Antimicrobial Polymethacrylates based on Quaternized 1,3-Thiazole and 1,2,3-Triazole Side-Chain Groups

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Electronic Supplementary Information (ESI)

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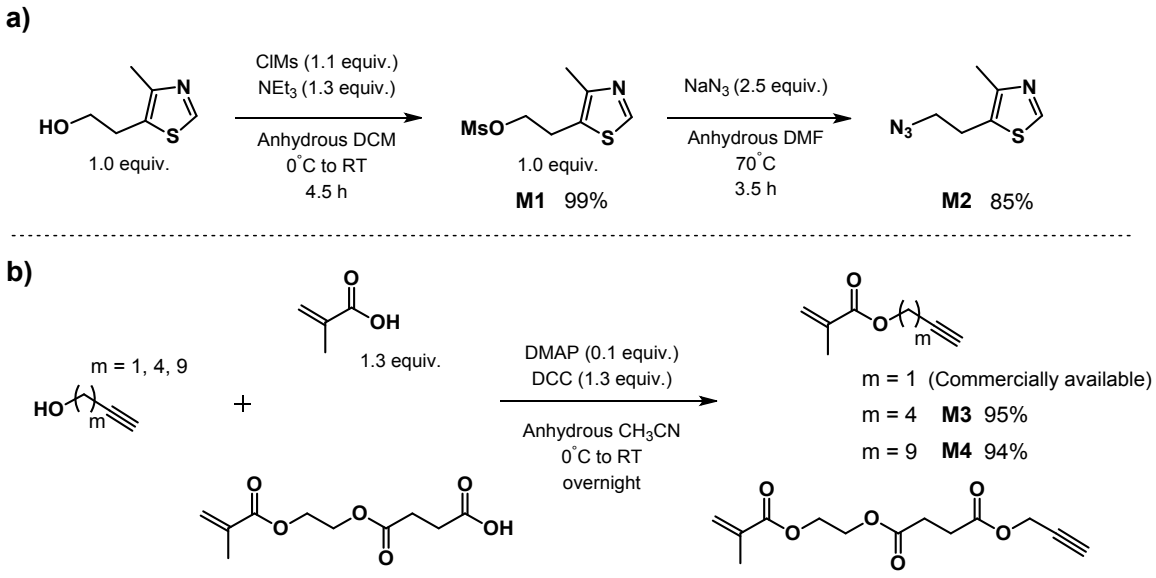
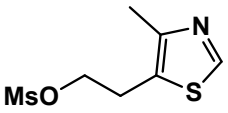


Scheme S1. Synthesis of 'Clickable' **Intermediates:** a) synthesis of the mesylate, **M1**, and the azide, **M2**; b) synthesis of novel alkynyl methacrylate intermediates with different spacer lengths, **M3**, **M4**, and succinate derivative, **M5**, by Steglich esterification.

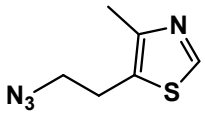
2-(4-methylthiazol-5-yl)ethyl methanesulfonate (M1)



M1 was prepared on a multi-gram scale under similar reaction conditions described in literature:[1] An oven-dried 500 mL three-necked round-bottomed flask containing a magnetic stirring bar under argon atmosphere was charged with 5-(2-hydroxyethyl)-4-methylthiazole (62.7 mL, 534 mmol) and anhydrous CH_2Cl_2 (250 mL) and was placed at 0 °C. After addition of freshly distilled TEA (78 mL, 593 mmol), MsCl (43 mL, 593 mmol) was added dropwise over 60 min at the same temperature. After stirring at room temperature for 4 h, the reaction mixture was diluted with a saturated aqueous solution of $NaHCO_3$ (250 mL) and transferred to a separatory funnel. The organic layer was separated and the aqueous phase was extracted with CH_2Cl_2 (2 × 100 mL). The combined organic layers were dried over anhydrous $MgSO_4$, filtered and the solvent was removed by rotary evaporation to give **M1** as orange oil that solidified on standing at 0 °C (117.2 g, 99% yield) which was used in the next step without further purification.

TLC: R_f = 0.38 (hexane/EtOAc, 1:1; UV, $KMnO_4$); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 8.64 (s, 1H; CH thiazole), 4.36 (t, J = 6.6 Hz, 2H; OCH_2), 3.22 (t, J = 6.6 Hz, 2H; CH_2), 2.96 (s, 3H; CH_3), 2.43 (s, 3H; CH_3 thiazole); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 150.0 (2C), 125.0, 68.4, 37.1, 26.0, 14.4; IR (neat): 3080 (C-H thiazole), 2940 (C-H), 1544 (C N thiazole), 1166 (C-O) cm^{-1}; HRMS (ESI): required for $C_7H_{12}NO_3S_2$ $[MH]^+$, 222.0253; found, 222.0258; Anal. Calcd. for $C_7H_{11}NO_3S_2$: C 37.99, H 5.01, N 6.33, S 28.98; found: C 37.74, H 4.98, N 6.09, S 29.12.

5-(2-azidoethyl)-4-methylthiazole (M2)

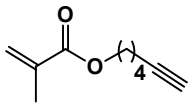


The azido compound **M2** was prepared on a multi-gram scale, under similar reaction conditions found in literature:[2] An oven-dried 2 L round-bottomed flask containing a magnetic stirring bar under argon atmosphere was charged with **M1** (100.0 g, 452 mmol) and anhydrous DMF (1000 mL) and then NaN_3 (73.5 g, 1130 mmol) was added in several portions. The reaction mixture was heated at 70 °C under stirring for 4.0 h, cooled to 25 °C and the solvent was evaporated under reduced pressure. The crude was dissolved in EtOAc/H_2O 1:1 (500 mL) and the organic layer was separated and washed with H_2O (3 × 200 mL). The combined organic layers were dried over anhydrous $MgSO_4$, filtered and the solvent was removed under reduced pressure to afford a dark orange oil residue that was purified by flash column chromatography (hexane/EtOAc, 3:1 to 1:1) to give **M2** as a clear yellow oil (64.5 g, 85% yield).*

TLC: R_f = 0.43 (hexane/EtOAc, 2:1; UV, $KMnO_4$); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 8.56 (s, 1H; CH thiazole), 3.45 (t, J = 6.8 Hz, 2H; OCH_2), 2.98 (t, J = 6.8 Hz, 2H; CH_2), 2.37 (s, 3H; CH_3 thiazole); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 150.0 (2C), 127.0, 52.0, 26.2, 14.9; IR (neat): 3076 (C-H thiazole), 2931 (C-H), 2088 (-N_3), 1544 (C N thiazole) cm^{-1}; HRMS (ESI): required for $C_6H_9N_4S$ $[MH]^+$, 169.0542; found, 169.0549; Anal. Calcd. for $C_6H_8N_4S$: C 42.84, H 4.79, N 33.31, S 19.06; found: C 43.00, H 4.71, N 32.98, S 18.79.

*Caution: organic azides are potentially dangerous and explosions may occur when handling them, although we experienced no problems in any case even on multigram quantities, the compound was stored at 4 °C.

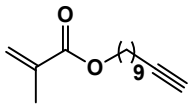
hex-5-yn-1-yl methacrylate (M3)



The intermediate was prepared using hex-5-yn-1-ol (50 mL, 431 mmol), DMAP (5.3 g, 43 mmol), freshly distilled 2-methylpropenoic acid (47.5 mL, 560 mmol) in anhydrous CH_3CN (200 mL) and a solution of DCC (115.5 g, 560 mmol) in dry CH_3CN (280 mL). After purification by flash column chromatography (hexane/EtOAc, 5:1 to 2:1), **M3** was isolated as a colorless oil (68.1 g, 95% yield).

TLC: R_f = 0.65 (hexane/EtOAc, 3:1; UV, $KMnO_4$); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 6.04 (m, 1H; CH), 5.50 (m, 1H; CH), 4.12 (t, J = 6.4 Hz, 2H; OCH_2) , 2.20 (td, J = 2.7, 7.0 Hz, 2H; CH_2), 1.92 (t, J = 2.7 Hz, 1H; ≡CH), 1.88 (m, 3H; CH_3), 1.80-1.73 (m, 2H; CH_2), 1.65-1.52 (m, 2H; CH_2); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 166.9 (C O), 136.0, 124.9 (CH_2), 83.4 (≡C-), 68.4 (≡CH), 63.7, 27.3, 24.6, 17.9, 17.7; IR (neat): 3290 (≡C-H), 2950 (C-H), 2116 (C≡C), 1714 (C O), 1637 (C C), 1157 (C-O) cm^{-1}; HRMS (ESI): required for $C_{10}H_{15}O_2$ $[MH]^+$, 167.1067; found, 167.1058; Anal. Calcd. for $C_{10}H_{14}O_2$: C 72.26, H 8.49; found: C 71.98, H 8.73.

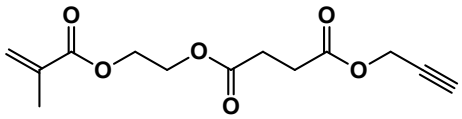
undec-10-yn-1-yl methacrylate (M4)



The compound was synthesized using undec-10-yn-1-ol (30.0 g, 169 mmol), freshly distilled 2-methylpropenoic acid (18.6 mL, 220 mmol), DMAP (2.1 g, 17 mmol) in anhydrous CH_3CN (100 mL) and a solution of DCC (45.4 g, 220 mmol) in dry CH_3CN (100 mL). After purification by flash column chromatography (hexane/EtOAc, 4:1 to 2:1), **M4** was obtained as a colorless oil (40.4 g, 94% yield).

TLC: R_f = 0.62 (hexane/EtOAc, 3:1; UV, $KMnO_4$); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 6.07 (m, 1H; =CH), 5.53 (m, 1H; =CH), 4.12 (t, J = 6.7 Hz, 2H; OCH_2), 2.17 (td, J = 7.0, 2.7 Hz, 2H; CH_2), 2.04-1.88 (m, 4H; CH_3 and ≡CH), 1.75-1.21 (m, 14H; $7CH_2$); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 167.6 (C=O), 136.7, 125.2 ($=CH_2$), 84.8 (≡C-), 68.2 (≡CH), 64.9, 29.5, 29.3, 29.1, 28.8, 28.7, 28.6, 28.1, 26.1, 18.5; IR (neat): 3320 (≡C-H), 2927 (C-H), 2845 (C-H), 2155 (C≡C), 1710 (C=O), 1638 (C=C), 1157 (C-O) cm^{-1}; HRMS (ESI): required for $C_{15}H_{25}O_2$ $[MH]^+$, 237.1849; found, 237.1855; Anal. Calcd. for $C_{15}H_{24}O_2$: C 76.23, H 10.24; found: C 75.99, H 10.06.

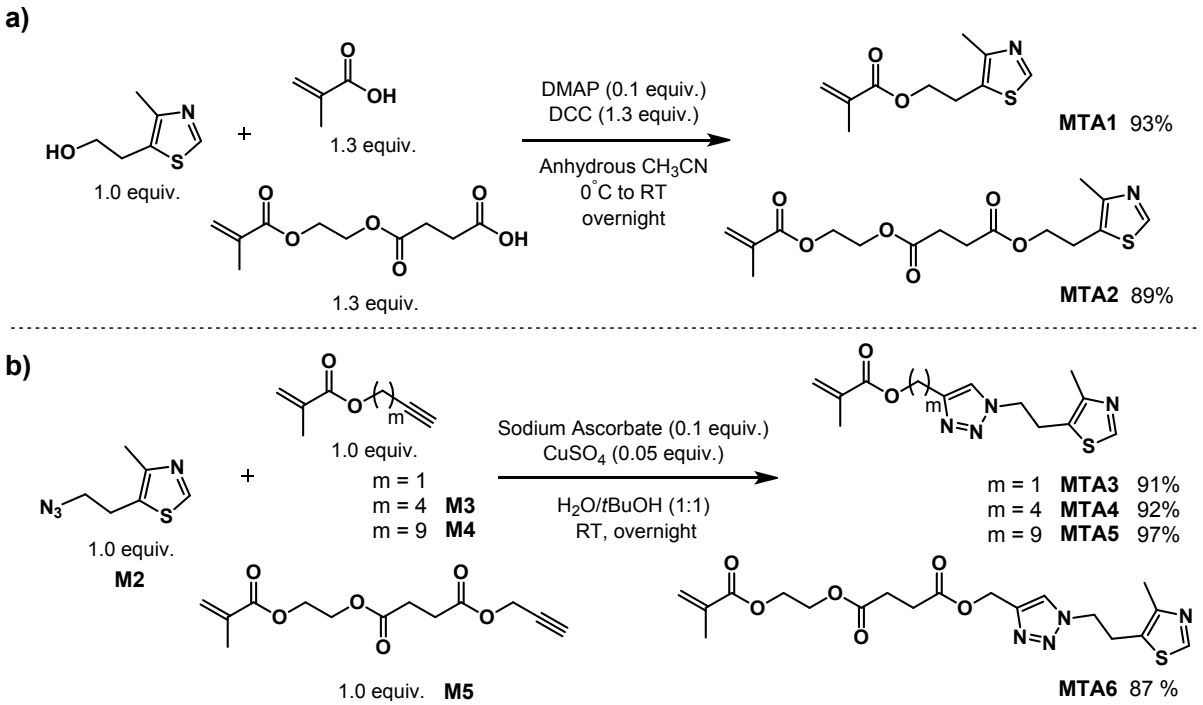
2-(methacryloyloxy)ethyl prop-2-yn-1-yl succinate (M5)



The compound was prepared using 2-propyn-1-ol (19.9 mL, 342 mmol), 4-(2-(methacryloyloxy)ethoxy)-4-oxobutanoic acid (85.9 mL, 444 mmol), DMAP (4.2 g, 34 mmol) in anhydrous CH_3CN (175 mL) and a solution of DCC (91.6 g, 444 mmol) in dry CH_3CN (225 mL). After purification by flash column chromatography (hexane/EtOAc, 5:1 to 2:1), **M5** was obtained as a very viscous colorless oil (81.7 g, 89% yield).

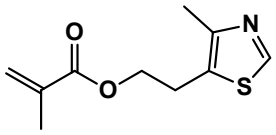
TLC: R_f = 0.52 (hexane/EtOAc, 2:1; UV, $KMnO_4$); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 6.10 (m, 1H; =CH), 5.57 (dd, J = 1.2, 1.6 Hz, 1H; =CH), 4.67 (d, J =2.5 Hz, 2H; OCH_2), 4.32 (m, 4H; $2OCH_2$), 2.65 (m, 4H; $2CH_2CO$), 2.47 (t, J = 2.5 Hz, 1H; ≡CH), 1.91 (dd, J = 1.2, 1.6 Hz, 3H; CH_3); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 171.8 (C=O), 171.4 (C=O), 167.0 (C=O), 135.9, 126.0 ($=CH_2$), 77.5 (≡C), 75.1 (≡CH), 62.5, 62.3, 52.2, 28.8 (2C), 18.2; IR (neat): 3269 (≡C-H), 2939 (C-H), 2857 (C-H), 2122 (C≡C), 1736 (C=O), 1718 (C=O), 1638 (C=C), 1144 (C-O) cm^{-1}; HRMS (ESI): required for $C_{13}H_{17}O_6$ $[MH]^+$, 269.1020; found, 269.1022; Anal. Calcd. for $C_{13}H_{16}O_6$: C 58.20, H 6.01; found: C 58.12, H 5.99.

2. Synthesis and characterization of MTA monomers



Scheme S2. Synthesis of methacrylate monomers: a) 1,3-thiazole heterocyclic **MTA1** and **MTA2** by Steglich esterification; b) 1,3-thiazole and 1,2,3-triazole bis-heterocyclic **MTA3**, **MTA4**, **MTA5** and **MTA6** by copper catalyzed azide alkyne cycloaddition (CuAAC): 'Click' chemistry.

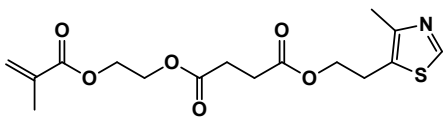
2-(4-methylthiazol-5-yl)ethyl methacrylate (MTA1)



The monomer was synthesized using 5-(2-hydroxyethyl)-4-methylthiazole (40.9 mL, 350 mmol), DMAP (4.2 g, 35.0 mmol), freshly distilled 2-methylpropenoic acid (38.4 mL, 454 mmol) in anhydrous CH_3CN (175 mL) and a solution of DCC (94.0 g, 454 mmol) in dry CH_3CN (225 mL). After purification by flash column chromatography (hexane/EtOAc, 10:1 to 4:1), **MTA1** was isolated as a yellow oil (68.8 g, 93% yield).

TLC: R_f = 0.35 (hexane/EtOAc, 2:1; UV, $KMnO_4$); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 8.55 (s, 1H; CH thiazole), 6.07 (m, 1H; CH), 5.54 (m, 1H; CH), 4.27 (t, J = 6.5 Hz, 2H; OCH_2), 3.10 (t, J = 6.5 Hz, 2H; CH_2), 2.38 (s, 3H; CH_3 thiazole), 1.89 (dd, J = 1.2, 1.5 Hz, 3H; CH_3); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 167.1 (CO), 149.9 (2C), 136.0, 126.8, 126.0 (CH_2), 64.3, 25.8, 18.3, 14.9; IR (neat): 3084 (C-H thiazole), 2962 (C-H), 2922 (C-H), 1711 (CO), 1636 (CC), 1543 (CN thiazole), 1151 (C-O) cm^{-1}; HRMS (ESI): required for $C_{10}H_{14}NO_2S$ $[MH]^+$, 212.0740; found, 212.0749; Anal. Calcd. for $C_{10}H_{13}NO_2S$: C 56.85, H 6.20, N 6.63, S 15.18; found: C 56.57, H 6.50, N 6.37, S 15.42.

2-(methacryloyloxy)ethyl (2-(4-methylthiazol-5-yl)ethyl) succinate (MTA2)

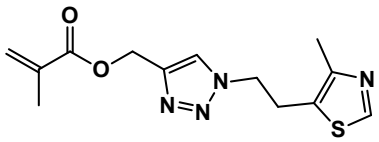


The monomer was prepared using 5-(2-hydroxyethyl)-4-methylthiazole (25.2 mL, 206 mmol), 4-(2-

(methacryloyloxy)ethoxy)-4-oxobutanoic acid (61.7 g, 268 mmol), DMAP (2.6 g, 21 mmol) in dry CH_3CN (100 mL) and a solution of DCC (55.3 g, 268 mmol) in CH_3CN (130 mL). After purification by flash column chromatography (hexane/EtOAc, 2:1), **MTA2** was obtained as a yellow oil (65.2 g, 89% yield).

TLC: R_f = 0.37 (hexane/EtOAc, 1:1; UV, $KMnO_4$); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 8.55 (s, 1H; CH thiazole), 6.07 (m, 1H; CH), 5.53 (m, 1H; CH), 4.28 (m, 4H; 2 OCH_2), 4.19 (t, J = 6.7 Hz, 2H; OCH_2), 3.04 (t, J = 6.7 Hz, 2H; CH_2), 2.59 (m, 4H; 2 CH_2CO), 2.35 (s, 3H; CH_3 thiazole), 1.88 (dd, J = 1.2, 1.6 Hz, 3H; CH_3); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 171.9 (2C; CO), 167.0 (CO), 150.0 (2C), 135.9, 126.6, 126.0 (CH_2), 64.2, 62.3 (2C), 28.9 (2C), 25.7, 18.2, 14.8; IR (neat): 3087 (C-H thiazole), 2947 (C-H), 1732 (CO), 1717 (CO), 1632 (CC), 1546 (CN thiazole), 1147 (C-O) cm^{-1}; HRMS (ESI): required for $C_{16}H_{22}NO_6S$ $[MH]^+$, 356.1162; found, 356.1166; Anal. Calcd. for $C_{16}H_{21}NO_6S$: C 54.07, H 5.96, N 3.94, S 9.02; found: C 53.98, H 6.02, N 4.10, S 8.87.

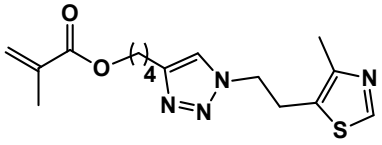
(1-(2-(4-methylthiazol-5-yl)ethyl)-1H-1,2,3-triazol-4-yl)methyl methacrylate (MTA3)



The monomer was prepared using **M2** (23.7 g, 141 mmol), prop-2-yn-1-yl methacrylate (17.8 mL, 141 mmol), sodium ascorbate (2.8 g, 14 mmol) and $CuSO_4$ (1.1 g, 7.2 mmol) in H_2O/tBuOH 1:1 (280 mL). After purification by flash column chromatography (hexane/EtOAc, 1:1 to 1:3) **MTA3** was obtained as a white solid (37.5 g, 91% yield).

TLC: R_f = 0.32 (hexane/EtOAc, 1:4; UV, $KMnO_4$); m.p. 43-44 °C; ^{1}H NMR (300 MHz, $CDCl_3$): δ = 8.56 (s, 1H; CH thiazole), 7.38 (s, 1H; CH triazole), 6.07 (m, 1H; CH), 5.54 (m, 1H; CH), 5.22 (s, 2H; OCH_2), 4.52 (t, J = 6.8 Hz, 2H; NCH_2), 3.36 (t, J = 6.8 Hz, 2H; CH_2), 2.17 (s, 3H; CH_3 thiazole), 1.89 (dd, J = 1.2, 1.6 Hz, 3H; CH_3); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 167.2 (CO), 150.8, 150.4, 143.0, 135.9, 126.3, 125.8, 124.4, 57.8, 51.1, 27.4, 18.3, 14.5; IR (neat): 3138 (C-H triazole), 3087 (C-H thiazole), 2973 (C-H), 2931 (C-H), 1711 (CO), 1636 (CC), 1548 (CN thiazole), 1149 (C-O) cm^{-1}; HRMS (ESI): required for $C_{13}H_{17}N_4O_2S$ $[MH]^+$, 293.1067; found, 293.1069; Anal. Calcd. for $C_{13}H_{16}N_4O_2S$: C 53.41, H 5.52, N 19.16, S 10.97; found: C 53.18, H 5.63, N 18.97, S 10.81.

4-(1-(2-(4-methylthiazol-5-yl)ethyl)-1H-1,2,3-triazol-4-yl)butyl methacrylate (MTA4)

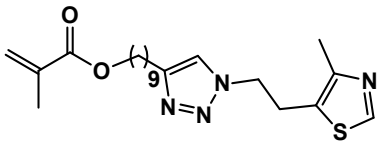


The compound was obtained from **M2** (16.5 g, 98 mmol), **M3** (16.3 g, 98 mmol), sodium ascorbate (1.94 g, 9.8 mmol) and $CuSO_4$ (782 mg, 4.9 mmol) in H_2O/tBuOH 1:1 (200 mL). After purification by flash column chromatography (hexane/EtOAc, 3:1 to 1:2), **MTA4** was isolated as a colorless oil (30.2 g, 92% yield).

TLC: R_f = 0.26 (hexane/EtOAc, 1:4; UV, $KMnO_4$); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 8.54 (s, 1H; CH thiazole), 7.03 (s, 1H; CH triazole), 6.03 (m, 1H; CH), 5.50 (m, 1H; CH), 4.47 (t, J = 6.7 Hz, 2H; OCH_2), 4.10 (m, 2H; NCH_2), 3.33 (t, J = 6.8 Hz, 2H; CH_2), 2.67 (m, 2H; CH_2), 2.17 (s, 3H; CH_3

thiazole), 1.88 (dd, J = 1.2, 1.6 Hz, 3H; CH_3), 1.70-1.65 (m, 4H; $2CH_2$); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 167.4 (C=O), 150.6, 150.3, 147.7, 136.4, 126.0, 125.3, 121.2, 64.3, 50.9, 28.1, 27.4, 26.0, 25.1, 18.3, 14.6; IR (neat): 3130 (=C-H triazole), 3083 (=C-H thiazole), 2930 (C-H), 2860 (C-H), 1714 (C=O), 1632 (C=C), 1546 (C=N thiazole), 1161 (C-O) cm^{-1}; HRMS (ESI): required for $C_{16}H_{23}N_4O_2S$ $[MH]^+$, 335.1536; found, 335.1524; Anal. Calcd. for $C_{16}H_{22}N_4O_2S$: C 57.46, H 6.63, N 16.75, S 9.59; found: C 57.18, H 6.92, N 16.49, S 9.44.

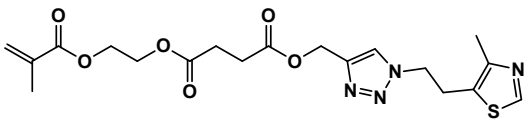
9-(1-(2-(4-methylthiazol-5-yl)ethyl)-1H-1,2,3-triazol-4-yl)nonyl methacrylate (MTA5)



The monomer was synthesized using **M2** (19.8 g, 118 mmol), **M4** (30 g, 118 mmol), sodium ascorbate (2.3 g, 12 mmol) and $CuSO_4$ (0.9 g, 6 mmol) in H_2O/*t*BuOH 1:1 (240 mL). After purification by flash column chromatography (hexane/EtOAc, 3:1 to 1:2), **MTA5** was obtained as a white solid (46.3 g, 97% yield).

TLC: R_f = 0.37 (hexane/EtOAc, 1:4; UV, $KMnO_4$); m.p. 47-48 °C; ^1H NMR (300 MHz, $CDCl_3$): δ = 8.55 (s, 1H; =CH thiazole), 7.00 (s, 1H; =CH triazole), 6.04 (m, 1H; =CH), 5.49 (m, 1H; =CH), 4.47 (t, J = 6.7 Hz, 2H; OCH_2), 4.08 (t, J = 6.7 Hz, 2H; NCH_2), 3.33 (t, J = 6.8 Hz, 2H; CH_2), 2.61 (t, J = 7.7 Hz, 2H; CH_2), 2.17 (s, 3H; CH_3 thiazole), 1.89 (dd, J = 1.2, 1.6 Hz, 3H; CH_3), 1.71-1.52 (m, 4H; $2CH_2$), 1.33-1.22 (m, 10H; $5CH_2$); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 167.5 (C=O), 150.6, 150.2, 148.4, 136.5, 126.1, 125.2, 121.1, 64.8, 50.8, 29.4, 29.2 (2C), 29.1 (2C), 28.6, 27.4, 25.9, 25.5, 18.3, 14.6; IR (neat): 3131 (=C-H triazole), 3087 (=C-H thiazole), 2927 (C-H), 2859 (C-H), 1714 (C=O), 1632 (C=C), 1546 (C=N thiazole), 1162 (C-O) cm^{-1}; HRMS (ESI): required for $C_{21}H_{33}N_4O_2S$ $[MH]^+$, 405.2319; found, 405.2333; Anal. Calcd. for $C_{21}H_{32}N_4O_2S$: C 62.34, H 7.97, N 13.85, S 7.93; found: C 62.58, H 8.08, N 13.65, S 7.73.

2-(methacryloyloxy)ethyl((1-(2-(4-methylthiazol-5-yl)ethyl)-1H-1,2,3-triazol-4-yl)methyl) succinate (MTA6)

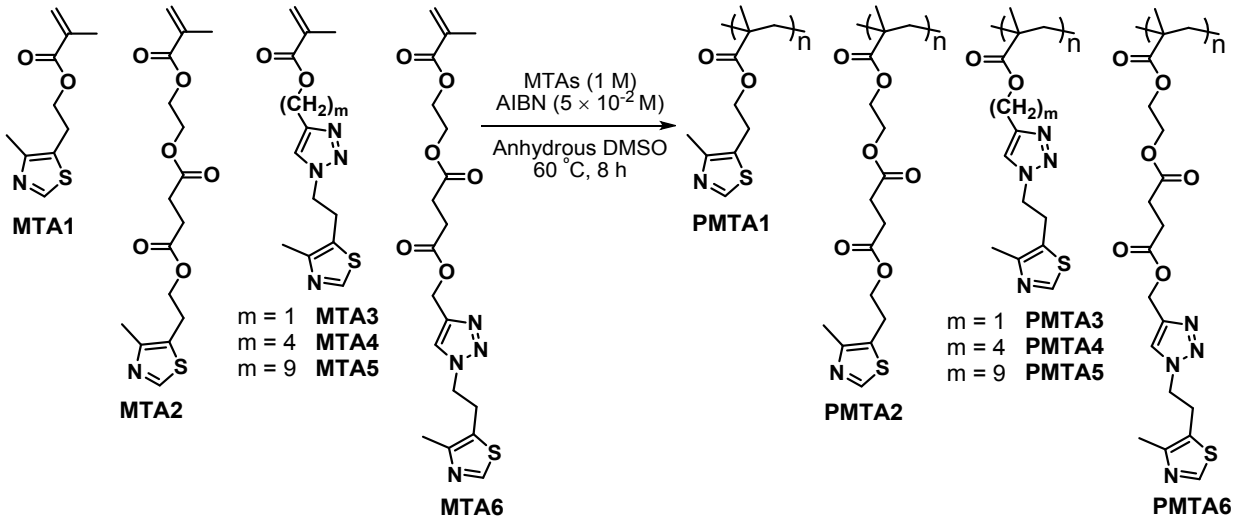


The monomer was prepared from **M2** (19.8 g, 118 mmol), **M5** (31.7 g, 118 mmol), sodium ascorbate (2.3 g, 12 mmol) and $CuSO_4$ (0.9 g, 6 mmol) in H_2O/*t*BuOH 1:1 (240 mL). After purification by flash column chromatography (hexane/EtOAc, 1:1 to 1:3), **MTA6** was obtained as a very viscous colorless oil (44.8 g, 87% yield).

TLC: R_f = 0.21 (hexane/EtOAc, 1:4; UV, $KMnO_4$); ^1H NMR (300 MHz, DMSO-d_6): δ = 8.88 (s, 1H; =CH thiazole), 8.12 (s, 1H; =CH triazole), 6.10 (m, 1H; =CH), 5.76 (m, 1H; =CH), 5.17 (s, 2H; CH_2O), 4.63 (t, J = 6.7 Hz, 2H; OCH_2), 4.35 (m, 4H; $2CH_2O$), 3.40 (t, J = 6.8 Hz, 2H; CH_2), 2.65 (t, 4H; $2CH_2CO$), 2.22 (s, 3H, CH_3 thiazole), 1.94 (dd, J = 1.0, 1.9 Hz, 3H; CH_3); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 171.7 (2C; C=O), 166.4 (C=O), 151.1, 149.8, 141.8, 135.6, 126.4, 126.1, 124.9, 62.4, 62.0, 57.3, 50.2, 28.5 (2C), 26.4, 17.9, 14.3; IR (neat): 3142 (=C-H triazole), 3086 (=C-H thiazole), 2964 (C-H), 2923 (C-H), 1736 (C=O), 1713 (C=O), 1637 (C=C), 1546 (C=N thiazole), 1141 (C-O) cm-

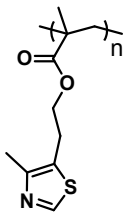
[1]; HRMS (ESI): required for $C_{19}H_{25}N_4O_6S$ $[MH]^+$, 437.1489; found, 437.1509; Anal. Calcd. for $C_{19}H_{24}N_4O_6S$: C 52.28, H 5.54, N 12.84, S 7.35; found: C 52.30, H 5.61, N 13.02, S 7.20.

3. Synthesis and characterization of PMTA polymers



Scheme S3. Synthesis of the polymethacrylate **PMTAs** by Conventional Free Radical Polymerization**.**

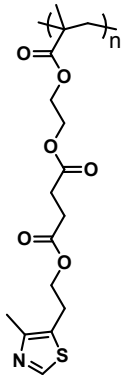
Poly[2-(4-methylthiazol-5-yl)ethyl methacrylate] (PMTA1)



The polymer was synthesized from **MTA1** (10.6 g, 50 mmol), AIBN (410 mg, 2.5 mmol) in dry DMSO (50 mL). After purification, **PMTA1** was isolated as an off-white solid (9.9 g, 91 % yield).

M_n = 53 kDa, PDI = 2.3; ^{1}H NMR (300 MHz, DMSO-d_6): δ = 8.80 (br, 1H; CH thiazole), 4.02 (br, 2H; OCH_2), 3.05 (br, 2H; CH_2), 2.30 (br, 3H; CH_3 thiazole), 1.92-1.24 (br, 2H; CH_2), 0.76-0.57 (br, 3H; CH_3); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 177.2 (CO), 151.3, 150.0, 127.5, 65.5, 54.1, 44.7 (C quat.), 25.4, 15.8, 15.4 (CH_3 thiazole); IR (neat): 3087 (C-H thiazole), 2956 (C-H), 2916 (C-H), 1723 (CO), 1546 (CN thiazole), 1140 (C-O) cm^{-1}; Anal. Calcd. for $(C_{10}H_{13}NO_2S)_n$: C 56.85, H 6.20, N 6.63, S 15.18; found: C 56.57, H 5.98, N 6.36, S 14.84.

Poly[2-(methacryloyloxy)ethyl (2-(4-methylthiazol-5-yl)ethyl)succinate] (PMTA2)

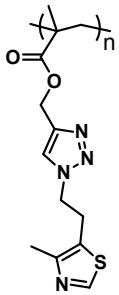


The polymer was synthesized using **MTA2** (10.6 g, 29 mmol), AIBN (240 mg, 1.5 mmol) in dry DMSO (30 mL). **PMTA2** was obtained as a gummy white solid (9.4 g, 91% yield).

M_n = 107 kDa, PDI = 2.7; ^{1}H NMR (300 MHz, DMSO-d_6): δ = 8.78 (br, 1H; CH thiazole), 4.15 (br, 6H; $3OCH_2$), 3.05 (br, 2H; CH_2), 2.55 (br, 4H; $2CH_2CO$), 2.30 (br, 3H; CH_3 thiazole), 1.98-1.28 (br, 2H; CH_2), 1.15-0.49 (br, 3H; CH_3); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 177.0 (CO), 171.9 (2C; 2CO), 150.9, 149.7, 127.1, 64.4, 62.9, 62.0, 53.3, 44.8 (C quat.), 28.8 (2C), 25.4, 15.1, 14.9 (CH_3 thiazole); IR (neat): 3048 (C-H

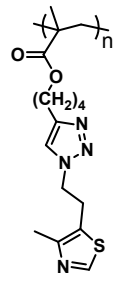
thiazole), 2959 (C-H), 2923 (C-H), 1729-1721 (C=O), 1546 (C=N thiazole), 1140 (C-O) cm^{-1}; Anal. Calcd. for $(C_{16}H_{21}NO_6S)_n$: C 54.07, H 5.96, N 3.94, S 9.02; found: C 54.30, H 6.12, N 4.10, S 8.78.

Poly[(1-(2-(4-methylthiazol-5-yl)ethyl)-1H-1,2,3-triazol-4-yl)methylmethacrylate] (PMTA3)



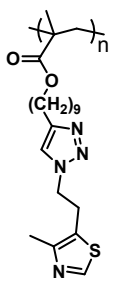
The polymer was prepared from **MTA3** (11.7 g, 40 mmol), AIBN (330 mg, 2.0 mmol) in dry DMSO (40 mL). **PMTA3** was obtained as a white solid (10.7 g, 92% yield). M_n = 115 kDa, PDI = 2.8; ^{1}H NMR (300 MHz, DMSO-d_6): δ = 8.75 (br, 1H; =CH thiazole), 8.08 (br, 1H; =CH triazole), 5.00 (br, 2H; OCH_2), 4.57 (br, 2H; NCH_2), 3.33 (br, 2H; CH_2), 2.11 (br, 3H; CH_3 thiazole), 1.76-1.23 (br, 2H; CH_2), 0.80-0.37 (br, 3H; CH_3); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 176.2 (C=O), 150.3 (=CH thiazole), 149.5, 140.8, 126.0, 124.7 (=CH triazole), 57.3, 53.6, 49.9, 44.0 (C quat.), 26.2, 14.1, 13.9 (CH_3 thiazole); IR (neat): 3137 (=C-H triazole), 3087 (=C-H thiazole), 2969 (C-H), 2929 (C-H), 1724 (C=O), 1546 (C=N thiazole), 1140 (C-O) cm^{-1}; Anal. Calcd. for $(C_{13}H_{16}N_4O_2S)_n$: C 53.41, H 5.52, N 19.16, S 10.97; found: C 53.67, H 5.40, N 19.31, S 10.75.

Poly[(4-(1-(2-(4-methylthiazol-5-yl)ethyl)-1H-1,2,3-triazol-4-yl)butylmethacrylate] (PMTA4)



The polymer was synthesized from **MTA4** (13.4 g, 40 mmol), AIBN (330 mg, 2.0 mmol) in dry DMSO (40 mL). **PMTA4** was obtained as a gummy white solid (12.5 g, 93% yield). M_n = 132 kDa, PDI = 2.3; ^{1}H NMR (300 MHz, DMSO-d_6): δ = 8.74 (br, 1H; =CH thiazole), 7.71 (br, 1H; =CH triazole), 4.48 (br, 2H; OCH_2), 3.89 (br, 2H; NCH_2), 3.30 (br, 2H; CH_2), 2.56 (br, 2H; CH_2), 2.11 (br, 3H; CH_3 thiazole), 1.76-0.48 (br, 9H; $3CH_2$ and CH_3); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 176.9 (C=O), 150.8 (=CH thiazole), 149.7, 146.4, 126.5, 121.9 (=CH triazole), 64.4, 50.2, 50.0, 44.5 (C quat.), 27.0, 26.5, 25.5, 24.4, 14.5, 14.3 (CH_3 thiazole); IR (neat): 3136 (=C-H triazole), 3080 (=C-H thiazole), 2946 (C-H), 2861 (C-H), 1721 (C=O), 1546 (C=N thiazole), 1148 (C-O) cm^{-1}; Anal. calcd for $(C_{16}H_{22}N_4O_2S)_n$: C 57.46, H 6.63, N 16.75, S 9.59; found: C 57.18, H 6.70, N 16.45, S 9.82.

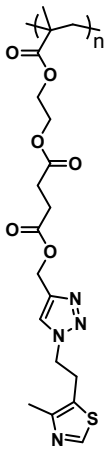
Poly[(4-(1-(2-(4-methylthiazol-5-yl)ethyl)-1H-1,2,3-triazol-4-yl)butylmethacrylate] (PMTA5)



The polymer was obtained using **MTA5** (12.1 g, 30 mmol), AIBN (250 mg, 1.5 mmol) in dry DMSO (30 mL). **PMTA5** was isolated as a gummy colorless solid (11.6 g, 94% yield). M_n = 172 kDa, PDI = 2.3; ^{1}H NMR (300 MHz, DMSO-d_6): δ = 8.71 (br, 1H; =CH thiazole), 7.65 (br, 1H; =CH triazole), 4.44 (br, 2H; OCH_2), 3.82 (br, 2H; NCH_2), 3.27 (br, 2H; CH_2), 2.48 (br, 2H; CH_2), 2.08 (br, 3H; CH_3 thiazole), 1.76-1.02 (br, 16H; $8CH_2$), 0.98-0.49 (br, 3H; CH_3); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 176.9 (C=O), 151.0 (=CH thiazole), 149.9, 147.1, 126.8, 122.0 (=CH triazole), 64.8, 50.5, 50.3, 44.4 (C quat.), 29.1, 28.9 (2C), 28.1, 27.9, 26.8, 25.9, 25.8, 25.3, 14.7, 14.5 (CH_3 thiazole); IR (neat): 3133 (=C-H triazole), 3078 (=C-

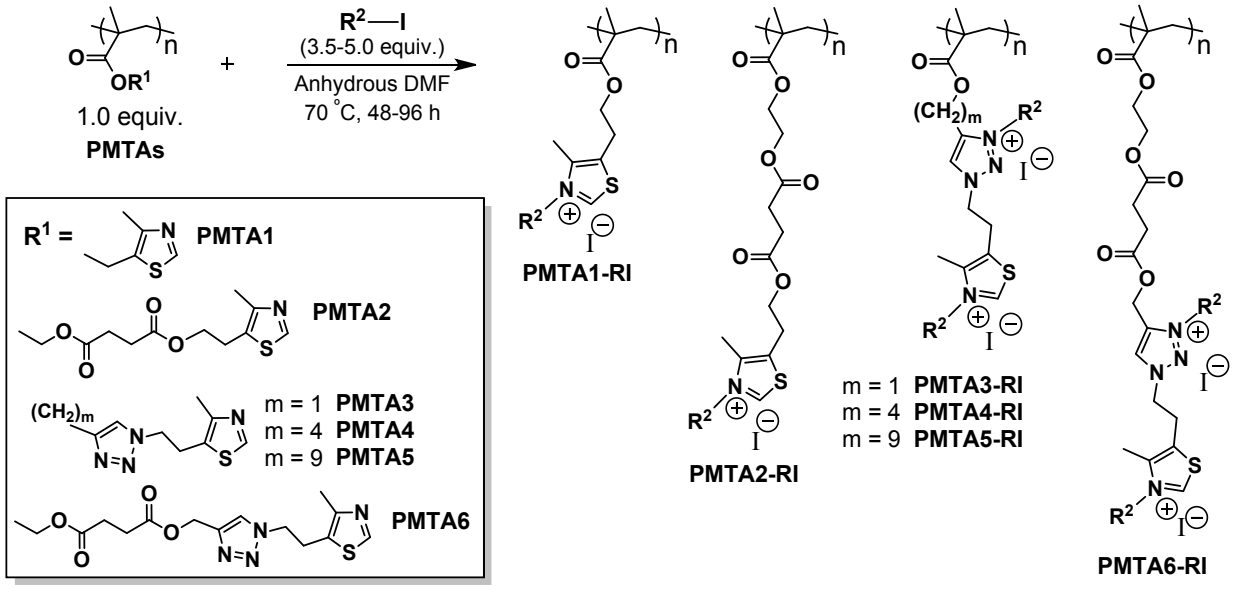
H thiazole), 2928 (C-H), 2852 (C-H), 1721 (C=O), 1546 (C=N thiazole), 1152 (C-O) cm^{-1}; Anal. Calcd. for $(C_{21}H_{32}N_4O_2S)_n$: C 62.34, H 7.97, N 13.85, S 7.93; found: C 62.60, H 8.11, N 13.86, S 8.20.

Poly[2-(methacryloyloxy)ethyl ((1-(2-(4-methylthiazol-5-yl)ethyl)-1H-1,2,3-triazol-4-yl) methyl) succinate] (PMTA6)



The polymer was synthesized using **MTA6** (13.1 g, 30 mmol), AIBN (250 mg, 1.5 mmol) in dry DMSO (30 mL). **PMTA6** was obtained as a white solid (12.8 g, 98% yield). M_n = 167 kDa, PDI = 2.8; ^{1}H NMR (300 MHz, DMSO-d_6): δ = 8.76 (br, 1H; =CH thiazole), 8.00 (br, 1H; =CH triazole), 5.08 (br, 2H; OCH_2), 4.54 (br, 4H; $2OCH_2$), 4.17 (br, 2H; NCH_2), 3.33 (br, 2H; CH_2), 2.56 (br, 4H; $2CH_2CO$), 2.11 (br, 3H; CH_3 thiazole), 1.89-0.45 (br, 5H; CH_2 and CH_3); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 176.8 (C=O), 171.7 (C=O), 171.6 (C=O), 151.0 (=CH thiazole), 149.8, 141.8, 126.4, 124.9 (=CH triazole), 61.4, 57.3 (2C), 50.2 (2C), 44.2 (C quat.), 28.3 (2C), 26.4, 14.2, 14.1 (CH_3 thiazole); IR (neat): 3142 (=C-H triazole), 3084 (=C-H thiazole), 2959 (C-H), 2928 (C-H), 1734-1721 (C=O), 1546 (C=N thiazole), 1144 (C-O) cm^{-1}; Anal. Calcd. for $(C_{19}H_{24}N_4O_6S)_n$: C 52.28, H 5.54, N 12.84, S 7.35; found: C 52.50, H 5.81, N 12.92, S 7.11.

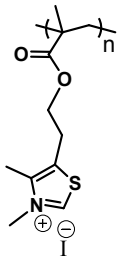
4. Synthesis and characterization of the cationic polyelectrolytes PMTAs-RI



R^2 = Me (methyl), Bu (butyl), Oc (octyl), Do (dodecyl), He (hexadecyl) iodide

Scheme S4. Synthesis of the cationic polyelectrolytes **PMTAs-RI** by *N*-alkylation of **PMTAs**.

