

E-Supporting Information-2 (ESI-2)

Ionic liquids promote PCR amplification of DNA†

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Synthesis of 1,3-dimethylimidazolium iodide (**1a**)

The preparation of 1,3-dimethylimidazolium iodide (**1a**) was made following the literature method.¹ To an ice-cooled solution of 1-methylimidazole (164 mg, 2.00 mmol) in acetonitrile (2 mL) was added iodomethane (313 mg, 2.2 mmol). The alkylation reaction was carried out at 0 °C for 1 h. After the reaction, the solvent was removed under reduced pressure and the residue was then washed three times with diethyl ether (2 mL). The residual ether was removed *in vacuo* to afford the desired product **1a**.

¹H NMR (200 MHz, DMSO-*d*₆) δ 3.85 (s, 2 × CH₃, 6H), 7.69 (d, *J* = 1.4 Hz, Im, 2H), 9.05 (s, Im, 1H); ¹³C NMR (50 MHz, DMSO-*d*₆) δ 35.8, 123.2, 136.8; FAB-HRMS *m/z* [M]⁺ calcd for C₅H₉N₂ 97.0760, found 97.0768.

Synthesis of 1-alkyl-3-methylimidazolium ionic liquids (**1b-f**)

1-Alkyl-3-methylimidazolium ionic liquids (**1b-f**) were prepared by following our previously reported procedure.² To a solution of 1-methylimidazole (164 mg, 2.00 mmol) in acetonitrile (2 mL) was added alkyl halide (2.2 mmol). The alkylation reaction was allowed to proceed at 80 °C for 2 h. After the reaction, the solvent was removed under reduced pressure and the residue was then washed three times with diethyl ether (2 mL). The residual ether was removed *in vacuo* to finally afford the desired ionic liquids **1b-f**.

1b, colorless liquid; ¹H NMR (200 MHz, DMSO-*d*₆) δ 1.41 (t, *J* = 7.2 Hz, CH₃, 3H),

3.85 (s, NCH₃, 3H), 4.20 (q, $J = 7.2$ Hz, NCH₂, 2H), 7.71 (s, Im, 1H), 7.80 (s, Im, 1H), 9.19 (s, Im, 1H); ¹³C NMR (50 MHz, DMSO-*d*₆) δ 15.1, 35.6, 44.0, 121.8, 123.4, 136.1; FAB-HRMS m/z [M]⁺ calcd for C₆H₁₁N₂ 111.0917, found 111.0922.

1c, colorless liquid; ¹H NMR (200 MHz, CDCl₃) δ 1.00 (t, $J = 7.4$ Hz, CH₃, 3H), 1.98 (sx, $J = 7.2$ Hz, CH₂, 2H), 4.14 (s, NCH₃, 3H), 4.32 (t, $J = 7.2$ Hz, NCH₂, 2H), 7.48 (s, Im, 1H), 7.57 (s, Im, 1H), 10.39 (s, Im, 1H); ¹³C NMR (50 MHz, CDCl₃) δ 10.2, 23.2, 36.2, 50.9, 121.9, 123.3, 136.4; FAB-HRMS m/z [M]⁺ calcd for C₇H₁₃N₂ 125.1073, found 125.1077.

1d, colorless liquid; ¹H NMR (200 MHz, CDCl₃) δ 0.97 (t, $J = 7.2$ Hz, CH₃, 3H), 1.40 (sx, $J = 7.4$ Hz, CH₂, 2H), 1.92 (qn, $J = 7.4$ Hz, CH₂, 2H), 4.14 (s, NCH₃, 3H), 4.35 (t, $J = 7.4$ Hz, NCH₂, 2H), 7.42 (s, Im, 1H), 7.53 (s, Im, 1H), 10.45 (s, Im, 1H); ¹³C NMR (50 MHz, CDCl₃) δ 13.0, 18.9, 31.7, 36.2, 49.3, 121.8, 123.4, 136.5.

1e, colorless liquid; ¹H NMR (200 MHz, CDCl₃) δ 0.90 (t, $J = 6.6$ Hz, CH₃, 3H), 1.22-1.49 (m, 2 \times CH₂, 4H), 1.93 (qn, $J = 7.2$ Hz, CH₂, 2H), 4.14 (s, NCH₃, 3H), 4.34 (t, $J = 7.4$ Hz, NCH₂, 2H), 7.40 (s, Im, 1H), 7.53 (s, Im, 1H), 10.45 (s, Im, 1H); ¹³C NMR (50 MHz, CDCl₃) δ 13.3, 21.4, 27.6, 29.4, 36.1, 49.4, 121.7, 123.3, 136.3; FAB-HRMS m/z [M]⁺ calcd for C₉H₁₇N₂ 153.1386, found 153.1391.

1f colorless liquid; ¹H NMR (200 MHz, CDCl₃) δ 0.88 (t, $J = 6.6$ Hz, CH₃, 3H), 1.32 (bs, 3 \times CH₂, 6H), 1.91 (bs, CH₂, 2H), 4.14 (s, NCH₃, 3H), 4.33 (t, $J = 7.4$ Hz, NCH₂, 2H), 7.35 (s, Im, 1H), 7.47 (s, Im, 1H), 10.50 (s, Im, 1H); ¹³C NMR (50 MHz, CDCl₃) δ 13.6, 22.0, 25.5, 29.9, 30.7, 36.3, 49.7, 121.8, 123.5, 136.7; FAB-HRMS m/z [M]⁺ calcd for C₁₀H₁₉N₂ 167.1543, found 167.1546.

Synthesis of 1,2,3-trimethylimidazolium iodide (**2a**)

The preparation of 1,2,3-trimethylimidazolium iodide (**2a**) was made following the literature method.¹ To an ice-cooled solution of 1,2-dimethylimidazole (100 mg, 1.04 mmol) in acetonitrile (2 mL) was added iodomethane (177 mg, 1.25 mmol). The alkylation reaction was carried out at 0 °C for 1 h. After the reaction, the solvent was removed under reduced pressure and then the residue was washed three times with diethyl ether (2 mL). The residual ether was removed *in vacuo* to afford the desired product **2a**.

2a, yellow solid (mp 317-319 °C); ¹H NMR (200 MHz, DMSO-*d*₆) δ 2.55 (s, N=CCH₃, 3H), 3.75 (s, 2 × NCH₃, 6H), 7.58(s, Im, 2H); ¹³C NMR (50 MHz, DMSO-*d*₆) δ 9.3, 34.7, 121.8, 144.6; FAB-HRMS *m/z* [M]⁺ calcd for C₆H₁₁N₂ 111.0917, found 111.0923.

Synthesis of 1-alkyl-2,3-dimethyleneimidazolium ionic liquids (**2b-f**)

1-Alkyl-2,3-dimethylimidazolium ionic liquids (**2b-f**) were prepared as described previously.² To a solution of 1,2-dimethylimidazole (100 mg, 1.04 mmol) in acetonitrile (2 mL) was added alkyl halide (1.25 mmol). The alkylation reaction was allowed to proceed at 80 °C for 2 h. After the reaction, the solvent was removed under reduced pressure and then the residue was washed three times with diethyl ether (2 mL). The residual ether was removed *in vacuo* to finally afford the desired ionic liquids **2b-f**.

2b, white solid (mp 58-62 °C); ^1H NMR (200 MHz, $\text{DMSO-}d_6$) δ 1.33 (t, $J = 7.4$ Hz, CH_3 , 3H), 2.59 (s, $\text{N}=\text{CCH}_3$, 3H), 3.75 (s, NCH_3 , 3H), 4.14 (q, $J = 7.2$ Hz, NCH_2 , 2H), 7.64 (d, $J = 2.0$ Hz, Im, 1H), 7.68 (d, $J = 2.2$ Hz, Im, 1H); ^{13}C NMR (50 MHz, $\text{DMSO-}d_6$) δ 9.2, 14.8, 34.7, 42.7, 120.2, 122.3, 144.0; FAB-HRMS m/z $[\text{M}]^+$ calcd for $\text{C}_7\text{H}_{13}\text{N}_2$ 125.1073, found 125.1079.

2c, white solid (mp 48-54 °C); ^1H NMR (200 MHz, CDCl_3) δ 0.97 (t, $J = 7.4$ Hz, CH_3 , 3H), 1.81 (sx, $J = 7.4$ Hz, CH_2 , 2H), 2.78 (s, $\text{N}=\text{CCH}_3$, 3H), 3.99 (s, NCH_3 , 3H), 4.15 (t, $J = 7.4$ Hz, NCH_2 , 2H), 7.48 (d, $J = 2.0$ Hz, Im, 1H), 7.67 (d, $J = 1.8$ Hz, Im, 1H); ^{13}C NMR (50 MHz, CDCl_3) δ 10.4, 10.5, 22.8, 35.7, 49.9, 121.0, 122.6, 143.2; FAB-HRMS m/z $[\text{M}]^+$ calcd for $\text{C}_8\text{H}_{15}\text{N}_2$ 139.1230, found 139.1232.

2d, white solid (mp 83-87 °C); ^1H NMR (200 MHz, CDCl_3) δ 0.92 (t, $J = 7.4$ Hz, CH_3 , 3H), 1.35 (sx, $J = 7.8$ Hz, CH_2 , 2H), 1.77 (qn, $J = 7.4$ Hz, CH_2 , 2H), 2.78 (s, $\text{N}=\text{CCH}_3$, 3H), 3.99 (s, NCH_3 , 3H), 4.17 (t, $J = 7.4$ Hz, NCH_2 , 2H), 7.46 (d, $J = 2.0$ Hz, Im, 1H), 7.69 (d, $J = 2.0$ Hz, Im, 1H); ^{13}C NMR (50 MHz, CDCl_3) δ 10.4, 13.0, 19.0, 31.3, 35.7, 48.2, 120.8, 122.5, 143.1.

2e, colorless liquid; ^1H NMR (200 MHz, CDCl_3) δ 0.87 (t, $J = 6.6$ Hz, CH_3 , 3H), 1.20-1.38 (m, $2 \times \text{CH}_2$, 4H), 1.79 (qn, $J = 7.2$ Hz, CH_2 , 2H), 2.76 (s, $\text{N}=\text{CCH}_3$, 3H), 3.98 (s, NCH_3 , 3H), 4.15 (t, $J = 7.4$ Hz, NCH_2 , 2H), 7.39 (d, $J = 2.0$ Hz, Im, 1H), 7.64 (d, $J = 2.0$ Hz, Im, 1H); ^{13}C NMR (50 MHz, CDCl_3) δ 10.6, 13.6, 21.9, 28.1, 29.3, 36.0, 48.7, 120.9, 122.9, 143.5; FAB-HRMS m/z $[\text{M}]^+$ calcd for $\text{C}_{10}\text{H}_{19}\text{N}_2$ 167.1543, found 167.1550.

2f, colorless liquid; ^1H NMR (200 MHz, CDCl_3) δ 0.85 (t, $J = 6.4$ Hz, CH_3 , 3H), 1.28

(bs, $3 \times \text{CH}_2$, 6H), 1.68-1.89 (m, CH_2 , 2H), 2.78 (s, $\text{N}=\text{CCH}_3$, 3H), 4.00 (s, NCH_3 , 3H), 4.16 (t, $J = 7.6$ Hz, NCH_2 , 2H), 7.41 (d, $J = 2.0$ Hz, Im, 1H), 7.69 (d, $J = 1.8$ Hz, Im, 1H); ^{13}C NMR (50 MHz, CDCl_3) δ 10.4, 13.4, 21.8, 25.4, 29.3, 30.5, 35.6, 48.4, 120.7, 122.5, 143.0; FAB-HRMS m/z $[\text{M}]^+$ calcd for $\text{C}_{11}\text{H}_{21}\text{N}_2$ 181.1699, found 181.1701.

Synthesis of 1-methyl-2,3-trimethyleneimidazolium iodide (**3a**)

1-Methyl-2,3-trimethyleneimidazolium iodide (**3a**) was prepared as described previously.³ To an ice-cooled solution of 6,7-dihydro-5*H*-pyrrolo[1,2-*a*]imidazole (100 mg, 0.93 mmol) in acetonitrile (2 mL) was added iodomethane (145 mg, 1.02 mmol). The alkylation reaction was carried out at 0 °C for 1 h. After the reaction, the solvent was removed under reduced pressure and the residue was washed three times with diethyl ether (2 mL). The residual ether was removed *in vacuo* to afford the desired product **3a**.

3a, white solid (mp 196-200 °C); ^1H NMR (200 MHz, $\text{DMSO}-d_6$) δ 2.66 (qn, $J = 7.0$ Hz, CH_2 , 2H), 3.13 (t, $J = 7.6$ Hz, $\text{N}=\text{CCH}_2$, 2H), 3.74 (s, NCH_3 , 3H), 4.19 (t, $J = 7.4$ Hz, NCH_2 , 2H), 7.59 (d, $J = 3.8$ Hz, Im, 2H); ^{13}C NMR (50 MHz, $\text{DMSO}-d_6$) δ 22.4, 25.6, 34.9, 47.9, 117.6, 126.6, 152.7; FAB-HRMS m/z $[\text{M}]^+$ calcd for $\text{C}_7\text{H}_{11}\text{N}_2$ 123.0917, found 123.0919.

Synthesis of 1-alkyl-2,3-trimethyleneimidazolium ionic liquids (**3b-f**)

1-Alkyl-2,3-trimethyleneimidazolium ionic liquids (**3b-f**) were prepared as described

previously.³ To a solution of 6,7-dihydro-5*H*-pyrrolo[1,2-*a*]imidazole (100 mg, 0.93 mmol) in acetonitrile (2 mL) was added alkyl halide (1.02 mmol). The alkylation reaction was allowed to proceed at 80 °C for 2 h. After the reaction, the solvent was removed and the residue was then washed three times with diethyl ether (2 mL). The residual ether was removed *in vacuo* to finally afford the desired ionic liquids **3b-f**.

3b white solid m(mp 135-138 °C); ¹H NMR (200 MHz, CDCl₃) δ 1.56 (t, *J* = 7.4 Hz, CH₃, 3H), 2.92 (qn, *J* = 7.2 Hz, CH₂, 2H), 3.48 (t, *J* = 7.6 Hz, N=CCH₂, 2H), 4.31 (q, *J* = 7.4 Hz, NCH₂, 2H), 4.45 (t, *J* = 7.2 Hz, NCH₂, 2H), 7.56 (d, *J* = 2.0 Hz, Im, 1H), 7.58 (d, *J* = 2.0 Hz, Im, 1H); ¹³C NMR (50 MHz, CDCl₃) δ 14.9, 23.6, 25.9, 44.5, 48.3, 118.1, 125.2, 151.5; FAB-HRMS *m/z* [M]⁺ calcd for C₈H₁₃N₂ 137.1073, found 137.1082.

3c, white solid (mp 83-88 °C); ¹H NMR (200 MHz, CDCl₃) δ 1.01 (t, *J* = 7.4 Hz, CH₃, 3H), 1.93 (sx, *J* = 7.4 Hz, CH₂, 2H), 2.93 (qn, *J* = 7.2 Hz, CH₂, 2H), 3.45 (t, *J* = 7.8 Hz, N=CCH₂, 2H), 4.19 (t, *J* = 7.2 Hz, NCH₂, 2H), 4.47 (t, *J* = 7.4 Hz, NCH₂, 2H), 7.52 (d, *J* = 2.0 Hz, Im, 1H), 7.59 (d, *J* = 2.0 Hz, Im, 1H); ¹³C NMR (50 MHz, CDCl₃) δ 10.5, 22.8, 23.4, 25.8, 48.3, 50.6, 118.0, 125.6, 151.5; FAB-HRMS *m/z* [M]⁺ calcd for C₉H₁₅N₂ 151.1230, found 151.1235.

3d, colorless liquid; ¹H NMR (200 MHz, CDCl₃) δ 0.97 (t, *J* = 7.2 Hz, CH₃, 3H), 1.40 (sx, *J* = 7.4 Hz, CH₂, 2H), 1.82 (qn, *J* = 7.6 Hz, CH₂, 2H), 2.93 (qn, *J* = 7.2 Hz, CH₂, 2H), 3.44 (t, *J* = 7.6 Hz, N=CCH₂, 2H), 4.22 (t, *J* = 7.2 Hz, NCH₂, 2H), 4.47 (t, *J* = 7.4 Hz, NCH₂, 2H), 7.49 (d, *J* = 2.2 Hz, Im, 1H), 7.59 (d, *J* = 2.0 Hz, Im, 1H); ¹³C

NMR (50 MHz, CDCl₃) δ 13.1, 19.2, 23.4, 25.8, 31.3, 48.3, 49.0, 118.1, 125.5, 151.5;

FAB-HRMS m/z [M]⁺ calcd for C₁₀H₁₇N₂ 165.1386, found 165.1391.

