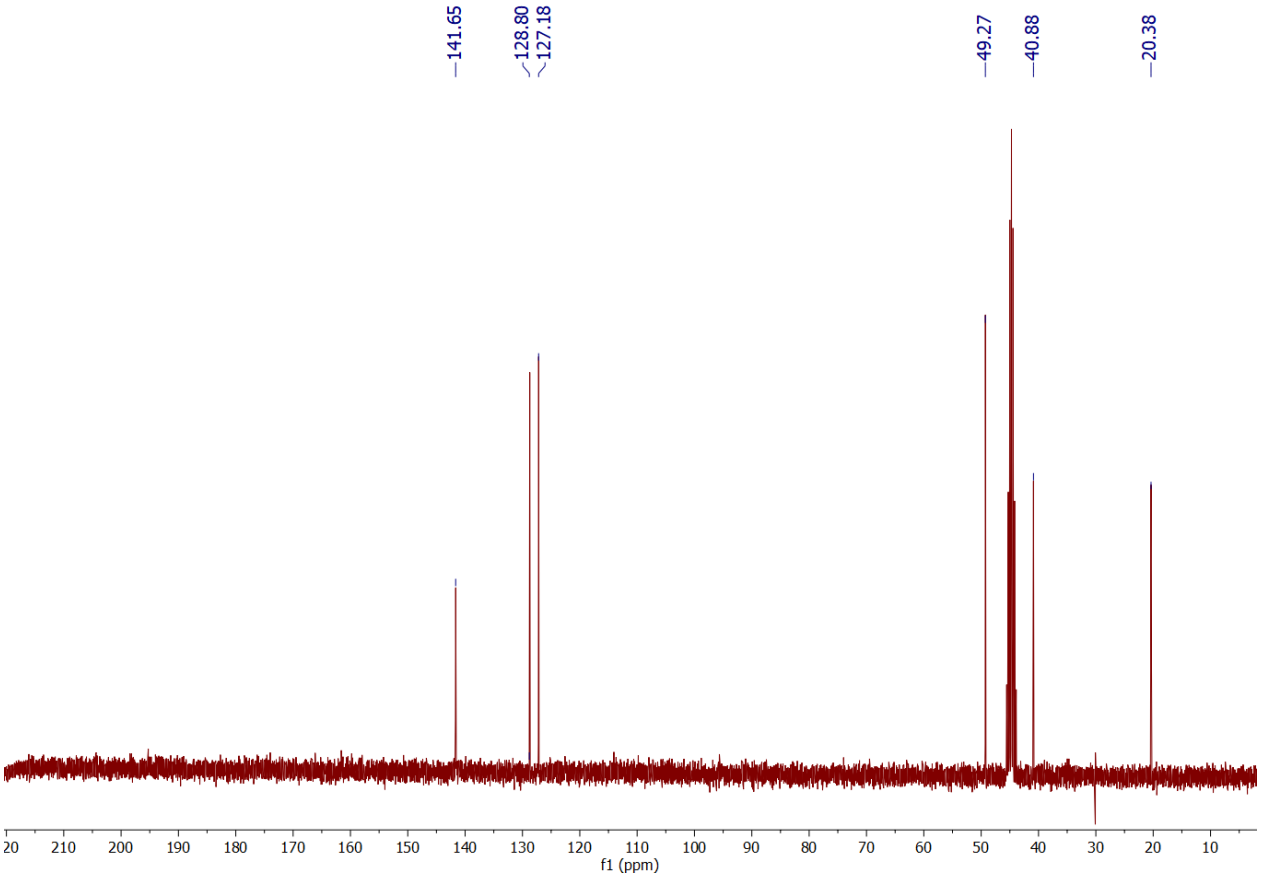

7.24
6.76
3.85
3.41
3.35
3.09
1.78
1.52
0.35
0.81
1.94
3.98
1.90
3.00
4.00
2.00
f1 (ppm)

