Supporting Information for:

Three-component difunctionalization of alkenes leading to β-acetamido sulfides and β-acetoxy sulphides

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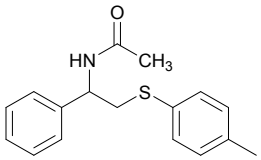
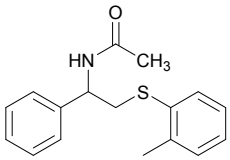
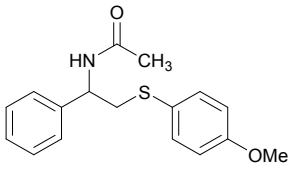
Analytical Data for the Products 4 and 5



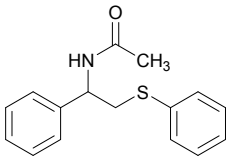
4a[1]: colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.32-7.26 (m, 7H), 7.09 (d, J = 8.0 Hz, 2H), 5.97 (s, 1H), 5.15 (d, J = 4.0 Hz, 1H), 3.35-3.27 (m, 2H), 2.31 (s, 3H), 1.95 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 169.63, 140.55, 136.79, 131.66, 130.67, 129.86, 128.68, 127.72, 126.59, 52.93, 40.54, 23.21, 21.03.



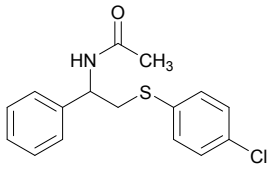
4b[1]: colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.38-7.27 (m, 6H), 7.14-7.10 (m, 3H), 6.13 (s, 1H), 5.17 (d, J = 8.0 Hz, 1H), 3.37-3.23 (m, 2H), 2.34 (s, 3H), 1.94 (s, 3H).



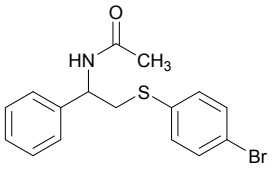
4c[1]: colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.34-7.21 (m, 7H), 6.81 (d, J = 4.0 Hz, 2H), 6.21 (s, 1H), 5.09 (d, J = 4.0 Hz, 1H), 3.77 (s, 3H), 3.22-3.19 (m, 2H), 1.94 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 169.63, 140.55, 136.79, 131.66, 130.67, 129.86, 128.68, 127.72, 126.59, 52.93, 40.54, 23.21, 21.03.



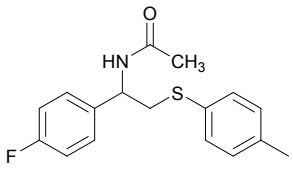
4d[1]: colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.36-7.16 (m, 10H), 6.18 (s, 1H), 5.18 (d, J = 4.0 Hz, 1H), 3.40-3.26 (m, 2H), 1.92 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 169.63, 140.55, 136.79, 131.66, 130.67, 129.86, 128.68, 127.72, 126.59, 52.93, 40.54, 23.21, 21.03.



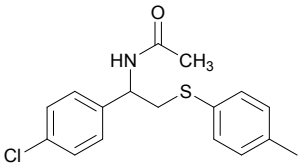
4e[1]: colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.32-7.21 (m, 9H), 5.97 (s, 1H), 5.14 (d, J = 8.0 Hz, 1H), 3.43-3.23 (m, 2H), 1.96 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 169.63, 139.97, 134.06, 132.45, 131.05, 129.12, 128.81, 127.99, 126.68, 52.92, 39.73, 23.24.



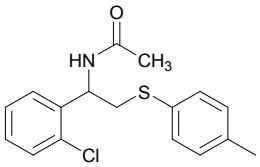
4f[1]: colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.37-7.19 (m, 9H), 6.14 (s, 1H), 5.16-5.11 (m, 1H), 3.42-3.21 (m, 2H), 1.95 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 169.63, 140.55, 136.79, 131.66, 130.67, 129.86, 128.68, 127.72, 126.59, 52.93, 40.54, 23.21, 21.03.



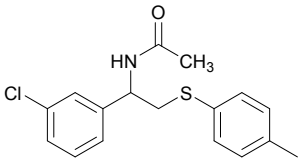
4g[1]: colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.26-7.19 (m, 4H), 7.09 (d, J = 8.0 Hz, 2H), 7.00-6.96 (m, 2H), 6.05 (s, 1H), 5.12-5.07 (m, 1H), 3.31-3.19 (m, 2H), 2.31 (s, 3H), 1.94 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 169.58, 163.36, 160.91, 137.02, 136.34, 131.31, 130.80, 129.90, 128.26, 128.18, 115.60, 115.39, 52.33, 40.62, 23.20, 21.01.



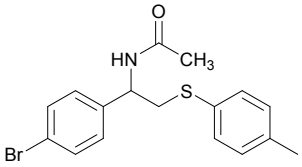
4h[1]: colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.27-7.24 (m, 4H), 7.16 (d, J = 8.0 Hz, 2H), 7.09 (d, J = 8.0 Hz, 2H), 5.99 (s, 1H), 5.10-5.08 (m, 1H), 3.26-3.23 (m, 2H), 2.31 (s, 3H), 1.94 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 169.53, 139.02, 137.14, 133.47, 131.13, 130.91, 129.93, 128.79, 127.91,52.37, 40.55, 23.22, 21.02.



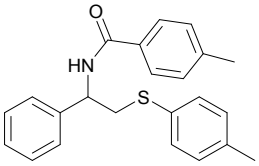
4i[1]: colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.31-7.07 (m, 8H), 6.21 (s, 1H), 5.44-5.39 (m, 1H), 3.38-3.24 (m, 2H), 2.30 (s, 3H), 1.96 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 169.46, 137.80, 137.00, 132.69, 131.06, 130.97, 130.04, 129.83, 128.80, 128.15, 126.98, 51.05, 38.84, 23.17, 21.04.



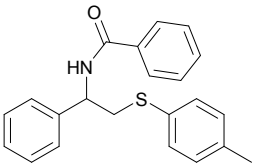
4j[1]: colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.27-7.21 (m, 6H), 7.09 (d, J = 8.0 Hz, 2H), 5.94 (s, 1H), 5.10-5.08 (m, 1H), 3.25-3.24 (m, 2H), 2.31 (s, 3H), 1.97 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 169.70, 142.74, 137.17, 134.50, 131.09, 131.02, 129.94, 129.90, 127.80, 126.62, 124.89, 52.55, 40.65, 23.17, 21.03.



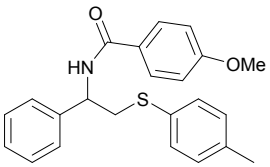
4k[1]: colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.42-7.40 (m, 2H), 7.24 (d, J = 8.0 Hz, 2H), 7.09 (d, J = 8.0 Hz, 4H), 6.07 (s, 1H), 5.06 (d, J = 8.0 Hz, 1H), 3.28-3.18 (m, 2H), 2.31 (s, 3H), 1.94 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 169.55, 139.54, 137.16, 131.73, 131.09, 130.93, 129.94, 128.25, 121.58, 52.43, 40.50, 23.22, 21.03.



4l[1]: colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.57 (d, J = 8.0 Hz, 2H), 7.32-7.18 (m, 7H), 7.19 (d, J = 8.0 Hz, 2H), 7.08 (d, J = 8.0 Hz, 2H), 6.63 (s, 1H), 5.32 (d, J = 8.0 Hz, 1H), 3.42-3.40 (m, 2H), 2.33 (s, 3H), 2.30 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 166.76, 141.90, 140.64, 136.84, 131.51, 131.29, 130.78, 129.90, 129.07, 128.64, 127.63, 126.96, 126.50, 53.35, 40.73, 21.36, 20.94.

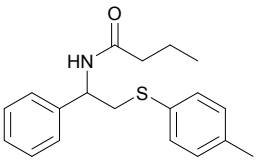


4m[1]: colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.21 (d, J = 8.0 Hz, 2H), 7.54-7.29 (m, 9H), 7.12 (d, J = 8.0 Hz, 2H), 8.78 (d, J = 8.0 Hz, 1H), 5.38-5.33 (m, 1H), 3.46-3.43 (m, 2H), 2.34 (s, 1H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 166.74, 140.47, 136.92, 134.08, 131.49, 131.37, 130.80, 129.92, 128.66, 128.41, 127.68, 126.90, 126.44, 53.40, 40.70, 20.94.

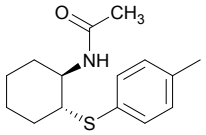


4n: colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.36-7.25 (m, 8H), 7.17 (d, J = 8.0 Hz, 1H), 7.09 (d, J = 8.0 Hz, 2H), 7.04-7.01 (m, 1H), 6.75 (d, J = 4.0 Hz, 1H), 5.33-5.28 (m, 1H), 3.81 (s, 3H), 3.41-3.39 (m, 2H), 2.3 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 166.69, 159.79, 140.52, 137.01, 130.88, 129.97,

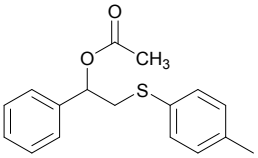
129.44, 128.73, 127.75, 126.50, 118.65, 117.80, 112.42, 55.39, 53.51, 40.77, 20.99. HRMS (ESI) m/z: calcd for $C_{23}H_{24}NO_2S$: 378.1522 $[M+H]^+$; found: 378.1524.



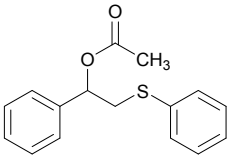
4o[2]: colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.33-7.23, 7.09 (d, J = 8.0 Hz, 2H), 6.0 (s, 1H), 5.17-5.12 (m, 1H), 3.31-3.26 (m, 2H), 2.30 (s, 3H), 2.14-2.12 (m, 2H), 1.65-1.59 (m, 2H), 0.94-0.90 (m, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 172.42, 140.61, 136.73, 131.60, 130.61, 129.80, 128.60, 127.61, 126.47, 52.61, 40.56, 38.51, 20.94, 18.99, 13.69.



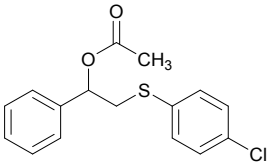
4p: colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.35-7.29 (m, 2H), 7.12 (d, J = 8.0 Hz, 2H), 5.75 (d, J = 8.0 Hz, 1H), 3.72-3.69 (m, 1H), 2.33 (s, 3H), 2.19-2.05 (m, 2H), 1.95 (s, 3H), 1.72-1.65 (m ,2H), 1.44-1.14 (m, 4H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 169.42, 137.56, 133.71, 129.58, 52.59, 51.73, 33.46, 32.89, 25.73, 24.33, 23.37, 21.00. HRMS (ESI) m/z: calcd for $C_{15}H_{22}ONS$: 264.1417 $[M+H]^+$; found: 264.1419.



5a[2]: colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.46-6.98 (m, 9H), 6.81-6.78 (m, 1H), 3.36-3.31 (m, 1H), 3.16-3.11 (m, 1H), 2.31 (s, 3H), 2.01 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 169.99, 139.00, 136.76, 131.62, 130.87, 129.73, 128.46, 128.30, 126.56, 74.44, 40.72, 20.98.

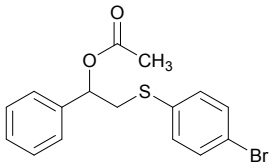


5b[2]: colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.38-7.18 (m, 10H), 5.69-5.66 (m, 1H), 3.44-3.33 (m, 1H), 3.25-3.20 (m, 1H), 2.02 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 169.95, 138.91, 135.50, 130.04, 128.92, 128.48, 128.35, 126.55, 126.49, 74.51, 40.01, 20.92.

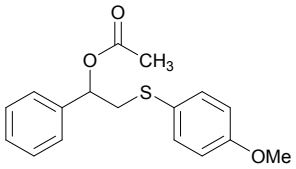


5c[2]: colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.36-7.24 (m, 9H), 5.88-5.85 (m, 1H), 3.41-3.36 (m, 1H), 3.23-3.18 (m, 1H), 2.03 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 169.92, 138.70, 134.09, 132.63,

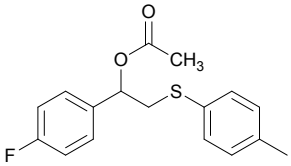
131.46, 129.08, 128.56, 128.48, 126.60, 74.38, 40.26, 20.96.



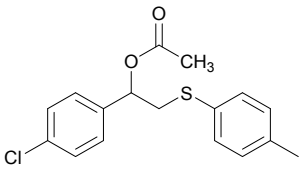
5d: colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.40 (d, J = 8.0 Hz, 2H), 7.36-7.30 (m, 4H), 7.23 (d, J = 8.0 Hz, 2H), 5.89-5.85 (m, 1H), 3.42-3.36 (m, 1H), 3.23-3.18 (m, 1H), 2.03 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 169.52, 139.87, 134.76, 132.03, 131.18, 128.82, 128.02, 126.67, 120.31, 52.90, 39.49, 23.24. HRMS (ESI) m/z: calcd for $C_{16}H_{15}BrO_2SNa$: 372.9868 $[M+Na]^+$; found: 372.9844.



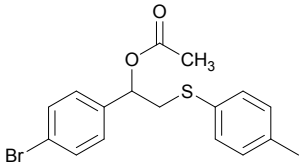
5e: colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.38-7.25 (m, 7H), 6.84 (d, J = 8.0 Hz, 2H), 5.85-5.82 (m, 1H), 3.79 (s, 3H), 3.32-3.27 (m, 1H), 3.15-3.10 (m, 1H), 2.04 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 170.05, 159.27, 139.13, 133.93, 128.51, 128.32, 126.63, 125.63, 114.66, 74.51, 55.32, 42.09, 21.08. HRMS (ESI) m/z: calcd for $C_{17}H_{18}O_3SNa$: 325.0869 $[M+Na]^+$; found: 325.0856.



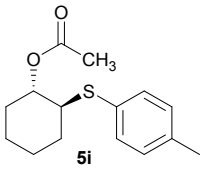
5f[2]: colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.36-7.25 (m, 6H), 7.10 (d, J = 4.0 Hz, 2H), 5.86-5.83 (m, 1H), 3.39-3.33 (m, 1H), 3.21-3.16 (m, 1H), 2.32 (s, 3H), 2.04 (s, 3H).



5g[2]: colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.31-7.23 (m, 6H), 7.10 (d, J = 8.0 Hz, 2H), 7.09 (d, J = 8.0 Hz, 2H), 5.82-5.78 (m, 1H), 3.36-3.31 (m, 1H), 3.17-3.12 (m, 1H), 2.32 (s, 3H), 2.02 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 169.84, 137.42, 136.94, 134.12, 131.31, 130.98, 129.75, 128.62, 128.04, 73.83, 40.52, 20.94, 20.89.

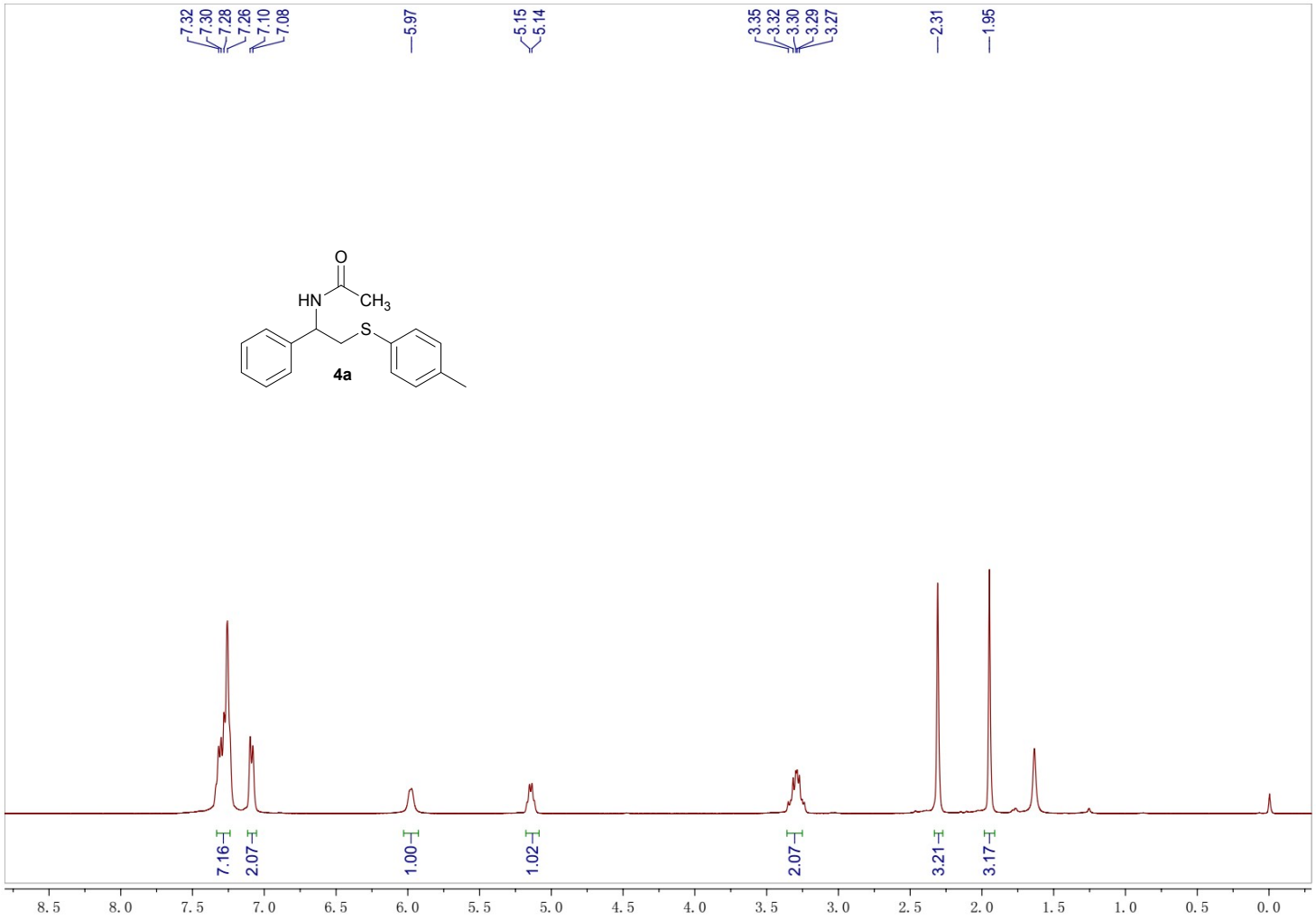


5h[2]: colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.44 (d, J = 8.0 Hz, 2H), 7.26 (d, J = 8.0 Hz, 2H), 7.17 (d, J = 8.0 Hz, 2H), 7.09 (d, J = 8.0 Hz, 2H), 5.78-5.75 (m, 1H), 3.35-3.29 (m, 1H), 3.16-3.11 (m, 1H), 2.32 (s, 3H), 2.02 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 169.80, 137.91, 136.93, 131.54, 131.27, 130.97, 129.73, 128.33, 122.26, 73.87, 40.45, 20.94, 20.88.