3e, colorless liquid; ¹H NMR (200 MHz, CDCl₃) δ 0.92 (t, J = 6.8 Hz, CH₃, 3H), 1.22-1.45 (m, 2 \times CH₂, 4H), 1.88 (qn, J = 7.6 Hz, CH₂, 2H), 2.93 (qn, J = 7.0 Hz, CH₂, 2H), 3.44 (t, J = 7.6 Hz, N=CCH₂, 2H), 4.19 (t, J = 7.2 Hz, NCH₂, 2H), 4.47 (t, J = 7.4 Hz, NCH₂, 2H), 7.42 (d, J = 1.8 Hz, Im, 1H), 7.55 (d, J = 2.2 Hz, Im, 1H); ¹³C NMR (50 MHz, CDCl₃) δ 13.5, 21.8, 23.5, 25.9, 28.1, 29.1, 48.4, 49.3, 118.2, 125.5, 151.6; FAB-HRMS m/z [M]⁺ calcd for C₁₁H₁₉N₂ 179.1543, found 179.1545.

3f, white solid (mp 76-79 °C); ¹H NMR (200 MHz, CDCl₃) δ 0.89 (t, J = 6.4 Hz, CH₃, 3H), 1.20-1.48 (m, 3 \times CH₂, 6H), 1.64-1.97 (m, CH₂, 2H), 2.93 (qn, J = 7.0 Hz, CH₂, 2H), 3.44 (t, J = 7.4 Hz, N=CCH₂, 2H), 4.20 (t, J = 7.4 Hz, NCH₂, 2H), 4.47 (t, J = 7.4 Hz, NCH₂, 2H), 7.45 (d, J = 1.6 Hz, Im, 1H), 7.58 (d, J = 1.8 Hz, Im, 1H); ¹³C NMR (50 MHz, CDCl₃) δ 14.1, 22.5, 23.9, 26.1, 26.3, 29.8, 31.2, 48.8, 49.7, 118.7, 125.9, 151.9; FAB-HRMS m/z [M]⁺ calcd for C₁₂H₂₁N₂ 193.1699, found 193.1708.

Synthesis of 1-methy-2,3-tetramethyleneimidazolium ionic liquids (**4a**)

1-Methyl-2,3-tetramethyleneimidazolium ionic liquids (**4a**) were prepared as described previously.³ To an ice-cooled solution of 5,6,7,8-tetrahydroimidazo[1,2-*a*]pyridine (50 mg, 0.41 mmol) in acetonitrile was added iodomethane (75 mg, 0.53 mmol). The alkylation reaction was carried out at 0 °C for 1 h. After the reaction, the solvent was removed and the residue was then washed three times with ethyl acetate (2 mL). The residual ethyl acetate was

removed *in vacuo* to afford the desired product **4a**.

4a, white solid (decomp. 215 °C); ¹H NMR (200 MHz, DMSO-*d*₆) δ 1.91-1.94 (bs, 2 × CH₂, 4H), 2.96 (bs, N=CCH₂, 2H), 3.69 (s, CH₃, 3H), 4.07-4.09 (m, NCH₂, 2H), 7.60 (dd, *J* = 2.0, 6.0 Hz, Im, 2H); ¹³C NMR (50 MHz, DMSO-*d*₆) δ 17.6, 20.1, 20.7, 33.6, 45.7, 120.5, 121.9, 144.2; FAB-HRMS *m/z* [M]⁺ calcd for C₈H₁₃N₂ 137.1079, found 137.1076.

Synthesis of 1-alkyl-2,3-tetramethyleneimidazolium ionic liquids (**4b-f**)

1-Alkyl-2,3-tetramethyleneimidazolium ionic liquids (**4b-f**) were prepared as described previously.³ To a round-bottomed flask containing 5,6,7,8-tetrahydroimidazo[1,2-*a*]pyridine (50 mg, 0.41 mmol) was added alkyl halide (0.53 mmol). The alkylation reaction was allowed to proceed at 60 °C for 2 h. After the reaction, the solution was washed three times with ethyl acetate (3 x 2 mL). The residual ethyl acetate was removed *in vacuo* to afford the desired products **4b-f**.

4b, colorless liquid; ¹H NMR (200 MHz, CDCl₃) δ 1.51 (t, *J* = 7.4 Hz, CH₃, 3H), 2.06-2.15 (m, 2 × CH₂, 4H), 3.17 (bs, N=CCH₂, 2H), 4.20-4.31 (m, 2 × NCH₂, 4H), 7.57 (t, *J* = 1.4 Hz, Im, 2H); ¹³C NMR (50 MHz, CDCl₃) δ 15.2, 18.5, 21.4, 21.5, 120.1, 121.8, 143.4; FAB-HRMS *m/z* [M]⁺ calcd for C₉H₁₅N₂ 151.1235, found 151.1235.

4c, colorless liquid; ¹H NMR (200 MHz, CDCl₃) δ 0.98 (t, *J* = 7.4 Hz, CH₃, 3H), 1.91 (sx, *J* = 7.2 Hz, CH₂, 2H), 2.12-2.15 (m, 2 × CH₂, 4H), 3.17 (bs, N=CCH₂, 2H), 4.13 (t, *J* = 7.4 Hz, NCH₂, 2H), 4.31 (bs, NCH₂, 2H), 7.51 (d, *J* = 1.8 Hz, Im, 1H), 7.61 (d,

$J = 1.8$ Hz, Im, 1H); ^{13}C NMR (50 MHz, CDCl_3) δ 10.8, 18.1, 21.1, 21.2, 22.8, 46.7, 49.1, 121.1, 121.4, 143.2; FAB-HRMS m/z $[\text{M}]^+$ calcd for $\text{C}_{10}\text{H}_{17}\text{N}_2$ 165.1392, found 165.1391.

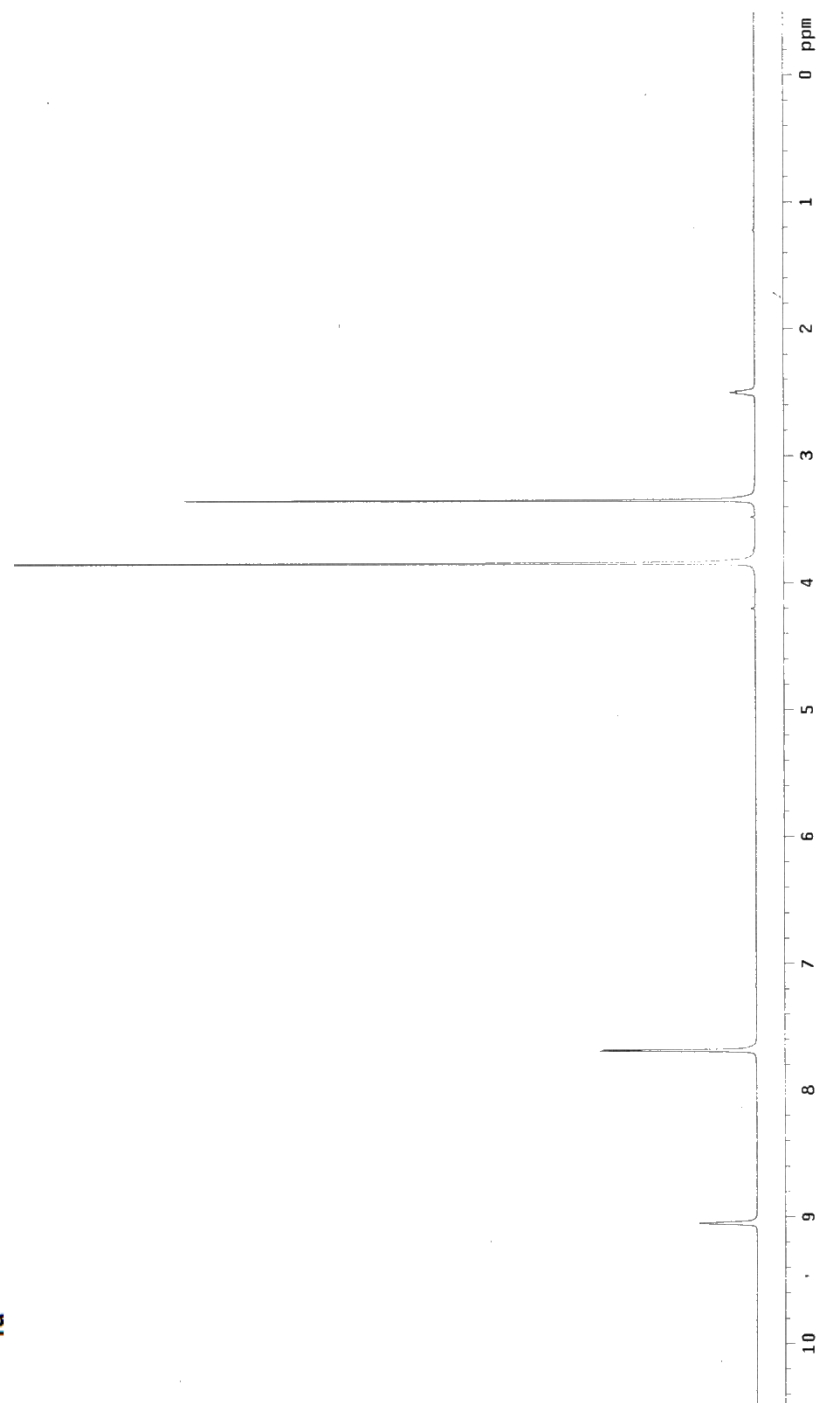
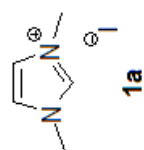
4d, white solid (mp 134-137 °C); ^1H NMR (200 MHz, CDCl_3) δ 0.93 (t, $J = 7.2$ Hz, CH_3 , 3H), 1.36 (sx, $J = 7.4$ Hz, CH_2 , 2H), 1.79 (qn, $J = 7.2$ Hz, CH_2 , 2H), 1.98-2.13 (m, $2 \times \text{CH}_2$, 4H), 3.13 (bs, $\text{N}=\text{CCH}_2$, 2H), 4.16 (t, $J = 7.4$ Hz, NCH_2 , 2H), 4.31 (bs, NCH_2 , 2H), 7.50 (d, $J = 2.2$ Hz, Im, 1H), 7.65 (d, $J = 2.2$ Hz, Im, 1H); ^{13}C NMR (50 MHz, CDCl_3) δ 13.3, 18.1, 19.4, 21.1, 21.2, 31.3, 46.7, 47.5, 121.1, 121.5, 143.2; FAB-HRMS m/z $[\text{M}]^+$ calcd for $\text{C}_{11}\text{H}_{19}\text{N}_2$ 179.1548, found 179.1546.

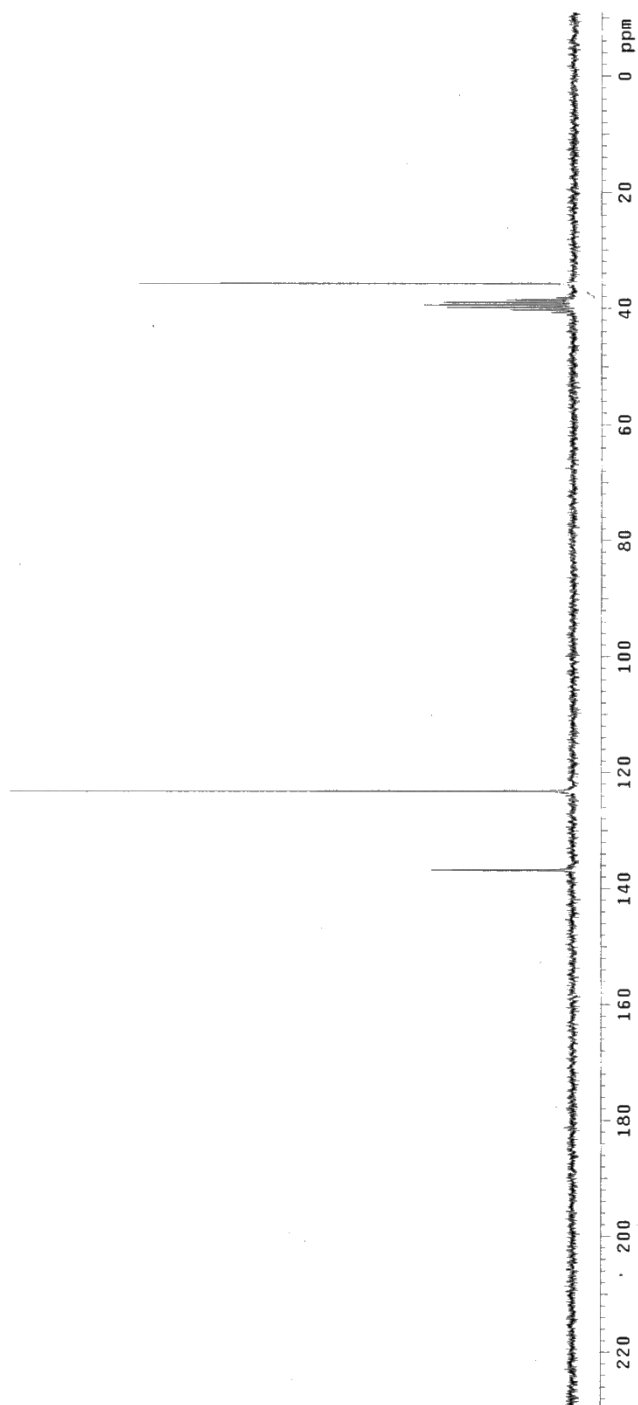
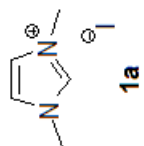
4e, yellow liquid; ^1H NMR (200 MHz, CDCl_3) δ 0.89 (t, $J = 6.8$ Hz, CH_3 , 3H), 1.33 (sx, $J = 3.6$ Hz, $2 \times \text{CH}_2$, 4H), 1.82 (qn, $J = 7.4$ Hz, CH_2 , 2H), 2.12-2.15 (m, $2 \times \text{CH}_2$, 4H), 3.11 (bs, $\text{N}=\text{CCH}_2$, 2H), 4.14 (t, $J = 7.4$ Hz, NCH_2 , 2H), 4.31 (bs NCH_2 , 2H), 7.44 (d, $J = 2.0$ Hz, Im, 1H), 7.59 (d, $J = 2.0$ Hz, Im, 1H); ^{13}C NMR (50 MHz, CDCl_3) δ 13.7, 18.2, 21.2, 21.3, 22.0, 28.3, 29.1, 46.8, 47.8, 121.1, 121.6, 143.3; FAB-HRMS m/z $[\text{M}]^+$ calcd $\text{C}_{12}\text{H}_{21}\text{N}_2$ for 193.1705, found 193.1702.