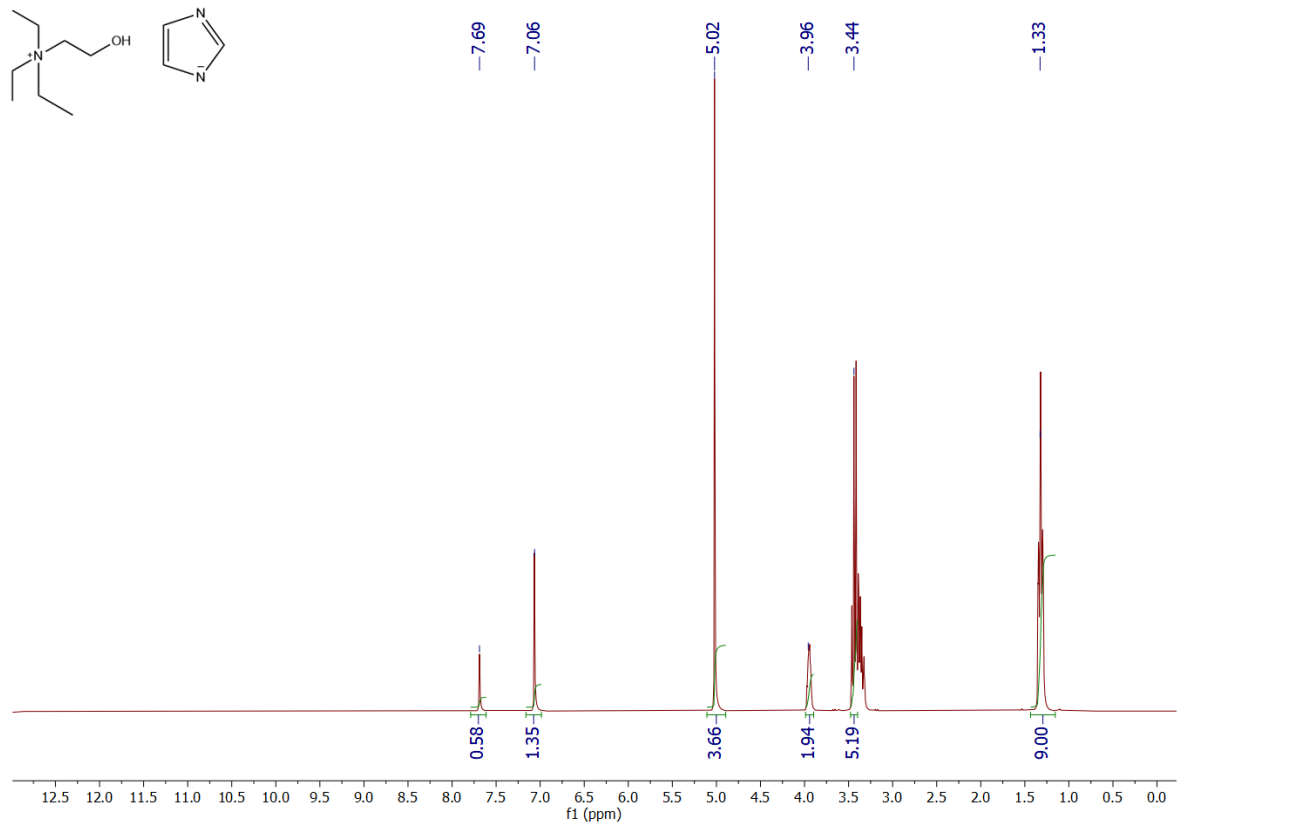

140.72
124.16
64.89
61.24
54.35
49.12
21.05
19.83
f1 (ppm)

