Supporting Information *for*

A Quick, Mild and Efficient Bromination Using CFBSA/KBr System

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1.General Information

All the starting chemicals were commercially available and used without further purification. Substrates were purchased from Energy chemical Co. Ltd. and Damas-beta Co. Ltd. Fluorinating reagents (Selectfluor) were purchased from Shanghai Science Bio-pharmaceutical Co. Ltd. Flash column chromatography was performed using silica gel (300-400 mesh). All ^{1}H NMR spectra were recorded on a Bruker spectrometer at 400 MHz. The ^{19}F NMR spectra were recorded on a Bruker spectrometer at 376 MHz. The ^{13}C NMR spectra were recorded on a Bruker spectrometer at 100 MHz. Chemical shifts (δ value) were reported in ppm down field from internal tetramethylsilane (TMS). *J* values are reported in Hz. IR spectrum (Film) were recorded on a Nicolet 6700 spectrophotometer in the range of 400~4000 cm^{-1}. HRMS (EI) Ms Spectra were recorded on a Waters GCT Premier msspectrometer with electron impact.

2.Typical procedures

Standard procedure for the bromination of 1,3-diketones and β-keto esters: To a mixture of CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) in acetonitrile (8 mL) with stirring for 10 min at room temperature. Then carbonyl compounds (1.0 mmol, 1.0 eq.) were added to it with stirring at room temperature. The reaction was monitored by thin layer chromatography until completion. After the complete conversion of starting material, the mixture was evaporated under reduced pressure. The residue was purified by column chromatography on silica gel.

Standard procedure for the bromination of heterocycles: To a mixture of CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) in acetonitrile (8 mL) with stirring 10 min at room temperature. Then heterocycles (1.0 mmol, 1.0 eq.) were added to it with stirring at room temperature. The reaction was monitored by thin layer chromatography until completion. After the complete conversion of starting material, the mixture was evaporated under reduced pressure. The residue was purified by column chromatography on silica gel.

Standard procedure for the bromination of aromatic amines: To a mixture of CFBSA (2.2 mmol, 2.2 eq.) and KBr (2.5 mmol, 2.5 eq.) in acetonitrile (8 mL) with stirring for 10 min at room temperature. Then aromatic amines (1.0 mmol, 1.0 eq.) were added to it with stirring at room temperature. The reaction was monitored by thin layer chromatography until completion. After the complete conversion of starting material, the mixture was evaporated under reduced pressure. The residue was purified by column chromatography on silica gel.

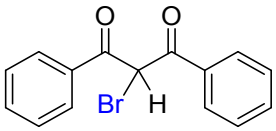
NOTES: Some substrates including p-methylaniline, N-phenylacetamide and indolin-2-one would convert completely and mono-brominated products were formed with 1.2 eq. CFBSA and 1.5 eq. KBr. For substrates that N-methyl-3-methylanilines and N-ethyl-3-methylanilines, addition of 3.2 eq. CFBSA and 3.5 eq. KBr would promote the strating materials to transform into tribromide products.

Standard procedure for the bromination of phenols: To a mixture of CFBSA (2.2 mmol, 2.2 eq.) and KBr (2.5 mmol, 2.5 eq.) in acetonitrile (8 mL) with stirring for 10 min at room temperature. Then phenols (1.0 mmol, 1.0 eq.) were added to it with stirring at room temperature. The reaction was monitored by thin layer chromatography until completion. After the complete conversion of starting material, the mixture was evaporated under reduced pressure. The residue

was purified by column chromatography on silica gel.

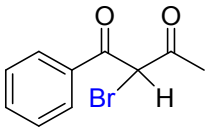
NOTES: For substrates that phenol and β-naphthol, addition of 3.2 eq. CFBSA/3.5 eq. KBr and 1.2 eq. CFBSA/1.5 eq. KBr would promote the starting materials to transform into tri-brominated and mono-brominated compounds respectively.

3. Analytical Data for the Products



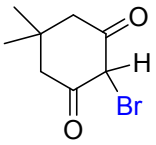
2-Bromo-1,3-diphenylpropane-1,3-dione.[1] (1a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **1a** in 94% yield. White solid; R_f = 0.61 (10% ethyl acetate/petroleum ether); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.00-7.98 (m, 4H), 7.62-7.59 (m, 2H), 7.49-7.46 (m, 4H), 6.55 (s, 1H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 185.10, 134.20, 131.25, 130.69, 128.78, 70.02.



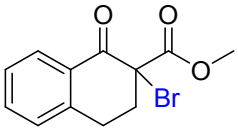
2-Bromo-1-phenylbutane-1,3-dione.[1] (2a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **2a** in 89% yield. Yellow oil; R_f = 0.54 (10% ethyl acetate/petroleum ether); ^{1}H NMR (400 MHz, $CDCl_3$) **δ** 8.00-7.97 (m, 2H), 7.66-7.62 (m, 1H), 7.53-7.49 (m, 2H), 5.62 (s, 1H), 2.46 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 198.34, 190.04, 134.62, 133.86, 129.39, 129.14, 53.03, 27.24.



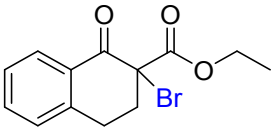
2-Bromo-5,5-dimethylcyclohexane-1,3-dione.[1] (3a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq) and KBr (1.5 mmol, 1.5 eq.) provided **3a** in 88% yield. White solid; R_f = 0.50 (50% ethyl acetate/petroleum ether); ^{1}H NMR (400 MHz, $CDCl_3$) δ 3.01 (s, 4H), 1.01 (s, 6H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 192.95, 66.55, 48.34, 30.71, 27.89.



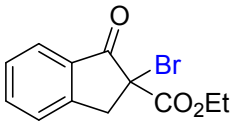
Methyl 2-bromo-1-oxo-1,2,3,4-tetrahydronaphthalene-2-carboxylate.[2] (4a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **4a** in 97% yield. Yellow oil; Rf = 0.35 (10% ethyl acetate/petroleum ether); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.10 (d, J = 8.0 Hz, 1H), 7.54 (t, J = 7.2 Hz, 1H), 7.36 (t, J = 7.2 Hz, 1H), 7.28-7.26 (m, 1H), 3.86 (s, 3H), 3.27-3.19 (m, 1H), 3.06-2.94 (m, 2H), 2.61-2.54 (m, 1H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 187.64, 168.07, 142.51, 134.54, 129.50, 129.22, 128.90, 127.44, 64.90, 54.16, 35.81, 26.88.



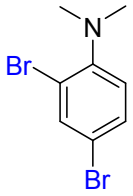
Ethyl 2-bromo-1-oxo-1,2,3,4-tetrahydronaphthalene-2-carboxylate.[2] (5a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **5a** in 94% yield. Pale yellow oil; R_f = 0.35 (10% ethyl acetate/petroleum ether); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.10 (dd, *J* = 1.2 Hz, 8.0 Hz, 1H), 7.56-7.52 (m, 1H), 7.38-7.35 (m, 1H), 7.28-7.26 (m, 1H), 4.31 (q, *J* = 7.2, 14.0 Hz, 2H), 3.27-3.19 (m, 1H), 3.06-2.95 (m, 2H), 2.60-2.54 (m, 1H), 1.30 (t, *J* = 7.2 Hz, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 187.70, 167.47, 142.49, 134.44, 129.66, 129.19, 128.88, 127.41, 65.25, 63.39, 35.80, 26.94, 14.07.



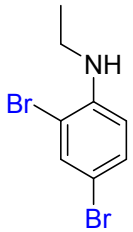
Ethyl 2-bromo-1-oxo-2,3-dihydro-1H-indene-2-carboxylate.[3] (6a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **6a** in 93% yield. Yellow oil; R_f = 0.35 (10% ethyl acetate/petroleum ether); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.88-7.86 (m, 1H), 7.72-7.68 (m, 1H), 7.48-7.45 (m, 2H), 4.32-4.24 (m, 2H), 4.20 (d, *J* = 18.0 Hz, 1H), 3.68 (d, *J* = 18.0 Hz, 1H), 1.29 (t, *J* = 7.2 Hz, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 195.31, 167.16, 150.31, 136.42, 132.39, 128.70, 126.43, 126.10, 63.70, 58.61, 44.00, 14.08.



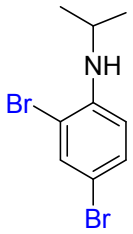
2,4-Dibromo-N,N-dimethylaniline.[4] (7a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **7a** in 88% yield. Yellow oil; R_f = 0.45 (petroleum ether); ^{1}H NMR (400 MHz, CDCl3) δ 7.68 (d, *J* = 2.4 Hz, 1H), 7.35 (dd, *J* = 8.8, 2.4 Hz, 1H), 6.93 (d, *J* = 8.8 Hz, 1H), 2.77 (s, 6H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 151.20, 136.13, 131.10, 121.74, 119.75, 115.47, 44.19.



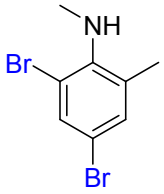
2,4-Dibromo-N-ethylaniline. (8a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **8a** in 92% yield. White solid; R_f = 0.35 (petroleum ether); ^{1}H NMR (400 MHz, CDCl3) δ 7.53 (d, *J* = 2.0 Hz, 1H), 7.26 (dd, *J* = 8.8, 2.0 Hz, 1H), 6.50 (d, *J* = 8.8 Hz, 1H), 4.32 (s, br, 1H), 3.17 (q, *J* = 7.2, 14.4 Hz, 2H), 1.30 (t, *J* = 7.2 Hz, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.24, 134.35, 131.33, 112.40, 109.88, 107.94, 38.64, 14.63.