5i

5i[2]: colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.33 (d, J = 8.0 Hz, 2H), 7.09 (d, J = 4.0 Hz, 2H), 4.77-4.72 (m, 1H), 3.07-3.01 (m, 1H), 2.31 (s, 3H), 2.08-2.04 (m, 2H), 1.95 (s, 3H), 1.69-1.66 (m, 2H), 1.44-1.25(m, 4H). ^{13}C NMR (100 MHz, $CDCl_3$) 169.95, 138.91, 135.50, 130.04, 128.92, 128.48, 128.35, 126.55, 126.49, 74.51, 40.01, 20.92.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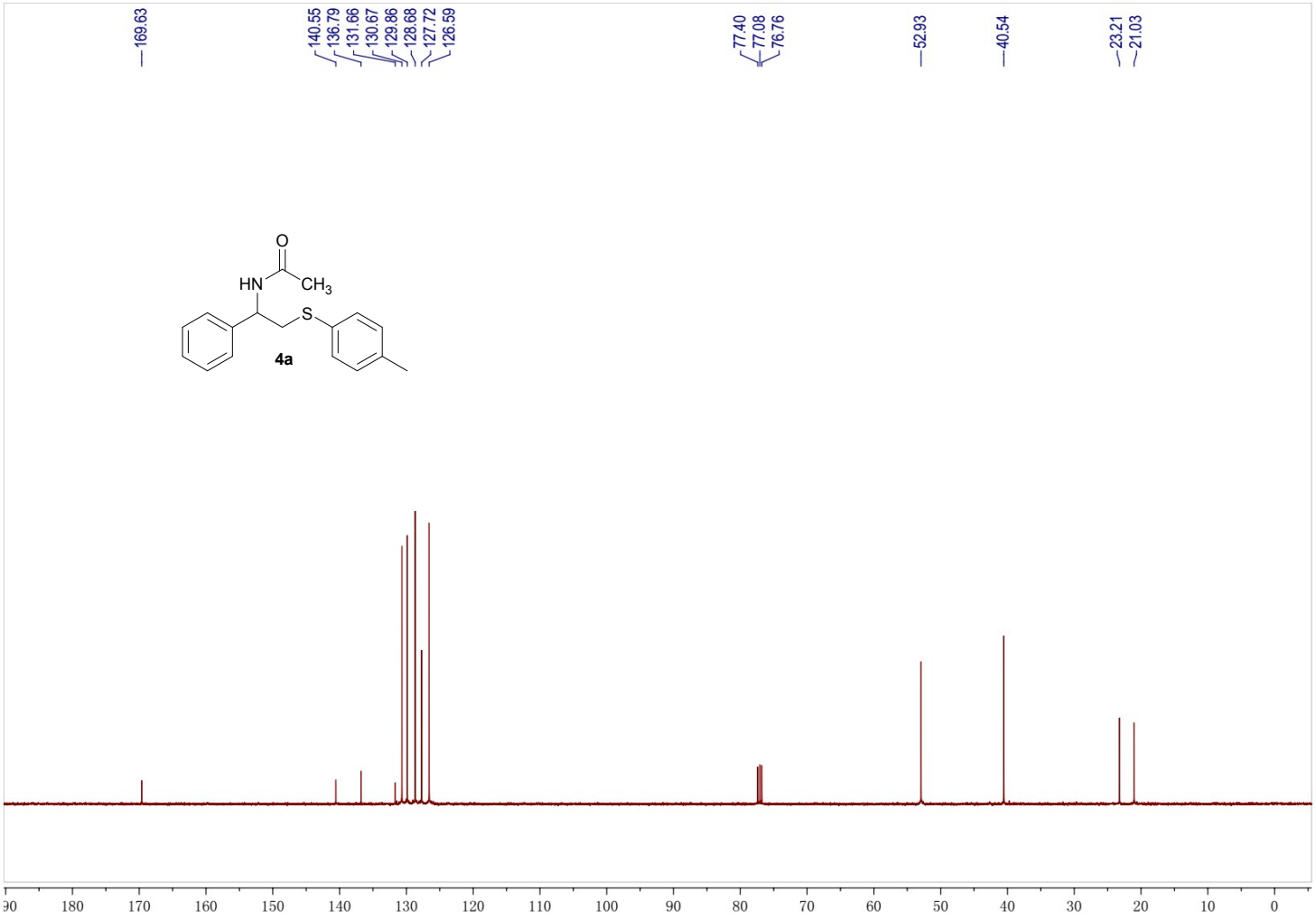
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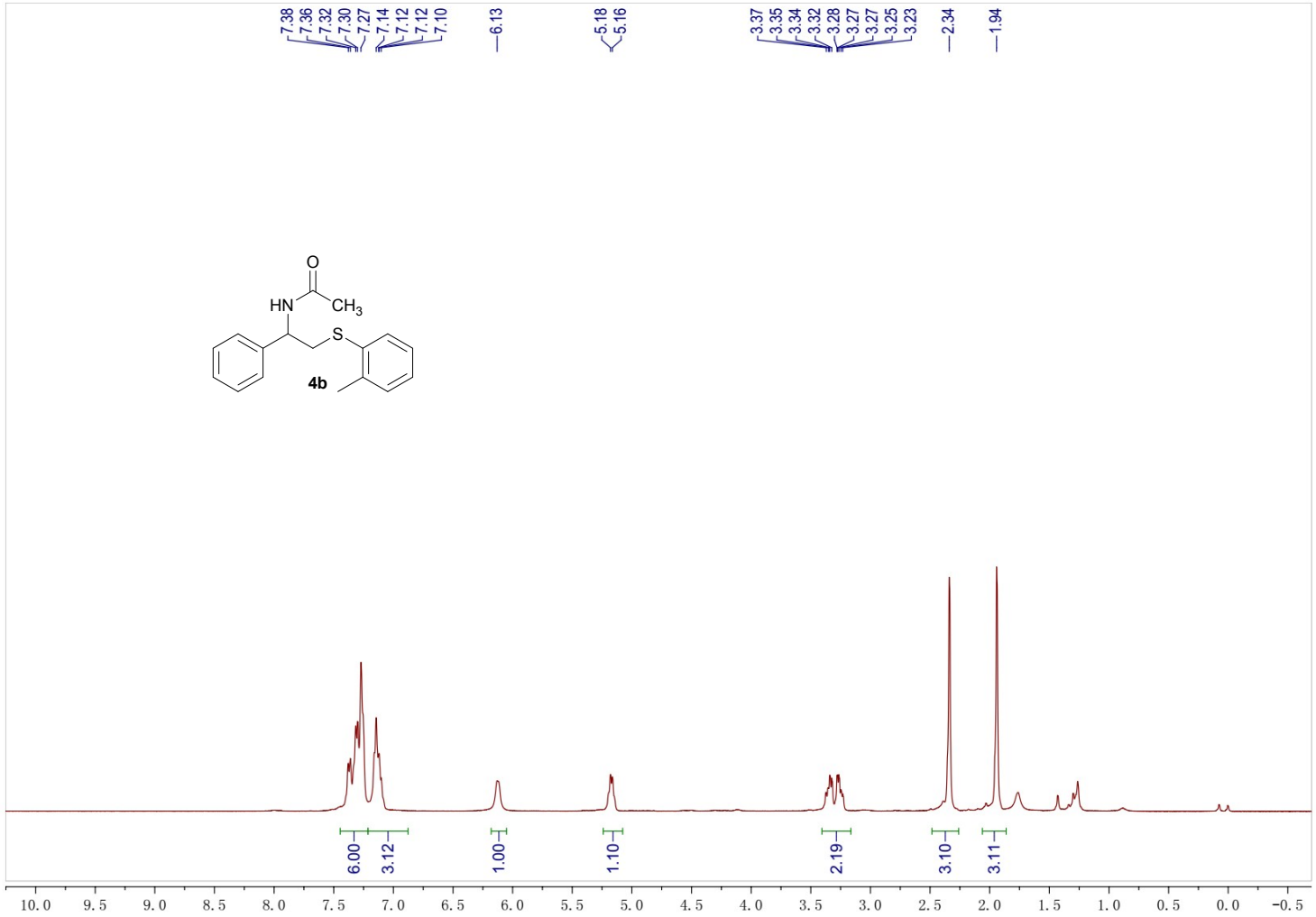
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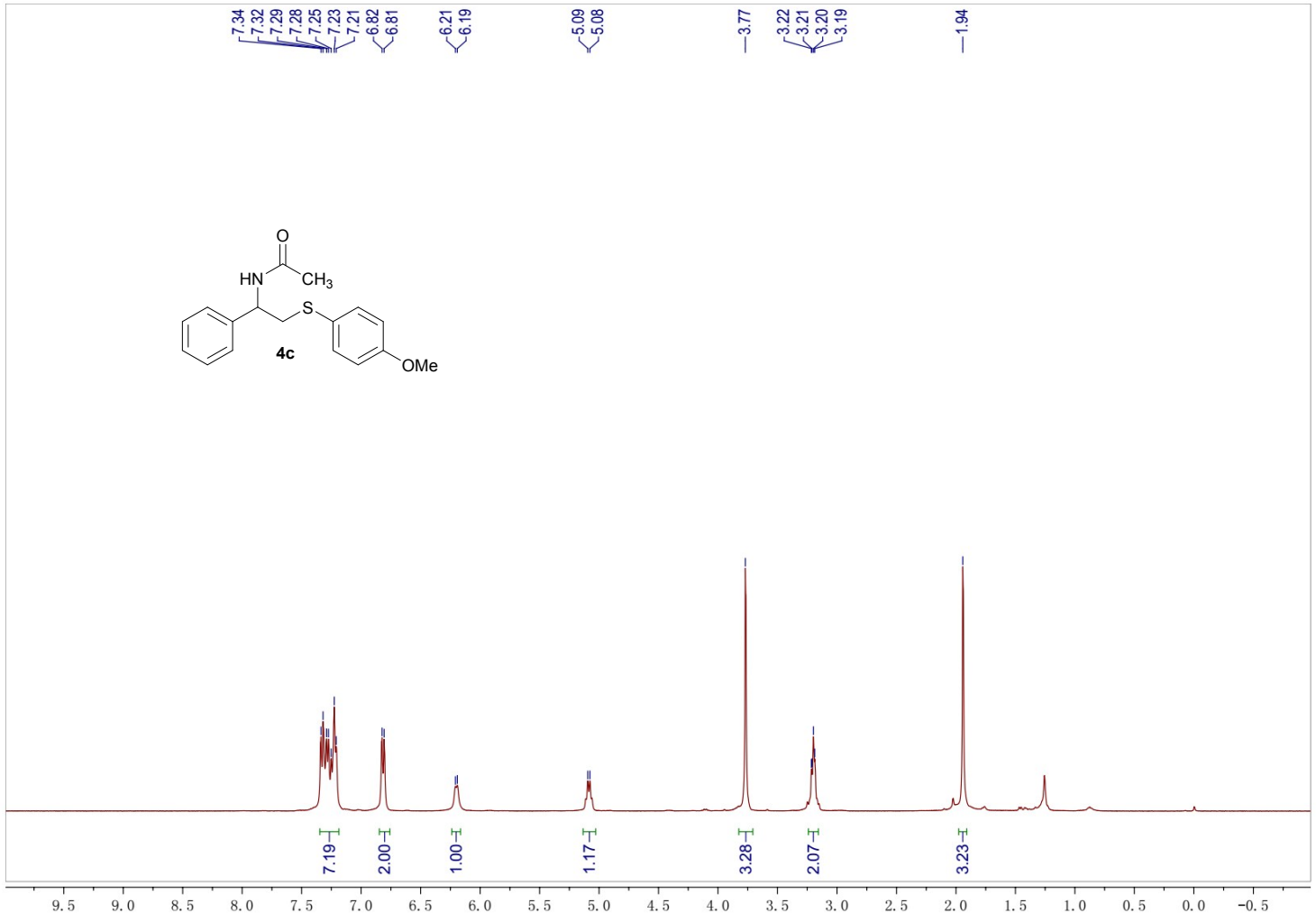
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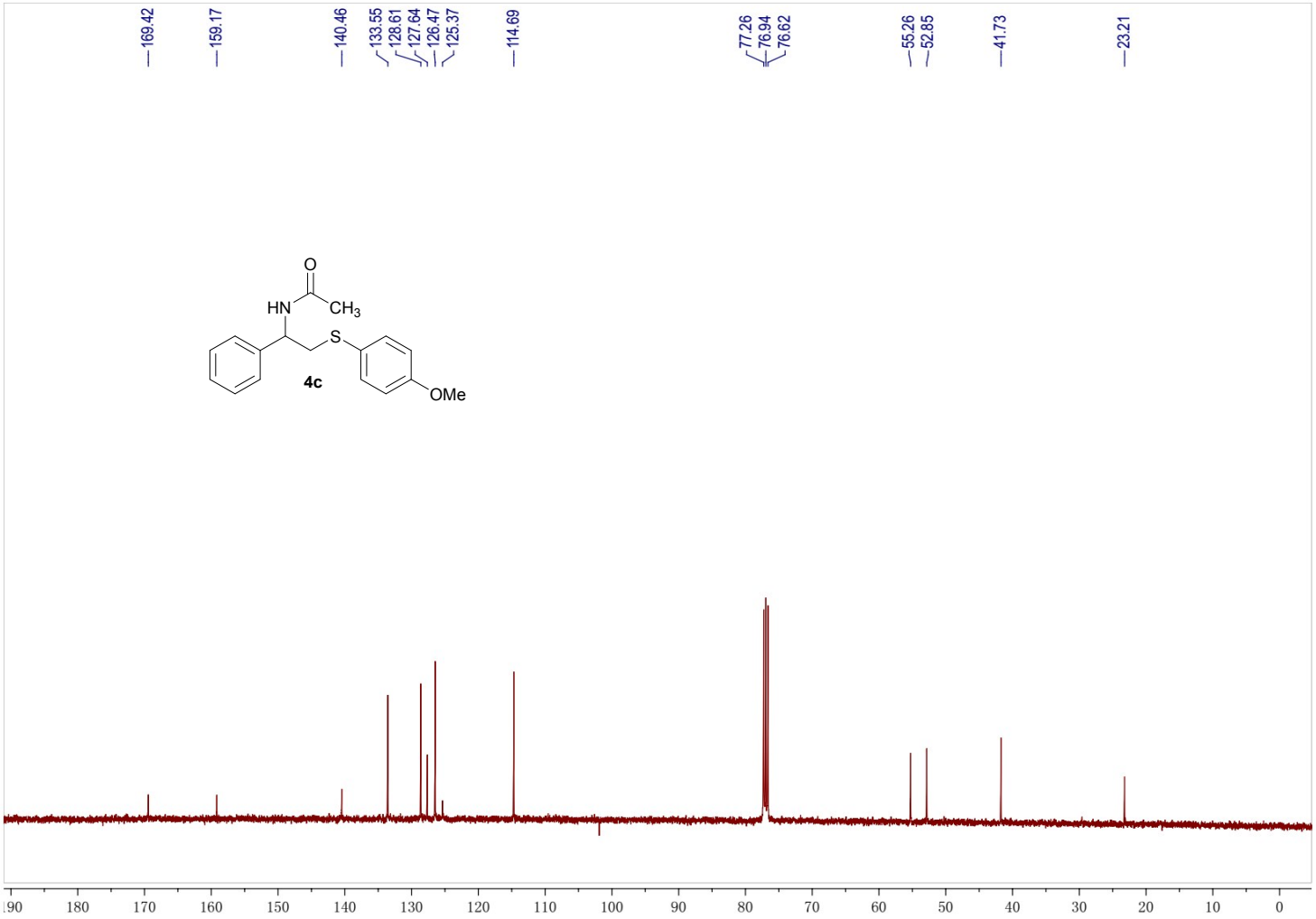