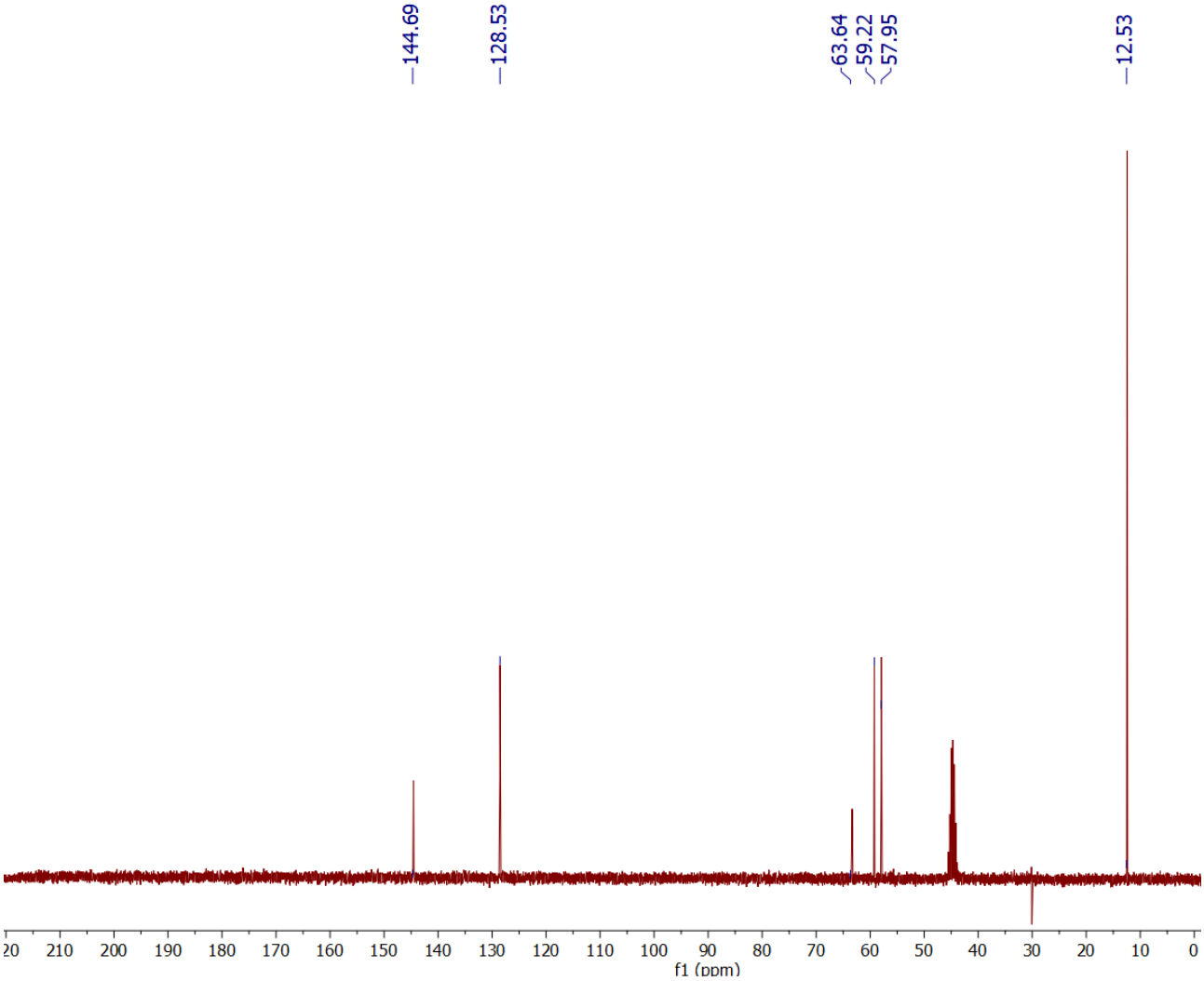

7.31
6.80
6.16
3.91
3.57
3.46
3.22
0.74
1.41
6.16
3.95
2.10
3.00
f1 (ppm)

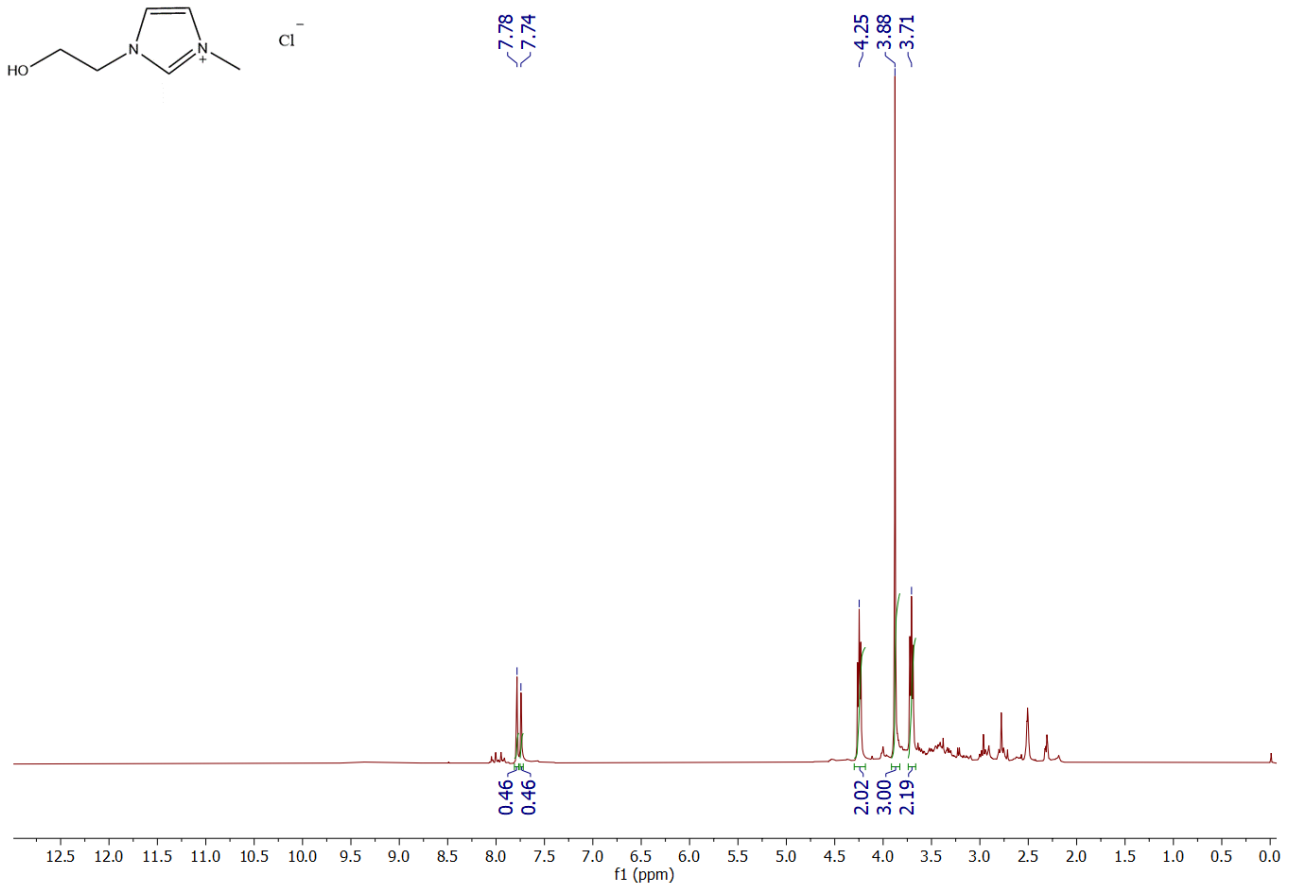

140.68
124.54
65.33
60.33
60.21
54.49
48.27
f1 (ppm)

