



SUPPLEMENTARY MATERIAL TO
**Reductive Heck reactions of *N*-arylamino-substituted
tricyclic imides**

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CHARACTERIZATION DATA FOR **3**

(3*a*R, 4*S*, 7*R*, 7*a*S)-rel-2-[(3-chloro-4-fluorophenyl)amino]-3*a*, 4, 7, 7*a*-tetrahydro-4, 7-methano-1*H*-isoindole-1, 3(2*H*)-dione (**3**). Yield: 80 %; colorless crystals; m.p.: 207–210 °C, *R*_f: 0.23 (20:1, dichloromethane/methanol); IR (ATR, cm⁻¹): 3272, 3055, 3024, 2970, 2944, 2873, 1712, 1692, 1636, 1608, 1496, 1414, 1199, 818; ¹H-NMR (500 MHz, CD₃OD, δ / ppm): 1.45–1.46 (2H, *m*, CH₂), 3.03 (1H, *brs*, NH), 3.12 (2H, *brs*, H4 & H4), 3.34–3.35 (2H, *m*, H7*a* & H3*a*), 6.08 (1H, *dd*, *J* = 3.4 & 5.6 Hz, =CH), 6.32 (1H, *dd*, *J* = 3.1 & 5.3 Hz, =CH), 6.75 (1H, *ddd*, *J* = 2.5, 6.6 & 8.8 Hz, Ar-H), 6.90 (1H, *dd*, *J* = 2.8 & 6.3 Hz, Ar-H), 7.03 (1H, *t*, *J* = 8.8 Hz, Ar-H); ¹³C-NMR (125 MHz, CD₃COCD₃, δ / ppm): 46.5 (CH), 46.7 (CH), 48.0 (CH), 48.4 (CH), 49.2 (CH₂), 113.1 (Ar-C), 113.9 (Ar-C), 114.5 (Ar-C), 115.4 (Cq), 133.7 (CH), 135.1 (CH), 136.5 (Cq), 147.9 (Cq), 173.3 (C=O), 174.1 (C=O); (+)ESI-LCMS (QTOF) (*m/z*): Calcd. for [C₁₅H₁₂ClFN₂O₂]: 306.0571. Found: 307.0632 [M + H]⁺.

CHARACTERIZATION DATA FOR **4a–d**

(3*a*R, 4*S*, 7*R*, 7*a*S)-rel-2-[(3-chloro-4-fluorophenyl)amino]hexahydro-5-phenyl-4, 7-methano-1*H*-isoindole-1, 3(2*H*)-dione (**4a**). Yield: 55 %; colorless crystals; m.p.: 148–151 °C, *R*_f: 0.47 (1:1, ethyl acetate/*n*-hexane); IR (ATR, cm⁻¹): 3287, 3064, 3024, 2948, 2913, 2881, 1768, 1706, 1598, 1496, 1452, 1178, 753, 698; ¹H-NMR (500 MHz, CDCl₃, δ / ppm): 1.63 (1H, *d*, *J* = 10.7 Hz, H8*a*), 1.88–1.90 (2H, *m*, H6*n* & H9*x*), 1.92 (1H, *d*, *J* = 10.7 Hz, H8*s*), 2.86 (1H, *t*, *J* = 7.5 Hz, H5*n*), 2.99 (1H, *brs*, H4), 3.01 (1H, *d*, *J* = 5.3 Hz, H4), 3.25 (1H, *dd*, *J* = 4.7 & 9.7 Hz, H7*a*), 3.31 (1H, *dd*, *J* = 5.3 & 9.7 Hz, H3*a*), 6.29 (1H, *brs*, NH), 6.83 (1H, *ddd*, *J* = 2.8, 6.6 & 8.8 Hz, Ar-H), 6.98 (1H, *dd*, *J* = 2.8 & 5.9 Hz, Ar-H), 7.05 (1H, *t*, *J* = 8.5 Hz, Ar-H), 7.17 (2H, *d*, *J* = 7.2 Hz, Ar-H), 7.23

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(1H, *d*, *J* = 7.2 Hz, Ar-H), 7.32 (2H, *t*, *J* = 7.5 Hz, Ar-H); ¹³C-NMR (125 MHz, CDCl₃, δ / ppm): 33.1 (CH₂), 39.4 (CH₂), 39.7 (CH), 41.8 (CH), 45.4 (CH), 46.3 (CH), 46.9 (CH), 115.7 (Ar-C), 117.0 (Ar-C), 117.9 (Ar-C), 126.4 (2 \times Ar-C), 126.8 (Ar-C), 128.6 (2 \times Ar-C), 142.1 (Cq), 144.0 (Cq), 153.3 (Cq), 155.3 (Cq), 175.6 (C=O), 175.7 (C=O). (+)ESI-LCMS (QTOF) (*m/z*): Calcd. for [C₂₁H₁₈ClFN₂O₂]: 384.1040. Found: 385.1110 [M + H]⁺.

(3*a*R, 4*S*, 7*R*, 7*a*S)-rel-2-[(3-chloro-4-fluorophenyl)amino]hexahydro-5-(4-thienyl)-4,7-methano-1*H*-isoindole-1,3(2*H*)-dione (**4b**). Yield: 62 %; colorless crystals; m.p.: 130–133 °C, *R*_f: 0.62 (2:1, ethyl acetate/*n*-hexane); IR (ATR, cm⁻¹): 3287, 3060, 2962, 2881, 1705, 1609, 1598, 1498, 1448, 1180, 754, 690; ¹H-NMR (500 MHz, CDCl₃, δ / ppm): 1.58 (1H, *d*, *J* = 10.7 Hz, H8a), 1.78–1.88 (2H, *m*, H6n & H6x), 1.96 (1H, *d*, *J* = 10.7 Hz, H8s), 2.89 (2H, *d*, *J* = 5.3 Hz, H4 & H4), 2.96 (1H, *t*, *J* = 7.2 Hz, H5n), 3.16 (1H, *dd*, *J* = 4.7 & 9.7 Hz, H7a), 3.21 (1H, *dd*, *J* = 5.3 & 9.4 Hz, H3a), 6.22 (1H, *brs*, NH), 6.68–6.71 (2H, *m*, Ar-H), 6.83–6.86 (2H, *m*, Ar-H), 6.95 (1H, *t*, *J* = 8.5 Hz, Ar-H), 7.07 (1H, *d*, *J* = 4.41 Hz, Ar-H); ¹³C-NMR (125 MHz, CDCl₃, δ / ppm): 35.3 (CH₂), 38.0 (CH), 39.4 (CH), 39.7 (CH₂), 46.0 (CH), 46.5 (CH), 46.9 (CH), 115.8 (Ar-C), 117.0 (Ar-C), 117.2 (Ar-C), 118.1 (Ar-C), 123.5 (Ar-C), 126.8 (Ar-C), 142.0 (Cq), 148.7 (Cq), 115.1 (Cq), 155.4 (Cq), 175.3 (C=O), 175.4 (C=O); (+)ESI-LCMS (QTOF) (*m/z*): Calcd. for [C₁₉H₁₆ClFN₂O₂S]: 390.0605. Found: 391.0671 [M + H]⁺.

(3*a*R, 4*S*, 7*R*, 7*a*S)-rel-2-[(3-chloro-4-fluorophenyl)amino]-5-(4-chlorophenyl)hexahydro-4,7-methano-1*H*-isoindole-1,3(2*H*)-dione (**4c**). Yield: 58 %; colorless crystals; m.p.: 75–78 °C, *R*_f: 0.42 (20:1, dichloromethane/methanol); IR (ATR, cm⁻¹): 3291, 3033, 2973, 2877, 1777, 1709, 1607, 1404, 1376, 1177, 817; ¹H-NMR (500 MHz, CDCl₃, δ / ppm): 1.64 (1H, *d*, *J* = 10.7 Hz, H8a), 1.84–1.87 (2H, *m*, H6n & H6x), 1.92 (1H, *d*, *J* = 10.7 Hz, H8s), 2.81 (1H, *t*, *J* = 7.2 Hz, H5n), 2.97 (1H, *d*, *J* = 5.0 Hz, H4), 3.00 (1H, *brs*, H4), 3.26 (1H, *dd*, *J* = 5.3 & 9.7 Hz, H7a), 3.32 (1H, *dd*, *J* = 5.0 & 9.7 Hz, H3a), 6.24 (1H, *brs*, NH), 6.83 (1H, *ddd*, *J* = 2.8, 6.6 & 8.8 Hz, Ar-H), 6.97 (1H, *dd*, *J* = 2.8 & 5.9 Hz, Ar-H), 7.05 (1H, *t*, *J* = 8.5 Hz, Ar-H), 7.09 (2H, *d*, *J* = 8.1 Hz, Ar-H), 7.28 (2H, *d*, *J* = 8.5 Hz, Ar-H); ¹³C-NMR (125 MHz, CDCl₃, δ / ppm): 33.1 (CH₂), 39.2 (CH₂), 39.7 (CH), 41.2 (CH), 45.3 (CH), 46.2 (CH), 46.8 (CH), 115.4 (Ar-C), 117.1 (Ar-C), 117.6 (Ar-C), 121.6 (Cq), 128.1 (2 \times Ar-C), 128.6 (2 \times Ar-C), 132.1 (Cq), 142.1 (Cq), 153.2 (Cq), 155.1 (Cq), 175.6 (C=O), 175.7 (C=O); (+)ESI-LCMS (QTOF) (*m/z*): Calcd. for [C₂₁H₁₇Cl₂FN₂O₂]: 418.0651. Found: 419.0711 [M + H]⁺.

(3*a*R, 4*S*, 7*R*, 7*a*S)-rel-2-[(3-chloro-4-fluorophenyl)amino]-5-(6-chloropyridin-3-yl)hexahydro-4,7-methano-1*H*-isoindole-1,3(2*H*)-dione (**4d**). Yield: 62 %; yellow oil; *R*_f: 0.03 (100:1, dichloromethane/methanol); IR (ATR, cm⁻¹): 3239, 3033, 2967, 2930, 2881, 1715, 1659, 1607, 1496, 1455, 1180, 828; ¹H-NMR (500 MHz, CDCl₃, δ / ppm): 1.58 (1H, *d*, *J* = 10.7 Hz, H8a), 1.66 (1H, *d*, *J* =

= 12.9 Hz, H6n), 1.75 (1H, *d*, *J* = 10.7 Hz, H8s), 1.82 (1H, *dt*, *J* = 12.9 Hz, H6x), 2.74 (1H, *t*, *J* = 7.2 Hz, H5n), 2.78 (1H, *brs*, H4), 2.87 (1H, *d*, *J* = 11.9 Hz, H4), 3.20 (1H, *dd*, *J* = 4.7 & 9.4 Hz, H7a), 3.26 (1H, *dd*, *J* = 5.0 & 9.4 Hz, H3a), 6.67 (1H, *dd*, *J* = 2.8 & 6.6 Hz, Ar-H), 6.80 (1H, *dd*, *J* = 2.8 & 5.9 Hz, Ar-H), 6.91 (1H, *t*, *J* = 8.5 Hz, Ar-H), 7.17 (1H, *d*, *J* = 8.5 Hz, Ar-H), 7.24 (1H, *brs*, NH), 7.35 (1H, *d*, *J* = 8.5 Hz, Ar-H), 7.91 (1H, *s*, Ar-H); ¹³C-NMR (125 MHz, CDCl₃, δ / ppm): 33.1 (CH₂), 39.1 (CH), 39.3 (CH₂), 39.7 (CH), 44.9 (CH), 46.0 (CH), 46.7 (CH), 115.6 (Ar-C), 117.0 (Ar-C), 117.7 (Ar-C), 124.1 (Ar-C), 137.8 (Ar-C), 138.4 (Cq), 142.2 (Cq), 148.3 (Ar-C), 149.5 (Cq), 153.2 (Cq), 155.2 (Cq), 175.2 (C=O), 175.3 (C=O); (+)ESI-LCMS (QTOF) (*m/z*): Calcd. for [C₂₀H₁₆Cl₂FN₃O₂]: 419.0603. Found: 420.0689 [M + H]⁺.

CHARACTERIZATION DATA FOR 7a-d

(3*a*R, 4*S*, 7*R*, 7*a*S)-rel-2-[(2,4-dinitrophenyl)amino]hexahydro-5-phenyl-4,7-methano-1*H*-isoindole-1,3(2*H*)-dione (7*a*). Yield: 85 %; yellow crystals; m.p.: 213–215 °C, *R*_f: 0.70 (2:1, ethyl acetate/*n*-hexane); IR (ATR, cm⁻¹): 3317, 3100, 3052, 2956, 2924, 2874, 1724, 1616, 1594, 1500, 1336, 1426, 1390, 1172, 833; ¹H-NMR (500 MHz, DMSO-*d*₆, δ / ppm): 1.61 (1H, *d*, *J* = 10.0 Hz, H8a), 1.78 (2H, *d*, *J* = 10.0 Hz, H8s & H6n), 1.95–2.00 (1H, *m*, H6x), 2.78 (1H, *brd*, *J* = 4.7 Hz, H4), 2.84 (1H, *brs*, H4), 3.04–3.06 (1H, *m*, H8x), 3.40 (1H, *dd*, *J* = 5.0 & 9.4 Hz, H7a), 3.46 (1H, *dd*, *J* = 5.0 & 9.4 Hz, H3a), 7.19 (1H, *t*, *J* = 7.5 Hz, Ar-H), 7.23 (2H, *d*, *J* = 7.5 Hz, Ar-H), 7.33 (3H, *t*, *J* = 7.5 Hz, Ar-H), 8.28 (1H, *brs*, Ar-H), 8.90 (1H, *d*, *J* = 2.5 Hz, Ar-H), 10.71 (1H, *brs*, NH); ¹³C-NMR (100 MHz, DMSO-*d*₆, δ / ppm): 32.9 (CH₂), 39.7 (CH₂), 41.5 (CH), 43.4 (CH), 45.7 (CH), 46.5 (CH), 47.3 (CH), 109.1 (Ar-C), 123.6 (Ar-C), 126.3 (Ar-C), 127.4 (2×Ar-C), 128.8 (2×Ar-C), 130.7 (Cq), 131.3 (Ar-C), 143.0 (Cq), 144.5 (Cq), 145.4 (Cq), 175.3 (C=O), 175.4 (C=O); (+)ESI-LCMS (QTOF) (*m/z*): Calcd. for [C₂₁H₁₈N₄O₆]: 422.1192. Found: 445.1083 [M + Na]⁺.