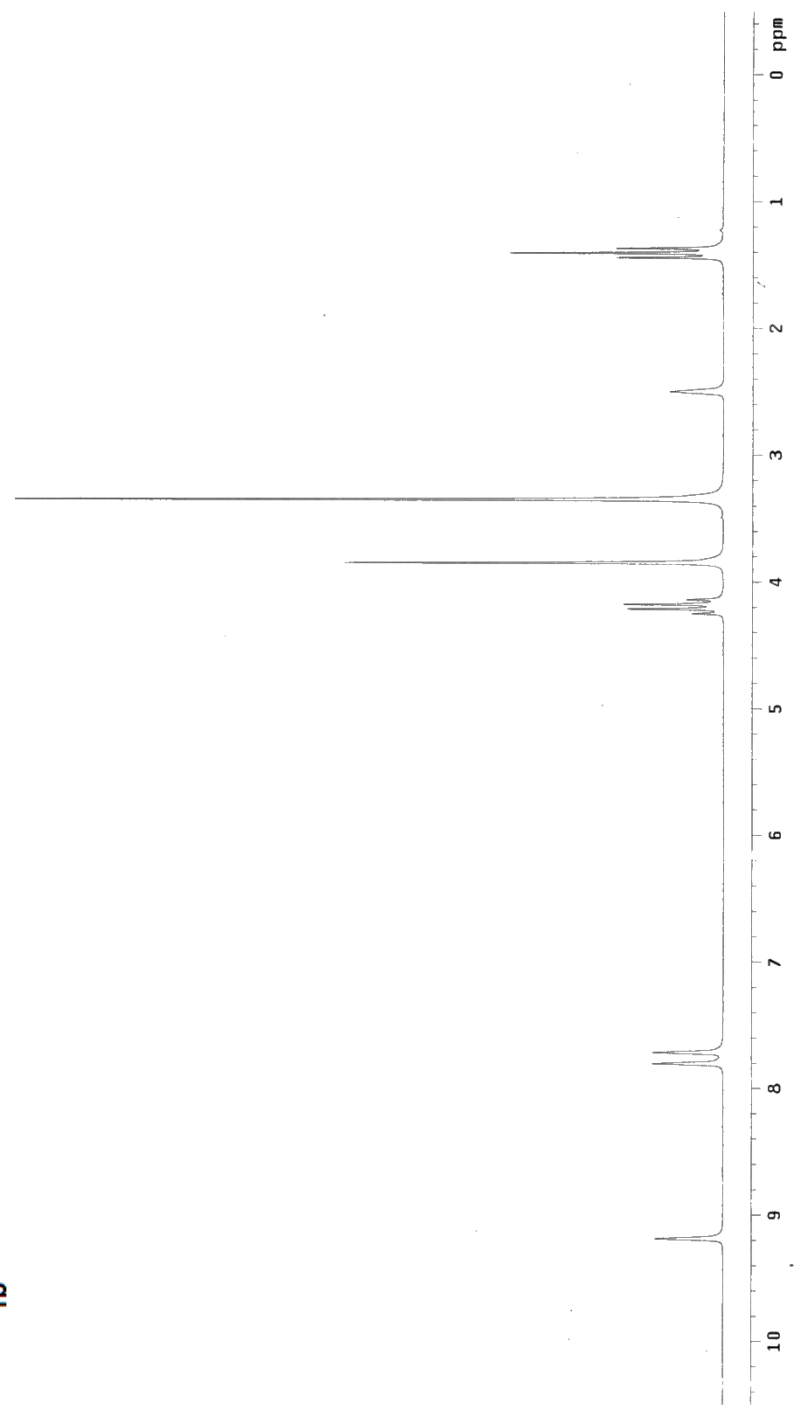
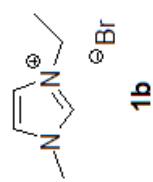
4f, yellow liquid; ^1H NMR (200 MHz, CDCl_3) δ 0.86 (t, $J = 6.2$ Hz, CH_3 , 3H), 1.30 (bs, $3 \times \text{CH}_2$, 6H), 1.77-1.81 (m, $J = 7.4$ Hz, CH_2 , 2H), 2.14 (bs, $2 \times \text{CH}_2$, 4H), 3.11 (bs, $\text{N}=\text{CCH}_2$, 2H), 4.14 (t, $J = 7.4$ Hz, NCH_2 , 2H), 4.32 (bs, NCH_2 , 2H), 7.44 (bs, Im, 1H), 7.62 (bs, Im, 1H); ^{13}C NMR (50 MHz, CDCl_3) δ 13.5, 17.9, 20.9, 20.7, 22.0, 25.6, 29.1, 30.7, 46.5, 47.5, 120.9, 121.3, 143.0; FAB-HRMS m/z $[\text{M}]^+$ calcd for $\text{C}_{11}\text{H}_{19}\text{N}_2$ 179.1548, found 179.1546.

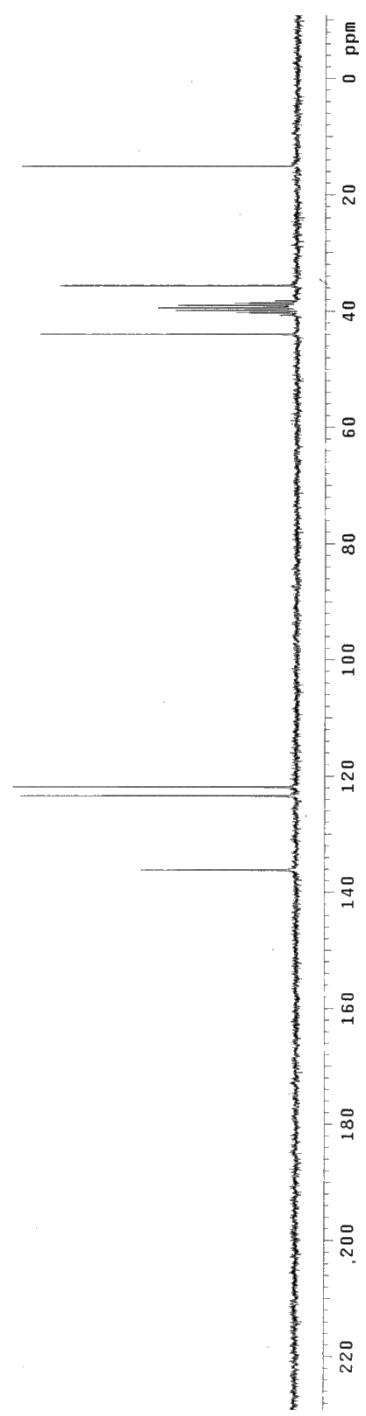
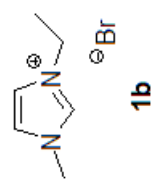
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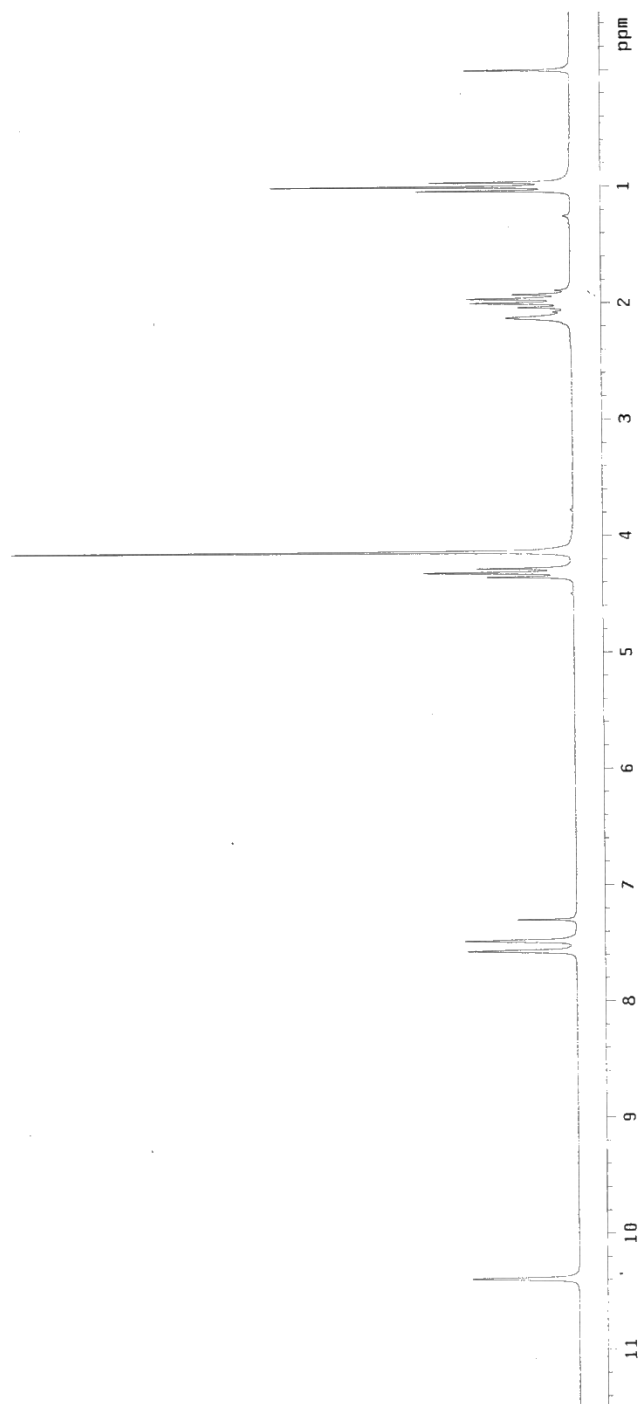
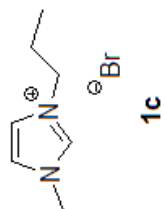
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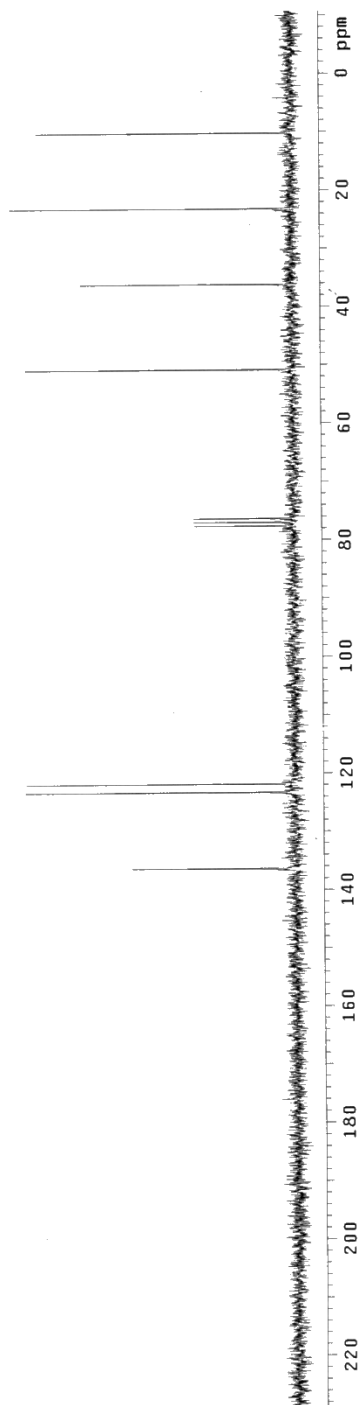
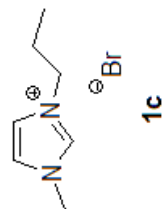


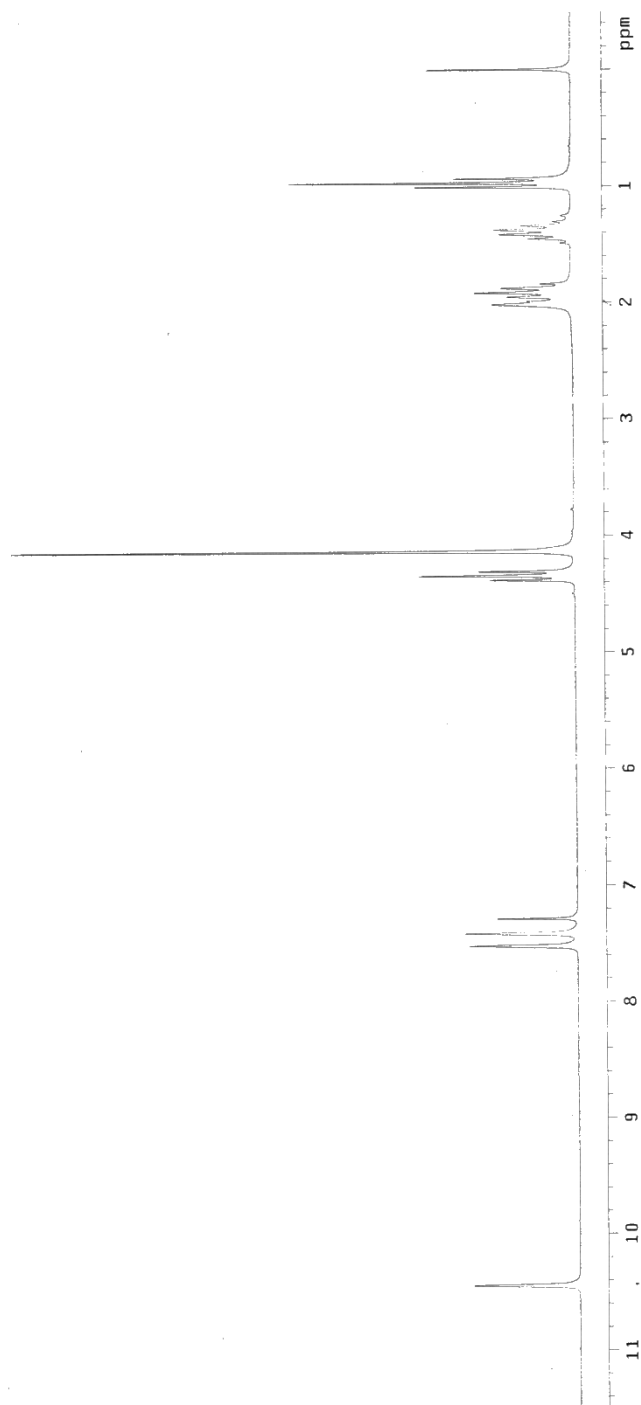
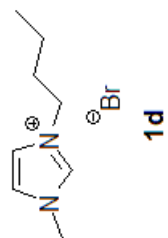


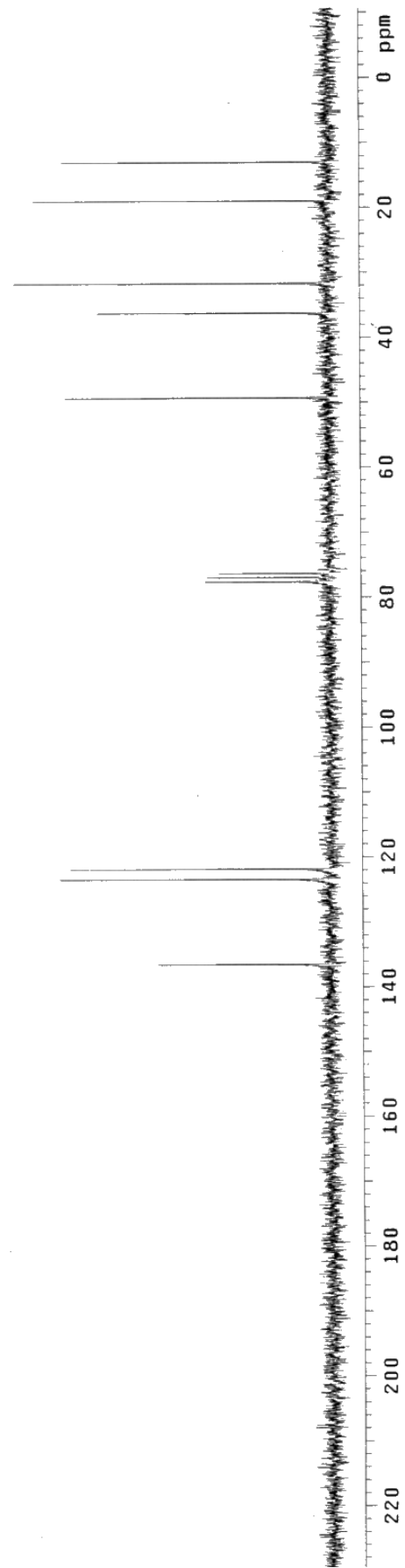
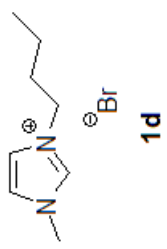