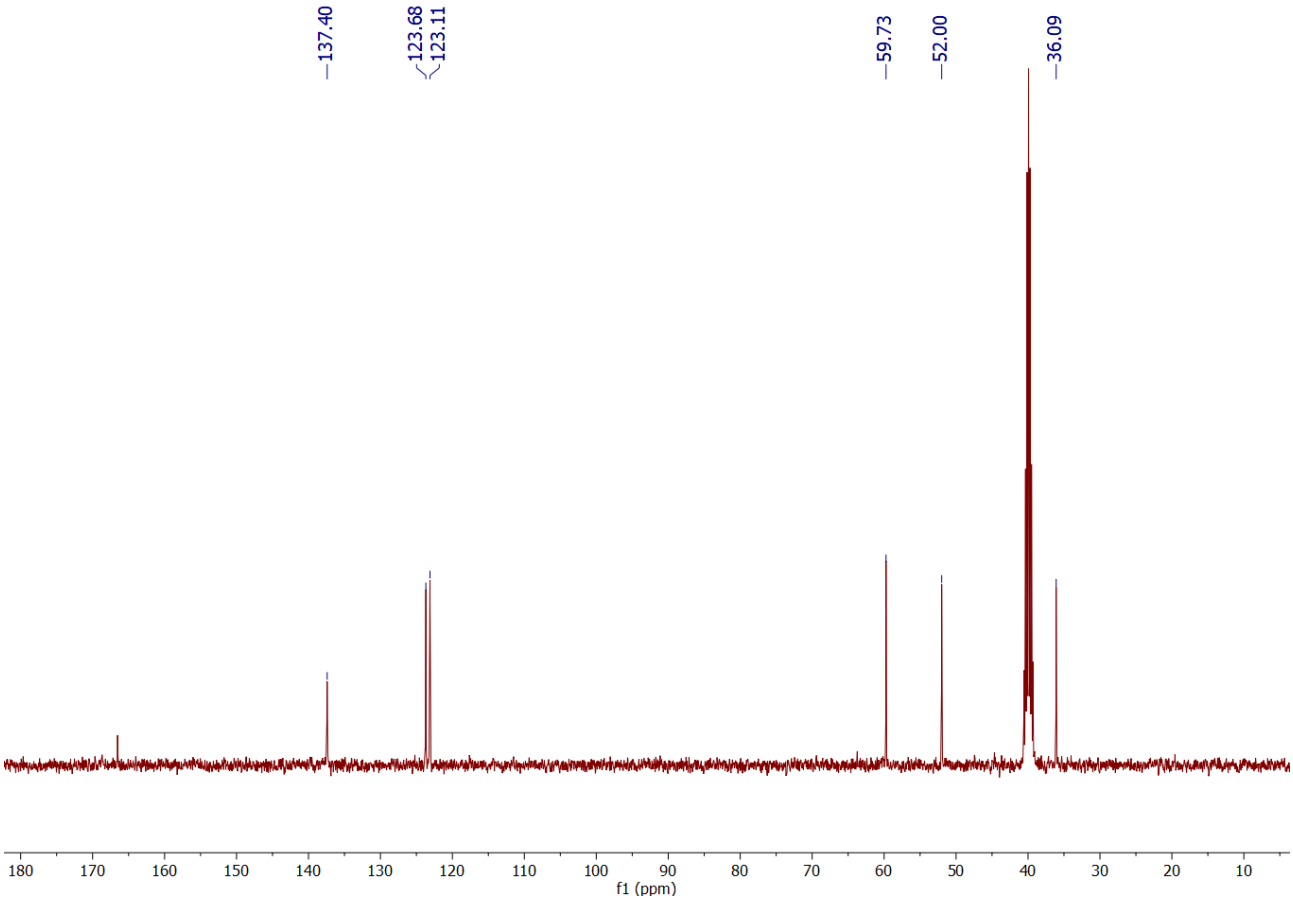

Cl⁻
9.51
7.89
7.79
4.21
3.87
1.40
1.00
0.90
0.92
2.43
3.11
3.05
f1 (ppm)