(3*a*R, 4*S*, 7*R*, 7*a*S)-rel-2-[(2,4-dinitrophenyl)amino]hexahydro-5-(2-thienyl)-phenyl-4,7-methano-1*H*-isoindole-1,3(2*H*)-dione (7*b*). Yield: 60 %; brownish crystals; m.p.: 269–271 °C, *R*_f: 0.78 (2:1, ethyl acetate/*n*-hexane); IR (ATR, cm⁻¹): 3332, 3086, 3061, 2973, 2916, 2857, 1730, 1660, 1608, 1534, 1324, 1425, 1382, 1170, 832; ¹H-NMR (500 MHz, DMSO-*d*₆, δ / ppm): 1.66 (1H, *d*, *J* = 10.0 Hz, H8a), 1.81 (2H, *d*, *J* = 10.0 Hz, H8s & H6n), 2.05 (1H, *dd*, *J* = 1.8 & 8.5 Hz, H6x), 2.77 (1H, *brd*, *J* = 5.0 Hz, H4), 2.83 (1H, *brs*, H4), 3.23–3.26 (1H, *m*, H8x), 3.41 (1H, *dd*, *J* = 5.0 & 9.4 Hz, H7a), 3.46 (1H, *dd*, *J* = 5.0 & 9.4 Hz, H3a), 6.89 (1H, *d*, *J* = 3.4 Hz, Ar-H), 6.97 (1H, *dd*, *J* = 3.4 & 5.0 Hz, Ar-H), 7.36 (2H, *dd*, *J* = 0.9 & 5.0 Hz, Ar-H), 8.27 (1H, *brd*, *J* = 8.5 Hz, Ar-H), 8.90 (1H, *d*, *J* = 2.5 Hz, Ar-H), 10.70 (1H, *brs*, NH); ¹³C-NMR (100 MHz, DMSO-*d*₆, δ / ppm): 34.8 (CH₂), 37.7 (CH₂), 46.3 (CH), 46.8 (CH), 47.3 (CH), 42.0 (CH), 63.2 (CH), 115.8 (Ar-C), 123.5 (Ar-C), 123.7 (Ar-C), 124.2 (Ar-C), 127.4 (Ar-C),

130.4 (Cq), 131.2 (Ar-C), 139.0 (Cq), 150.0 (Cq), 175.1 (C=O), 175.2 (C=O); (+)ESI-LCMS (QTOF) (m/z): Calcd. for [C₁₉H₁₆N₄O₆S]: 428.0755. Found: 451.0646 [M + Na]⁺.

(3*a*R,4*S*,7*R*,7*a*S)-rel-5-(4-chlorophenyl)-2-[(2,4-dinitrophenyl)amino]hexahydro-4,7-methano-1*H*-isoindole-1,3(2*H*)-dione (**7c**). Yield: 60 %; yellow crystals; m.p.: 267–268 °C, *R*_f: 0.74 (2:1, ethyl acetate/*n*-hexane); IR (ATR, cm⁻¹): 3314, 3100, 3052, 2976, 2952, 2883, 1725, 1617, 1597, 1502, 1339, 1425, 1388, 1170, 819); ¹H-NMR (500 MHz, DMSO-*d*₆, δ / ppm): 1.67 (1H, *d*, *J* = 10.0 Hz, H8a), 1.80 (2H, *d*, *J* = 10.0 Hz, H8s & H6n), 1.99–2.03 (1H, *m*, H6x), 2.82 (1H, *brd*, *J* = 4.4 Hz, H4), 2.89 (1H, *brs*, H4), 3.07–3.09 (1H, *m*, H8x), 3.46 (1H, *dd*, *J* = 4.4 & 6.3 Hz, H7a), 3.51 (1H, *dd*, *J* = 5.0 & 9.4 Hz, H3a), 7.31 (2H, *d*, *J* = 8.1 Hz, Ar-H), 8.24 (3H, *d*, *J* = 8.5 Hz, Ar-H), 8.32 (1H, *brs*, Ar-H), 8.96 (1H, *brd*, *J* = 1.89 Hz, Ar-H), 10.76 (1H, *brs*, NH); ¹³C-NMR (100 MHz, DMSO-*d*₆, δ / ppm): 32.5 (CH₂), 35.2 (CH₂), 40.6 (CH), 45.2 (CH), 46.0 (CH), 46.8 (CH), 48.5 (CH), 115.4 (Ar-C), 117.1 (Ar-C), 123.1 (Ar-C), 126.9 (Cq), 128.3 (Ar-C), 130.4 (Ar-C), 130.8 (Ar-C), 131.3 (Ar-C), 143.9 (Cq), 148.1 (Cq), 151.0 (Cq), 154.8 (Cq), 174.8 (C=O), 174.9 (C=O); (+)ESI-LCMS (QTOF) (m/z): Calcd. for [C₂₁H₁₇Cl₂N₄O₆] 456.0837. Found: 457.0902 [M + H]⁺.

(3*a*R,4*S*,7*R*,7*a*S)-rel-5(6-chloropyridin-3-yl)-2-[(2,4-dinitrophenyl)amino]hexahydro-4,7-methano-1*H*-isoindole-1,3(2*H*)-dione (**7d**). Yield: 87 %; yellow crystals; m.p.: 255–257 °C, *R*_f: 0.42 (2:1, ethyl acetate/*n*-hexane); IR (ATR, cm⁻¹): 3318, 3104, 2956, 2931, 2877, 1725, 1616, 1594, 1501, 1337, 1425, 1390, 1173, 829; ¹H-NMR (500 MHz, DMSO-*d*₆, δ / ppm): 1.65 (1H, *d*, *J* = 10.4 Hz, H8a), 1.78 (2H, *d*, *J* = 10.4 Hz, H8s & H6n), 1.97–2.03 (1H, *m*, H6x), 2.85 (1H, *brs*, H4), 3.07 (1H, *brs*, H7), 3.39–3.40 (1H, *m*, H8x), 3.44 (1H, *dd*, *J* = 5.0 & 9.4 Hz, H7a), 3.49 (1H, *dd*, *J* = 5.0 & 9.4 Hz, H3a), 7.39 (1H, *brs*, Ar-H), 7.47 (1H, *d*, *J* = 8.1 Hz, Ar-H), 7.73 (1H, *dd*, *J* = 1.8 & 8.1 Hz, Ar-H), 8.28 (2H, *brd*, *J* = 1.8 Hz, Ar-H), 8.90 (1H, *d*, *J* = 2.5 Hz, Ar-H), 10.66 (1H, *brs*, NH); ¹³C-NMR (100 MHz, DMSO-*d*₆, δ / ppm): 33.0 (CH₂), 38.9 (CH₂), 39.8 (CH), 45.1 (CH), 46.4 (CH), 47.2 (CH), 63.2 (CH), 115.8 (Ar-C), 123.5 (Ar-C), 124.4 (Ar-C), 130.5 (Cq), 131.3 (Ar-C), 138.5 (Ar-C), 138.8 (Ar-C), 140.2 (Cq), 146.6 (Cq), 148.4 (Cq), 149.0 (Cq), 175.2 (C=O), 175.3 (C=O); (+)ESI-LCMS (QTOF) (m/z): Calcd. for [C₂₀H₁₆ClN₅O₆]: 457.0787. Found: 458.0861 [M + H]⁺.

CHARACTERIZATION SPECTRA OF THE SYNTHESIZED COMPOUNDS

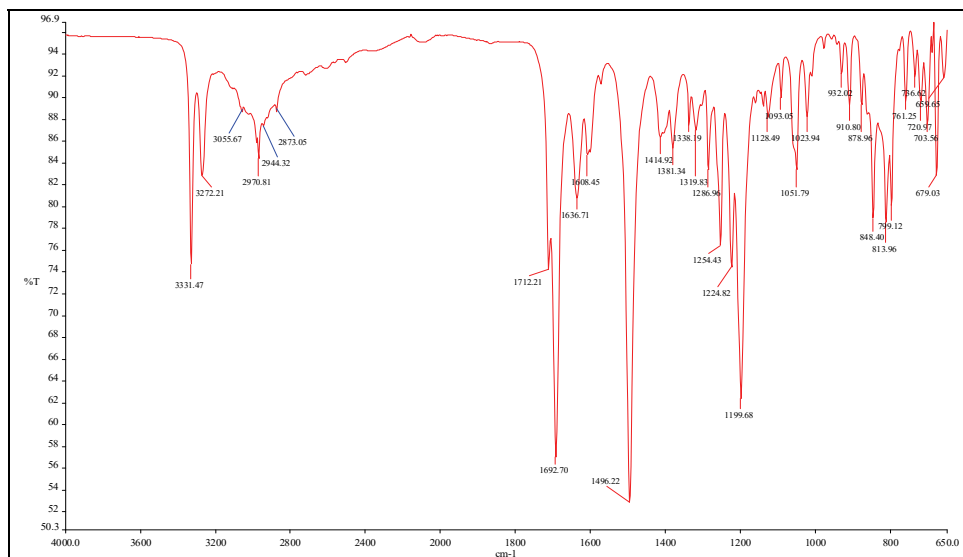
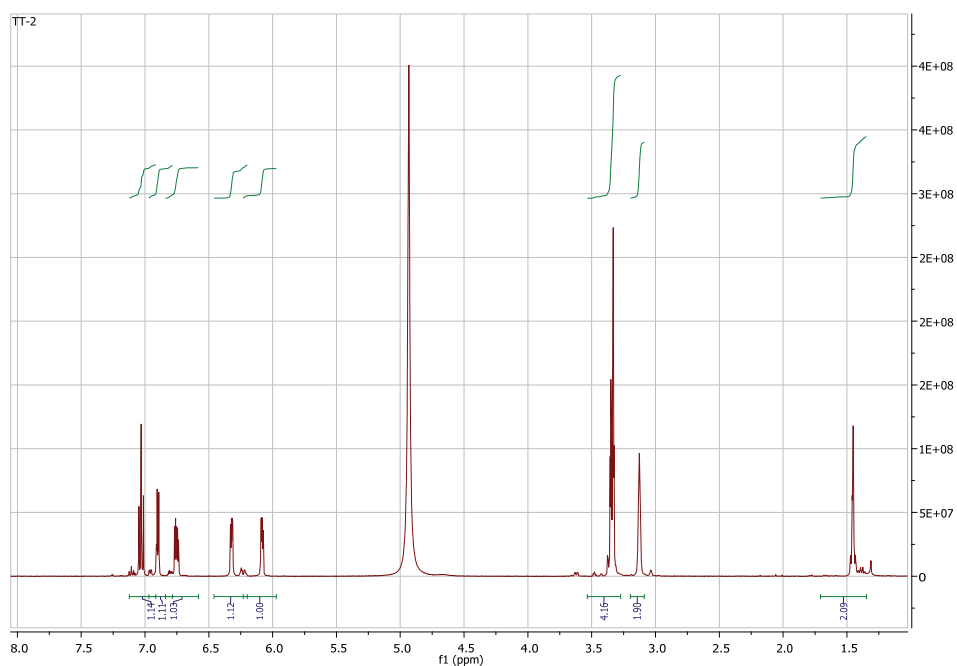


Fig. S-1. IR spectrum of compound 3.

Fig. S-2. ¹H-NMR spectrum of compound 3 (CD₃OD).

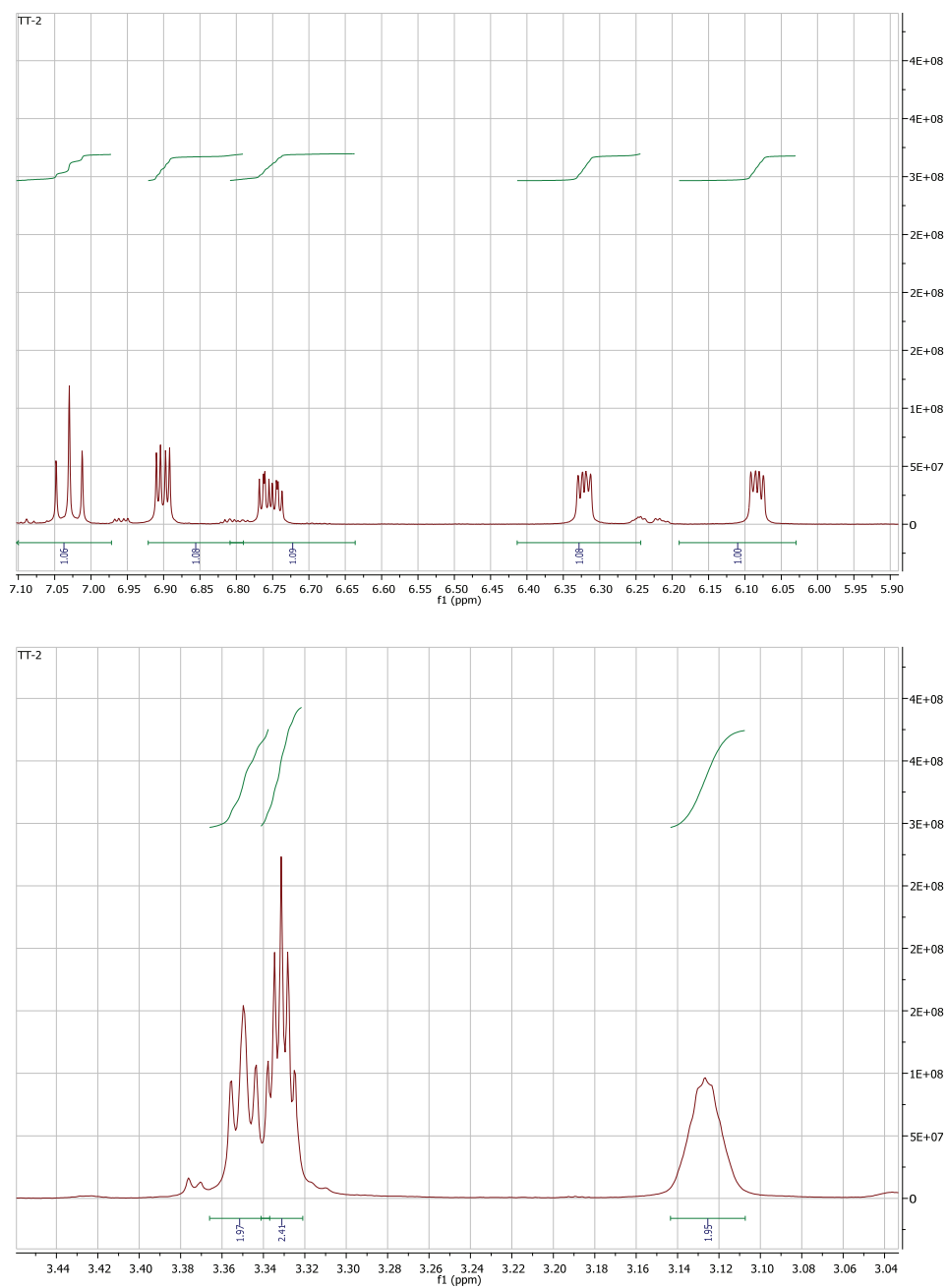


Fig. S-3. $^1\text{H-NMR}$ spectrum of compound **3** (CD_3OD).