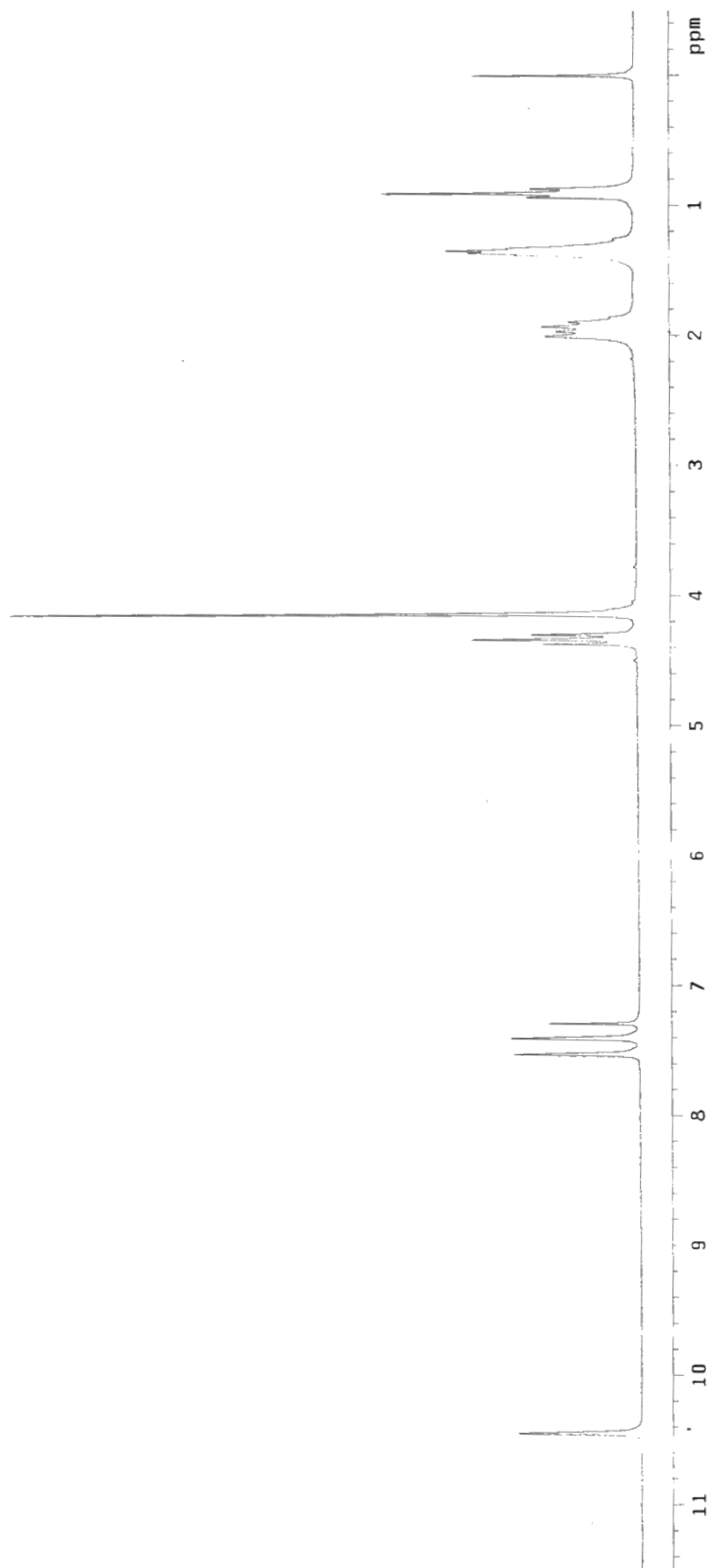


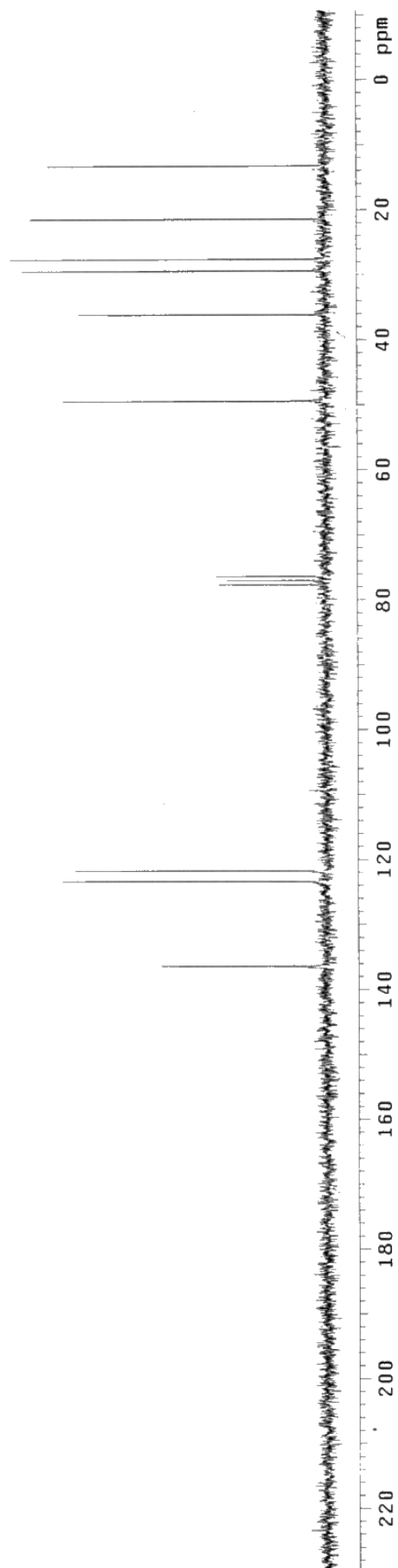


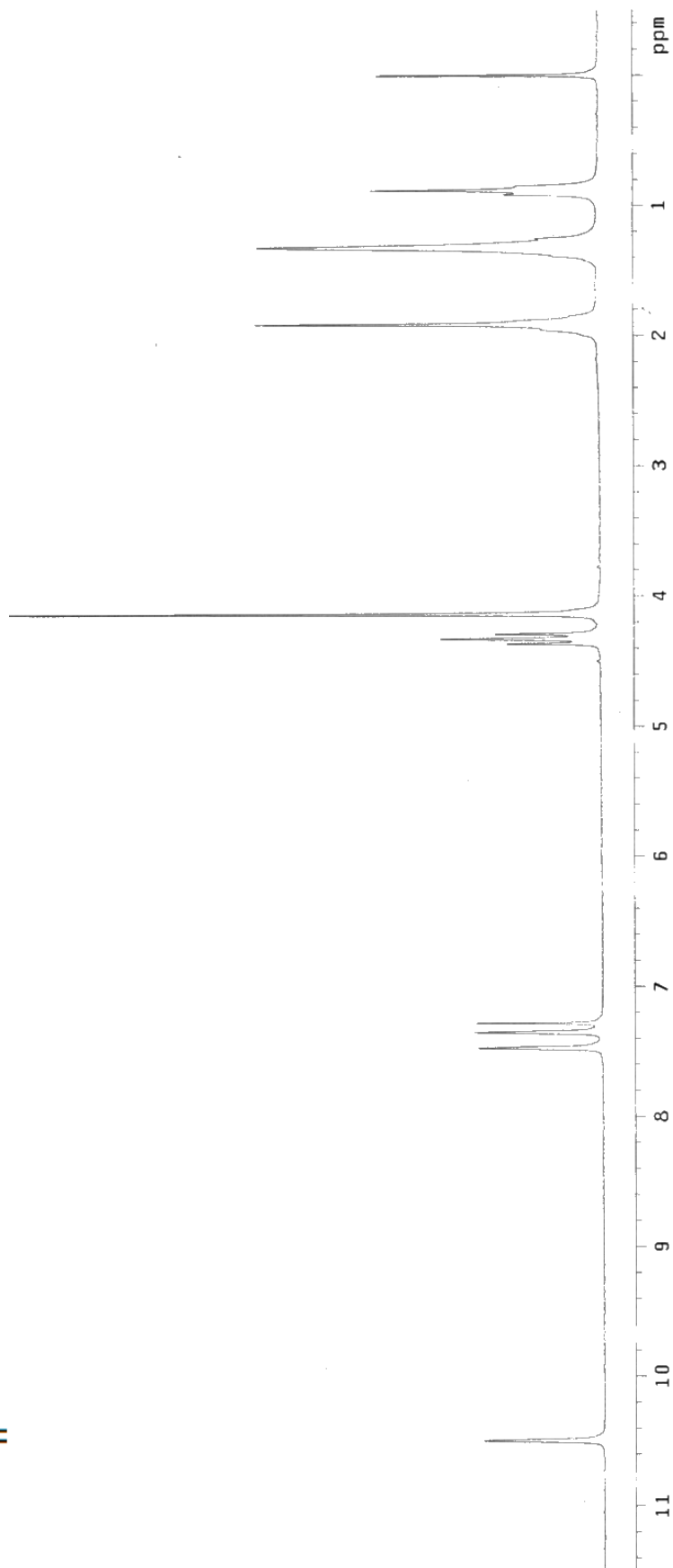






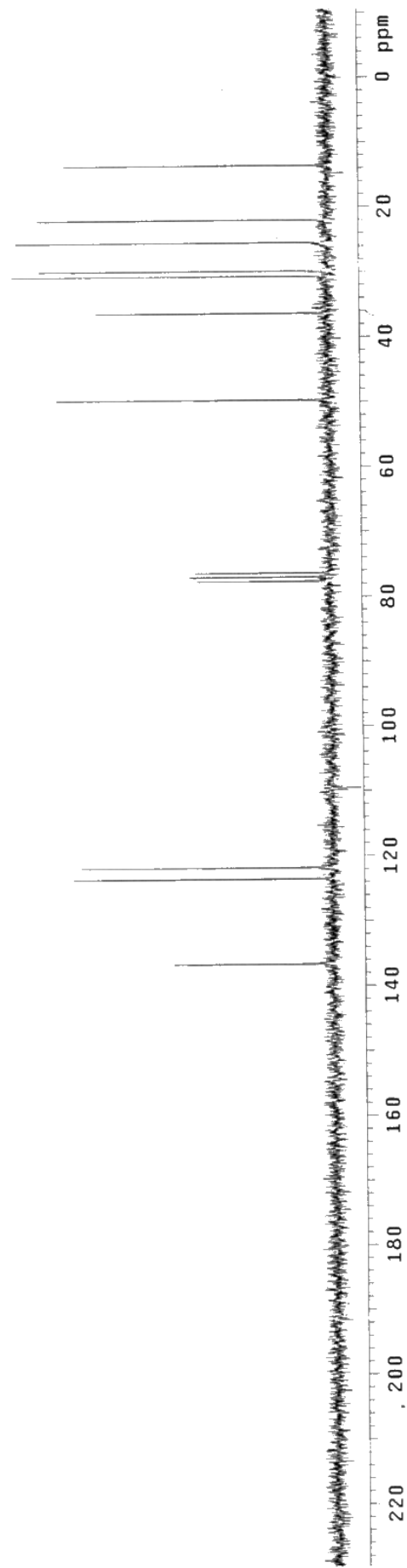


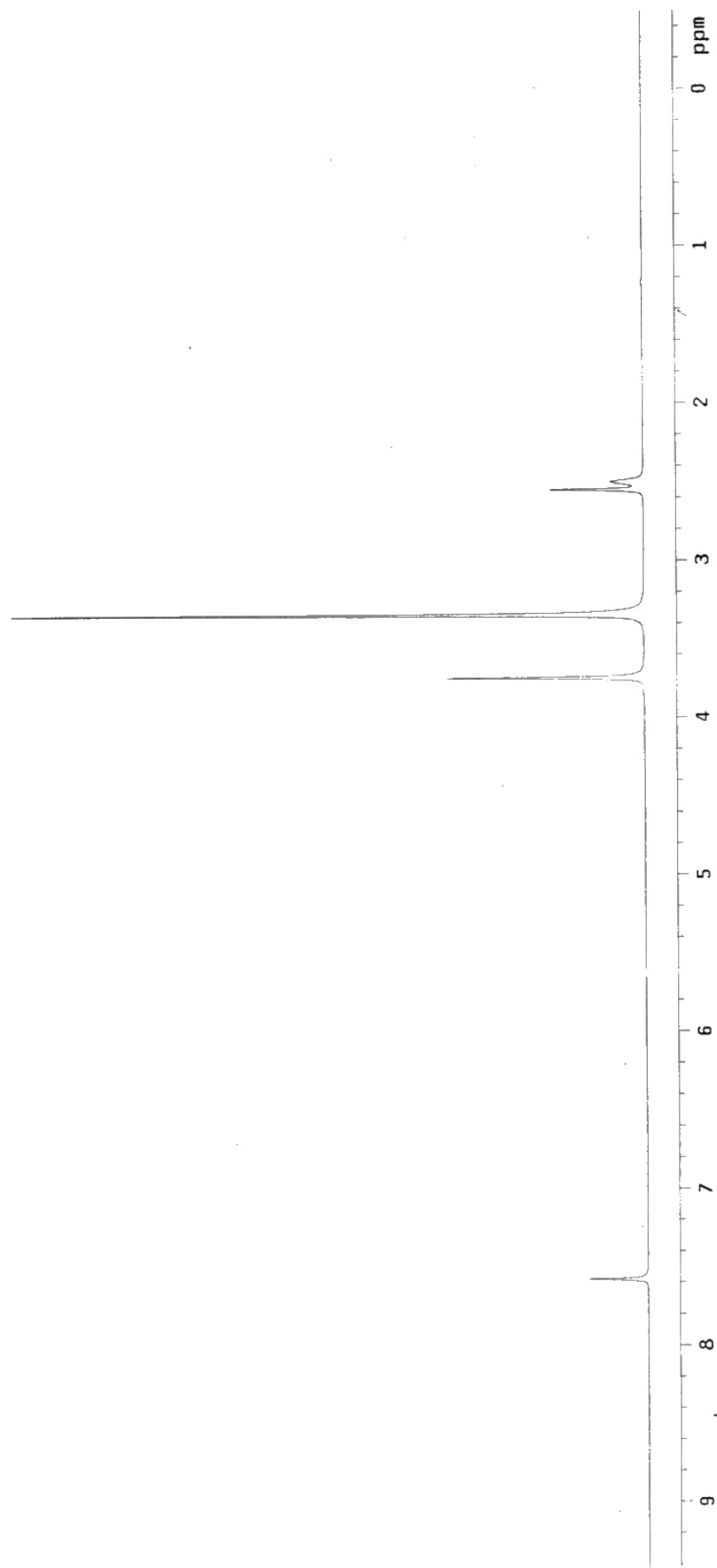
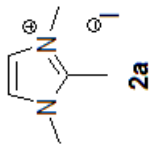


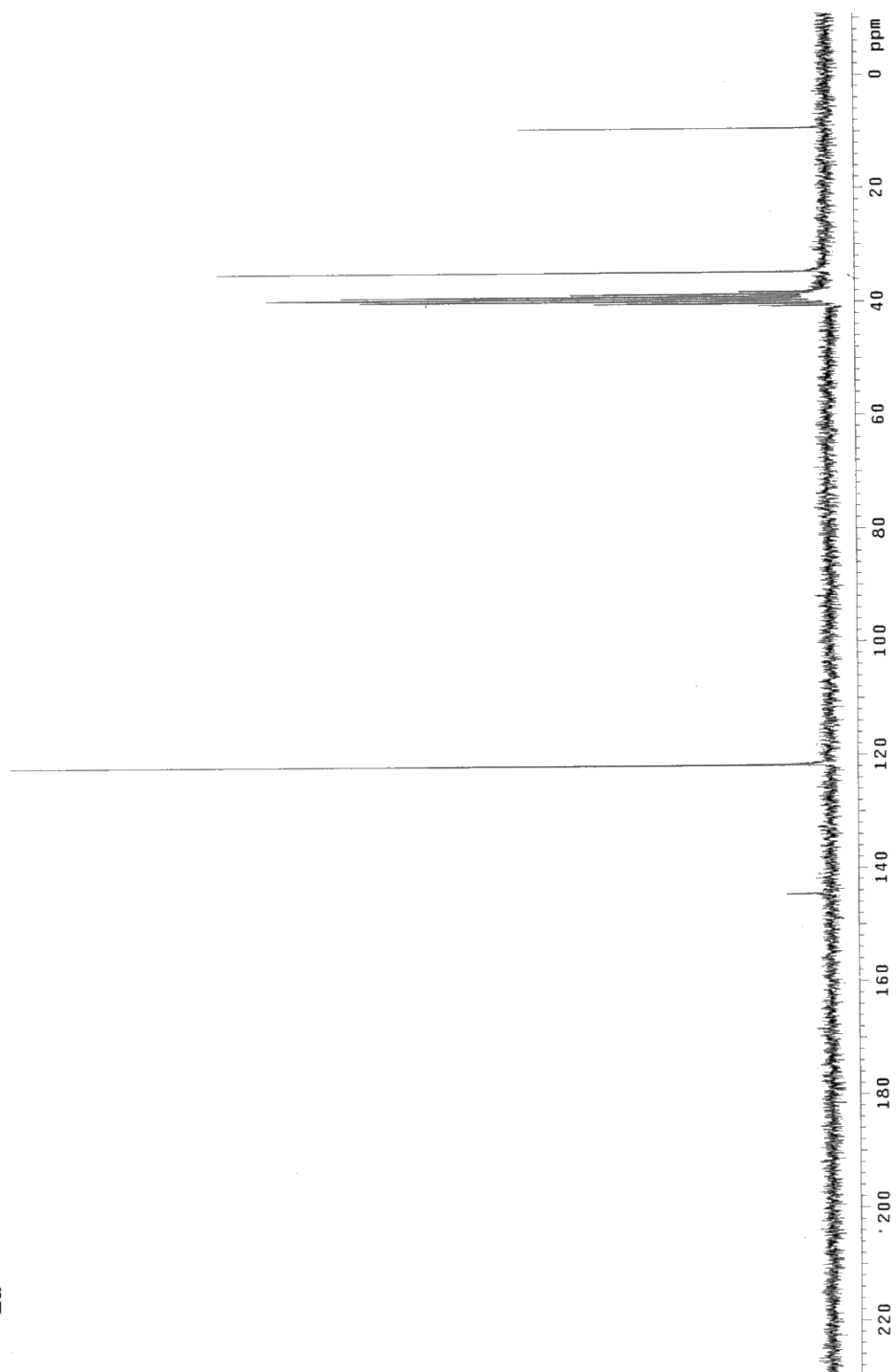
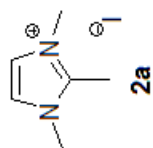