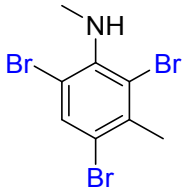
2,4-Dibromo-N-isopropylaniline. (9a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **9a** in 86% yield. White oil; R_f = 0.35 (petroleum ether); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.52 (d, *J* = 2.4 Hz, 1H), 7.25 (dd, *J* = 8.8, 2.4 Hz, 1H), 6.50 (d, *J* = 8.8 Hz, 1H), 4.18 (s, br, 1H), 3.65-3.56 (m, 1H), 1.24 (d, *J* = 6.0 Hz, 6H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 143.46, 134.50, 131.26, 112.85, 110.06, 107.48, 44.57, 22.84.



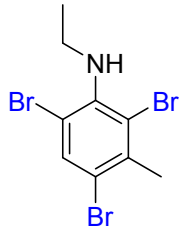
2,4-Dibromo-N,6-dimethylaniline. (10a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **10a** in 80% yield. Yellow oil; R_f = 0.50 (petroleum ether); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.47 (d, *J* = 2.4 Hz, 1H), 7.19 (d, *J* = 2.4 Hz, 1H), 3.66 (s, br, 1H), 2.79 (s, 3H), 2.33 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 146.16, 133.54, 132.73, 132.29, 117.47, 113.74, 35.17, 19.53.



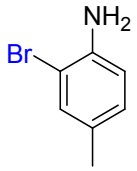
2,4,6-Tribromo-N,3-dimethylaniline. (11a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **11a** in 75% yield. Yellow oil; R_f = 0.45 (petroleum ether); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.70 (s, 1H), 3.61 (s, br, 1H), 2.92 (s, 3H), 2.54 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 146.12, 137.86, 135.13, 120.65, 117.00, 113.91, 35.26, 24.87.



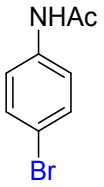
2,4,6-Tribromo-N-ethyl-3-methylaniline. (12a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **12a** in 88% yield. Pale Yellow oil; R_f = 0.50 (petroleum ether); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.69 (s, 1H), 3.27 (q, *J* = 7.2, 14.4 Hz, 2H), 2.54 (s, 3H), 1.22 (t, *J* = 7.2 Hz, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 145.04, 137.83, 135.07, 121.08, 116.96, 114.39, 43.24, 24.94, 16.01.



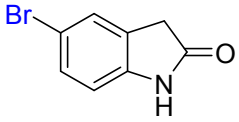
2-Bromo-4-methylaniline.[5] (13a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **13a** in 72% yield. Pale brown oil; Rf = 0.50 (petroleum ether); ^{1}H NMR (400 MHz, CDCl3) δ 7.24 (d, *J* = 1.2 Hz, 1H), 6.93-6.90 (m, 1H), 6.69-6.67 (m, 1H), 3.71 (s, br, 2H), 2.23 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 141.65, 132.85, 129.12, 115.91, 109.44, 20.22.



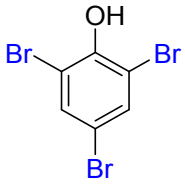
N-(4-bromophenyl)acetamide.[5] (14a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **14a** in 92% yield. Drab yellow solid; Rf = 0.25 (25% ethyl acetate/petroleum ether); ^{1}H NMR (400 MHz, CH_3CN-d_3) δ 8.40 (s, br, 1H), 7.50-7.48 (m, 2H), 7.45-7.42 (m, 2H), 2.04 (s, 3H). ^{13}C NMR (100 MHz, DMSO-d_6) δ 168.47, 138.68, 131.48, 120.85, 114.47, 24.02.



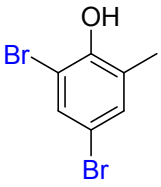
5-Bromoindolin-2-one.[6] (15a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **15a** in 90% yield. Light yellow solid; Rf = 0.45 (25% ethyl acetate/petroleum ether); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.97 (s, br, 1H), 7.36-7.34 (m, 2H), 6.75 (d, *J* = 8.8 Hz, 1H), 3.54 (s, 2H). ^{13}C NMR (100 MHz, DMSO-d_6) δ 175.90, 143.00, 130.07, 128.52, 127.22, 112.79, 110.88, 35.76.



2,4,6-Tribromophenol.[7] (16a)

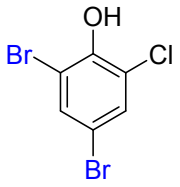
Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **16a** in 72% yield. Yellow solid; R_f = 0.35 (10% ethyl acetate/petroleum ether); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.59 (s, 2H), 5.86 (s, 1H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 149.09, 134.38, 112.84, 110.55.



2,4-Dibromo-6-methylphenol.[7] (17a)

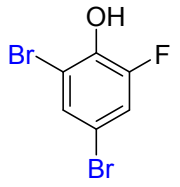
Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **17a** in 70%

yield. Yellow solid; R_f = 0.25 (10% ethyl acetate/petroleum ether); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.43 (d, *J* = 2.0 Hz, 1H), 7.20 (d, *J* = 2.0 Hz, 1H), 5.52 (s, 1H), 2.27 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 149.90, 133.22, 131.40, 127.82, 112.16, 110.57, 16.69.



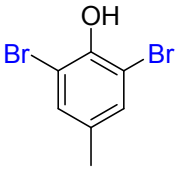
2,4-Dibromo-6-chlorophenol.[7] (18a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **18a** in 93% yield. White solid; R_f = 0.25 (10% ethyl acetate/petroleum ether); ^{1}H NMR (400 MHz, CDCl3) δ 7.55 (d, *J* = 2.4 Hz, 1H), 7.45 (d, *J* = 2.4 Hz, 1H), 5.86 (s, 1H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 148.33, 133.75, 131.57, 121.67, 112.38, 110.96.



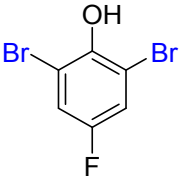
2,4-Dibromo-6-fluorophenol.[8] (19a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **19a** in 95% yield. Yellow solid; R_f = 0.25 (10% ethyl acetate/petroleum ether); ^{1}H NMR (400 MHz, CDCl3) δ 7.43 (t, *J* = 2.0 Hz, 1H), 7.23 (dd, *J* = 9.6, 2.0 Hz, 1H), 5.61 (s, 1H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 150.82 (d, *J* = 248.1 Hz), 141.22 (d, *J* = 14.3 Hz), 130.24 (d, *J* = 3.8 Hz), 119.22 (d, *J* = 21.4 Hz), 111.75 (d, *J* = 9.2 Hz), 111.53(d, *J* = 2.6 Hz). ^{19}F NMR (376 MHz, $CDCl_3$) δ -131.03.



2,6-Dibromo-4-methylphenol.[7] (20a)

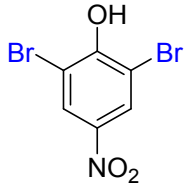
Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **20a** in 66% yield. White solid; R_f = 0.25 (10% ethyl acetate/petroleum ether); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.26 (s, 2H), 5.71 (s, 1H), 2.26 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 147.26, 132.54, 109.55, 100.12, 20.12.



2,6-Dibromo-4-fluorophenol. (21a)

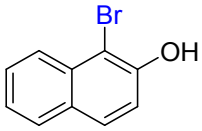
Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **21a** in 89% yield. White solid; R_f = 0.25 (10% ethyl acetate/petroleum ether); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.26 (s, 1H), 7.24 (s, 1H), 5.70 (s, 1H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 155.85 (d, *J* = 245.1 Hz), 146.57 (d, *J* = 3.3 Hz), 119.31 (d, *J* = 25.4 Hz), 109.43 (d, *J* = 10.4 Hz). ^{19}F NMR (376 MHz,

$CDCl_3$) δ -120.50.



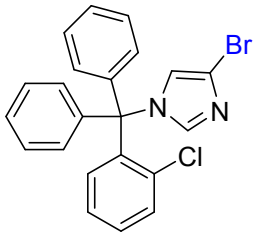
2,6-Dibromo-4-nitrophenol.[7] (22a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq) and KBr (1.5 mmol, 1.5 eq.) provided **22a** in 97% yield. Yellow solid; R_f = 0.25 (10% ethyl acetate/petroleum ether); ^{1}H NMR (400 MHz, DMSO-d_6) δ 8.38 (s, 2H). ^{13}C NMR (100 MHz, DMSO-d_6) δ 157.53, 140.01, 127.95, 111.12.



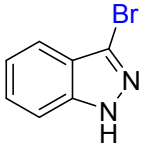
1-Bromonaphthalen-2-ol.[7] (23a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **23a** in 93% yield. Pale yellow solid; R_f = 0.35 (10% ethyl acetate/petroleum ether); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.03 (d, *J* = 8.4 Hz, 1H), 7.79 (d, *J* = 8.0 Hz, 1H), 7.75 (d, *J* = 8.4 Hz, 1H), 7.60-7.55 (m, 1H), 7.42-7.38 (m, 1H), 7.27 (d, *J* = 8.0 Hz, 1H), 5.92 (s, 1H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 150.72, 132.43, 129.83, 129.48, 128.36, 127.99, 125.47, 124.30, 117.30, 106.28.



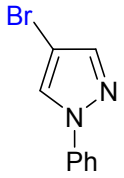
4-Bromo-1-((2-chlorophenyl)diphenylmethyl)-1H-imidazole. (24a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided 24a in 77% yield. White solid; Rf = 0.50 (50% ethyl acetate/petroleum ether); mp 198-199℃. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.44-7.28 (m, 10H), 7.18-7.16 (m, 4H), 6.92 (dd, J = 8.0, 2.4 Hz, 1H), 6.73 (d, J = 1.6 Hz, 1H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 140.20, 139.77, 138.82, 135.64, 132.50, 130.48, 130.26, 130.24, 128.59, 128.33, 127.30, 120.81, 114.87, 76.00. IR (KBr) **ν** = 3066, 1585, 1488, 1464, 1444, 1433, 1217, 767, 751, 707, 667. HRMS-EI (m/z) *calcd.* for ($C_{22}H_{16}BrClN_2$) 422.0185; found 422.0191.