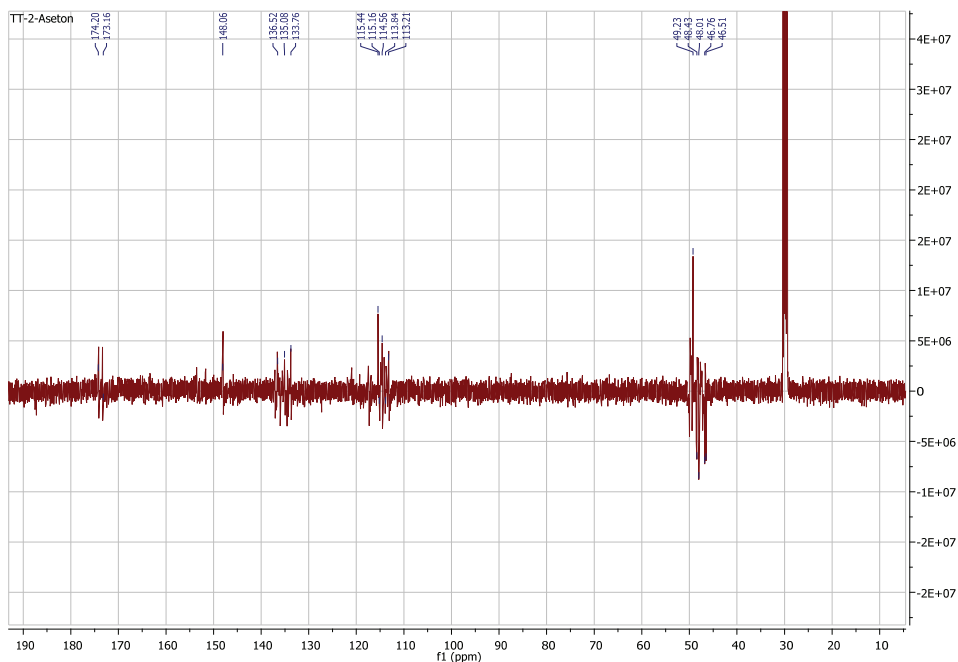
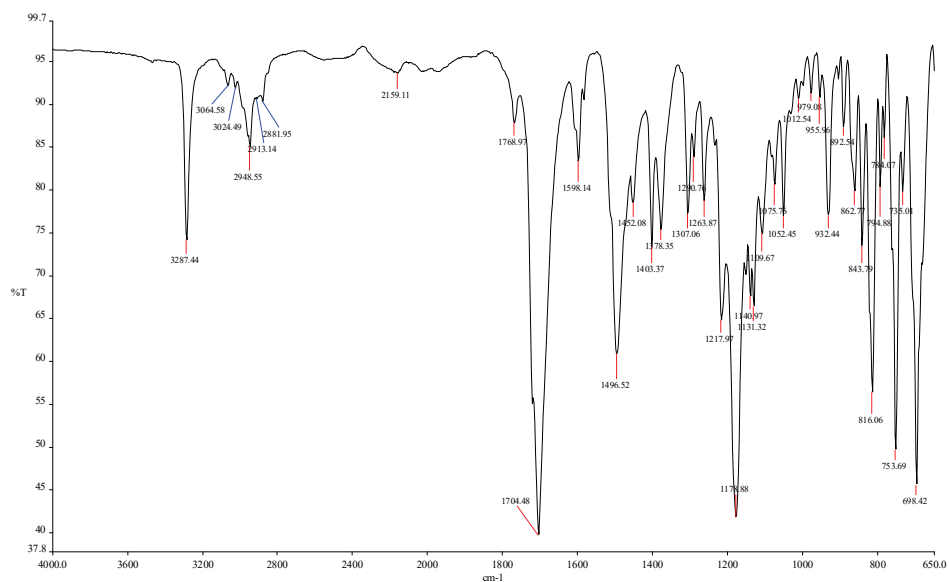
Fig. S-4. ¹³C-NMR spectrum of compound 3 (CD₃COCD₃).

Fig. S-5. IR spectrum of compound 4a.

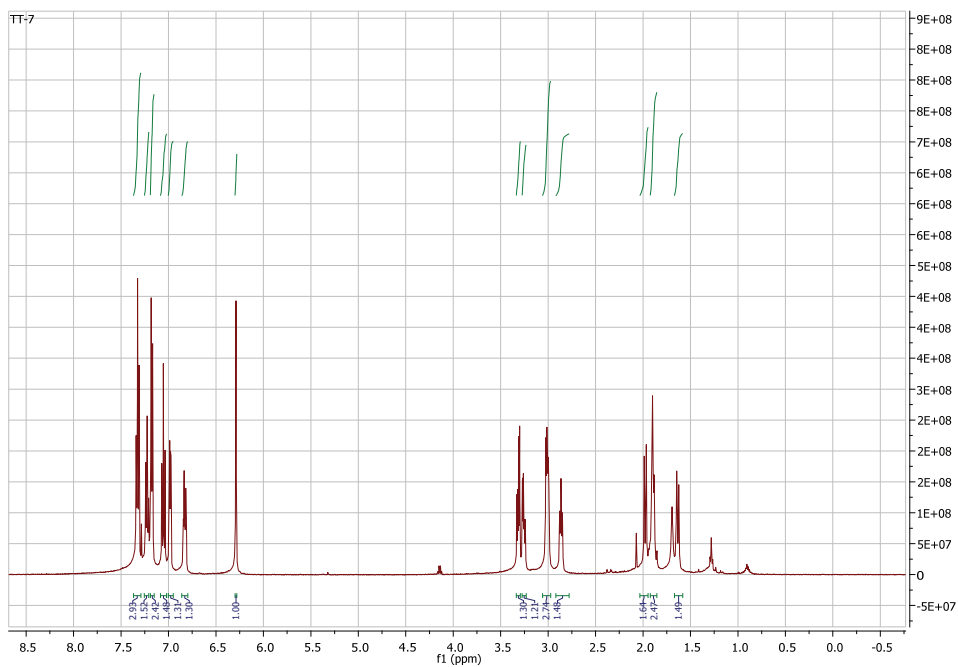


Fig. S-6. $^1\text{H-NMR}$ spectrum of compound **4a** (CDCl_3).

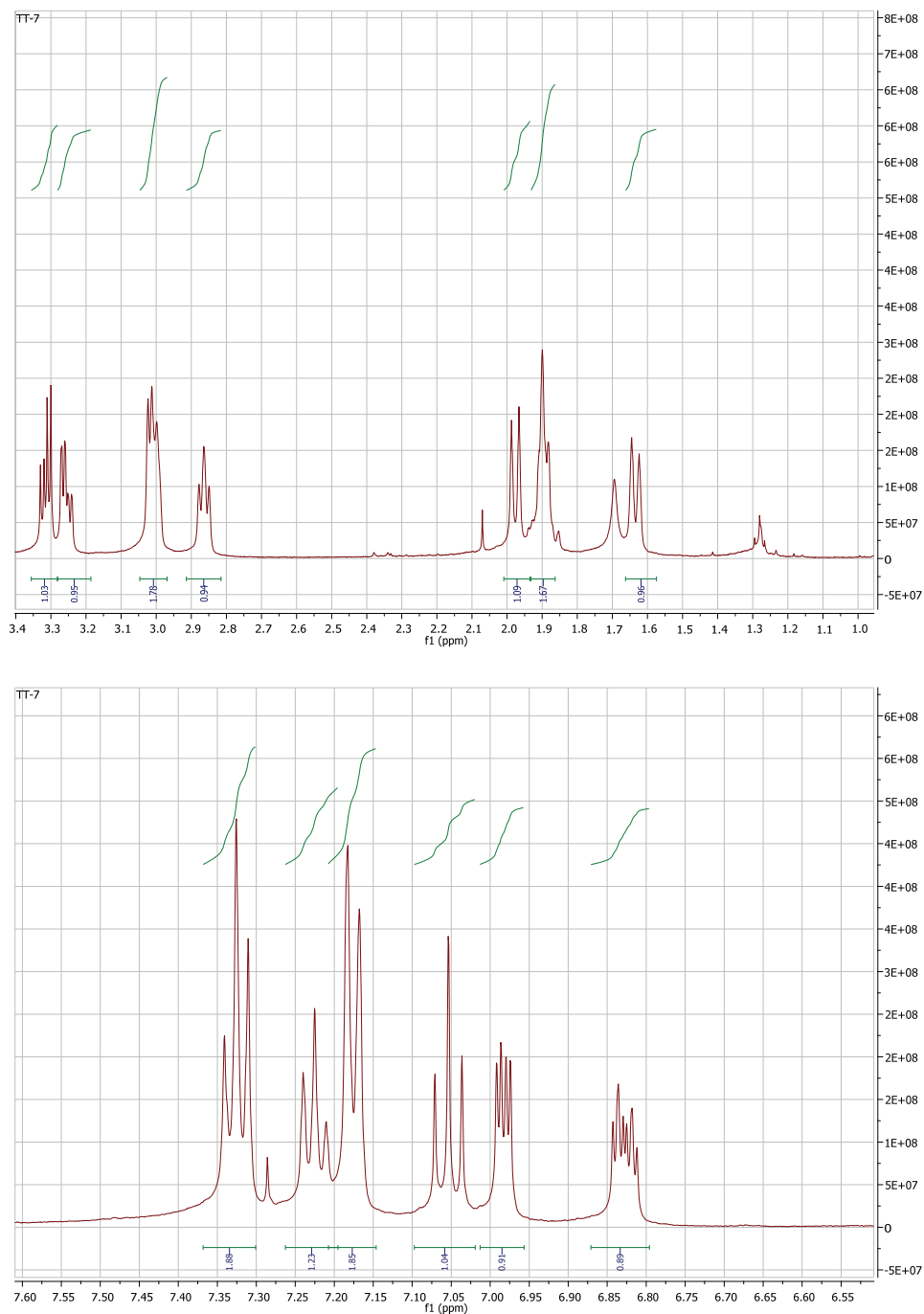
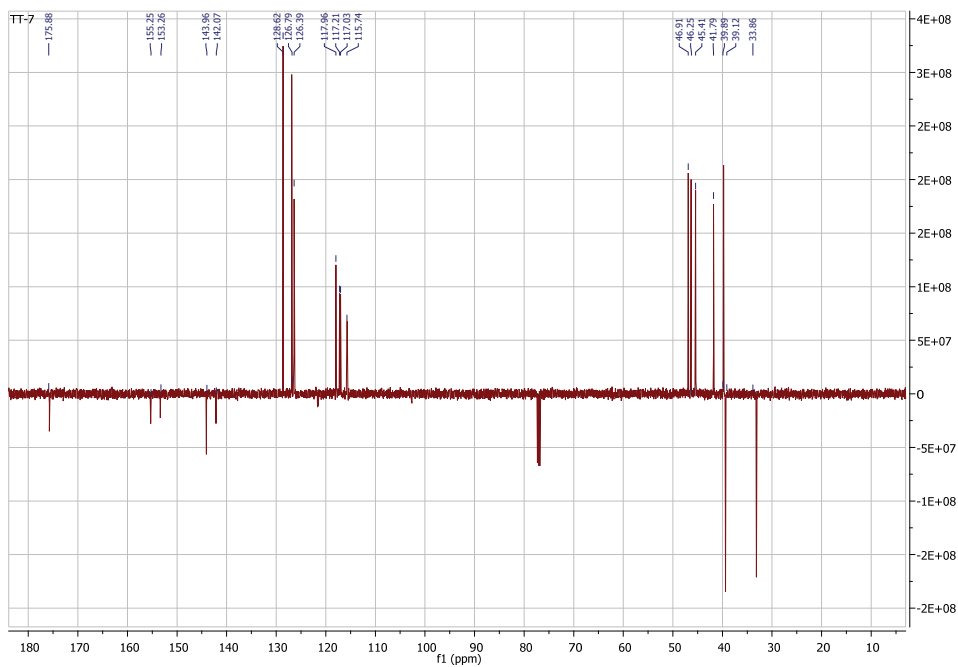
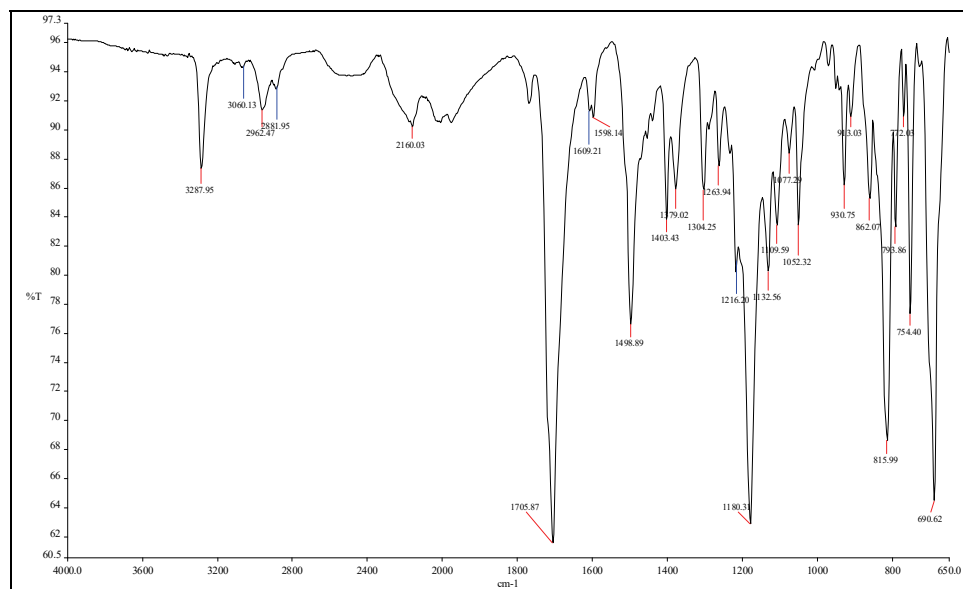


Fig. S-7. ¹H-NMR spectrum of compound **4a** (CDCl₃).