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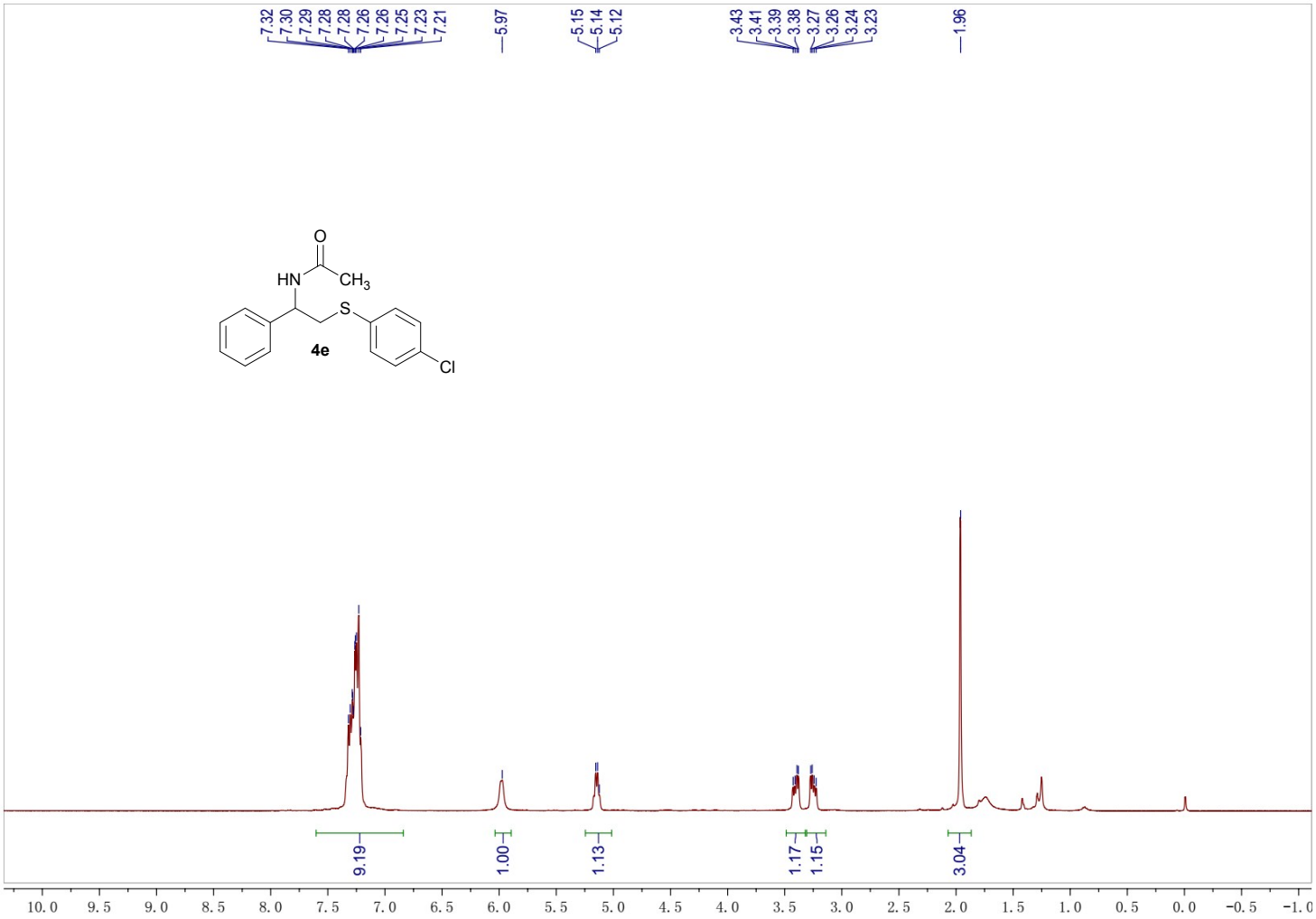
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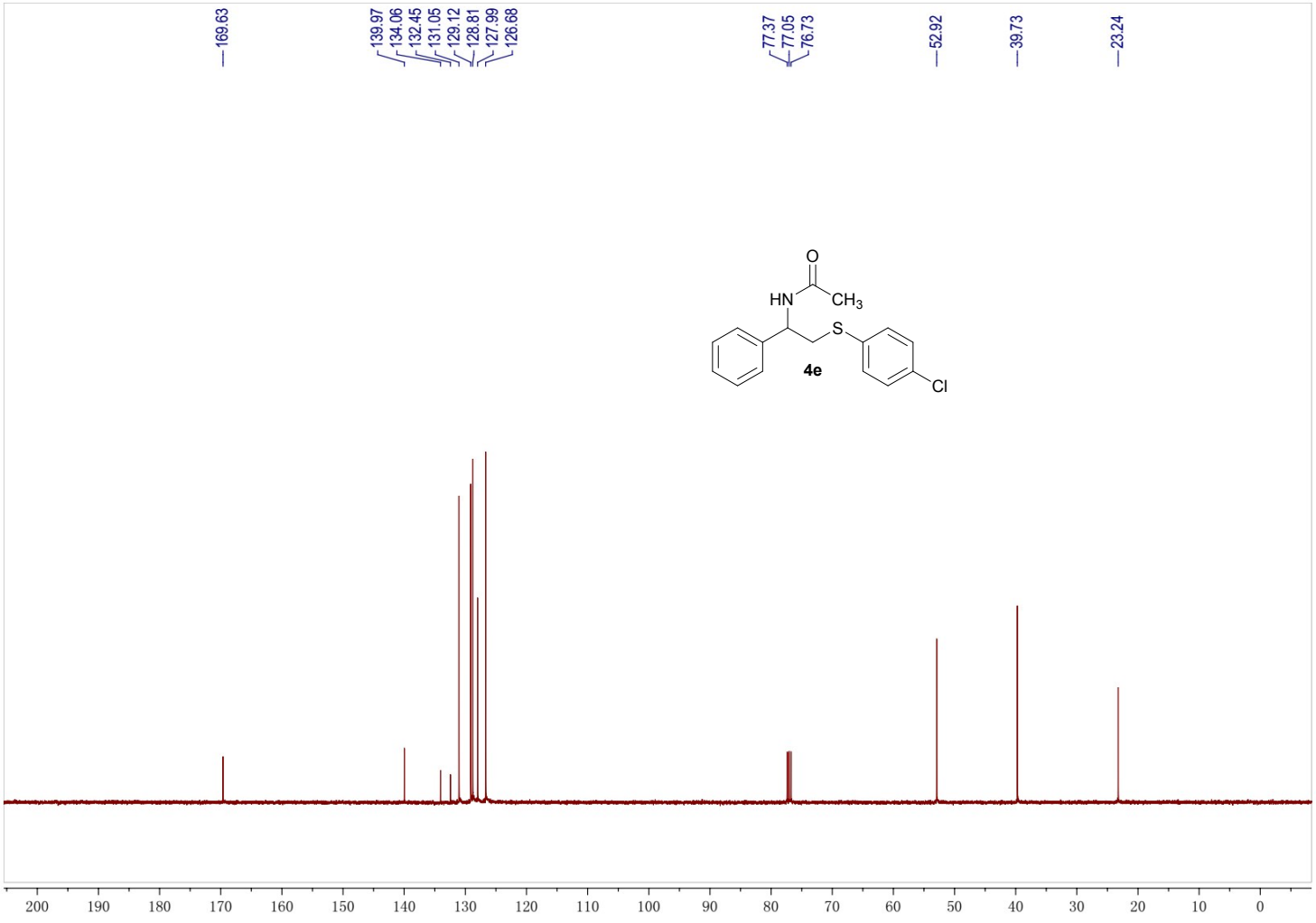
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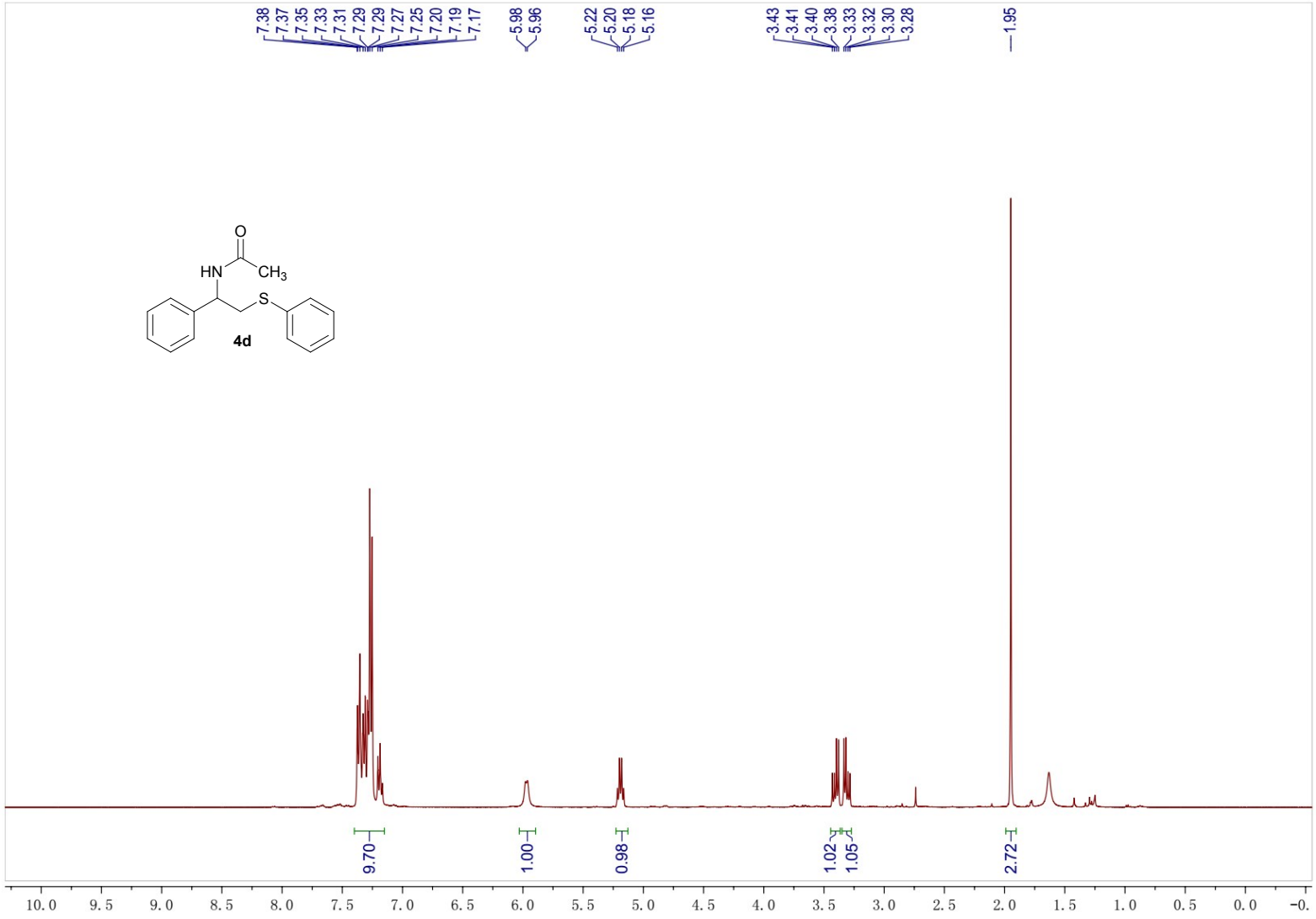
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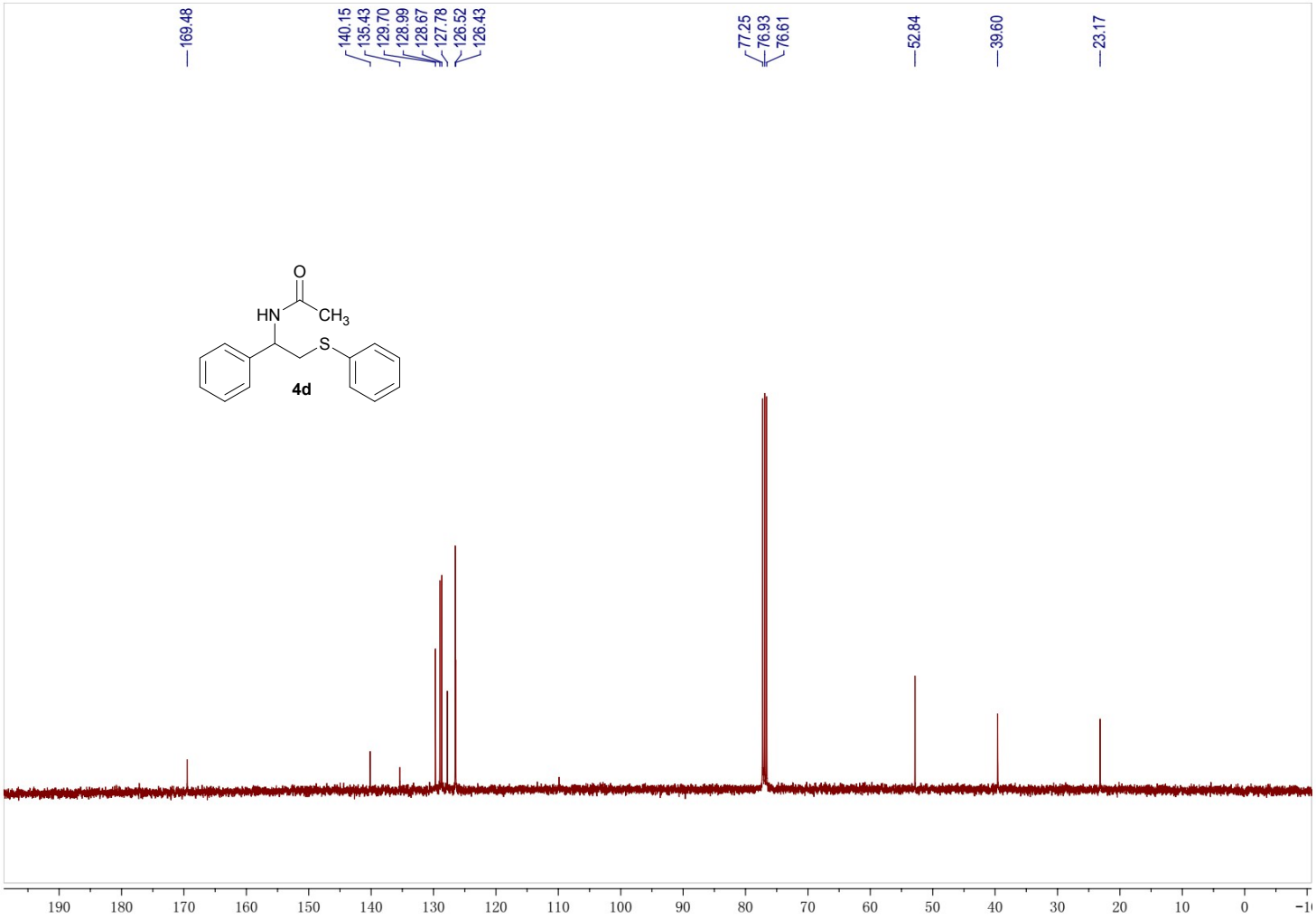
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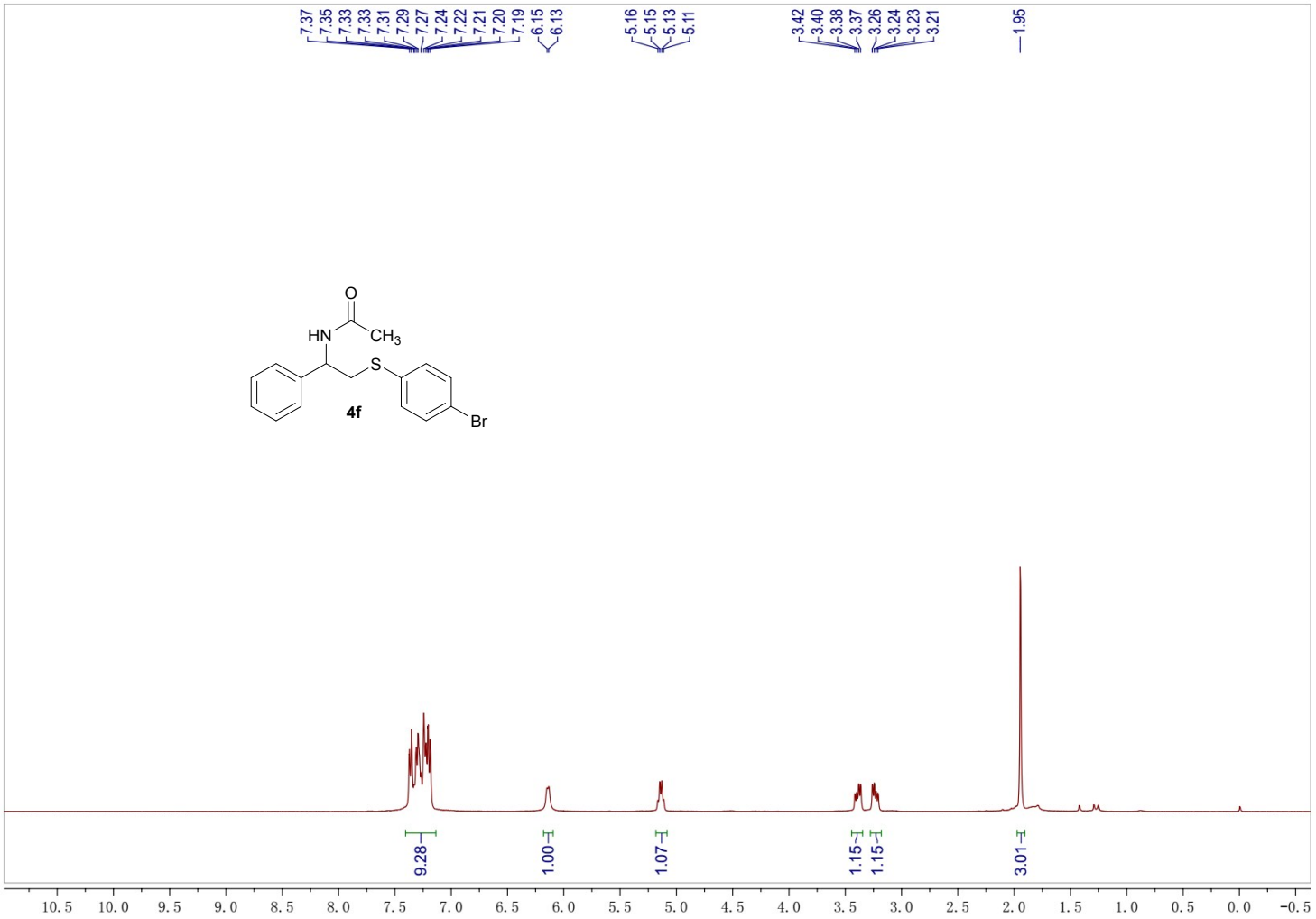
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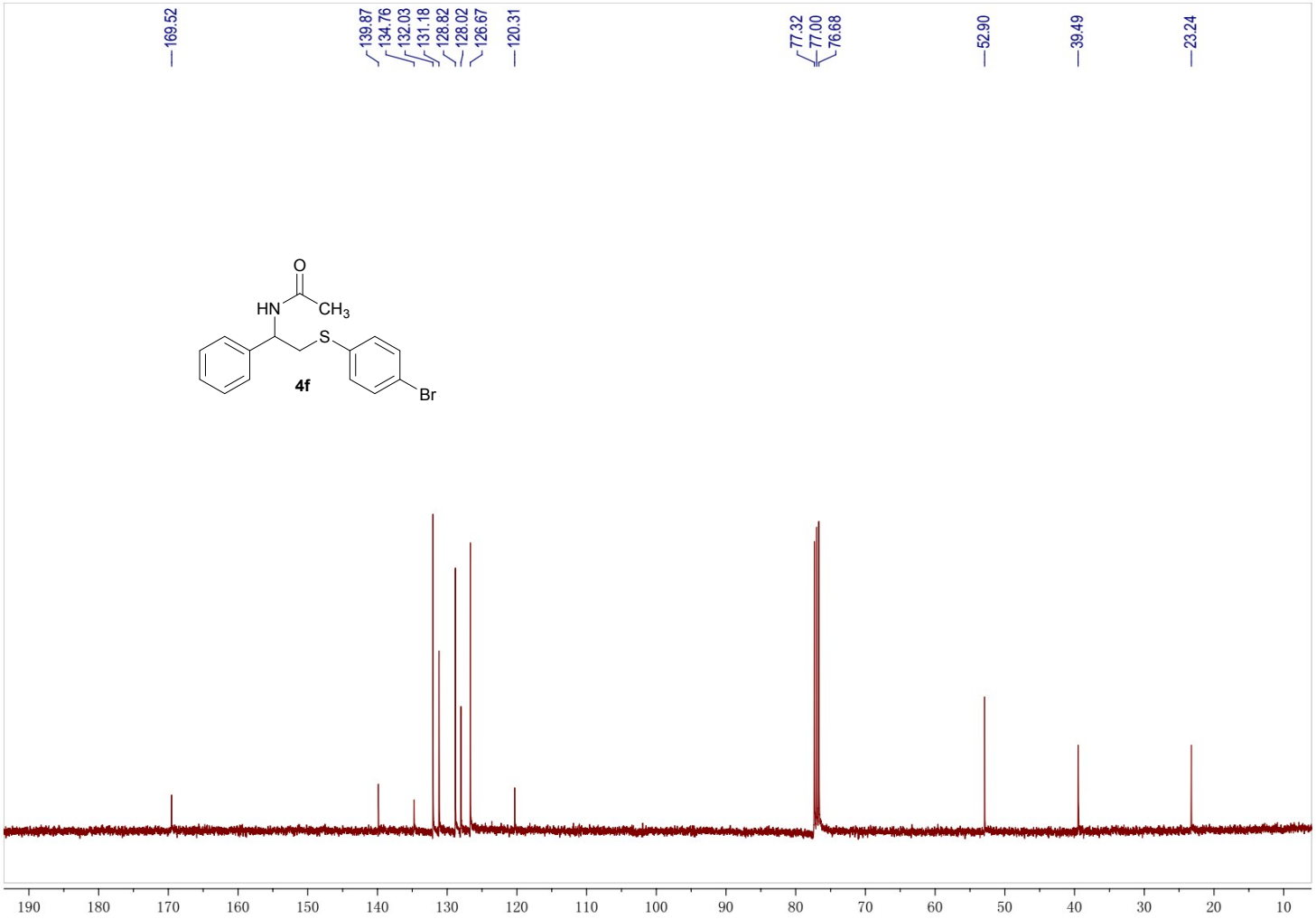
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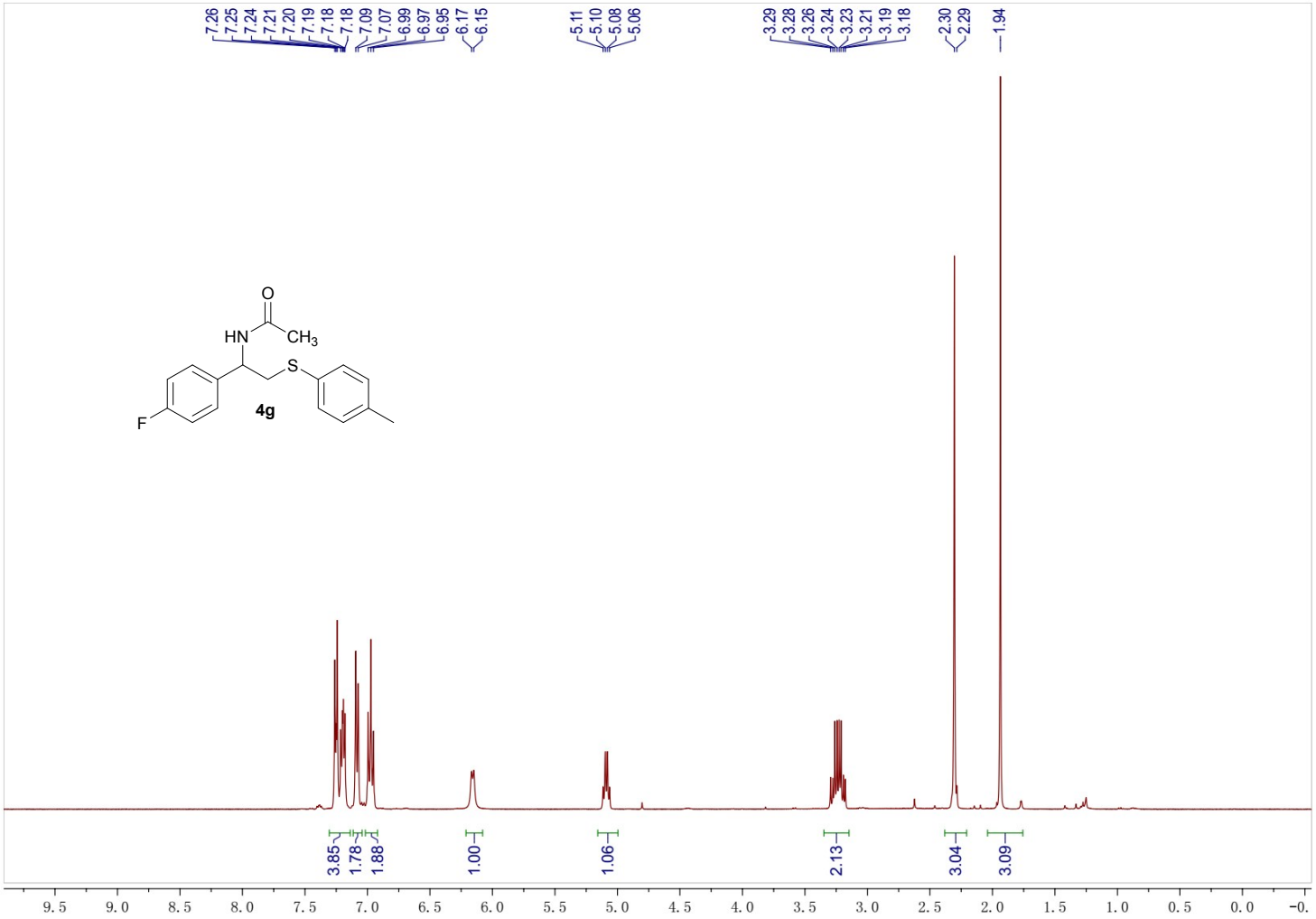
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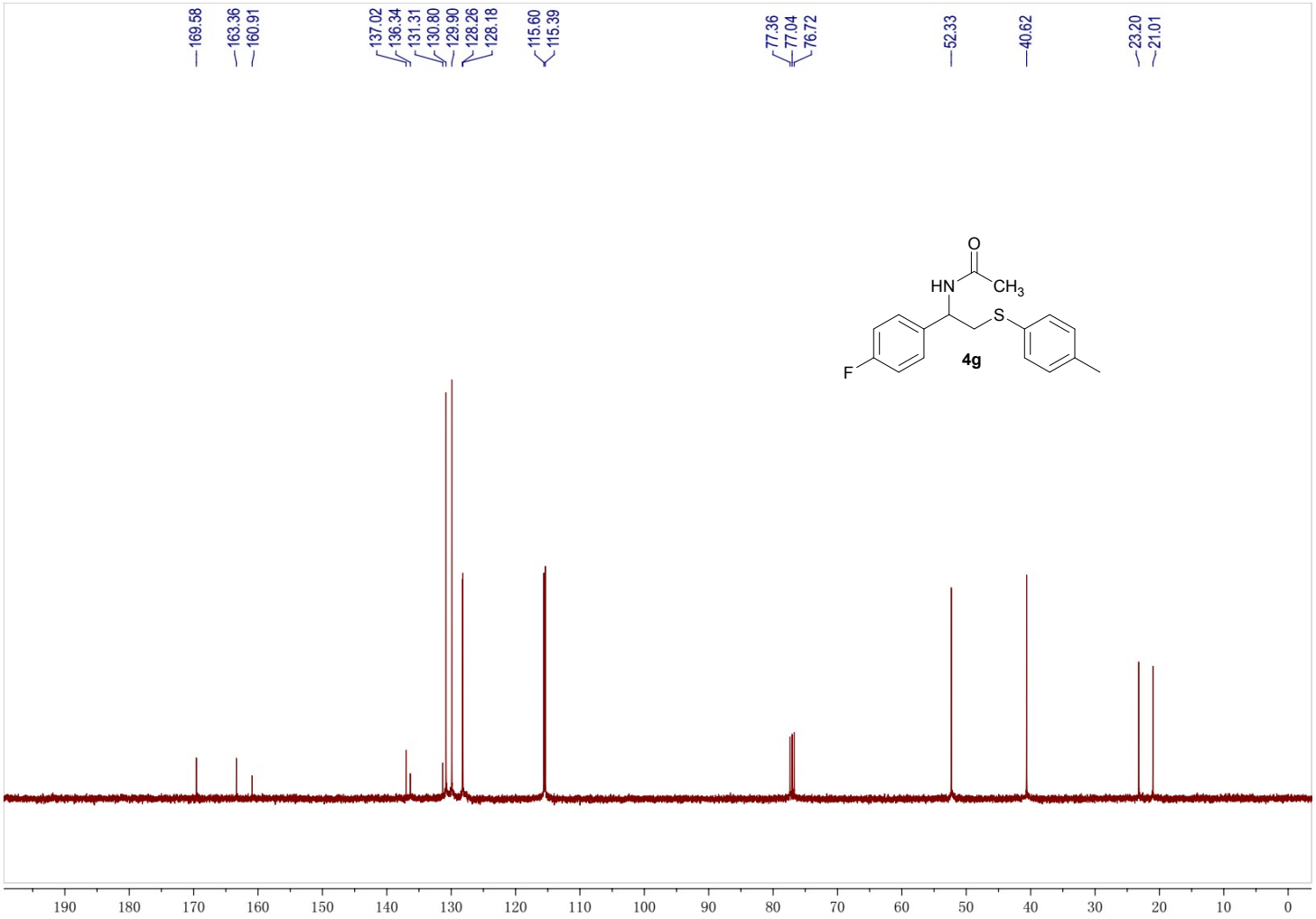