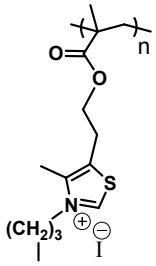
Poly[5-(2-(methacryloyloxy)ethyl)-3,4-dimethylthiazol-3-ium iodide] (PMTA1-MeI)



The polyelectrolyte was synthesized from **PMTA1** (1.0 g, 5 mmol), iodomethane (1.1 mL, 18 mmol) in dry DMF (50 mL). **PMTA1-MeI** was obtained as a white solid (1.8 g, 99% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.23 (br, 1H; CH thiazolium), 4.37-3.99 (br, 5H; $^{+}NCH_3$ and OCH_2), 3.40 (br, 2H; CH_2), 2.56 (br, 3H; CH_3 thiazolium), 2.14-1.47 (br, 2H; CH_2), 1.07-0.41 (br, 3H; CH_3); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 176.3 (CO), 157.3 (CH thiazolium), 143.9, 133.5, 64.6 (OCH_2), 53.4, 44.7 (C quat.), 41.5 ($^{+}NCH_3$), 26.1, 12.7 (2C; $2CH_3$); IR (neat): 3139-3052 (C-H thiazolium), 2993 (C-H), 2949 (C-H), 1721 (CO), 1590 (CN^{+} thiazolium), 1146 (C-O) cm^{-1}; Anal. Calcd. for $(C_{11}H_{16}INO_2S)_n$: C 37.40, H 4.57, N 3.97, S 9.08; found: C 37.32, H 4.61, N 4.02, S 9.17.

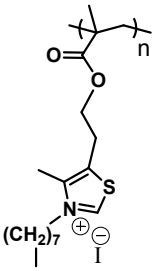
Poly[3-butyl-5-(2-(methacryloyloxy)ethyl)-4-methylthiazol-3-ium iodide] (PMTA1-BuI)



The polyelectrolyte was synthesized from **PMTA1** (1.0 g, 5 mmol), 1-iodobutane (2.1 mL, 18 mmol) in dry DMF (50 mL). **PMTA1-BuI** was isolated as a white solid (1.6 g, 93% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.30 (br, 1H; CH thiazolium), 4.56 (br, 2H; $^{+}NCH_2$), 4.09 (br, 2H; OCH_2), 3.32 (br, 2H; CH_2), 2.57 (br, 3H; CH_3 thiazolium), 1.93-1.65 (br, 2H; CH_2), 1.48-1.23 (br, 4H; $2CH_2$), 0.98-0.34 (br, 6H; $2CH_3$); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 177.3 (CO), 157.1 (CH thiazolium), 143.5, 134.0, 64.7, 53.5 (2C; $^{+}NCH_2$ and CH_2), 44.5 (C quat.), 31.3, 26.0, 19.5, 14.0 (2C; $2CH_3$), 12.7 (CH_3); IR (neat): 3135-3050 (C-H thiazolium), 2956 (C-H), 2868 (C-H), 1723 (CO), 1590 (CN^{+} thiazolium), 1141 (C-O) cm^{-1}; Anal. Calcd. for $(C_{14}H_{22}INO_2S)_n$: C 42.54, H 5.61, N 3.54, S 8.11; found: C 42.27, H 5.92, N 3.80, S 7.98.

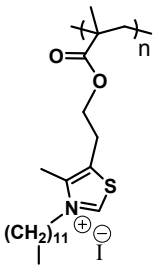
Poly[5-(2-(methacryloyloxy)ethyl)-4-methyl-3-octylthiazol-3-ium iodide] (PMTA1-OcI)



The polyelectrolyte was synthesized from **PMTA1** (1.0 g, 5 mmol), 1-iodooctane (3.4 mL, 18 mmol) in anhydrous DMF (50 mL). **PMTA1-OcI** was obtained as a white solid (2.2 g, 96% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.31 (br, 1H; CH thiazolium), 4.54 (br, 2H; $^{+}NCH_2$), 4.10 (br, 2H; OCH_2), 3.31 (br, 2H; CH_2), 2.57 (br, 3H; CH_3 thiazolium), 1.82 (br, 2H; CH_2), 1.54-1.05 (br, 12H; $6CH_2$), 0.98-0.68 (br, 3H; CH_3), 0.32-0.60 (br, 3H; CH_3); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 176.7 (CO), 156.8 (CH thiazolium), 143.2, 133.7, 64.5, 53.3 (2C; $^{+}NCH_2$ and CH_2), 44.3 (C quat.), 31.4 (2C), 29.2, 28.8 (2C), 25.8, 22.3, 14.2 (2C; $2CH_3$), 12.5 (CH_3); IR (neat): 3130-3030 (C-H thiazolium), 2923 (C-H), 2850 (C-H), 1723 (CO), 1590 (CN^{+} thiazolium), 1146 (C-O) cm^{-1}; Anal. Calcd. for $(C_{18}H_{30}INO_2S)_n$: C 47.89, H 6.70, N 3.10, S 7.10; found: C 48.18, H 6.90, N 3.08, S 7.26.

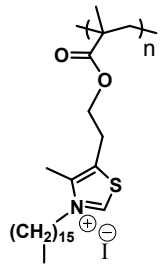
Poly[3-dodecyl-5-(2-(methacryloyloxy)ethyl)-4-methylthiazol-3-ium iodide] (PMTA1-DoI)



The polyelectrolyte was prepared using **PMTA1** (1.0 g, 5 mmol) and 1-iodododecane (4.5 mL, 18 mmol) in anhydrous DMF (50 mL). **PMTA1-DoI** was obtained as a white solid (2.4 g, 94% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.30 (br, 1H; CH thiazolium), 4.52 (br, 2H; $^+NCH_2$), 4.08 (br, 2H; OCH_2), 3.31 (br, 2H; CH_2), 2.56 (br, 3H; CH_3 thiazolium), 1.81 (br, 2H; CH_2), 1.49-0.98 (br, 20H; $10CH_2$), 0.84-0.68 (br, 3H; CH_3), 0.37-0.61 (br, 3H; CH_3); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 177.0 (CO), 157.0 (CH thiazolium), 143.2, 133.8, 64.7, 53.3 (2C; $^+NCH_2$ and CH_2), 44.5 (C quat.), 31.6, 29.4, 29.0 (6C), 28.8, 25.9, 22.4, 14.2 (2C; $2CH_3$), 12.6 (CH_3); IR (neat): 3121-3034 (C-H thiazolium), 2913 (C-H), 2850 (C-H), 1724 (CO), 1590 (CN$^+$ thiazolium), 1146 (C-O) cm^{-1}; Anal. Calcd. for $(C_{22}H_{38}INO_2S)_n$: C 52.06, H 7.55, N 2.76, S 6.32; found: C 52.36, H 7.41, N 3.02, S 6.30.

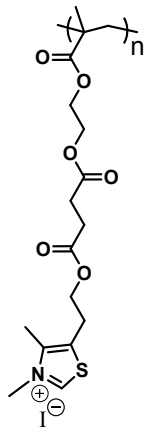
Poly[3-hexadecyl-5-(2-(methacryloyloxy)ethyl)-4-methylthiazol-3-ium iodide] (PMTA1-HeI)



The polyelectrolyte was synthesized using **PMTA1** (1.0 g, 5 mmol), 1-iodohexadecane (5.9 mL, 18 mmol) in dry DMF (50 mL). **PMTA1-HeI** was isolated as a white solid (2.7 g, 95% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.36 (br, 1H; CH thiazolium), 8.84 (br, 0.02H; unmodified CH thiazole), 4.55 (br, 2H; $^+NCH_2$), 4.20 (br, 2H; OCH_2), 3.39 (br, 2H; CH_2), 2.60 (br, 3H; CH_3 thiazolium), 1.90 (br, 2H; CH_2), 1.59-1.15 (br, 28H; $14CH_2$), 1.12-0.82 (br, 3H; CH_3), 0.79-0.61 (br, 3H; CH_3); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 176.8 (CO), 156.8 (CH thiazolium), 143.4, 134.0, 64.2, 53.8 (2C; $^+NCH_2$ and CH_2), 45.1 (C quat.), 31.6, 29.4 (10C), 28.9 (2C), 26.1, 22.3, 14.0 (2C; $2CH_3$), 12.7 (CH_3); IR (neat): 3126-3024 (C-H thiazolium), 2922 (C-H), 2854 (C-H), 1724 (CO), 1589 (CN$^+$ thiazolium), 1146 (C-O) cm^{-1}; Anal. Calcd. for $(C_{26}H_{46}INO_2S)_n$: C 55.41, H 8.23, N 2.49, S 5.69; found: C 56.36, H 8.11, N 2.53, S 5.74.

Poly[5-(2-((4-(2-(methacryloyloxy)ethoxy)-4-oxobutanoyl)oxy)ethyl)-3,4-dimethylthiazol-3-ium iodide] (PMTA2-MeI)

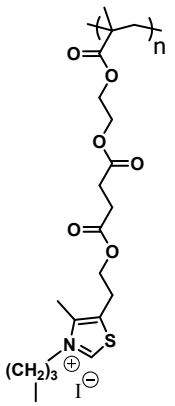


The polyelectrolyte was synthesized using **PMTA2** (1.0 g, 3 mmol), iodomethane (0.7 mL, 11 mmol) in dry DMF (30 mL). **PMTA2-MeI** was obtained as a white solid (1.5 g, 98% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.12 (br, 1H; CH thiazolium), 4.95-3.74 (br, 9H; $^+NCH_3$ and $3OCH_2$), 3.62-2.92 (br, 6H; $3CH_2$), 2.61 (br, 3H; CH_3 thiazolium), 2.03-1.47 (br, 2H; CH_2), 1.45-0.48 (br, 3H; CH_3); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 176.9 (CO), 172.0 (2C; 2CO), 157.2 (CH thiazolium), 143.8, 133.5, 63.5 (2C; $2OCH_2$),

62.1 (OCH_2), 53.5 (CH_2), 44.9 (C quat.), 41.5 ($^+NCH_3$), 29.0 (2C), 26.3, 11.9 (2C; $2CH_3$); IR (neat): 3131-3038 (□C-H thiazolium), 2990 (C-H), 2953 (C-H), 1732-1719 (C□O), 1589 (C□N^+ thiazolium), 1146 (C-O) cm^{-1}; Anal. Calcd. for $(C_{17}H_{24}INO_6S)_n$: C 41.05, H 4.86, N 2.82, S 6.45; found: C 40.98, H 4.91, N 3.00, S 6.35.

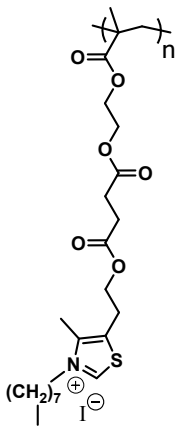
Poly[3-butyl-5-(2-((4-(2-(methacryloyloxy)ethoxy)-4-oxobutanoyl)oxy)ethyl)-4-methyl thiazol-3-ium iodide] (PMTA2-BuI)



The polyelectrolyte was synthesized using **PMTA2** (1.0 g, 3 mmol), 1-iodobutane (1.3 mL, 11 mmol) in dry DMF (30 mL). **PMTA2-BuI** was isolated as a white solid (1.6 g, 97% yield).

^1H NMR (300 MHz, DMSO-d_6): δ = 10.28 (br, 1H; □CH thiazolium), 4.53 (br, 2H; $^+NCH_2$), 4.33-3.92 (br, 6H; $3OCH_2$), 3.28 (br, 6H; $3CH_2$), 2.55 (br, 3H; CH_3 thiazolium), 1.92-1.68 (br, 2H; CH_2), 1.58-1.14 (br, 4H; $2CH_2$), 1.12-0.48 (br, 6H; $2CH_3$); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 176.9 (C□O), 171.9 (2C; 2C□O), 156.7 (□CH thiazolium), 143.1, 134.0, 63.4 (2C; $2OCH_2$), 62.2 (OCH_2), 53.1 (2C; $^+NCH_2$ and CH_2), 44.6 (C quat.), 31.1, 28.7, 28.5, 26.1, 19.2, 13.9 (CH_3), 13.7 (CH_3), 11.8 (CH_3); IR (neat): 3138-3017 (□C-H thiazolium), 2959 (C-H), 2931 (C-H), 2872 (C-H), 1731-1724 (C□O), 1589 (C□N^+ thiazolium), 1146 (C-O) cm^{-1}; Anal. Calcd. for $(C_{20}H_{30}INO_6S)_n$: C 44.53, H 5.61, N 2.60, S 5.94; found: C 45.23, H 6.33, N 2.61, S 6.55.

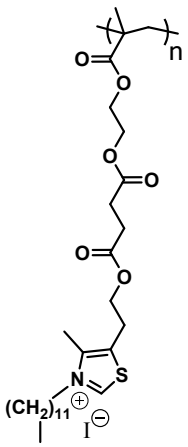
Poly[5-(2-((4-(2-(methacryloyloxy)ethoxy)-4-oxobutanoyl)oxy)ethyl)-4-methyl-3-octylthiazol-3-ium iodide] (PMTA2-OcI)



The polyelectrolyte was synthesized using **PMTA2** (1.0 g, 3 mmol), 1-iodooctane (2.0 mL, 11 mmol) in dry DMF (30 mL). **PMTA2-OcI** was obtained as a white solid (1.7 g, 93% yield).

^1H NMR (300 MHz, DMSO-d_6): δ = 10.19 (br, 1H; □CH thiazolium), 4.52 (br, 2H; $^+NCH_2$), 4.43-3.87 (br, 6H; $3OCH_2$), 3.71-3.14 (br, 6H; $3CH_2$), 2.57 (br, 3H; CH_3 thiazolium), 2.11-1.69 (br, 2H; CH_2), 1.62-1.08 (br, 12H; $6CH_2$), 1.04-0.51 (br, 6H; $2CH_3$); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 176.0 (C□O), 172.1 (2C; 2C□O), 156.9 (□CH thiazolium), 143.2, 134.1, 63.5 (2C; $2OCH_2$), 61.8 (OCH_2), 53.4 (2C; $^+NCH_2$ and CH_2), 44.5 (C quat.), 31.5, 29.2 (2C), 28.7 (2C), 26.1, 25.9, 22.4 (2C), 14.3 (2C; $2CH_3$), 11.8 (CH_3); IR (neat): 3147-3038 (□C-H thiazolium), 2959 (C-H), 2922 (C-H), 2854 (C-H), 1731-1724 (C□O), 1589 (C□N^+ thiazolium), 1146 (C-O) cm^{-1}; Anal. Calcd. for $(C_{24}H_{38}INO_6S)_n$: C 48.40, H 6.43, N 2.35, S 5.38; found: C 49.01, H 6.75, N 2.54, S 6.10.

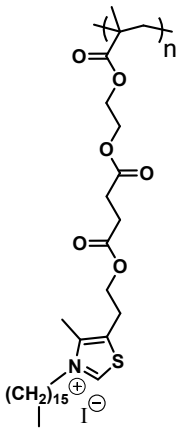
Poly[3-dodecyl-5-(2-((4-(2-(methacryloyloxy)ethoxy)-4-oxobutanoyl)oxy)ethyl)-4-methyl thiazole-3-ium iodide] (PMTA2-DoI)



The polyelectrolyte was synthesized using **PMTA2** (1.0 g, 3 mmol), 1-iodododecane (2.8 mL, 11 mmol) in dry DMF (30 mL). **PMTA2-DoI** was obtained as a white solid (1.9 g, 98% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.18 (br, 1H; CH thiazolium), 4.50 (br, 2H; $^+NCH_2$), 4.39-3.84 (br, 6H; $3OCH_2$), 3.45-3.21 (br, 6H; $3CH_2$), 2.58 (br, 3H; CH_3 thiazolium), 1.93-1.69 (br, 2H; CH_2), 1.31-1.12 (br, 20H; $10CH_2$), 0.94-0.58 (br, 6H; $2CH_3$); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 177.2 (CO), 172.3 (2C; 2CO), 156.9 (CH thiazolium), 143.2, 134.1, 63.5 (2C; $2OCH_2$), 62.2 (OCH_2), 53.4 (2C; $^+NCH_2$ and CH_2), 44.8 (C quat.), 31.7, 29.4 (2C), 29.1 (5C), 28.8, 26.1, 25.9, 22.5 (2C), 14.3 (2C; $2CH_3$), 11.9 (CH_3); IR (neat): 3128-3046 (C-H thiazolium), 2955 (C-H), 2922 (C-H), 2854 (C-H), 1731-1724 (CO), 1589 (CN$^+$ thiazolium), 1151 (C-O) cm^{-1}; Anal. Calcd. for $(C_{28}H_{46}INO_6S)_n$: C 51.61, H 7.12, N 2.15, S 4.92; found: C 51.90, H 6.98, N 2.50, S 5.10.

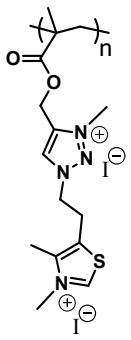
Poly[3-hexadecyl-5-(2-((4-(2-(methacryloyloxy)ethoxy)-4-oxobutanoyl)oxy)ethyl)-4-methylthiazol-3-ium iodide] (PMTA2-HeI)



The polyelectrolyte was synthesized using **PMTA2** (1.0 g, 3 mmol), 1-iodohexadecane (3.6 mL, 11 mmol) in dry DMF (30 mL). **PMTA2-HeI** was isolated as a white solid (2.0 g, 96% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.18 (br, 1H; CH thiazolium), 8.80 (br, 0.01H; unmodified CH thiazole), 4.48 (br, 2H; $^+NCH_2$), 4.41-3.81 (br, 6H; $3OCH_2$), 3.48-3.19 (br, 6H; $3CH_2$), 2.56 (br, 3H; CH_3 thiazolium), 1.95-1.72 (br, 2H; CH_2), 1.55-1.12 (br, 28H; $14CH_2$), 1.19-0.56 (br, 6H; $2CH_3$); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 176.4 (CO), 171.2 (2C; 2CO), 156.1 (CH thiazolium), 142.6, 133.6, 62.7 (2C; $2OCH_2$), 61.4 (OCH_2), 53.1 (2C; $^+NCH_2$ and CH_2), 44.5 (C quat.), 30.3, 29.3, 28.6 (2C), 28.3 (10C), 25.8, 25.3, 21.6, 13.4 (2C; $2CH_3$), 11.3 (CH_3); IR (neat): 3134-3020 (CH thiazolium), 2919 (C-H), 2850 (C-H), 1731-1724 (CO), 1589 (CN$^+$ thiazolium), 1152 (C-O) cm^{-1}; Anal. Calcd. for $(C_{32}H_{54}INO_6S)_n$: C 54.31, H 7.69, N 1.98, S 4.53; found: C 54.01, H 7.71, N 2.09, S 4.60.

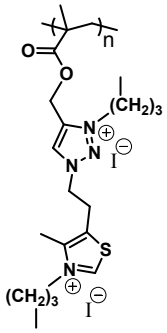
Poly[5-(2-(4-((methacryloyloxy)methyl)-3-methyl-1H-1,2,3-triazol-3-ium-1-yl)ethyl)-3,4-dimethylthiazol-3-ium iodide] (PMTA3-MeI)



The polyelectrolyte was synthesized using **PMTA3** (1.0 g, 3 mmol), iodomethane (0.9 mL, 15 mmol) in dry DMF (30 mL). **PMTA3-MeI** was obtained as a white solid (1.7 g, 99% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.16 (br, 1H; CH thiazolium), 9.44 (br, 1H; CH triazolium), 5.73-499 (br, 2H; OCH_2), 4.46 (br, 3H; $^+NCH_3$ triazolium), 4.19 (br, 3H; $^+NCH_3$ thiazolium), 3.85 (br, 2H; NCH_2), 3.16 (br, 2H; CH_2), 2.58 (br, 3H; CH_3 thiazolium), 2.19-1.47 (br, 2H; CH_2), 1.39-0.46 (br, 3H; CH_3); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 176.9 (CO), 157.9 (CH thiazolium), 145.0, 138.6, 131.5 (2C; C-S quat. thiazolium and CH triazolium), 55.7 (OCH_2), 53.6 (2C; NCH_2 and CH_2), 45.4 (C quat.), 41.7 (2C; 2^+NCH_3), 26.6, 13.0 (2C; $2CH_3$); IR (neat): 3140-3036 (C-H thiazolium and triazolium), 2996 (C-H), 2948 (C-H), 1730 (CO), 1593 (CN^+ thiazolium), 1139 (C-O) cm^{-1}; Anal. Calcd. for $(C_{15}H_{22}I_2N_4O_2S)_n$: C 31.27, H 3.85, N 9.72, S 5.56; found: C 31.40, H 3.92, N 10.01, S 5.80.

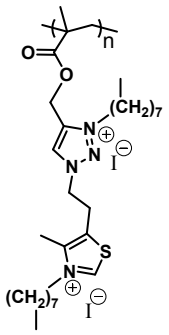
Poly[3-butyl-5-(2-(3-butyl-4-((methacryloyloxy)methyl)-1H-1,2,3-triazol-3-ium-1-yl)ethyl)-4-methylthiazol-3-ium iodide] (PMTA3-BuI)



The polyelectrolyte was synthesized using **PMTA3** (1.0 g, 3 mmol), 1-iodobutane (1.7 mL, 15 mmol) in dry DMF (30 mL). **PMTA3-BuI** was isolated as a white solid (1.8 g, 93% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.24 (br, 1H; CH thiazolium), 9.48 (br, 1H; CH triazolium), 8.50 (br, 0.01H; unmodified CH triazole), 5.75-4.98 (br, 2H; OCH_2), 4.74 (br, 2H; $^+NCH_2$ triazolium), 4.52 (br, 2H; $^+NCH_2$ thiazolium), 3.86 (br, 2H; NCH_2), 3.35 (br, 2H; CH_2), 2.58 (br, 3H; CH_3 thiazolium), 2.28-1.19 (br, 10H; $5CH_2$), 1.17-0.42 (br, 9H; $3CH_3$); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 176.3 (CO), 157.4 (CH thiazolium), 144.4, 138.1, 132.1, 131.7 (CH triazolium), 56.0 (OCH_2), 53.7 (2C; $^+NCH_2$), 52.9 (2C; NCH_2 and CH_2), 45.3 (C quat.), 31.1, 30.3, 26.7, 19.3 (2C), 13.7 (2C; $2CH_3$), 13.0 (2C; $2CH_3$); IR (neat): 3148-3016 (C-H thiazolium and triazolium), 2955 (C-H), 2931 (C-H), 2871 (C-H), 1730 (CO), 1589 (CN^+ thiazolium), 1135 (C-O) cm^{-1}; Anal. Calcd. for $(C_{21}H_{34}I_2N_4O_2S)_n$: C 38.19, H 5.19, N 8.48, S 4.86; found: C 40.21, H 5.45, N 9.2, S 5.13.

Poly[5-(2-(4-((methacryloyloxy)methyl)-3-octyl-1H-1,2,3-triazol-3-ium-1-yl)ethyl)-4-methyl-3-octylthiazol-3-ium iodide] (PMTA3-OcI)

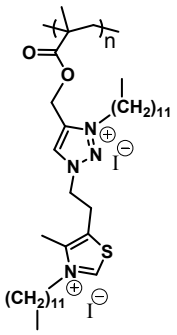


The polyelectrolyte was synthesized using **PMTA3** (1.0 g, 3 mmol), 1-iodooctane (2.7 mL, 15 mmol) in dry DMF (30 mL). **PMTA3-OcI** was obtained as a white solid (2.2 g, 96% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.23 (br, 1H; CH thiazolium), 9.45 (br, 0.68H; CH triazolium), 8.43 (br, 0.32H; unmodified CH triazole), 5.52-4.38 (br, 5H), 3.87-2.74 (br, 4H), 2.57 (br, 3H; CH_3 thiazolium), 2.16-0.36 (br, 34H); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 175.6 (CO), 157.5 (CH thiazolium), 144.3, 143.6, 141.5 (unmodified C- triazole), 132.2, 131.5 (CH triazolium), 125.9 (unmodified CH triazole), 58.3 (OCH_2), 53.6, 53.4, 49.6 (unmodified CH_2), 45.2 (C quat.), 31.5, 29.2, 28.8, 26.4, 25.9, 22.3, 14.1, 11.8. IR (neat): 3152-3032 (C-H thiazolium and triazolium), 2948 (C-H), 2923 (C-H), 2855 (C-H), 1731 (CO), 1589 (CN^+ thiazolium), 1139 (C-O) cm^{-1}.*

* Degree of quaternization is detailed in paragraph 6 since the polymer did not reach the complete *N*-alkylation of pendant 1,2,3-triazole moieties.

Poly[3-dodecyl-5-(2-(3-dodecyl-4-((methacryloyloxy)methyl)-1H-1,2,3-triazol-3-ium-1-yl)ethyl)-4-methylthiazol-3-ium iodide] (PMTA3-DoI)

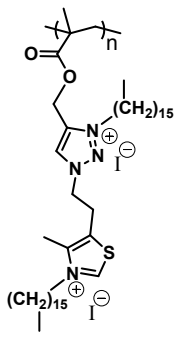


The polyelectrolyte was synthesized using **PMTA3** (1.0 g, 3 mmol), 1-iodododecane (3.7 mL, 15 mmol) in dry DMF (30 mL). **PMTA3-DoI** was isolated as a white solid (2.5 g, 96% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.23 (br, 1H; CH thiazolium), 9.41 (br, 0.45H; CH triazolium), 8.40 (br, 0.55H; unmodified CH triazole), 5.23-4.29 (br, 5H), 4.10-2.72 (br, 4H), 2.57 (br, 3H; CH_3 thiazolium), 2.24-0.28 (br, 44H); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 175.9 (CO), 156.3 (CH thiazolium), 143.8, 143.0, 141.0 (unmodified C- triazole), 133.0, 131.7 (CH triazolium), 125.0 (unmodified CH triazole), 57.8 (OCH_2), 53.1 (2C), 52.2 (2C), 44.5 (C quat.), 30.9, 29.3, 28.3, 25.3, 21.7, 13.4, 11.5; IR (neat): 3156-3028 (C-H thiazolium and triazolium), 2927 (C-H), 2851 (C-H), 1730 (CO), 1589 (CN^+ thiazolium), 1139 (C-O) cm^{-1}.*

* Degree of quaternization is detailed in paragraph 6 since the polymer did not reach the complete *N*-alkylation of pendant 1,2,3-triazole moieties.

Poly[3-hexadecyl-5-(2-(3-hexadecyl-4-((methacryloyloxy)methyl)-1H-1,2,3-triazol-3-ium-1-yl)ethyl)-4-methylthiazol-3-ium iodide] (PMTA3-HeI)

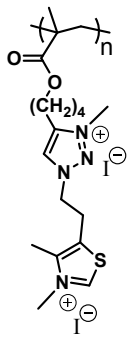


The polyelectrolyte was synthesized using **PMTA3** (1.0 g, 3 mmol), 1-iodohexadecane (4.7 mL, 15 mmol) in dry DMF (30 mL). **PMTA3-HeI** was obtained as a white solid (2.8 g, 94% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.26 (br, 1H; CH thiazolium), 9.33 (br, 0.43H; CH triazolium), 8.81 (br, 0.07H; unmodified CH thiazole), 8.40 (br, 0.64H; unmodified CH triazole), 5.33-4.25 (br, 5H), 3.86-2.92 (br, 4H), 2.56 (br, 3H; CH_3 thiazolium), 2.07-0.33 (br, 55H); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 176.4 (CO), 156.9 (CH thiazolium), 143.6, 143.0, 140.9 (unmodified C- triazole), 132.9, 131.7 (CH triazolium), 125.4 (unmodified CH triazole), 53.8, 53.0, 52.1, 49.0, 44.1 (C quat.), 31.0, 28.8, 25.8, 21.7, 13.3, 11.4; IR (neat): 3152-3036 (C-H thiazolium and triazolium), 2915 (C-H), 2851 (C-H), 1734 (CO), 1589 (CN^+ thiazolium), 1143 (C-O) cm^{-1}.*

* Degree of quaternization is detailed in paragraph 6 since the polymer did not reach the complete *N*-alkylation of pendant 1,2,3-triazole moieties.

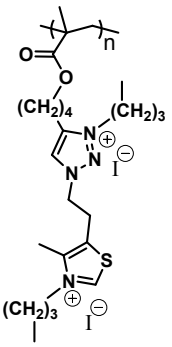
Poly[5-(2-(4-(4-(methacryloyloxy)butyl)-3-methyl-1H-1,2,3-triazol-3-ium-1-yl)ethyl)-3,4-dimethylthiazol-3-ium iodide] (PMTA4-MeI)



The polyelectrolyte was synthesized using **PMTA4** (1.0 g, 3 mmol), iodomethane (0.7 mL, 15 mmol) in dry DMF (30 mL). **PMTA4-MeI** was obtained as a white solid (1.8 g, 98% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.21 (br, 1H; CH thiazolium), 9.23 (br, 1H; CH triazolium), 5.05 (br, 3H; $^+NCH_3$ triazolium), 4.41 (br, 3H; $^+NCH_3$ thiazolium), 4.24 (br, 2H; OCH_2), 3.88 (br, 2H; NCH_2), 3.28 (br, 2H; CH_2), 3.11 (br, 2H; CH_2), 2.57 (br, 3H; CH_3 thiazolium), 2.28-1.39 (br, 6H; $3CH_2$), 1.27-0.53 (br, 3H; CH_3); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 176.5 (CO), 157.2 (CH thiazolium), 144.2, 143.8, 130.9, 128.8 (CH triazolium), 64.1 (OCH_2), 52.4 (2C; NCH_2 and CH_2), 44.6 (C quat.), 40.9 (2C; 2^+NCH_3), 26.6, 25.7 (2C), 22.6, 12.0 (2C; $2CH_3$); IR (neat): 3140-3016 (C-H thiazolium and triazolium), 2995 (C-H), 2951 (C-H), 1719 (CO), 1589 (CN^+ thiazolium), 1151 (C-O) cm^{-1}; Anal. Calcd. for $(C_{18}H_{28}I_2N_4O_2S)_n$: C 34.96, H 4.56, N 9.06, S 5.19; found: C 34.84, H 4.66, N 9.17, S 5.22.

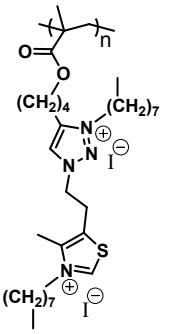
Poly[3-butyl-5-(2-(3-butyl-4-(4-(methacryloyloxy)butyl)-1H-1,2,3-triazol-3-ium-1-yl)ethyl)-4-methylthiazol-3-ium iodide] (PMTA4-BuI)



The polyelectrolyte was synthesized using **PMTA4** (1.0 g, 3 mmol), 1-iodobutane (1.7 mL, 15 mmol) in dry DMF (30 mL). **PMTA4-BuI** was isolated as a white solid (1.9 g, 91% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.30 (br, 1H; CH thiazolium), 9.29 (br, 1H; CH triazolium), 5.07 (br, 2H; $^+NCH_2$ triazolium), 4.88-4.30 (br, 4H; $^+NCH_2$ thiazolium and OCH_2), 3.91 (br, 2H; NCH_2), 3.43 (br, 2H; CH_2), 3.18 (br, 2H; CH_2), 2.61 (br, 3H; CH_3 thiazolium), 2.30-1.23 (br, 14H; $7CH_2$), 1.22-0.38 (br, 9H; $3CH_3$); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 177.2 (CO), 157.6 (CH thiazolium), 144.3, 144.1, 132.3, 129.6 (CH triazolium), 65.0 (OCH_2), 53.4 (2C; $^+NCH_2$), 51.3 (2C; NCH_2 and CH_2), 44.7 (C quat.), 31.3, 30.3, 27.4, 26.6 (2C), 23.5, 19.5, 19.3, 13.9 (2C; $2CH_3$), 12.6 (2C; $2CH_3$); IR (neat): 3160-3012 (C-H thiazolium and triazolium), 2955 (C-H), 2931 (C-H), 2868 (C-H), 1724 (CO), 1586 (CN$^+$ thiazolium), 1150 (C-O) cm^{-1}; Anal. Calcd. for $(C_{24}H_{40}I_2N_4O_2S)_n$: C 41.03, H 5.74, N 7.98, S 4.56; found: C 41.56, H 6.18, N 8.20, S 4.88.

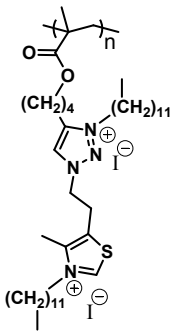
Poly[5-(2-(4-(4-(methacryloyloxy)butyl)-3-octyl-1H-1,2,3-triazol-3-ium-1-yl)ethyl)-4-methyl-3-octylthiazol-3-ium iodide] (PMTA4-OcI)



The polyelectrolyte was synthesized using **PMTA4** (1.0 g, 3 mmol), 1-iodooctane (2.7 mL, 15 mmol) in dry DMF (30 mL). **PMTA4-OcI** was isolated as a white solid (2.2 g, 92 %yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.25 (br, 1H; CH thiazolium), 9.23 (br, 1H; CH triazolium), 5.02 (br, 2H; $^+NCH_2$ triazolium), 4.63 (br, 2H; $^+NCH_2$ thiazolium), 4.51 (br, 2H; OCH_2), 4.02 (br, 2H; NCH_2), 3.85 (br, 2H; CH_2), 3.05 (br, 2H; CH_2), 2.57 (br, 3H; CH_3 thiazolium), 2.30-1.05 (br, 30H; $15CH_2$), 1.04-0.46 (br, 9H; $3CH_3$); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 177.0 (CO), 157.3 (CH thiazolium), 144.3, 144.2, 132.4, 129.9 (CH triazolium), 64.7 (OCH_2), 53.9 ($^+NCH_2$), 53.1 ($^+NCH_2$), 51.8 (2C; NCH_2 and CH_2), 45.2 (C quat.), 31.5 (2C; $2CH_2$), 29.2 (8C), 28.7 (2C), 27.5, 23.3, 22.3 (2C), 14.1 (2C; $2CH_3$), 12.8 (2C; $2CH_3$); IR (neat): 3156-3013 (C-H thiazolium and triazolium), 2918 (C-H), 2854 (C-H), 1724 (CO), 1583 (CN$^+$ thiazolium), 1151 (C-O) cm^{-1}; Anal. Calcd. for $(C_{32}H_{56}I_2N_4O_2S)_n$: C 47.18, H 6.93, N 6.88, S 3.94; found: C 47.30, H 6.91, N 6.90, S 3.85.

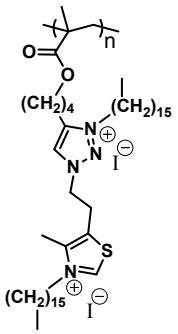
Poly[3-dodecyl-5-(2-(3-dodecyl-4-(4-(methacryloyloxy)butyl)-1H-1,2,3-triazol-3-ium-1-yl) ethyl)-4-methylthiazol-3-ium iodide] (PMTA4-DoI)



The polyelectrolyte was synthesized using **PMTA4** (1.0 g, 3 mmol), 1-iodododecane (3.7 mL, 15 mmol) in dry DMF (30 mL). **PMTA4-DoI** was obtained as a white solid (2.6 g, 95% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.26 (br, 1H; CH thiazolium), 9.23 (br, 1H; CH triazolium), 5.02 (br, 2H; $^+NCH_2$ triazolium), 4.62 (br, 2H; $^+NCH_2$ thiazolium), 4.50 (br, 2H; OCH_2), 4.03 (br, 2H; NCH_2), 3.85 (br, 2H; CH_2), 3.33-2.98 (br, 2H; CH_2), 2.57 (br, 3H; CH_3 thiazolium), 2.24-1.02 (br, 46H; $23CH_2$), 1.01-0.40 (br, 9H; $3CH_3$); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 177.0 (CO), 157.3 (CH thiazolium), 144.3, 144.2, 132.4, 129.9 (CH triazolium), 64.7 (OCH_2), 53.9 ($^+NCH_2$), 53.1 ($^+NCH_2$), 51.8 (2C; NCH_2 and CH_2), 45.5 (C quat.), 31.6 (2C), 29.0 (16C), 28.3, 26.0 (2C), 23.7, 22.3 (2C), 14.0 (2C; $2CH_3$), 12.8 (2C; $2CH_3$); IR (neat): 3159-3023 (C-H thiazolium and triazolium), 2918 (C-H), 2854 (C-H), 1724 (CO), 1583 (CN$^+$ thiazolium), 1155 (C-O) cm^{-1};Anal. Calcd. for $(C_{40}H_{72}I_2N_4O_2S)_n$: C 51.83, H 7.83, N 6.04, S 3.46; found: C 51.85, H 8.02, N 6.19, S 3.70.

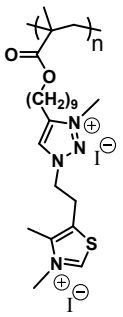
Poly[3-hexadecyl-5-(2-(3-hexadecyl-4-(4-(methacryloyloxy)butyl)-1H-1,2,3-triazol-3-ium-1-yl)ethyl)-4-methylthiazol-3-ium iodide] (PMTA4-HeI)



The polyelectrolyte was synthesized using **PMTA4** (1.0 g, 3 mmol), 1-iodohexadecane (4.7 mL, 15 mmol) in dry DMF (30 mL). **PMTA4-HeI** was obtained as a white solid (2.9 g, 92% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.32 (br, 1H; CH thiazolium), 9.24 (br, 1H; CH triazolium), 5.03 (br, 2H; $^+NCH_2$ triazolium), 4.63 (br, 2H; $^+NCH_2$ thiazolium), 4.52 (br, 2H; OCH_2), 4.06 (br, 2H; NCH_2), 3.89 (br, 2H; CH_2), 3.10 (br, 2H; CH_2), 2.57 (br, 3H; CH_3 thiazolium), 2.19-0.97 (br, 62H; $31CH_2$), 0.96-0.40 (br, 9H; $3CH_3$); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 176.8 (CO), 157.4 (CH thiazolium), 144.3, 144.2, 132.4, 129.9 (CH triazolium), 65.0 (OCH_2), 53.9 ($^+NCH_2$), 53.2 ($^+NCH_2$), 51.9 (2C; NCH_2 and CH_2), 45.5 (C quat.), 31.6 (2C), 29.4 (24C), 28.3, 26.1 (2C), 23.7, 22.3 (2C), 13.9 (2C; $2CH_3$), 12.9 (2C; $2CH_3$); IR (neat): 3142-3023 (C-H thiazolium and triazolium), 2931 (C-H), 2857 (C-H), 1722 (CO), 1585 (CN$^+$ thiazolium), 1153 (C-O) cm^{-1}; Anal. Calcd. for $(C_{48}H_{88}I_2N_4O_2S)_n$: C 55.48, H 8.54, N 5.39, S 3.09; found: C 55.40, H 8.61, N 5.06, S 2.99.

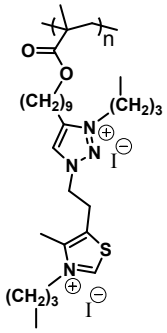
Poly[5-(2-(4-(9-(methacryloyloxy)nonyl)-3-methyl-1H-1,2,3-triazol-3-ium-1-yl)ethyl)-3,4-dimethylthiazol-3-ium iodide] (PMTA5-MeI)



The polyelectrolyte was synthesized using **PMTA5** (1.0 g, 2 mmol), iodomethane (0.6 mL, 10 mmol) in dry DMF (20 mL). **PMTA5-MeI** was obtained as a white solid (1.4 g, 99% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.13 (br, 1H; CH thiazolium), 9.06 (br, 1H; CH triazolium), 4.96 (br, 3H; $^+NCH_3$ triazolium), 4.27 (br, 3H; $^+NCH_3$ thiazolium), 4.15 (br, 2H; OCH_2), 3.77 (br, 2H; NCH_2), 3.24 (br, 2H; CH_2), 2.91 (br, 2H; CH_2), 2.50 (br, 3H; CH_3 thiazolium), 2.01-1.05 (br, 16H; $8CH_2$), 1.04-0.38 (br, 3H; CH_3); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 176.4 (CO), 157.2 (CH thiazolium), 144.5, 144.1, 131.0, 128.5 (CH triazolium), 64.3 (OCH_2), 52.3 (2C; NCH_2 and CH_2), 44.4 (C quat.), 40.6 (2C; 2^+NCH_3), 28.3 (4C), 27.4 (2C), 26.0, 25.6, 25.2, 22.7, 11.7 (2C; $2CH_3$); IR (neat): 3140-3012 (C-H thiazolium and triazolium), 2995 (C-H), 2927 (C-H), 2855 (C-H), 1725 (CO), 1589 (CN^+ thiazolium), 1153 (C-O) cm^{-1}; Anal. Calcd. for $(C_{23}H_{38}I_2N_4O_2S)_n$: C 40.13, H 5.56, N 8.14, S 4.66; found: C 39.98, H 5.52, N 8.02, S 4.71.

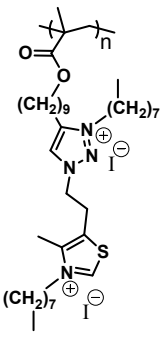
Poly[3-butyl-5-(2-(3-butyl-4-(9-(methacryloyloxy)nonyl)-1H-1,2,3-triazol-3-ium-1-yl)ethyl)-4-methylthiazol-3-ium iodide] (PMTA5-BuI)



The polyelectrolyte was synthesized using **PMTA5** (1.0 g, 2 mmol), 1-iodobutane (1.1 mL, 10 mmol) in dry DMF (20 mL). **PMTA5-BuI** was obtained as a white solid (1.5 g, 97% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.30 (br, 1H; CH thiazolium), 9.20 (br, 1H; CH triazolium), 5.01 (br, 2H; $^+NCH_2$ triazolium), 4.72-4.31 (br, 4H; $^+NCH_2$ thiazolium and OCH_2), 3.83 (br, 2H; NCH_2), 3.26 (br, 2H; CH_2), 2.90 (br, 2H; CH_2), 2.56 (br, 3H; CH_3 thiazolium), 2.02-1.04 (br, 24H; $12CH_2$), 1.36-0.38 (br, 9H; $3CH_3$); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 176.3 (CO), 156.8 (CH thiazolium), 144.0, 143.7, 131.9, 129.1 (CH triazolium), 64.4 (OCH_2), 53.1 ($^+NCH_2$), 52.5 ($^+NCH_2$), 50.8 (2C; NCH_2 and CH_2), 44.7 (C quat.), 30.6, 29.8, 28.7, 28.5, 28.3, 27.6, 26.6, 25.9, 25.9, 25.4, 22.9, 18.7 (2C), 13.0 (2C; $2CH_3$), 12.0 (2C; $2CH_3$); IR (neat): 3115-3010 (C-H thiazolium and triazolium), 2953 (C-H), 2930 (C-H), 2858 (C-H), 1724 (CO), 1584 (CN^+ thiazolium), 1151 (C-O) cm^{-1}; Anal. Calcd. for $(C_{29}H_{50}I_2N_4O_2S)_n$: C 45.08, H 6.52, N 7.25, S 4.15; found: C 45.11, H 6.80, N 7.24, S 4.36.

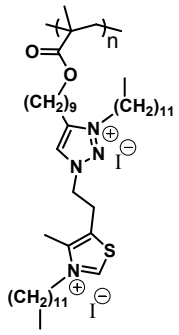
Poly[5-(2-(4-(9-(methacryloyloxy)nonyl)-3-octyl-1H-1,2,3-triazol-3-ium-1-yl)ethyl)-4-methyl-3-octylthiazol-3-ium iodide] (PMTA5-OcI)



The polyelectrolyte was synthesized using **PMTA5** (1.0 g, 2 mmol), 1-iodooctane (1.8 mL, 10 mmol) in dry DMF (20 mL). **PMTA5-OcI** was obtained as a white solid (1.7 g, 94% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.22 (br, 1H; CH thiazolium), 9.13 (br, 1H; CH triazolium), 4.96 (br, 2H; $^+NCH_2$ triazolium), 4.74-4.34 (br, 4H; $^+NCH_2$ thiazolium and OCH_2), 3.80 (br, 2H; NCH_2), 3.38 (br, 2H; CH_2), 2.94 (br, 2H; CH_2), 2.50 (br, 3H; CH_3 thiazolium), 2.09-0.98 (br, 40H; $20CH_2$), 0.97-0.38 (br, 9H; $3CH_3$); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 176.8 (CO), 157.6 (CH thiazolium), 144.7, 144.2, 132.3, 129.5 (CH triazolium), 64.8 (OCH_2), 53.6 ($^+NCH_2$), 53.2 ($^+NCH_2$), 51.3 (2C; NCH_2 and CH_2), 45.1 (C quat.), 31.6 (2C), 29.2 (8C), 28.9 (3C), 28.5 (2C), 27.1 (2C), 26.4, 26.0, 22.5 (2C), 14.3 (2C; $2CH_3$), 12.5 (2C; $2CH_3$); IR (neat): 3118-3018 (C-H thiazolium and triazolium), 2927 (C-H), 2854 (C-H), 1724 (CO), 1584 (CN$^+$ thiazolium), 1150 (C-O) cm^{-1}; Anal. Calcd. for $(C_{37}H_{66}I_2N_4O_2S)_n$: C 50.22, H 7.52, N 6.33, S 3.62; found: C 50.43, H 7.81, N 6.44, S 3.91.