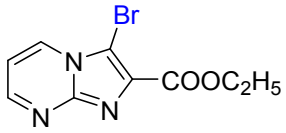
3-Bromo-1H-indazole.[9] (25a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq) and KBr (1.5 mmol, 1.5 eq.) provided **25a** in 93% yield. White solid; R_f = 0.25 (10% ethyl acetate/petroleum ether); ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.33 (s, br, 1H), 7.66 (d, *J* = 8.0 Hz, 1H), 7.52-7.45 (m, 2H), 7.27-7.24 (m, 1H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 141.31, 128.28, 123.24, 123.14, 122.01, 120.31, 110.38.



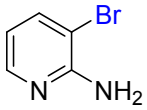
4-Bromo-1-phenyl-1H-pyrazole.[10] (26a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **26a** in 93% yield. White solid; R_f = 0.75 (10% ethyl acetate/petroleum ether); ^{1}H NMR (400 MHz, CDCl3) δ 7.94 (s, 1H), 7.68 (s, 1H), 7.65-7.63 (m, 2H), 7.48-7.44 (m, 2H), 7.34-7.30 (m, 1H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 141.64, 139.74, 129.68, 127.19, 127.15, 119.15, 95.76.



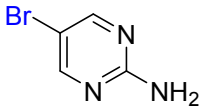
Ethyl 3-bromoimidazo[1,2-a]pyrimidine-2-carboxylate.[11] (27a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **27a** in 93% yield. Bright yellow solid; R_f = 0.50 (50% ethyl acetate/petroleum ether); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.71 (dd, *J* = 4.0, 2.0 Hz, 1H), 8.52 (dd, *J* = 7.2, 2.0 Hz, 1H), 7.09 (dd, *J* = 7.2, 4.0 Hz, 1H), 4.50 (q, *J* = 7.2, 14.0 Hz, 2H), 1.46 (t, *J* = 7.2 Hz, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 162.04, 152.85, 147.68, 135.00, 132.56, 110.90, 99.07, 61.85, 14.43.



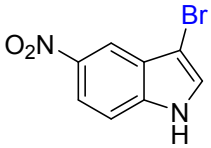
3-Bromopyridin-2-amine.[12] (28a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **28a** in 83% yield. Yellowish-brown solid; R_f = 0.45 (50% ethyl acetate/petroleum ether); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.09 (d, *J* = 2.4 Hz, 1H), 7.51 (dd, *J* = 8.8, 2.4 Hz, 1H), 6.44 (d, *J* = 8.8 Hz, 1H), 4.49 (s, 2H). ^{13}C NMR (400 MHz, $CDCl_3$) δ 156.96, 148.32, 140.55, 110.38, 108.40.



5-Bromopyrimidin-2-amine.[5] (29a)

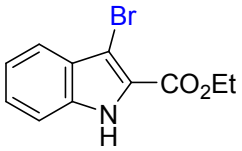
Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **29a** in 93% yield. White solid; Precipitated in acetonitrile. ^{1}H NMR (400 MHz, DMSO-d_6) δ 8.30 (s, 1H), 6.90 (s, br, 1H). ^{13}C NMR (100 MHz, DMSO-d_6) δ 162.03, 158.07, 105.11.



3-Bromo-5-nitro-1H-indole. (30a)

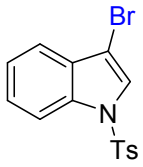
Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **30a** in 93% yield. Yellow solid; R_f = 0.45 (50% ethyl acetate/petroleum ether); ^{1}H NMR (400 MHz, DMSO-d_6) δ 12.21 (s, br, 1H), 8.31 (d, J = 2.4 Hz, 1H), 8.07 (dd, J = 9.2, 2.4 Hz, 1H), 7.88 (d, J = 2.8 Hz, 1H), 7.63 (d, J = 9.2 Hz, 1H). ^{13}C NMR (100 MHz, DMSO-d_6) δ 141.36, 138.57, 129.08, 125.64,

117.51, 114.94, 113.00, 91.03.



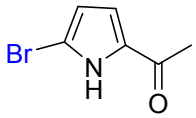
Ethyl 3-bromo-1H-indole-2-carboxylate.[13] (31a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **31a** in 93% yield. White solid; R_f = 0.35 (10% ethyl acetate/petroleum ether); ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.11 (s, br, 1H), 7.68 (d, *J* = 8.0 Hz, 1H), 7.42-7.36 (m, 2H), 7.26-7.21 (m, 1H), 4.47 (q, J = 7.2, 14.4 Hz 2H), 1.46 (t, J = 7.2 Hz, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 161.12, 135.44, 128.14, 126.72, 124.25, 121.61, 121.47, 112.12, 98.46, 61.62, 14.50.



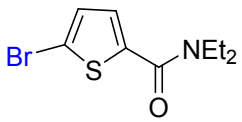
3-Bromo-1-tosyl-1H-indole.[14] (32a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **32a** in 69% yield. Off-white solid; R_f = 0.45 (10% ethyl acetate/petroleum ether); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.99 (d, J = 8.4 Hz, 1H), 7.77 (d, J = 8.4 Hz, 2H), 7.62 (s, 1H), 7.49 (m, 1H), 7.40-7.36 (m, 1H), 7.33-7.29 (m, 1H), 7.24 (d, J = 8.0 Hz, 2H), 2.35 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 145.51, 134.99, 134.40, 130.17, 129.90, 127.07, 125.88, 124.92, 124.02, 120.19, 113.73, 99.73, 21.75.



1-(5-bromo-1H-pyrrol-2-yl)ethan-1-one.[15] (33a)

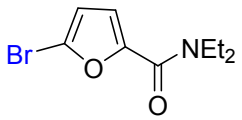
Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **33a** in 69% yield. White solid; R_f = 0.45 (50% ethyl acetate/petroleum ether); ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.62 (s, br, 1H), 7.02 (dd, J = 2.8, 1.2 Hz, 1H), 6.89 (dd, J = 2.8, 1.2 Hz, 1H), 2.42 (s, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 186.32, 131.10, 109.30, 106.56, 105.77, 27.96.



5-Bromo-N,N-diethylthiophene-2-carboxamide.[16] (34a)

Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **34a** in 94% yield. Yellow oil; R_f = 0.35 (25% ethyl acetate/petroleum ether); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.08 (d, *J* = 4.0 Hz, 1H), 6.99 (d, *J* = 4.0 Hz, 1H), 3.52 (q, *J* = 7.2, 14.0 Hz, 4H), 1.24 (t, *J* = 7.2 Hz, 6H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 159.70, 148.72, 143.63, 115.90, 111.31, 42.84, 41.41, 14.81, 13.00.

Notes: The ethyl peaks from the amide group are broad peaks in ^{13}C NMR due to restricted rotation.

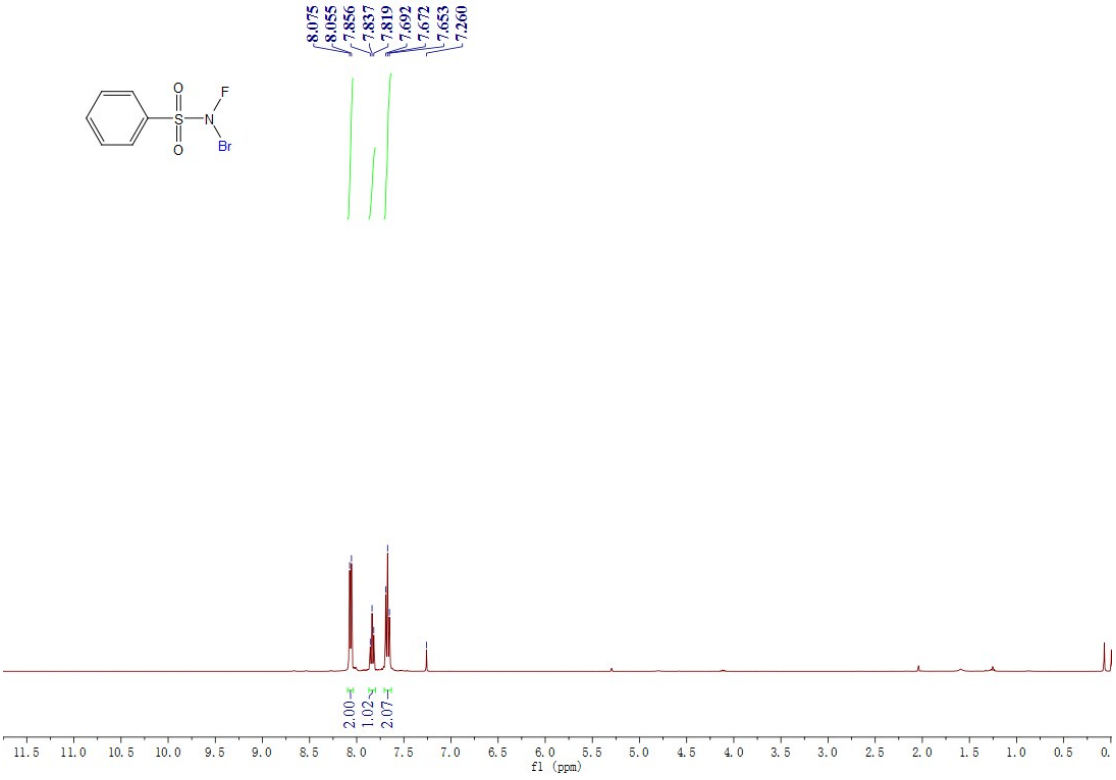


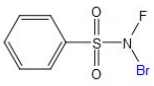
5-Bromo-N,N-diethylfuran-2-carboxamide.[16] **(35a)**

Procedure: Using CFBSA (1.2 mmol, 1.2 eq.) and KBr (1.5 mmol, 1.5 eq.) provided **35a** in 61% yield. Yellow oil; R_f = 0.25 (25% ethyl acetate/petroleum ether); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.07 (d, J = 4.0 Hz, 1H), 6.98 (d, J = 4.0 Hz, 1H), 3.51 (q, J = 7.2, 14.4 Hz, 4H), 1.23 (t, J = 7.2 Hz, 6H).^{13}C NMR (100 MHz, $CDCl_3$) δ 158.35, 150.30, 123.83, 118.33, 113.26, 42.83, 41.48, 14.74, 12.72.