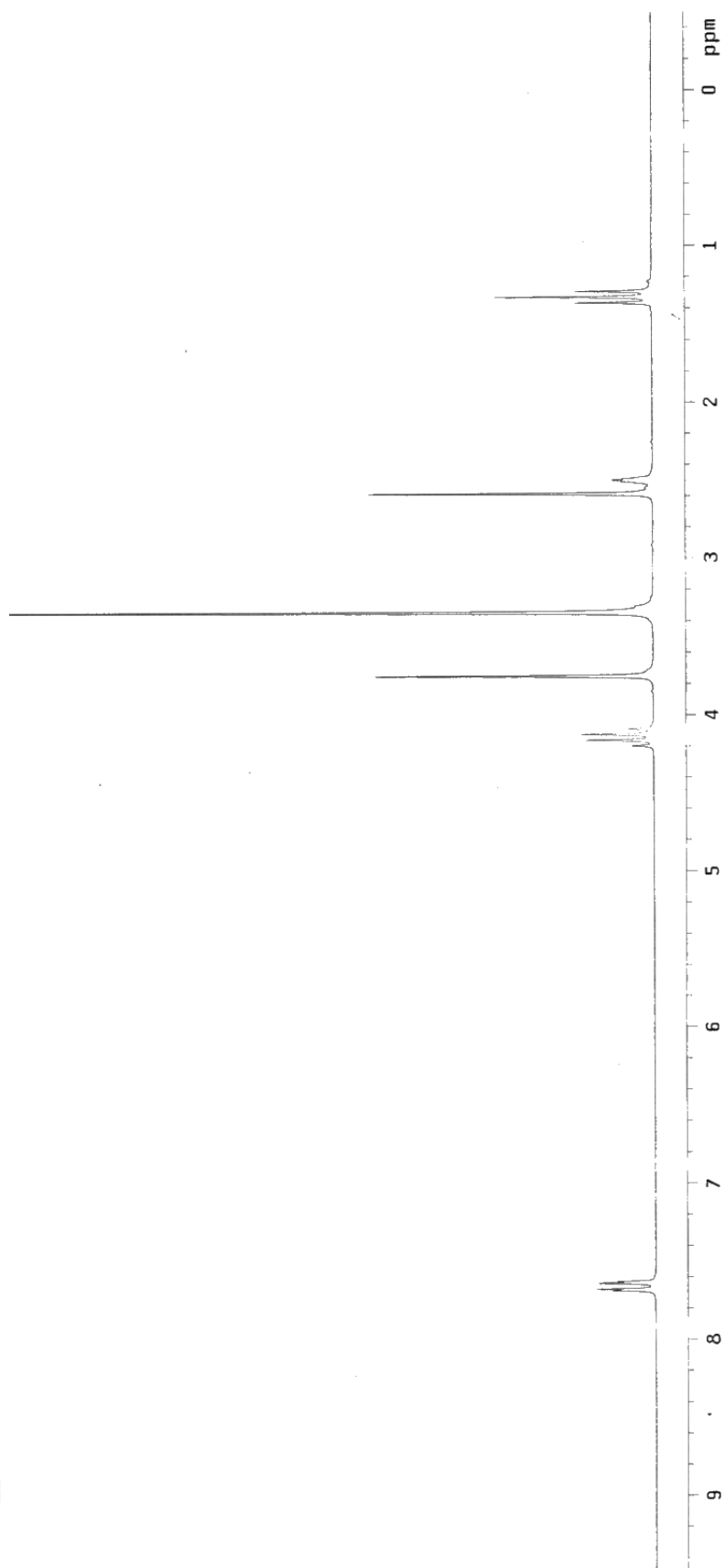
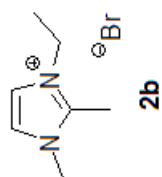


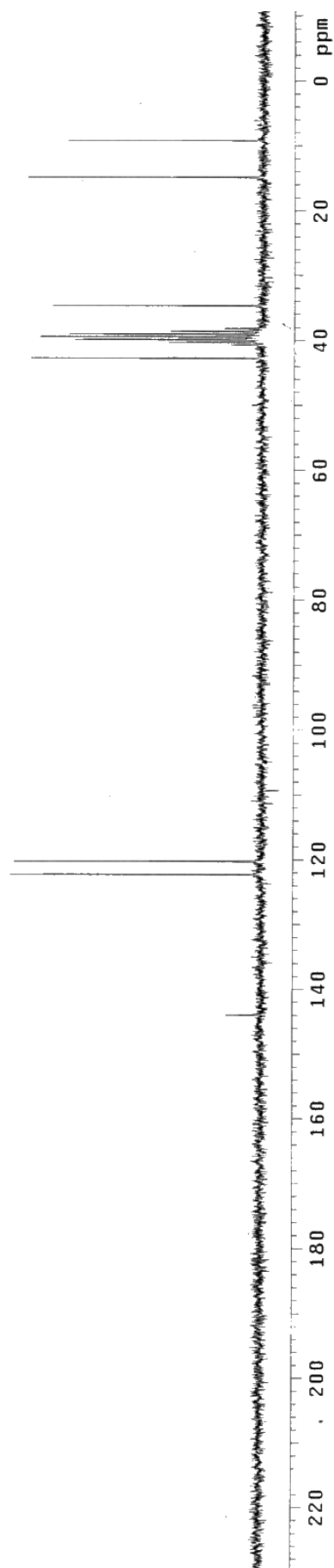
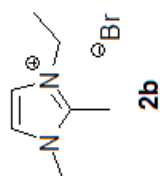
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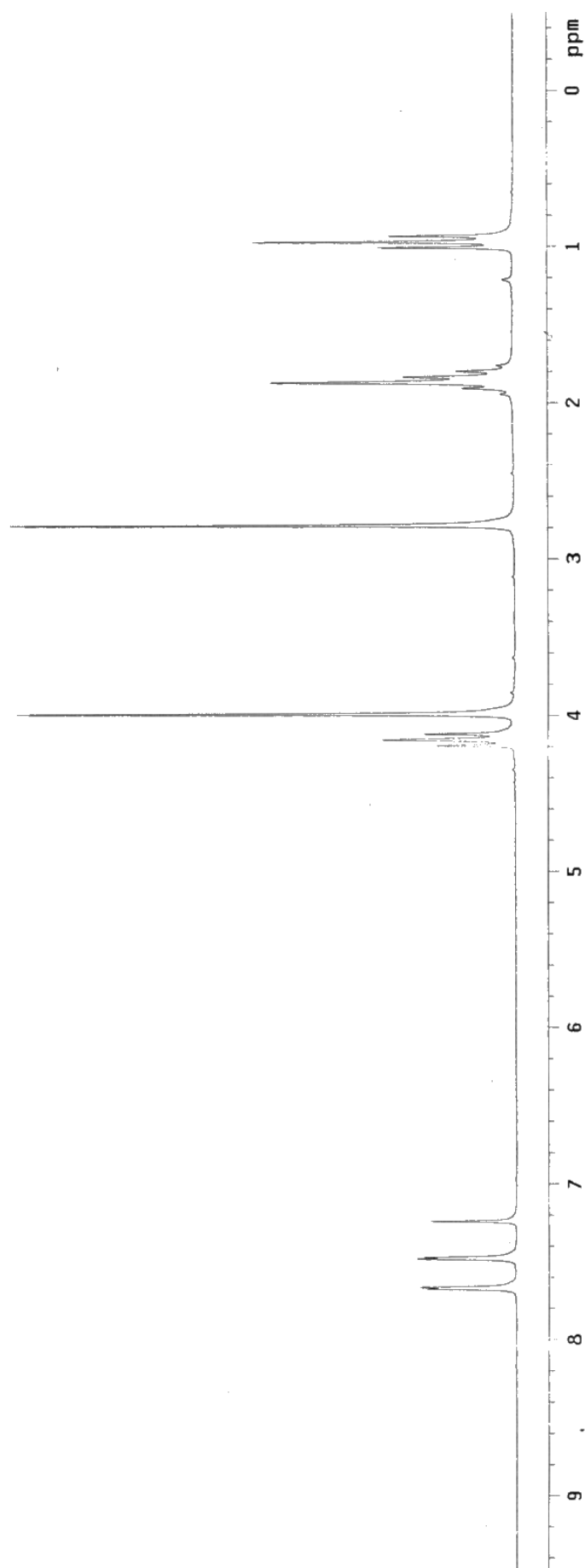
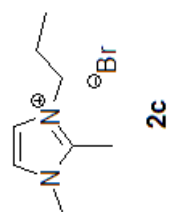


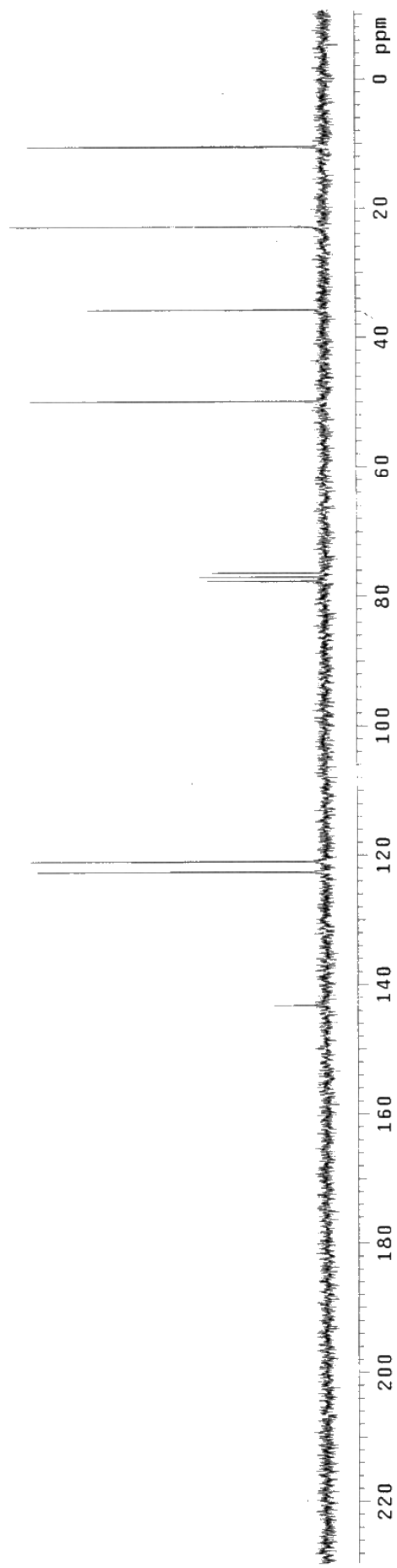
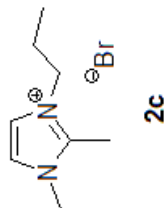


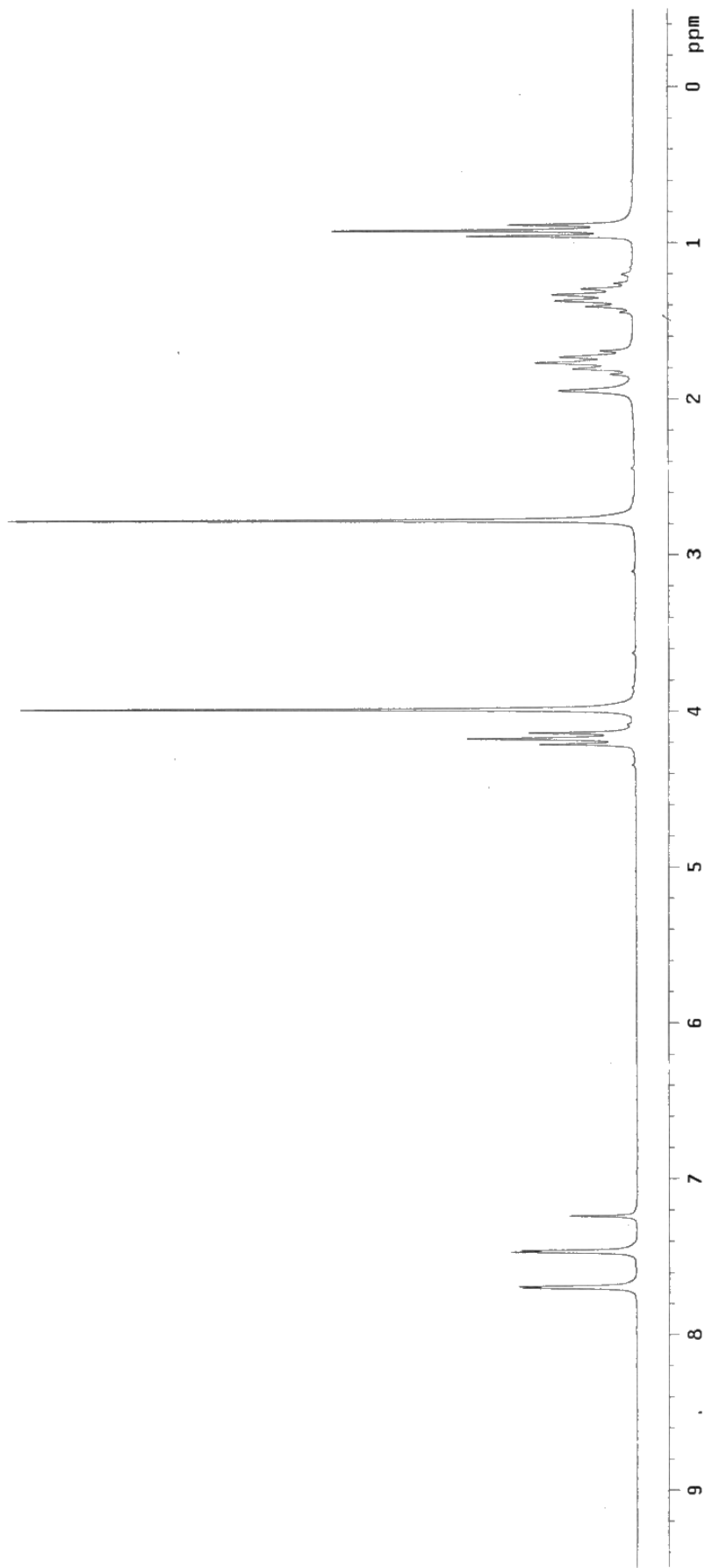
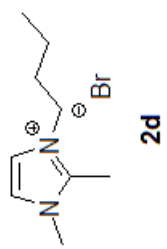