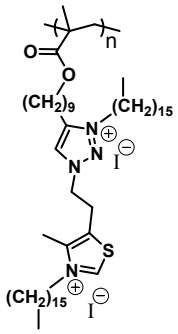
Poly[3-dodecyl-5-(2-(3-dodecyl-4-(9-(methacryloyloxy)nonyl)-1H-1,2,3-triazol-3-ium-1-yl)ethyl)-4-methylthiazol-3-ium iodide] (PMTA5-DoI)



The polyelectrolyte was synthesized using **PMTA5** (1.0 g, 2 mmol), 1-iodododecane (2.5 mL, 10 mmol) in dry DMF (20 mL). **PMTA5-DoI** was obtained as a white solid (1.9 g, 96% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.25 (br, 1H; CH thiazolium), 9.15 (br, 1H; CH triazolium), 5.02 (br, 2H; $^+NCH_2$ triazolium), 4.58 (br, 2H; $^+NCH_2$ thiazolium), 4.51 (br, 2H; OCH_2), 3.82 (br, 2H; NCH_2), 3.02 (br, 4H; $2CH_2$), 2.54 (br, 3H; CH_3 thiazolium), 1.99-0.98 (br, 56H; $28CH_2$), 0.96-0.35 (br, 9H; $3CH_3$); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 175.7 (CO), 157.8 (CH thiazolium), 144.8, 144.3, 132.9, 129.4 (CH triazolium), 65.4 (OCH_2), 53.5 ($^+NCH_2$), 52.8 ($^+NCH_2$), 51.8 (2C; NCH_2 and CH_2), 44.7 (C quat.), 31.7 (2C), 29.5 (14C), 28.9 (8C), 26.0 (3C), 22.5 (2C), 14.3 (2C; $2CH_3$), 12.4 (2C; $2CH_3$); IR (neat): 3120-3019 (C-H thiazolium and triazolium), 2930 (C-H), 2858 (C-H), 1724 (CO), 1583 (CN$^+$ thiazolium), 1147 (C-O) cm^{-1}; Anal. Calcd. for $(C_{45}H_{82}I_2N_4O_2S)_n$: C 54.21, H 8.29, N 5.62, S 3.22; found: C 54.53, H 8.58, N 5.86, S 3.54.

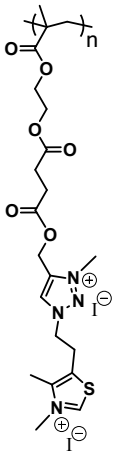
Poly[3-hexadecyl-5-(2-(3-hexadecyl-4-(9-(methacryloyloxy)nonyl)-1H-1,2,3-triazol-3-ium-1-yl)ethyl)-4-methylthiazol-3-ium iodide] (PMTA5-HeI)



The polyelectrolyte was synthesized using **PMTA5** (1.0 g, 2 mmol), 1-iodohexadecane (3.1 mL, 10 mmol) in dry DMF (20 mL). **PMTA5-HeI** was isolated as a white solid (2.2 g, 98% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.25 (br, 1H; CH thiazolium), 9.16 (br, 1H; CH triazolium), 5.02 (br, 2H; $^+NCH_2$ triazolium), 4.57 (br, 2H; $^+NCH_2$ thiazolium), 4.50 (br, 2H; OCH_2), 3.83 (br, 2H; NCH_2), 3.12 (br, 2H; CH_2), 2.94 (br, 2H; CH_2), 2.54 (br, 3H; CH_3 thiazolium), 2.02-0.99 (br, 72H; $36CH_2$), 0.98-0.36 (br, 9H; $3CH_3$); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 176.2 (CO), 157.4 (CH thiazolium), 144.5, 144.2, 132.5, 129.8 (CH triazolium), 65.0 (OCH_2), 53.9 ($^+NCH_2$), 53.2 ($^+NCH_2$), 51.6 (2C; NCH_2 and CH_2), 45.2 (C quat.), 31.6 (2C), 29.3 (22C), 28.8 (6C), 28.2 (4C), 26.0 (2C), 22.3 (2C), 14.0 (2C; $2CH_3$), 12.6 (2C; $2CH_3$); IR (neat): 3128-3016 (C-H thiazolium and triazolium), 2921 (C-H), 2849 (C-H), 1726 (CO), 1589 (CN$^+$ thiazolium), 1147 (C-O) cm^{-1}; Anal. Calcd. for $(C_{53}H_{98}I_2N_4O_2S)_n$: C 57.39, H 8.90, N 5.05, S 2.89; found: C 57.31, H 8.83, N 4.98, S 3.02.

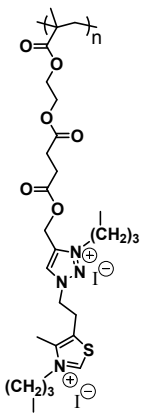
Poly[5-(2-(4-(((4-(2-(methacryloyloxy)ethoxy)-4-oxobutanoyl)oxy)methyl)-3-methyl-1H-1,2,3-triazol-3-ium-1-yl)ethyl)-3,4-dimethylthiazol-3-ium iodide] (PMTA6-MeI)



The polyelectrolyte was synthesized using **PMTA6** (1.0 g, 2 mmol), iodomethane (0.6 mL, 10 mmol) in dry DMF (20 mL). **PMTA6-MeI** was obtained as a white solid (1.4 g, 97% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.15 (br, 1H; CH thiazolium), 9.25 (br, 1H; CH triazolium), 5.52 (br, 2H; OCH_2), 5.05 (br, 3H; $^+NCH_3$ triazolium), 4.30 (br, 3H; $^+NCH_3$ thiazolium), 4.17 (br, 4H; $2OCH_2$), 3.80 (br, 2H; NCH_2), 3.19 (br, 2H; CH_2), 2.81-2.65 (br, 4H; $2CH_2CO$), 2.52 (br, 3H; CH_3 thiazolium), 2.19-1.46 (br, 2H; CH_2), 1.37-0.51 (br, 3H; CH_3); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 176.4 (CO), 172.0 (CO), 171.6 (CO), 158.0 (CH thiazolium), 144.9, 139.1, 131.5 (2C; C-S thiazolium and CH triazolium), 63.1 (OCH_2), 62.2 (OCH_2), 54.4 (OCH_2), 53.4 (2C; NCH_2 and CH_2), 45.0 (C quat.), 41.4 (2C; 2^+NCH_3), 28.9 (2C; $2CH_2$), 26.3, 12.5 (2C; $2CH_3$); IR (neat): 3160-3034 (C-H thiazolium and triazolium), 2991 (C-H), 2915 (C-H), 1731-1716 (CO), 1593 (CN$^+$ thiazolium), 1145 (C-O) cm^{-1}; Anal. Calcd. for $(C_{21}H_{30}I_2N_4O_6S)_n$: C 35.01, H 4.20, N 7.78, S 4.45; found: C 35.11, H 4.19, N 7.83, S 4.55.

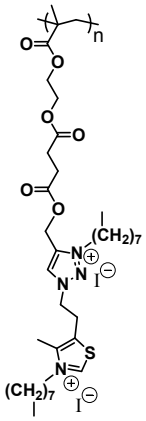
Poly[3-butyl-5-(2-(3-butyl-4-(((4-(2-(methacryloyloxy)ethoxy)-4-oxobutanoyl)oxy)methyl)-1H-1,2,3-triazol-3-ium-1-yl)ethyl)-4-methylthiazol-3-ium iodide] (PMTA6-BuI)



The polyelectrolyte was synthesized using **PMTA6** (1.0 g, 2 mmol), 1-iodobutane (1.1 mL, 10 mmol) in dry DMF (20 mL). **PMTA6-BuI** was obtained as a white solid (1.5 g, 95% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.17 (br, 1H; CH thiazolium), 9.19 (br, 1H; CH triazolium), 5.49 (br, 2H; OCH_2), 5.00 (br, 2H; $^+NCH_2$ triazolium), 4.78-3.91 (br, 6H; $^+NCH_2$ thiazolium and $2OCH_2$), 3.74 (br, 2H; NCH_2), 3.33 (br, 2H; CH_2), 2.62 (br, 4H; $2CH_2CO$), 2.55 (br, 3H; CH_3 thiazolium), 2.04-1.13 (br, 10H; $5CH_2$), 1.12-0.41 (br, 9H; $3CH_3$); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 176.6 (CO), 172.4 (CO), 1721.1 (CO), 157.7 (CH thiazolium), 144.2, 138.5, 132.3, 131.6 (CH triazolium), 62.8 (OCH_2), 62.1 (OCH_2), 54.1 (OCH_2), 53.3 (2C; $^+NCH_2$), 52.0 (2C; NCH_2 and CH_2), 44.8 (C quat.), 31.1, 30.5, 28.7 (2C), 26.2, 19.3 (2C), 13.7 (2C; $2CH_3$), 12.1 (2C; $2CH_3$); IR (neat): 3148-3016 (C-H thiazolium and triazolium), 2975 (C-H), 2923 (C-H), 2875 (C-H), 1734-1716 (CO), 1589 (CN^+ thiazolium), 1139 (C-O) cm^{-1}; Anal. Calcd. for $(C_{27}H_{42}I_2N_4O_6S)_n$: C 40.31, H 5.26, N 6.96, S 3.99; found: C 40.51, H 5.54, N 7.20, S 4.70.

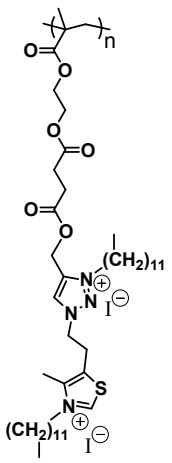
Poly[5-(2-(4-(((4-(2-(methacryloyloxy)ethoxy)-4-oxobutanoyl)oxy)methyl)-3-octyl-1H-1,2,3-triazol-3-ium-1-yl)ethyl)-4-methyl-3-octylthiazol-3-ium iodide] (PMTA6-OcI)



The polyelectrolyte was synthesized using **PMTA6** (1.0 g, 2 mmol), 1-iodooctane (1.8 mL, 10 mmol) in dry DMF (20 mL). **PMTA6-OcI** was obtained as a white solid (1.8 g, 97% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.21 (br, 1H; CH thiazolium), 9.23 (br, 1H; CH triazolium), 5.51 (br, 2H; OCH_2), 5.05 (br, 2H; $^+NCH_2$ triazolium), 4.67 (br, 2H; $^+NCH_2$ thiazolium), 4.61-4.32 (br, 4H; $2OCH_2$), 3.71 (br, 2H; NCH_2), 3.09 (br, 2H; CH_2), 2.65 (br, 4H; $2CH_2CO$), 2.57 (br, 3H; CH_3 thiazolium), 2.19-1.08 (br, 26H; $13CH_2$), 1.07-0.41 (br, 9H; $3CH_3$); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 176.2 (CO), 171.8 (CO), 171.4 (CO), 157.4 (CH thiazolium), 144.3, 138.7, 132.3, 131.7 (CH triazolium), 62.9 (OCH_2), 62.1 (OCH_2), 54.2 (OCH_2), 53.8 (2C; 2^+NCH_2), 52.6 (2C; NCH_2 and CH_2), 45.1 (C quat.), 31.4 (2C), 29.2 (8C), 28.7 (2C), 26.0, 22.2 (2C), 14.0 (2C; $2CH_3$), 12.3 (2C; $2CH_3$); IR (neat): 3140-3032 (C-H thiazolium and triazolium), 2955 (C-H), 2923 (C-H), 2859 (C-H), 1736-1719 (CO), 1586 (CN^+ thiazolium), 1139 (C-O) cm^{-1}; Anal. Calcd. for $(C_{35}H_{58}I_2N_4O_6S)_n$: C 45.86, H 6.38, N 6.11, S 3.50; found: C 46.51, H 6.54, N 6.20, S 3.70.

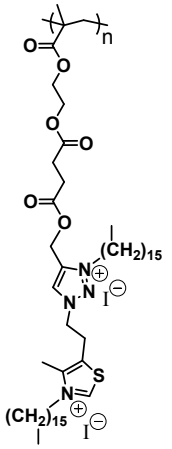
Poly[3-dodecyl-5-(2-(3-dodecyl-4-(((4-(2-(methacryloyloxy)ethoxy)-4-oxobutanoyl)oxy) methyl)-1H-1,2,3-triazol-3-ium-1-yl)ethyl)-4-methylthiazol-3-ium iodide] (PMTA6-DoI)



The polyelectrolyte was synthesized using **PMTA6** (1.0 g, 2 mmol), 1-iodododecane (2.5 mL, 10 mmol) in dry DMF (20 mL). **PMTA6-DoI** was obtained as a white solid (2.0 g, 98% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.21 (br, 1H; CH thiazolium), 9.22 (br, 1H; CH triazolium), 5.50 (br, 2H; OCH_2), 5.14 (br, 2H; $^+NCH_2$ triazolium), 4.66 (br, 2H; $^+NCH_2$ thiazolium), 4.60-4.15 (br, 4H; $2OCH_2$), 3.79 (br, 2H; NCH_2), 3.31 (br, 2H; CH_2), 2.92-2.58 (br, 4H; $2CH_2CO$), 2.54 (br, 3H; CH_3 thiazolium), 2.12-1.03 (br, 42H; $21CH_2$), 1.02-0.43 (br, 9H; $3CH_3$); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 176.7 (CO), 171.8 (CO), 171.4 (CO), 157.4 (CH thiazolium), 144.3, 138.8, 132.4, 131.7 (CH triazolium), 62.9 (OCH_2), 62.0 (OCH_2), 54.2 (OCH_2), 53.7 (2C; 2^+NCH_2), 53.6 (2C; NCH_2 and CH_2), 45.1 (C quat.), 31.6 (2C), 29.2 (18C), 26.0, 22.3 (2C), 14.0 (2C; $2CH_3$), 11.8 (2C; $2CH_3$). IR (neat): 3160-3038 (C-H thiazolium and triazolium), 2951 (C-H), 2927 (C-H), 2851 (C-H), 1734-1722 (CO), 1585 (CN$^+$ thiazolium), 1143 (C-O) cm^{-1}; Anal. Calcd. for $(C_{43}H_{74}I_2N_4O_6S)_n$: C 50.19, H 7.25, N 5.45, S 3.12; found: C 51.51, H 7.54, N 4.70, S 3.70.

Poly[3-hexadecyl-5-(2-(3-hexadecyl-4-((4-(2-(methacryloyloxy)ethoxy)-4-oxobutanoyl)oxy) methyl)-1H-1,2,3-triazol-3-ium-1-yl)ethyl-4-methylthiazol-3-ium iodide] (PMTA6-HeI)



The polyelectrolyte was synthesized using **PMTA6** (1.0 g, 2 mmol), 1-iodohexadecane (3.1 mL, 10 mmol) in dry DMF (20 mL). **PMTA6-HeI** was isolated as a white solid (2.1 g, 96% yield).

^{1}H NMR (300 MHz, DMSO-d_6): δ = 10.23 (br, 1H; CH thiazolium), 9.27 (br, 1H; CH triazolium), 8.26 (br, 0.01H; unmodified CH triazole), 5.51 (br, 2H; OCH_2), 5.05 (br, 2H; $^+NCH_2$ triazolium), 4.71 (br, 2H; $^+NCH_2$ thiazolium), 4.55-4.10 (br, 4H; $2OCH_2$), 3.81 (br, 2H; NCH_2), 3.12 (br, 2H; CH_2), 2.62 (br, 4H; $2CH_2$), 2.56 (br, 3H; CH_3 thiazolium), 2.16-0.97 (br, 58H; $29CH_2$), 0.96-0.42 (br, 9H; $3CH_3$); ^{13}C NMR (75 MHz, DMSO-d_6): δ = 176.3 (CO), 171.9 (CO), 171.5 (CO), 157.5 (CH thiazolium), 144.2, 138.7, 132.4, 131.7 (CH triazolium), 63.0 (OCH_2), 62.1 (OCH_2), 54.4 (OCH_2), 53.7 (2C; 2^+NCH_2), 52.5 (2C; NCH_2 and CH_2), 45.0 (C quat.), 31.6 (2C), 29.4-28.4 (26C), 26.0, 22.4 (2C), 14.1 (2C; $2CH_3$), 12.4 (2C; $2CH_3$); IR (neat): 3140-3041 (C-H thiazolium and triazolium), 2955 (C-H), 2919 (C-H), 2851 (C-H), 1736-1721 (CO), 1589 (CN$^+$ thiazolium), 1147 (C-O) cm^{-1}; Anal. Calcd. for $(C_{51}H_{90}I_2N_4O_6S)_n$: C 53.68, H 7.95, N 4.91, S 2.81; found: C 55.51, H 7.54, N 4.20, S 2.70.

5. Degree of Quaternization (DQ) of PMTAs-RI

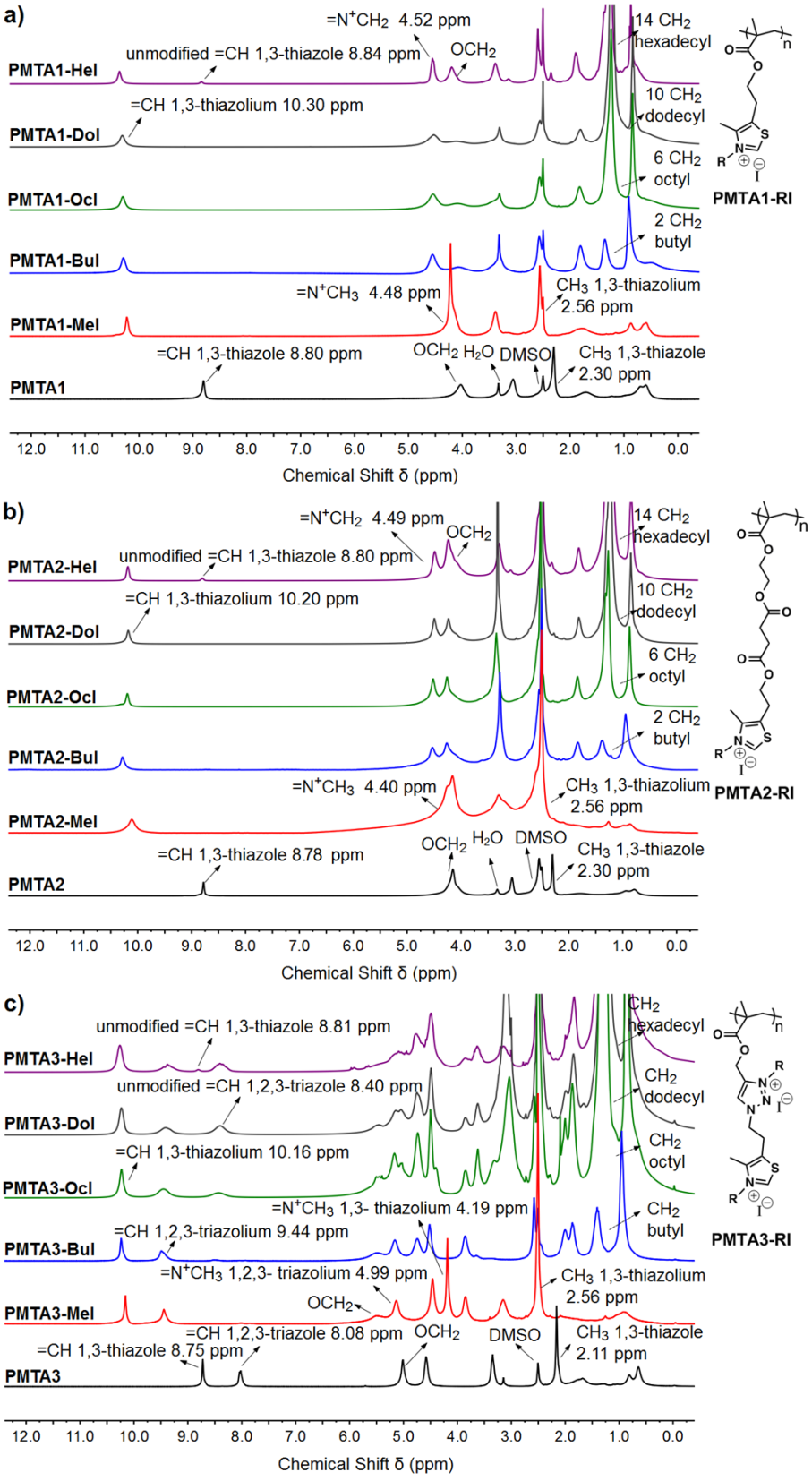
The degree of the polymer modification was determined by ^{1}H-NMR spectroscopy. The signals corresponding to the aromatic protons of 1,3-thiazolium and 1,2,3-triazolium show different chemical shifts (ppm) than the corresponding of 1,3-thiazole and 1,2,3-triazole. Depending on the polymeric family, aromatic protons of positively charged heterocycles are more deshielded (=CH of 1,3-thiazolium around 10.2 ppm and =CH of 1,2,3-triazolium around 9.4 ppm) than in the unmodified ones (=CH of 1,3-thiazole around 8.7 ppm and =CH of 1,2,3-triazole around 7.7 ppm). Besides these signals are not overlapping with each other (see **Figure S1**), a relationship between the integration area (I) of the two peaks can be applied as follows:

$$DQ_{th}\,(\%) = \frac{I\,(CH\ aromatic\ 1,3\text{-}thiazolium\ around\ 10.2\,)}{I\,(CH\ aromatic\ 1,3\text{-}thiazolium\ around\ 10.2\,) + I\,(CH\ unmodified\ 1,3\text{-}thiazole\ around\ 8.7\ ppm)} \times 100$$

$$DQ_{tr}\,(\%) = \frac{I\,(CH\ aromatic\ 1,2,3\text{-}triazolium\ around\ 9.4\,)}{I\,(CH\ aromatic\ 1,2,3\text{-}triazolium\ around\ 9.4\ ppm) + I\,(CH\ aromatic\ unmodified\ 1,2,3\text{-}triazole\ around\ 7.7\ ppm)} \times 100$$

Table S1. Degrees of Quaternization (DQs) of **PMTAs-RI** series**.**

Polymer	DQth (%) 1,3-thiazolium	DQtr (%) 1,2,3-triazolium	Polymer	DQth (%) 1,3-thiazolium	DQtr (%) 1,2,3-triazolium
PMTA1-MeI	100	-	**PMTA4-MeI**	100	100
PMTA1-BuI	100	-	**PMTA4-BuI**	100	100
PMTA1-OcI	100	-	**PMTA4-OcI**	100	100
PMTA1-DoI	100	-	**PMTA4-DoI**	100	100
PMTA1-HeI	98	-	**PMTA4-HeI**	>99	>99
PMTA2-MeI	100	-	**PMTA5-MeI**	100	100
PMTA2-BuI	100	-	**PMTA5-BuI**	100	100
PMTA2-OcI	100	-	**PMTA5-OcI**	100	100
PMTA2-DoI	100	-	**PMTA5-DoI**	100	100
PMTA2-HeI	99	-	**PMTA5-HeI**	100	100
PMTA3-MeI	100	100	**PMTA6-MeI**	100	100
PMTA3-BuI	100	99	**PMTA6-BuI**	100	100
PMTA3-OcI	100	68	**PMTA6-OcI**	100	100
PMTA3-DoI	100	45	**PMTA6-DoI**	100	100
PMTA3-HeI	93	40	**PMTA6-HeI**	100	99


a)
=N+CH2 4.52 ppm
14 CH2 hexadecyl
unmodified =CH 1,3-thiazole 8.84 ppm
OCH2
PMTA1-Hel
=CH 1,3-thiazolium 10.30 ppm
10 CH2 dodecyl
PMTA1-Dol
6 CH2 octyl
PMTA1-Ocl
2 CH2 butyl
PMTA1-Bul
=N+CH3 4.48 ppm
CH3 1,3-thiazolium 2.56 ppm
PMTA1-Mel
=CH 1,3-thiazole 8.80 ppm
OCH2 H2O DMSO
CH3 1,3-thiazole 2.30 ppm
PMTA1
PMTA1-RI
12.0 11.0 10.0 9.0 8.0 7.0 6.0 5.0 4.0 3.0 2.0 1.0 0.0
Chemical Shift δ (ppm)
b)
=N+CH2 4.49 ppm
OCH2
14 CH2 hexadecyl
unmodified =CH 1,3-thiazole 8.80 ppm
PMTA2-Hel
=CH 1,3-thiazolium 10.20 ppm
10 CH2 dodecyl
PMTA2-Dol
6 CH2 octyl
PMTA2-Ocl
2 CH2 butyl
PMTA2-Bul
=N+CH3 4.40 ppm
CH3 1,3-thiazolium 2.56 ppm
PMTA2-Mel
=CH 1,3-thiazole 8.78 ppm
OCH2 H2O DMSO
CH3 1,3-thiazole 2.30 ppm
PMTA2
PMTA2-RI
12.0 11.0 10.0 9.0 8.0 7.0 6.0 5.0 4.0 3.0 2.0 1.0 0.0
Chemical Shift δ (ppm)
c)
unmodified =CH 1,3-thiazole 8.81 ppm
CH2 hexadecyl
PMTA3-Hel
unmodified =CH 1,2,3-triazole 8.40 ppm
CH2 dodecyl
PMTA3-Dol
=CH 1,3-thiazolium 10.16 ppm
CH2 octyl
PMTA3-Ocl
=N+CH3 1,3- thiazolium 4.19 ppm
CH2 butyl
=CH 1,2,3-triazolium 9.44 ppm
PMTA3-Bul
=N+CH3 1,2,3- triazolium 4.99 ppm
CH3 1,3-thiazolium 2.56 ppm
OCH2
PMTA3-Mel
=CH 1,2,3-triazole 8.08 ppm
OCH2
DMSO
CH3 1,3-thiazole 2.11 ppm
=CH 1,3-thiazole 8.75 ppm
PMTA3
PMTA3-RI
12.0 11.0 10.0 9.0 8.0 7.0 6.0 5.0 4.0 3.0 2.0 1.0 0.0
Chemical Shift δ (ppm)

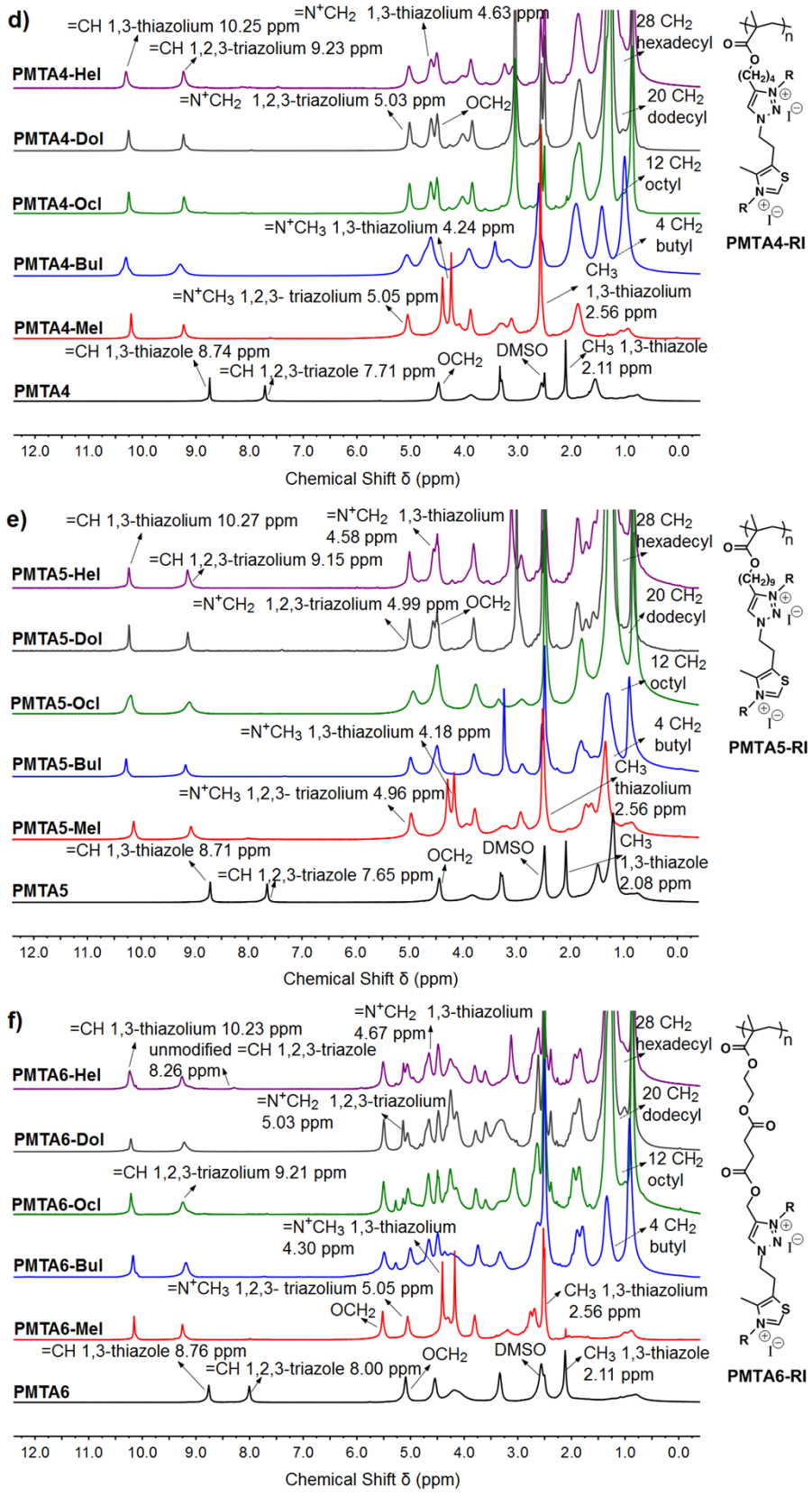


Figure S1. Effect of DQ on chemical shifts of the aromatic protons in **PMTAs** and **PMTAs-RI** series (from bottom to top in each set of spectra) attending to ^{1}H-NMR in DMSO-d_6: a) **PMTA1-RI**, b) **PMTA2-RI**, c) **PMTA3-RI**, d) **PMTA4-RI**, e) **PMTA5-RI** and f) **PMTA6-RI**.

6. Bioassays Data

Table S2. Minimum Inhibitory Concentration (MIC), Selectivity Index (HC_{50}/MIC) and HC_{50} values with standard deviations (SD) of **MTAs**, **PMTAs**, **PMTAs-RI** and the cationic peptide **MSI-78.**

	MIC (μg/mL), Selectivity Index (HC_{50}/MIC)[a]						
Monomer and Polymer	***E. coli*** **(ATCC® 25922)**	***P. aeruginosa*** **(ATCC® 27853)**	***S. aureus*** **(ATCC® 29213)**	**MRSA (Clinical Sample)**	***S. epidermidis*** **(ATCC® 12221)**	***C. parapsilosis*** **(ATCC® 22019)**	**HC_{50} (μg/mL)**
MSI-78[3] (cationic polypeptide)	8 (15)	8 (15)	4 (30)	32 (4)	4 (30)	8-128 (15-0.9)	120[4]
MTA1	>128	>128	>128	>128	>128	>128	n.t[b]
PMTA1	>128	>128	>128	>128	>128	>128	n.t
PMTA1-MeI	64 (>78)	16 (>312)	8 (>625)	32 (>156)	4 (>1250)	16 (>312)	>5000
PMTA1-BuI	32 (>156)	8 (>625)	8 (>625)	16 (>312)	4 (>1250)	8 (>625)	>5000
PMTA1-OcI	128 (8)	64 (17)	128 (8)	128 (8)	64 (17)	16 (68)	1094 ± 90
PMTA1-DoI	128 (7)	64 (14)	128 (7)	128 (7)	64 (14)	16 (58)	932 ± 110
PMTA1-HeI	64 (12)	64 (12)	64 (12)	128 (6)	32 (24)	8 (95)	757 ± 53
MTA2	>128	>128	>128	>128	>128	>128	n.t
PMTA2	>128	>128	>128	>128	>128	>128	n.t
PMTA2-MeI	128 (>39)	64 (>78)	32 (>156)	64 (>78)	16 (>312)	8 (>625)	>5000
PMTA2-BuI	128 (>39)	32 (>156)	16 (>312)	32 (>156)	16 (>312)	16 (>312)	>5000
PMTA2-OcI	128 (12)	64 (25)	64 (25)	64 (25)	32 (50)	32 (50)	1584 ± 25
PMTA2-DoI	64 (18)	64 (18)	32 (37)	32 (37)	16 (74)	64 (18)	1177 ± 34
PMTA2-HeI	64 (18)	64 (18)	32 (35)	32 (35)	16 (71)	64 (18)	1129 ± 100
MTA3	>128	>128	>128	>128	>128	>128	n.t
PMTA3	>128	>128	>128	>128	>128	>128	n.t
PMTA3-MeI	128 (>39)	32 (>156)	16 (>312)	32 (>156)	16 (>312)	16 (>312)	>5000
PMTA3-BuI	64 (>78)	16 (>312)	16 (>312)	8 (>625)	8 (>625)	32 (>156)	>5000
PMTA3-OcI	64 (17)	64 (17)	64 (17)	64 (17)	64 (17)	32 (33)	1064 ± 102
PMTA3-DoI	64 (13)	64 (13)	32 (26)	32 (26)	32 (26)	32 (26)	826 ± 43
PMTA3-HeI	64 (12)	64 (12)	64 (12)	64 (12)	64 (12)	16 (48)	767 ± 58

[a]Selectivity Index (HC_{50}/MIC) is given between parentheses; [b] n.t. means not tested.

Table S3. Minimum Inhibitory Concentration (MIC), Selectivity Index (HC_{50}/MIC) and HC_{50} values with standard deviations (SD) of **MTAs**, **PMTAs**, **PMTAs-RI** and the cationic peptide **MSI-78.**

	MIC (μg/mL), Selectivity Index (HC_{50}/MIC)[a]						
Monomer and Polymer	***E. coli*** **(ATCC® 25922)**	***P. aeruginosa*** **(ATCC® 27853)**	***S. aureus*** **(ATCC® 29213)**	**MRSA (Clinical Sample)**	***S. epidermidis*** **(ATCC® 12221)**	***C. parapsilosis*** **(ATCC® 22109)**	**HC_{50} (μg/mL)**
MSI-78[3] (cationic polypeptide)	8 (15)	8 (15)	4 (30)	32 (4)	4 (30)	8-128 (15-0.9)	120[4]
MTA4	>128	>128	>128	>128	>128	>128	n.t[b]
PMTA4	>128	>128	>128	>128	>128	>128	n.t
PMTA4-MeI	32 (>156)	8 (>625)	8 (>625)	8 (>625)	8 (>625)	16 (>312)	>5000
PMTA4-BuI	32 (>156)	4 (>1250)	4 (>1250)	8 (>625)	4 (>1250)	4 (>1250)	>5000
PMTA4-OcI	128 (4)	64 (8)	128 (4)	128 (4)	128 (4)	64 (8)	512 ± 37
PMTA4-DoI	128 (5)	64 (9)	64 (9)	64 (9)	64 (9)	32 (19)	598 ± 44
PMTA4-HeI	64 (9)	64 (9)	128 (5)	128 (5)	128 (5)	64 (9)	587 ± 82
MTA5	>128	>128	>128	>128	128	>128	n.t
PMTA5	>128	>128	>128	>128	>128	>128	n.t
PMTA5-MeI	32 (>72)	4 (>575)	4 (>575)	8 (>287)	4 (>575)	16 (>144)	2305 ± 158
PMTA5-BuI	16 (>156)	4 (>625)	4 (>625)	8 (>312)	4 (>625)	8 (>312)	2584 ± 143
PMTA5-OcI	64 (9)	64 (9)	64 (9)	128 (5)	64 (9)	64 (9)	506 ± 69
PMTA5-DoI	128 (3)	64 (7)	128 (3)	128 (3)	64 (7)	64 (7)	548 ± 52
PMTA5-HeI	128 (4)	64 (7)	128 (4)	128 (4)	64 (7)	64 (7)	580 ± 47
MTA6	>128	>128	>128	>128	>128	>128	n.t
PMTA6	>128	>128	>128	>128	>128	>128	n.t
PMTA6-MeI	128 (>39)	32 (>156)	8 (>625)	32 (>156)	8 (>625)	32 (>156)	>5000
PMTA6-BuI	128 (>39)	32 (>156)	8 (>625)	16 (>312)	8 (>625)	16 (>312)	>5000
PMTA6-OcI	64 (8)	64 (8)	32 (16)	16 (32)	16 (32)	32 (16)	516 ± 66
PMTA6-DoI	64 (9)	64 (9)	32 (19)	32 (19)	16 (37)	16 (37)	600 ± 86
PMTA6-HeI	64 (7)	64 (7)	32 (14)	32 (14)	8 (56)	32 (14)	447 ± 24

[a]Selectivity Index (HC_{50}/MIC) is given between parentheses; [b]n.t. means not tested.

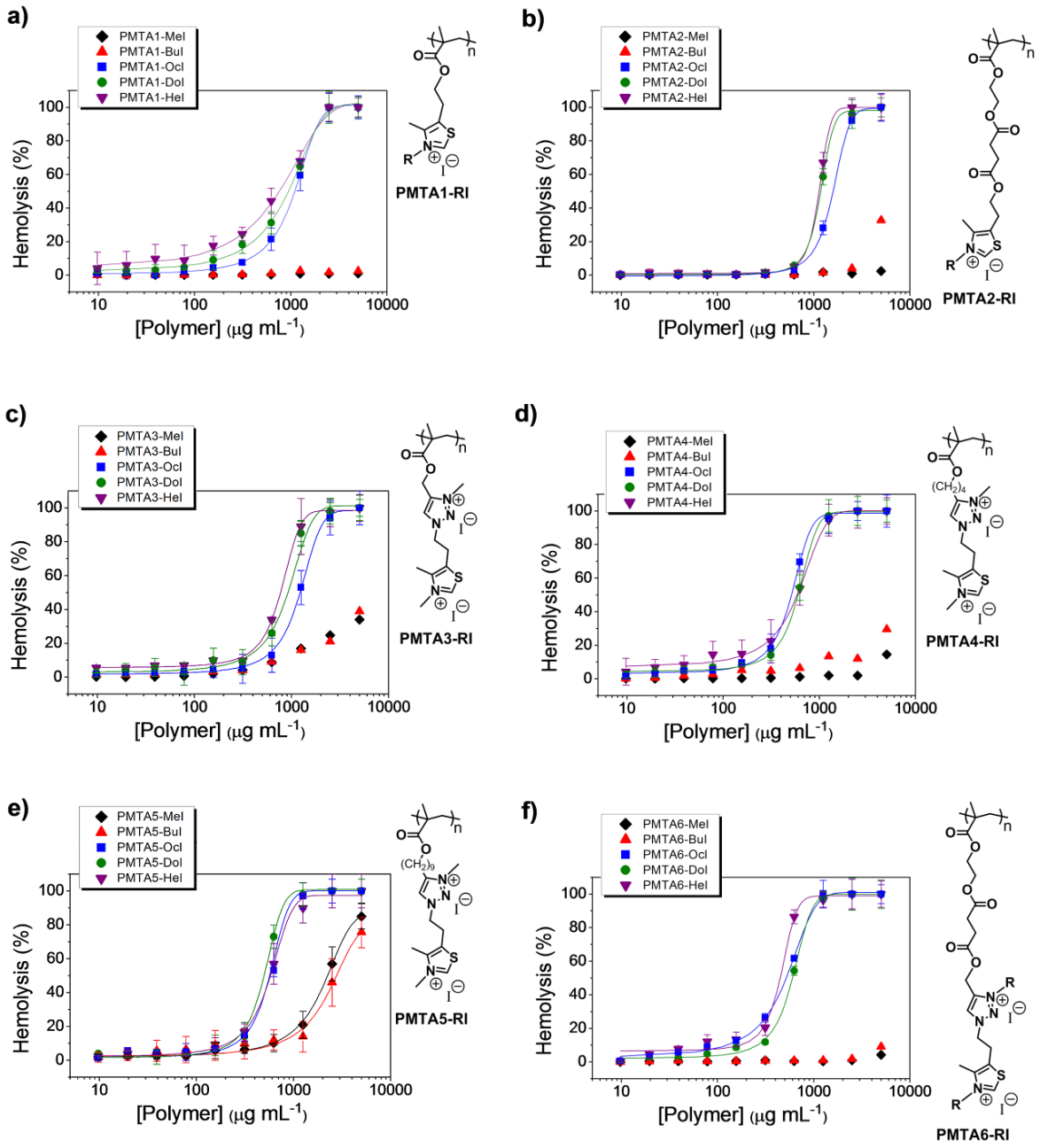


Figure S2. Hemolysis dose-response curves for **PMTAs-RI** series: a) **PMTA1-RI**, b) **PMTA2-RI**, c) **PMTA3-RI**, d) **PMTA4-RI**, e) **PMTA5-RI** and f) **PMTA6-RI**.