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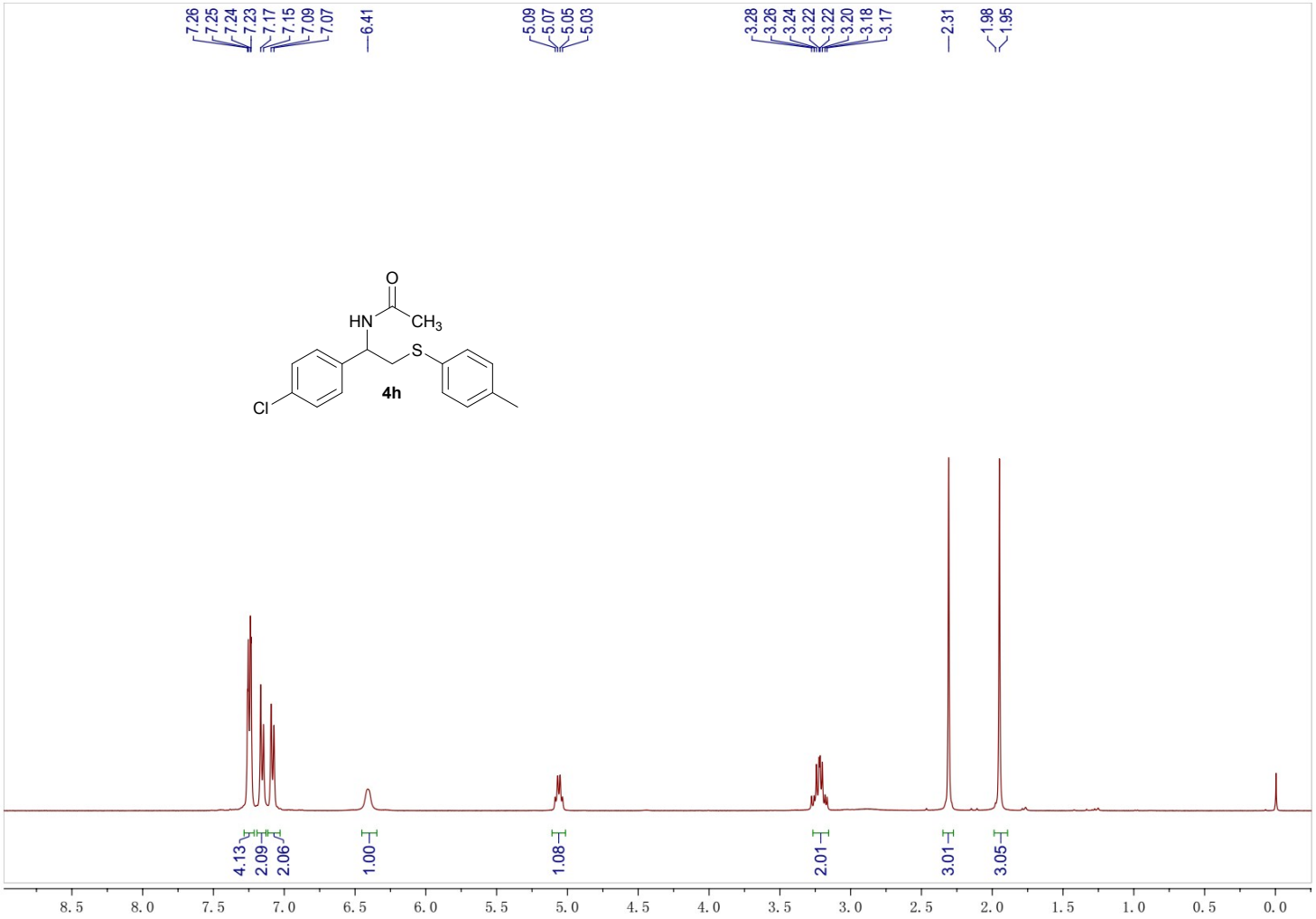
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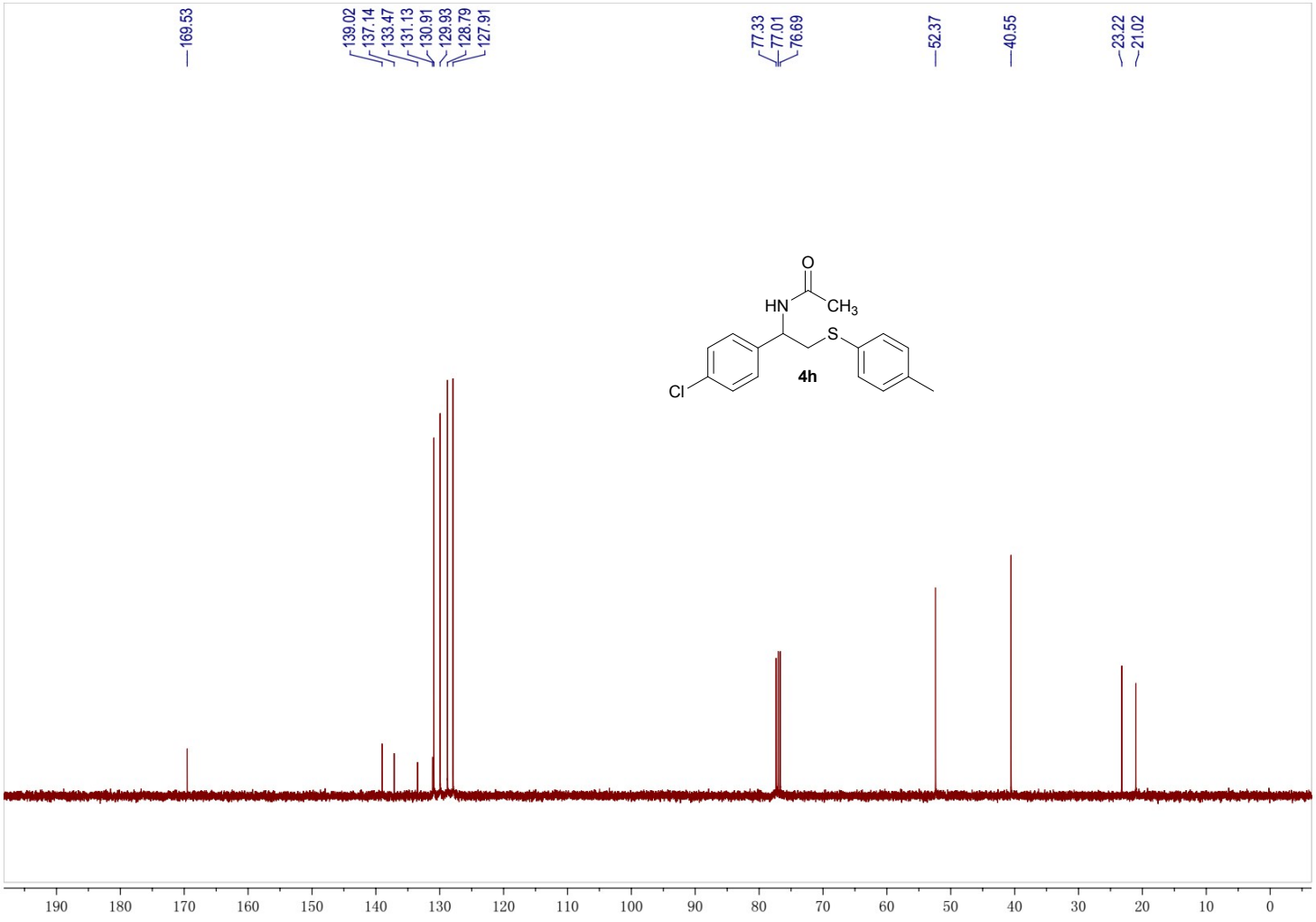
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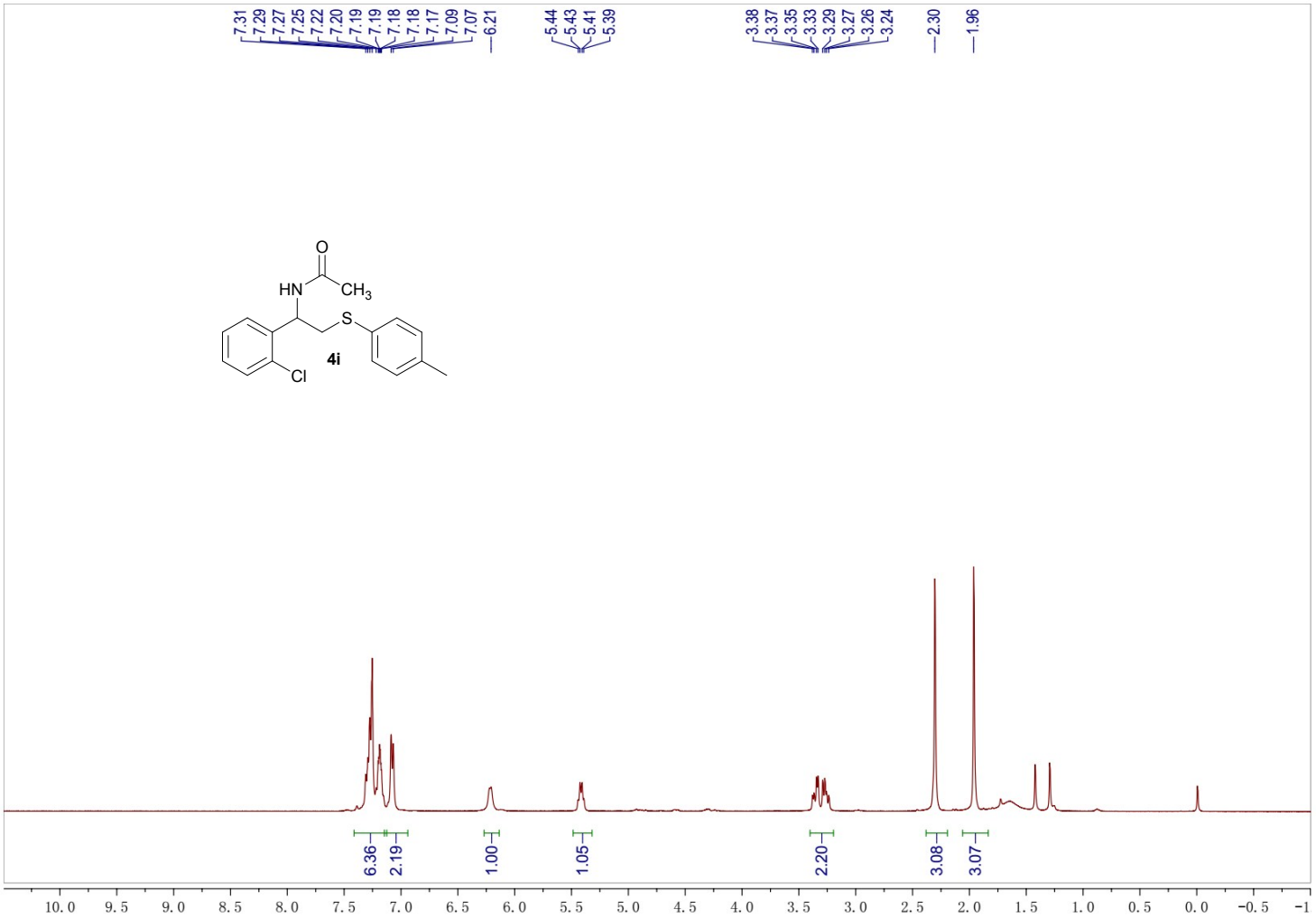
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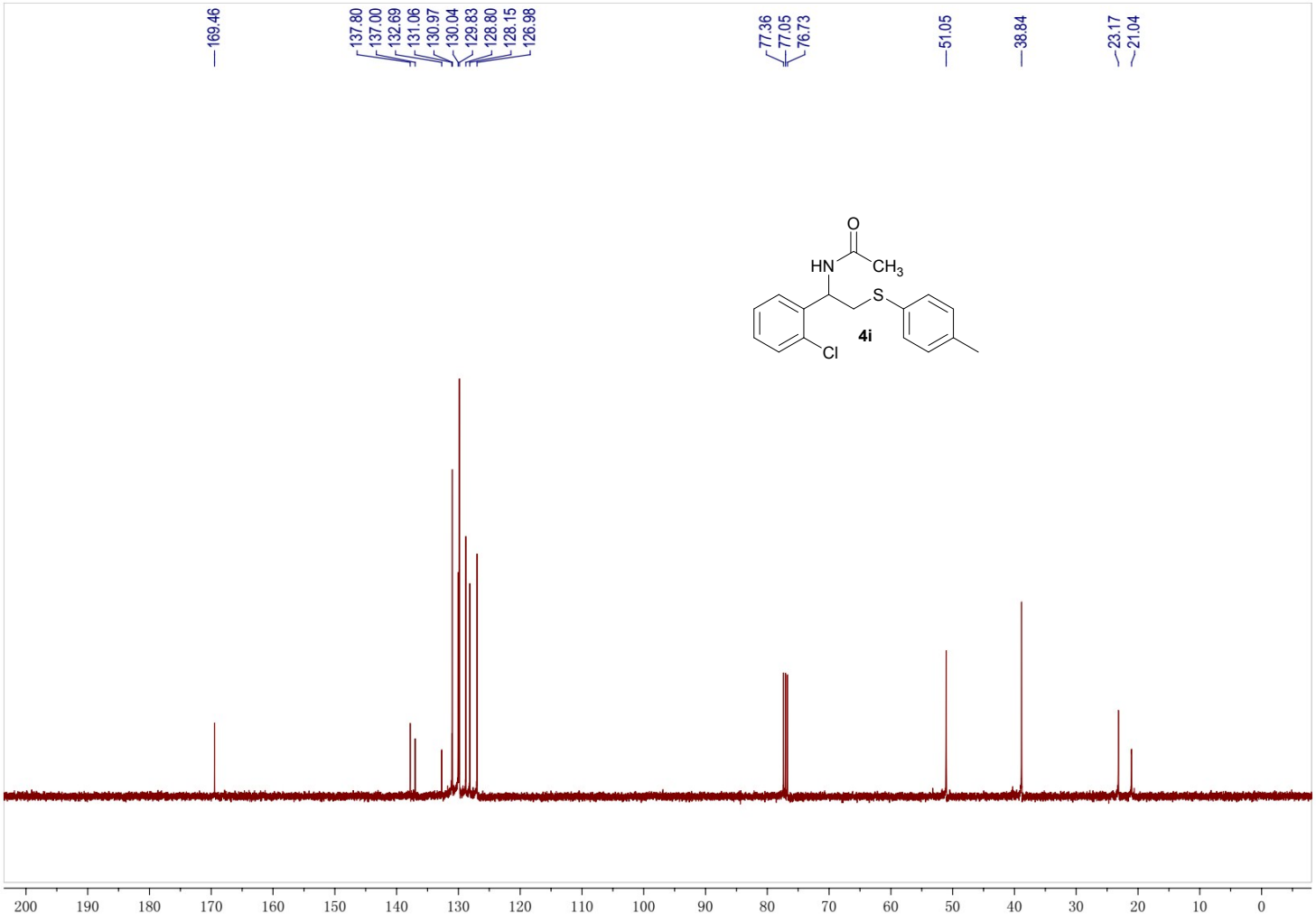
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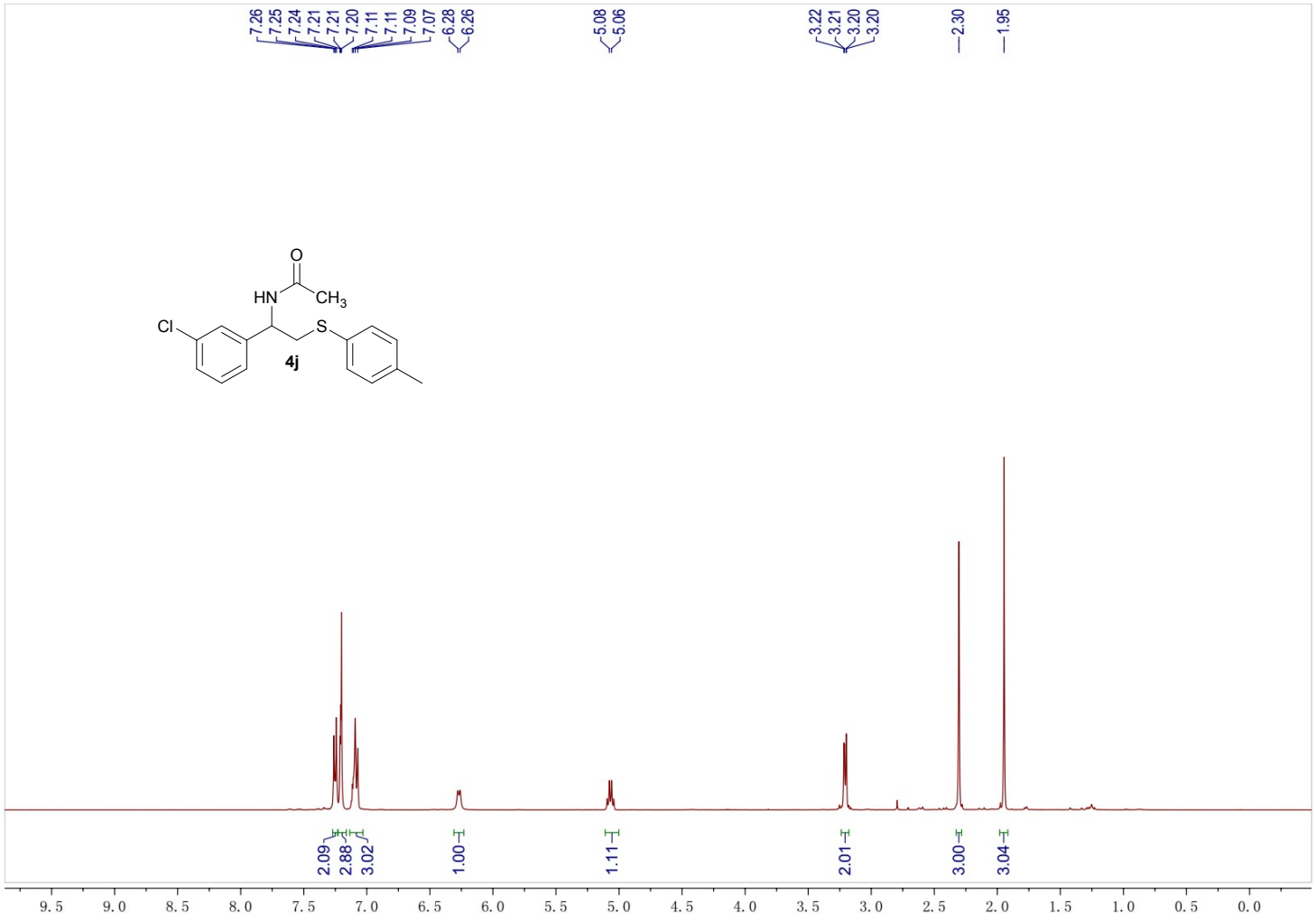
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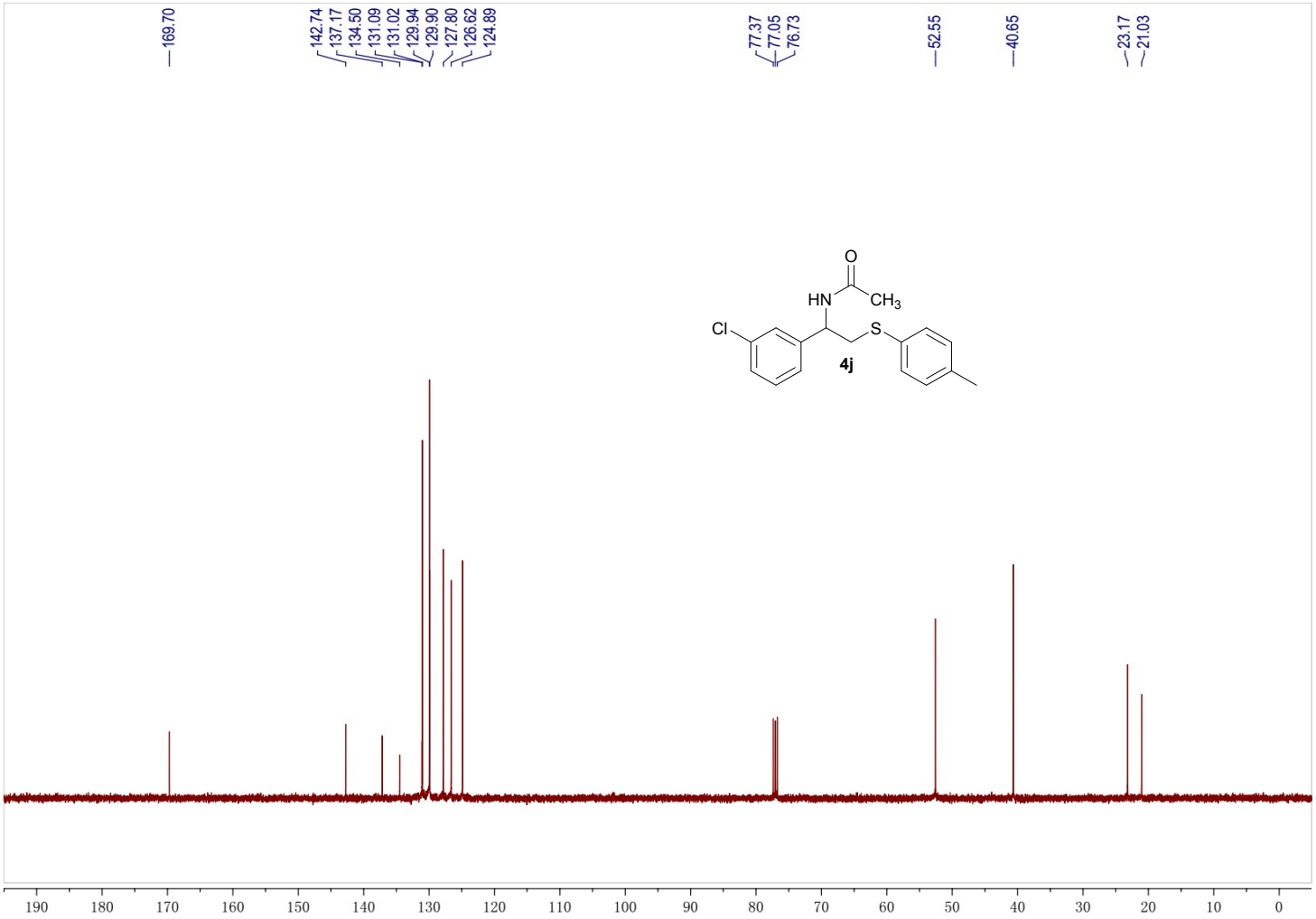
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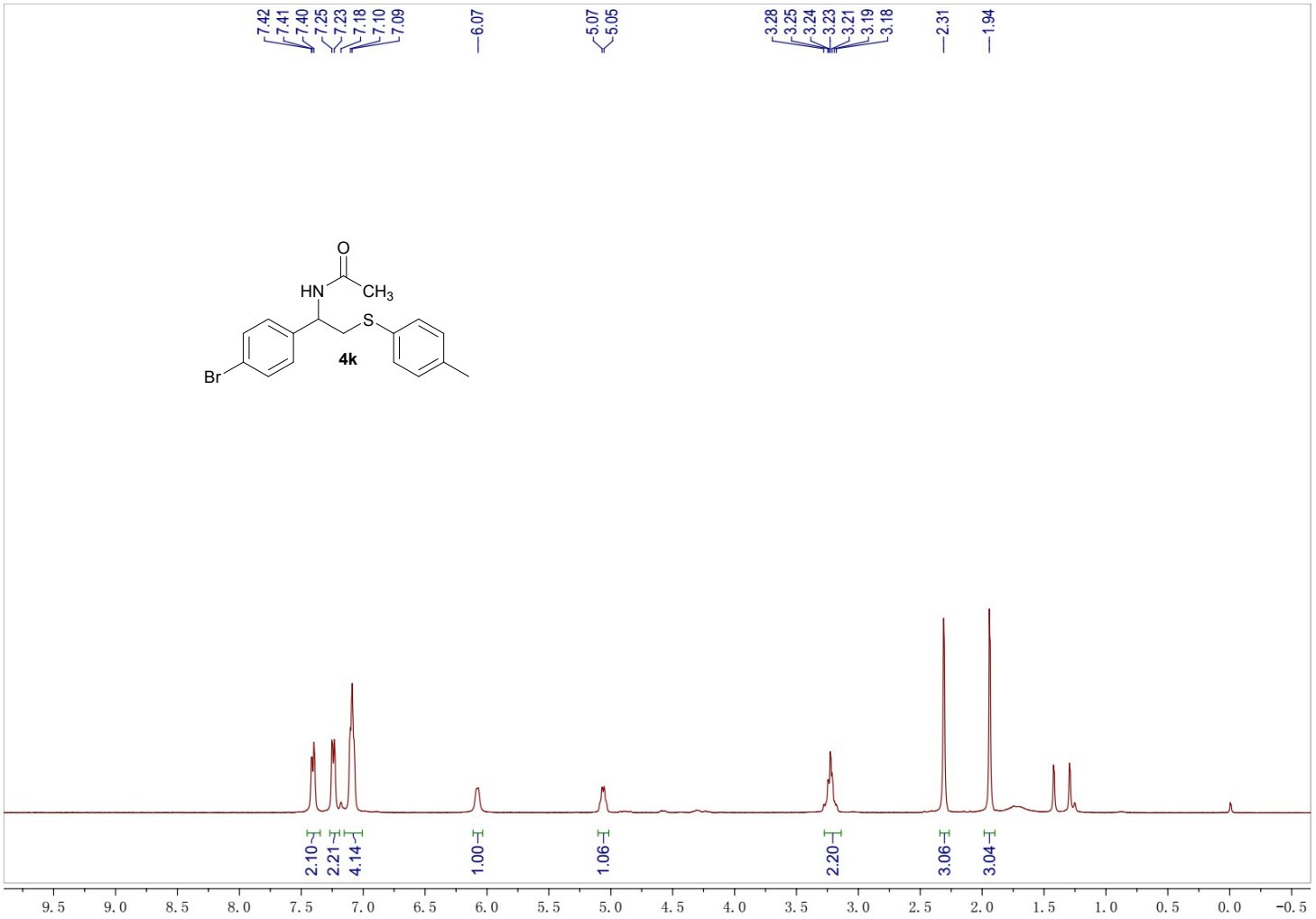
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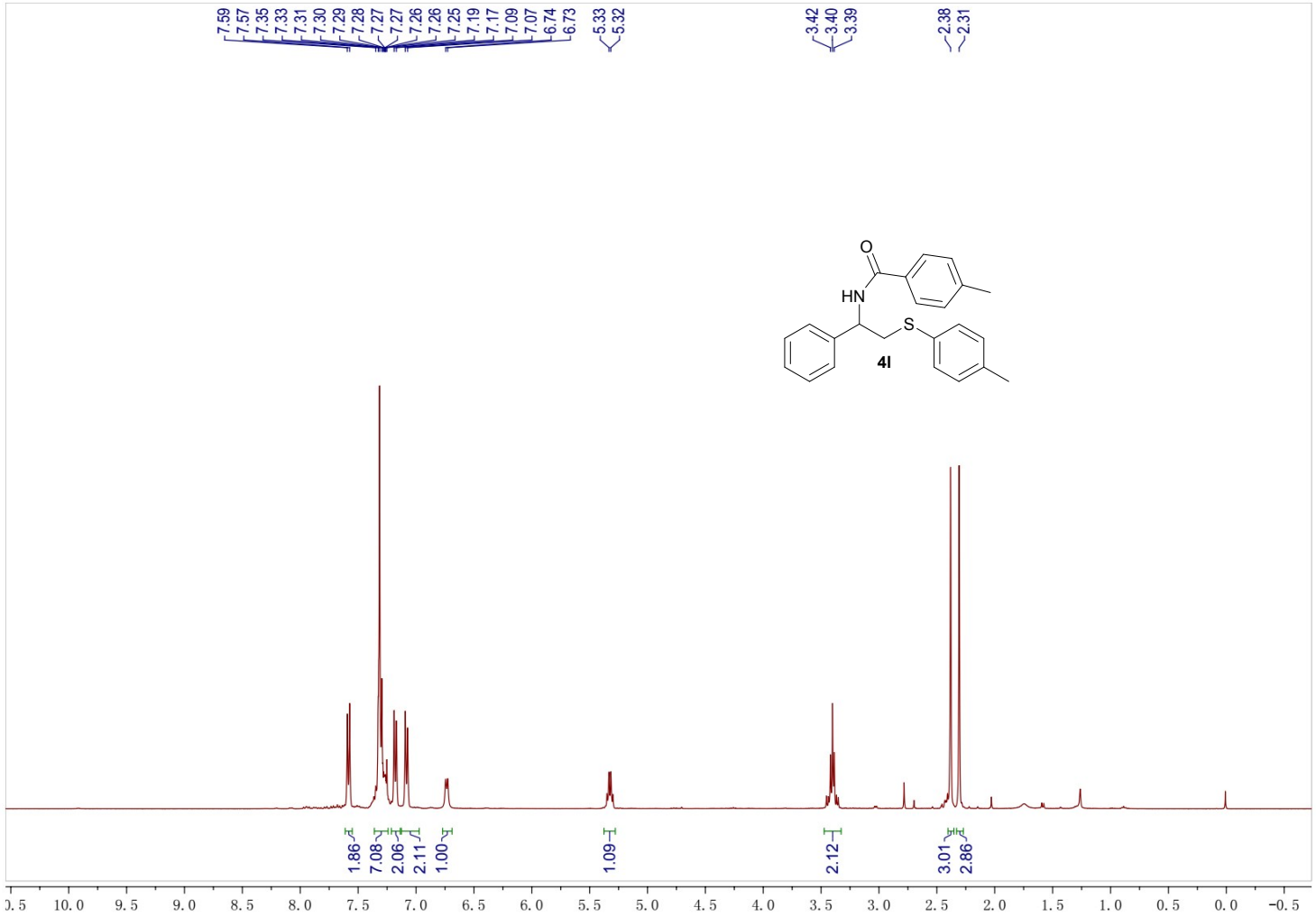