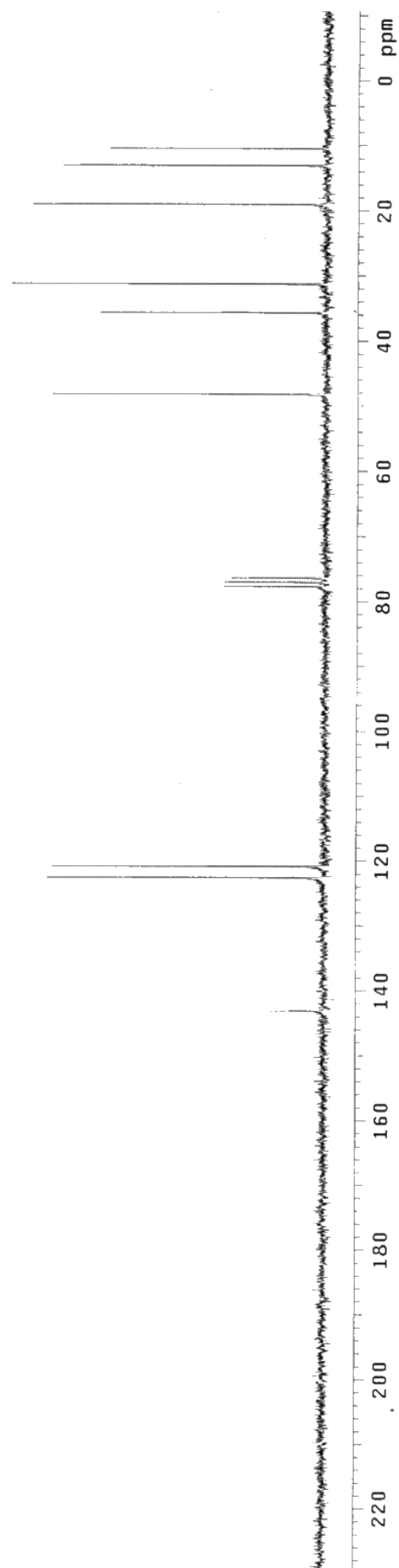
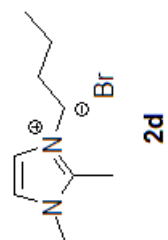


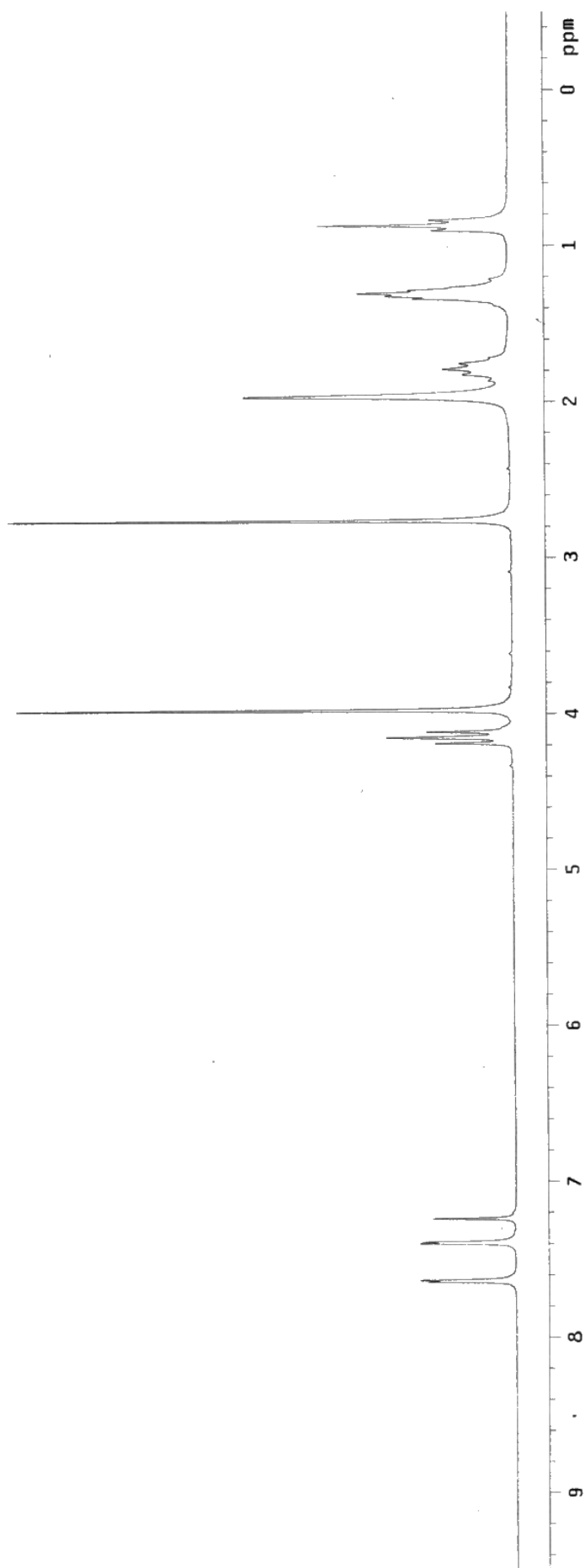


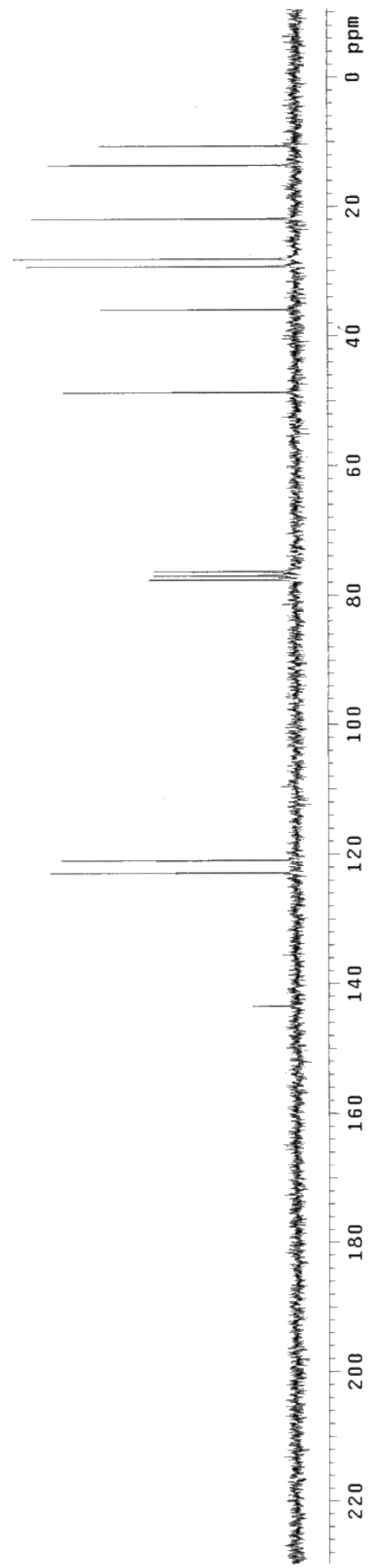


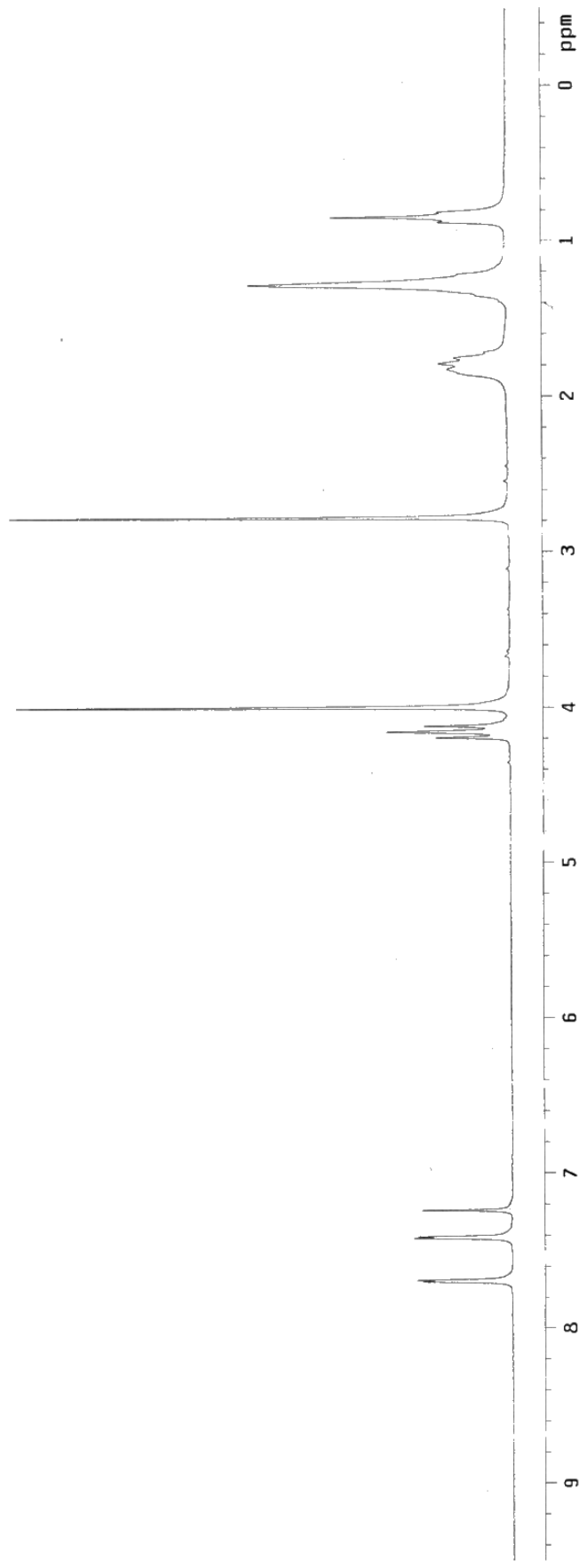


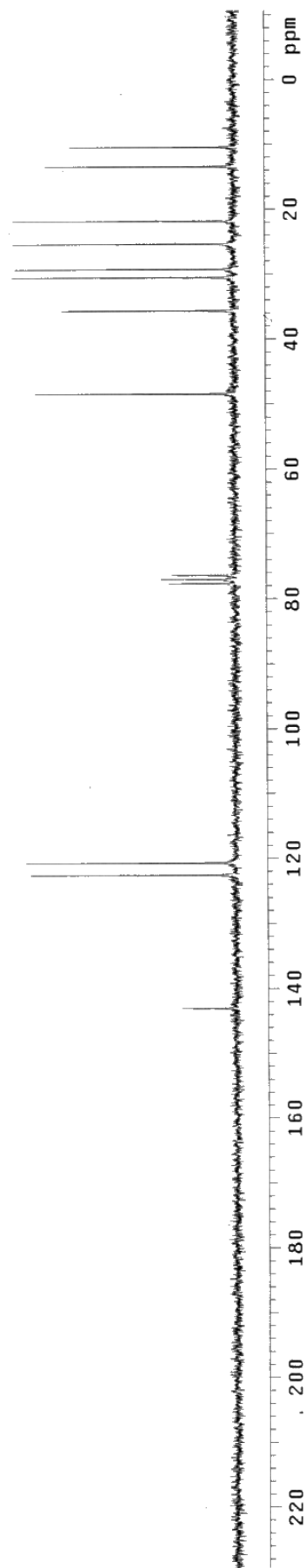


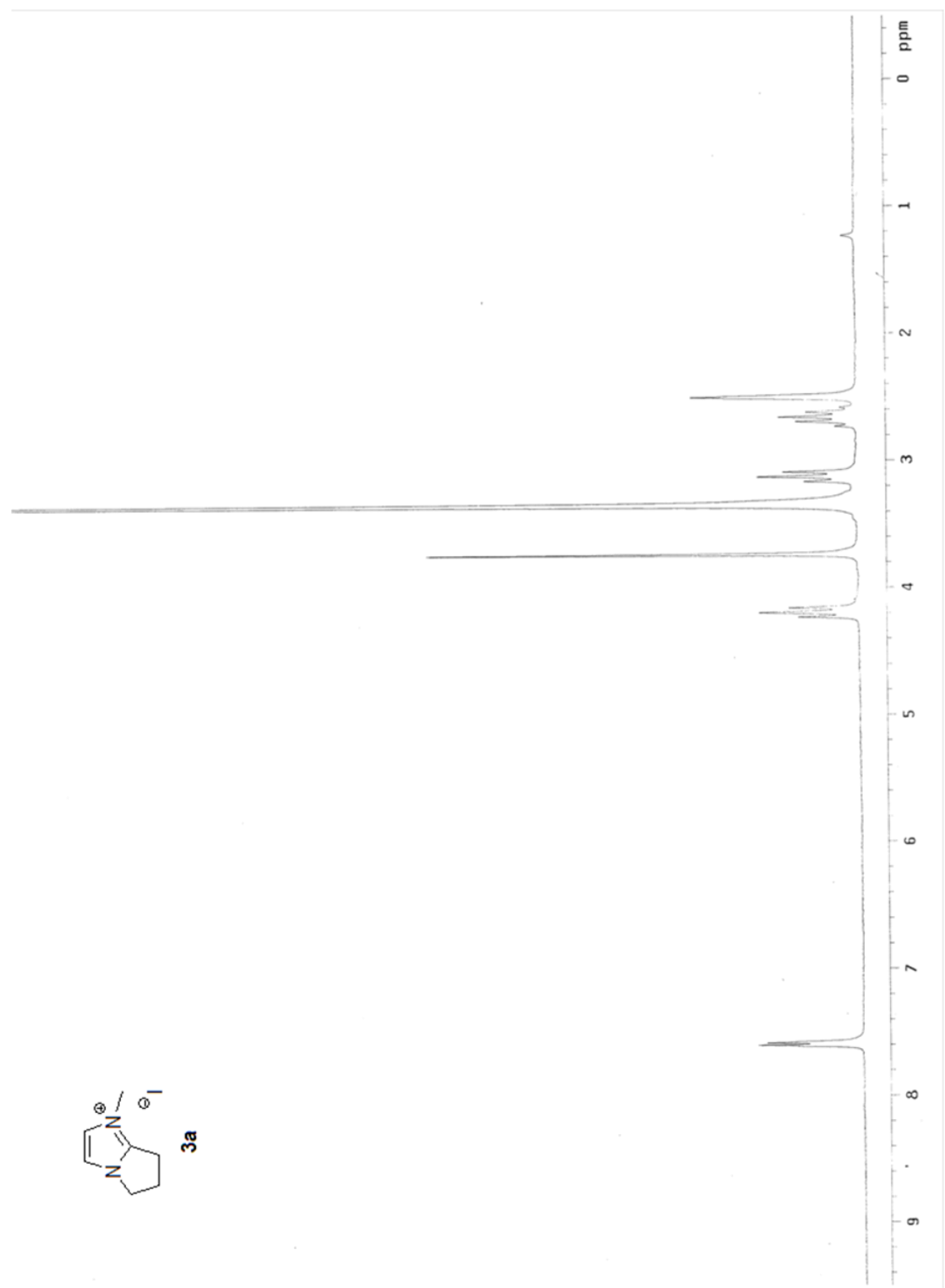


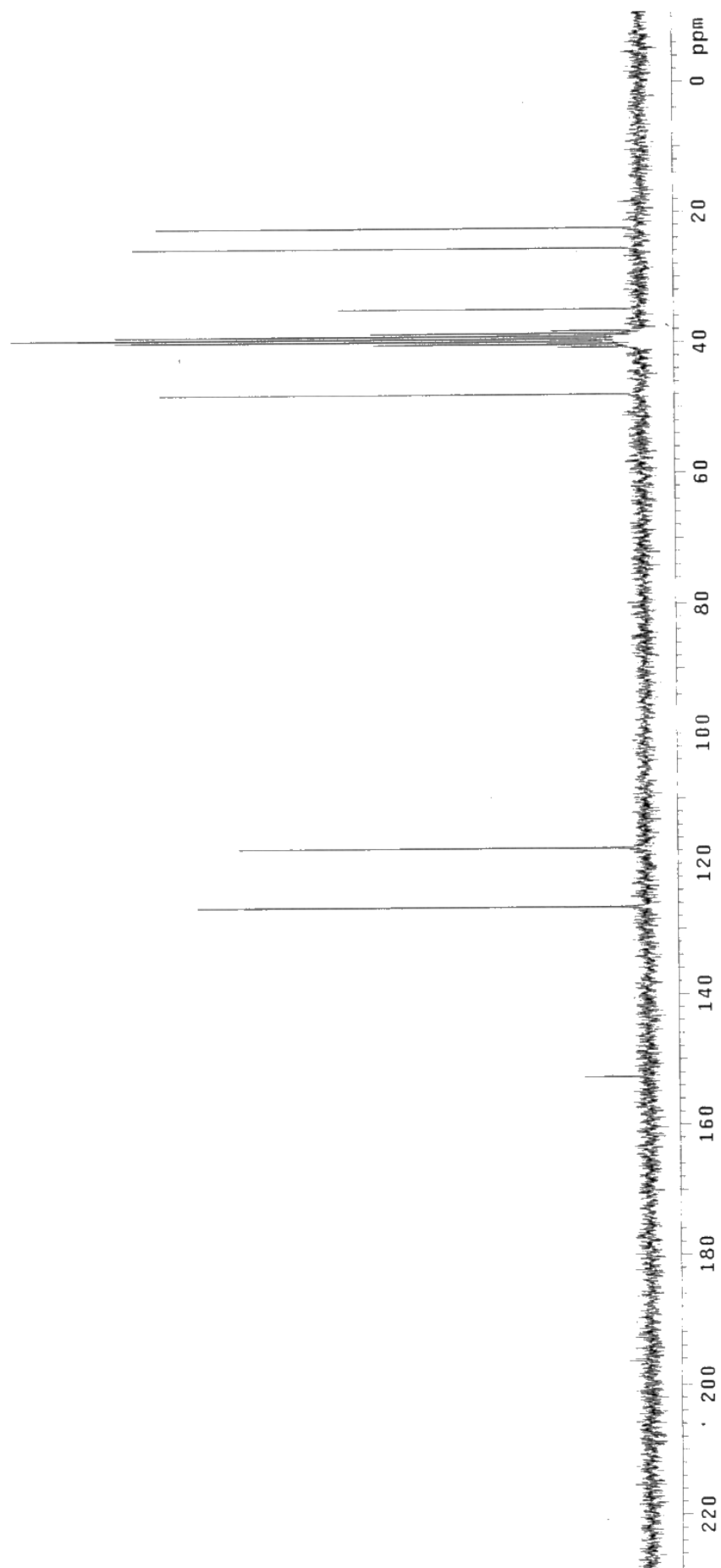
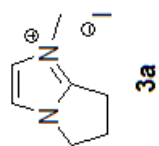