Notes: The ethyl peaks from the amide group are broad peaks in ^{13}C NMR due to restricted rotation.

4. ^{1}H, ^{19}F and ^{13}C NMR spectra





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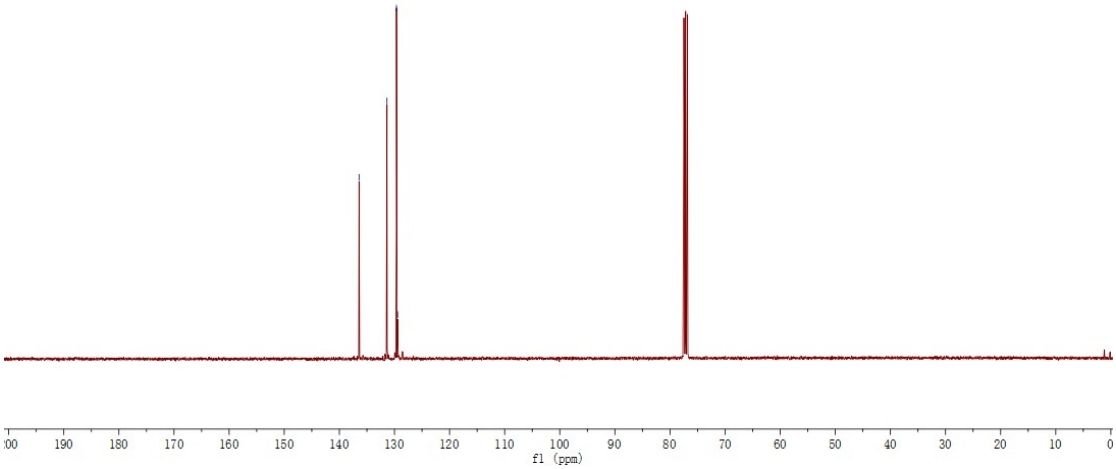
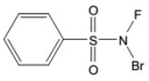
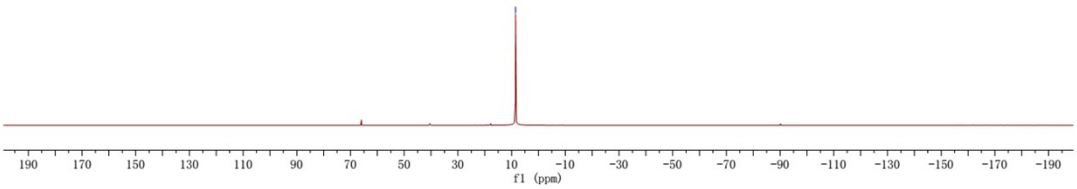
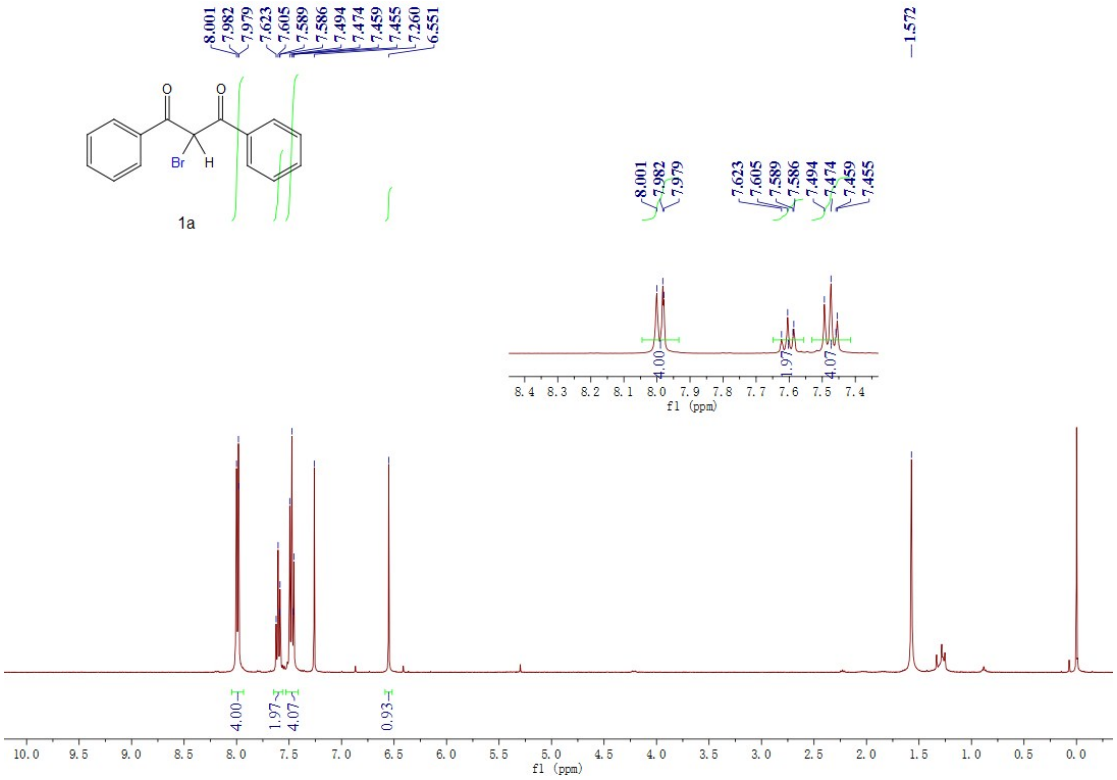
129.638
129.423





8.526

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7.623
7.605
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7.474
7.459
7.455
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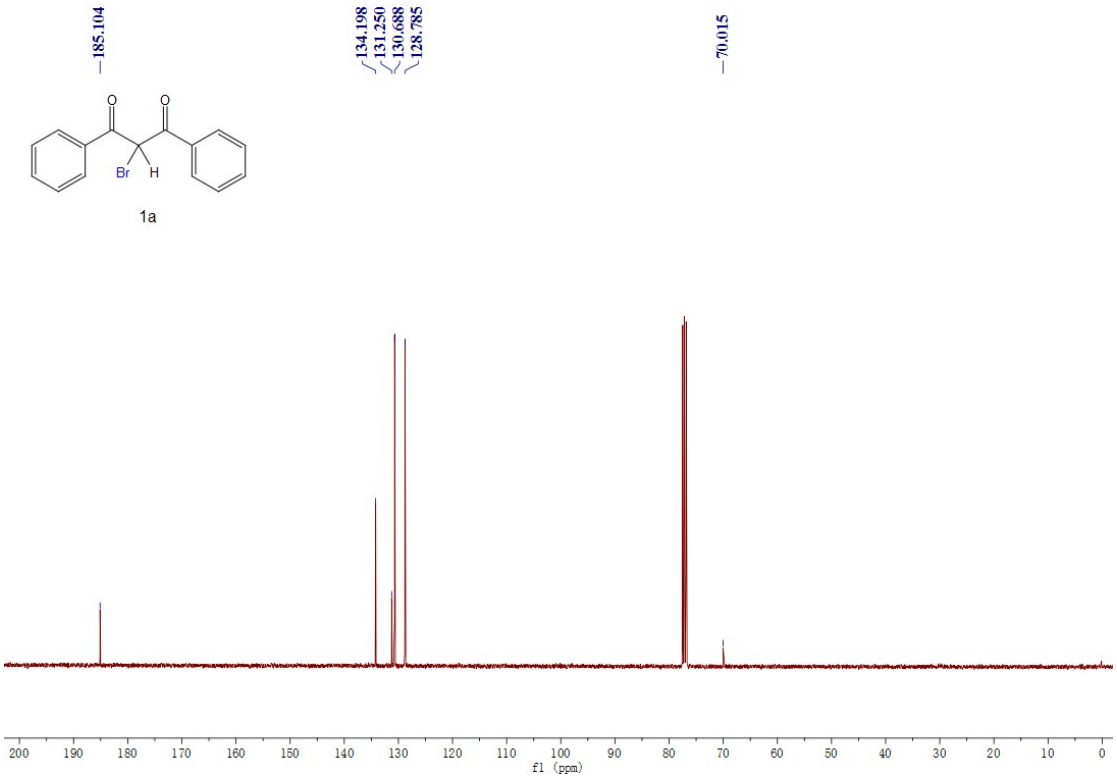
1.572
O
O
Br
H
1a
4.00
1.97
4.07
0.93
f1 (ppm)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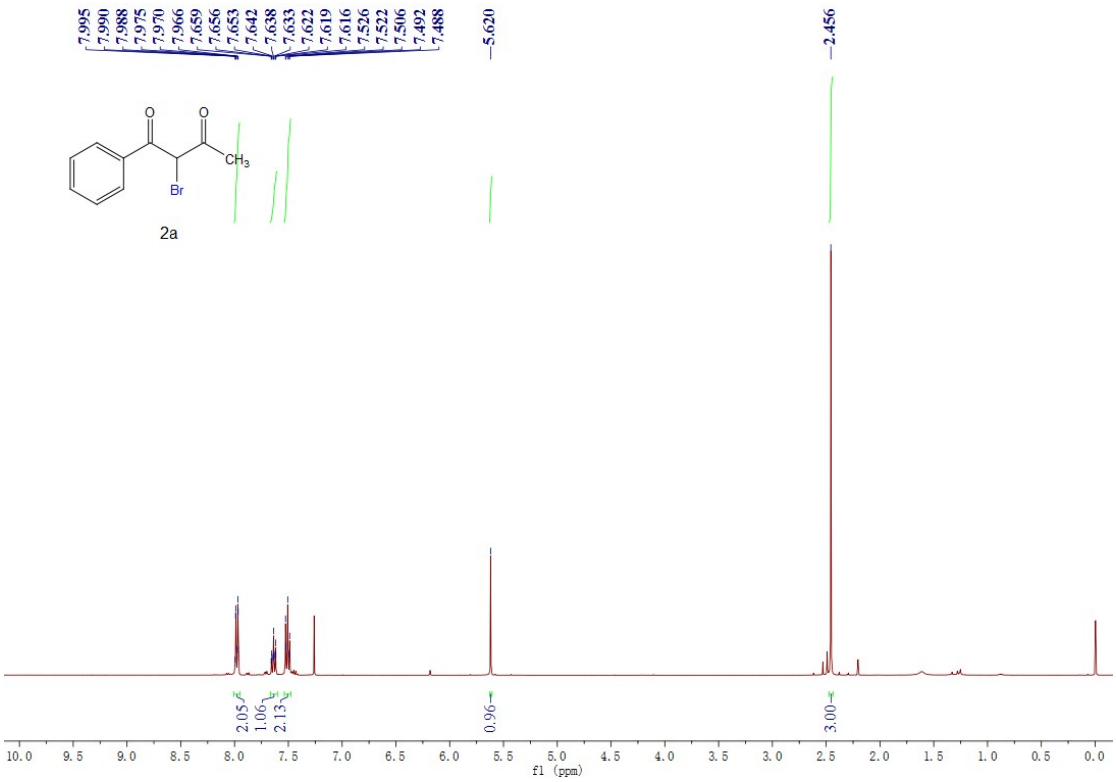
O
Br
H
1a
f1 (ppm)