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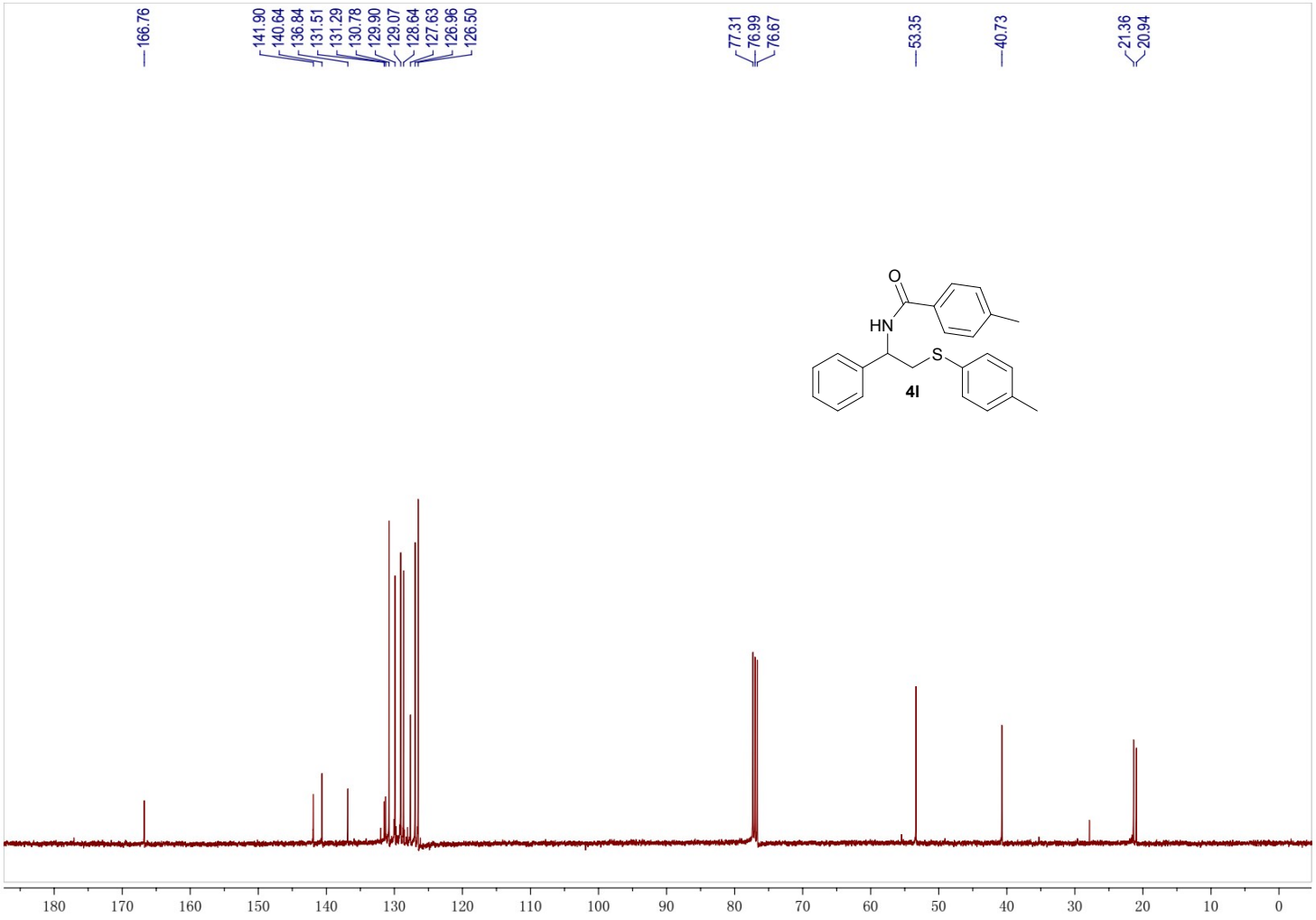
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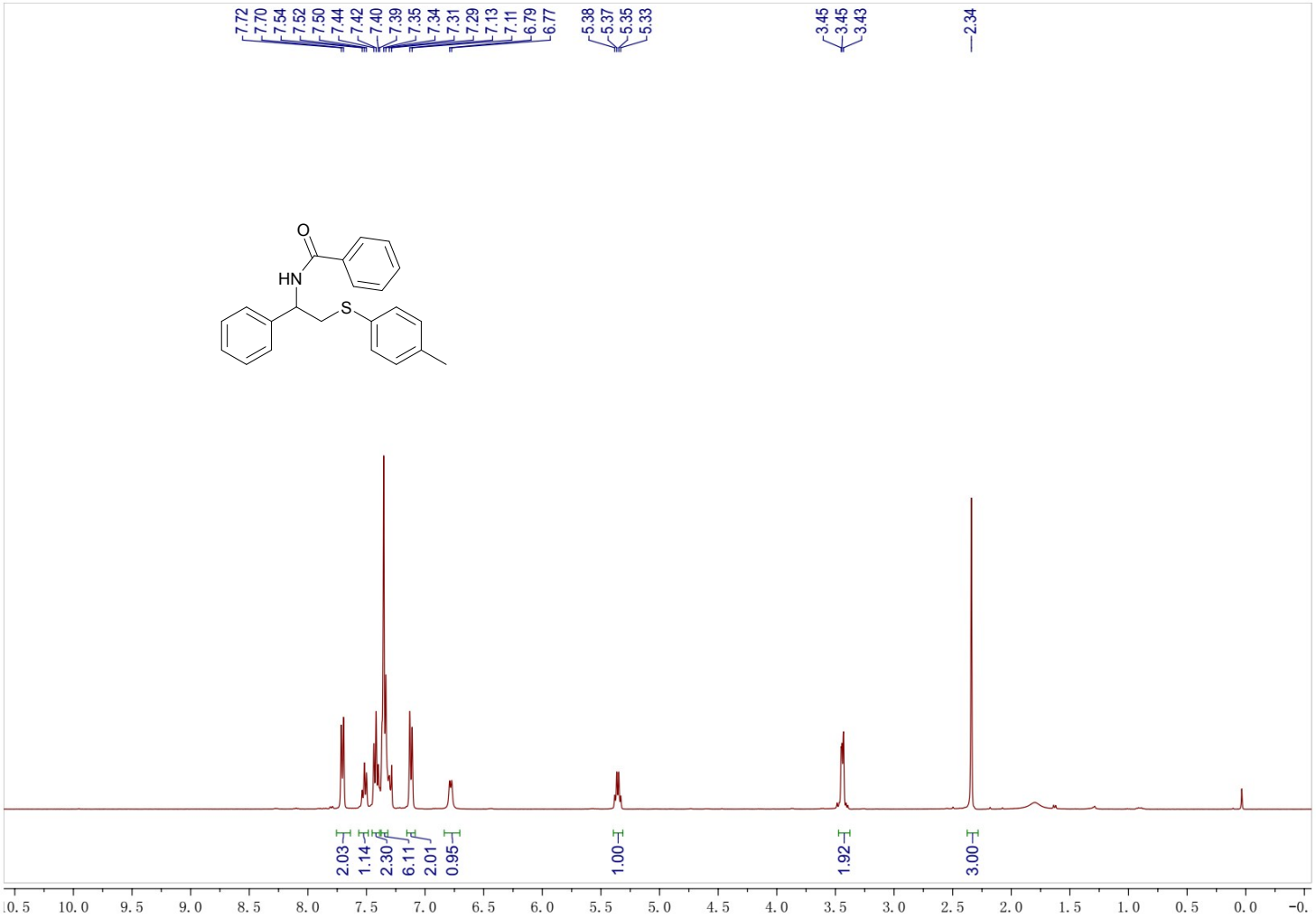
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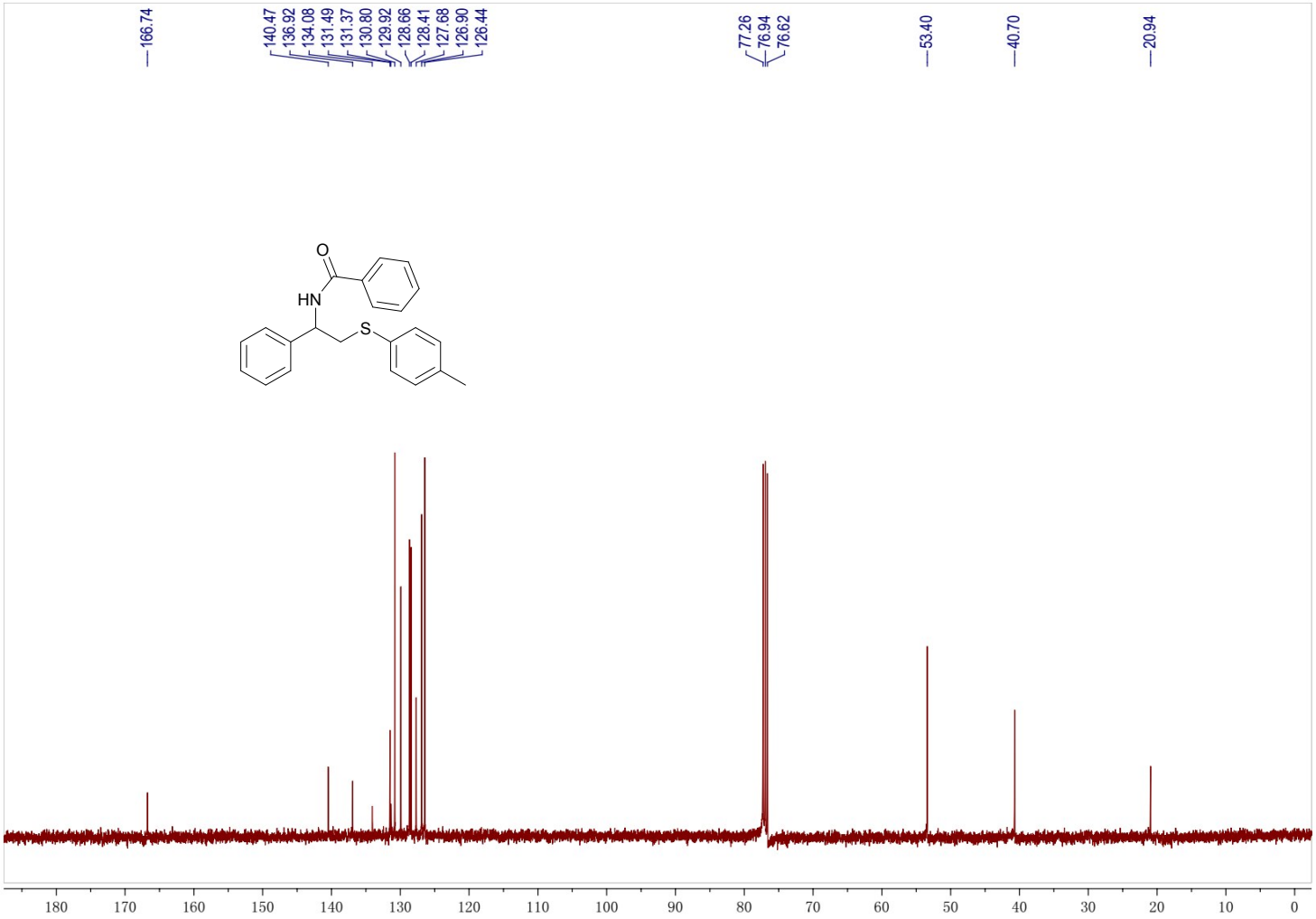
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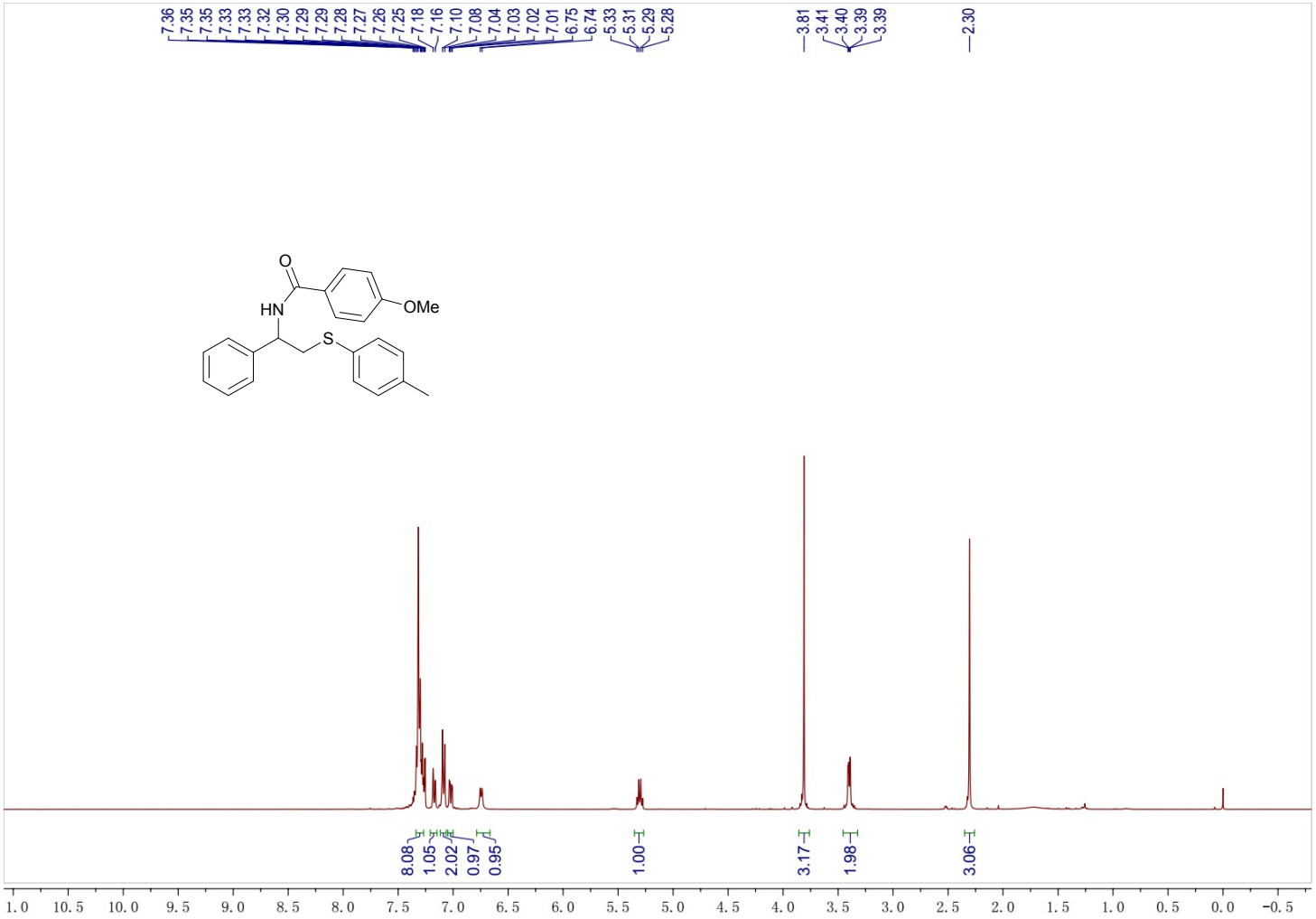
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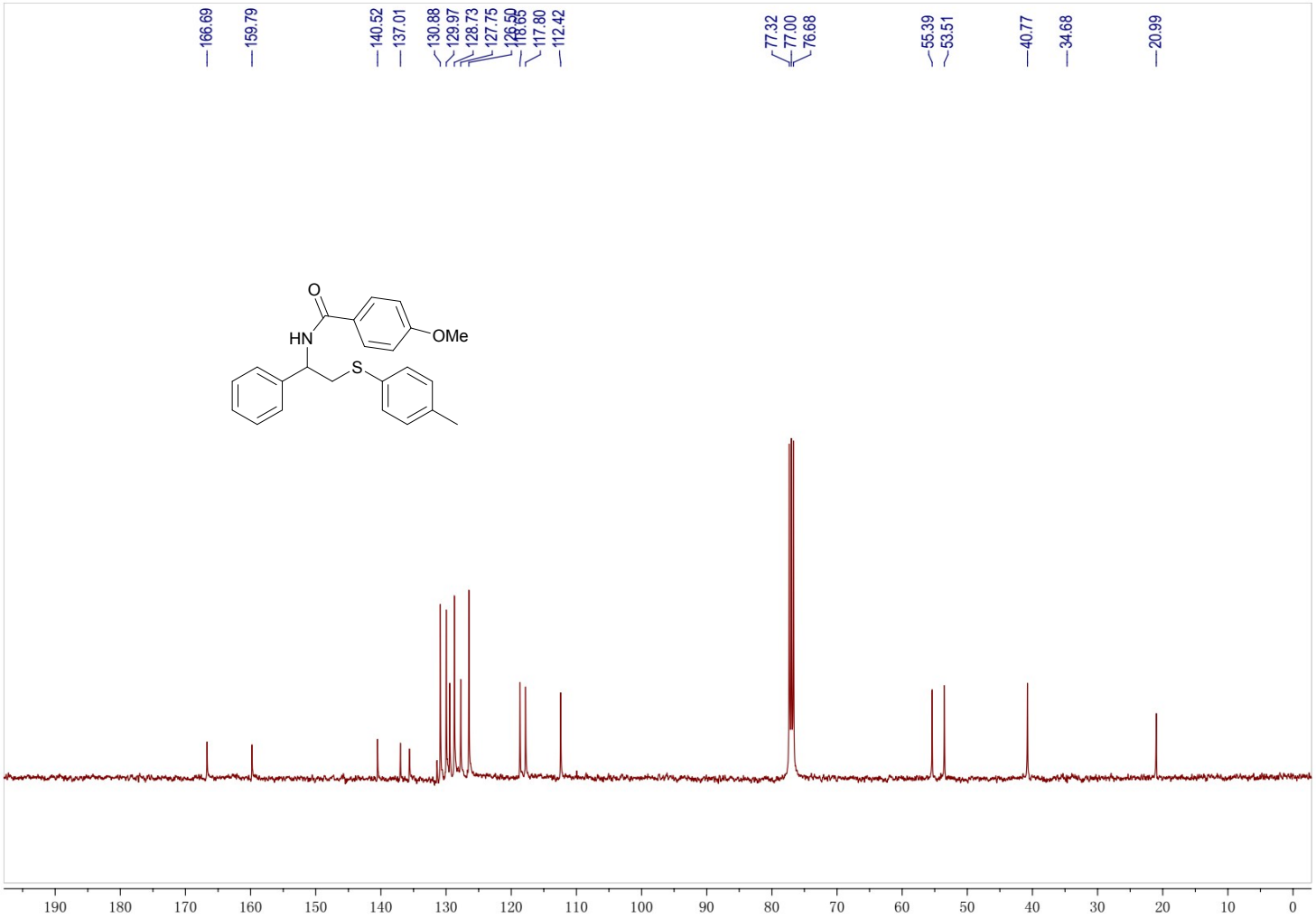
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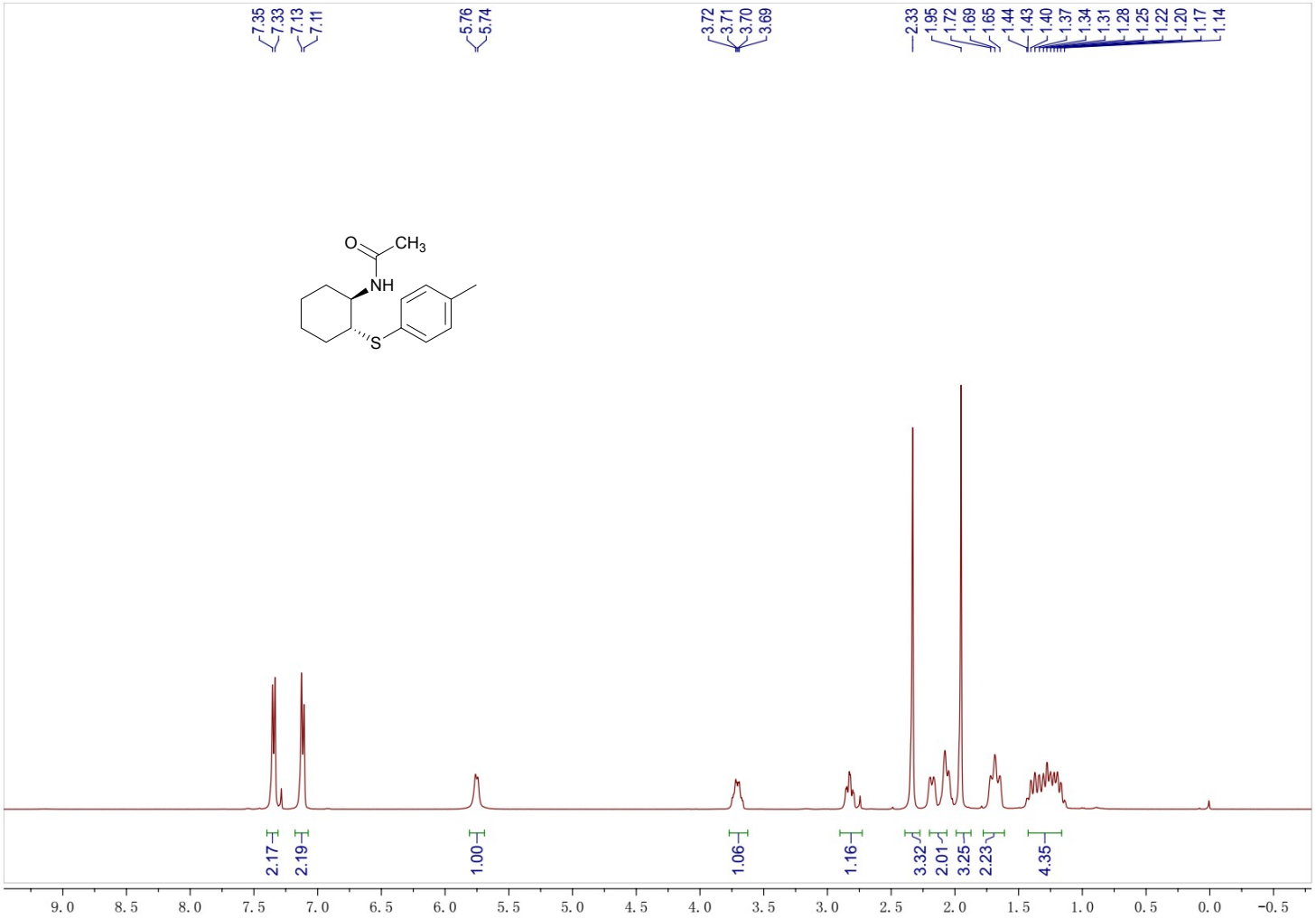
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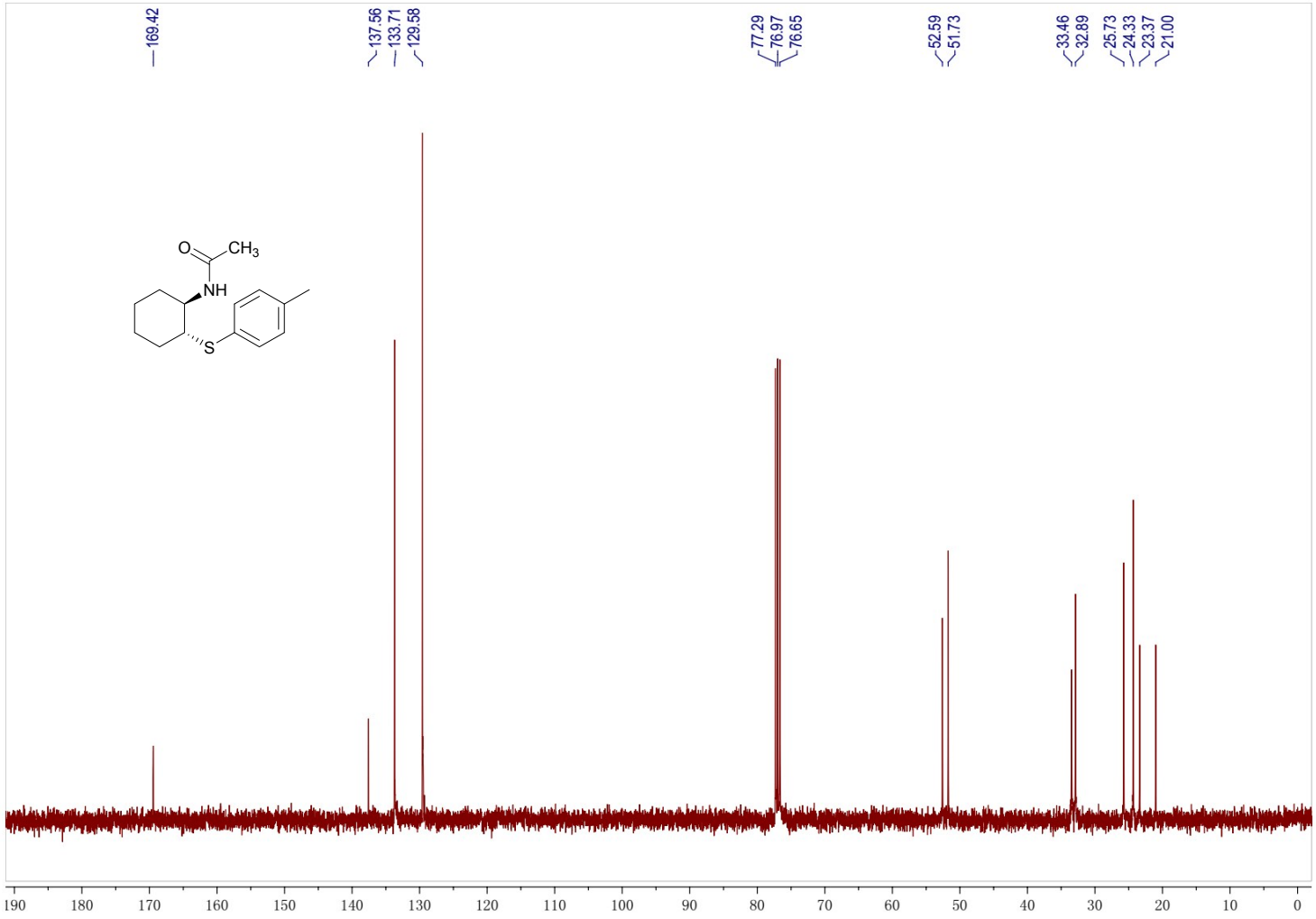