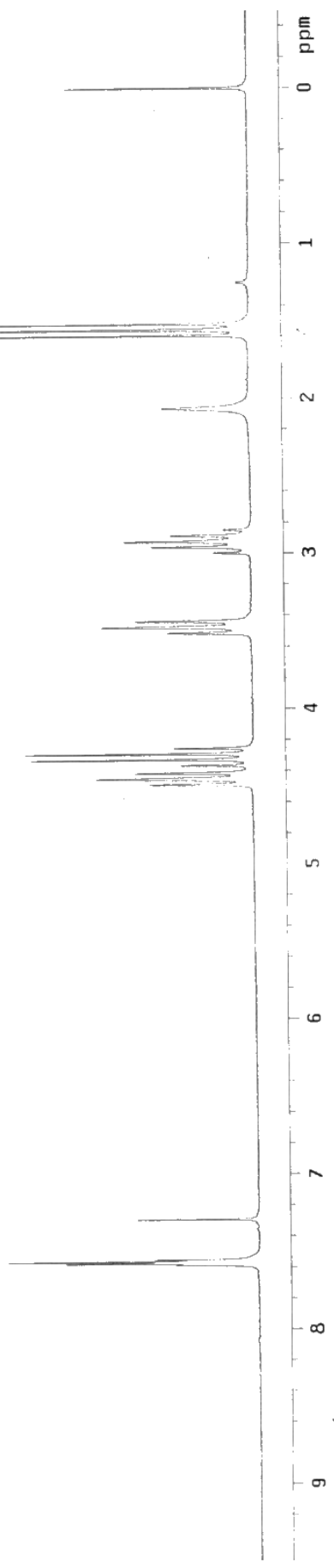
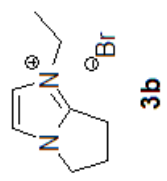


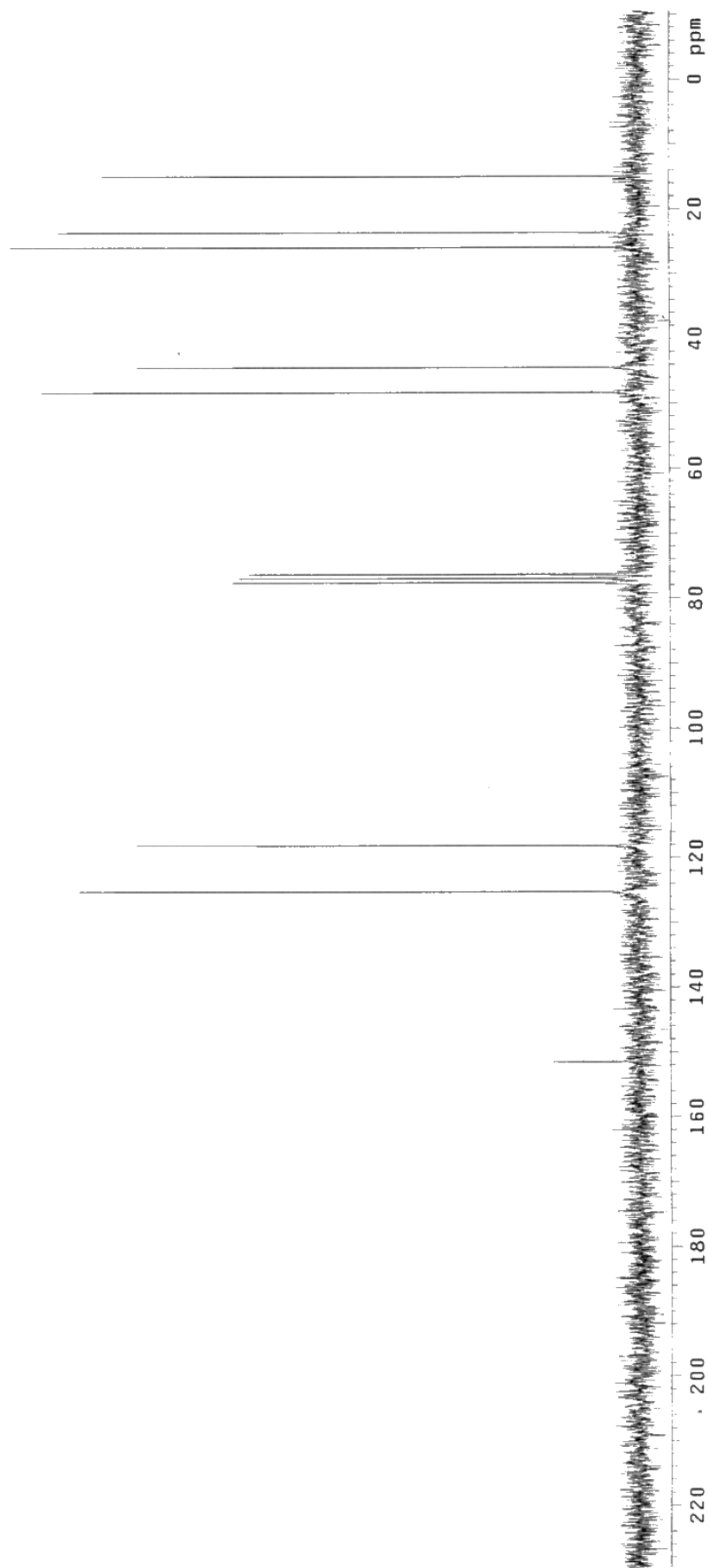
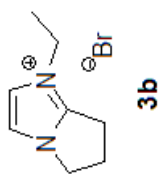


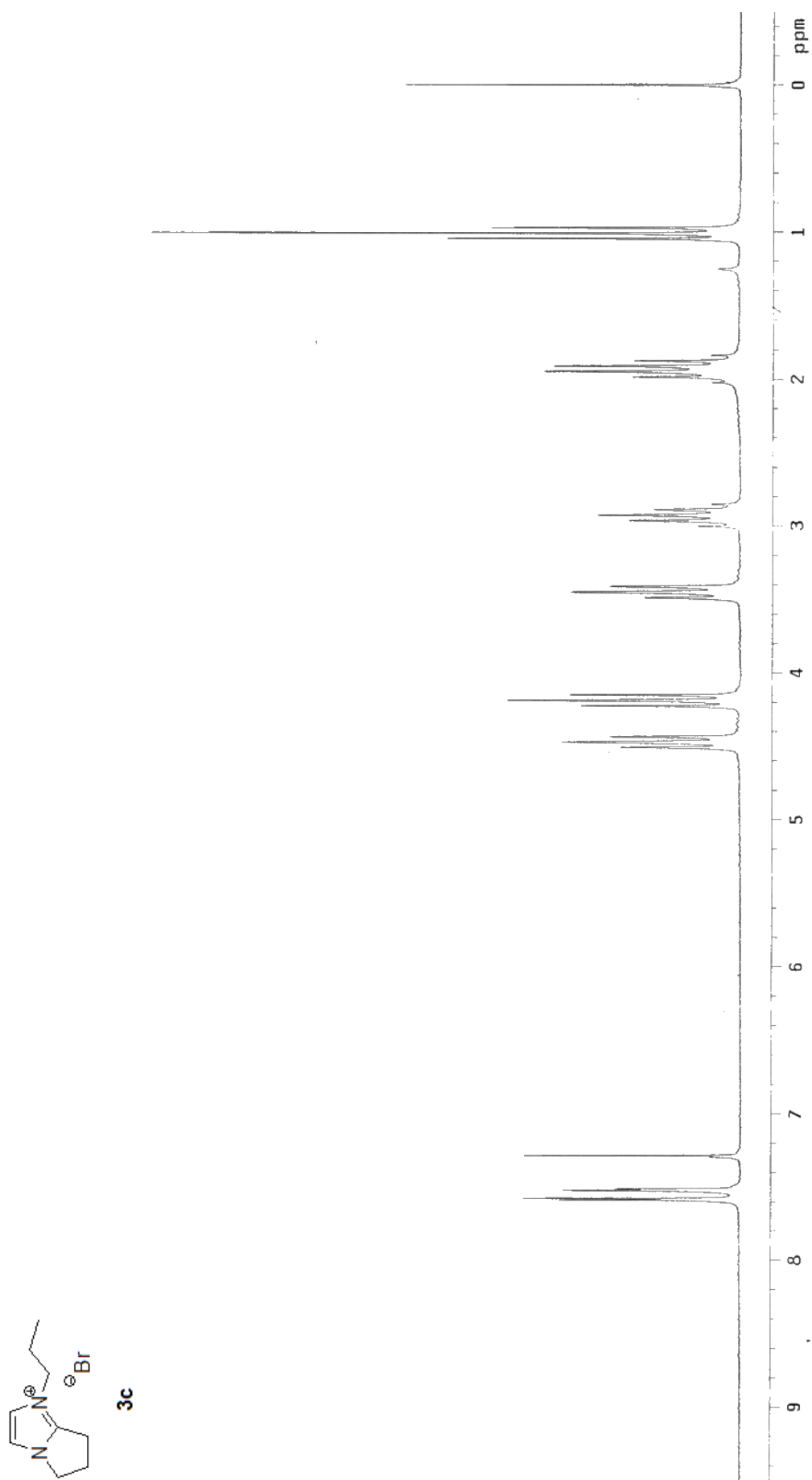


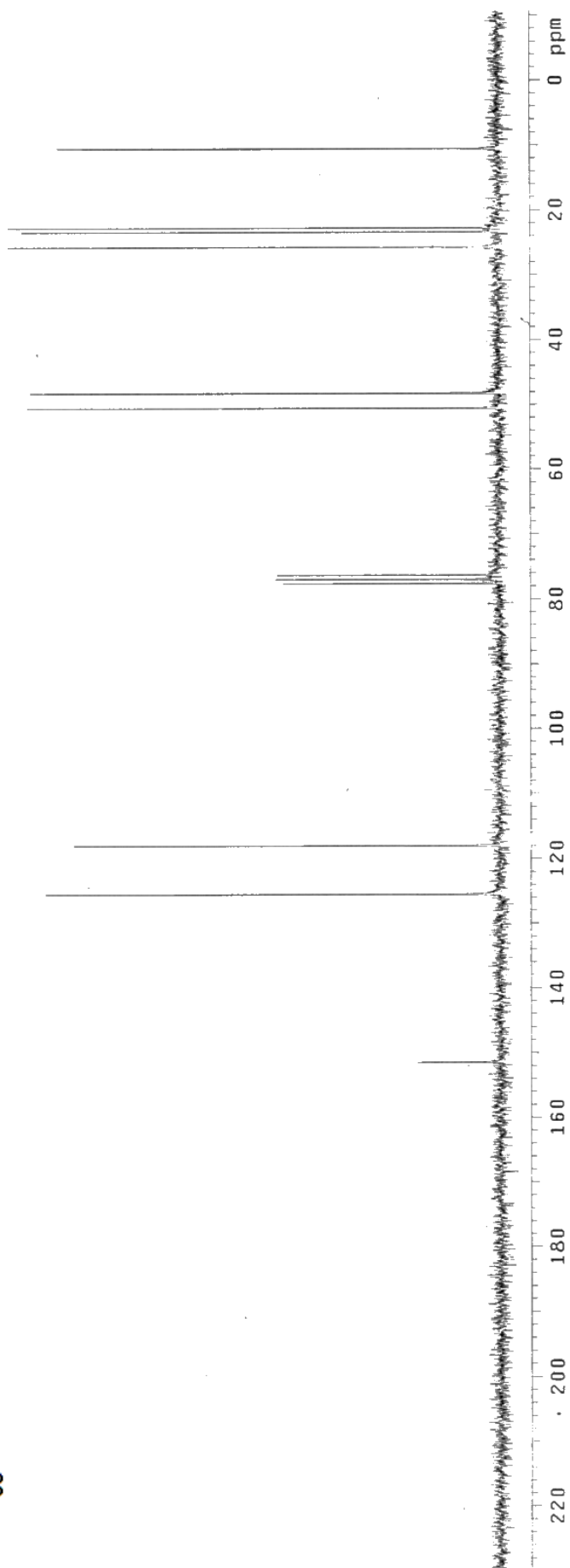
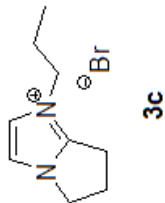