7.995
7.990
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7.975
7.970
7.966
7.659
7.656
7.653
7.642
7.638
7.633
7.622
7.619
7.616
7.526
7.522
7.506
7.492
7.488
5.620
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O
O
CH3
Br
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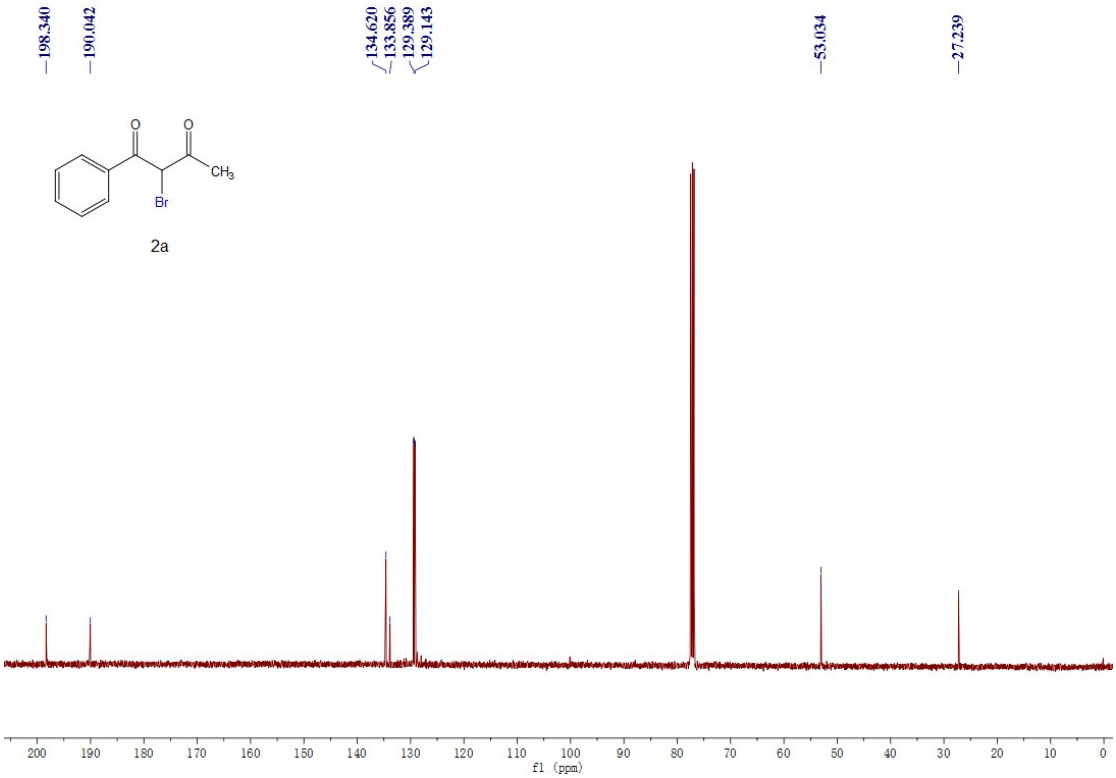
2.05
1.06
2.13
0.96
3.00
f1 (ppm)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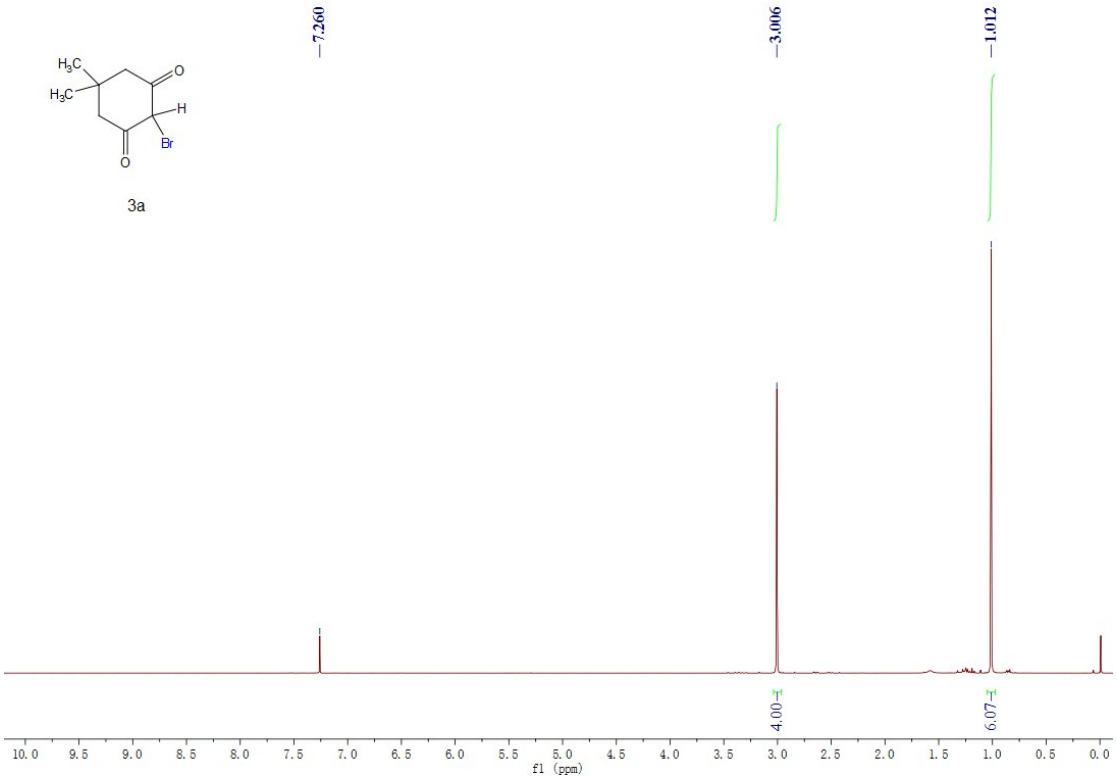
129.389
129.143
53.034
27.239
O
O
CH3
Br
2a