7. NMR Spectra

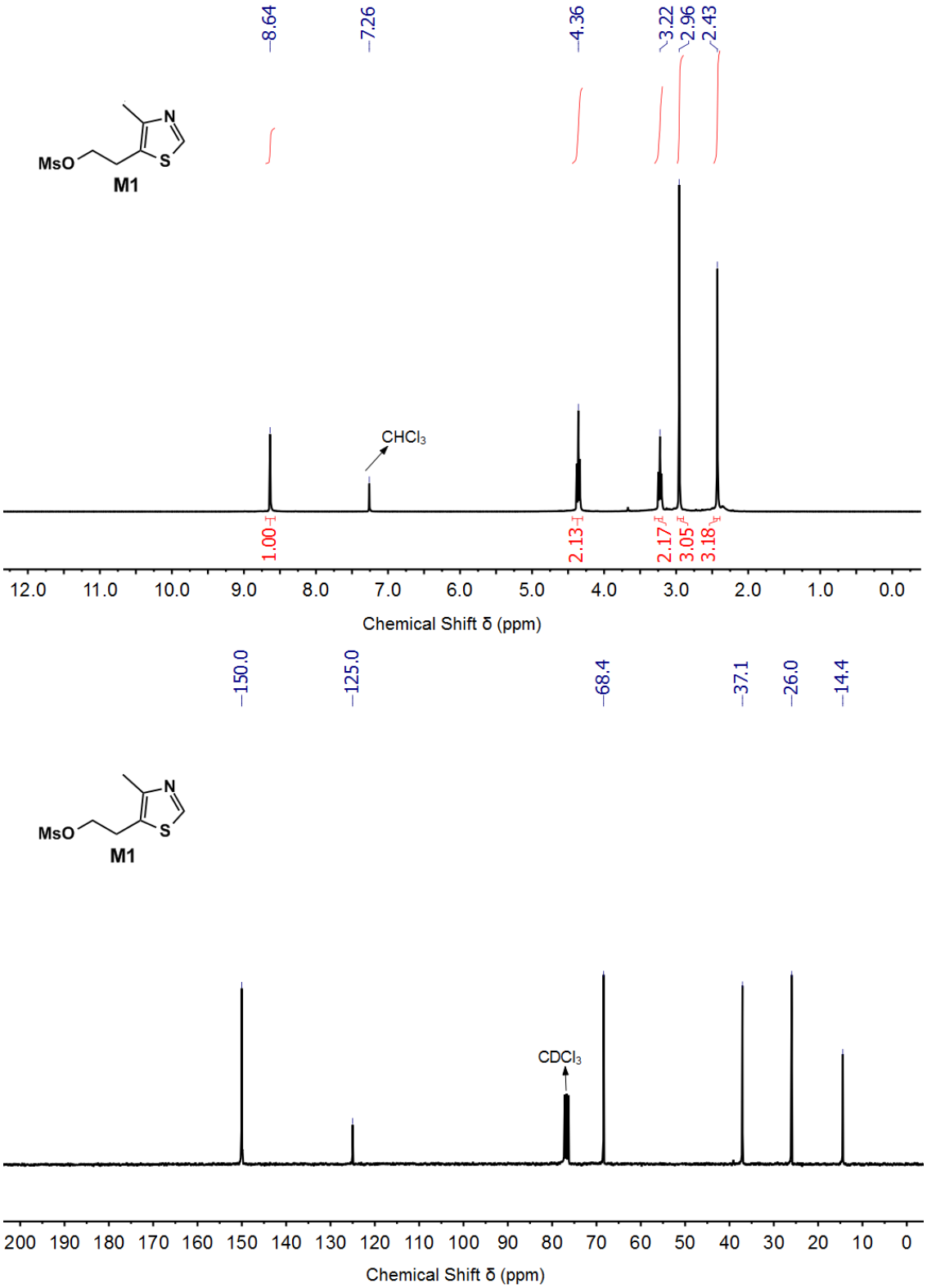


Figure S3. ^{1}H (top) and ^{13}C (bottom) NMR spectra in $CDCl_3$ of **M1.**

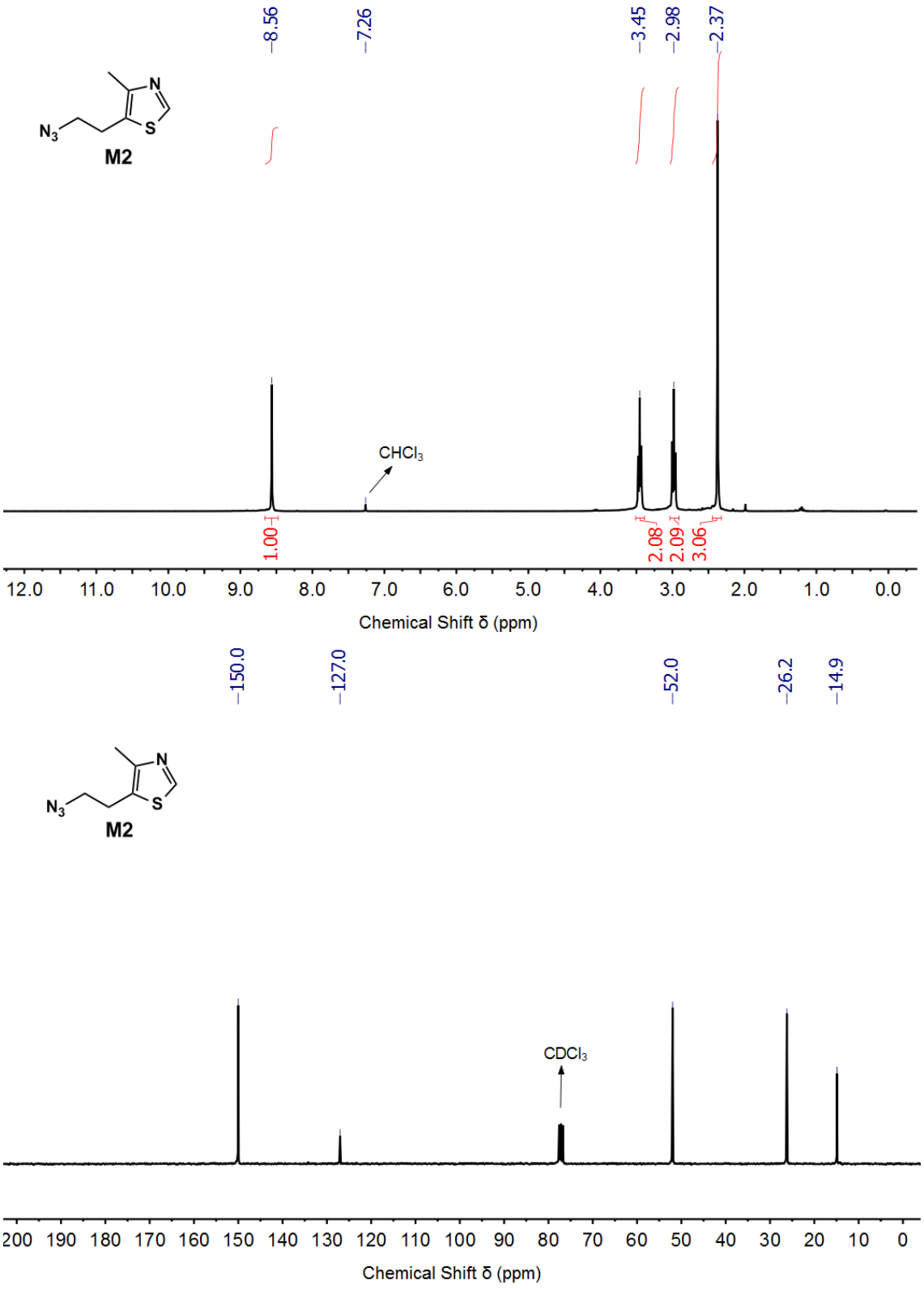


Figure S4. ^{1}H (top) and ^{13}C (bottom) NMR spectra in $CDCl_3$ of **M2.**

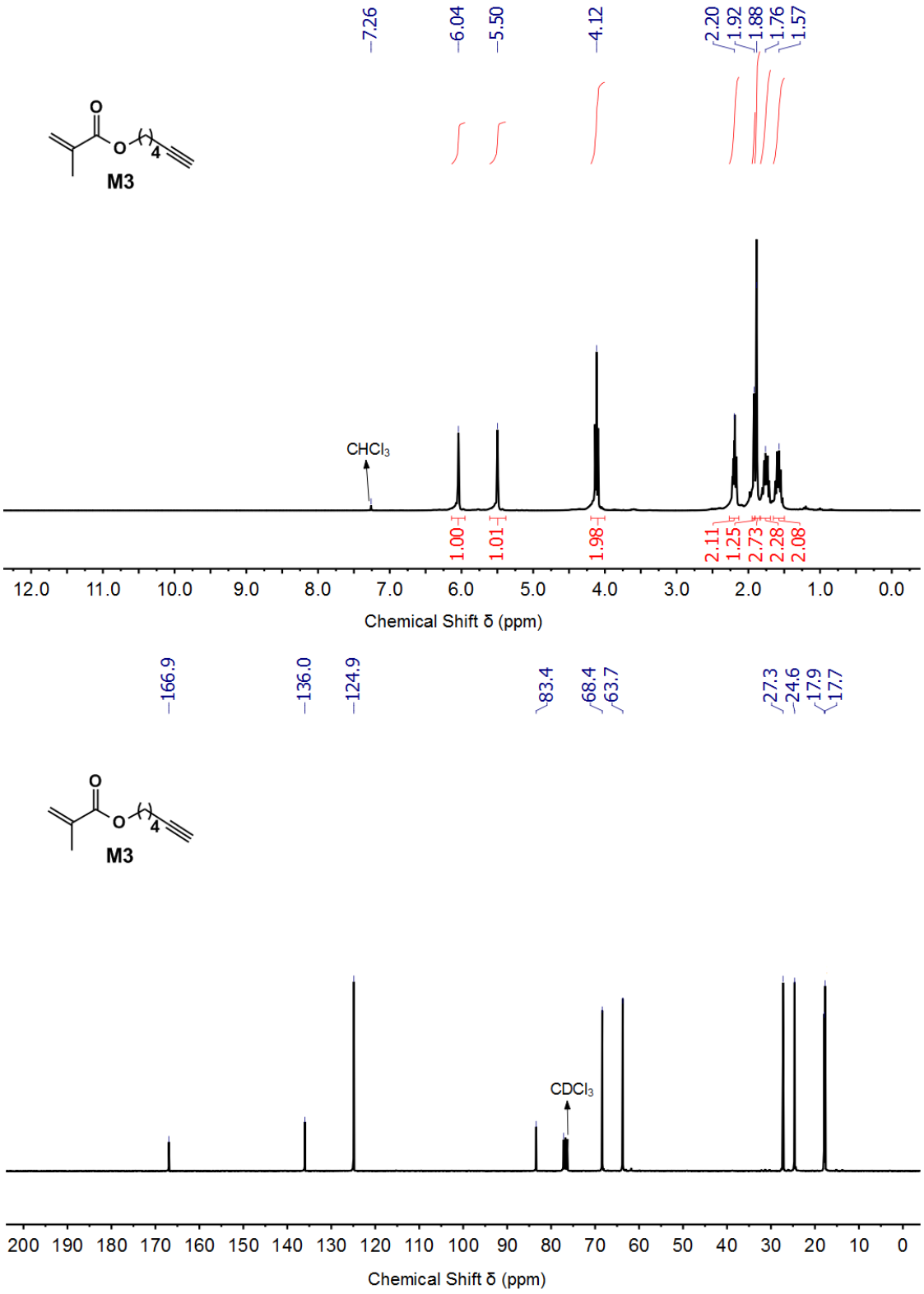


Figure S5. ^{1}H (top) and ^{13}C (bottom) NMR spectra in $CDCl_3$ of **M3.**

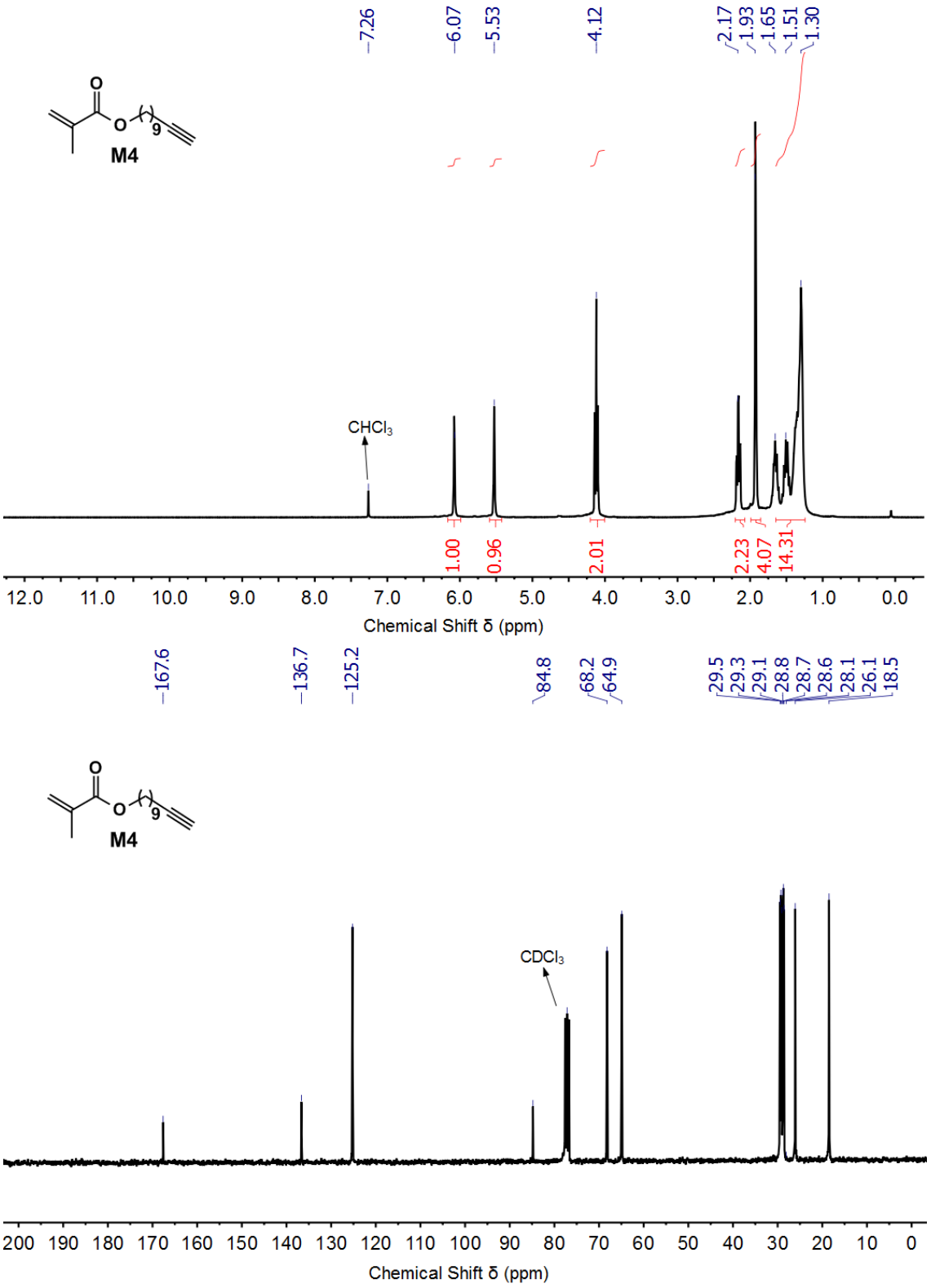


Figure S6. ^{1}H (top) and ^{13}C (bottom) NMR spectra in $CDCl_3$ of **M4.**

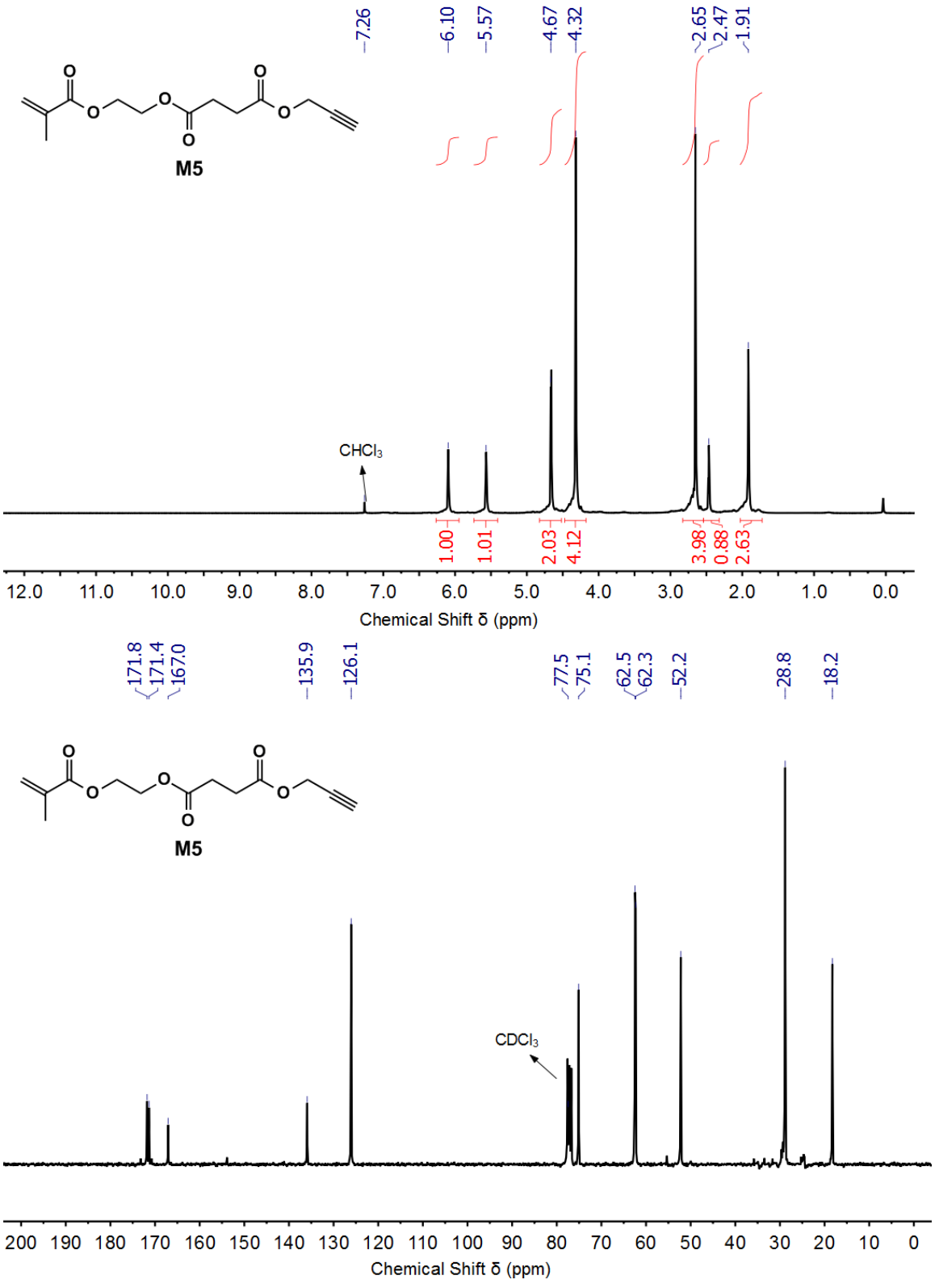


Figure S7. ^{1}H (top) and ^{13}C (bottom) NMR spectra in $CDCl_3$ of **M5.**

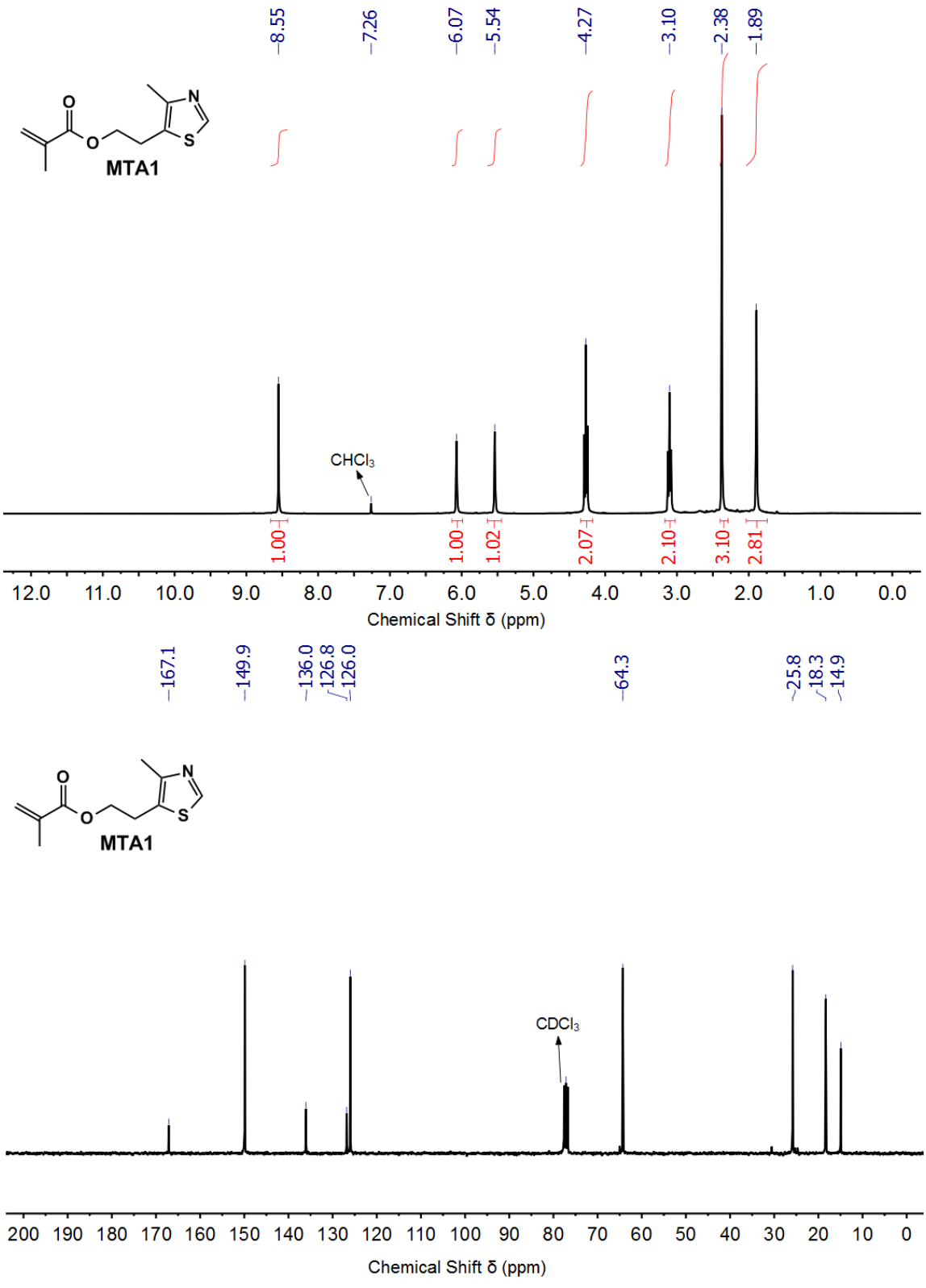


Figure S8. ^{1}H (top) and ^{13}C (bottom) NMR spectra in $CDCl_3$ of **MTA1.**

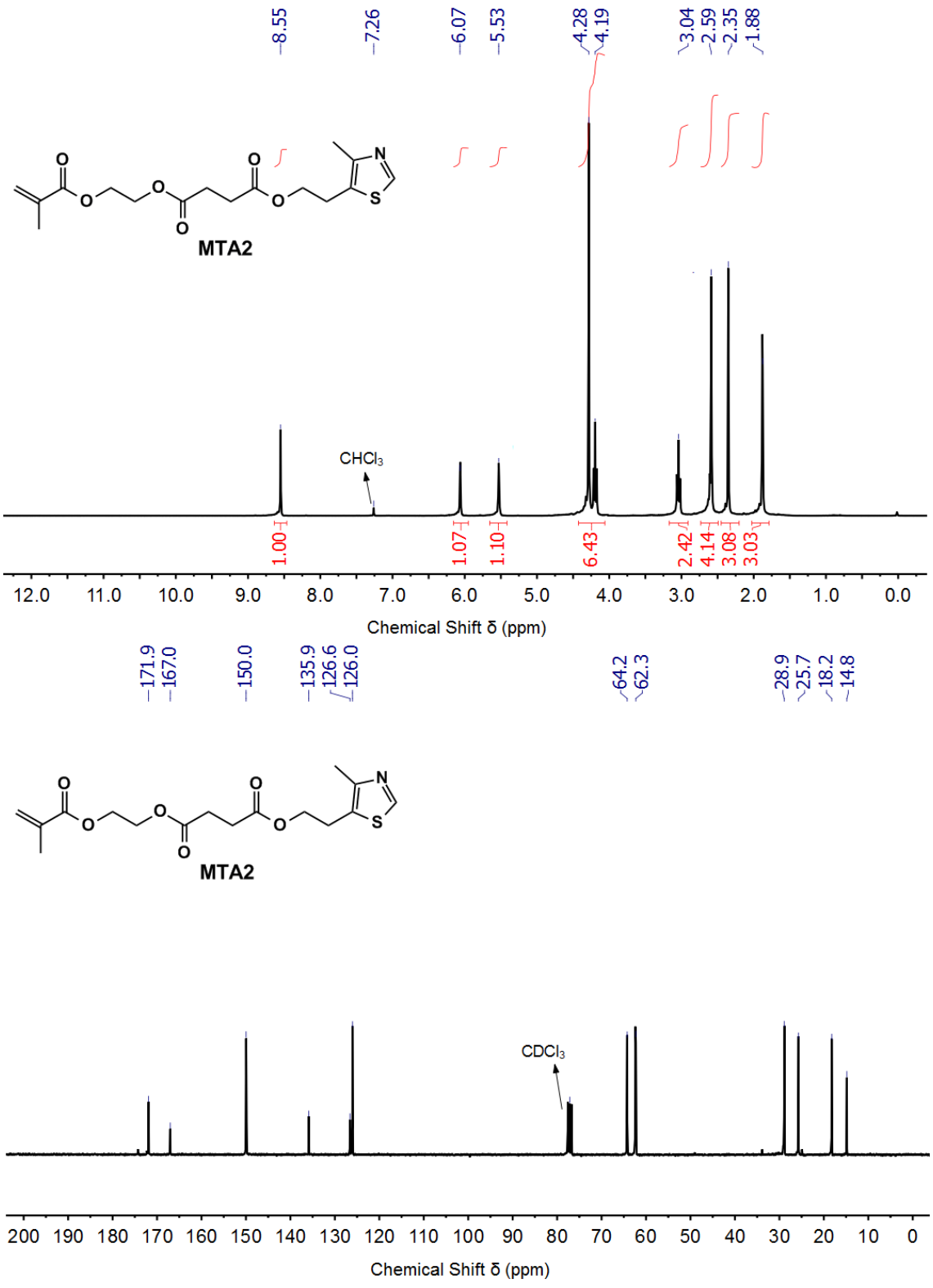


Figure S9. ^{1}H (top) and ^{13}C (bottom) NMR spectra in $CDCl_3$ of **MTA2.**

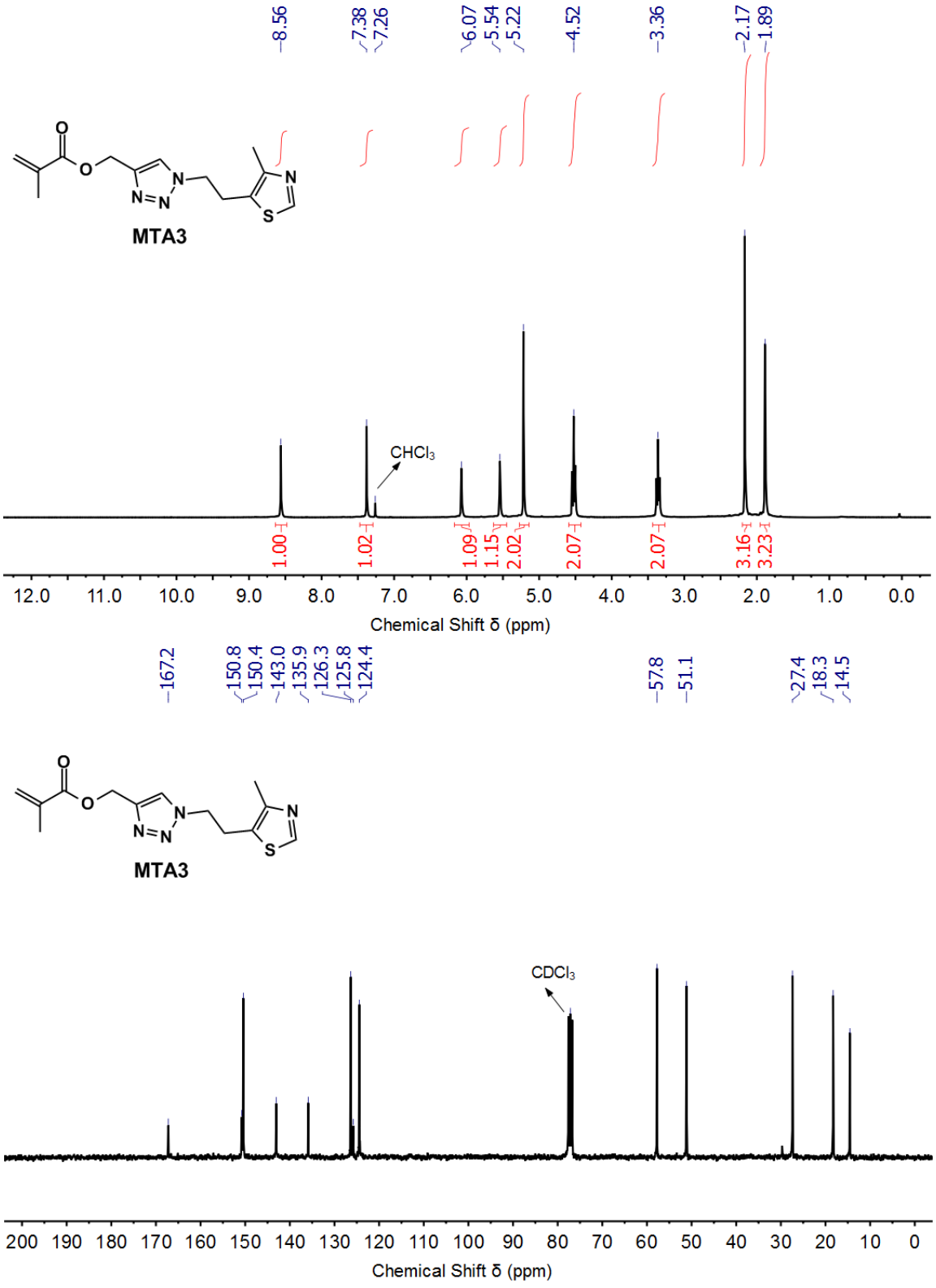


Figure S10. ^{1}H (top) and ^{13}C (bottom) NMR spectra in $CDCl_3$ of **MTA3.**

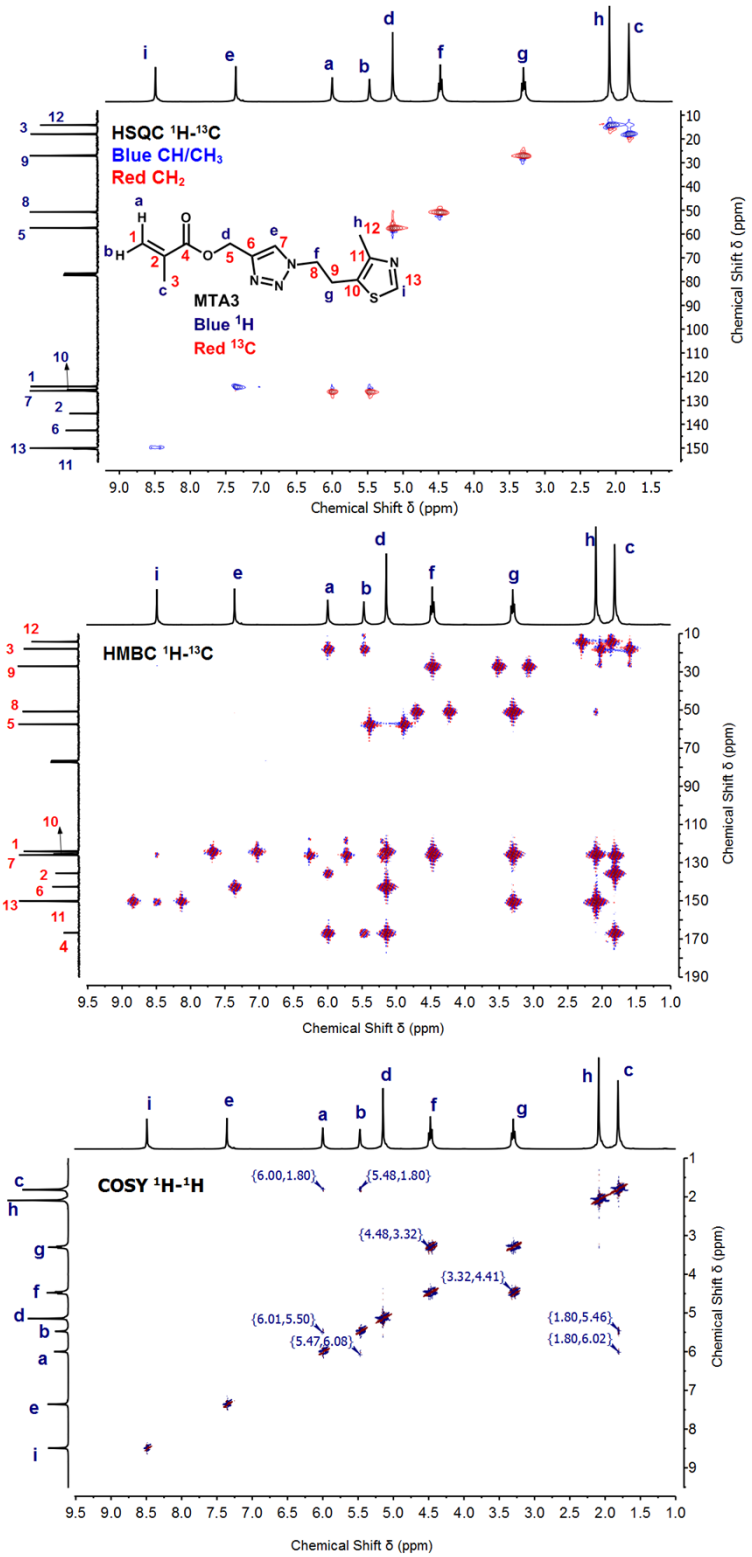


Figure S11. HSQC, HMBC and COSY NMR spectra in $CDCl_3$ of **MTA3.**

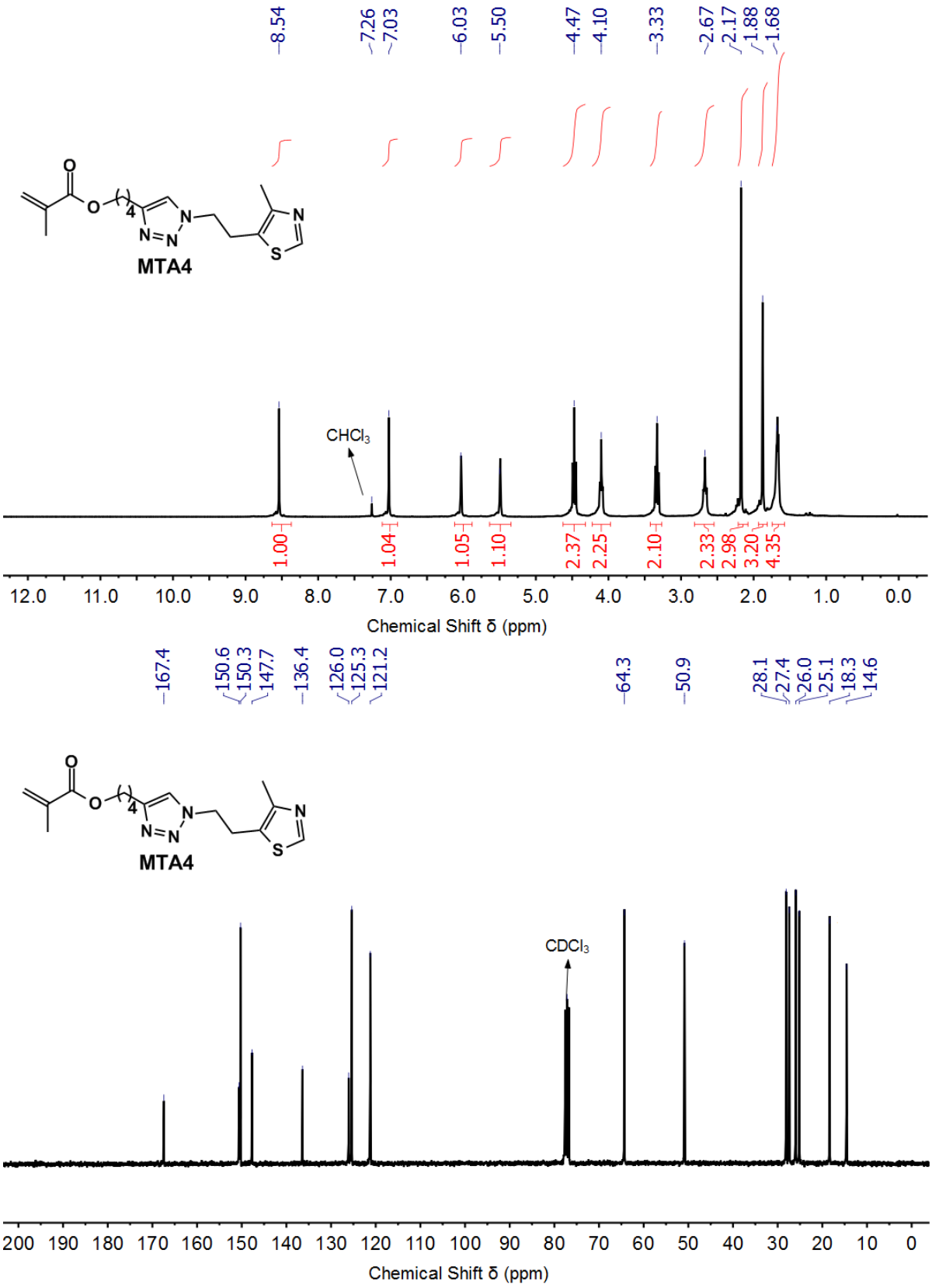


Figure S12. ^{1}H (top) and ^{13}C (bottom) NMR spectra in $CDCl_3$ of **MTA4.**

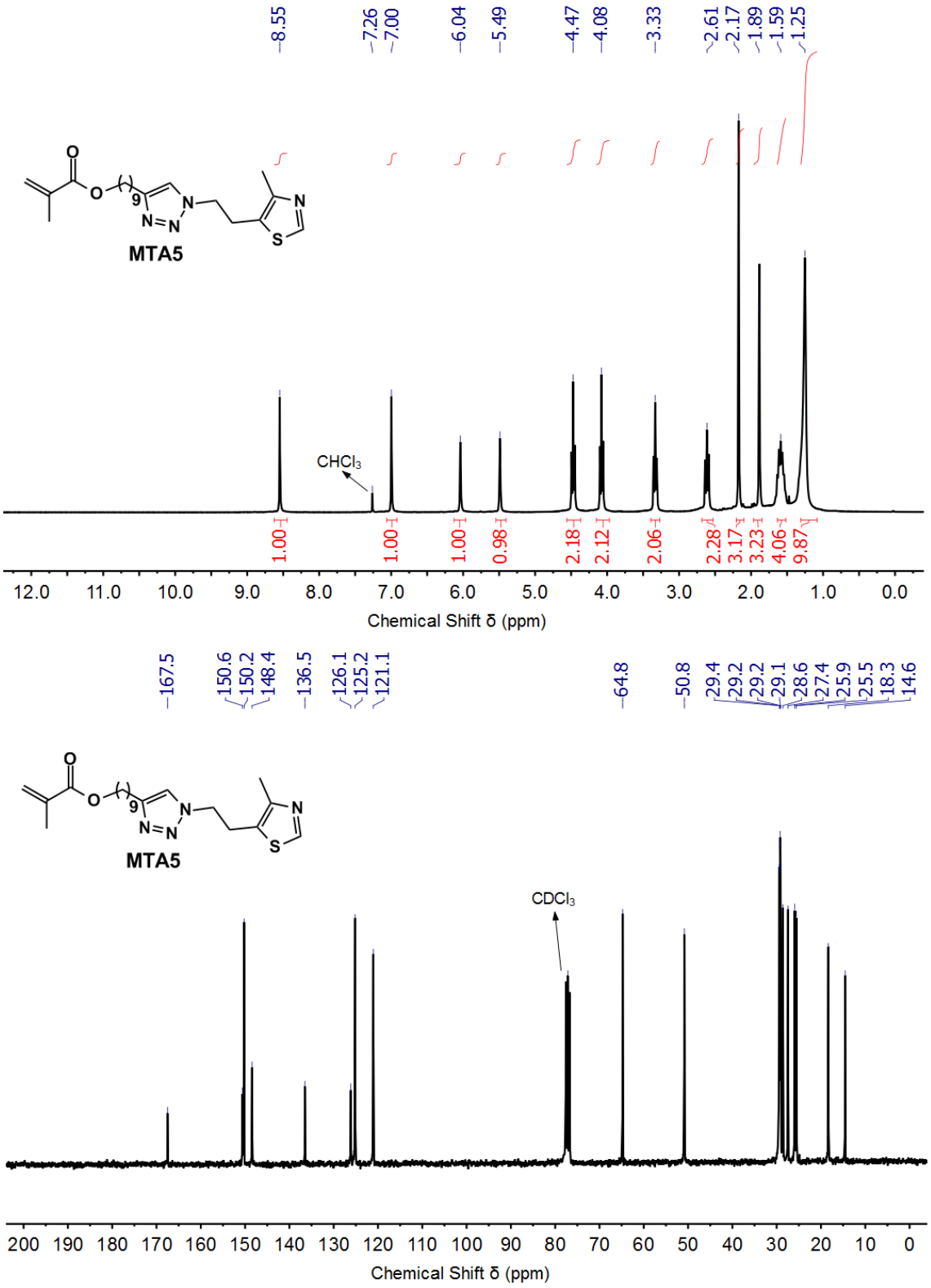


Figure S13. ^{1}H (top) and ^{13}C (bottom) NMR spectra in $CDCl_3$ of **MTA5.**

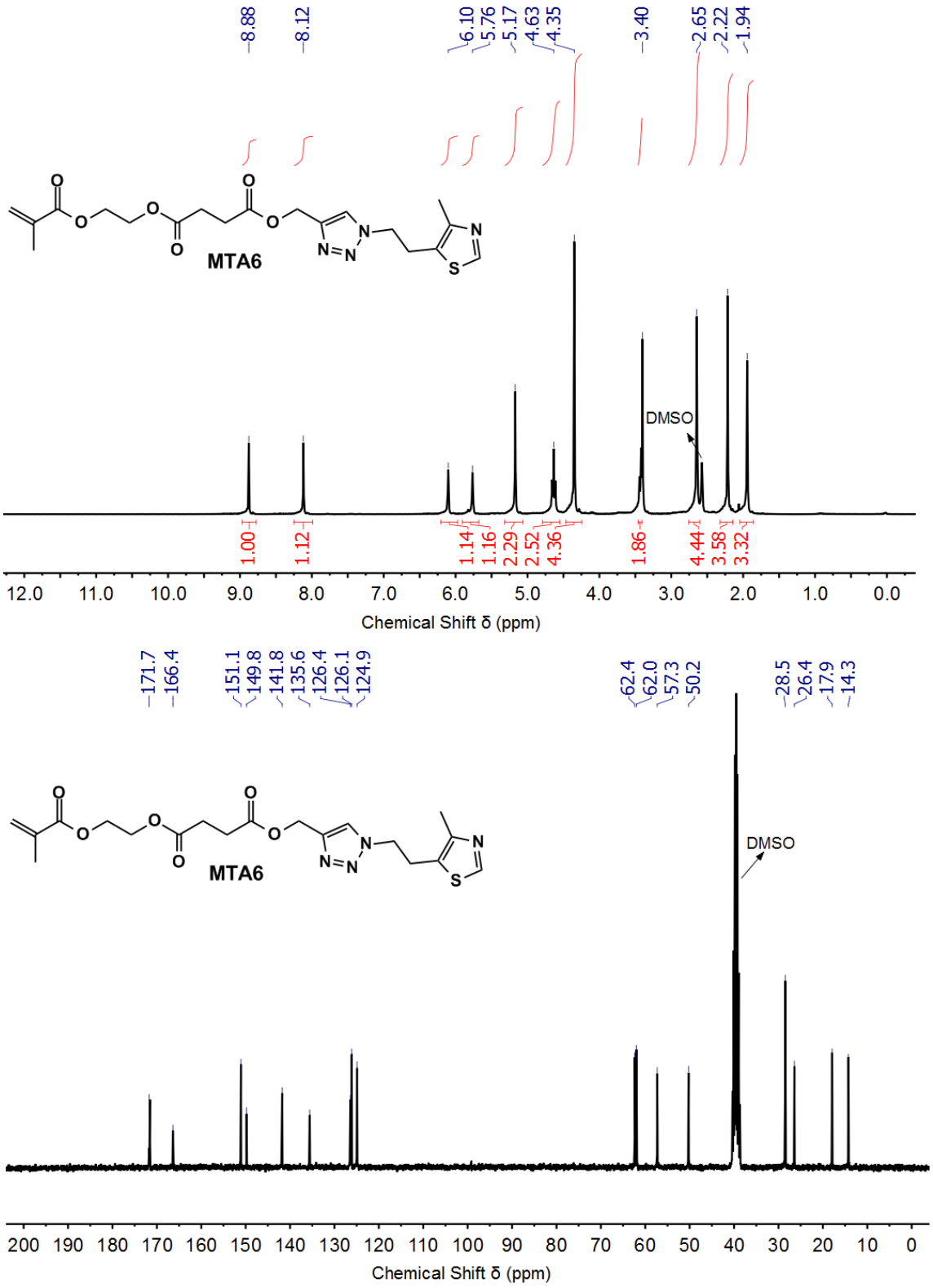


Figure S14. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **MTA6.**