Fig. S-8. ^{13}C -NMR spectrum of compound **4a** (CDCl_3).Fig. S-9. IR spectrum of compound **4b**.

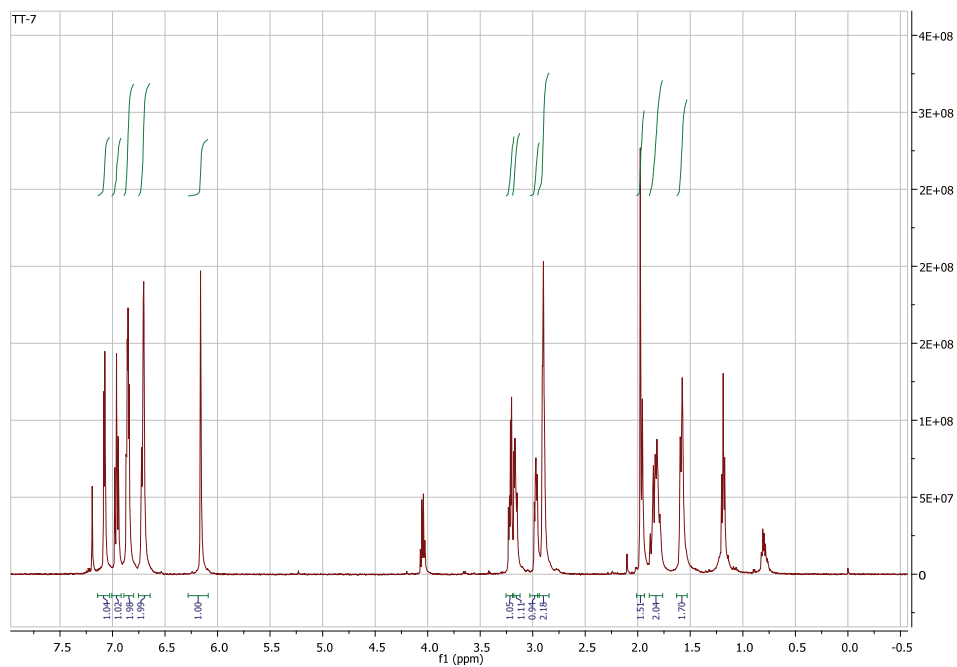


Fig. S-10. $^1\text{H-NMR}$ spectrum of compound **4b** (CDCl_3).

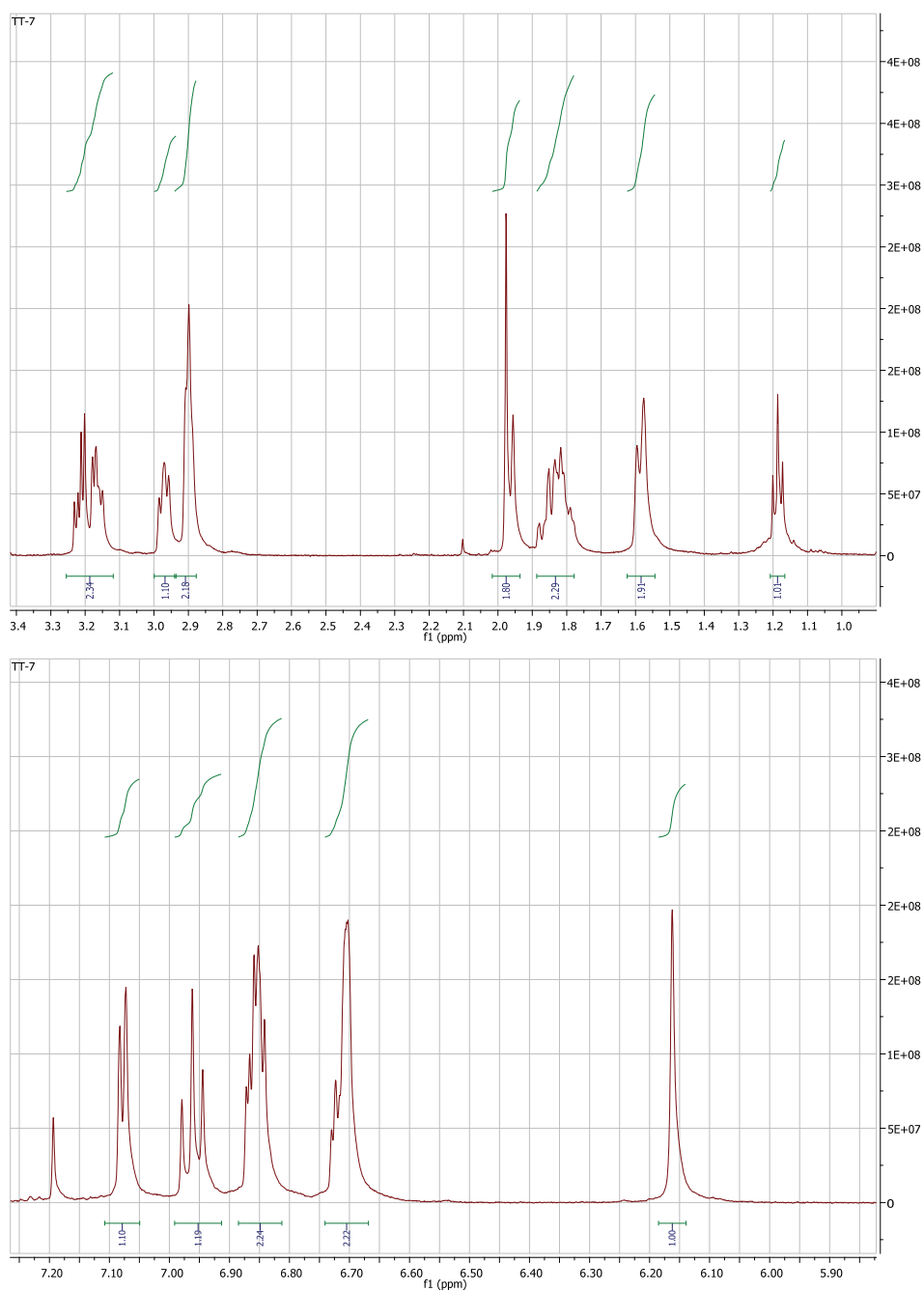
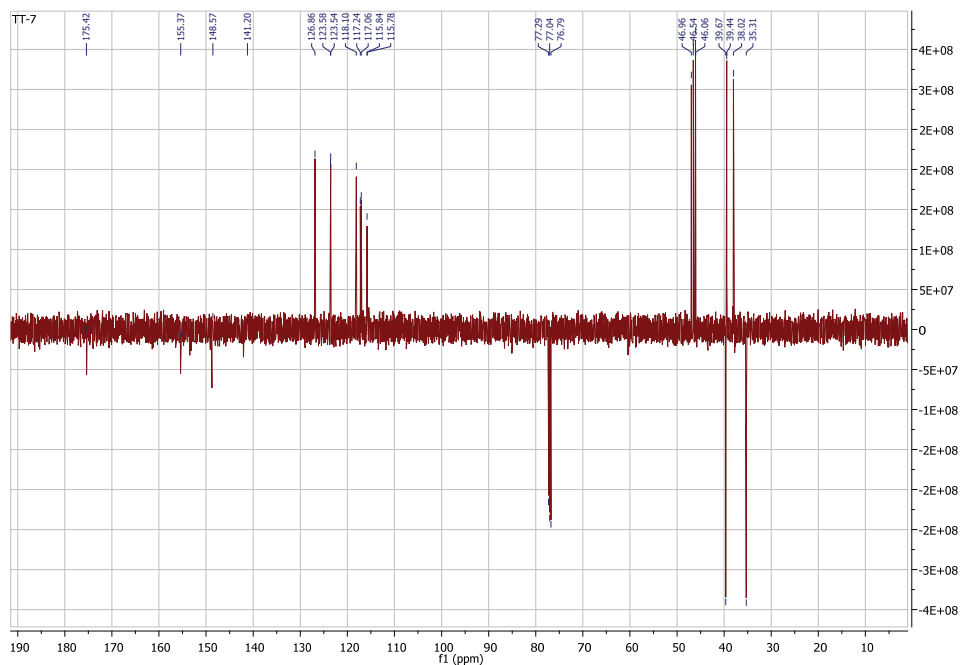
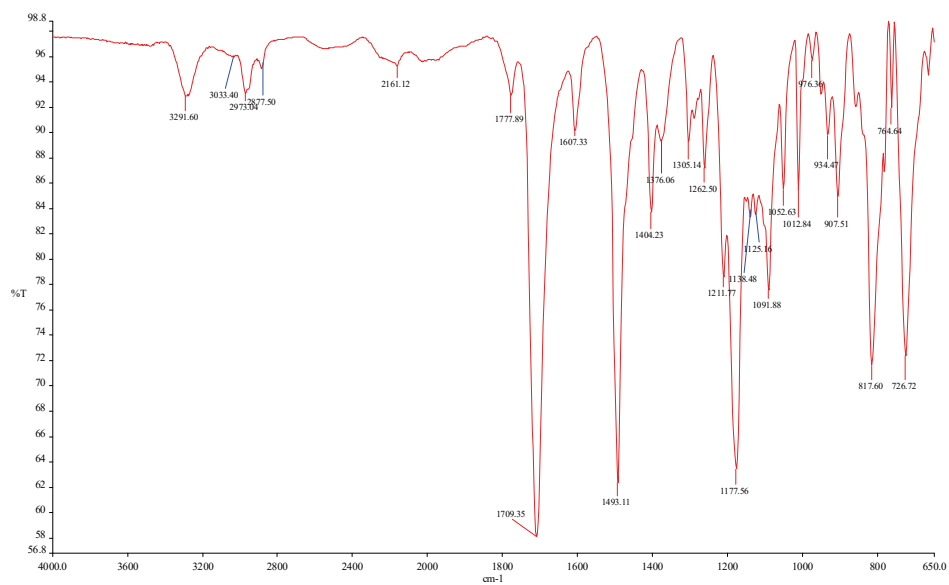


Fig. S-11. ¹H-NMR spectrum of compound **4b** (CDCl₃).

Fig. S-12. ^{13}C -NMR spectrum of compound **4b** (CDCl_3).Fig. S-13. IR spectrum of compound **4c** (ATR).