f1 (ppm)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1.012
4.00
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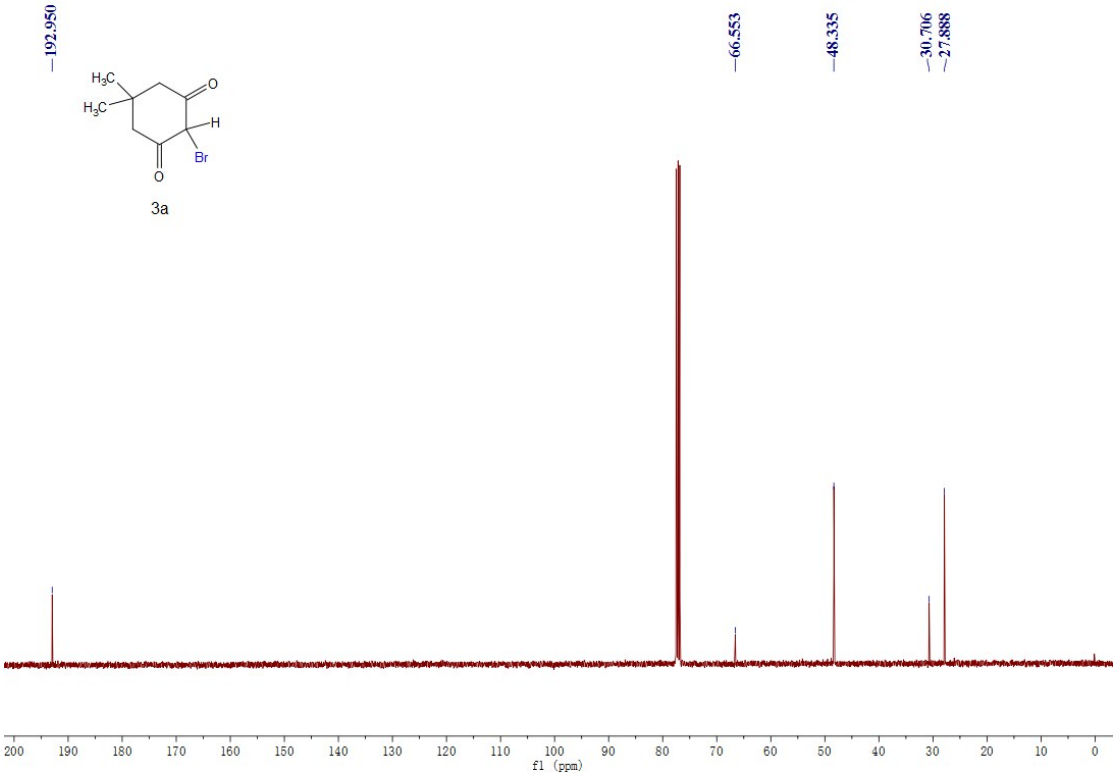
f1 (ppm)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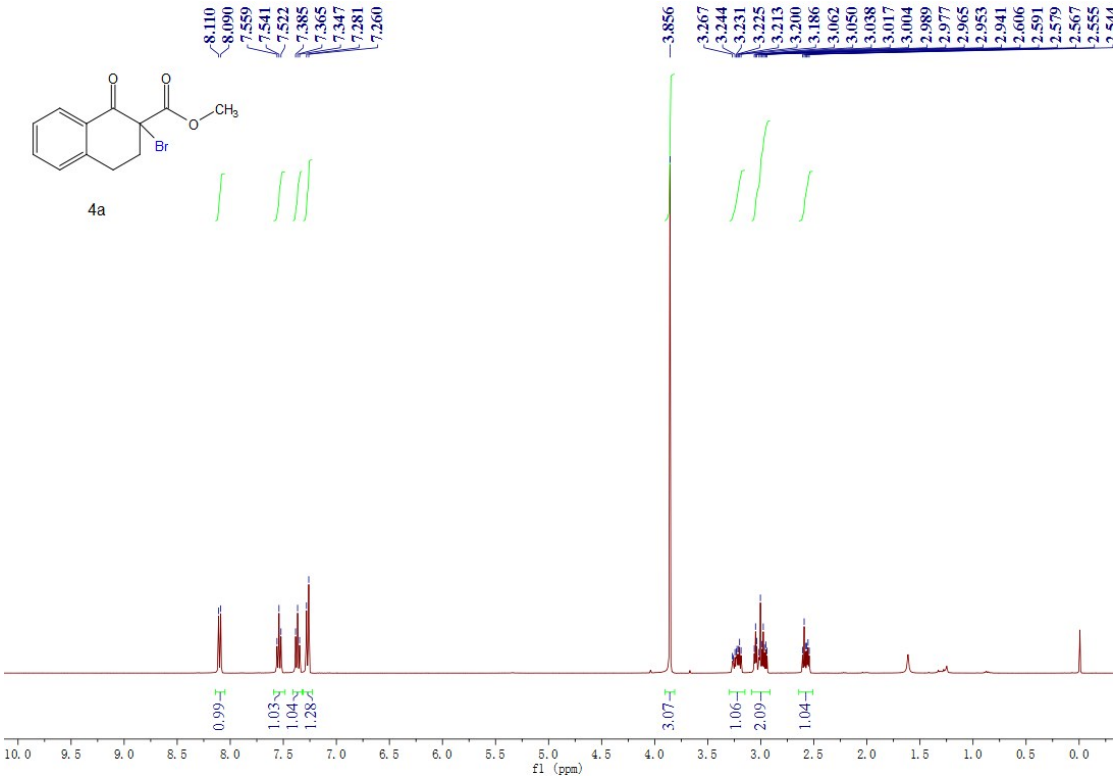
3a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3.231
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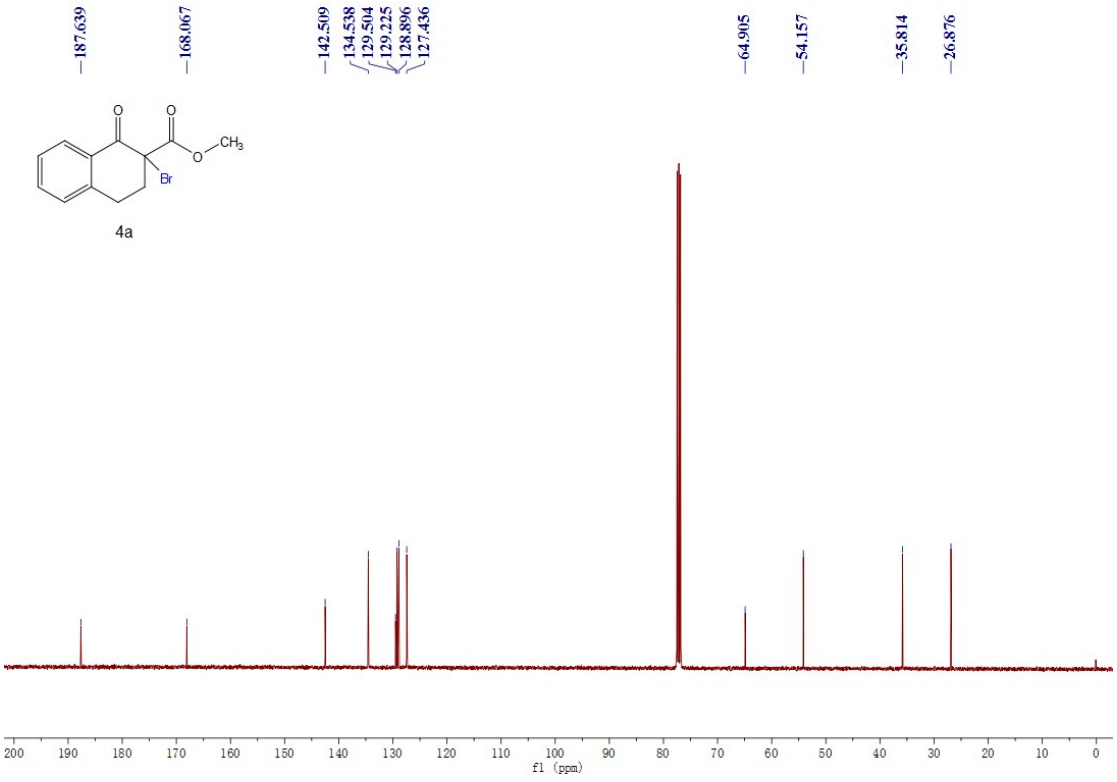
3.213
3.200
3.186
3.062
3.050
3.038
3.017
3.004
2.989
2.977
2.965
2.953
2.941
2.606
2.591
2.579
2.567
2.555
O
O