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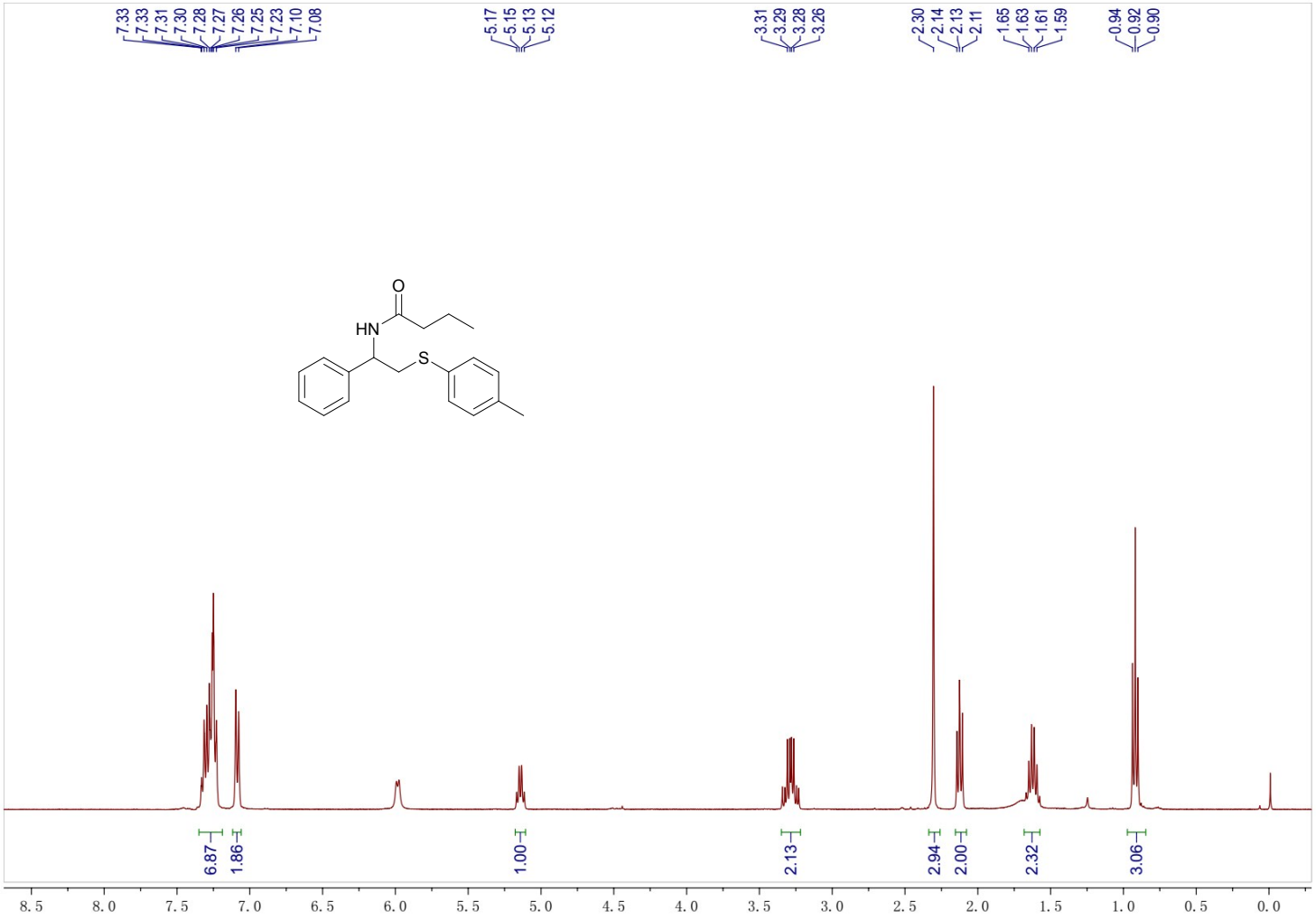
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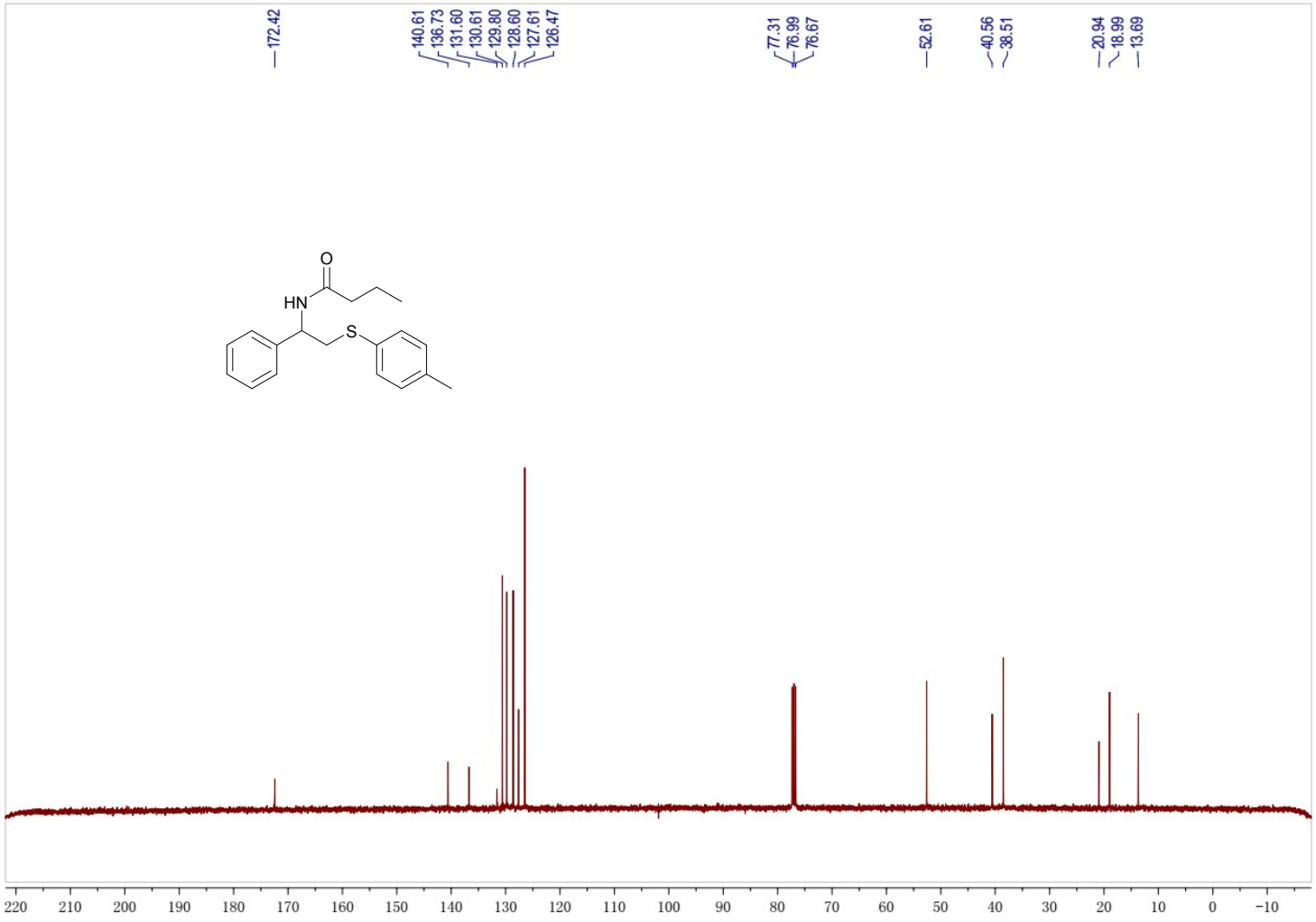
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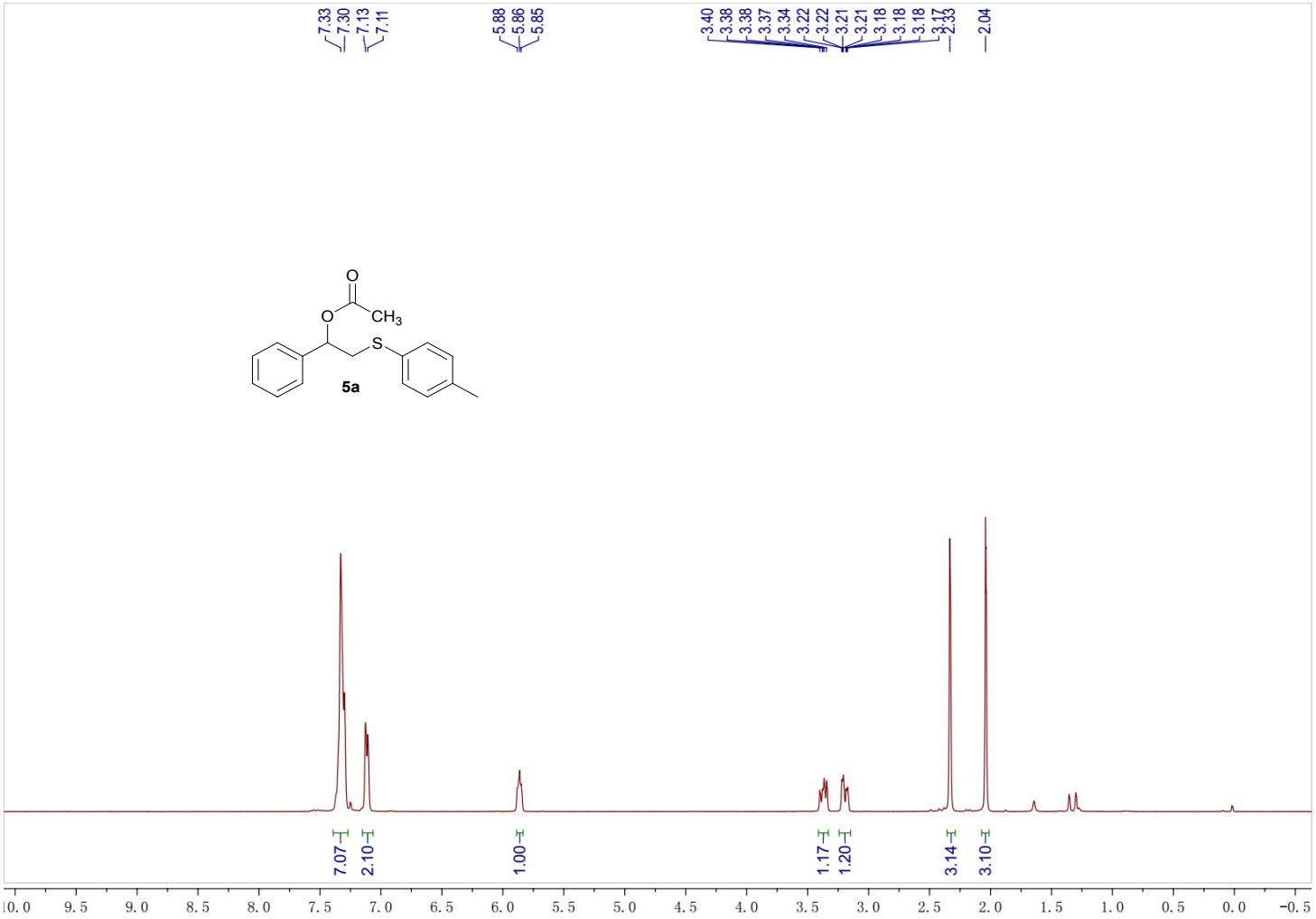
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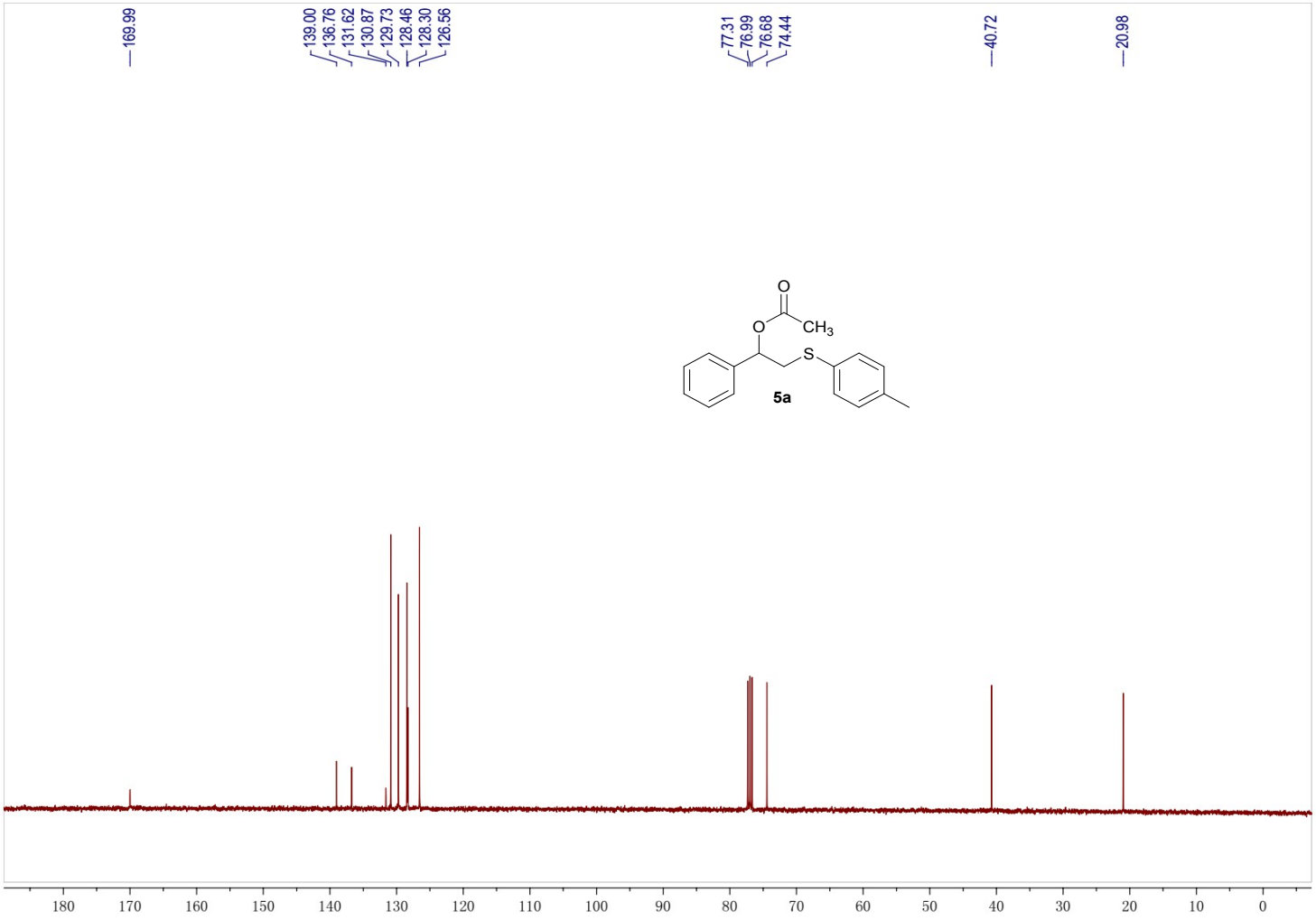
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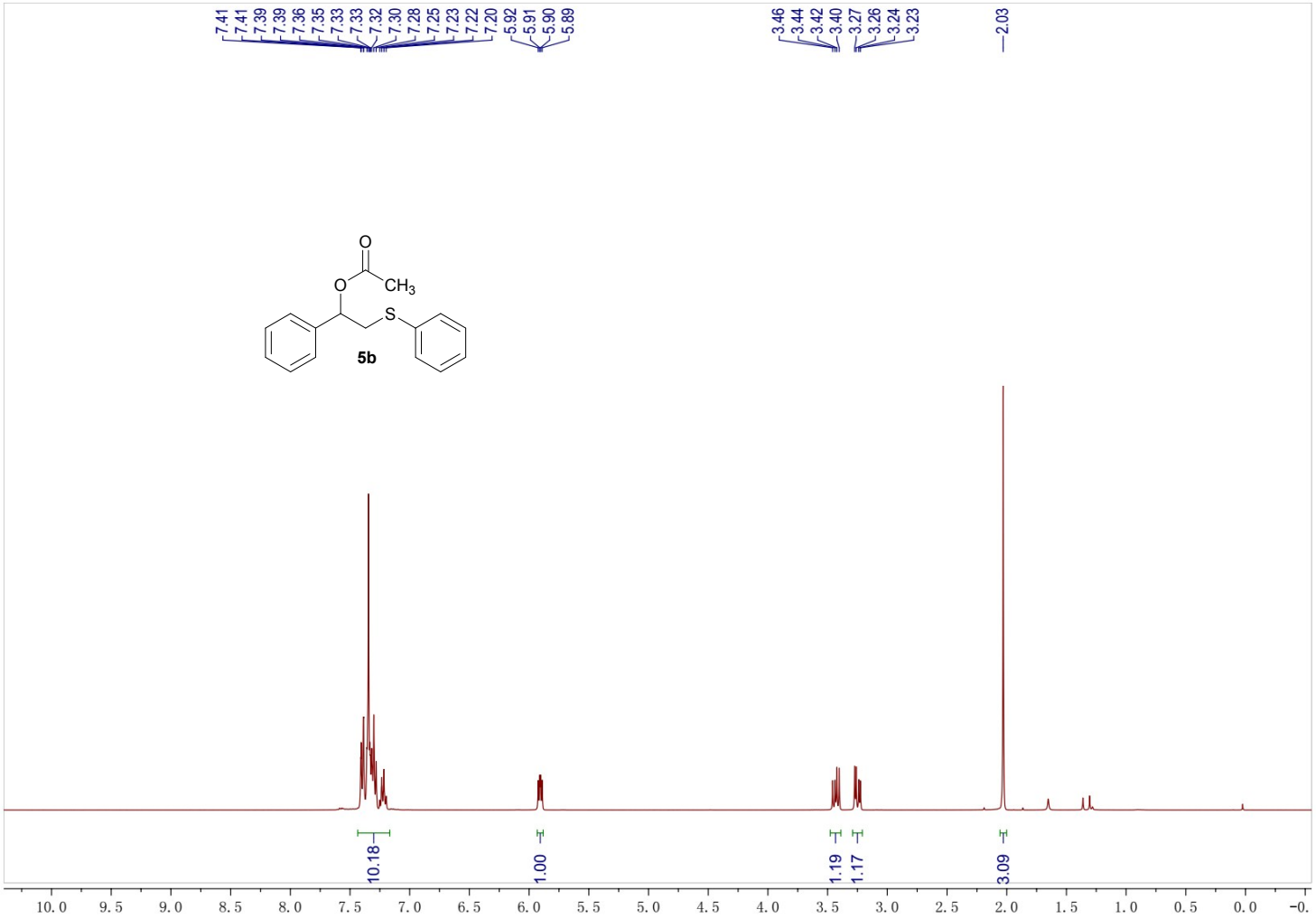
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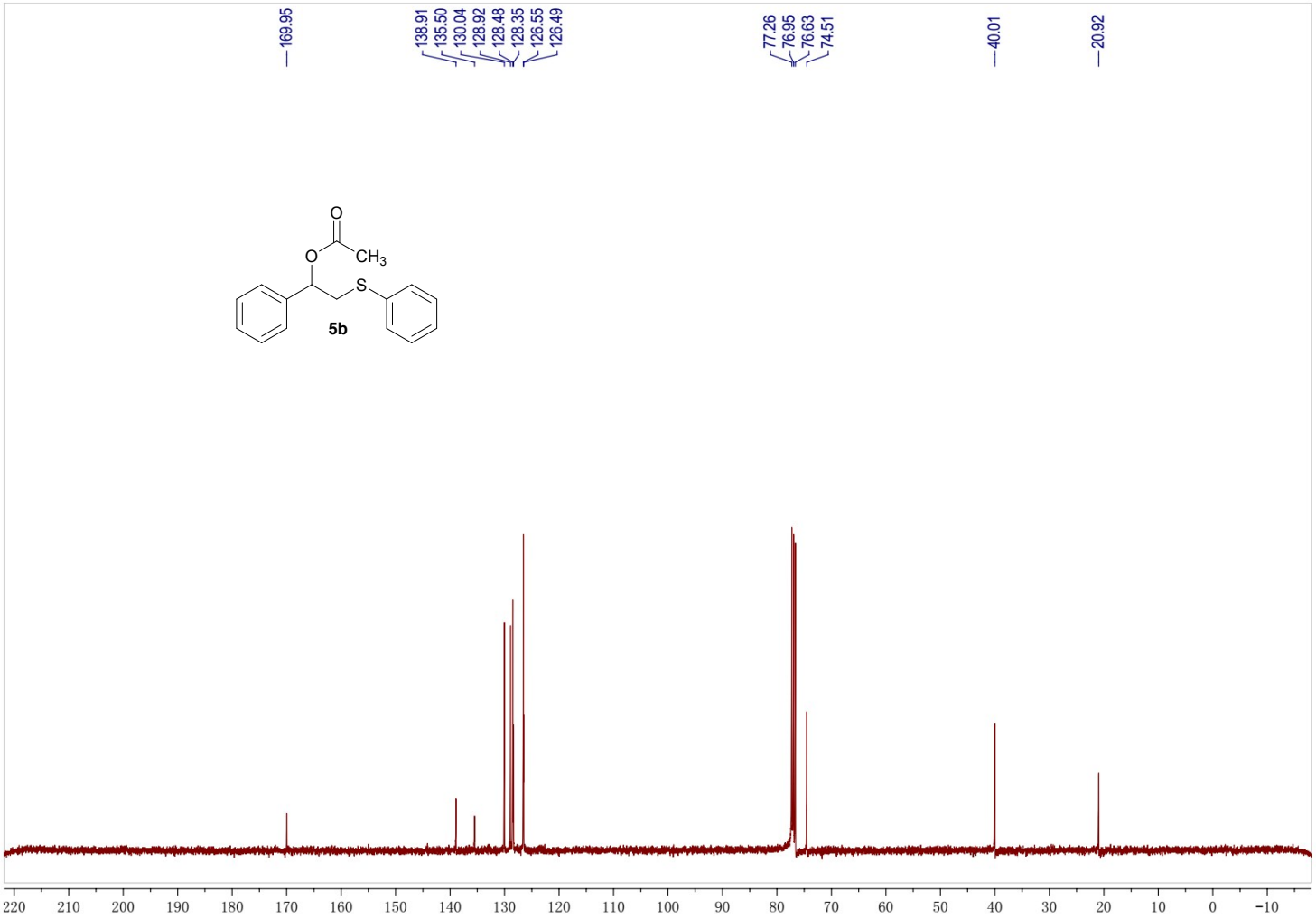
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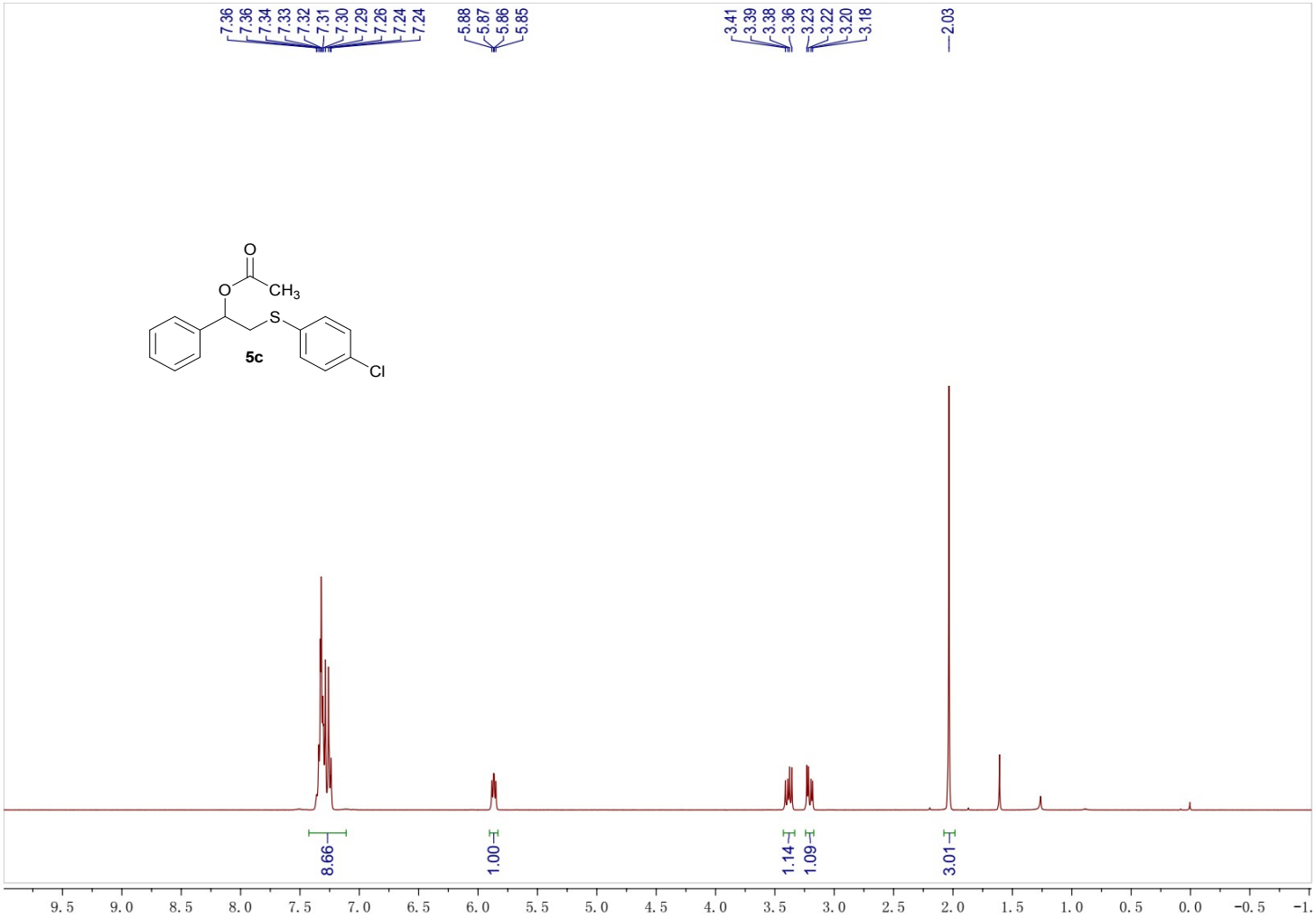
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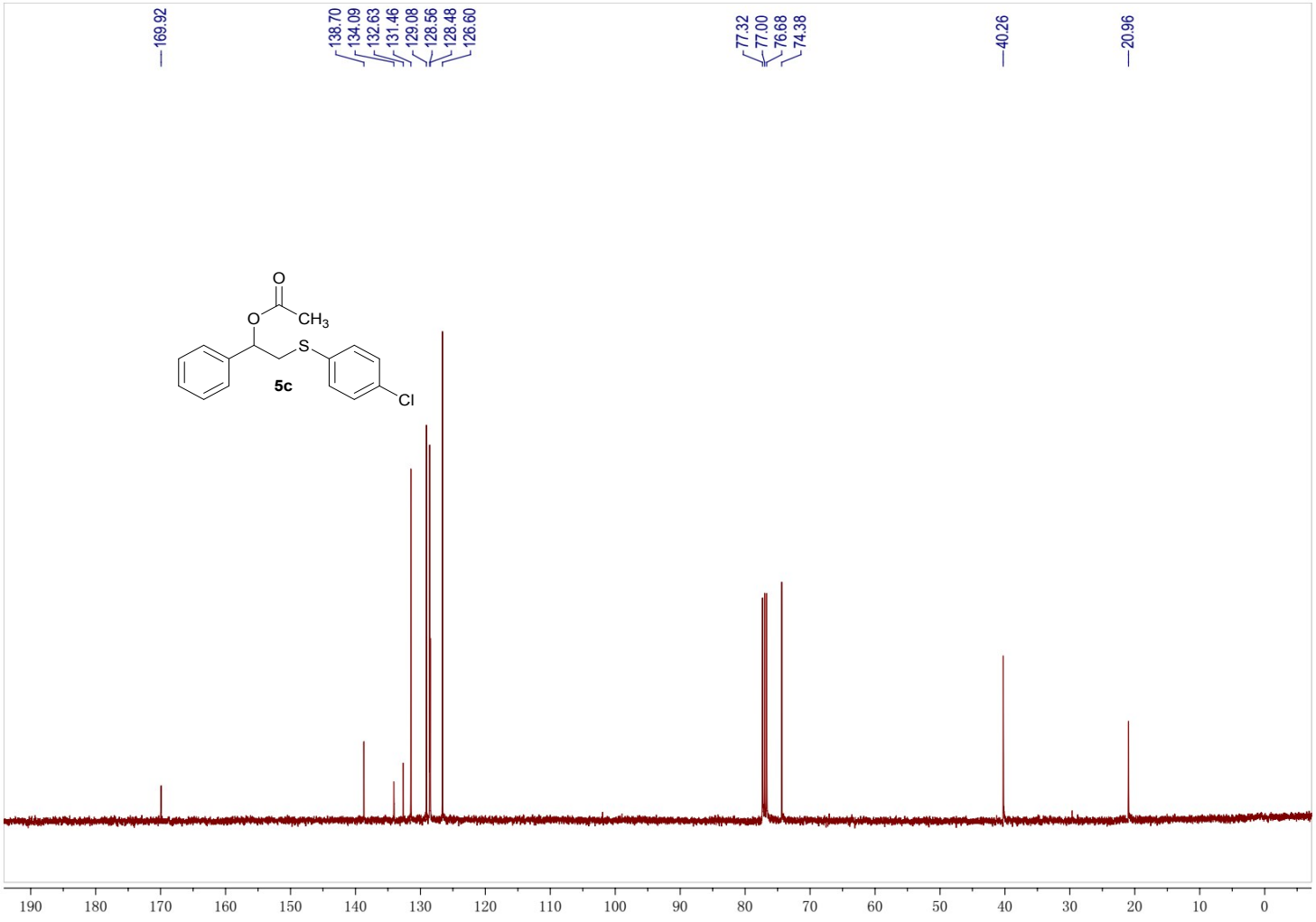