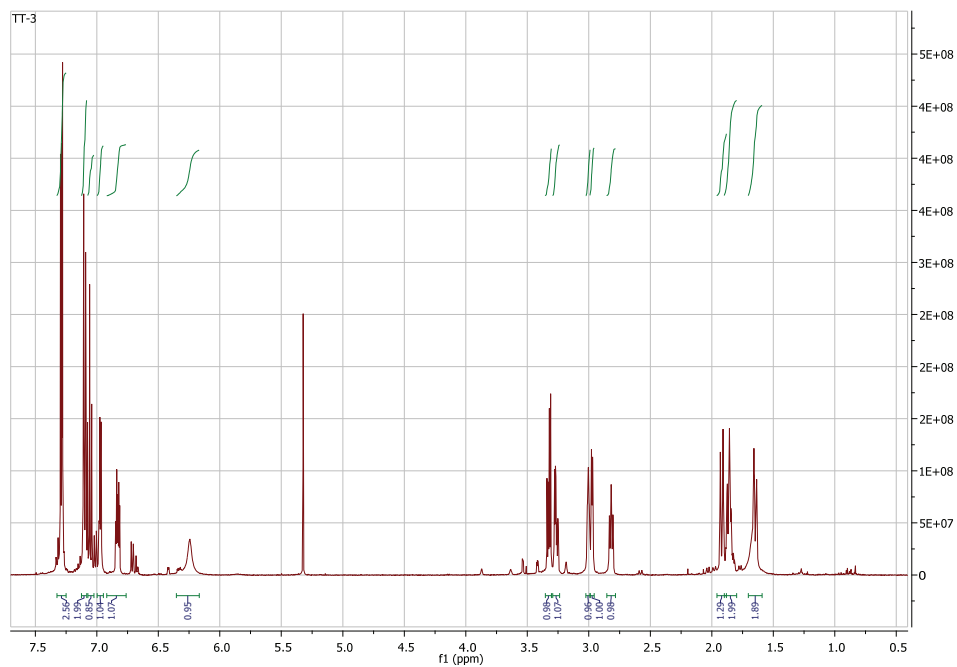
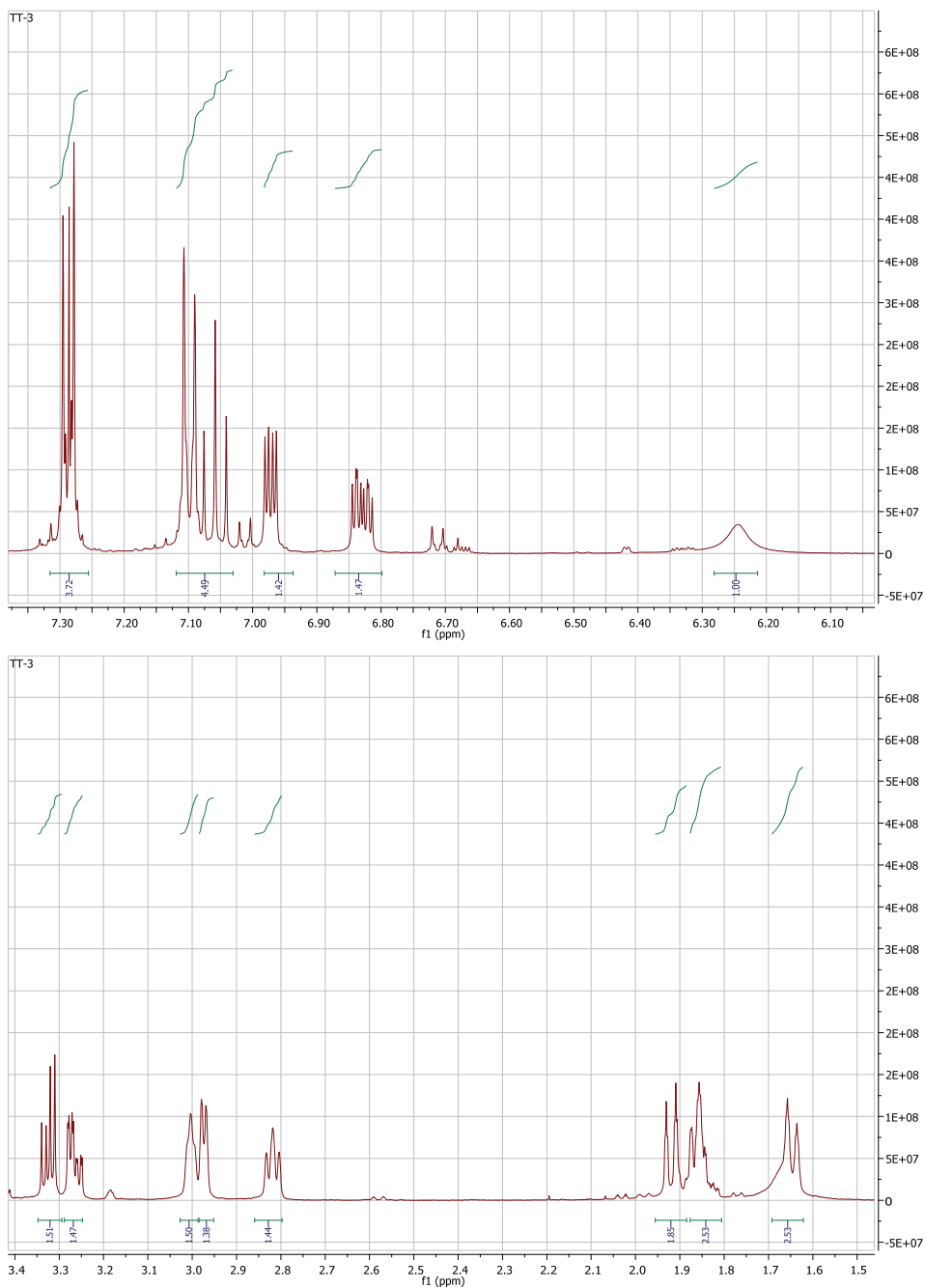
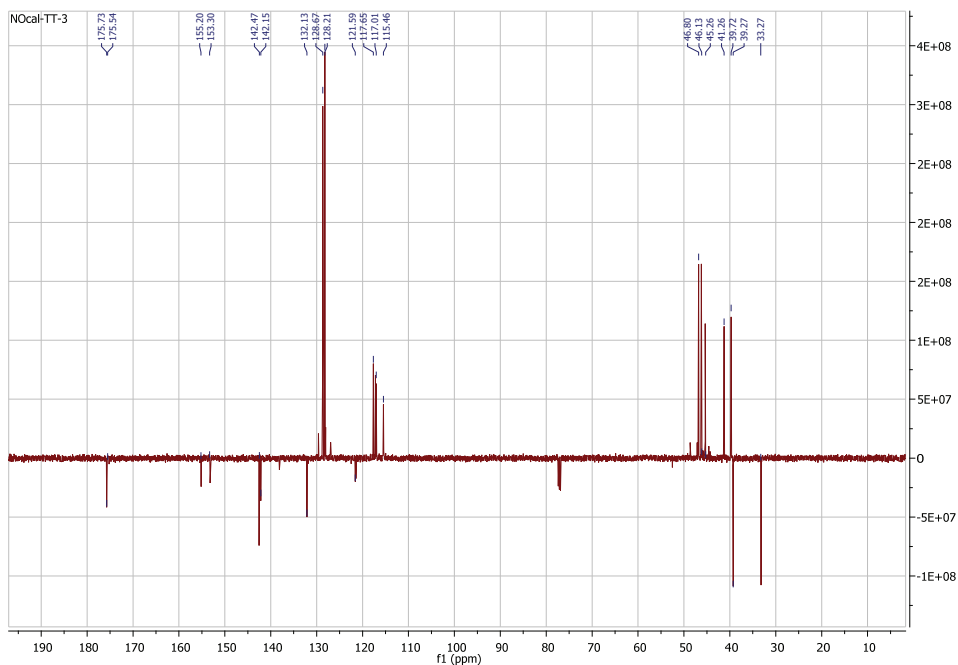
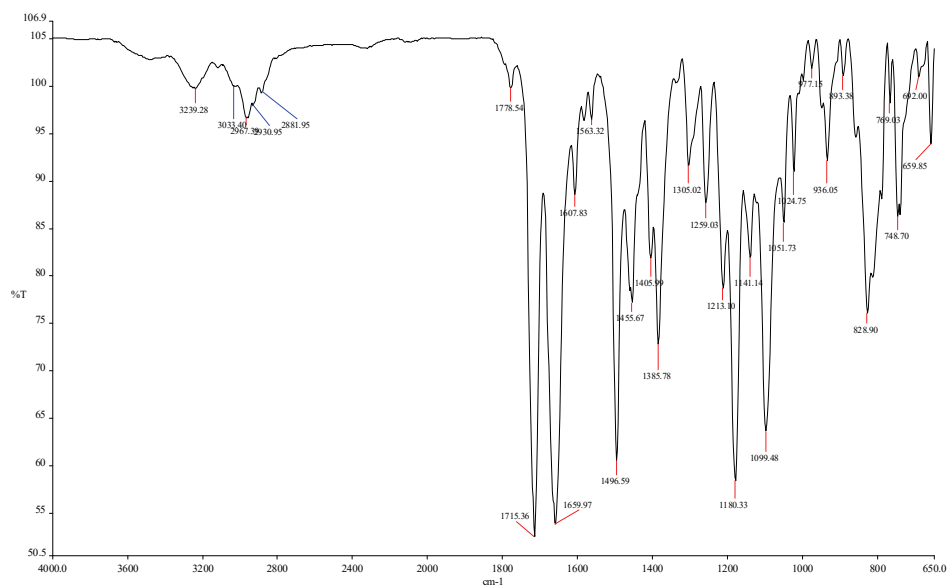


Fig. S-14. $^1\text{H-NMR}$ spectrum of compound **4c** (CDCl_3).

Fig. S-15. ¹H-NMR spectrum of compound **4c** (CDCl₃).

Fig. S-16. ^{13}C -NMR spectrum of compound **4c** (CDCl_3).Fig. S-17. IR spectrum of compound **4d** (ATR).

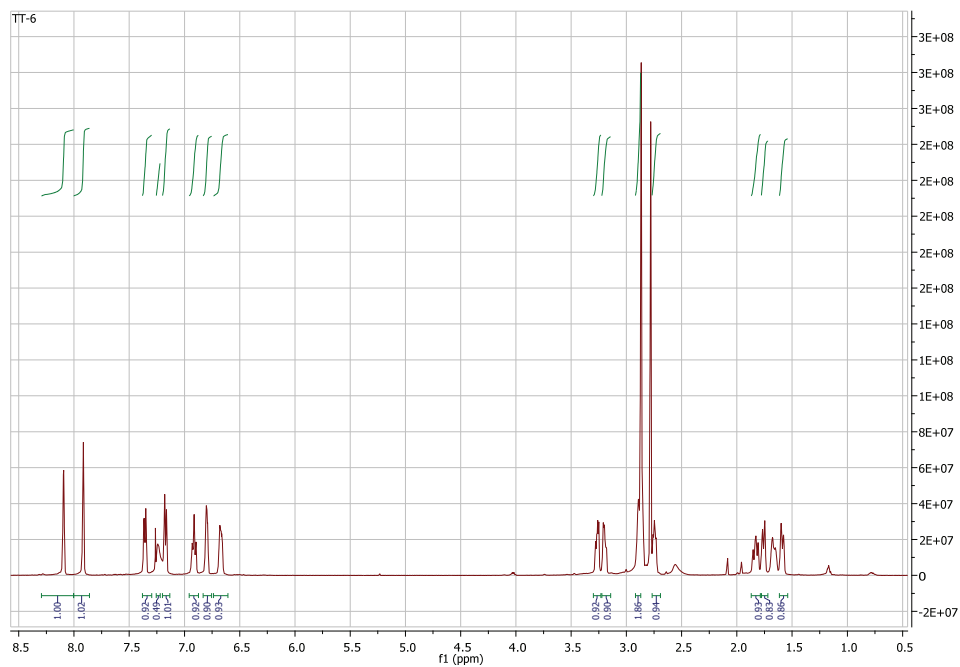


Fig. S-18. ¹H-NMR spectrum of compound **4d** (CDCl₃).