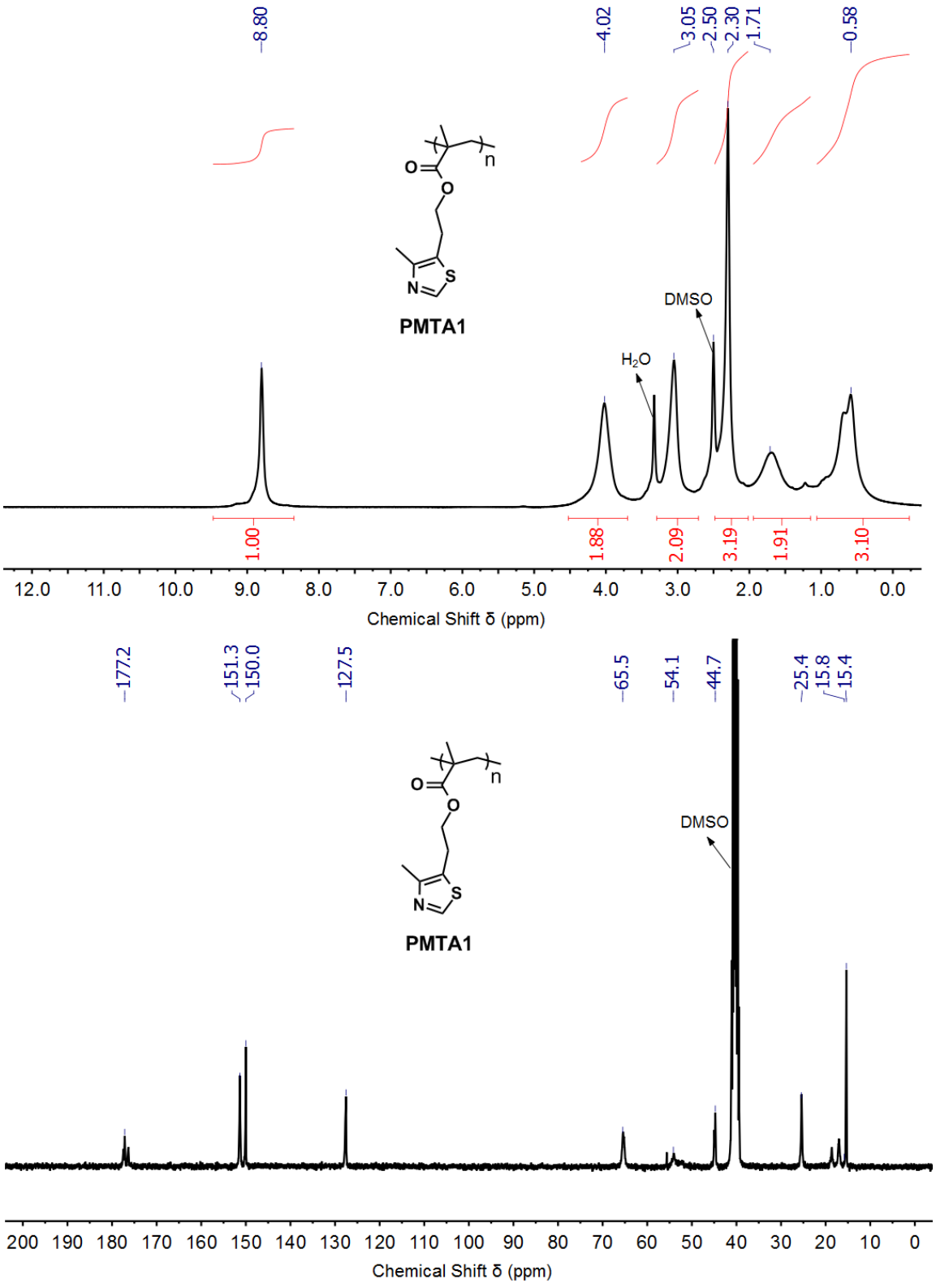


Figure S15. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA1.**

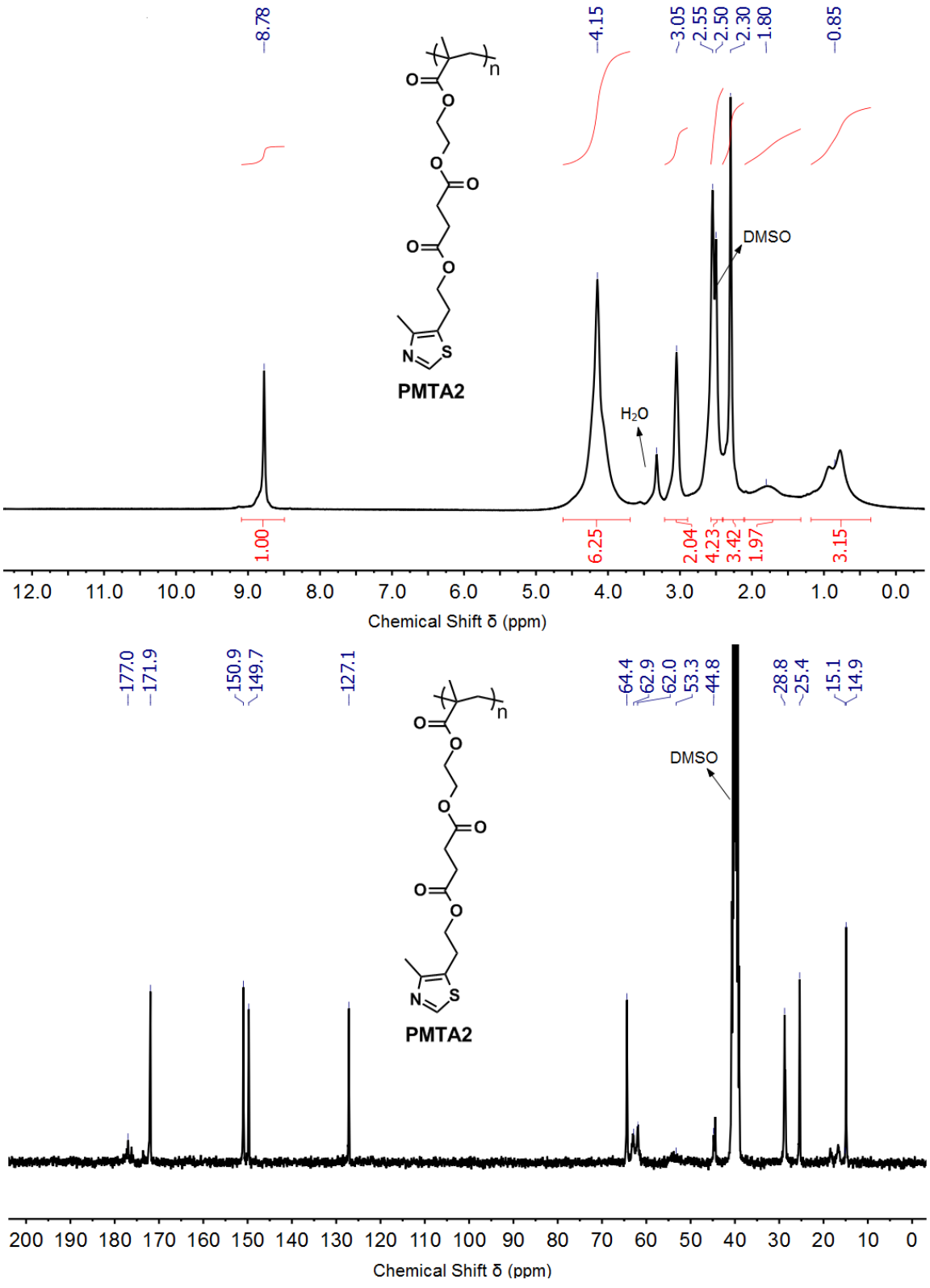


Figure S16. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA2.**

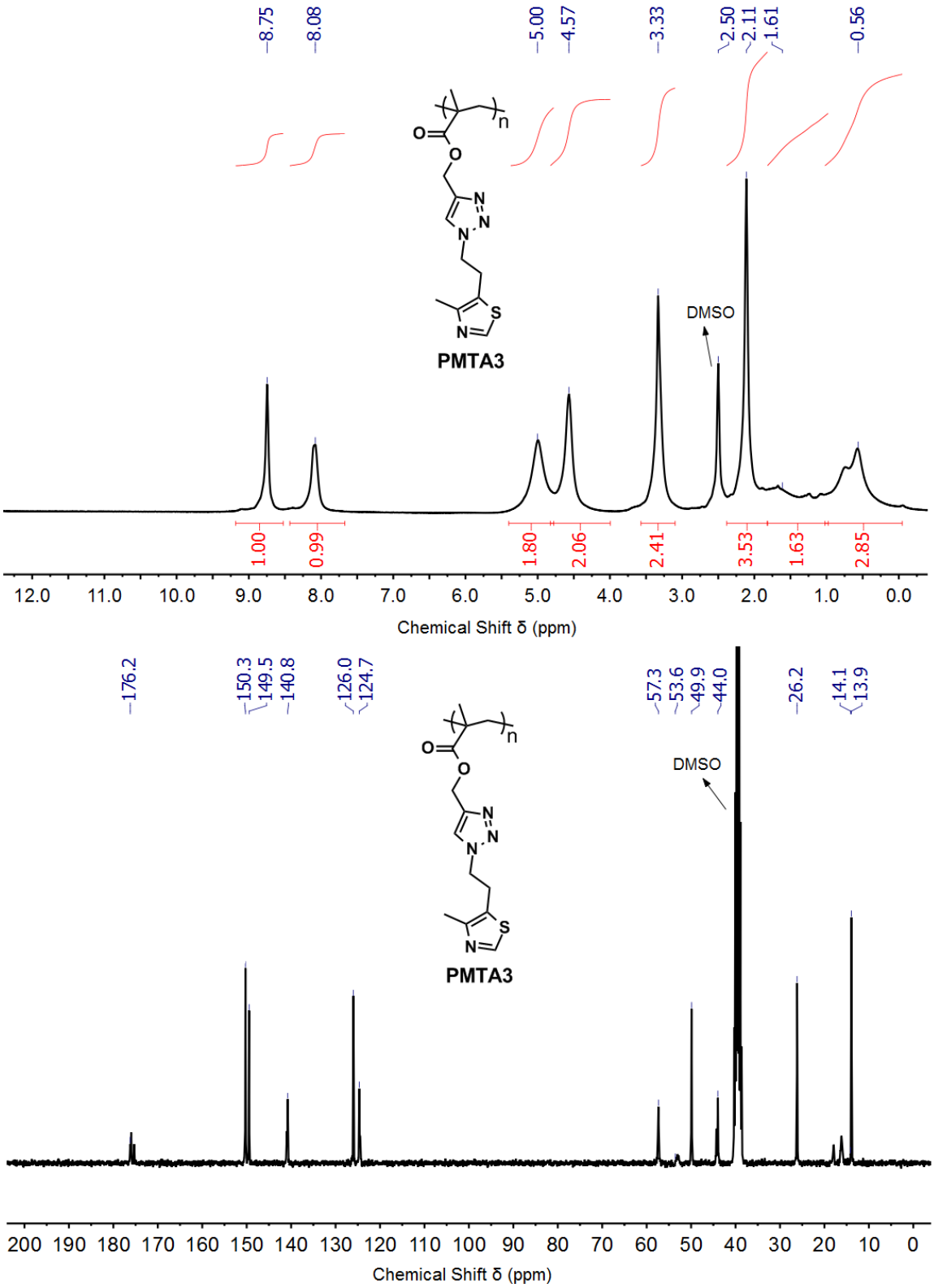


Figure S17. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA3.**

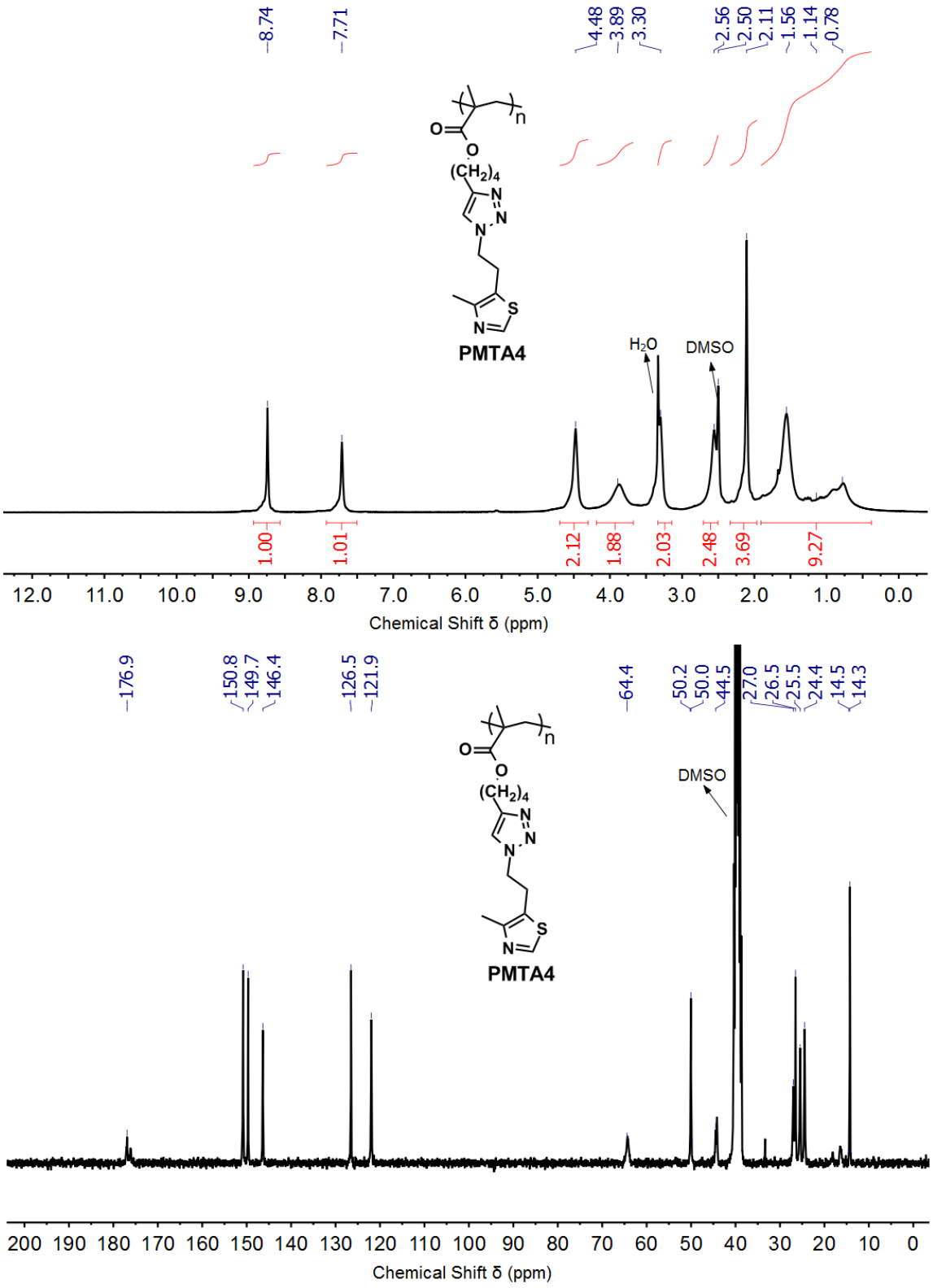


Figure S18. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA4.**

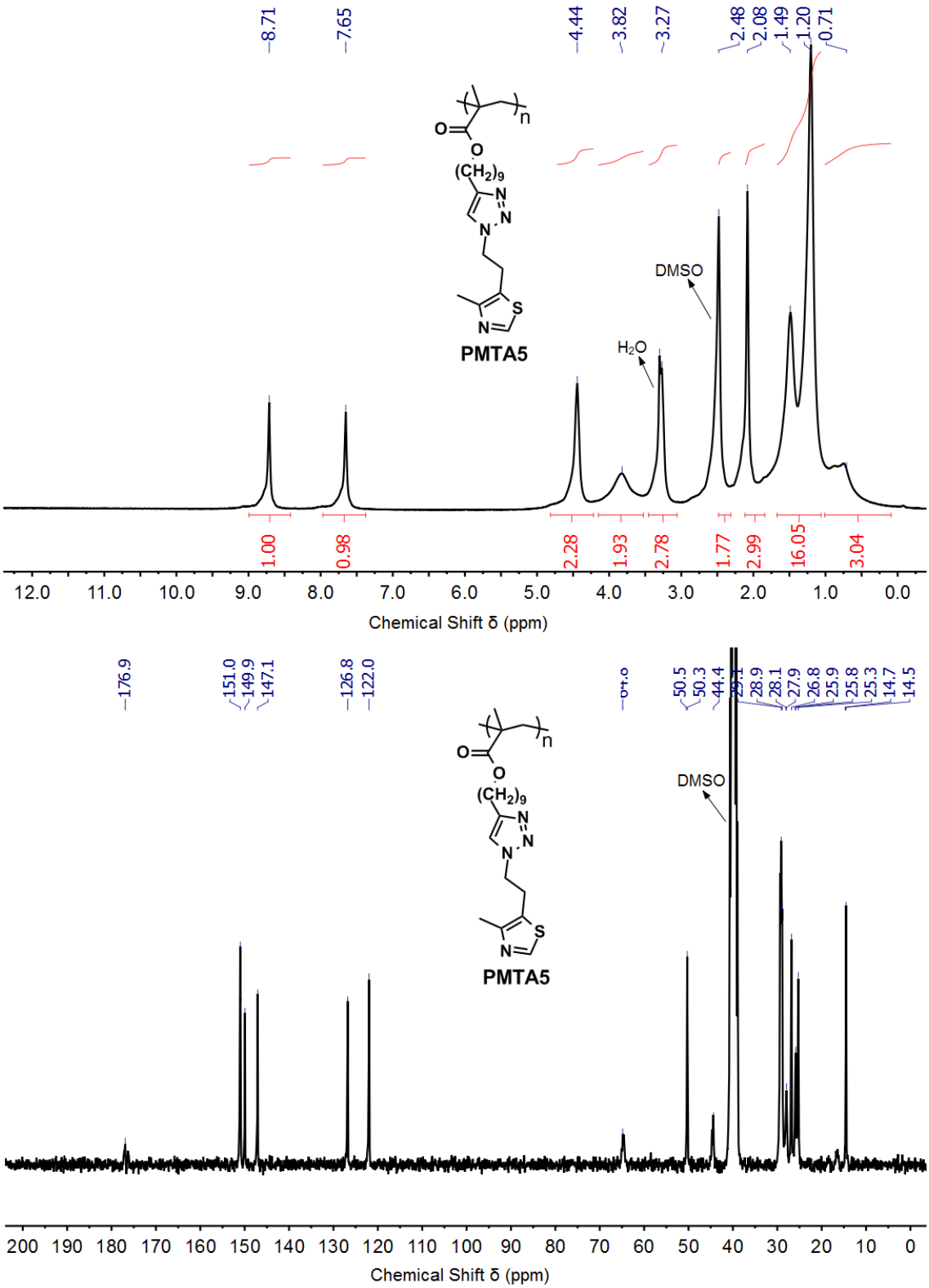


Figure S19. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA5.**

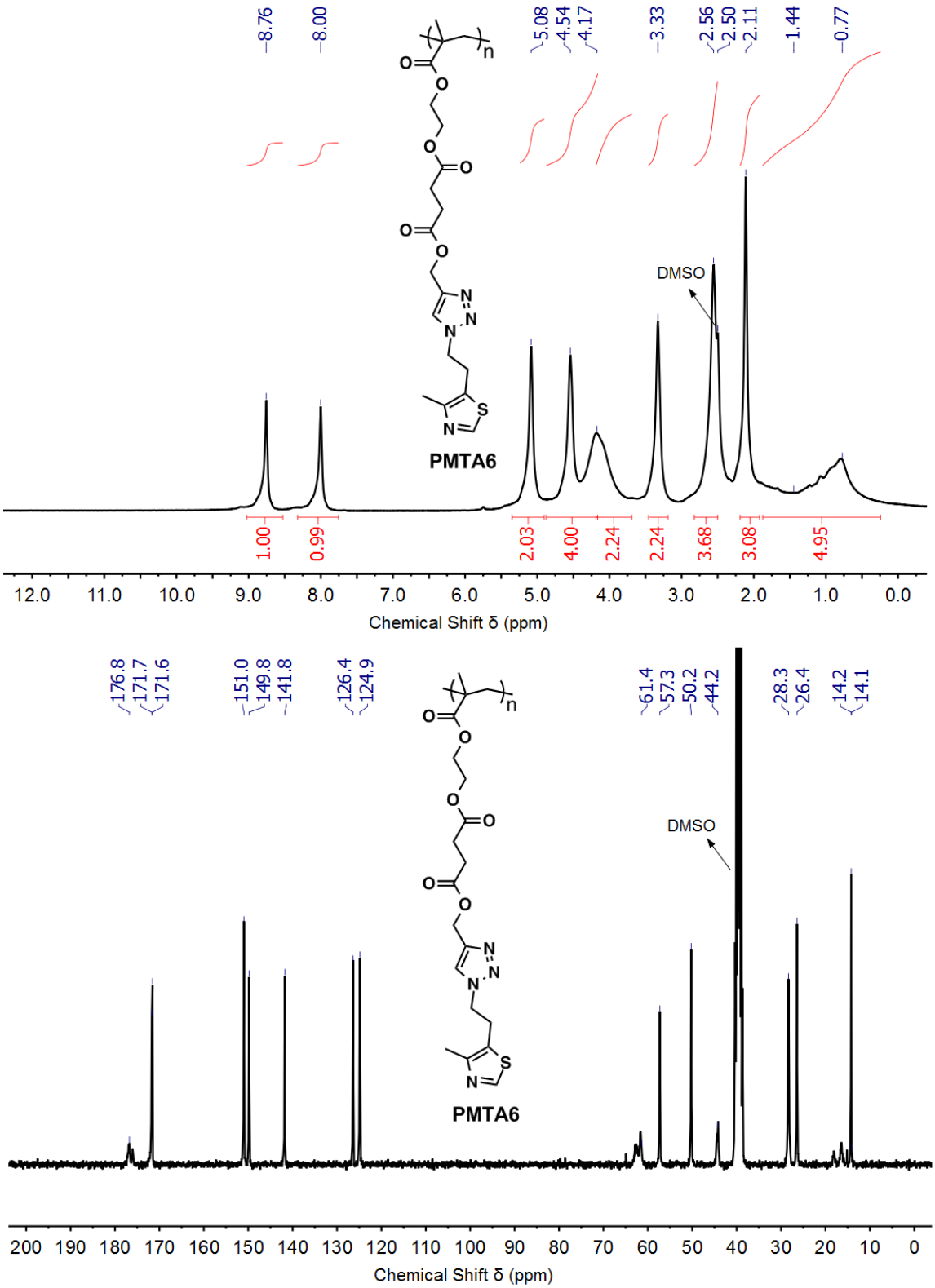


Figure S20. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA6.**

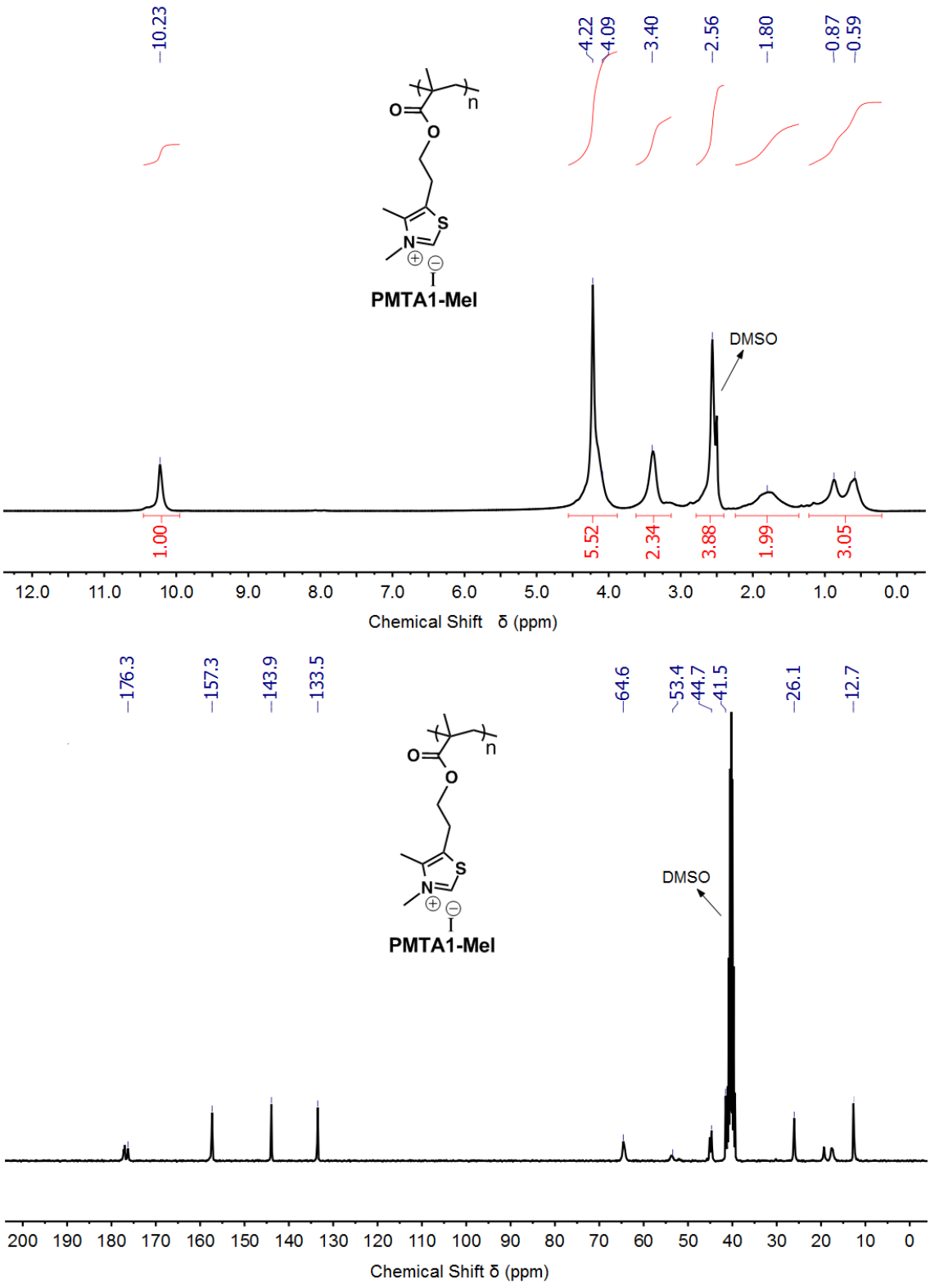


Figure S21. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA1-MeI.**

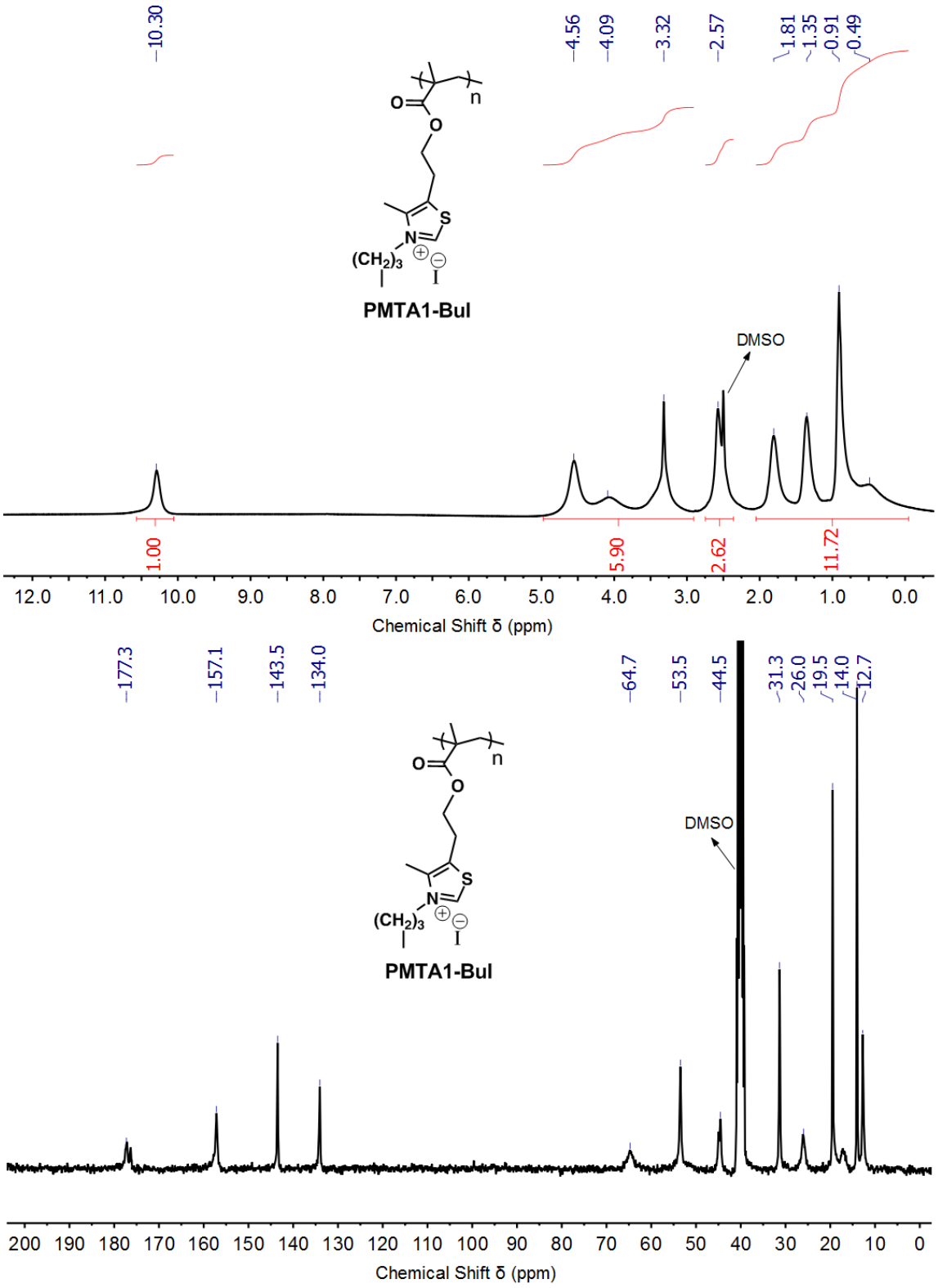


Figure S22. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA1-BuI.**

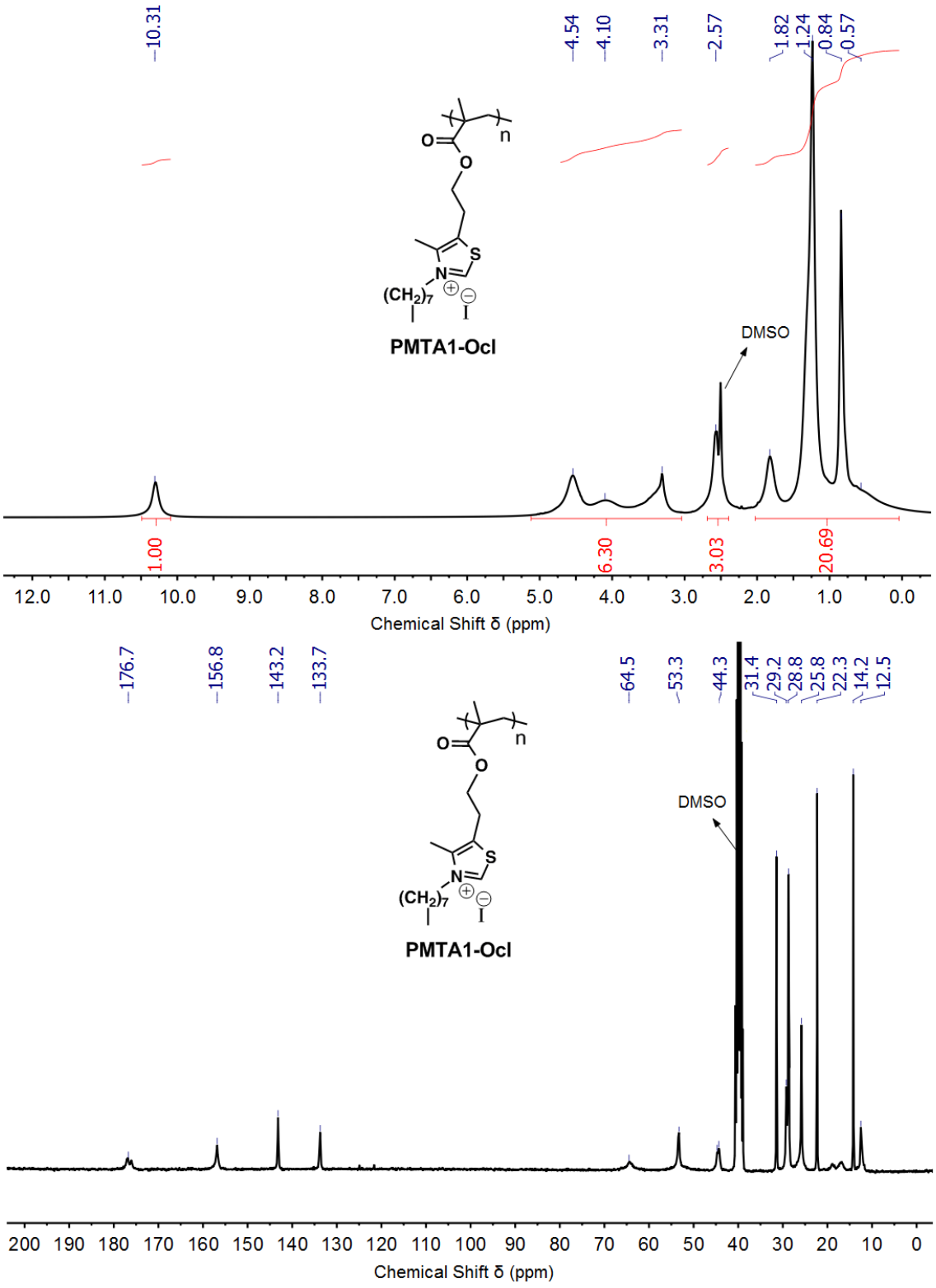


Figure S23. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA1-OcI.**

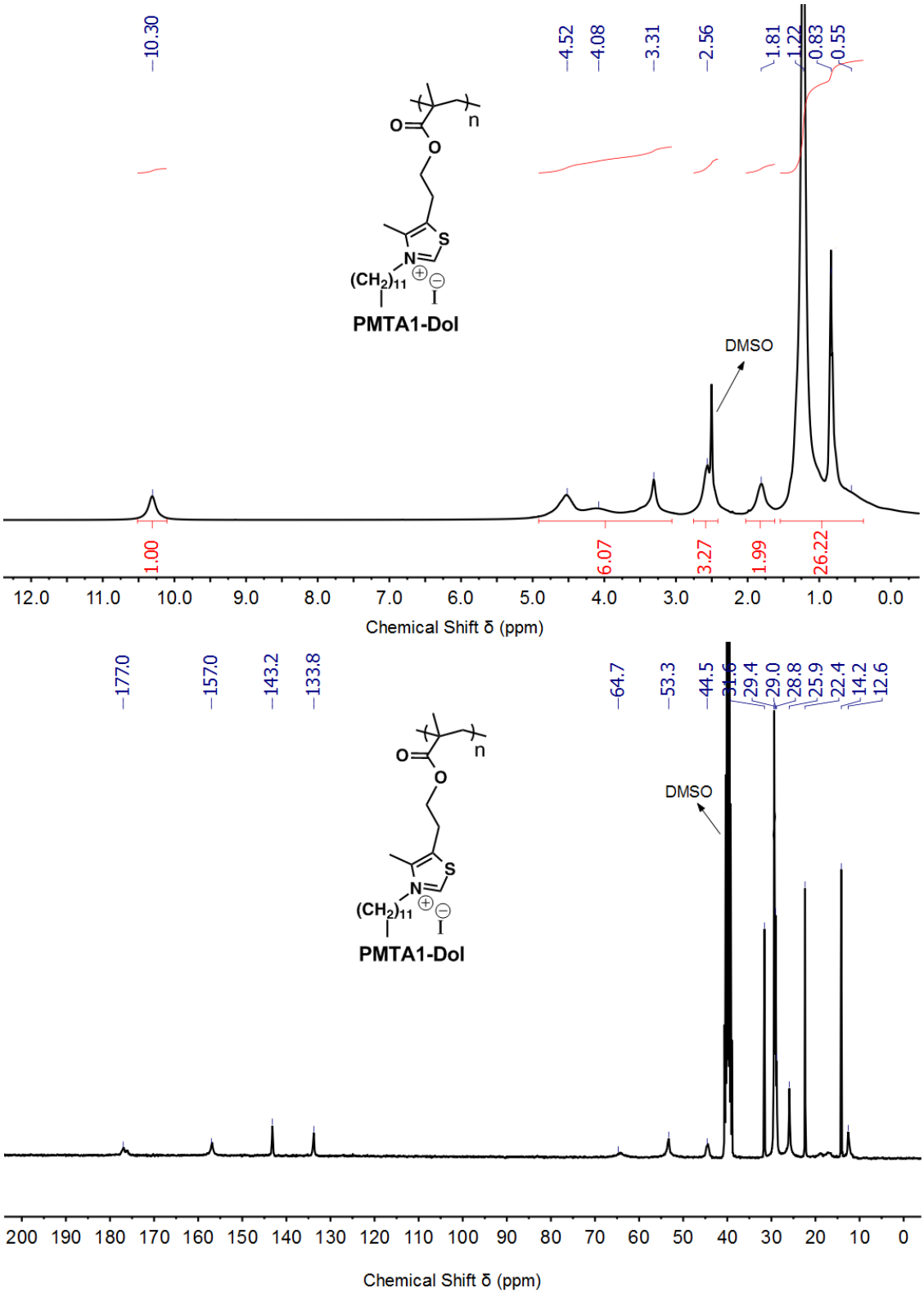


Figure S24. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA1-DoI.**

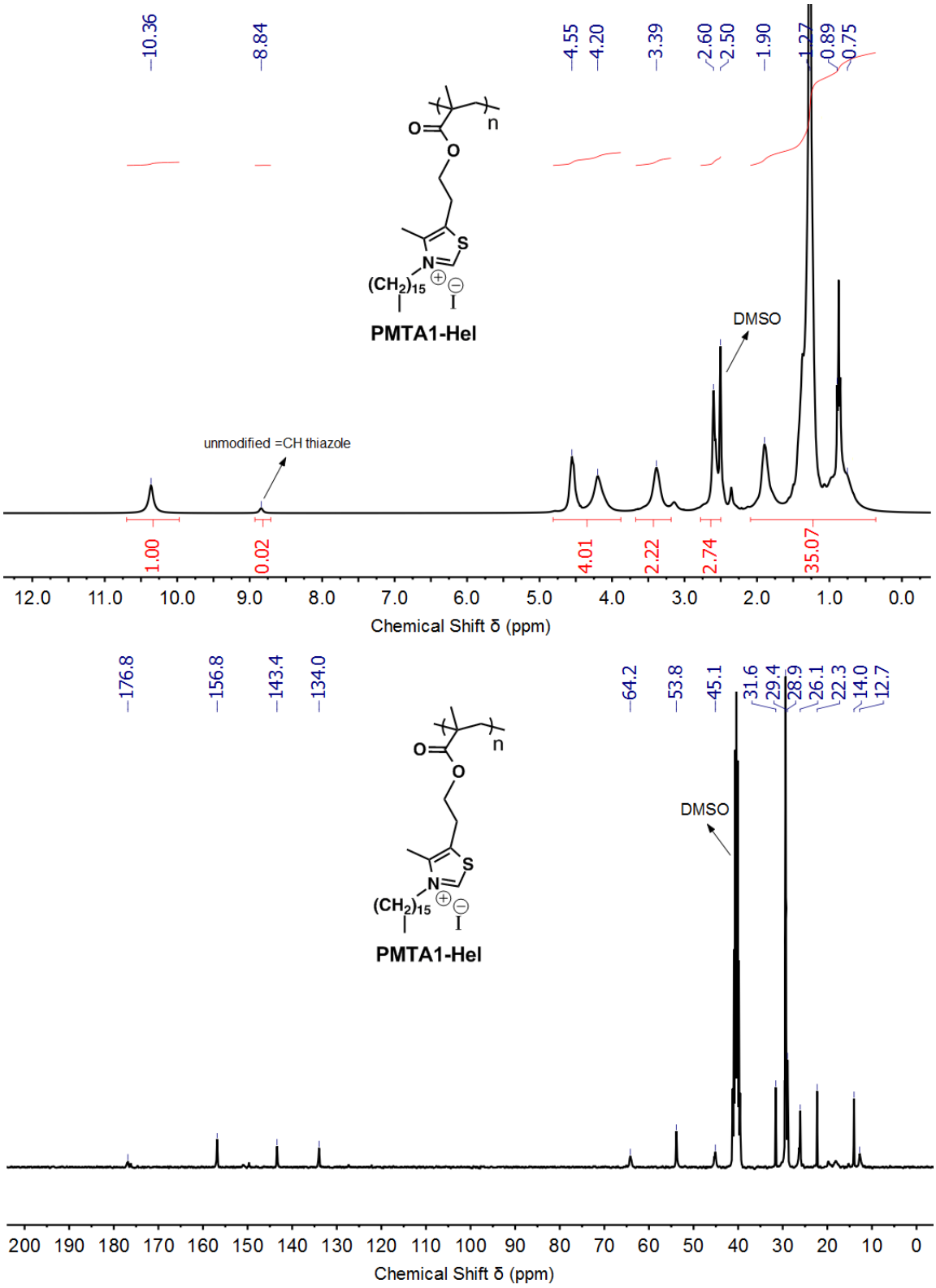


Figure S25. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA1-HeI.**

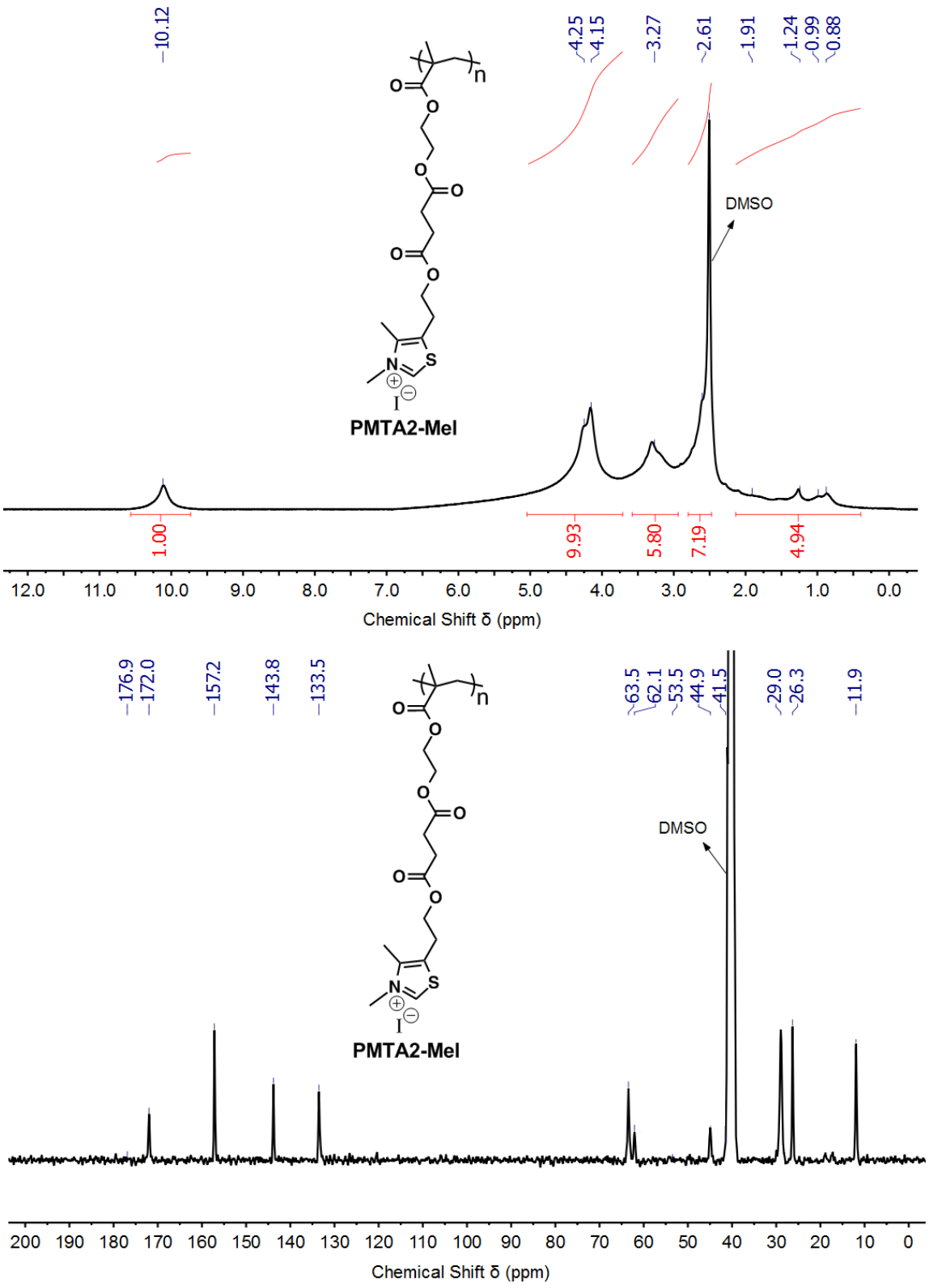


Figure S26. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA2-MeI.**

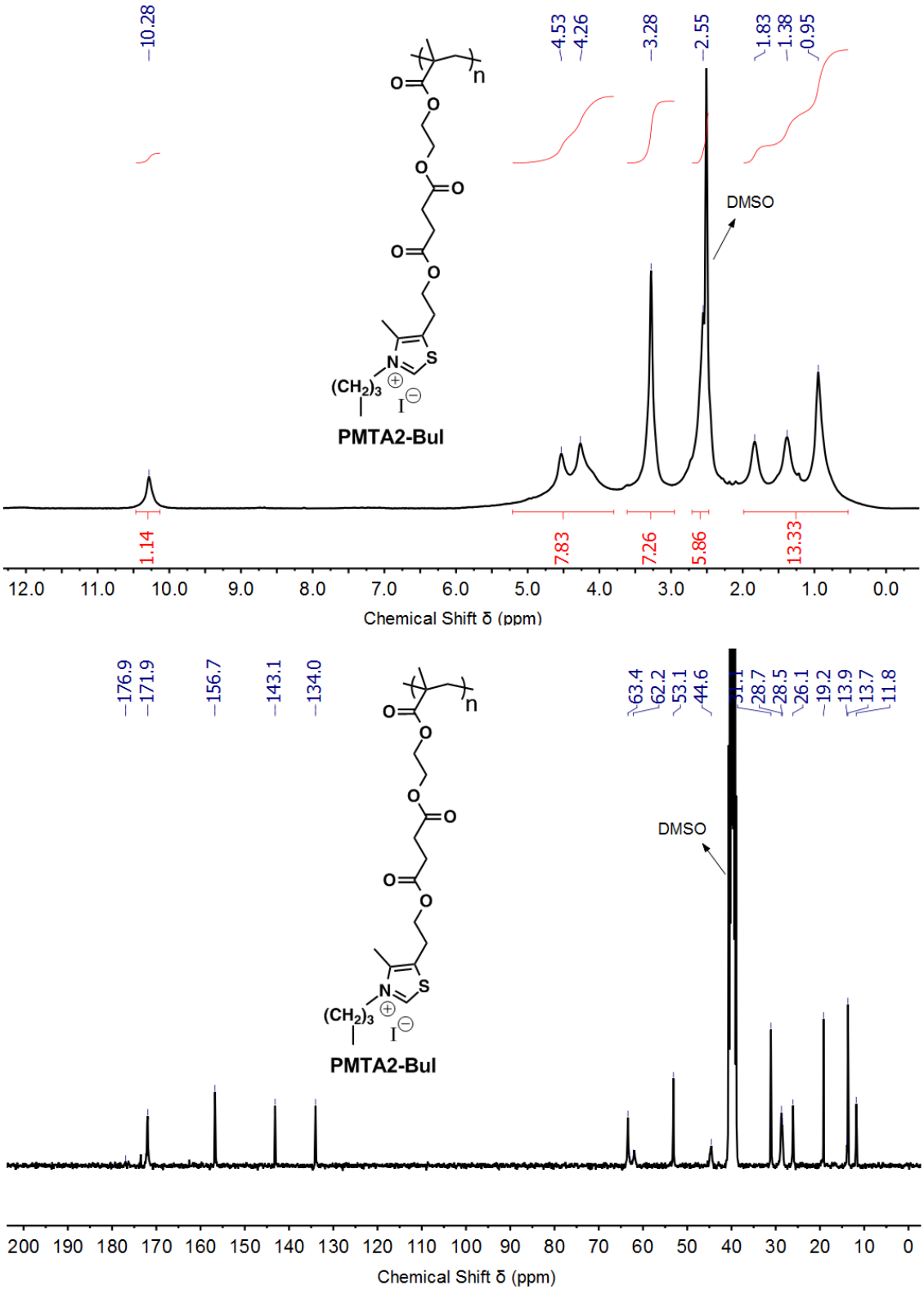


Figure S27. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA2-BuI.**