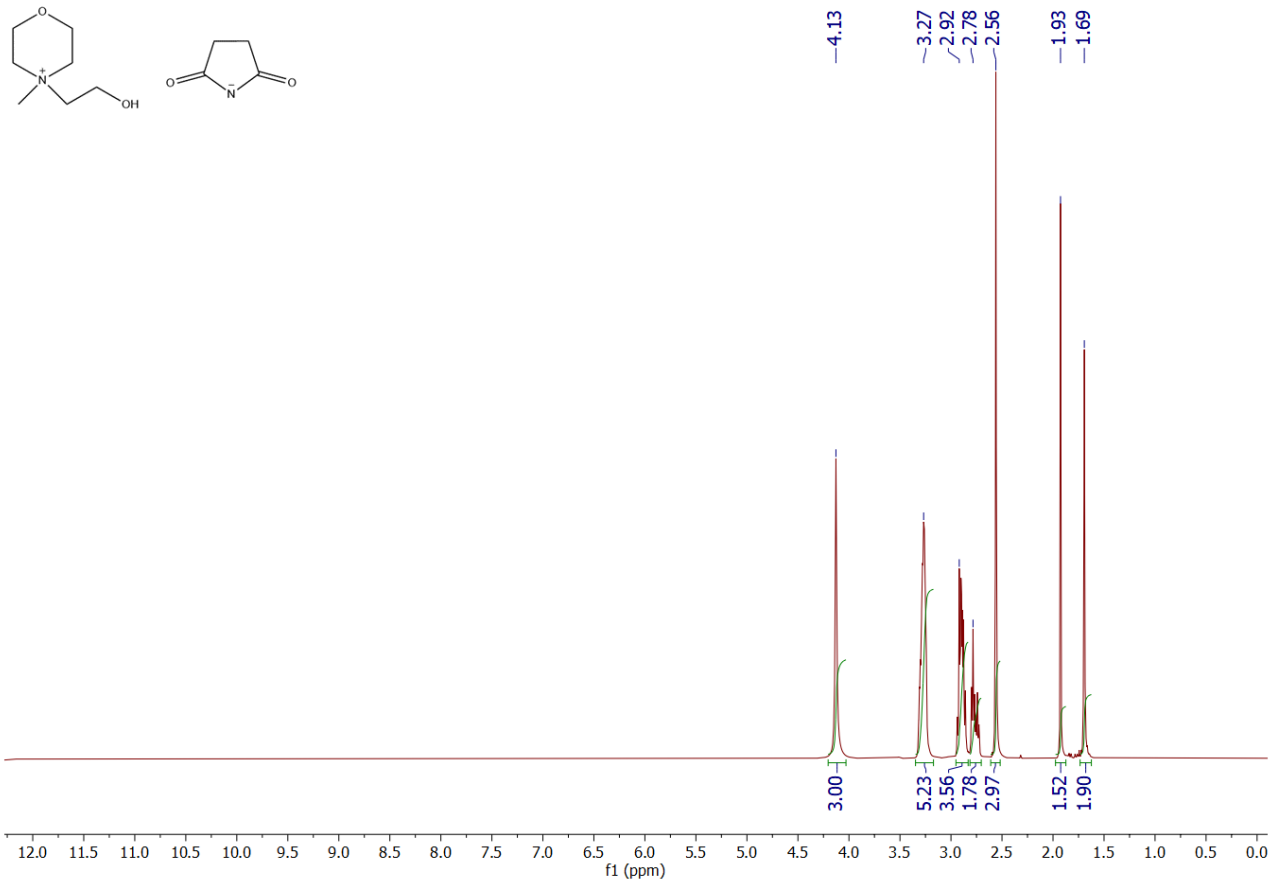

141.65
128.80
127.18
49.27
40.88
20.38
f1 (ppm)