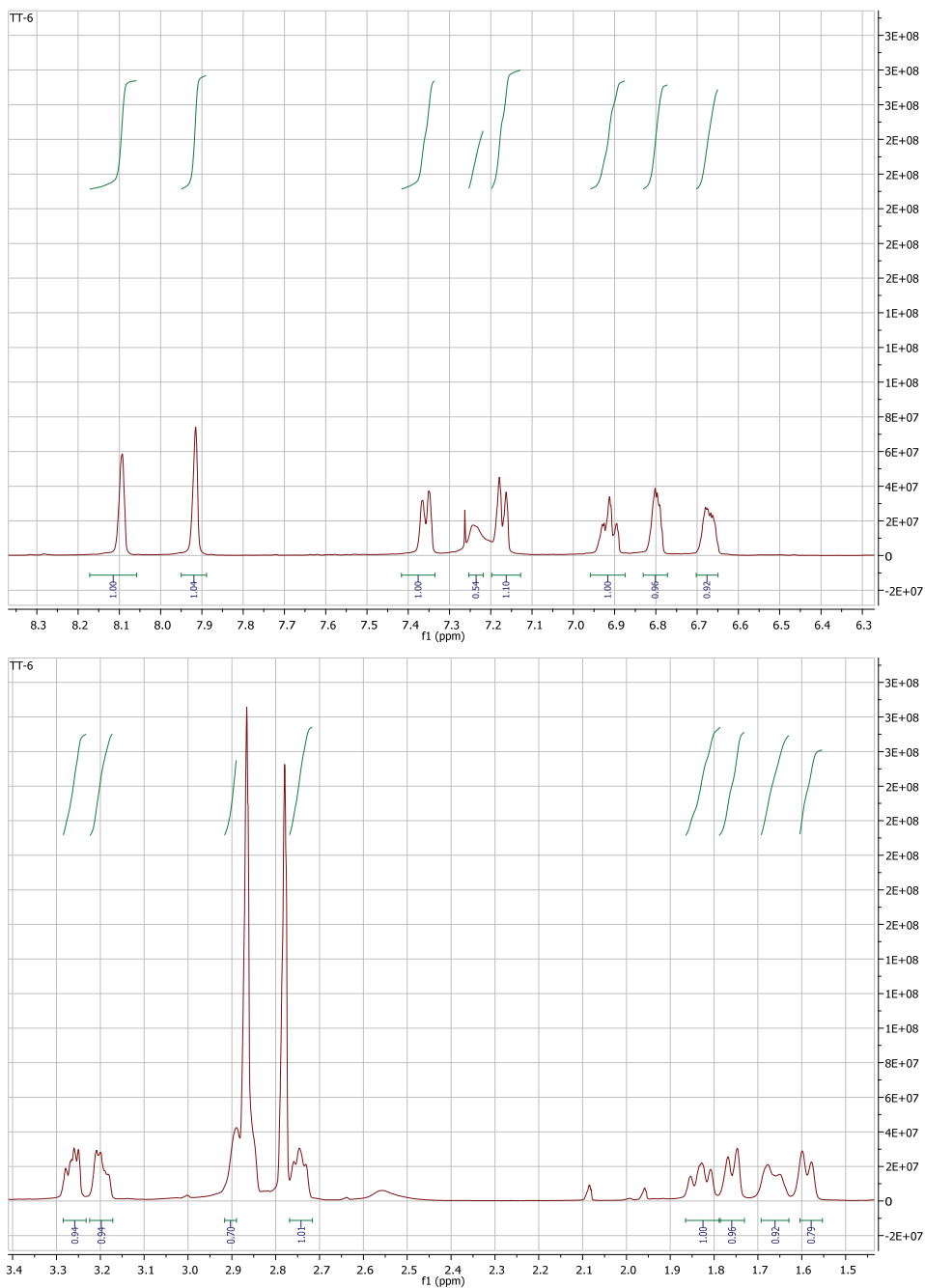
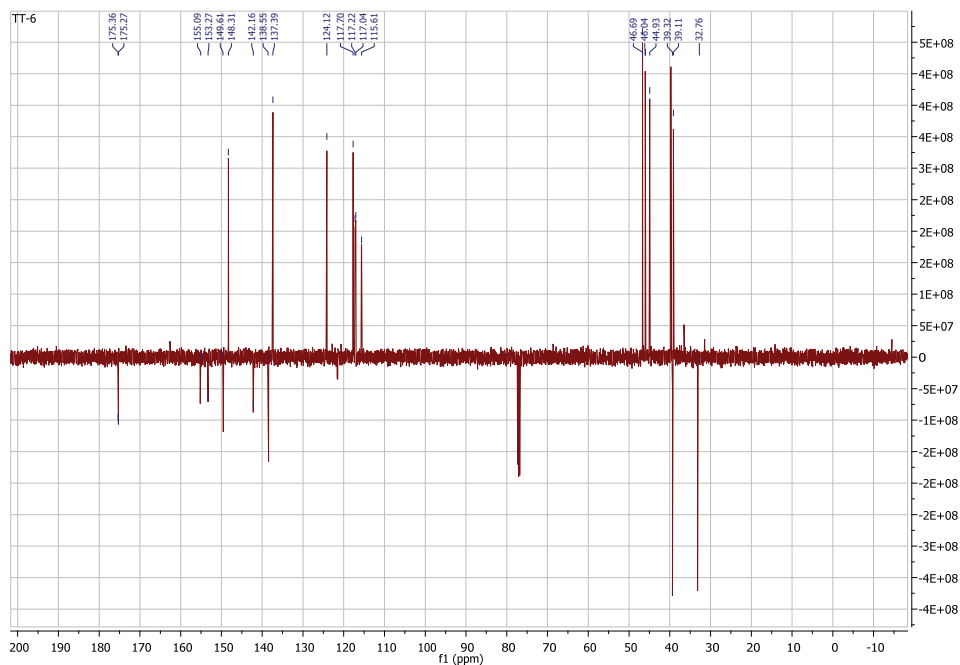
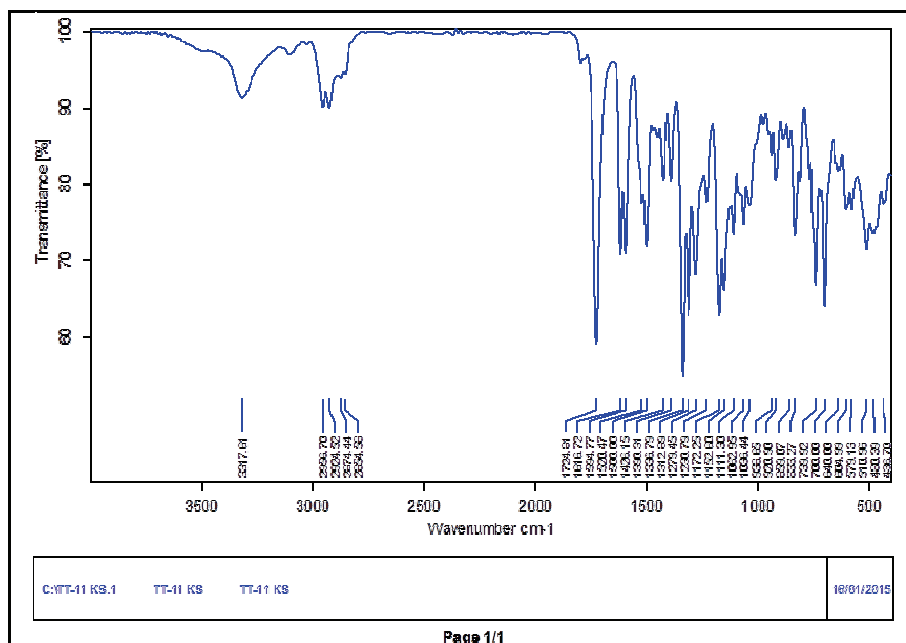


Fig. S-19. $^1\text{H-NMR}$ spectrum of compound **4d** (CDCl_3).

Fig. S-20. ^{13}C -NMR spectrum of compound **4d** (CDCl_3).Fig. S-21. IR spectrum of compound **7a** (ATR).

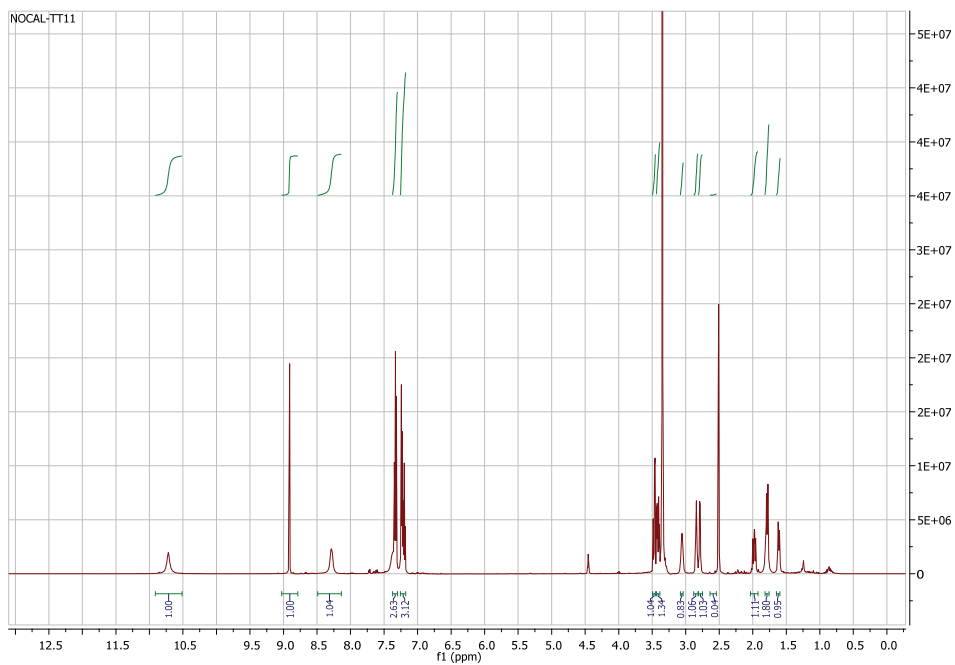


Fig. S-22. ¹H-NMR spectrum of compound 7a (DMSO-d₆).

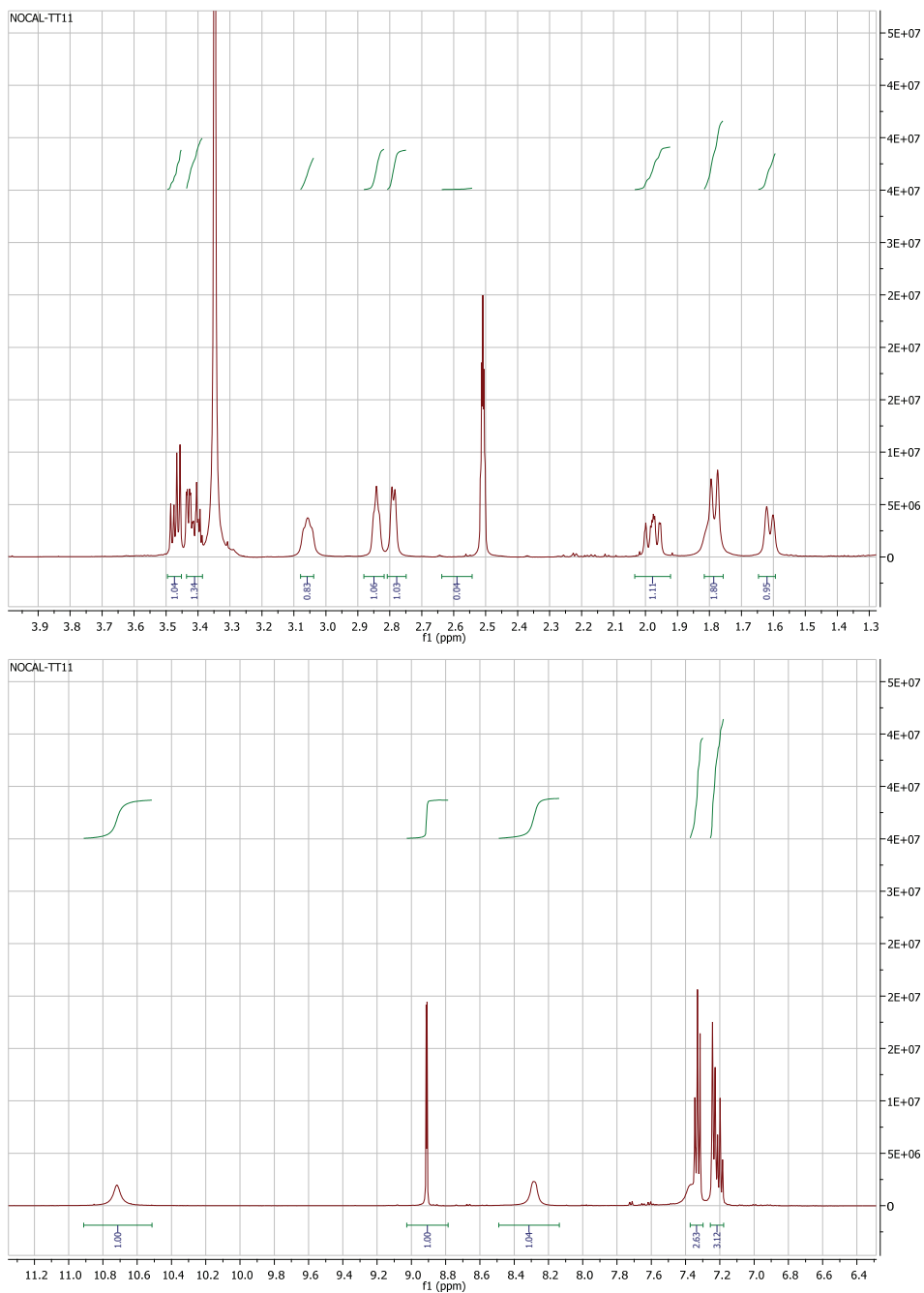
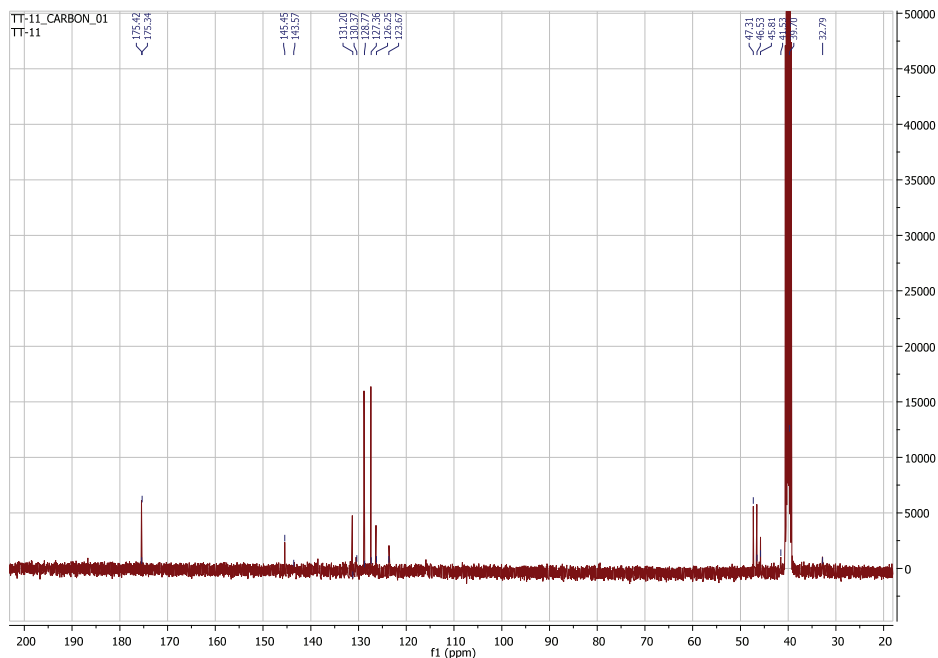
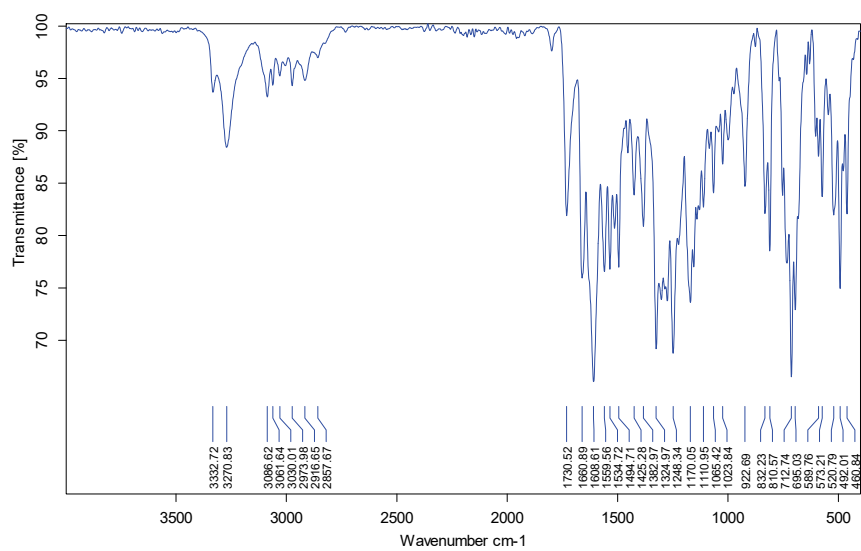


Fig. S-23. ¹H-NMR spectrum of compound **7a** (DMSO-*d*₆).