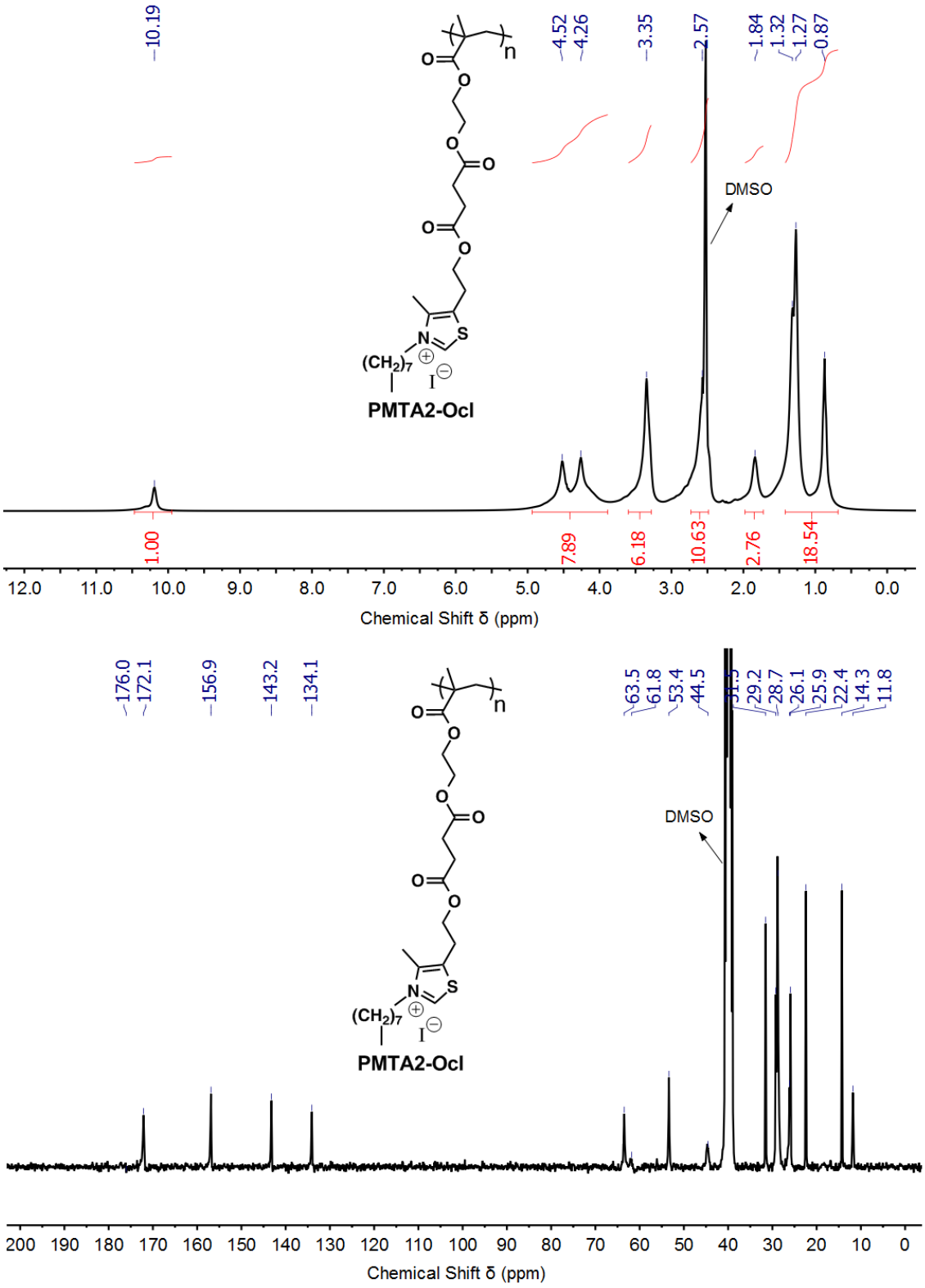


Figure S28. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA2-OcI.**

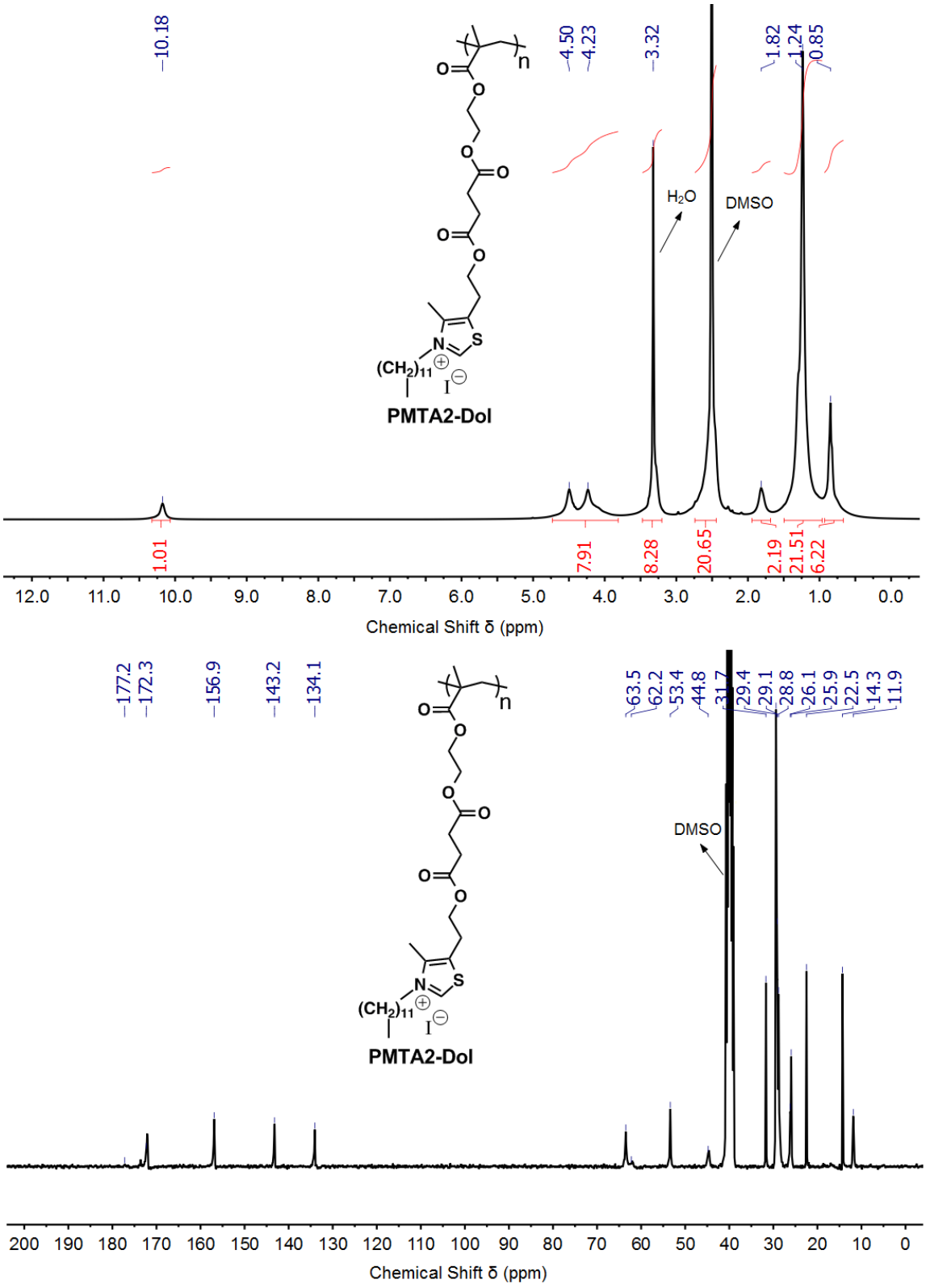


Figure S29. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA2-DoI.**

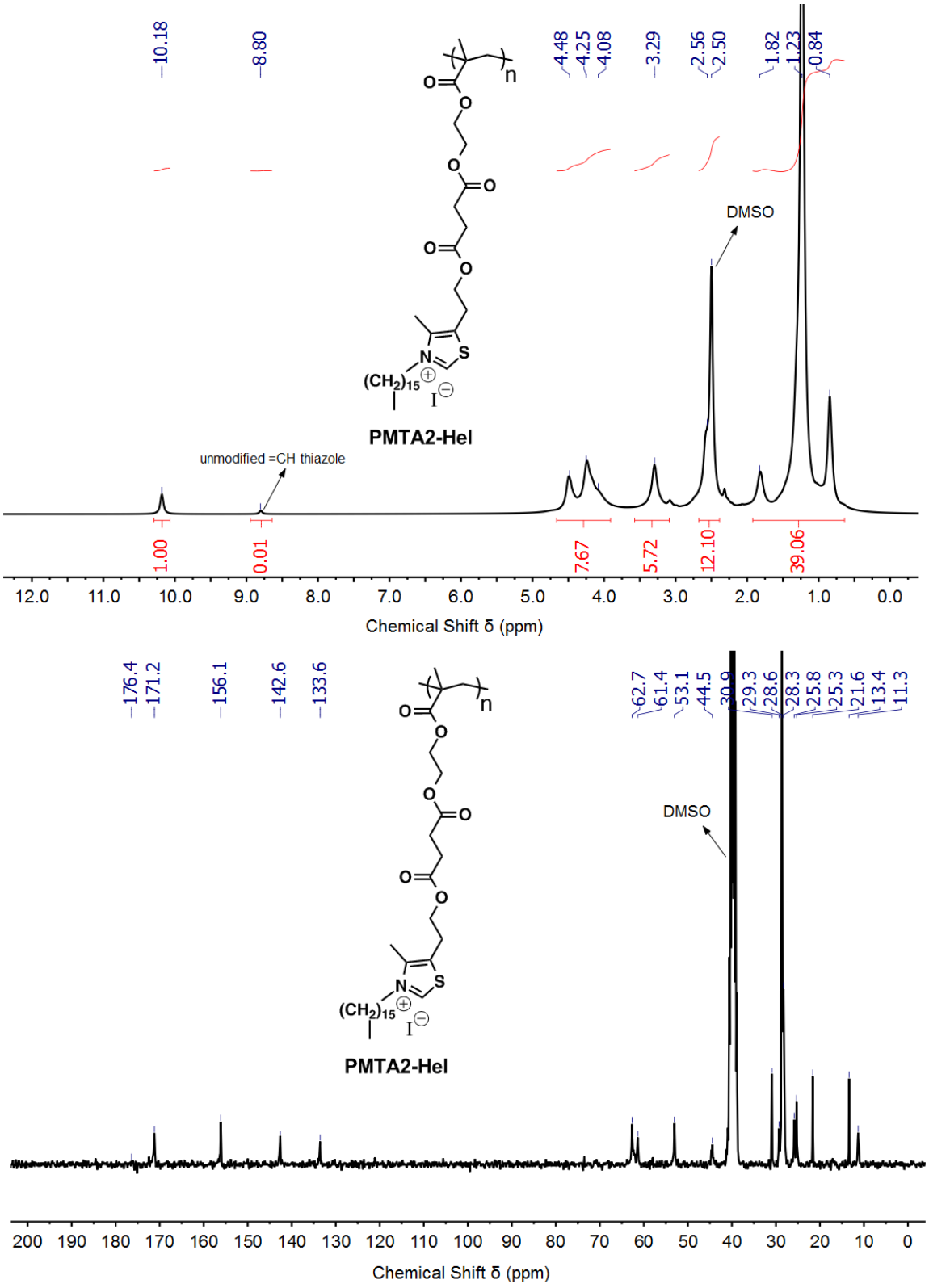


Figure S30. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA2-HeI.**

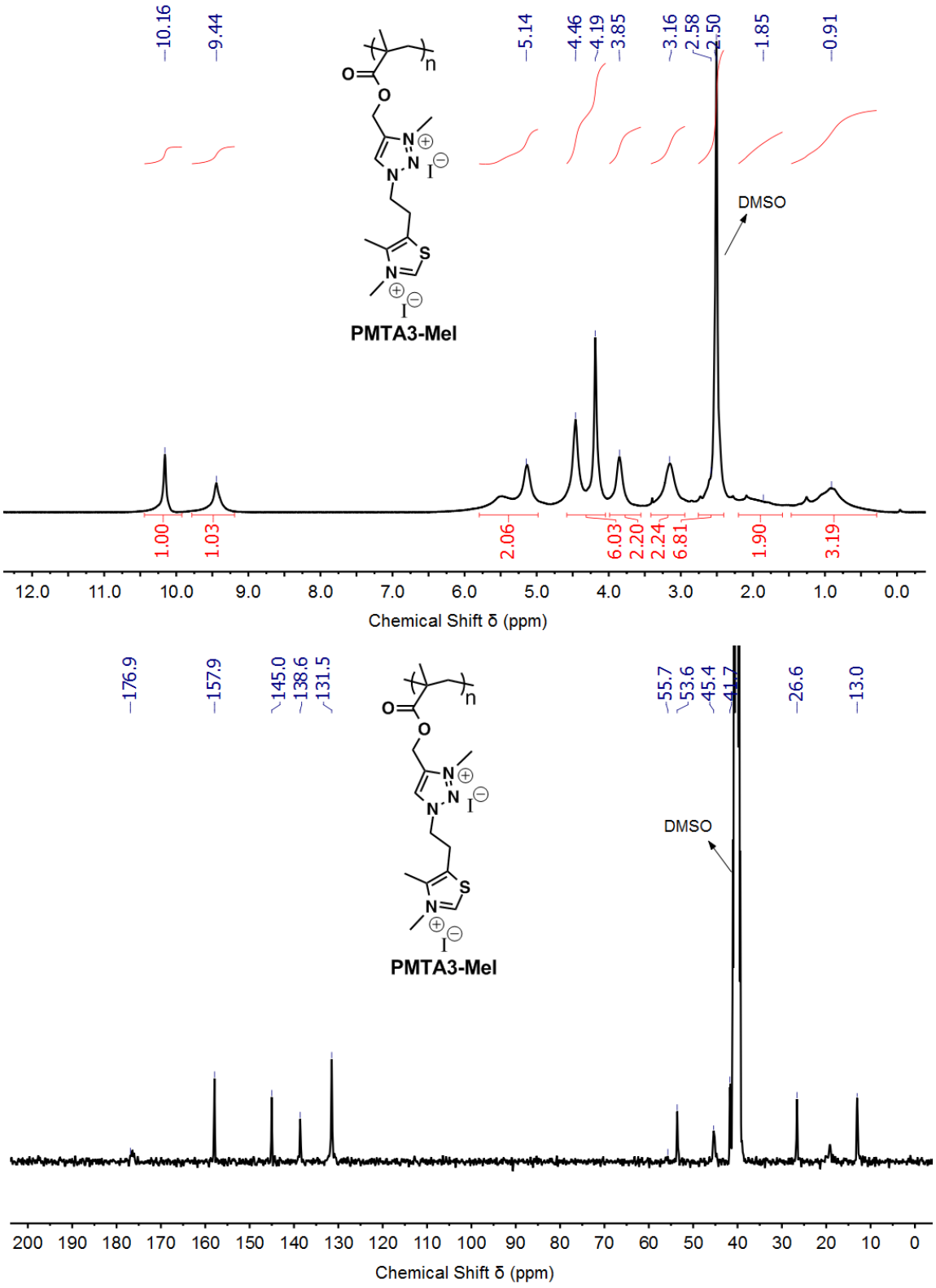


Figure S31. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA3-MeI.**

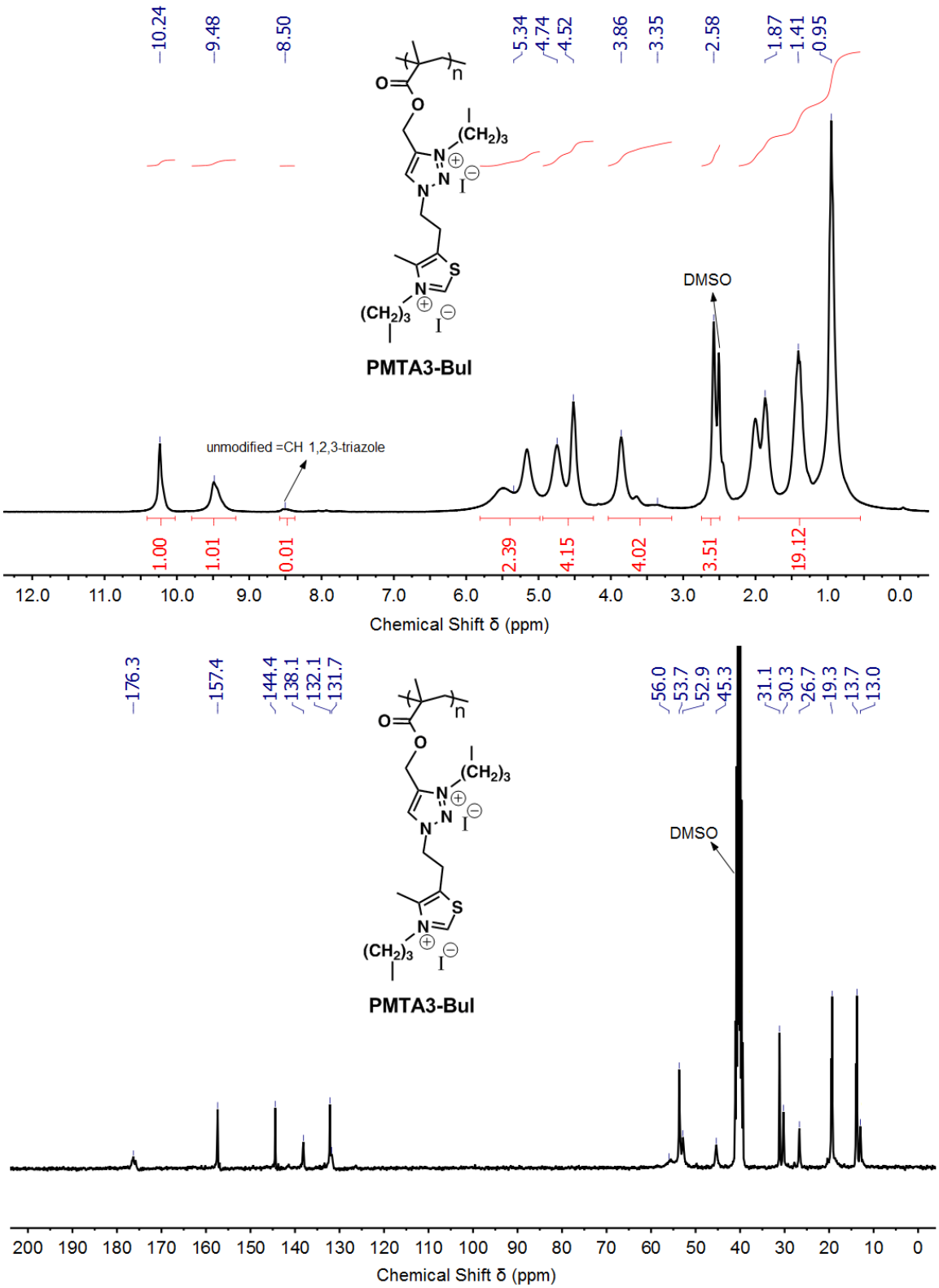


Figure S32. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA3-BuI.**

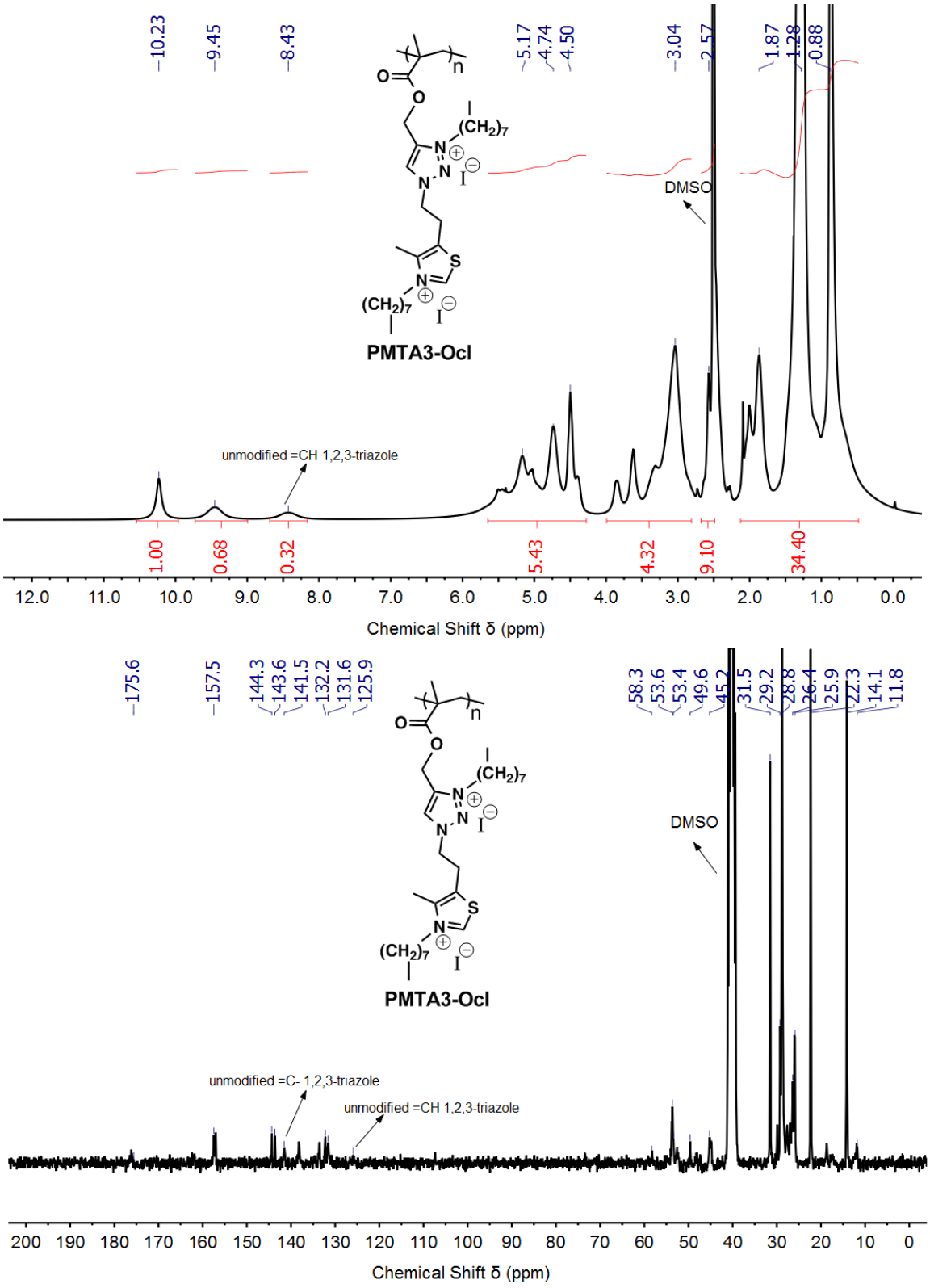


Figure S33. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA3-OcI.**

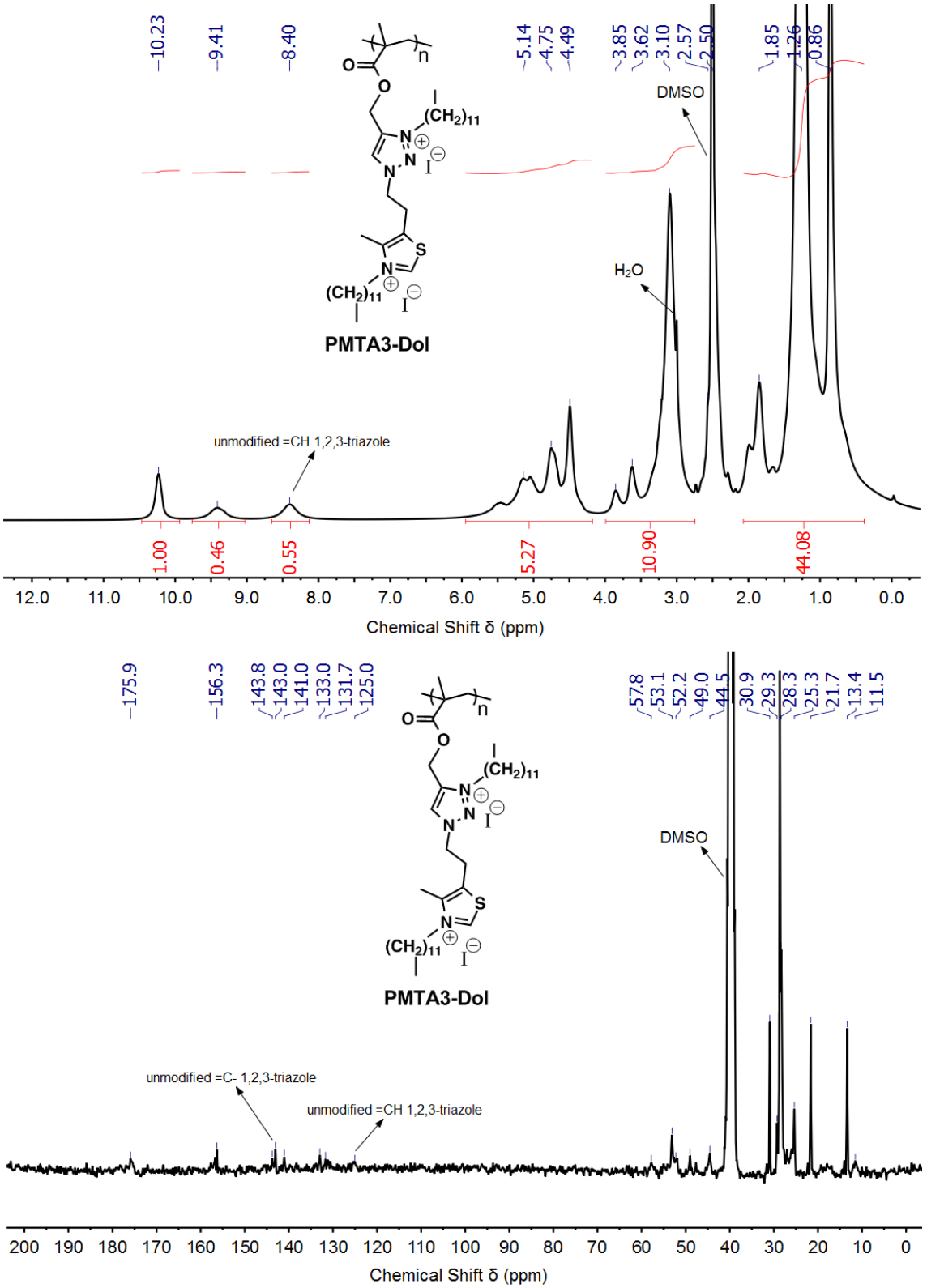


Figure S34. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA3-DoI.**

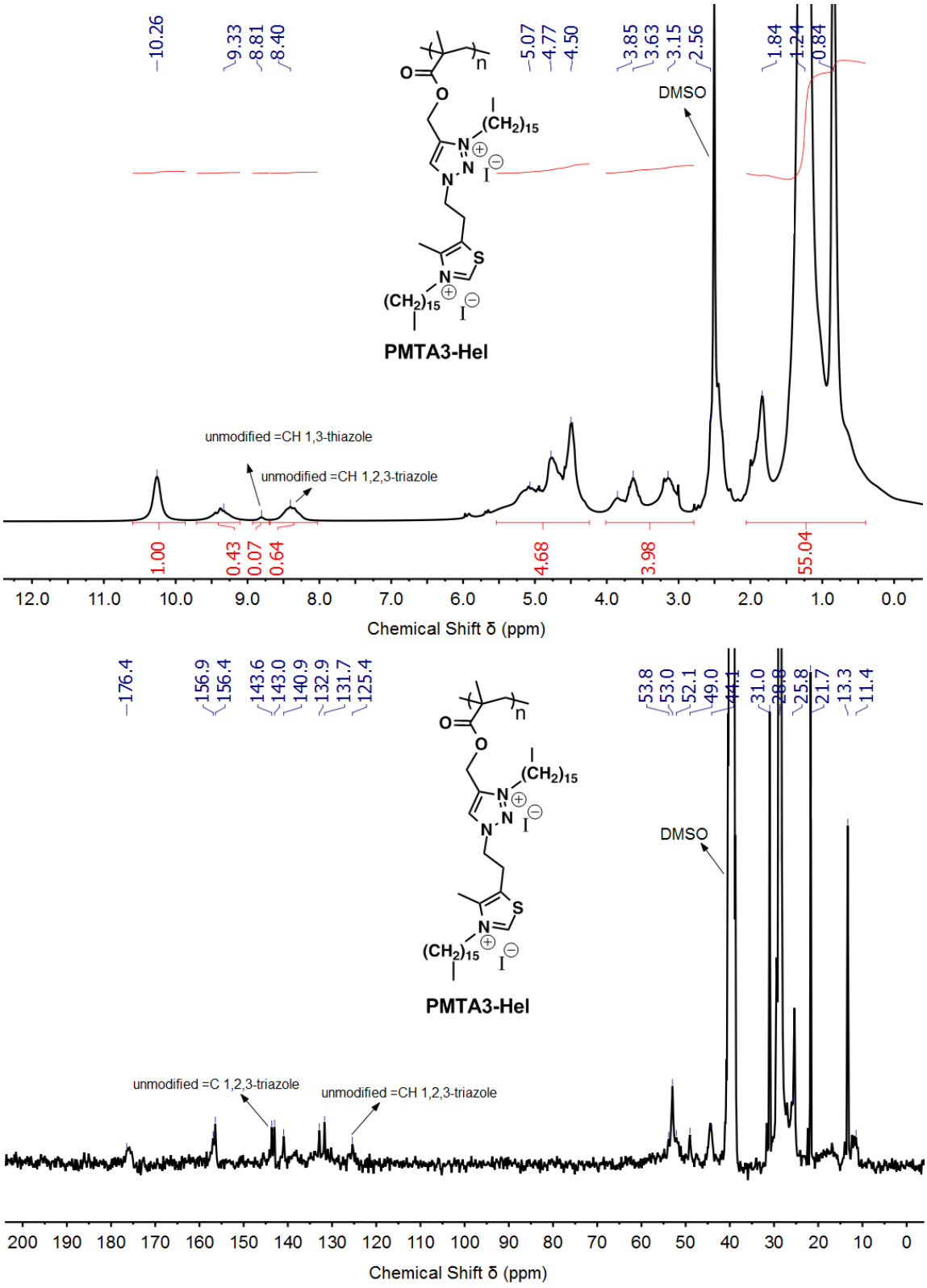


Figure S35. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA3-HeI.**

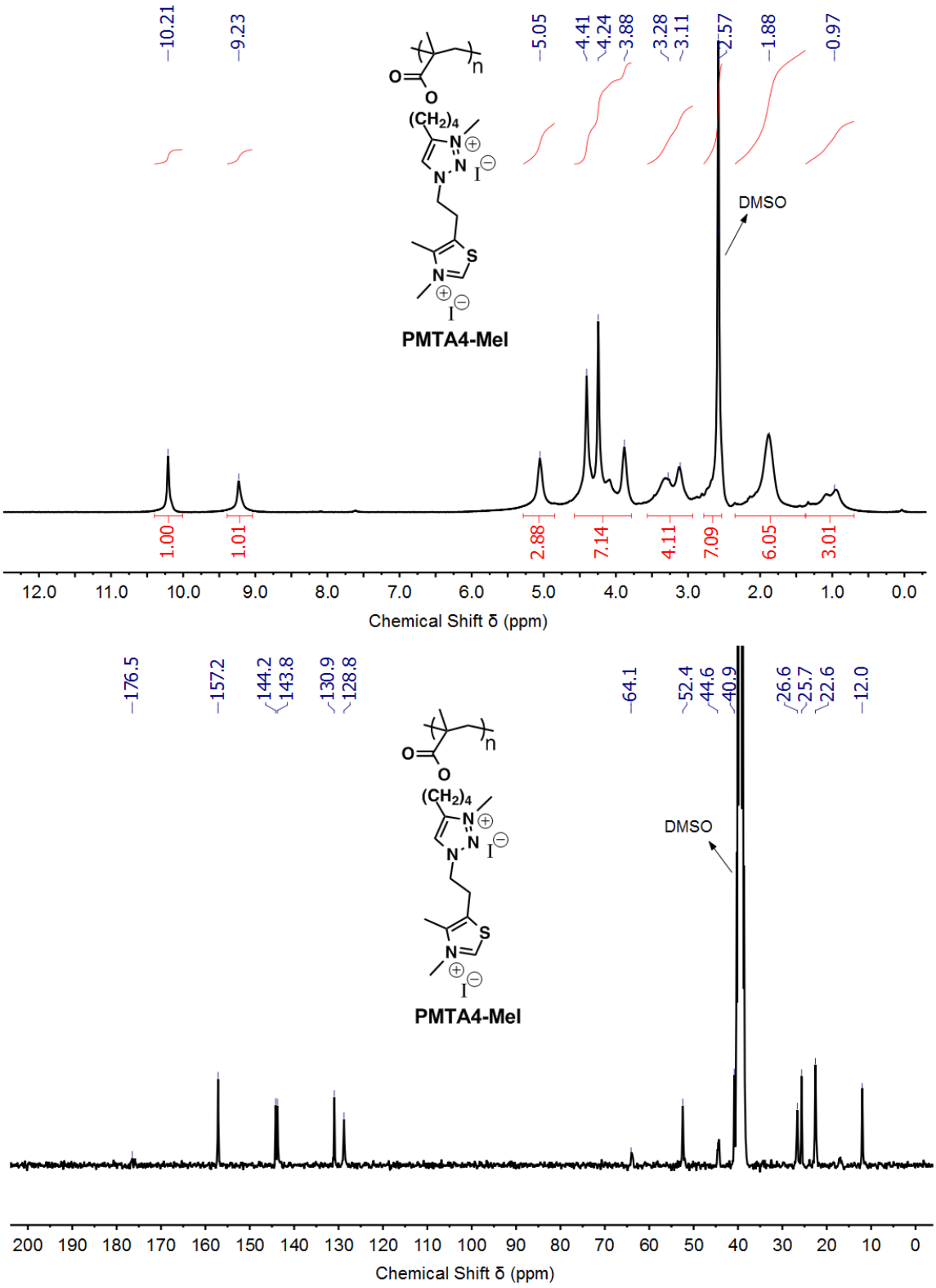


Figure S36. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA4-MeI.**

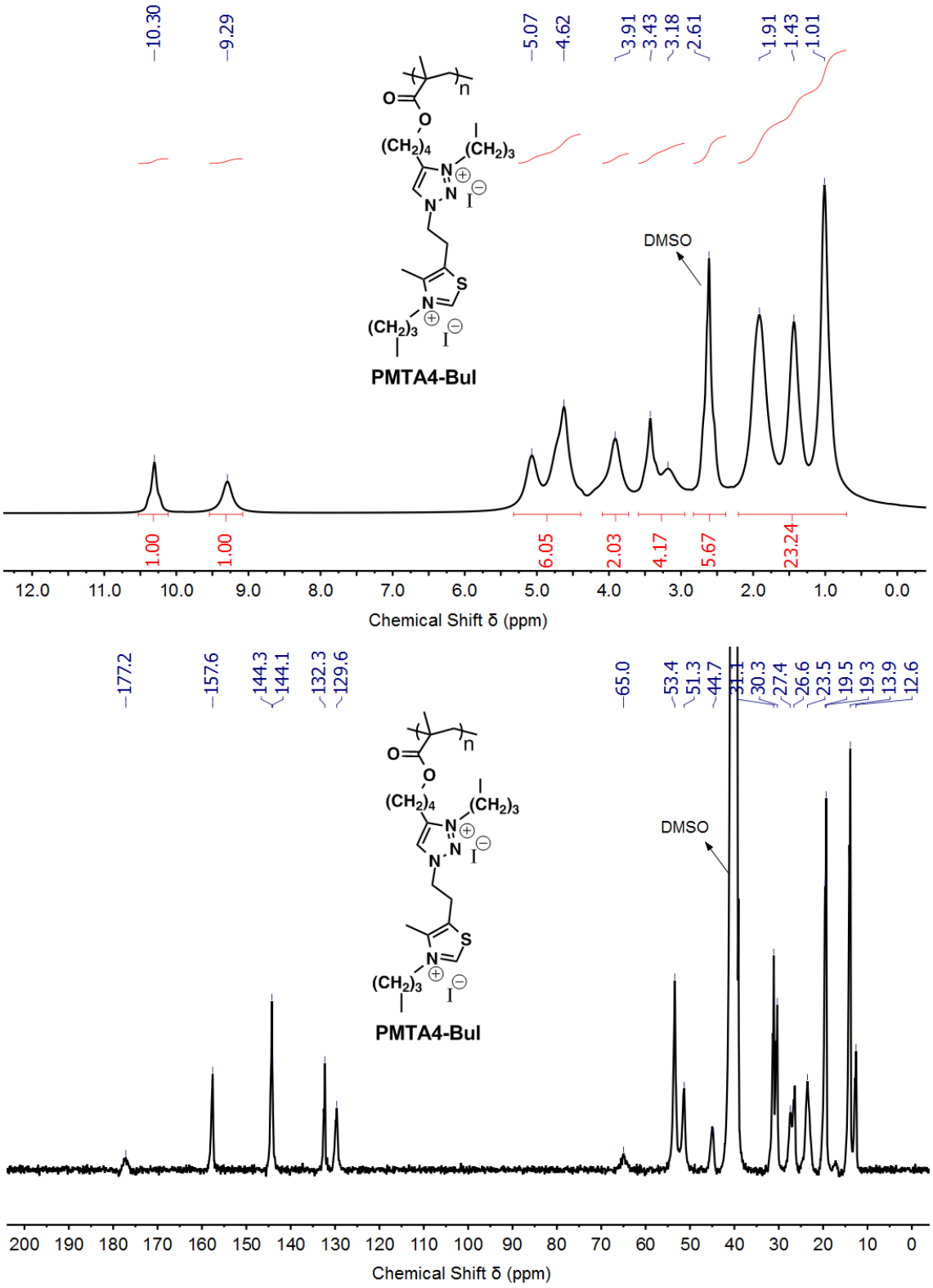


Figure S37. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA4-BuI.**

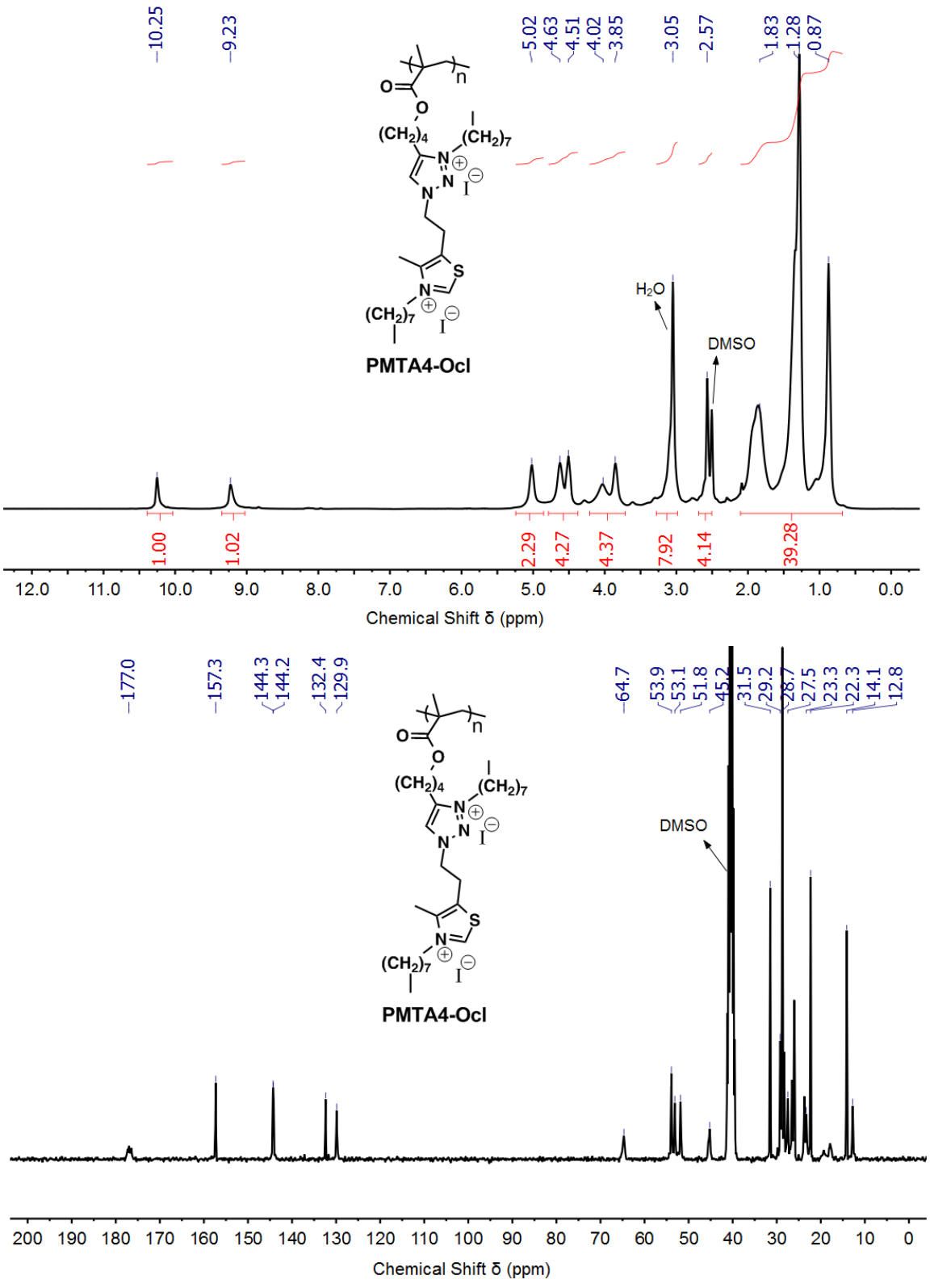


Figure S38. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA4-OcI.**

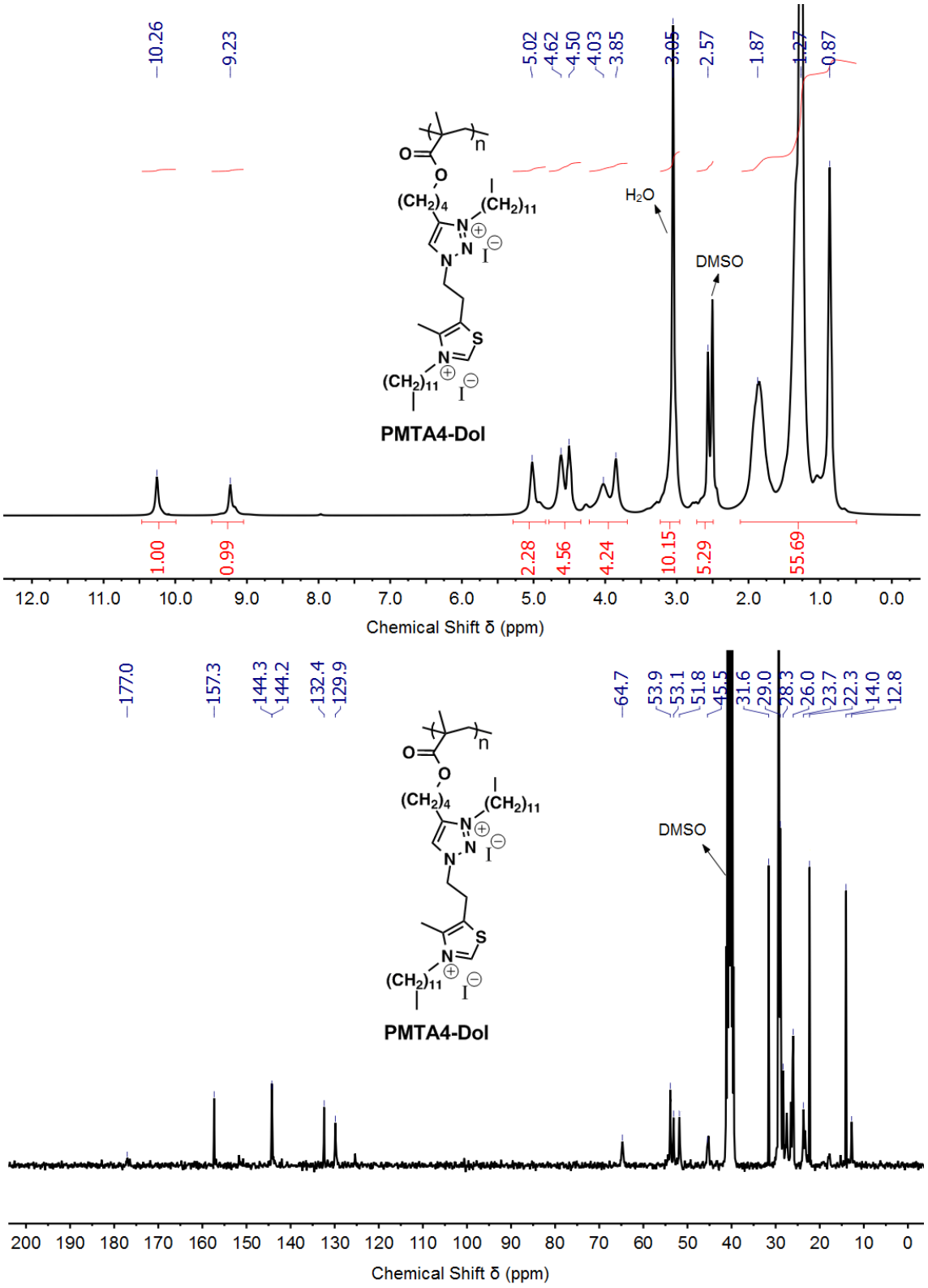


Figure S39. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA4-DoI.**

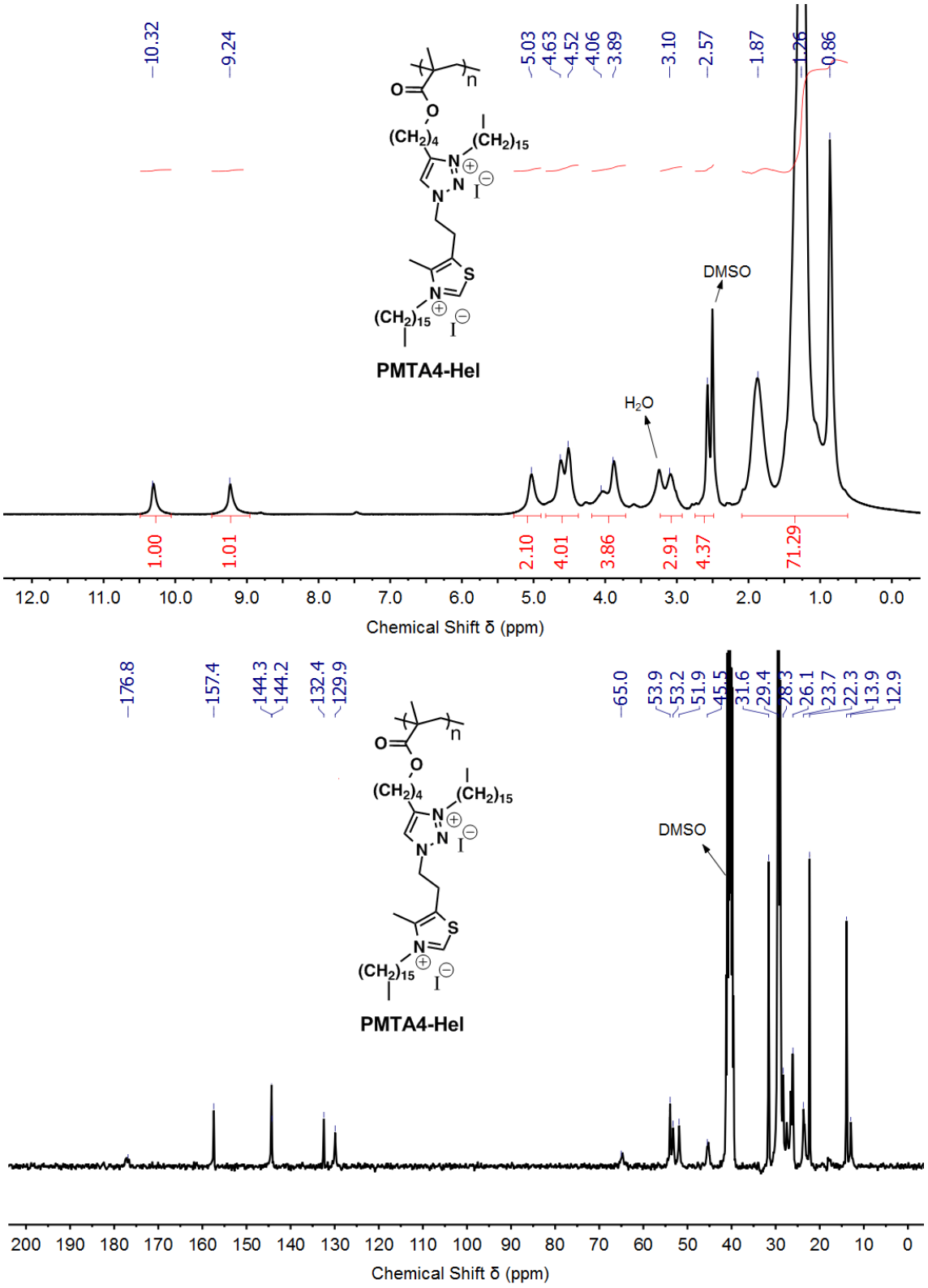