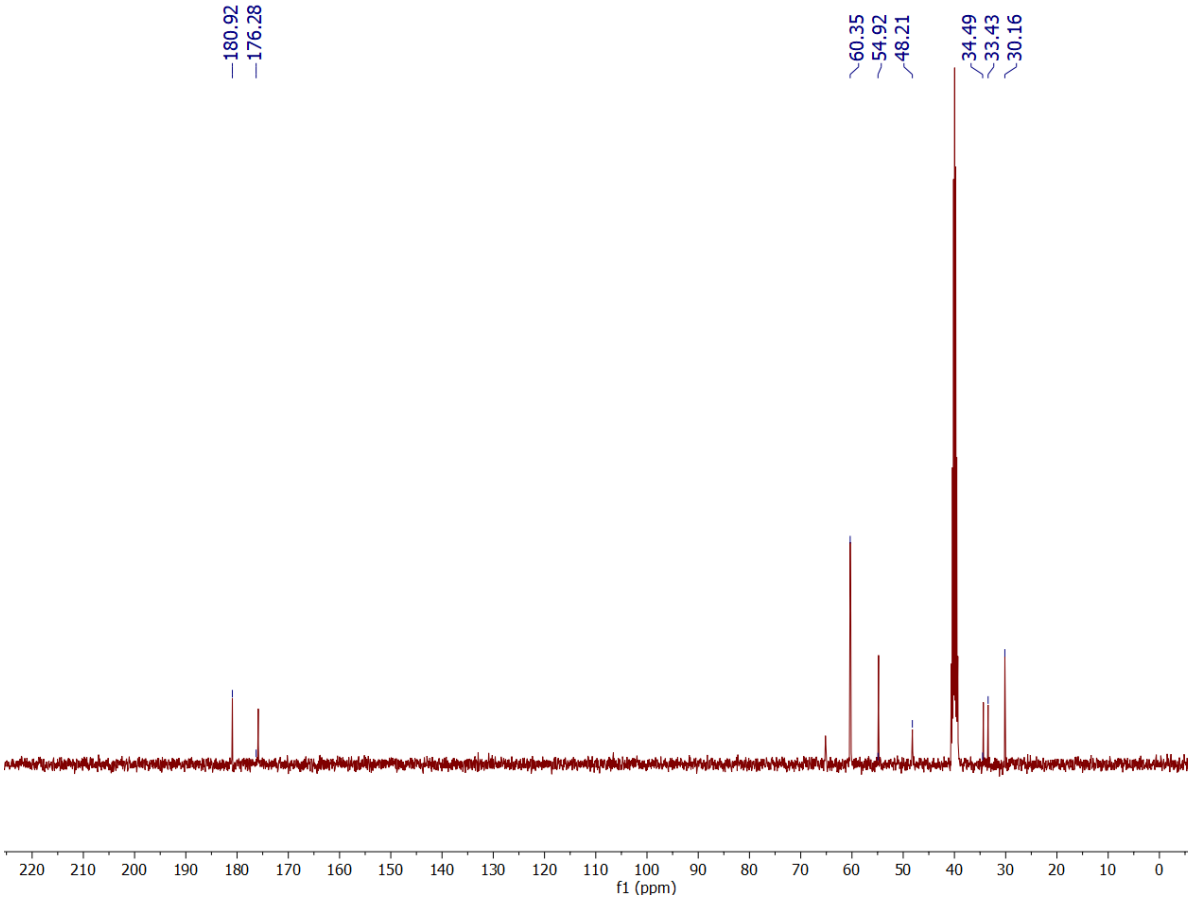

7.69
7.06
5.02
3.96
3.44
1.33
0.58
1.35
3.66
1.94
5.19
9.00
f1 (ppm)

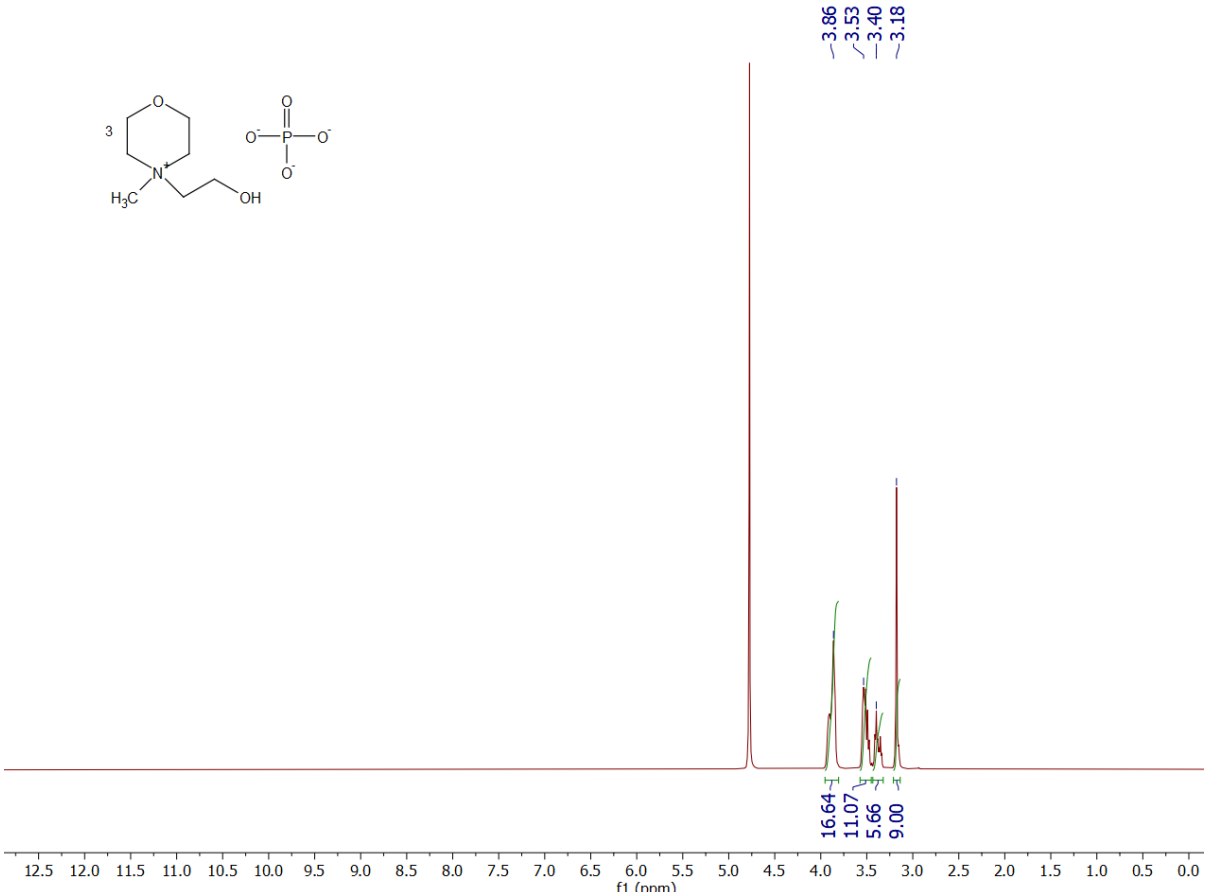

144.69
128.53
63.64
59.22
57.95
12.53
f1 (ppm)