Fig. S-24. ^{13}C -NMR spectrum of compound **7a** ($\text{DMSO}-d_6$).

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Fig. S-25. IR spectrum of compound **7b** (ATR).

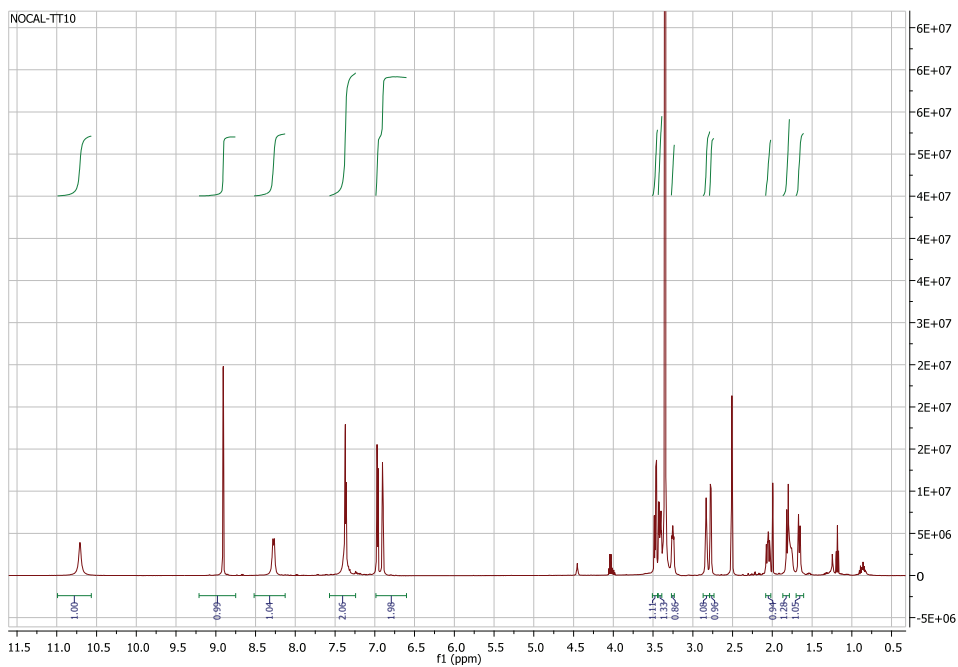


Fig. S-26. ¹H-NMR spectrum of compound **7b** (DMSO-*d*₆).

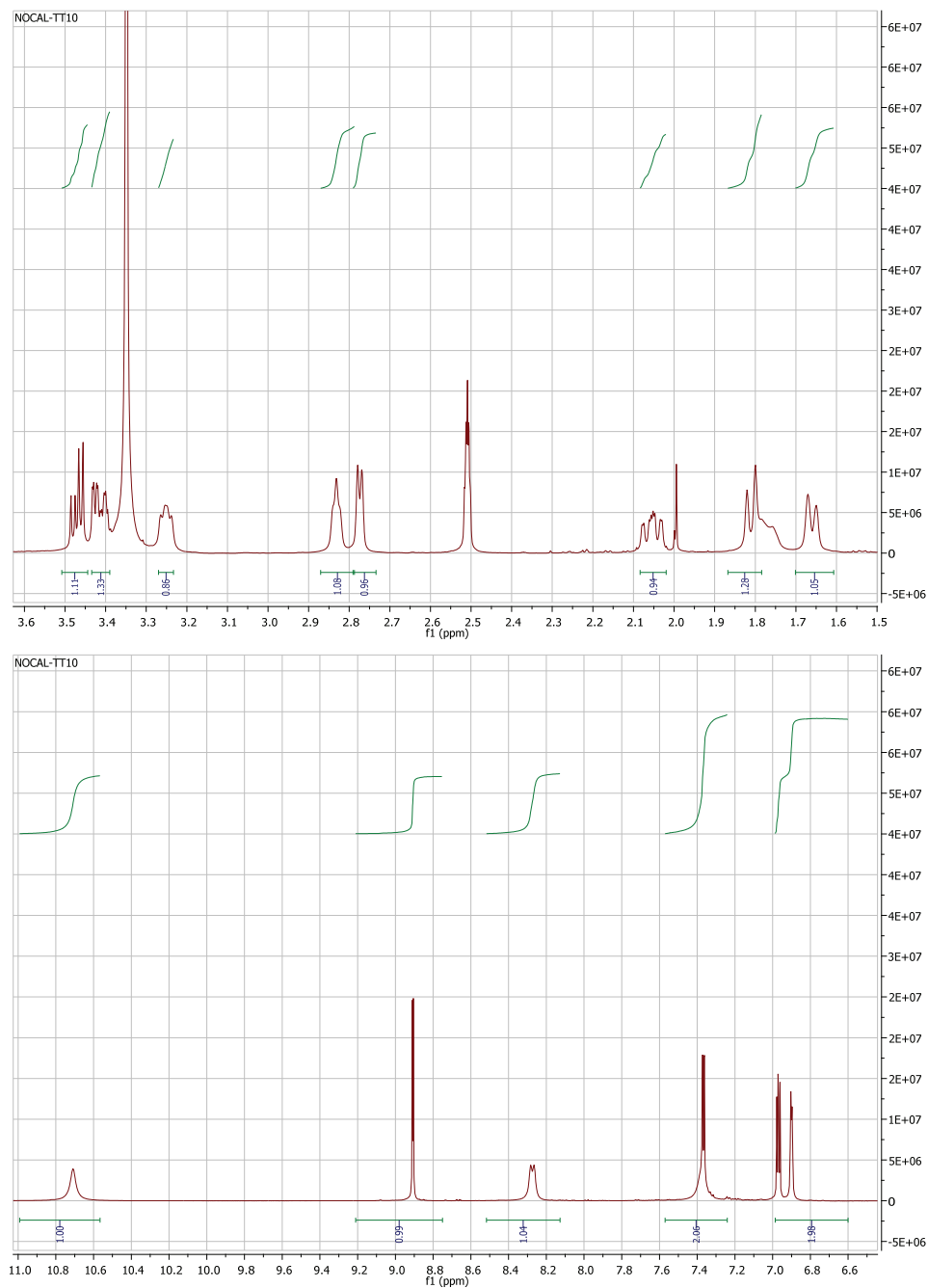
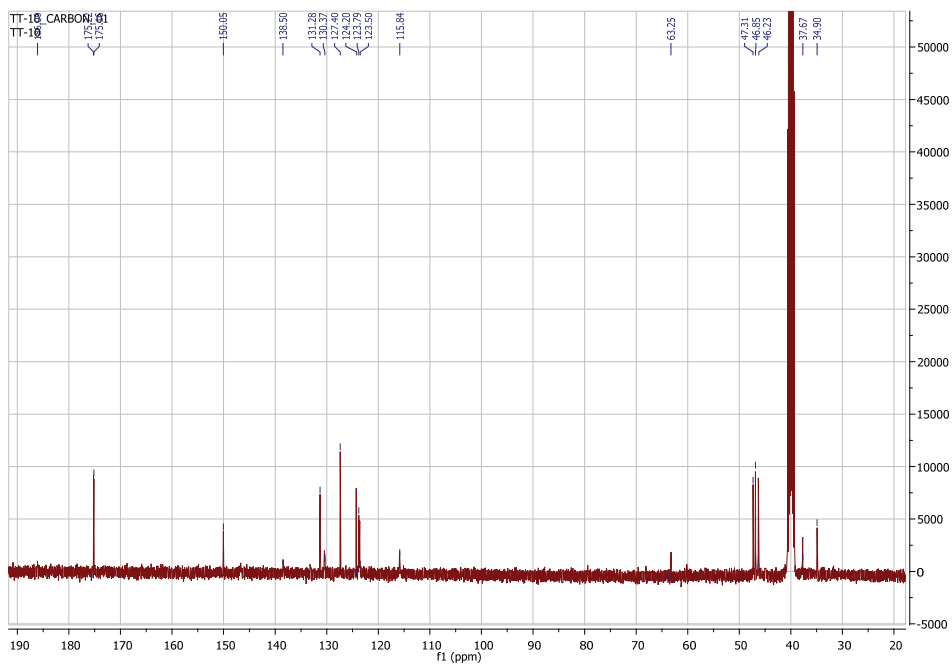
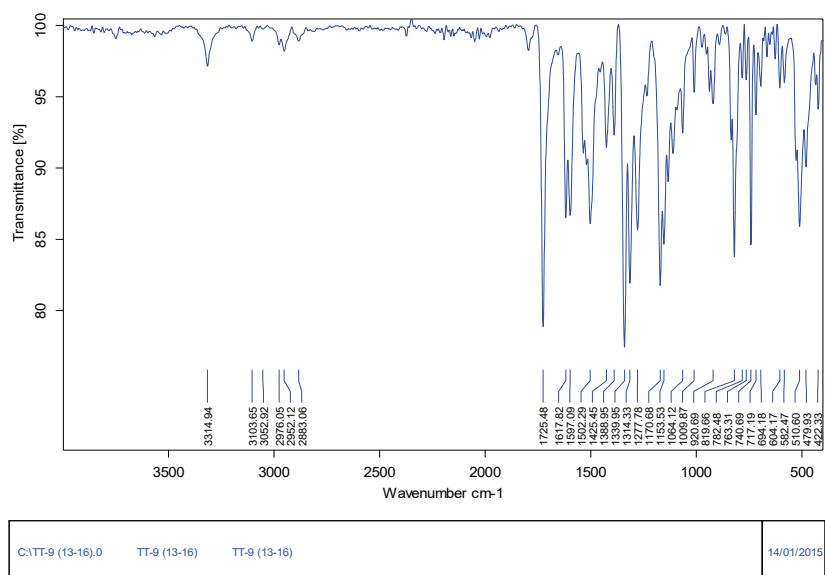


Fig. S-27. $^1\text{H-NMR}$ spectrum of compound **7b** ($\text{DMSO-}d_6$).

Fig. S-28. ^{13}C -NMR spectrum of compound **7b** ($\text{DMSO-}d_6$).

Page 1/1

Fig. S.29. IR spectrum of compound **7c** (ATR).