Figure S40. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA4-HeI.**

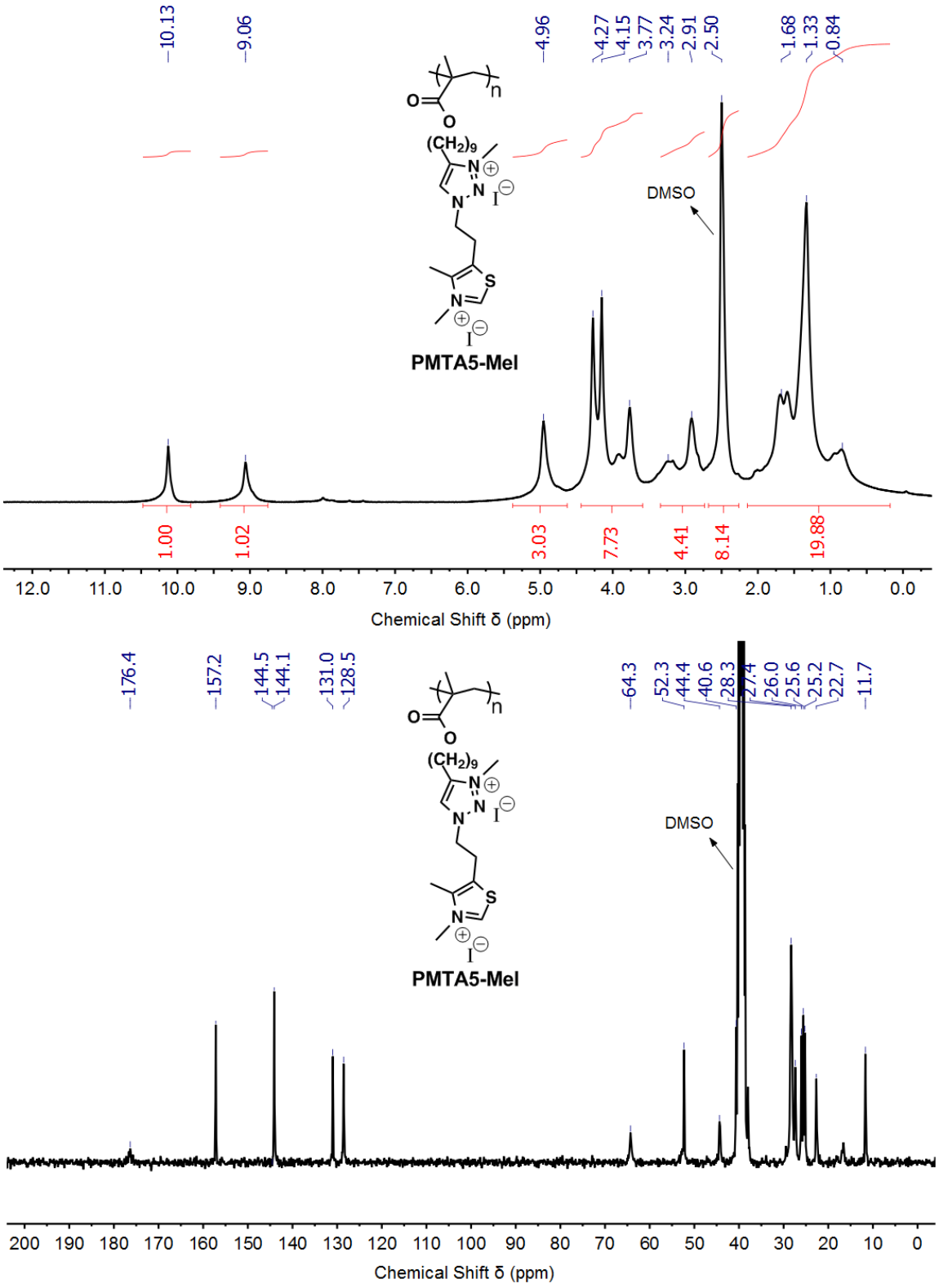


Figure S41. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA5-MeI.**

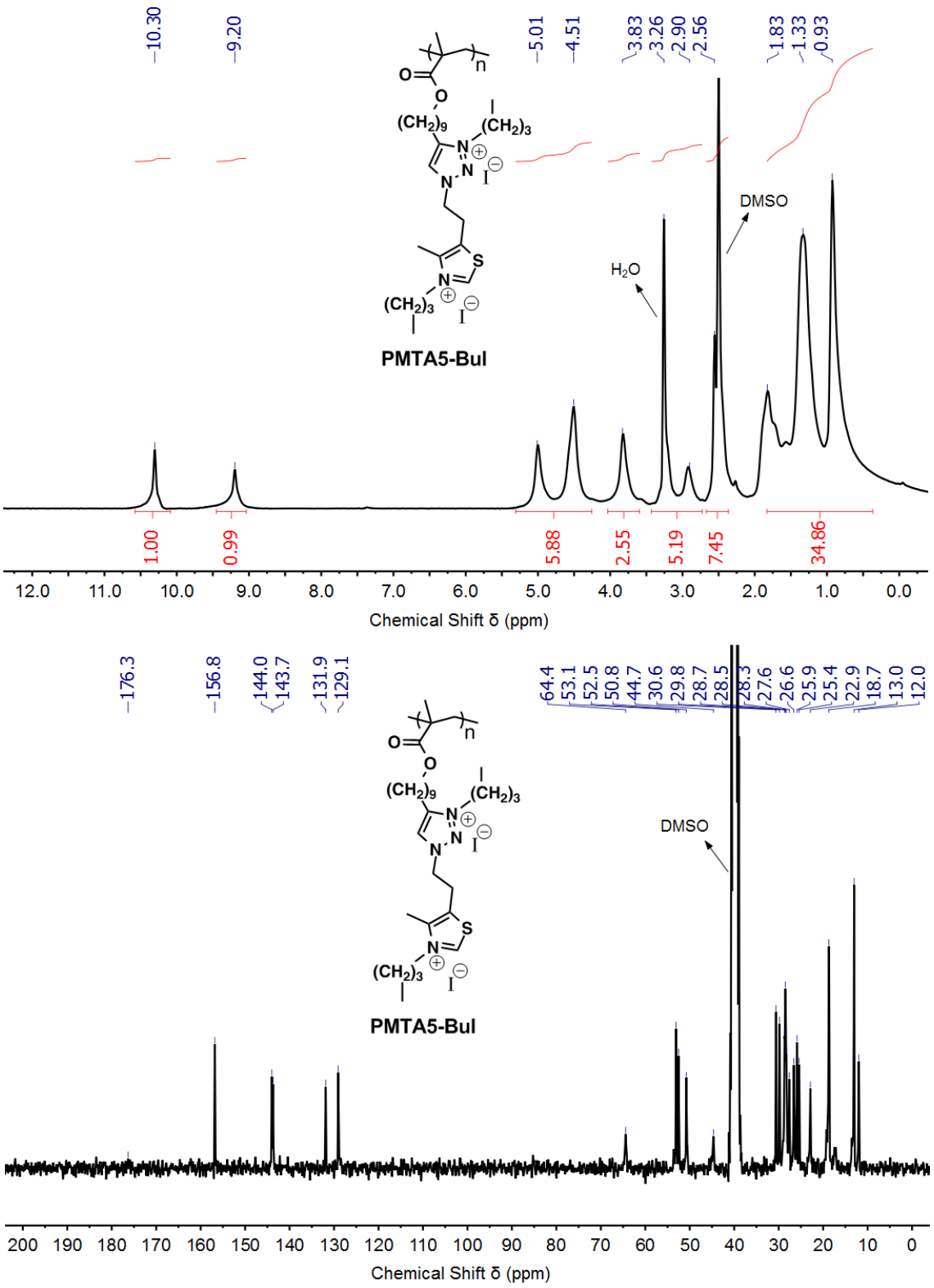


Figure S42. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA5-BuI.**

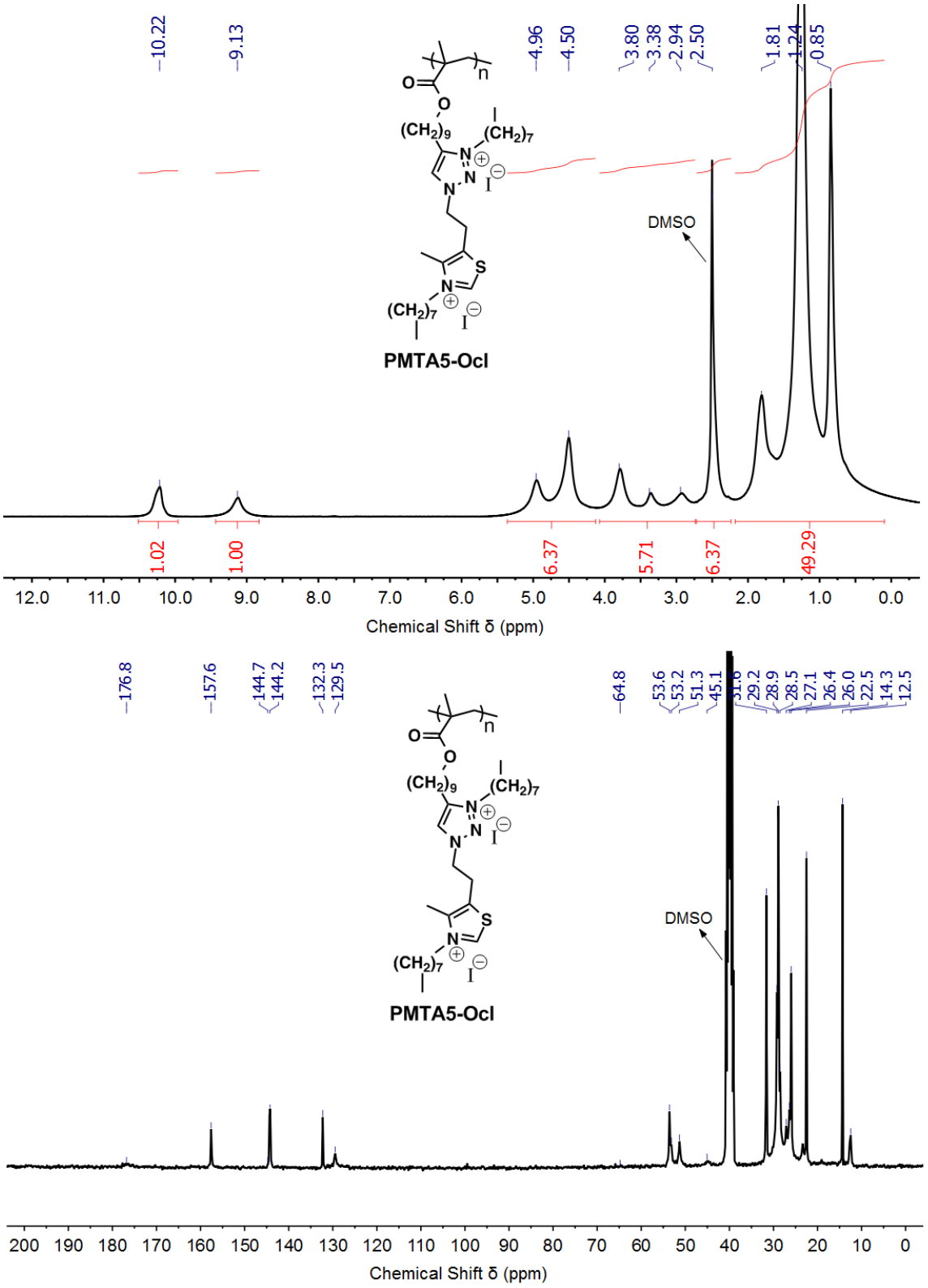


Figure S43. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA5-OcI.**

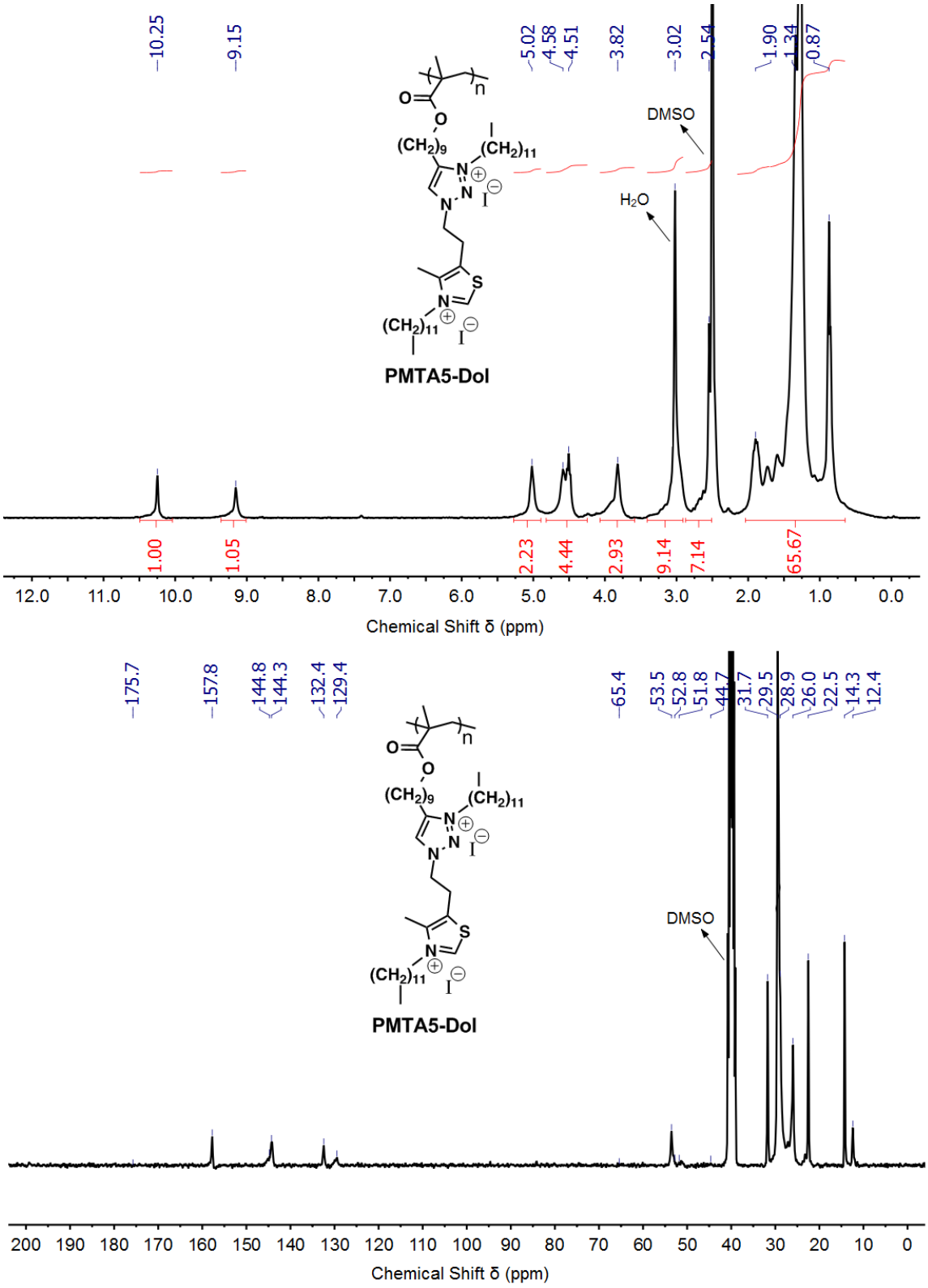


Figure S44. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA5-DoI.**

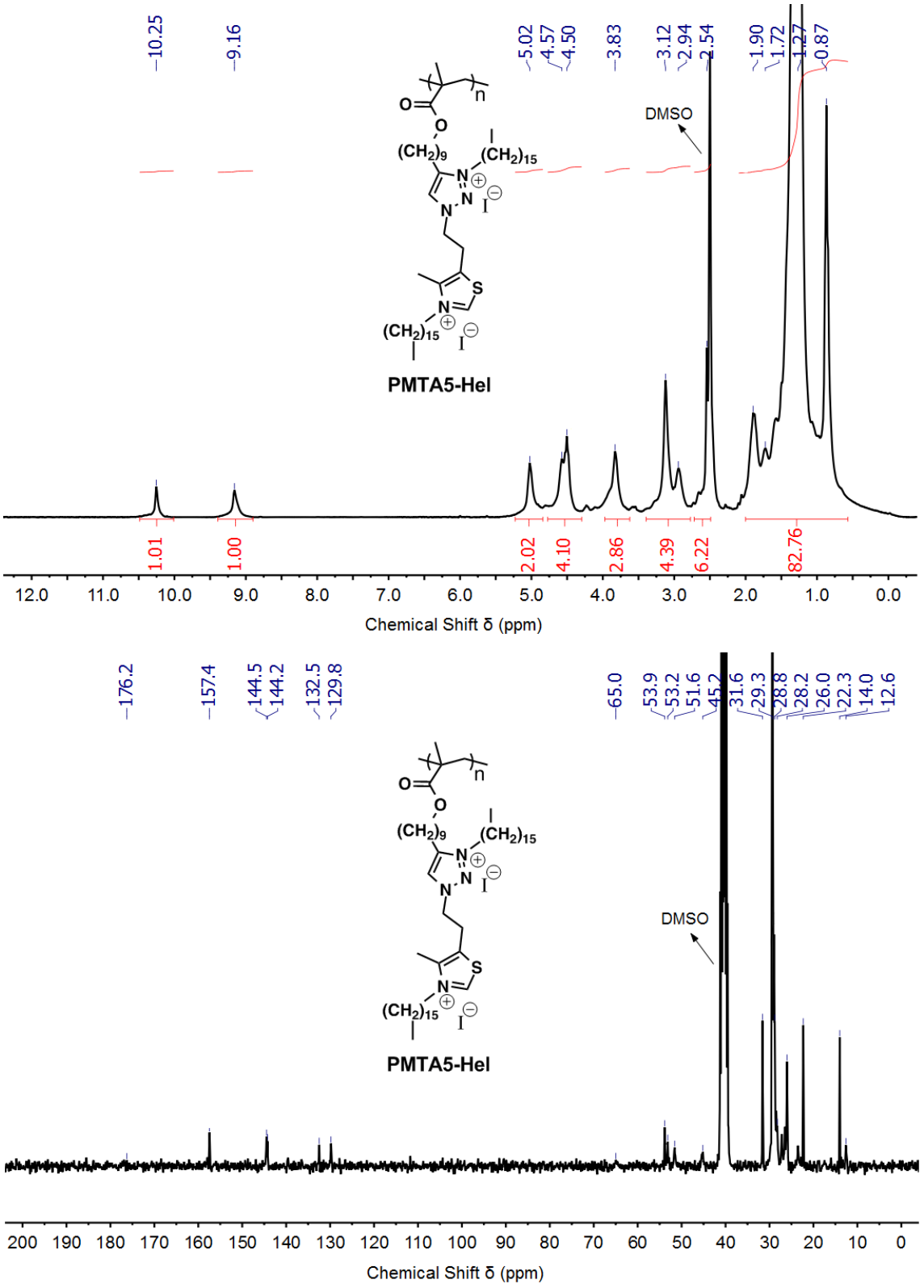


Figure S45. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA5-HeI.**

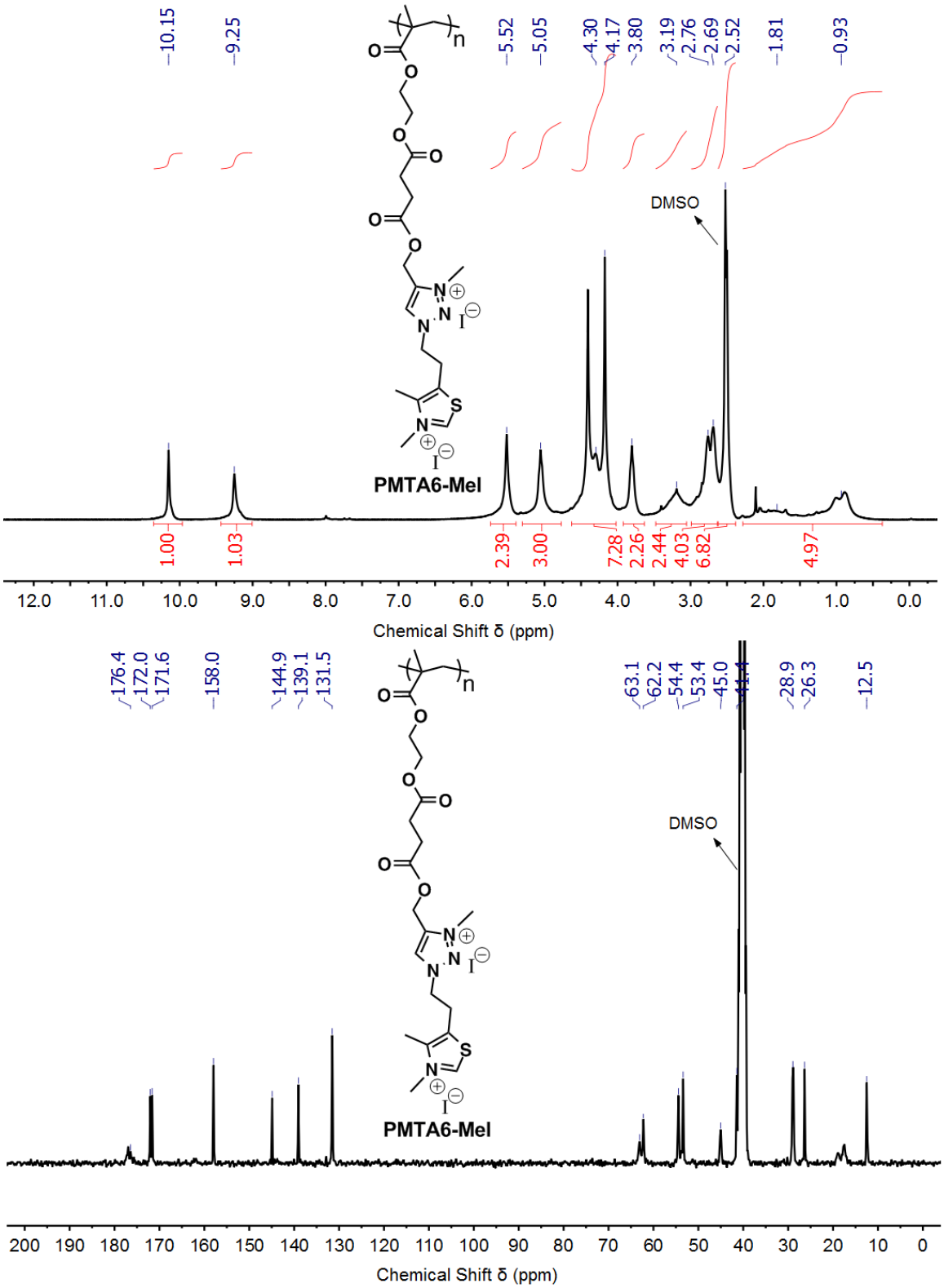


Figure S46. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA6-MeI.**

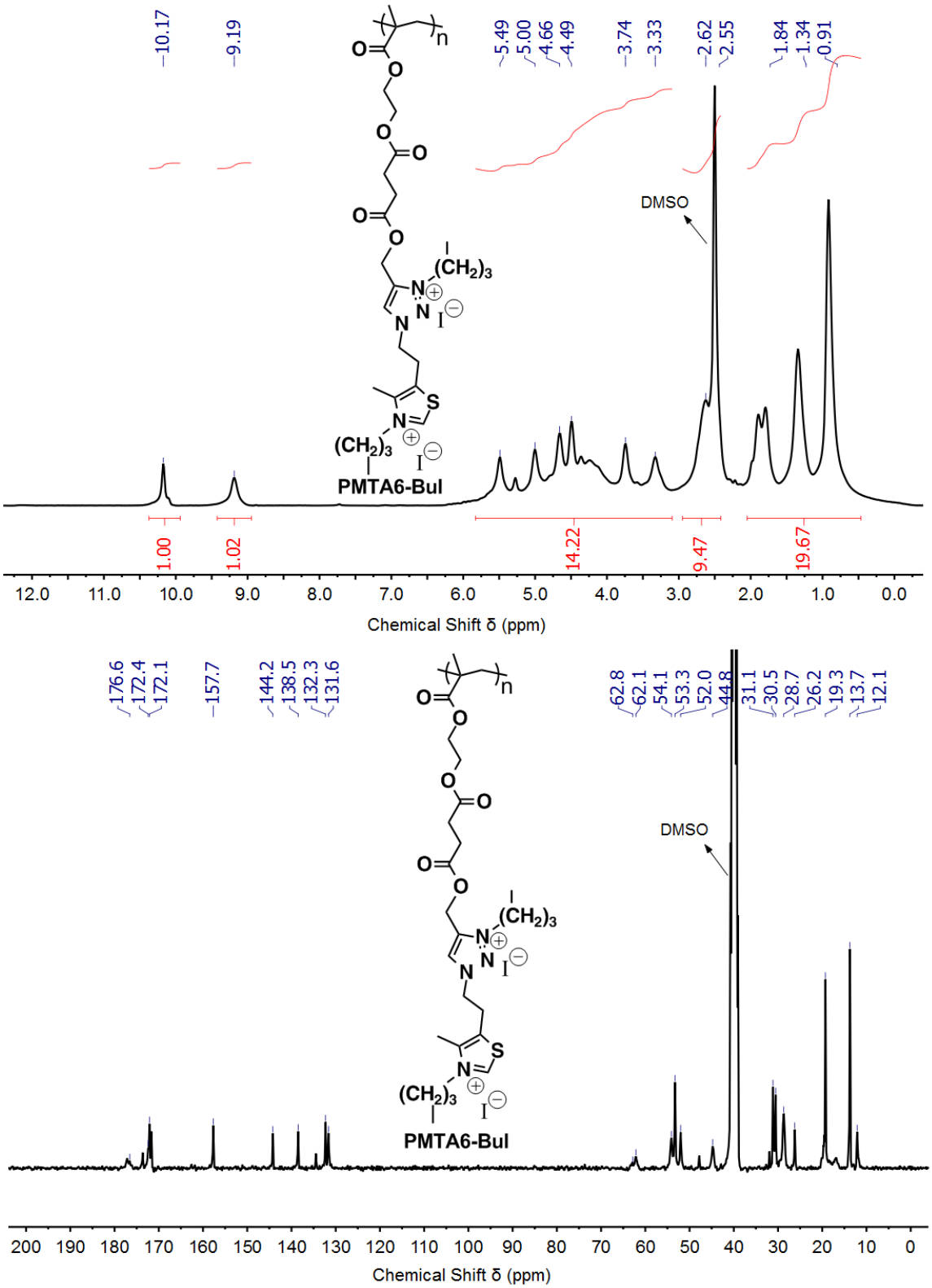


Figure S47. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA6-BuI.**

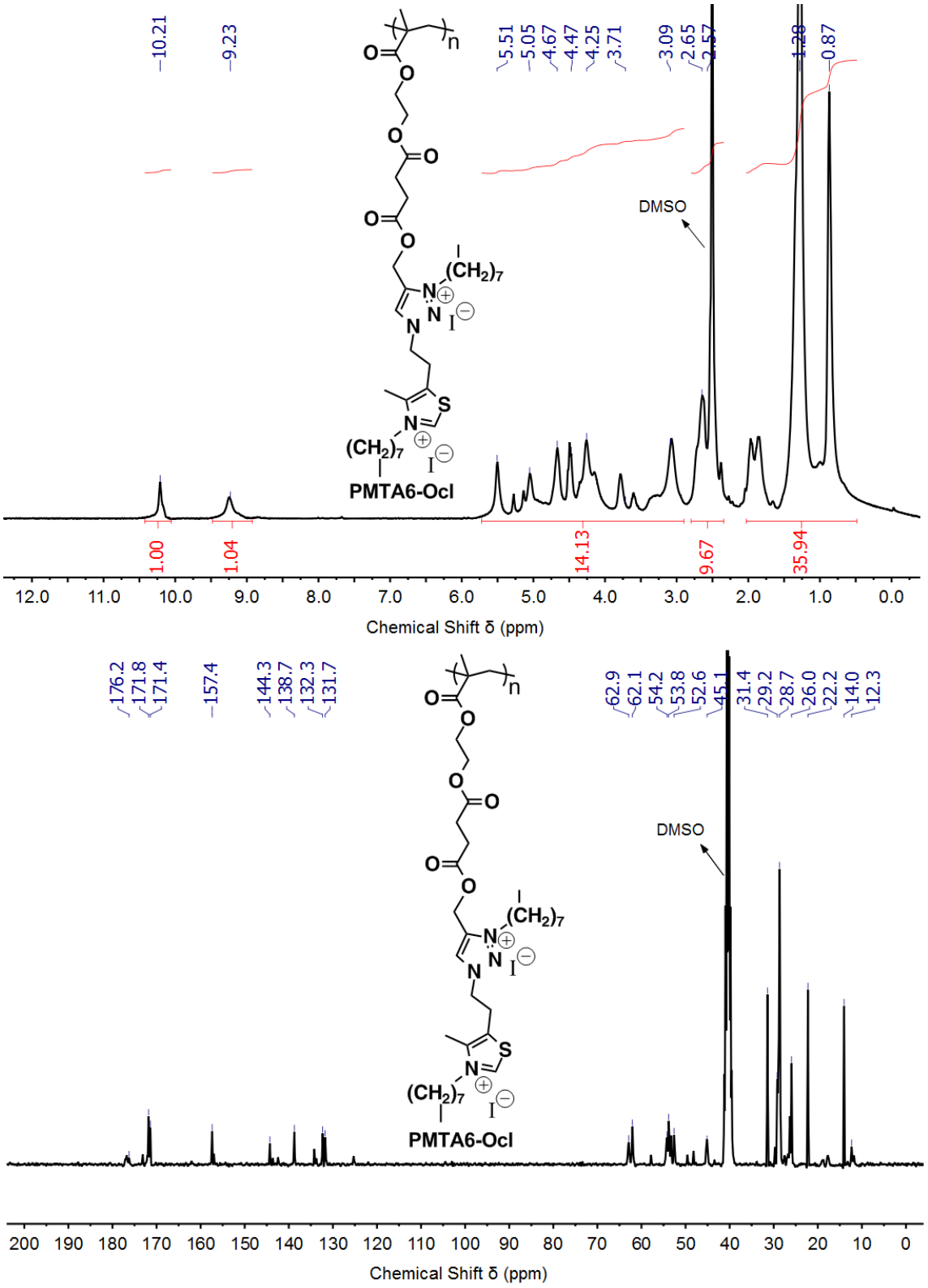


Figure S48. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA6-OcI.**

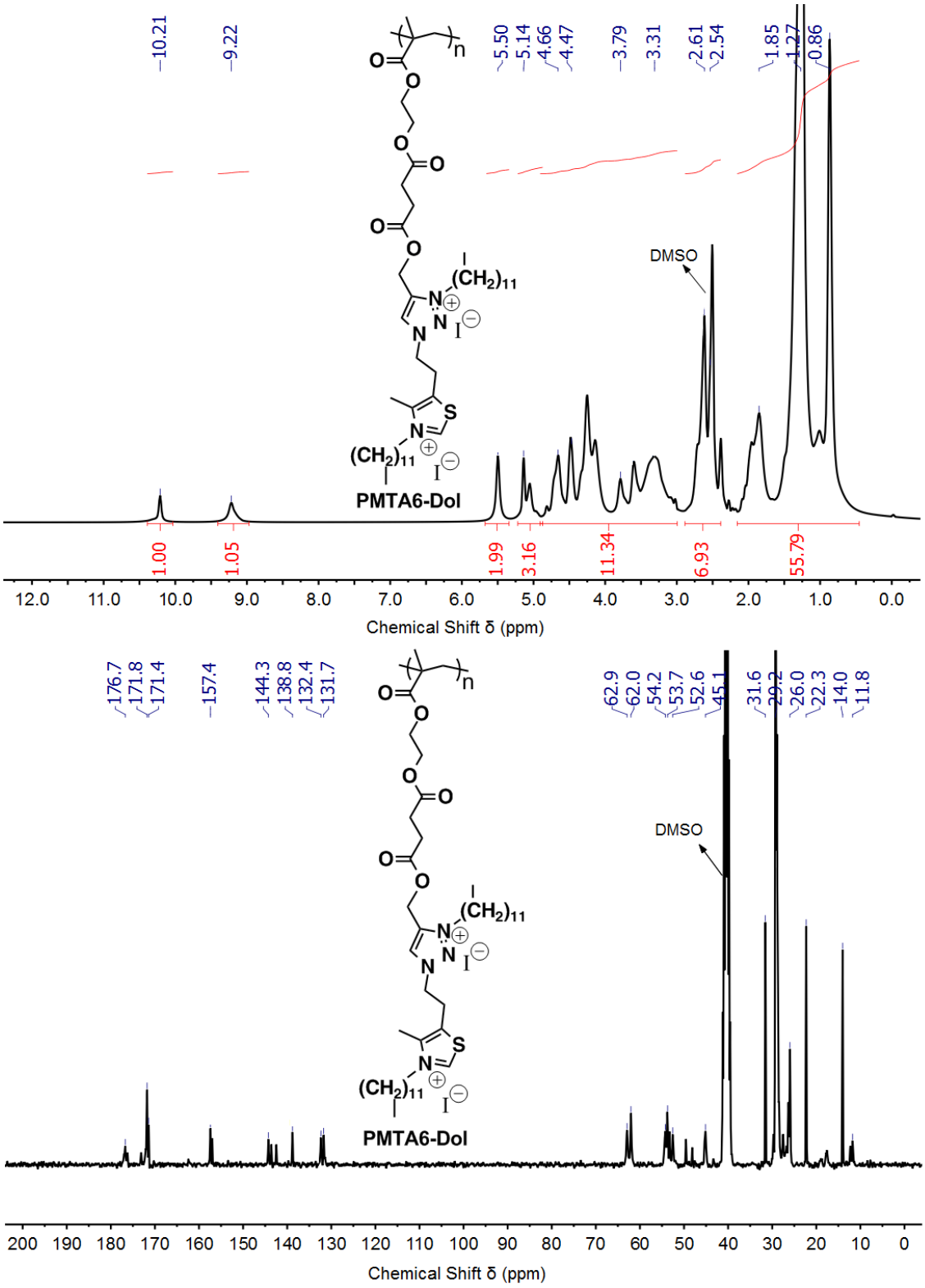


Figure S49. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA6-DoI.**

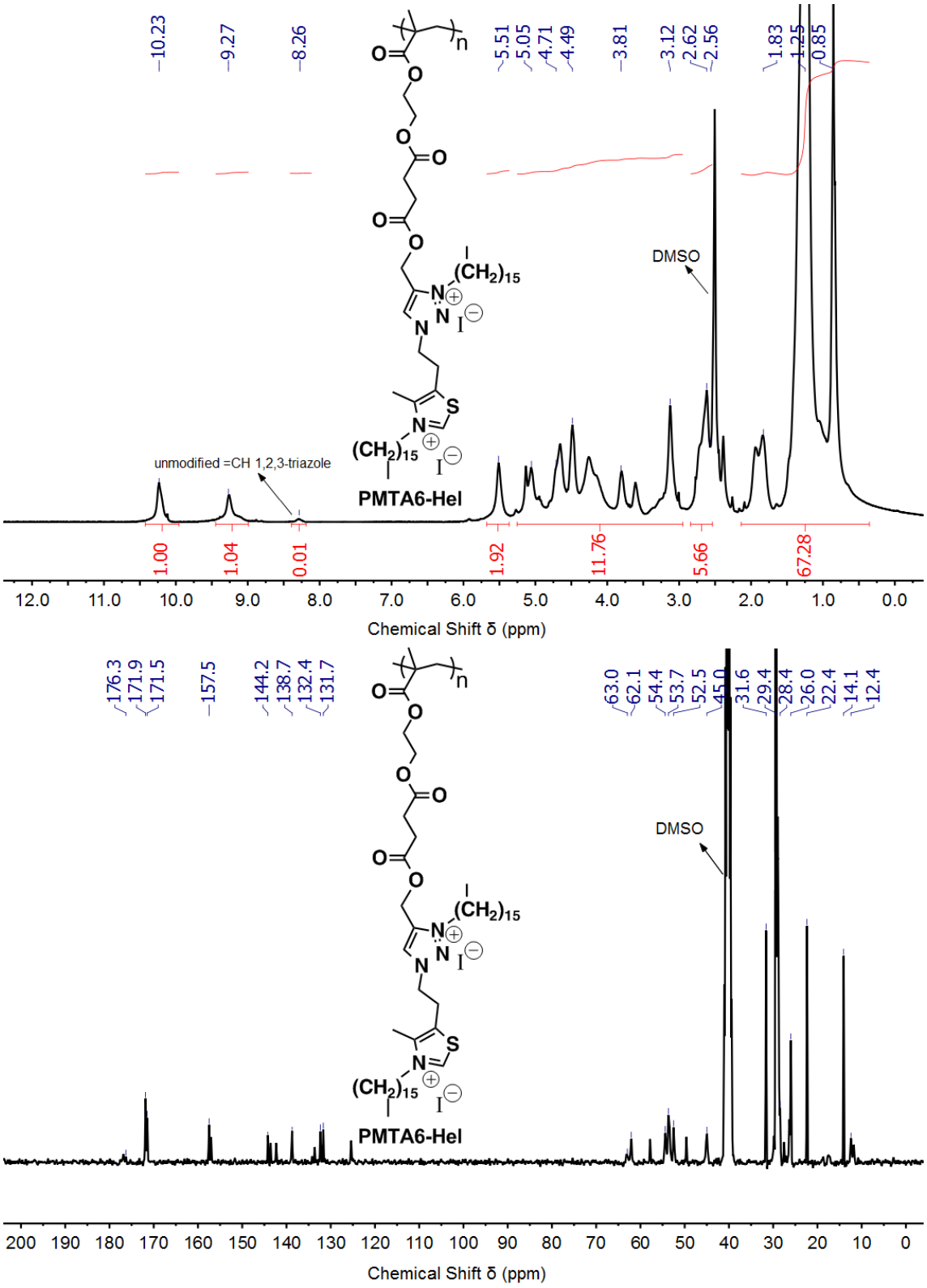


Figure S50. ^{1}H (top) and ^{13}C (bottom) NMR spectra in DMSO-d_6 of **PMTA6-HeI.**

8. ATR-FTIR spectra

8.1 ATR-FTIR spectra of the 'Clickable' Intermediates

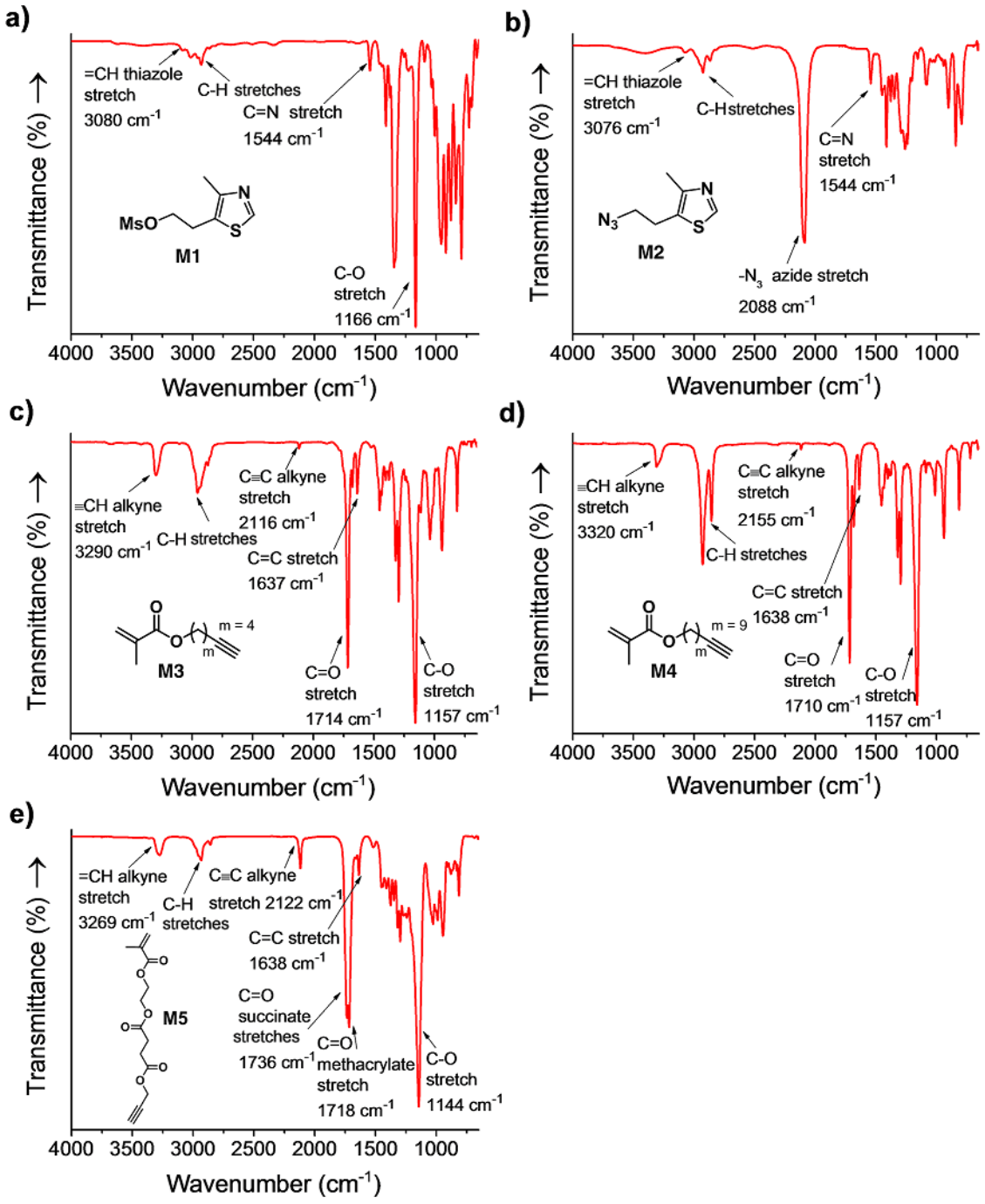


Figure S51. ATR-FTIR spectra of the 'Clickable' Intermediates: a) **M1,** b) **M2**, c) **M3,** d) **M4** and e) **M5**.