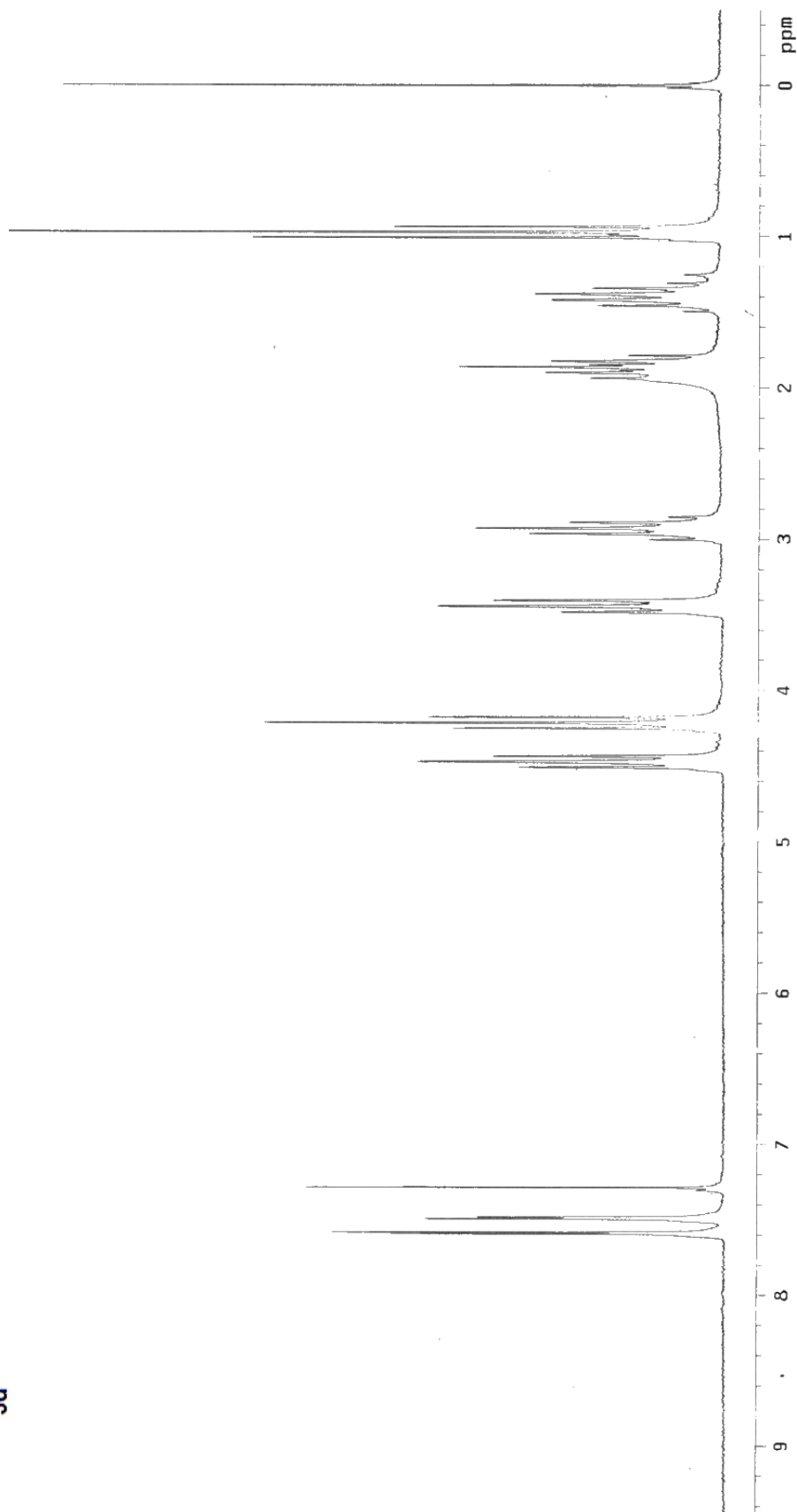
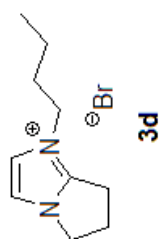


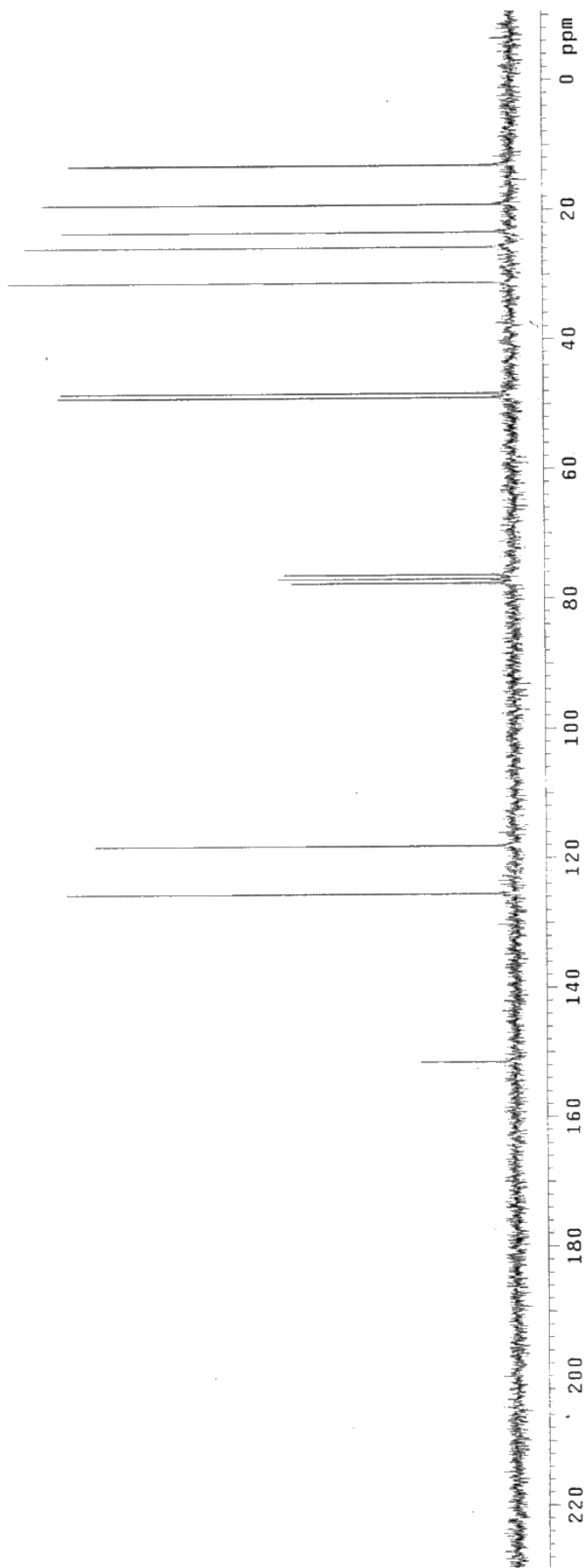
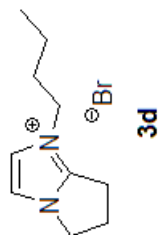


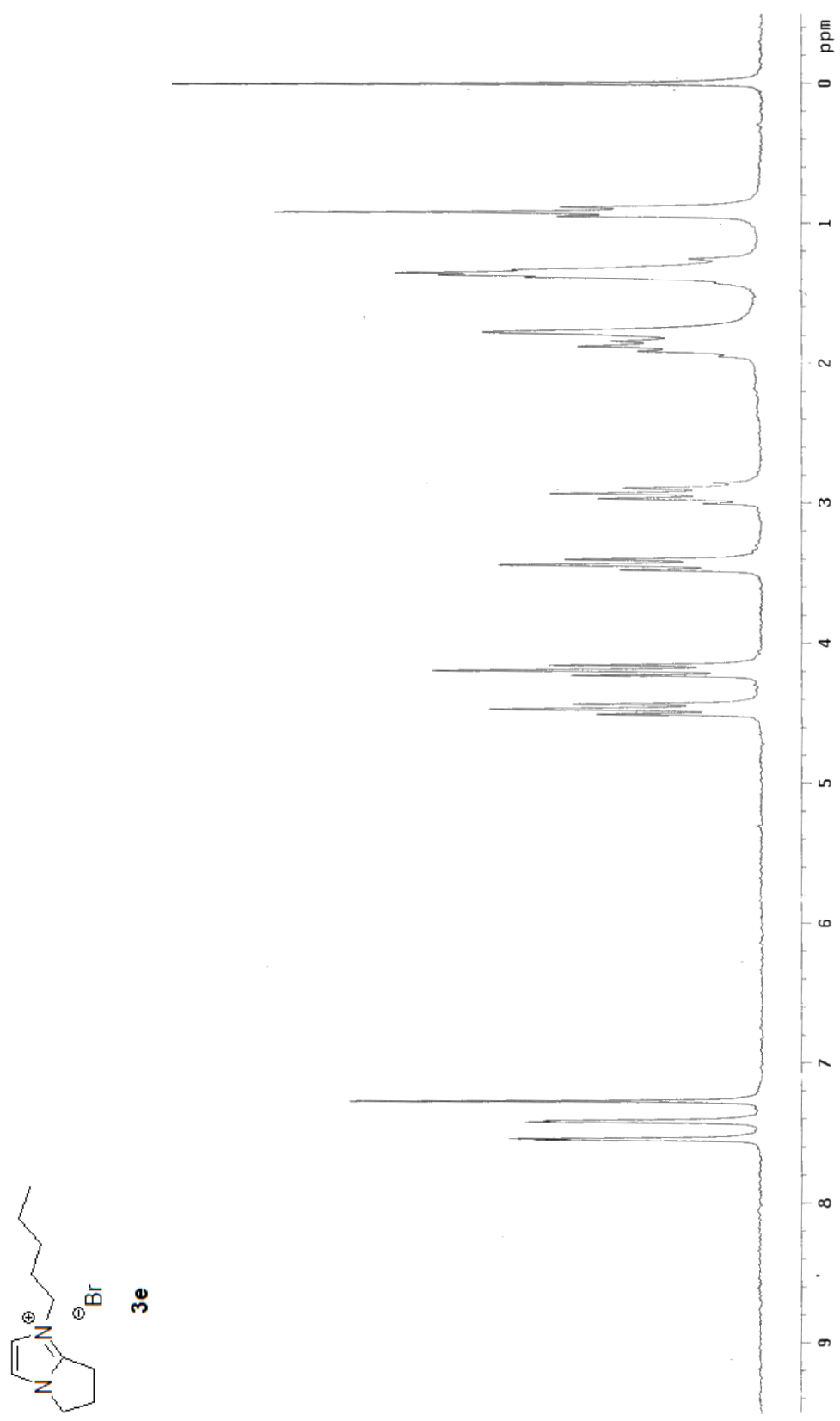


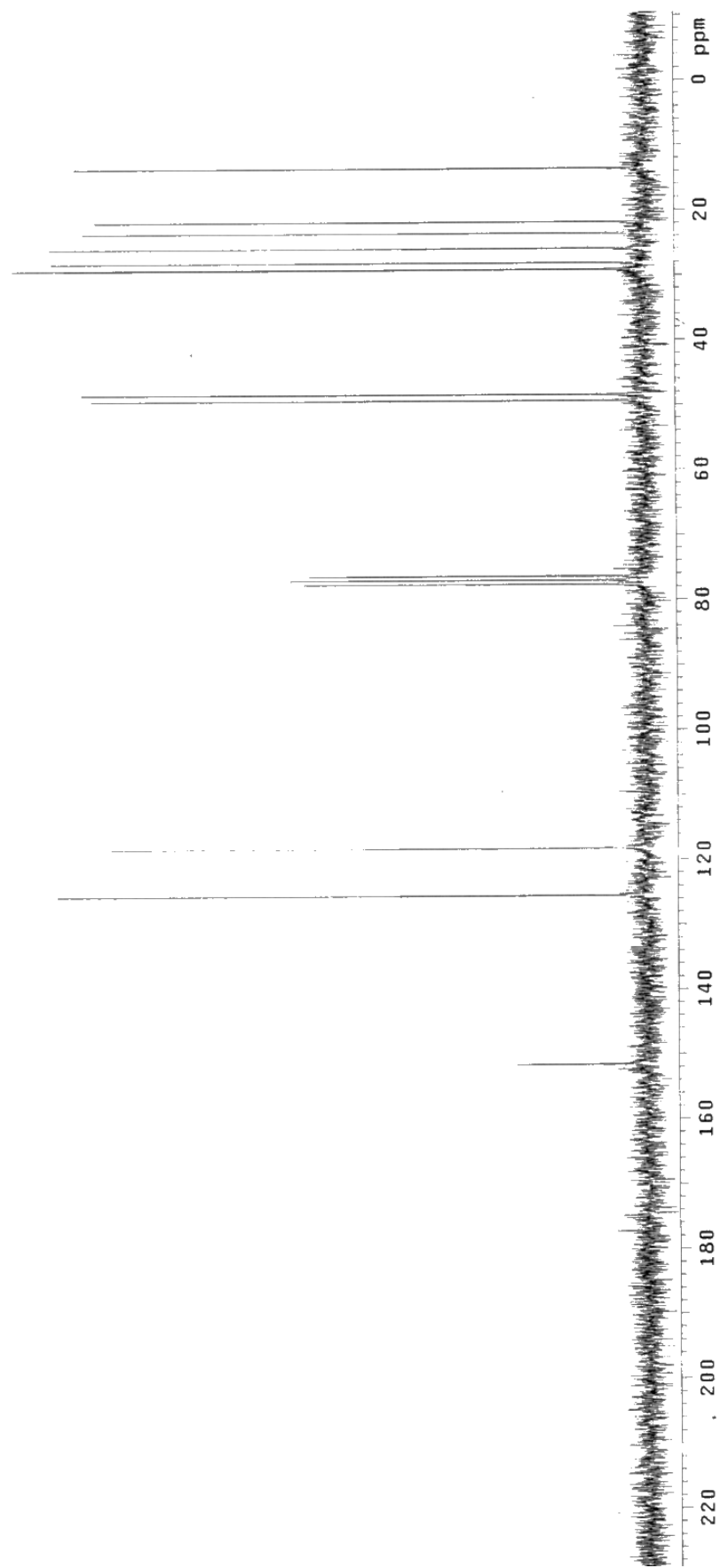




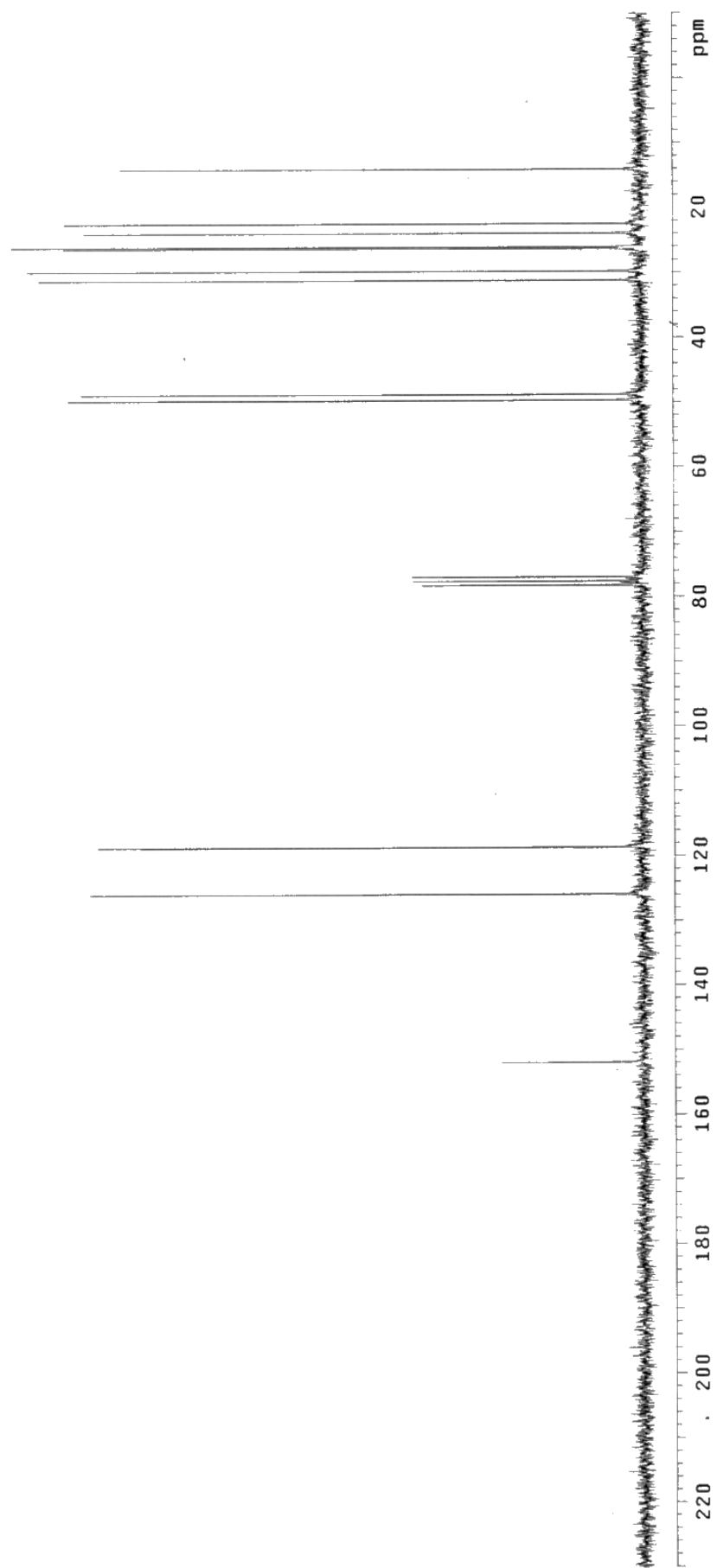


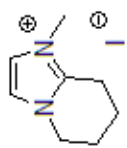












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