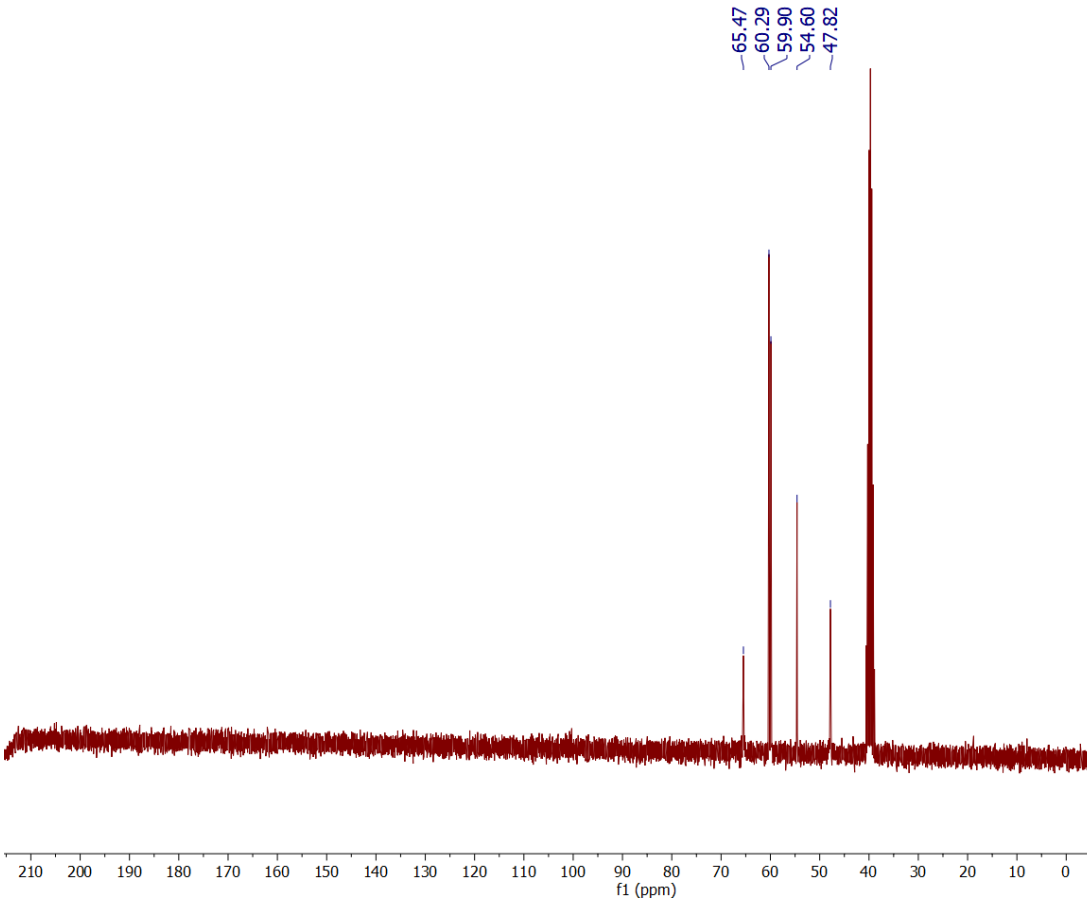

HO
N
N
+
Cl
7.78
7.74
4.25
3.88
3.71
0.46
0.46
2.02
3.00
2.19
f1 (ppm)