8.2 ATR-FTIR spectra of MTA1, PMTA1 and PMTA1-RI series

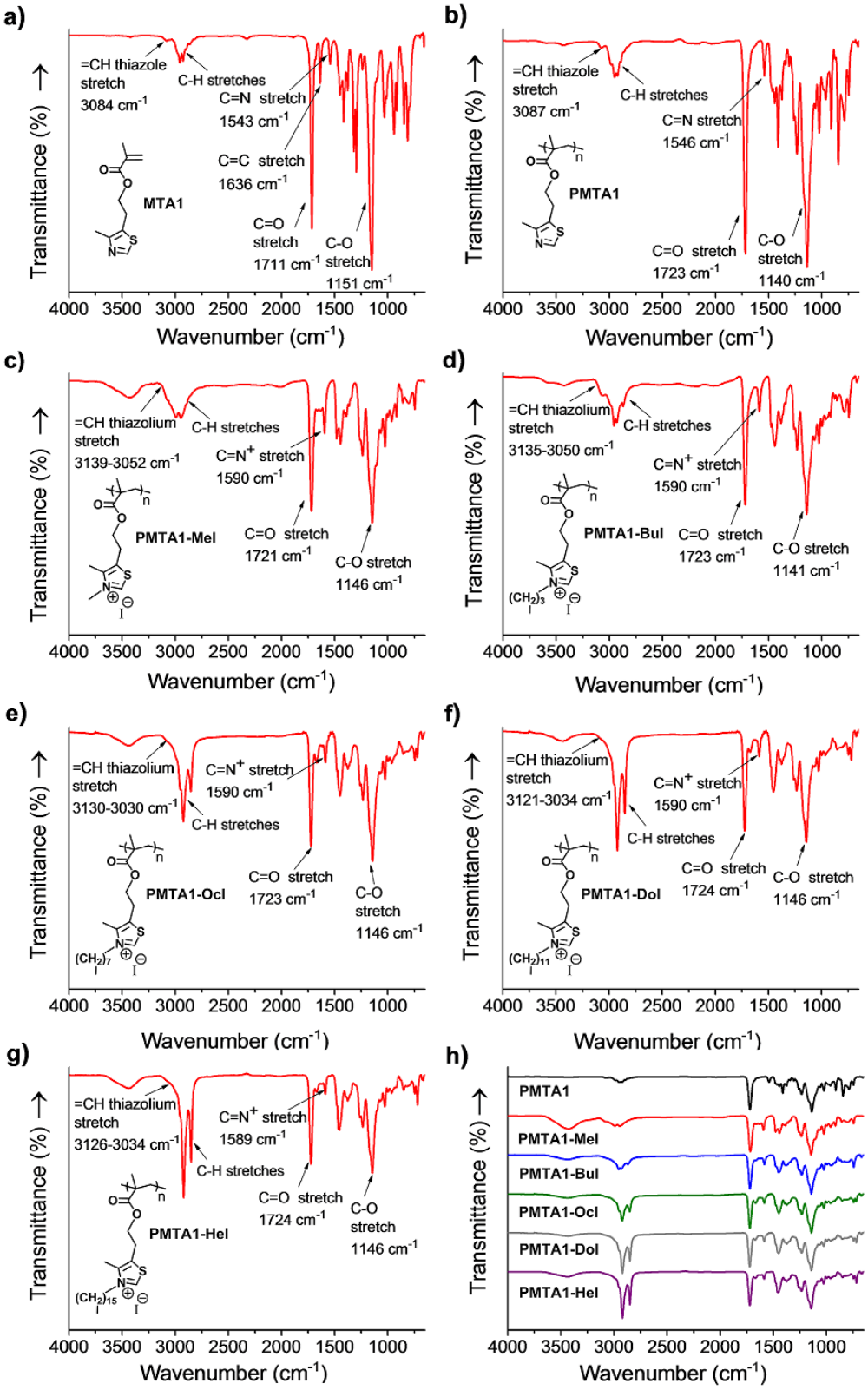


Figure S52. ATR-FTIR spectra of **MTA1**, **PMTA1** and **PMTA1-RI** series: a) **MTA1** methacrylate monomer, b) **PMTA1**, c) **PMTA1-MeI**, d) **PMTA1-BuI**, e) **PMTA1-OcI**, f) **PMTA1-DoI**, g) **PMTA1-HeI** and h) **PMTA1** and **PMTA1-RI** series from top to bottom.

8.3 ATR-FTIR spectra of MTA2, PMTA2 and PMTA2-RI series

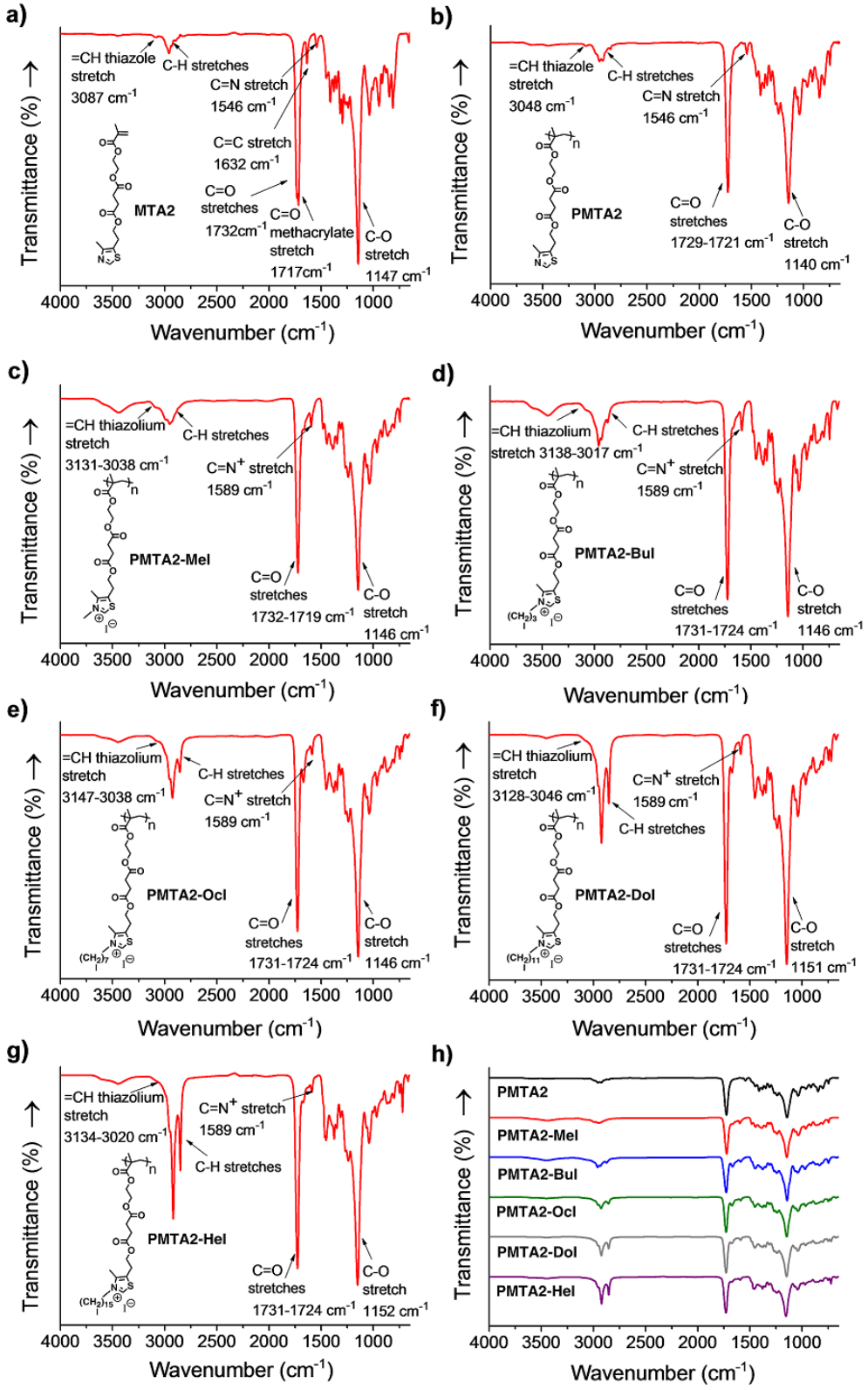


Figure S53. ATR-FTIR spectra of **MTA2**, **PMTA2** and **PMTA2-RI** series: a) **MTA2** methacrylate monomer, b) **PMTA2**, c) **PMTA2-MeI**, d) **PMTA2-BuI**, e) **PMTA2-OcI**, f) **PMTA2-DoI**, g) **PMTA2-HeI** and h) **PMTA2** and **PMTA2-RI** series from top to bottom.

8.4 ATR-FTIR spectra of MTA3, PMTA3 and PMTA3-RI series

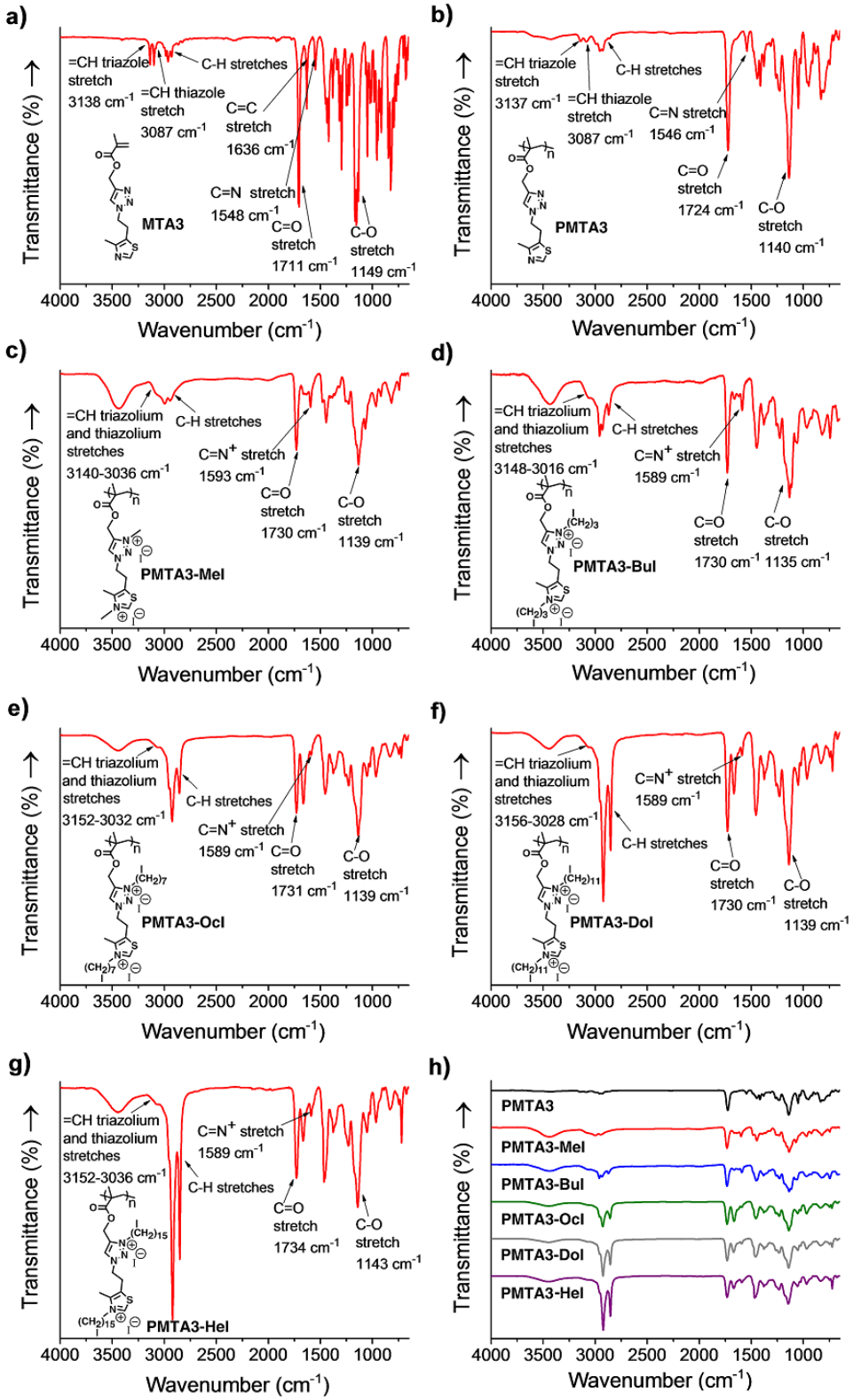


Figure S54. ATR-FTIR spectra of **MTA3**, **PMTA3** and **PMTA3-RI** series: a) **MTA3** methacrylate monomer, b) **PMTA3**, c) **PMTA3-MeI**, d) **PMTA3-BuI**, e) **PMTA3-OcI**, f) **PMTA3-DoI**, g) **PMTA3-HeI** and h) **PMTA3** and **PMTA3-RI** series from top to bottom.

8.5 ATR-FTIR spectra of MTA4, PMTA4 and PMTA4-RI series

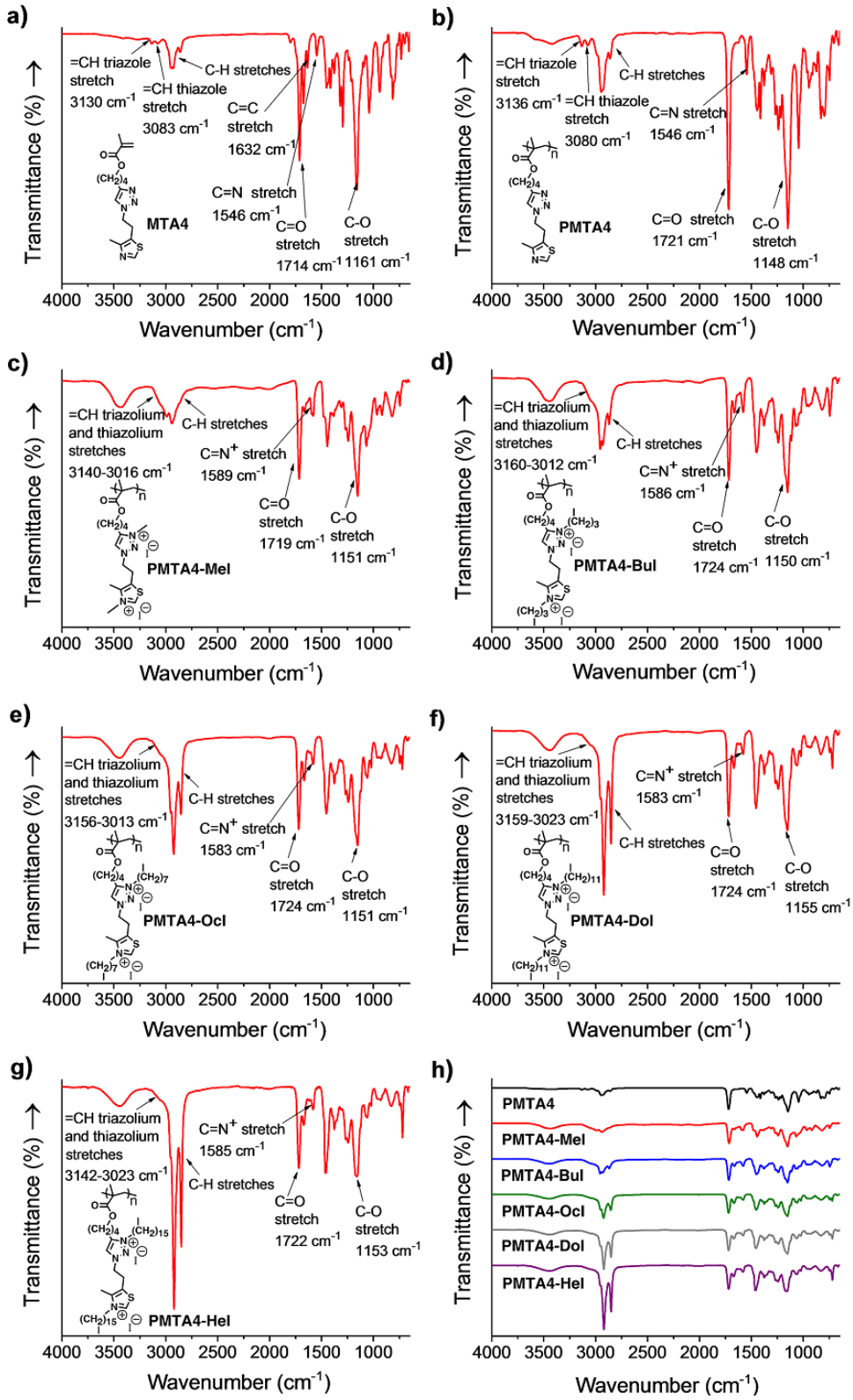


Figure S55. ATR-FTIR spectra of **MTA4**, **PMTA4** and **PMTA4-RI** series: a) **MTA4** methacrylate monomer, b) **PMTA4**, c) **PMTA4-MeI**, d) **PMTA4-BuI**, e) **PMTA4-OcI**, f) **PMTA4-DoI**, g) **PMTA4-HeI** and h) **PMTA4** and **PMTA4-RI** series from top to bottom.

8.6 ATR-FTIR spectra of MTA5, PMTA5 and PMTA5-RI series

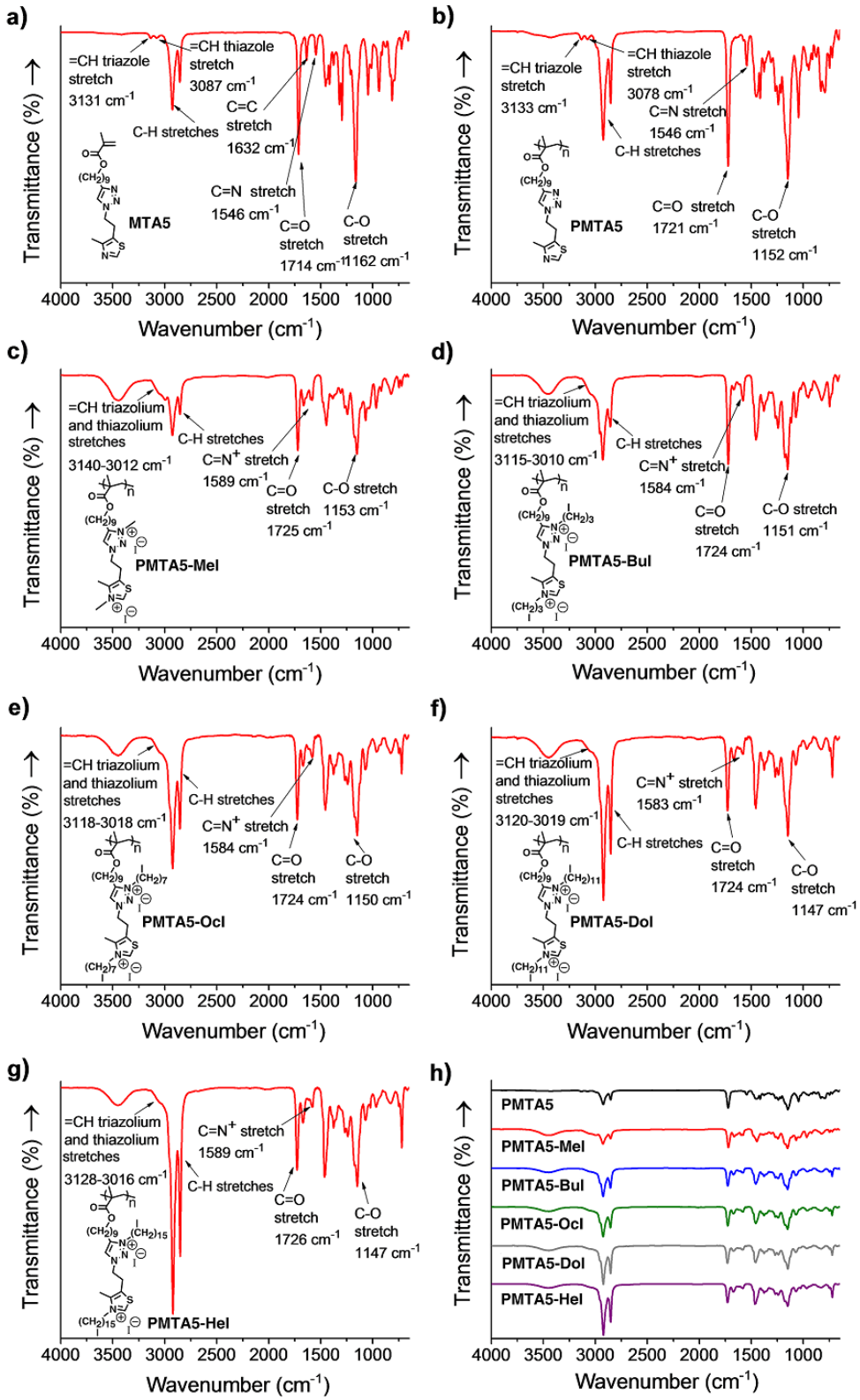


Figure S56. ATR-FTIR spectra of **MTA5**, **PMTA5** and **PMTA5-RI** series: a) **MTA5** methacrylate monomer, b) **PMTA5**, c) **PMTA5-MeI**, d) **PMTA5-BuI**, e) **PMTA5-OcI**, f) **PMTA5-DoI**, g) **PMTA5-HeI** and h) **PMTA5** and **PMTA5-RI** series from top to bottom.

8.7 ATR-FTIR spectra of MTA6, PMTA6 and PMTA6-RI series

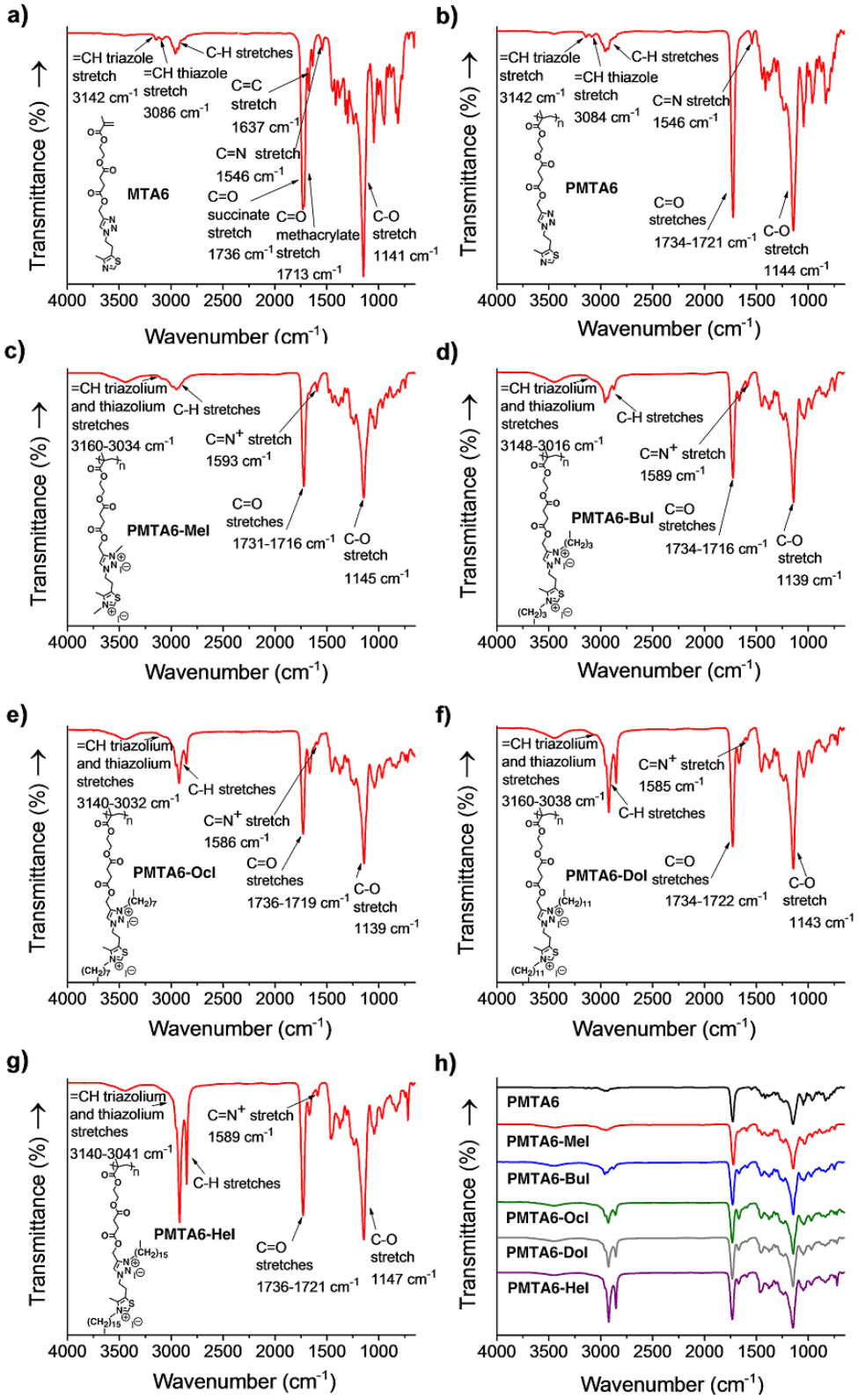
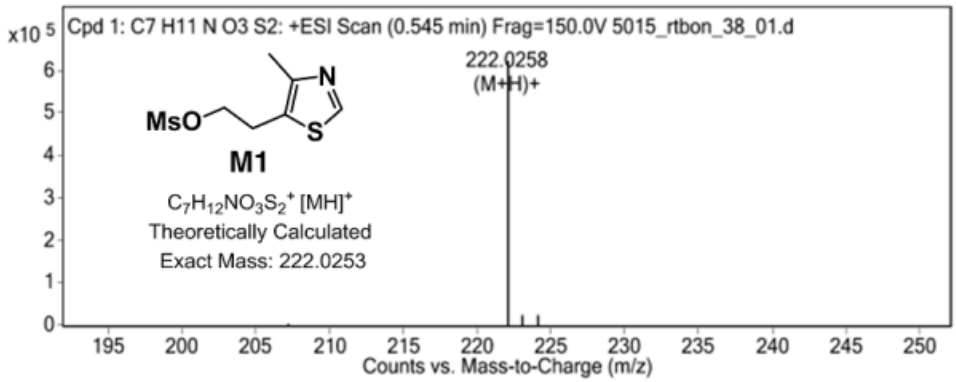


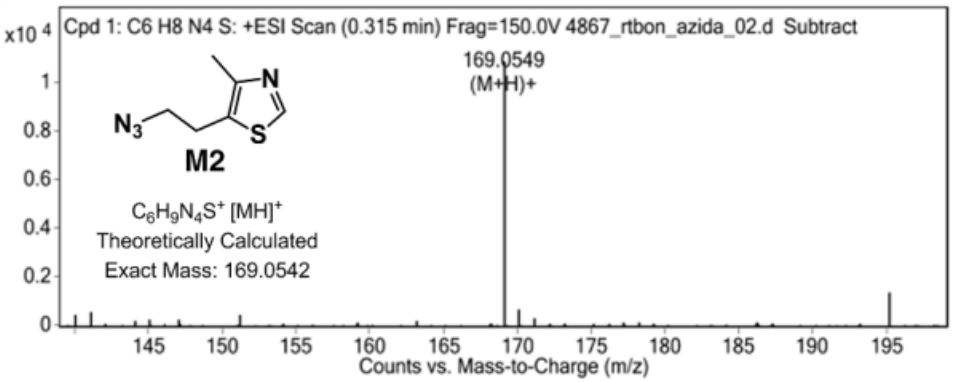
Figure S57. ATR-FTIR spectra of **MTA6**, **PMTA6** and **PMTA6-RI** series: a) **MTA6** methacrylate monomer, b) **PMTA6**, c) **PMTA6-MeI**, d) **PMTA6-BuI**, e) **PMTA6-OcI**, f) **PMTA6-DoI**, g) **PMTA6-HeI** and h) **PMTA6** and **PMTA6-RI** series from top to bottom.

9. Mass spectra

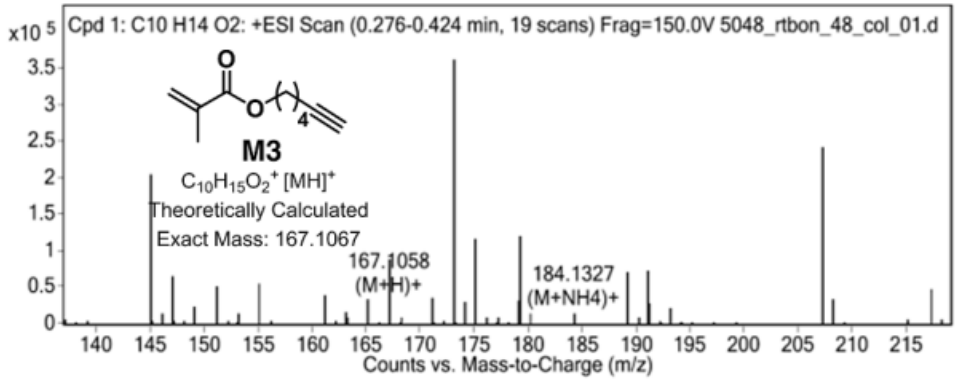
a)



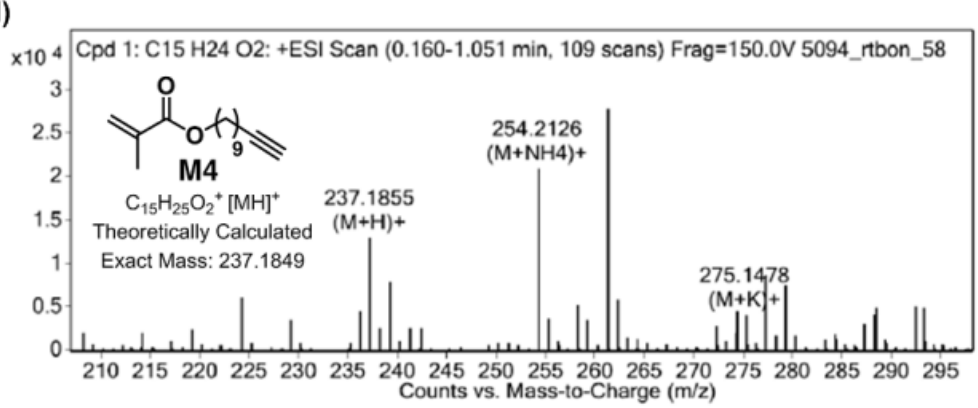
b)



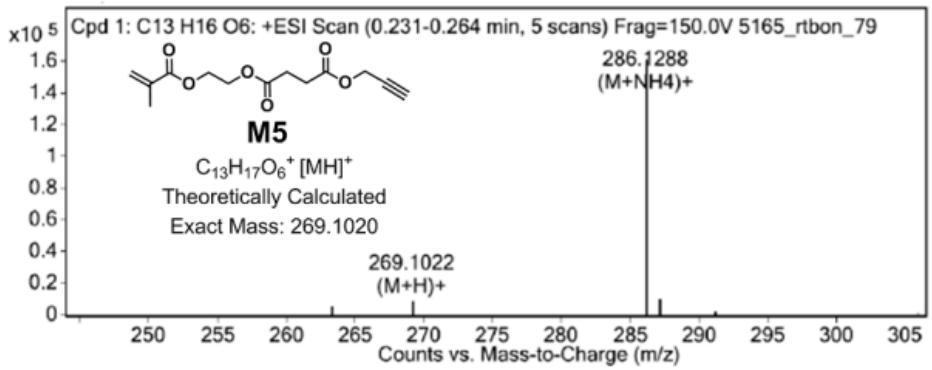
c)



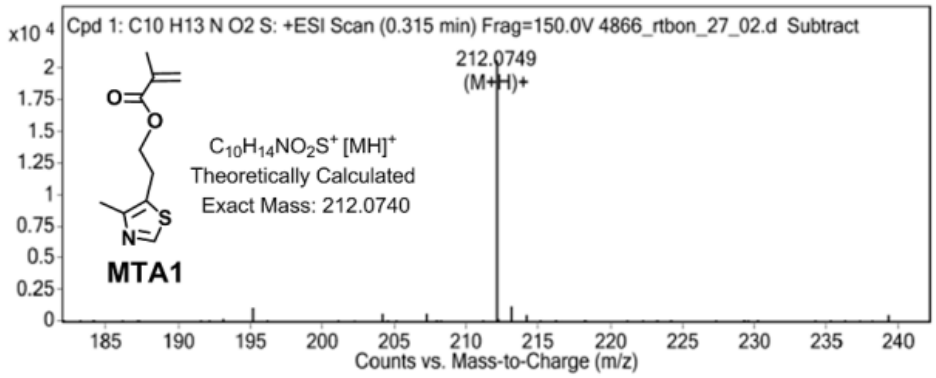
d)



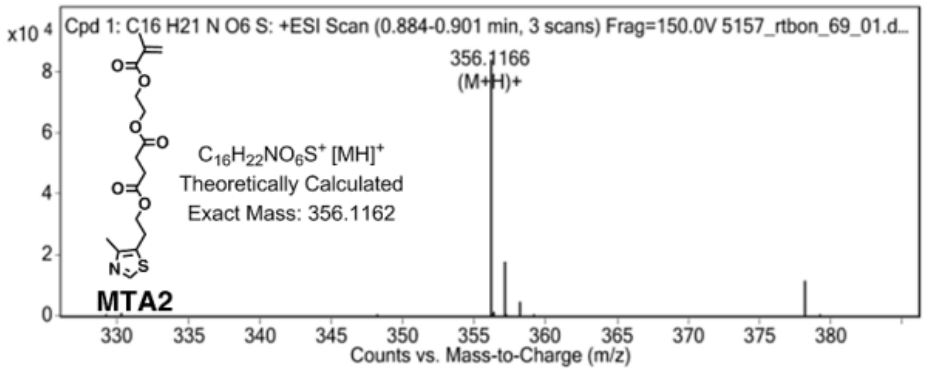
e)


Cpd 1: C13 H16 O6: +ESI Scan (0.231-0.264 min, 5 scans) Frag=150.0V 5165_rtbon_79
x10 5
286.1288
(M+NH4)+
M5
C13H17O6+ [MH]+
Theoretically Calculated
Exact Mass: 269.1020
269.1022
(M+H)+
Counts vs. Mass-to-Charge (m/z)

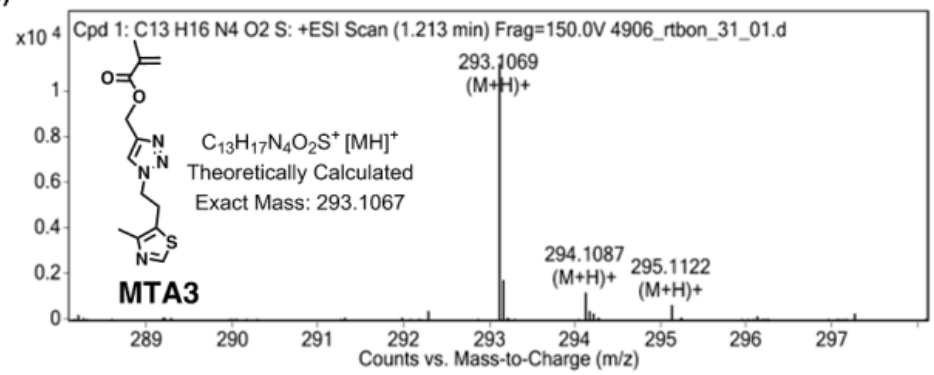
f)


Cpd 1: C10 H13 N O2 S: +ESI Scan (0.315 min) Frag=150.0V 4866_rtbon_27_02.d Subtract
x10 4
212.0749
(M+H)+
C10H14NO2S+ [MH]+
Theoretically Calculated
Exact Mass: 212.0740
MTA1
Counts vs. Mass-to-Charge (m/z)

g)


Cpd 1: C16 H21 N O6 S: +ESI Scan (0.884-0.901 min, 3 scans) Frag=150.0V 5157_rtbon_69_01.d...
x10 4
356.1166
(M+H)+
C16H22NO6S+ [MH]+
Theoretically Calculated
Exact Mass: 356.1162
MTA2
Counts vs. Mass-to-Charge (m/z)

h)


Cpd 1: C13 H16 N4 O2 S: +ESI Scan (1.213 min) Frag=150.0V 4906_rtbon_31_01.d
x10 4
293.1069
(M+H)+
C13H17N4O2S+ [MH]+
Theoretically Calculated
Exact Mass: 293.1067
294.1087
(M+H)+
295.1122
(M+H)+
MTA3
Counts vs. Mass-to-Charge (m/z)

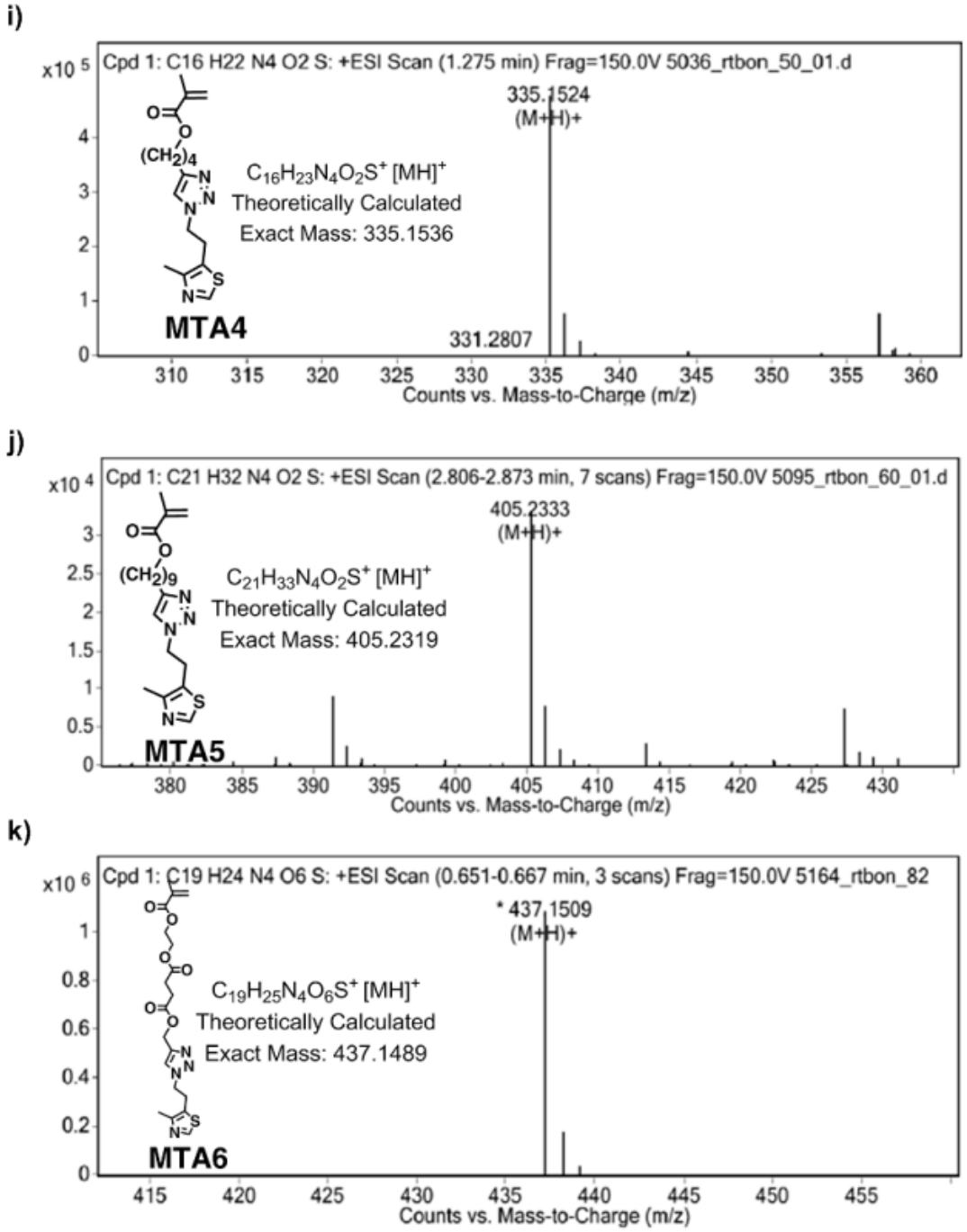


Figure S58. Mass spectra of the 'Clickable' Intermediates: a) **M1**, b) **M2**, c) **M3**, d) **M4**, e) **M5**; and the monomers **MTAs**: f) **MTA1**, g) **MTA2**, h) **MTA3**, i) **MTA4**, j) **MTA5** and k) **MTA6.**

10. Supplementary References

1. D. Albanese, C. Ghidoli and M. Zenoni, *Org. Process Res. Dev.*, 2008, **12**, 736-739.
2. Y. Wang, S. Hu and W. Fast, *J. Am. Chem. Soc.*, 2009, **131**, 15096-15097.
3. P. C. Fuchs, A. L. Barry and S. D. Brown, *Antimicrob. Agents Chemother.*, 1998, **42**, 1213-1216.
4. T. Eren, A. Som, J. R. Rennie, C. F. Nelson, Y. Urgina, K. Nüsslein, E. B. Coughlin and G. N. Tew, *Macromol. Chem. Phys.*, 2008, **209**, 516-524.