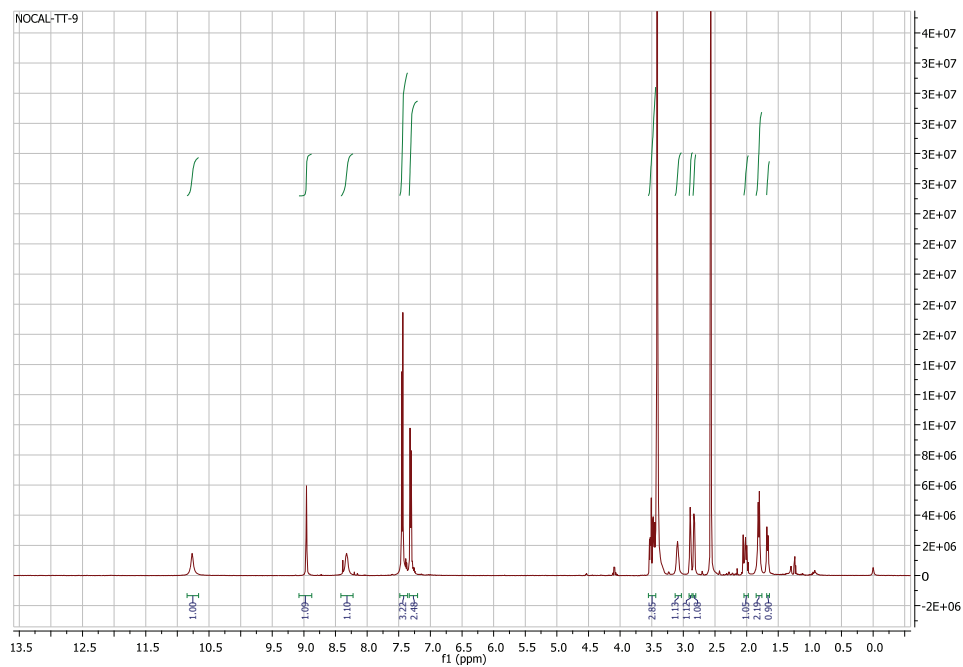
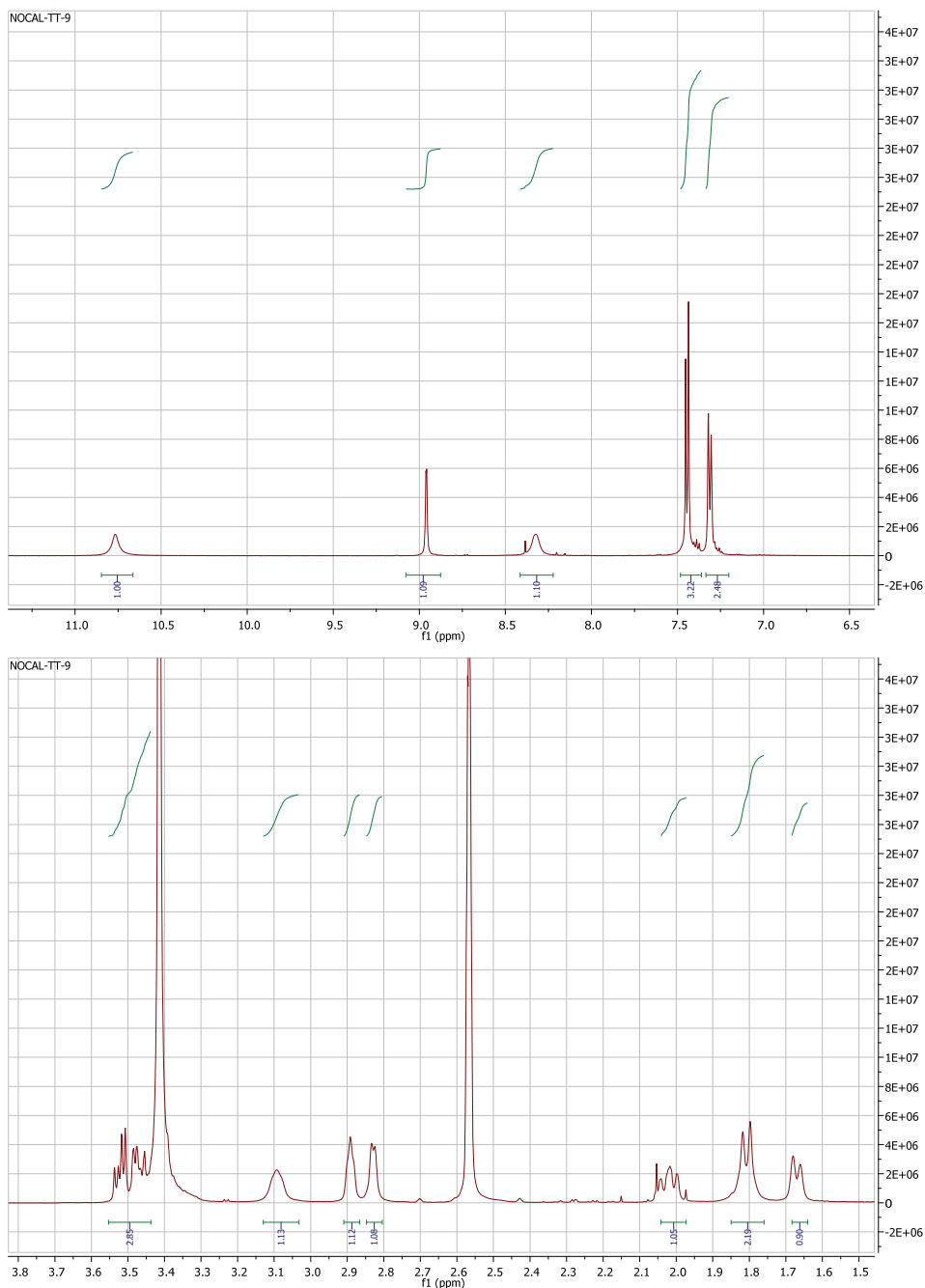
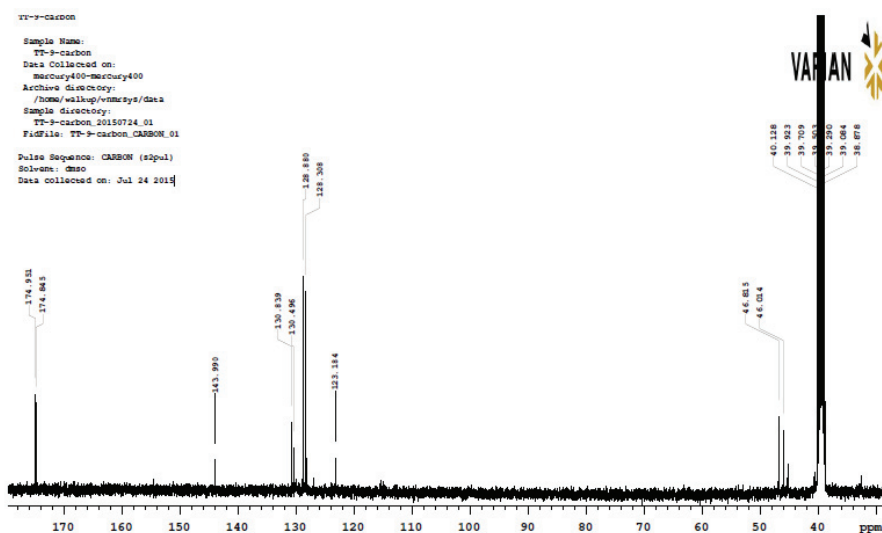
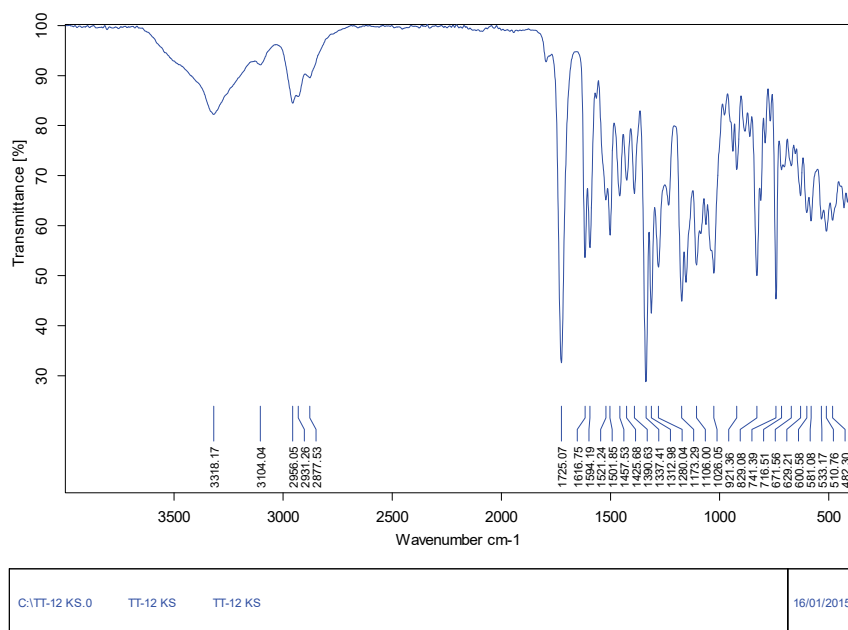


Fig. S-30. $^1\text{H-NMR}$ spectrum of compound **7c** ($\text{DMSO-}d_6$).

Fig. S-31. ¹H-NMR spectrum of compound 7c (DMSO-d₆).

Fig. S-32. ^{13}C -NMR spectrum of compound **7c** ($\text{DMSO}-d_6$).

Page 1/1

Fig. S-33. IR spectrum of compound **7d** (ATR).

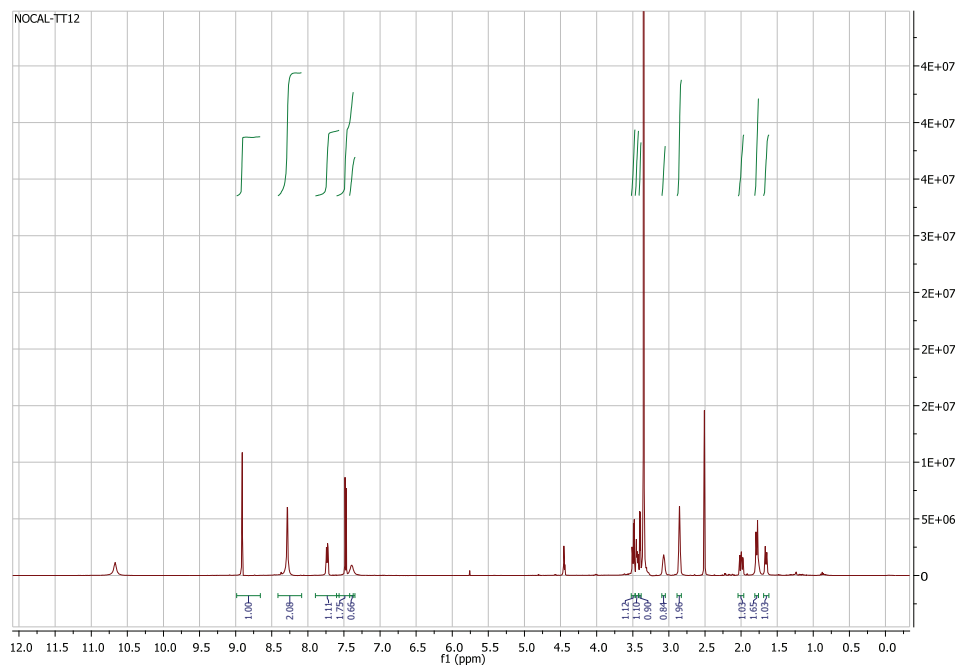


Fig. S-34. ¹H-NMR spectrum of compound **7d** (DMSO-*d*₆)

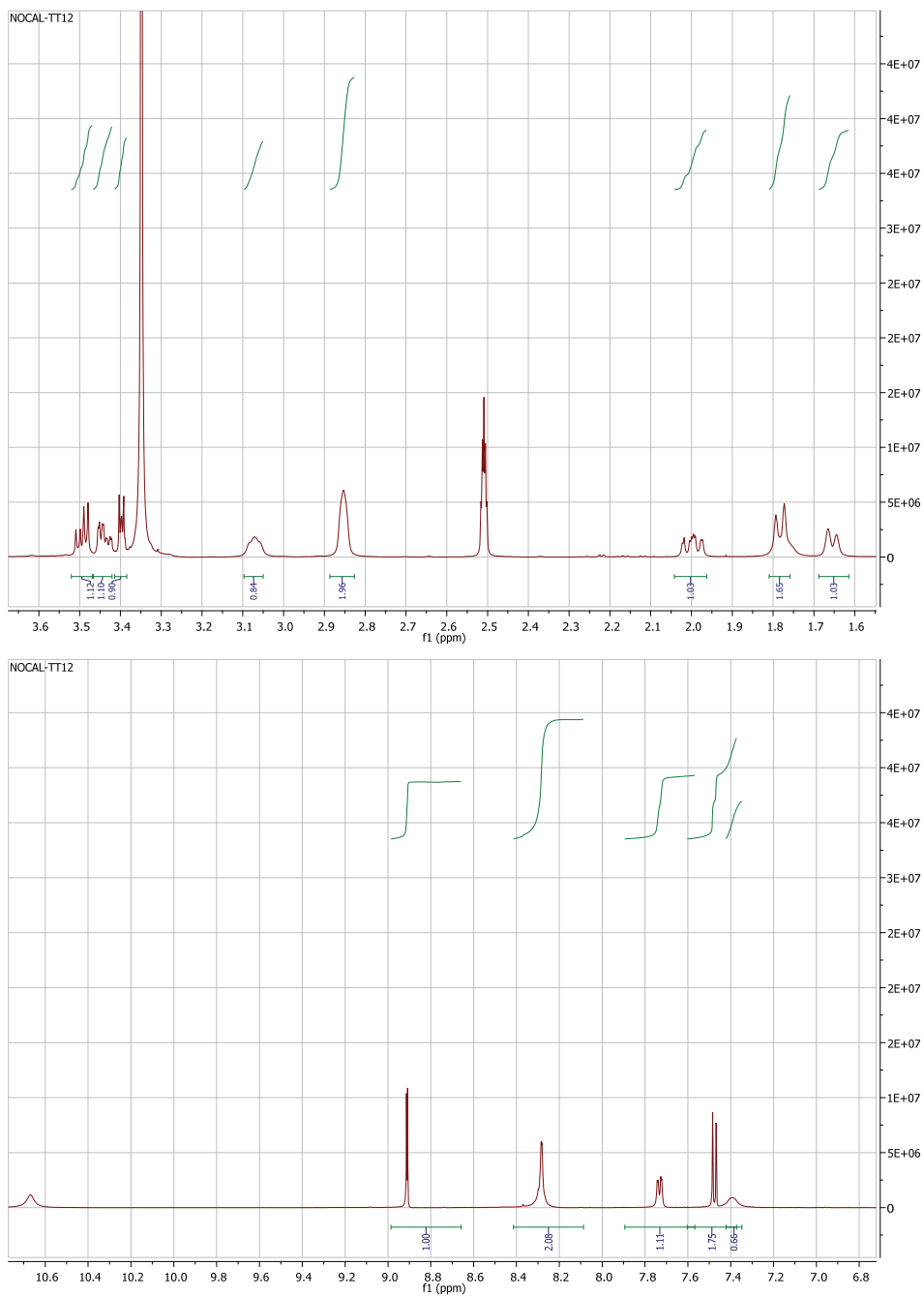


Fig. S-35. ¹H-NMR spectrum of compound **7d** (DMSO-*d*₆).

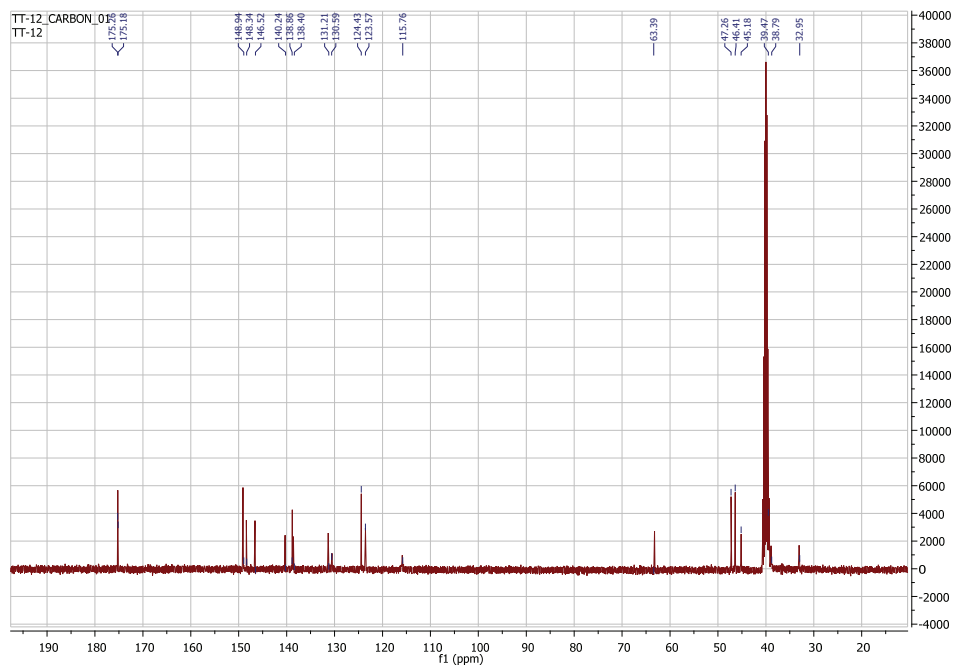


Fig. S-36. ^{13}C -NMR spectrum of compound **7d** ($\text{DMSO}-d_6$).