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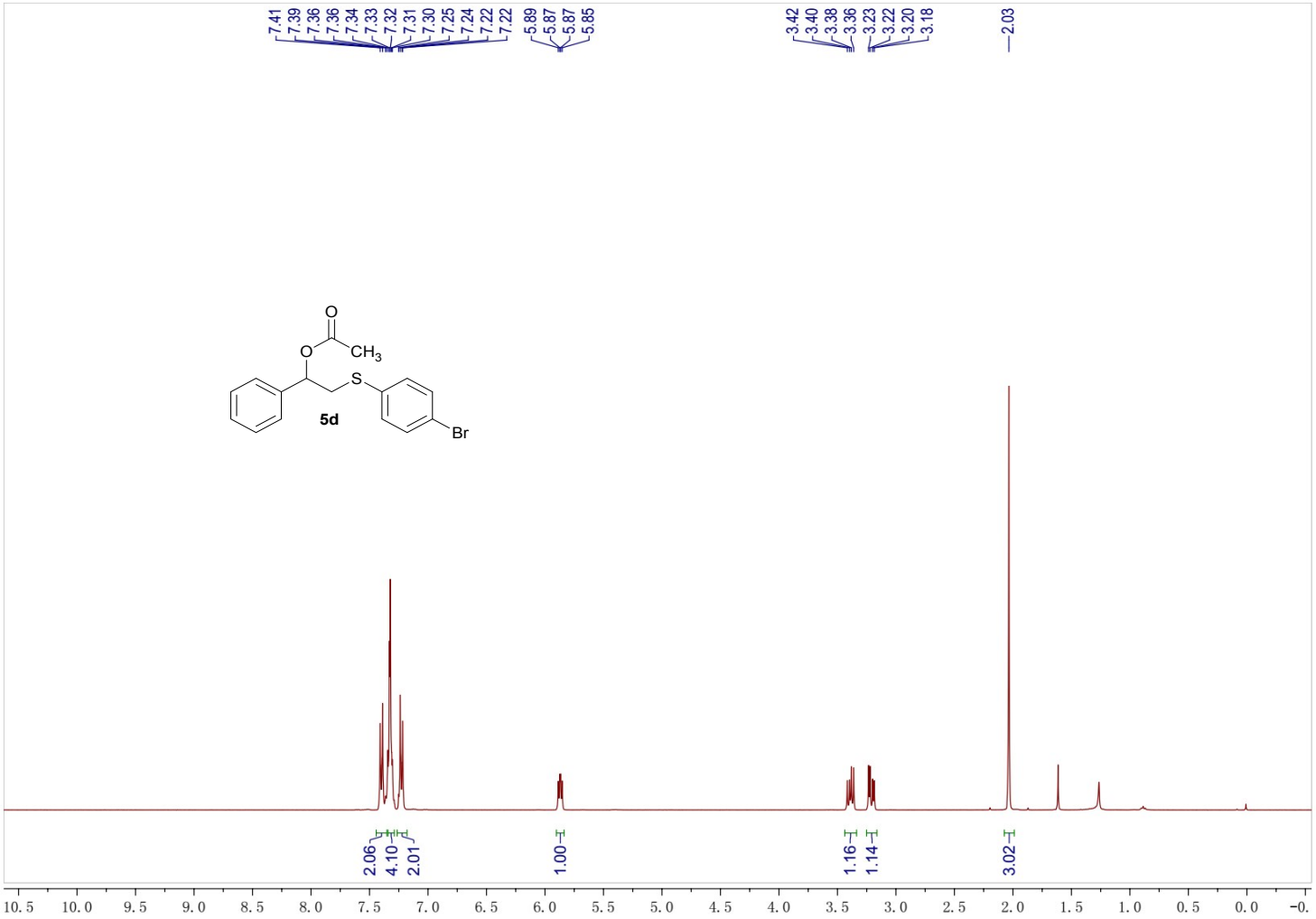
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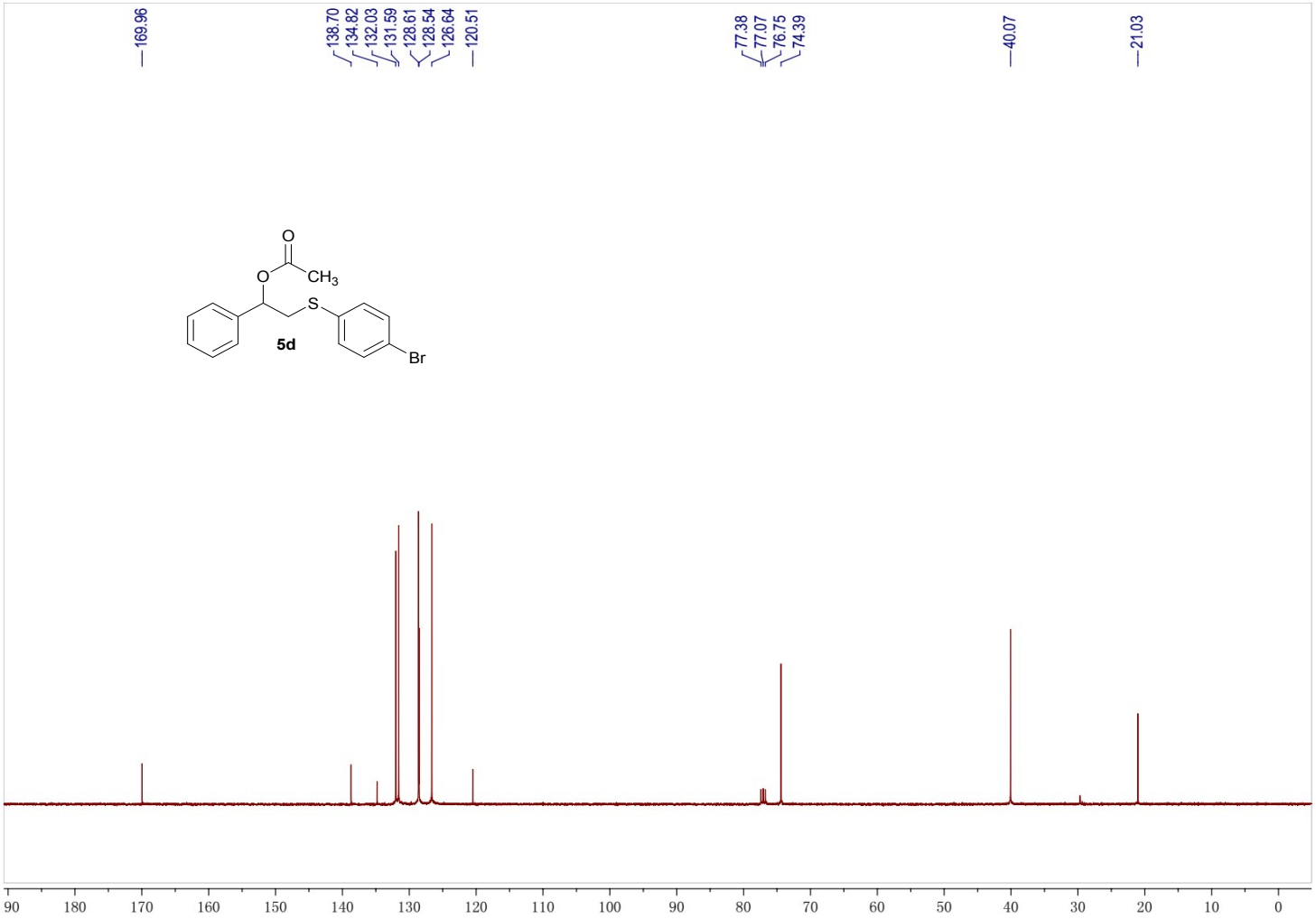
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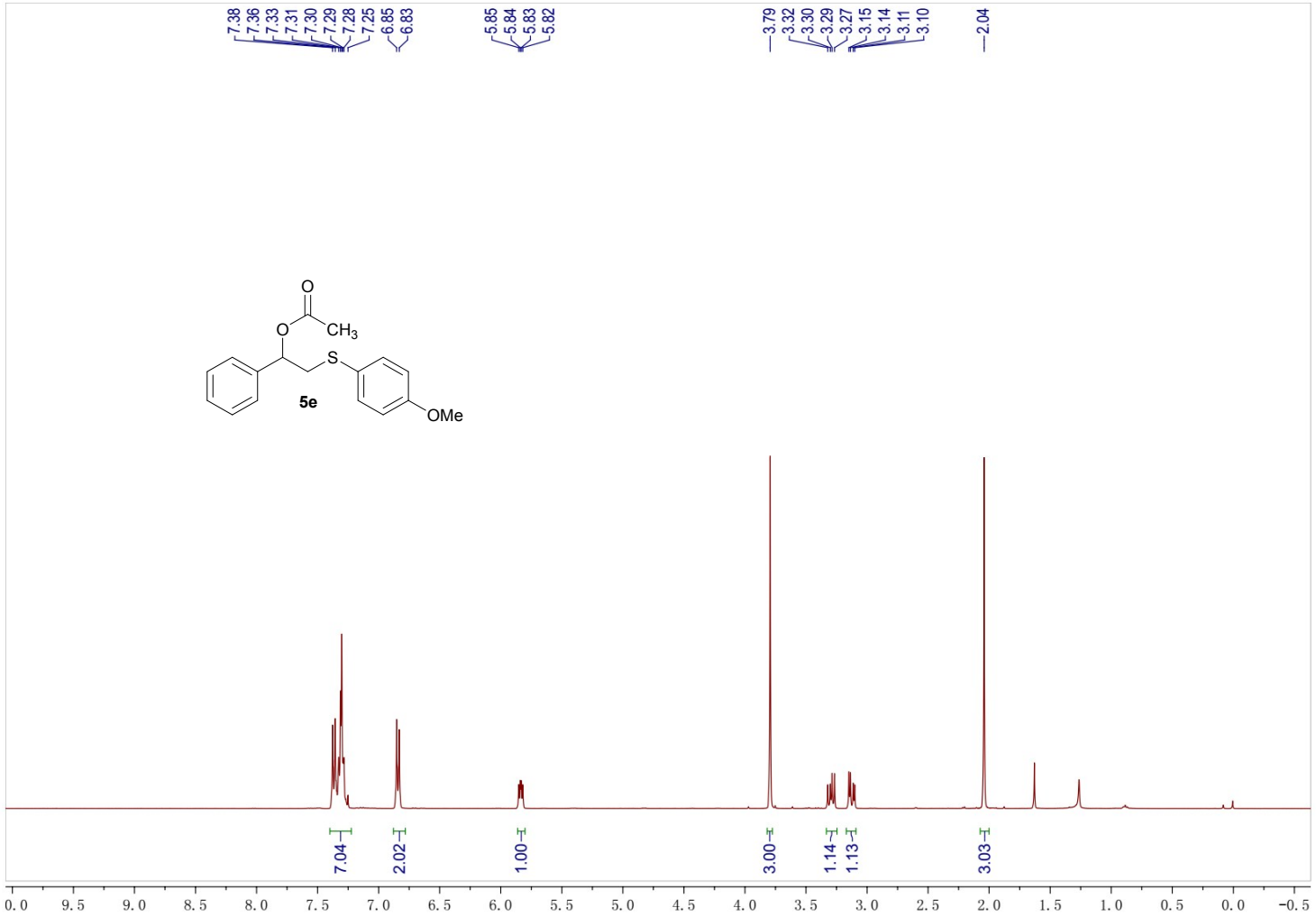
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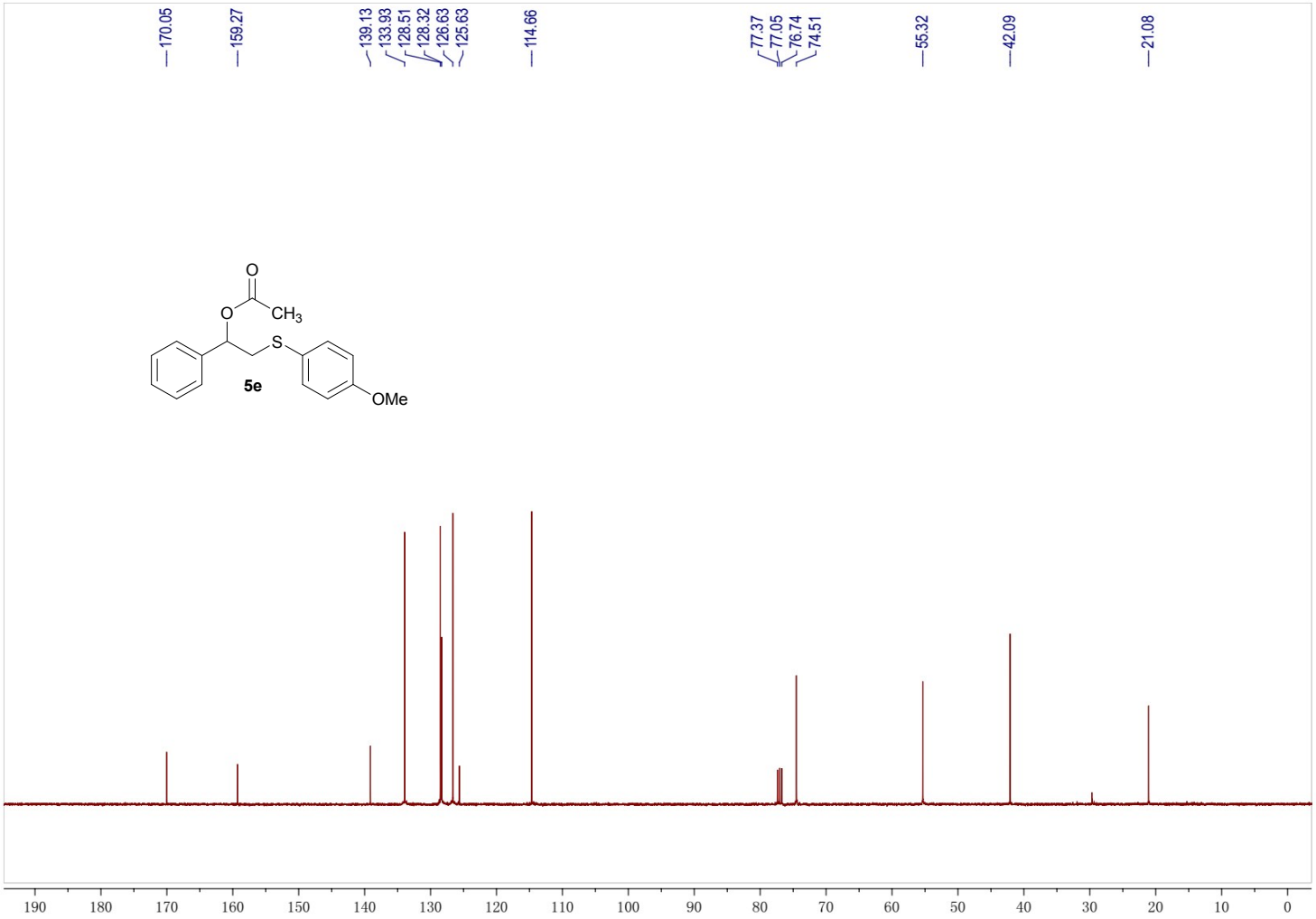
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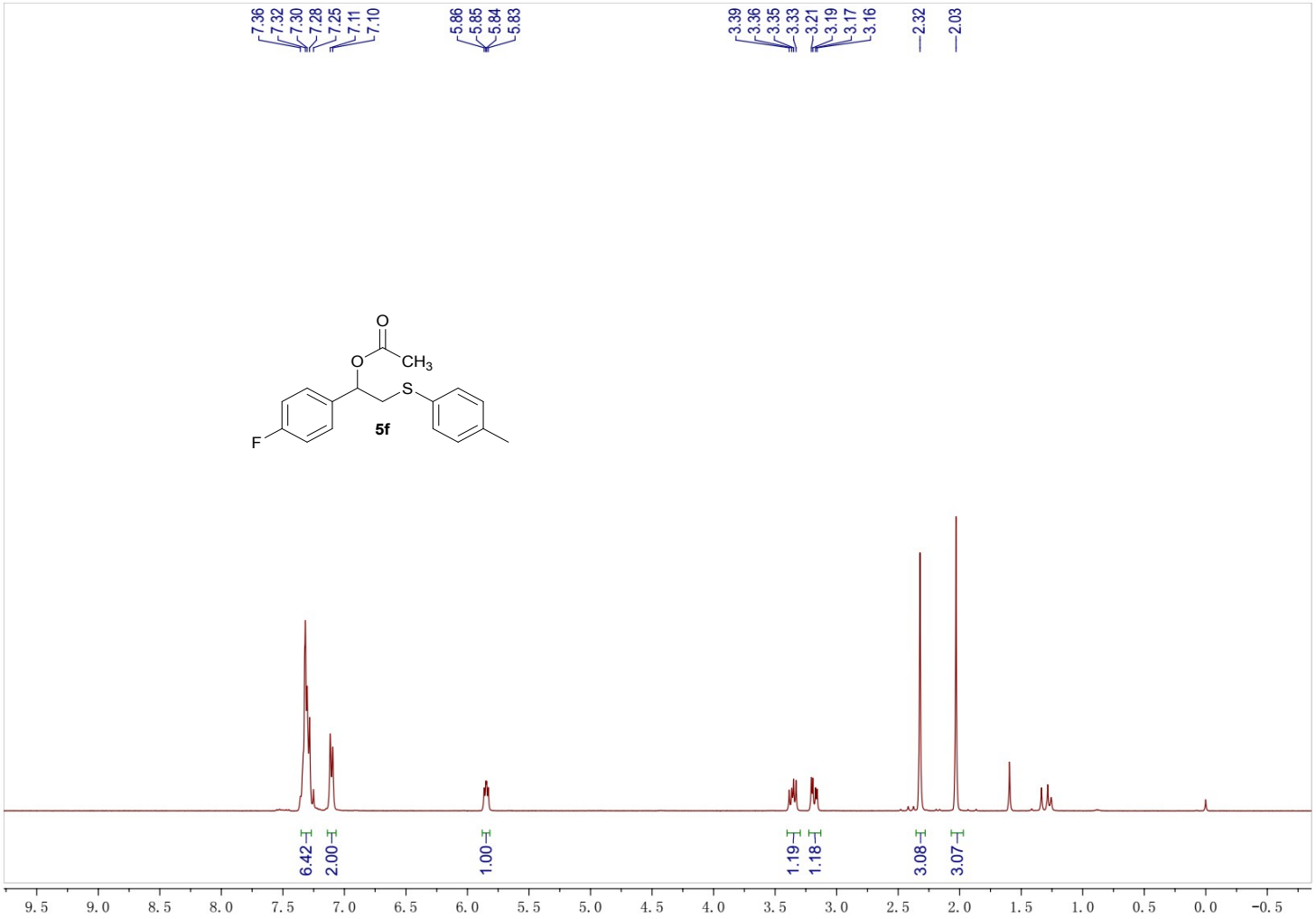
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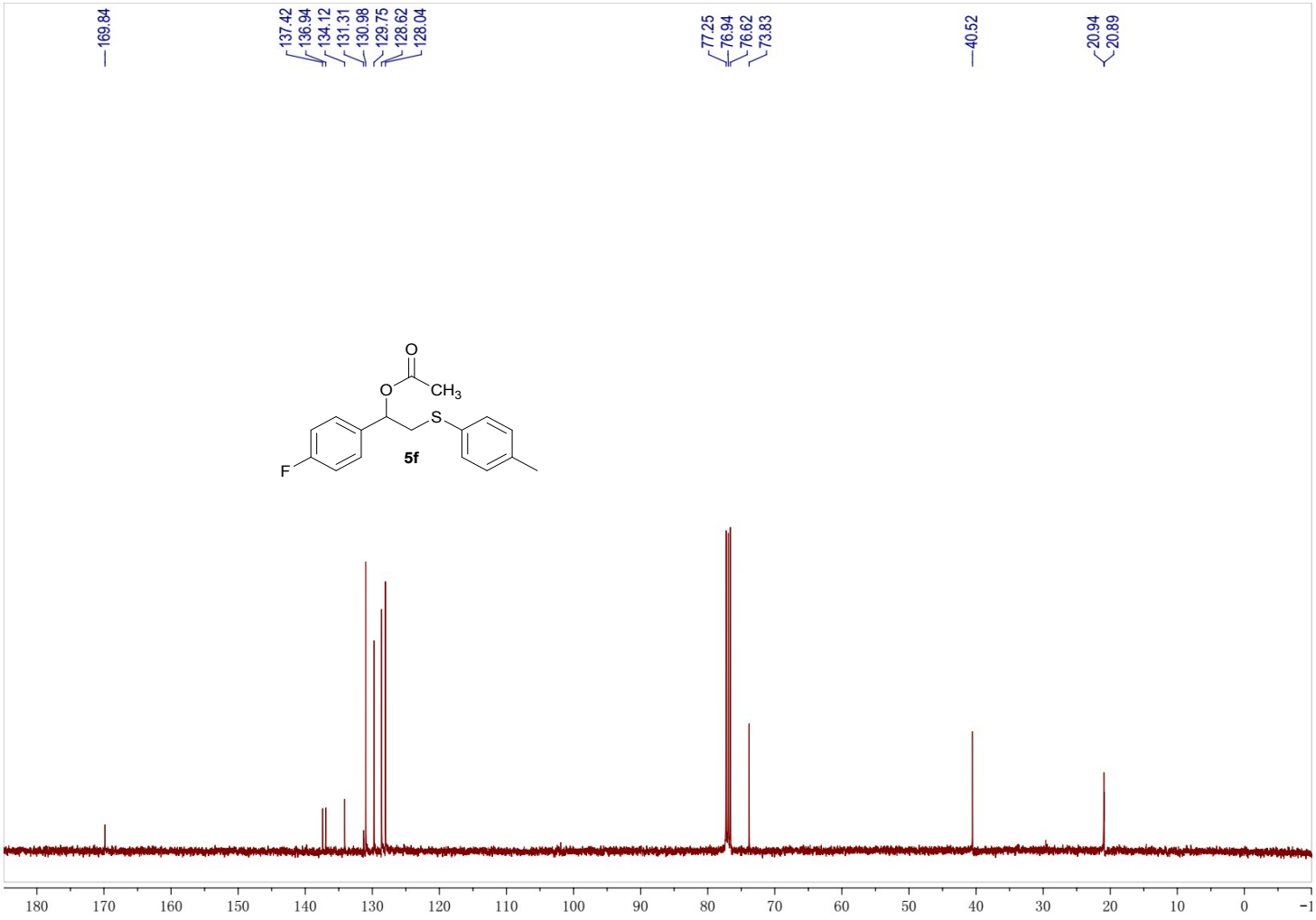
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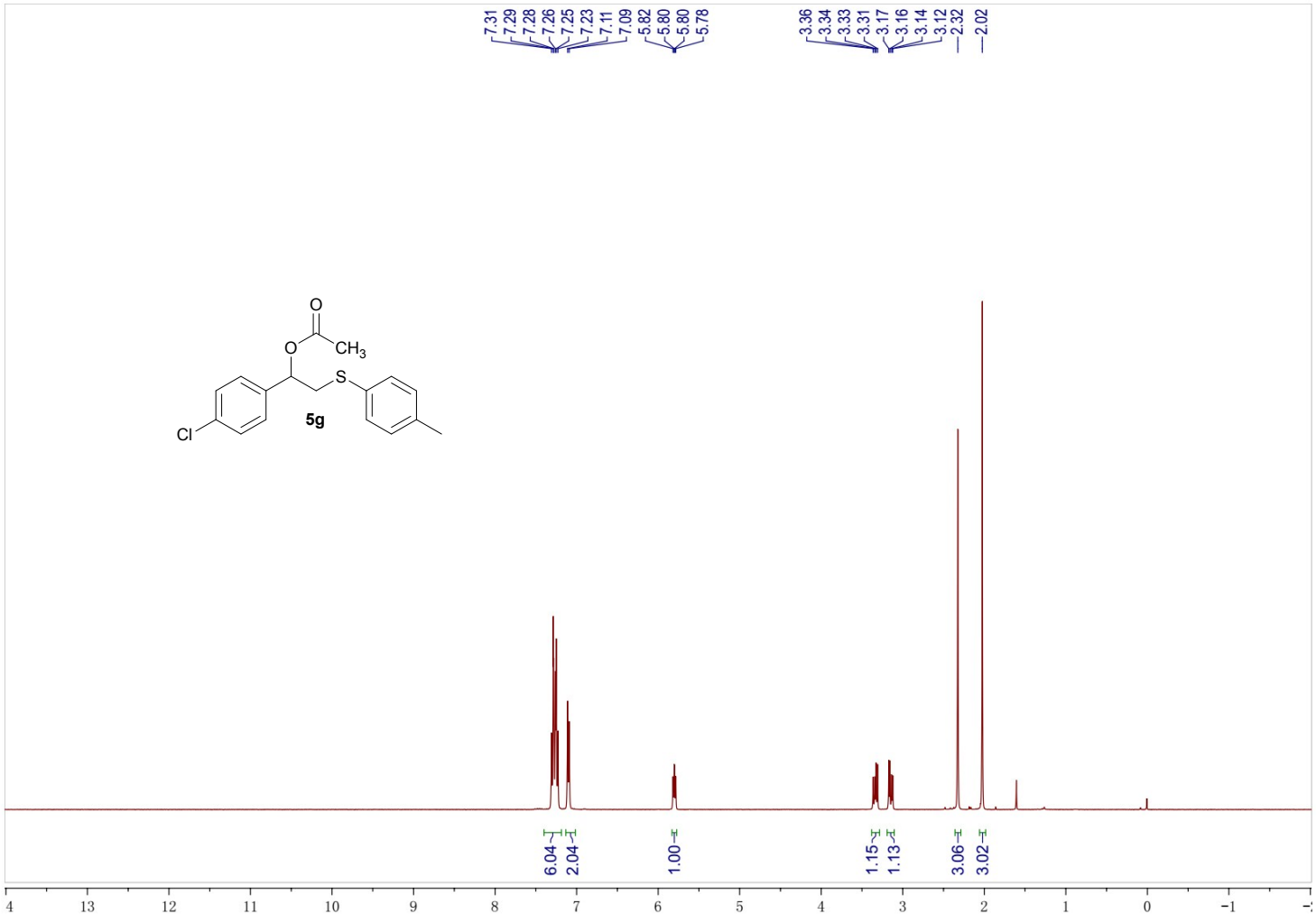
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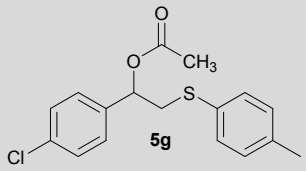