O
CH3
Br
4a
0.99
1.03
1.04
1.28
3.07
1.06
2.09
1.04
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)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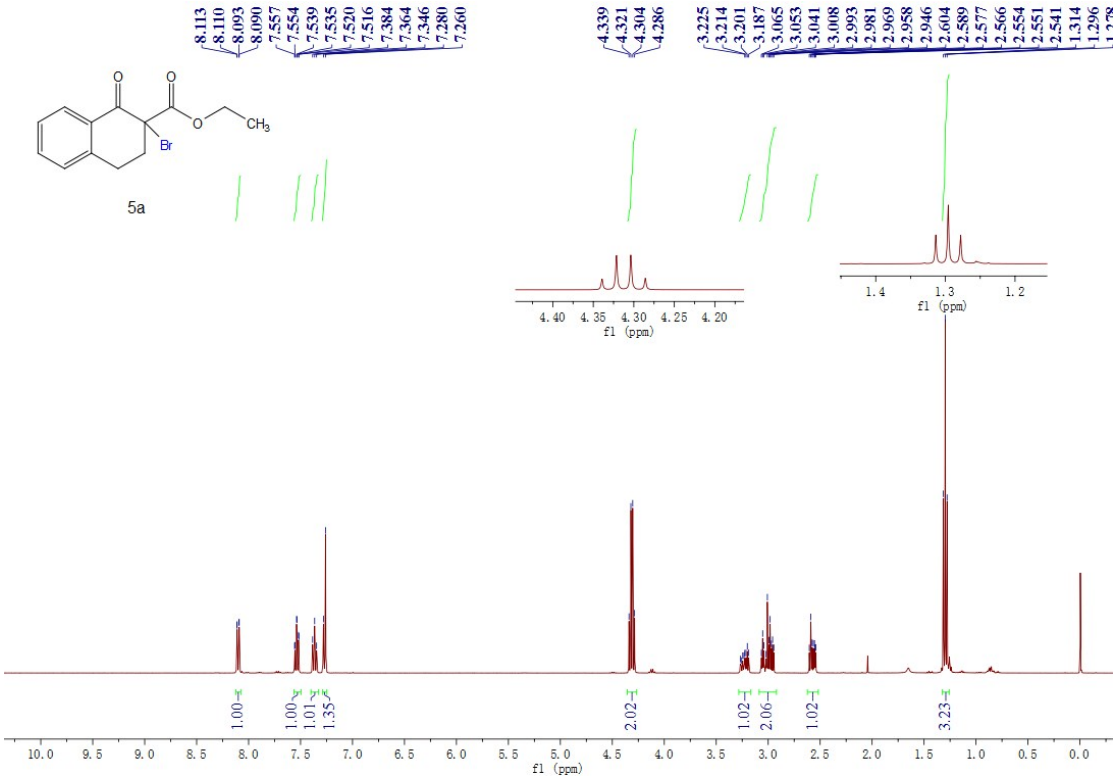
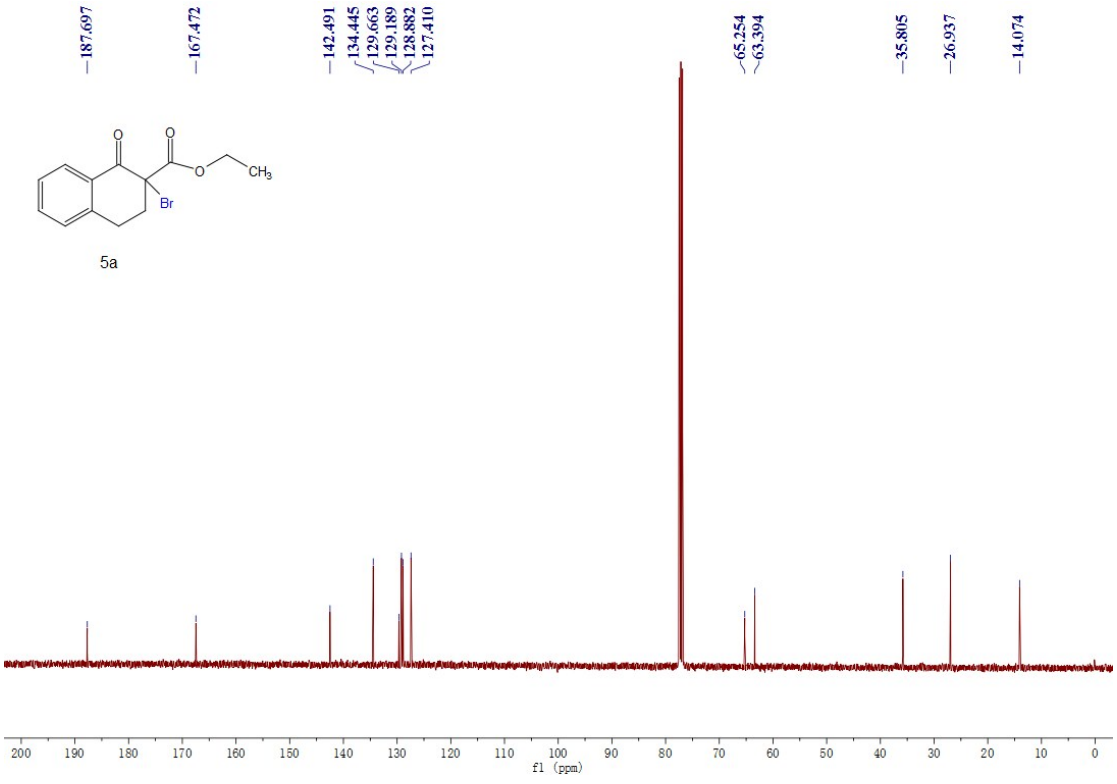
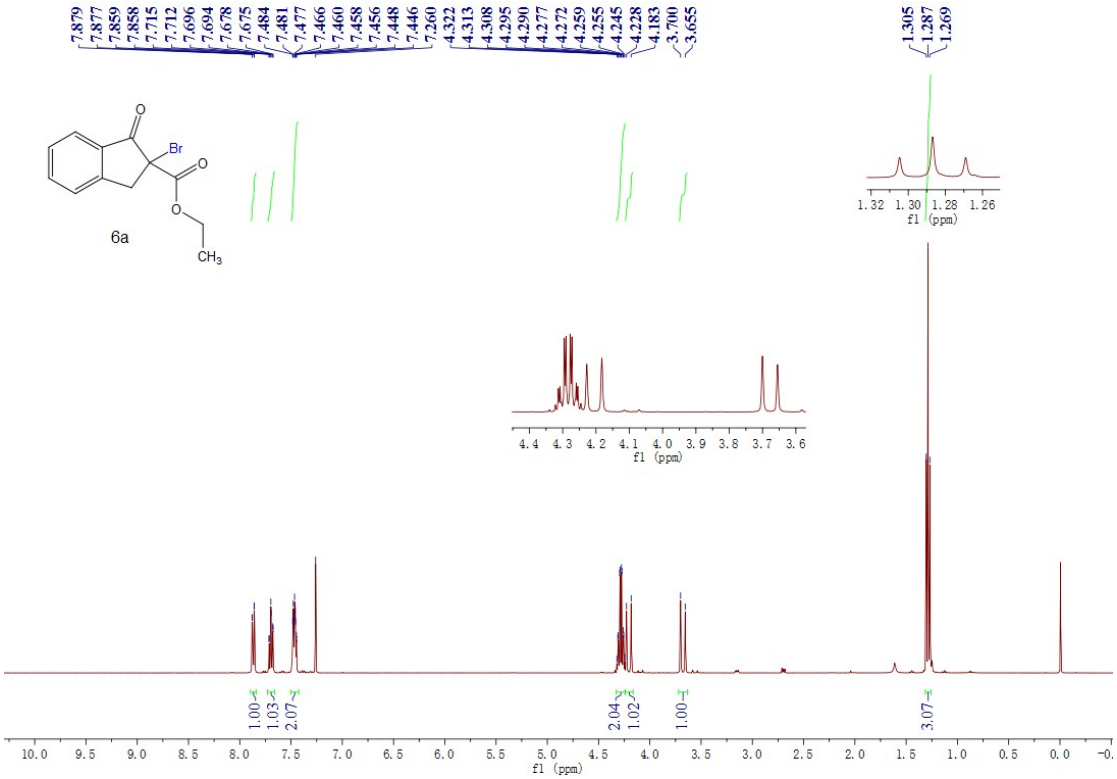
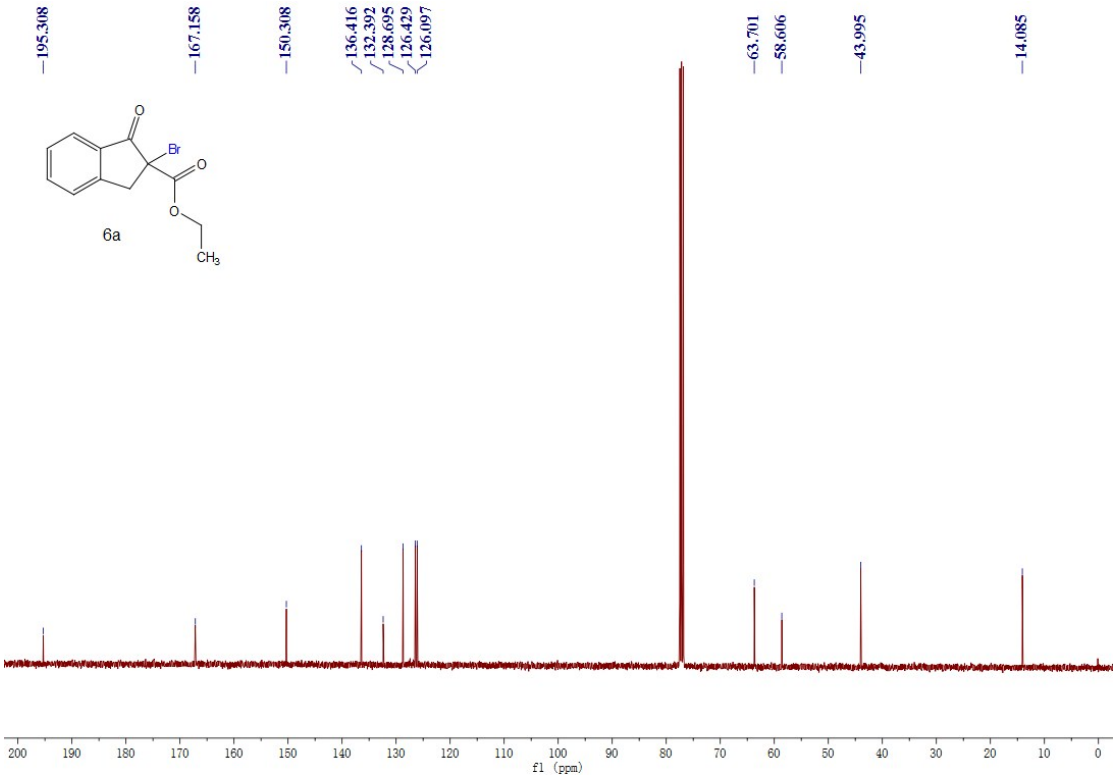
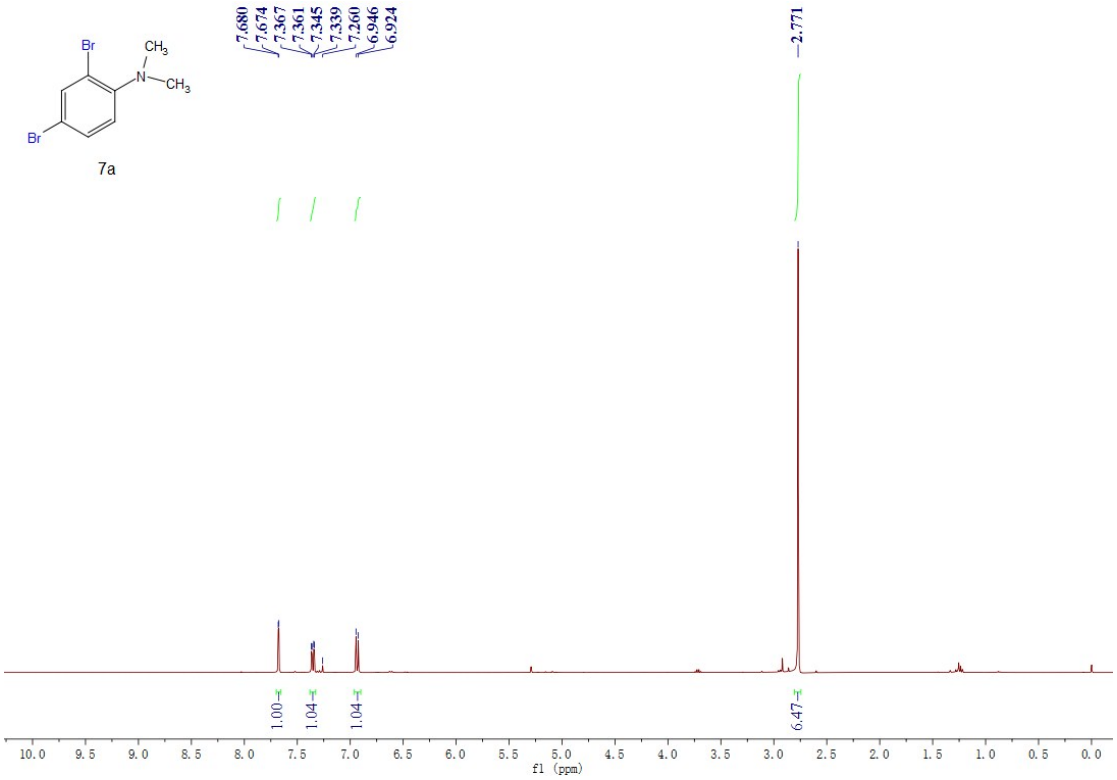
168.067
142.509
134.538
129.504
129.225
128.896
127.436
64.905
54.157
35.814
26.876
O
O
O
CH3
Br
4a
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