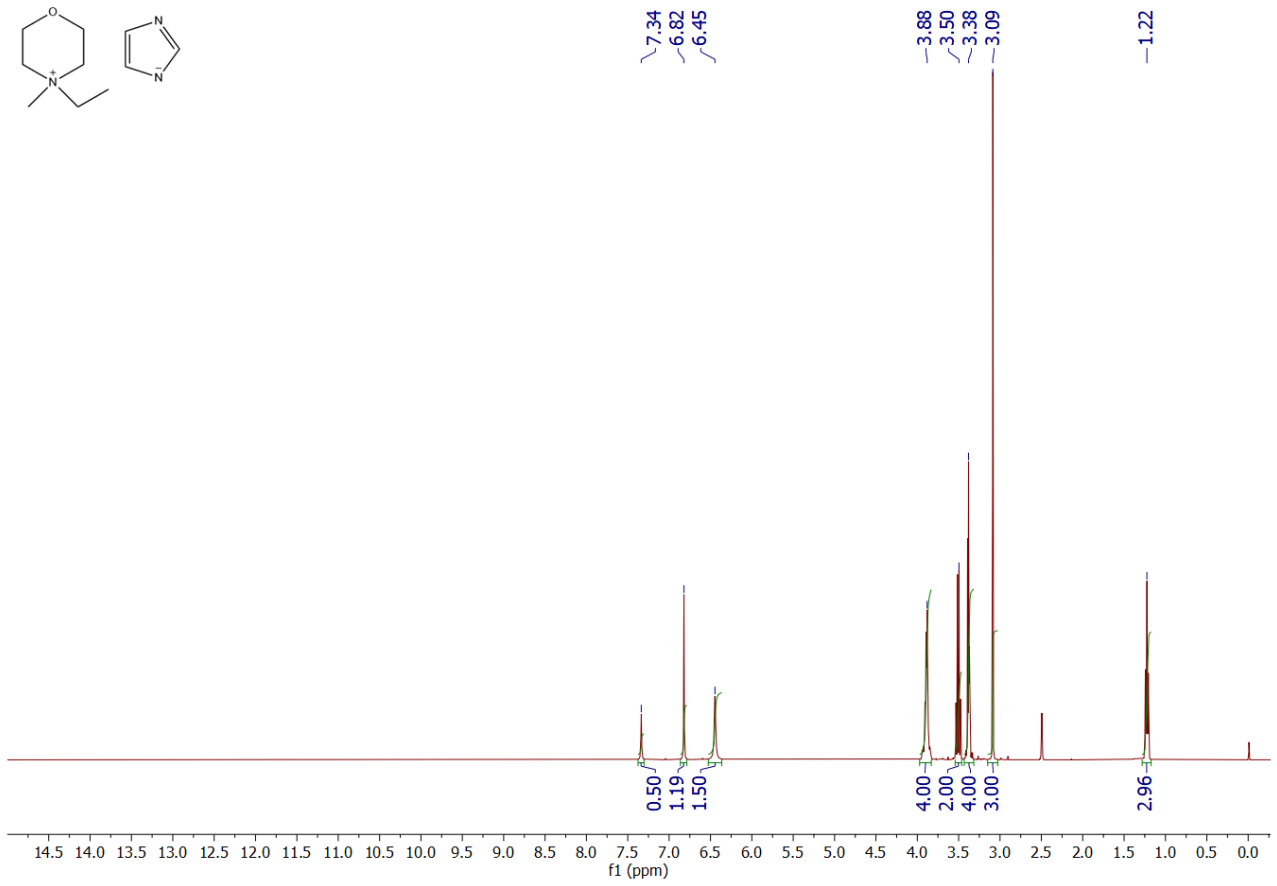

137.40
123.68
123.11
59.73
52.00
36.09
f1 (ppm)


4.13
3.27
2.92
2.78
2.56
1.93
1.69
3.00
5.23
3.56
1.78
2.97
1.52
1.90
f1 (ppm)


180.92
176.28
60.35
54.92
48.21
34.49
33.43
30.16
f1 (ppm)


3.86
3.53
3.40
3.18
16.64
11.07
5.66
9.00
f1 (ppm)


65.47
60.29
59.90
54.60
47.82
f1 (ppm)



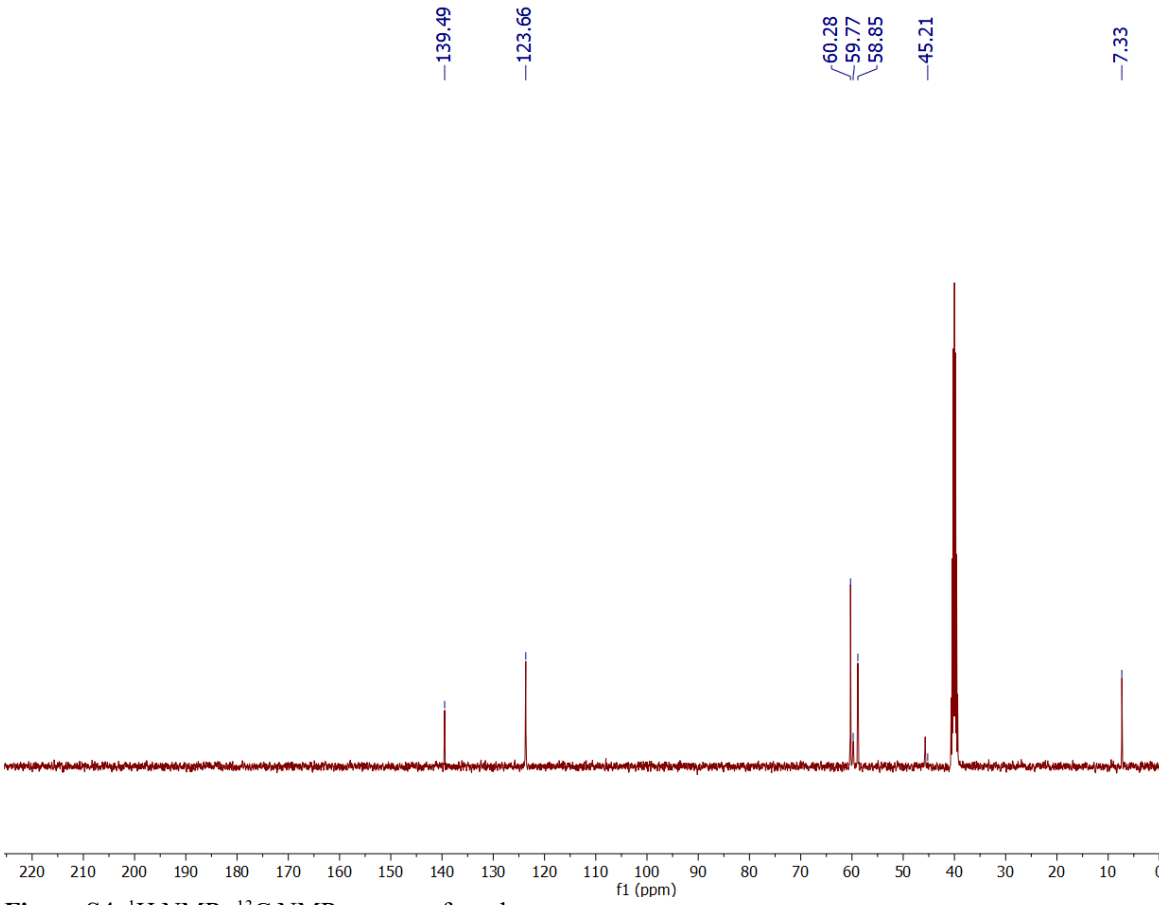


Figure S4. ^{1}H NMR, ^{13}C NMR spectra of catalysts.