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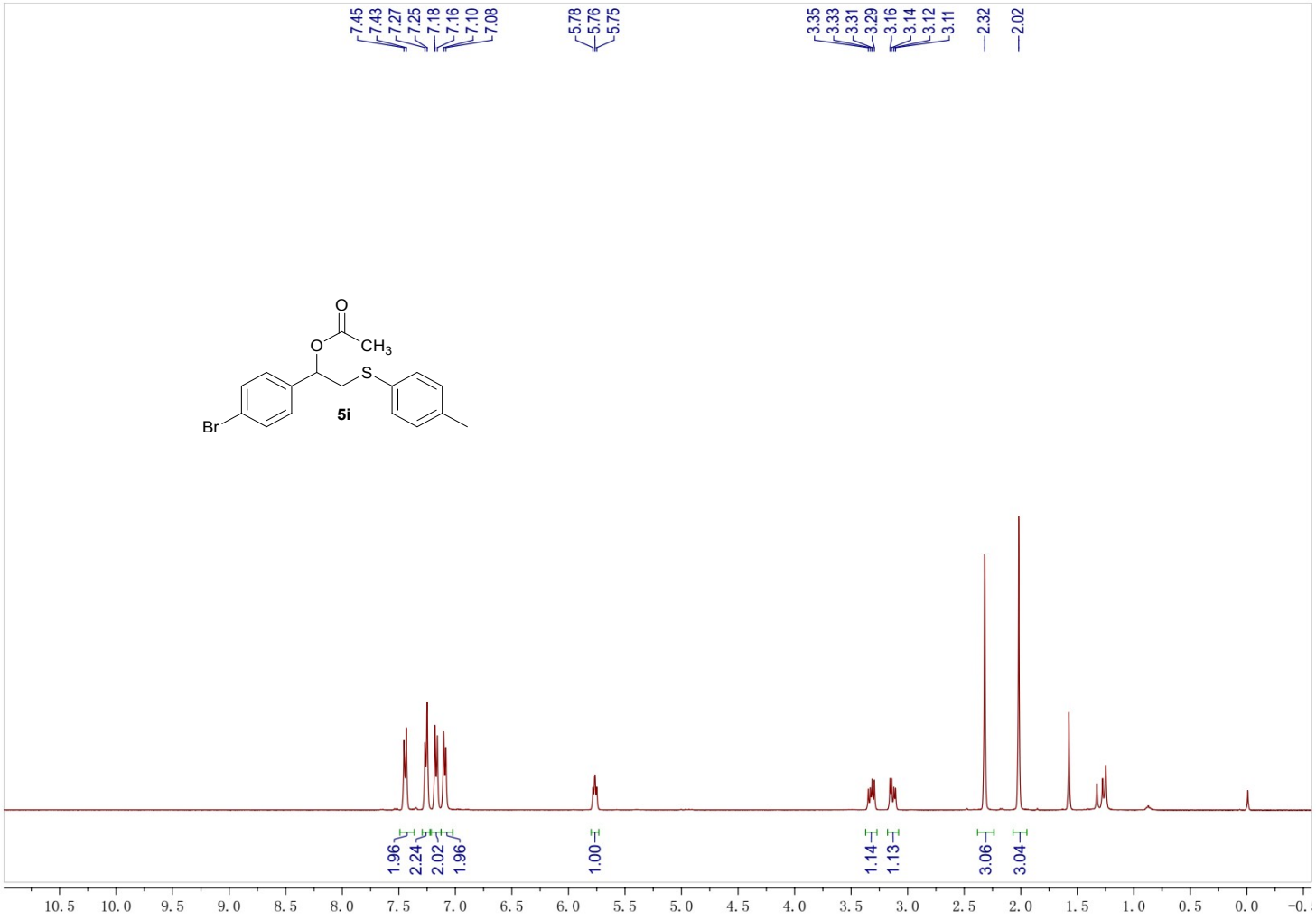
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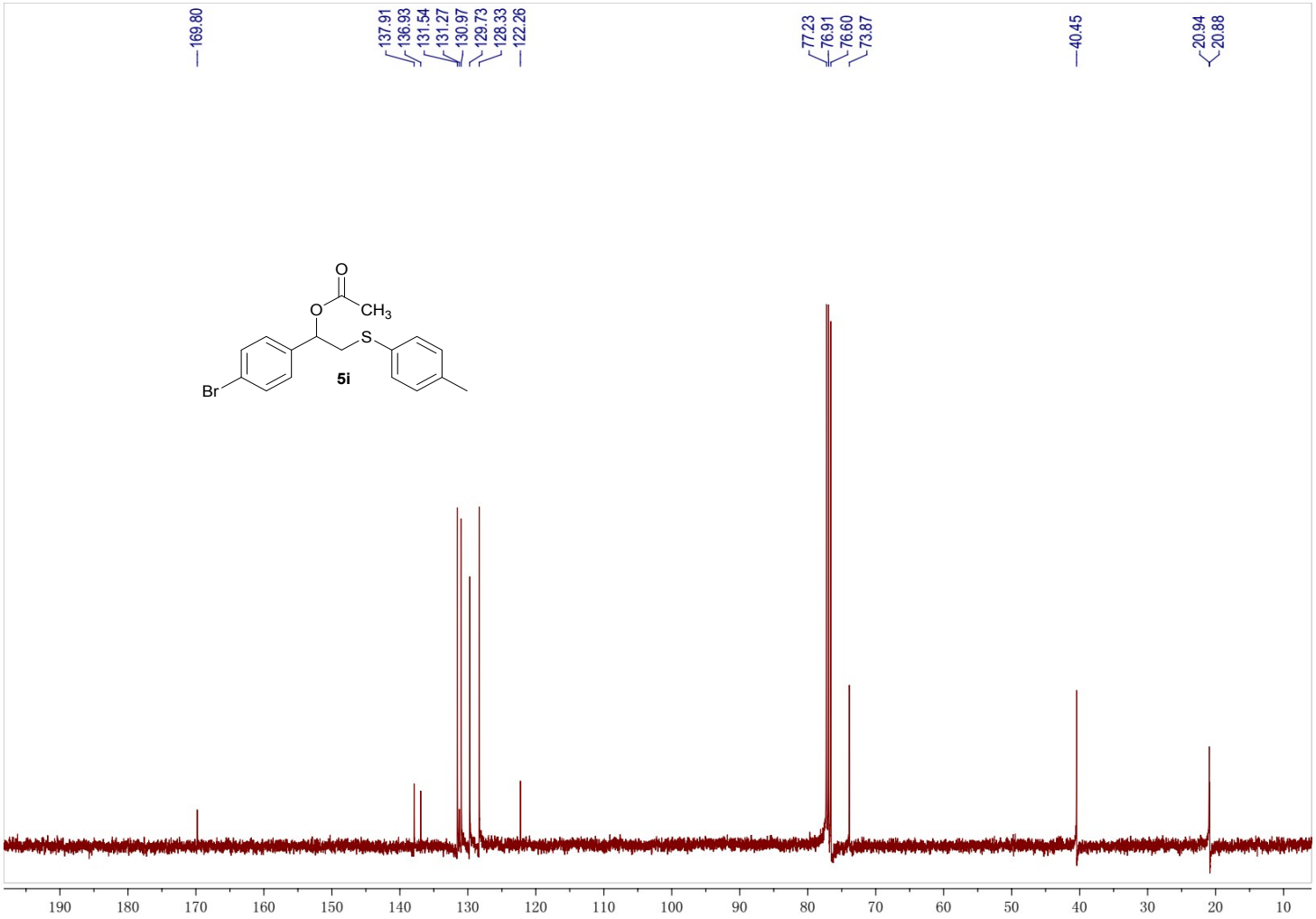
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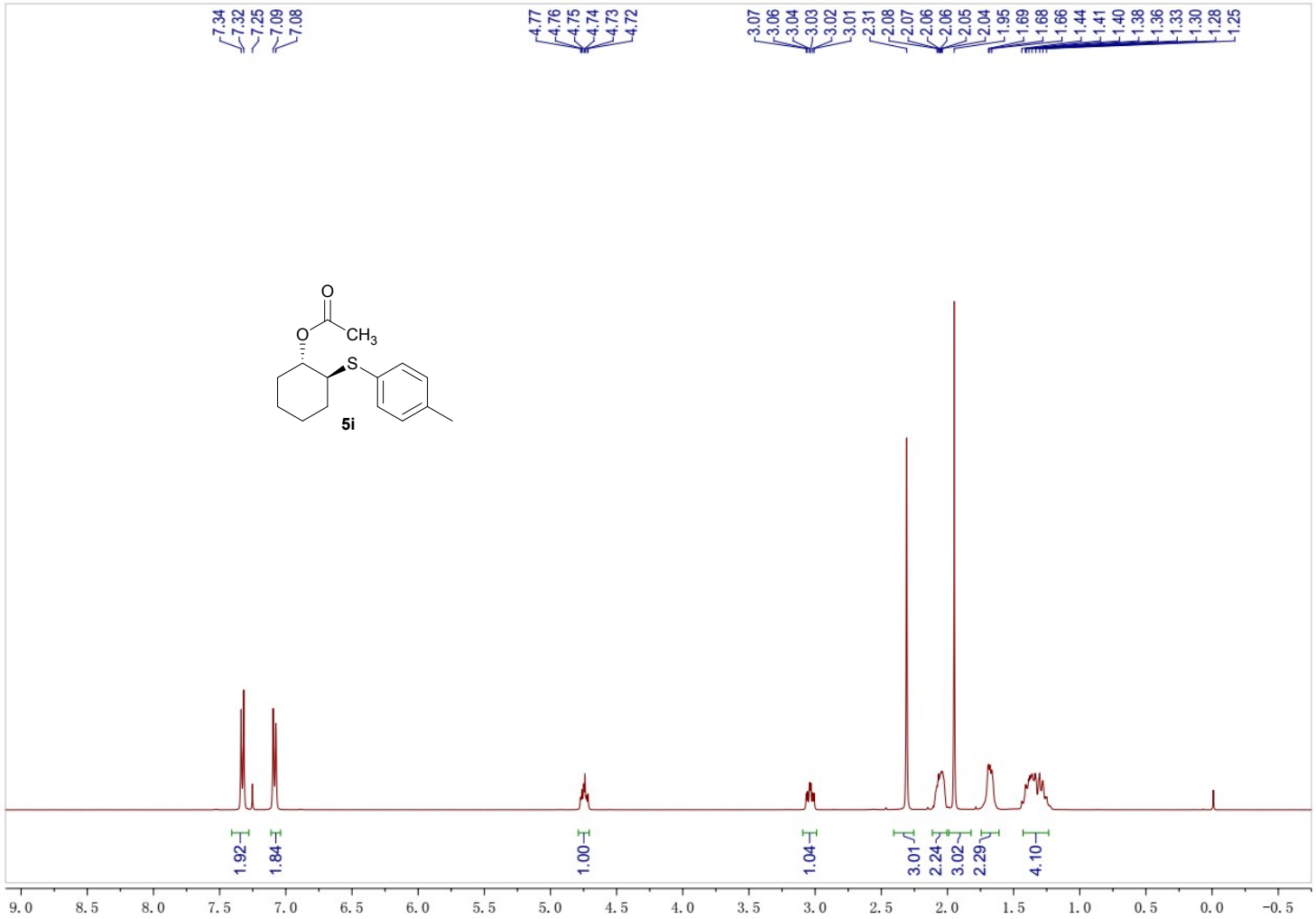
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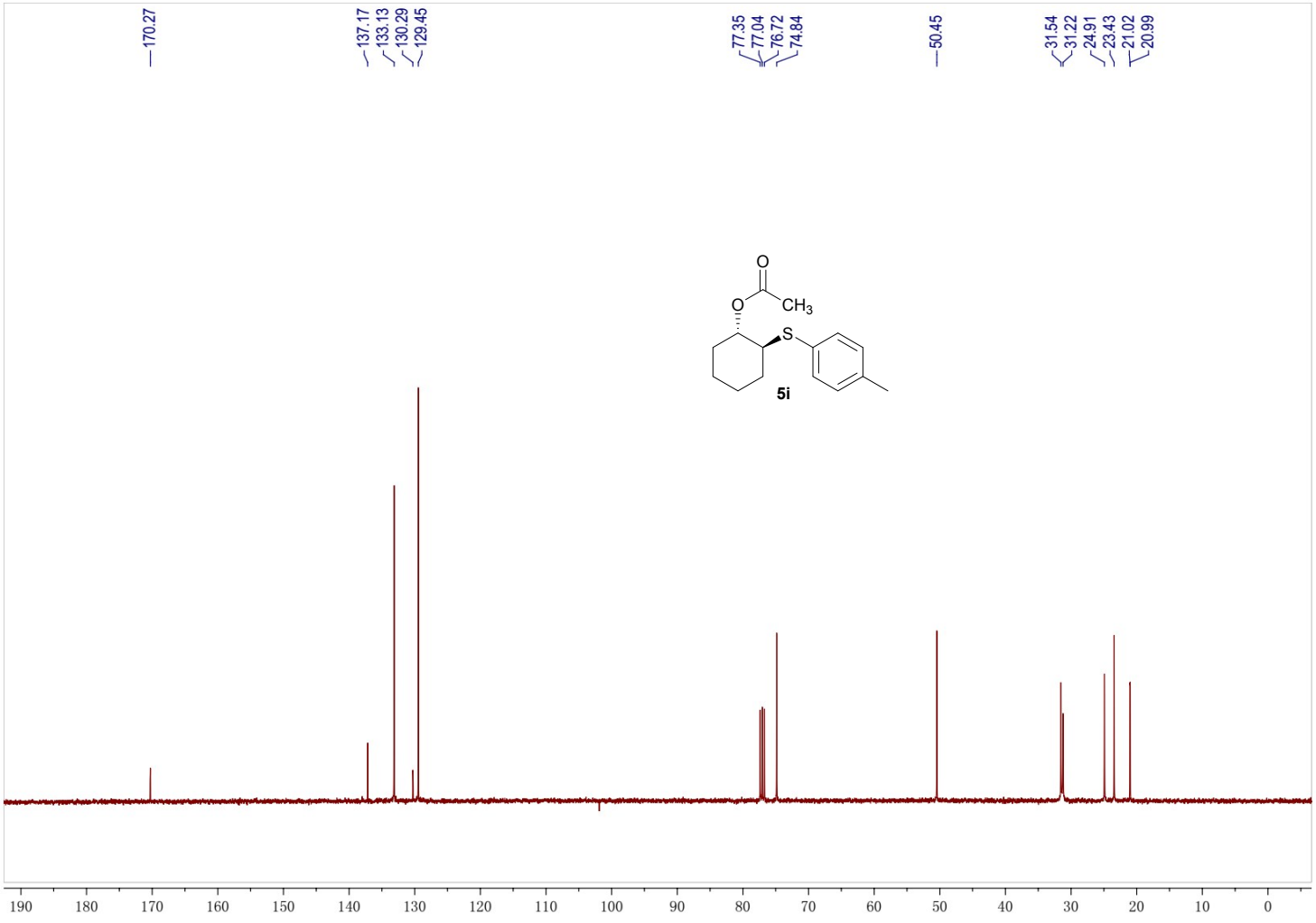
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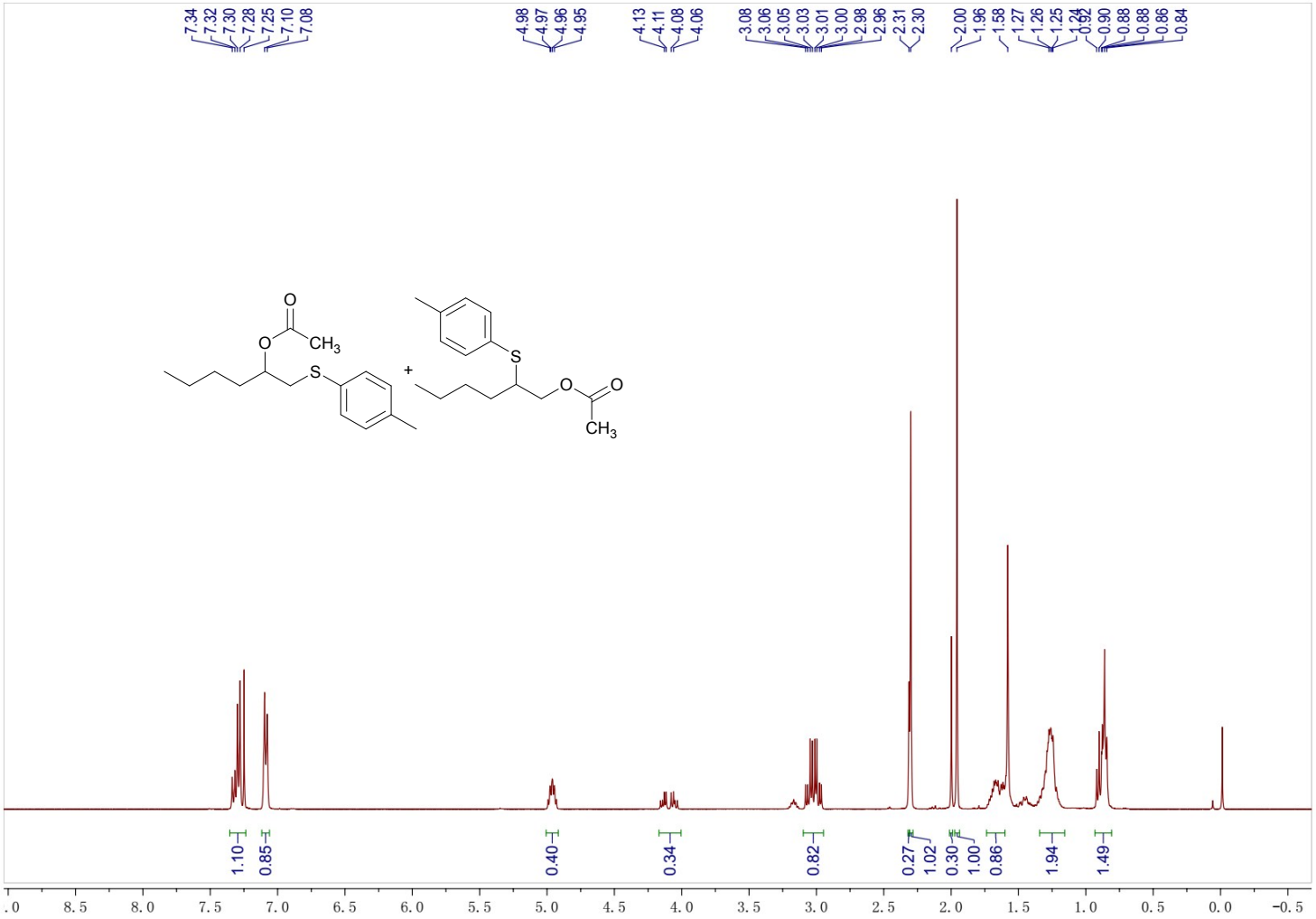
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