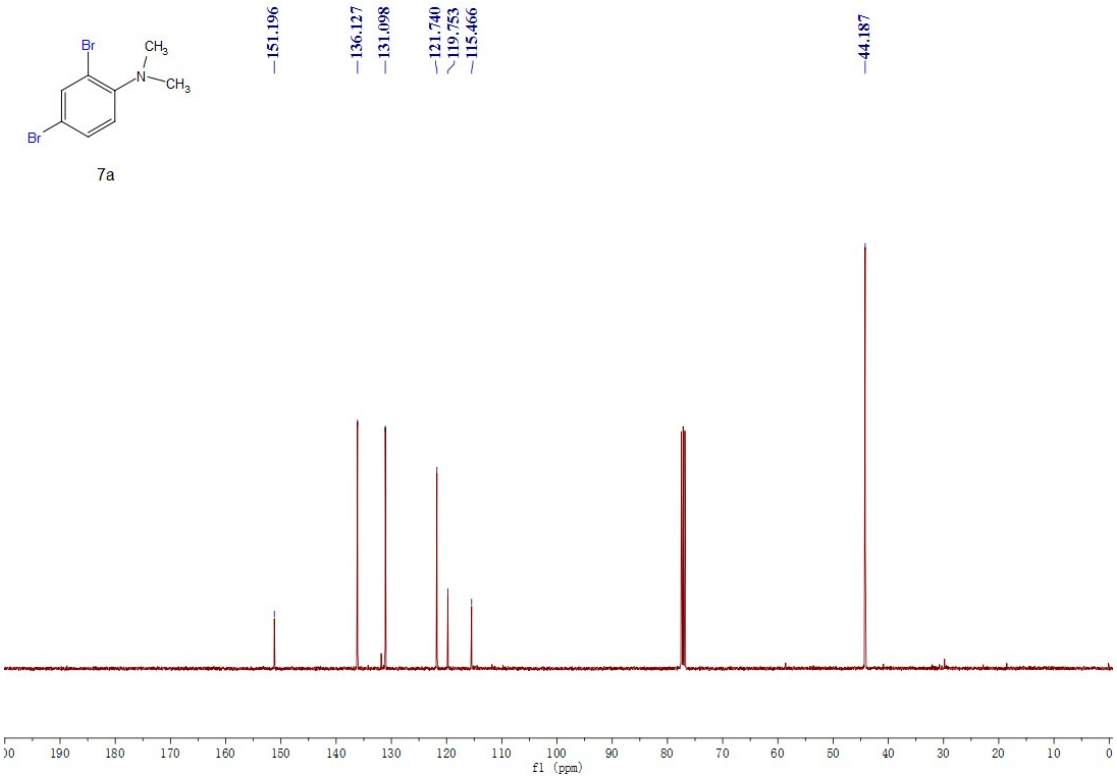

8.113
8.110
8.093
8.090
7.557
7.554
7.539
7.535
7.520
7.516
7.384
7.364
7.346
7.280
7.260
4.339
4.321
4.304
4.286
3.225
3.214
3.201
3.187
3.065
3.053
3.041
3.008
2.993
2.981
2.969
2.958
2.946
2.604
2.589
2.577
2.566
2.554
2.551
2.541
1.314
1.296
O
O
O
CH3
Br
5a
4.40 4.35 4.30 4.25 4.20
f1 (ppm)
1.4 1.3 1.2
f1 (ppm)
1.00
1.00
1.01
1.35
2.02
1.02
2.06
1.02
3.23
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

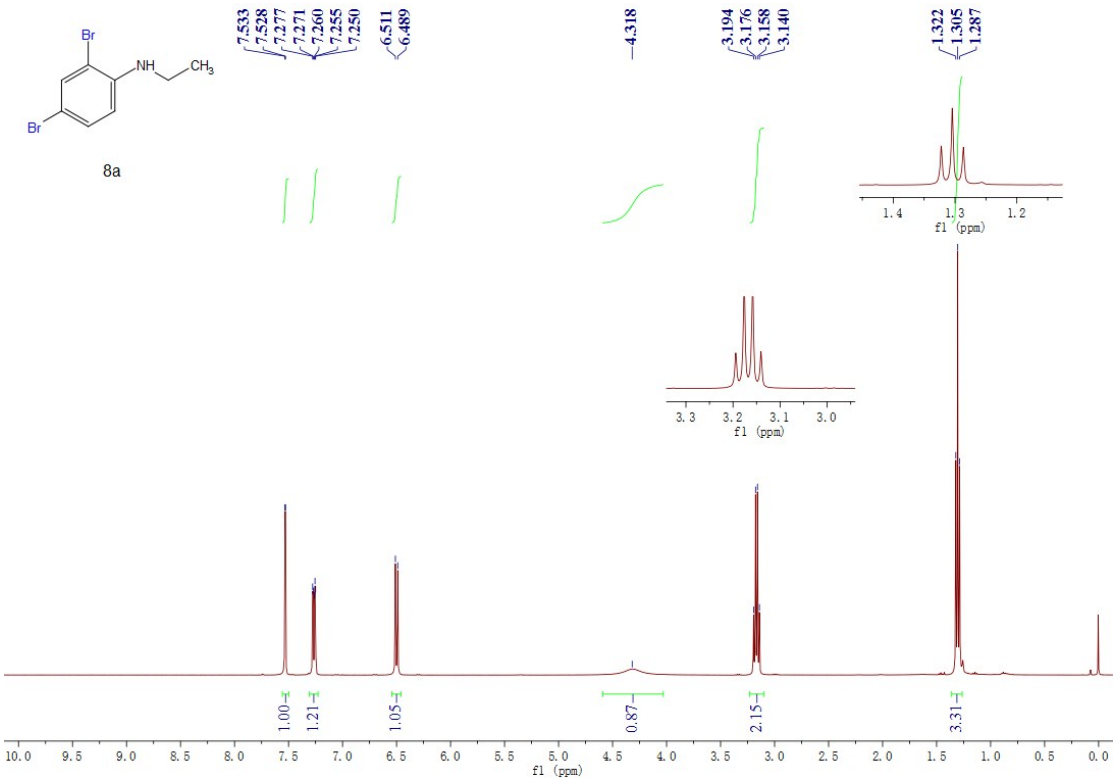

187.697
167.472
142.491
134.445
129.663
129.189
128.882
127.410
65.254
63.394
35.805
26.937
14.074
O
O
O
CH3
Br
5a
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

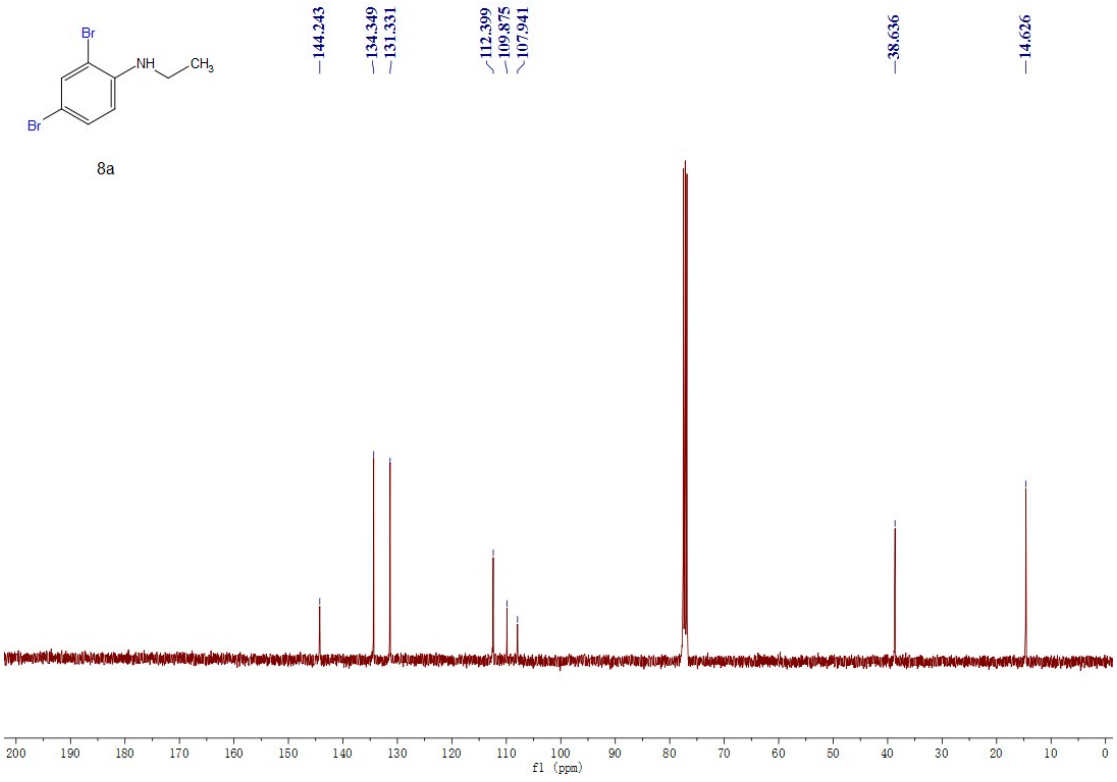

7.879
7.877
7.859
7.858
7.715
7.712
7.696
7.694
7.678
7.675
7.484
7.481
7.477
7.466
7.460
7.458
7.456
7.448
7.446
7.260
4.322
4.313
4.308
4.295
4.290
4.277
4.272
4.259
4.255
4.245
4.228
4.183
3.700
3.655
1.305
1.287
1.269
Br
O
O
O
6a
CH3
1.32 1.30 1.28 1.26
f1 (ppm)
4.4 4.3 4.2 4.1 4.0 3.9 3.8 3.7 3.6
f1 (ppm)
1.00
1.03
2.07
2.04
1.02
1.00
3.07
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

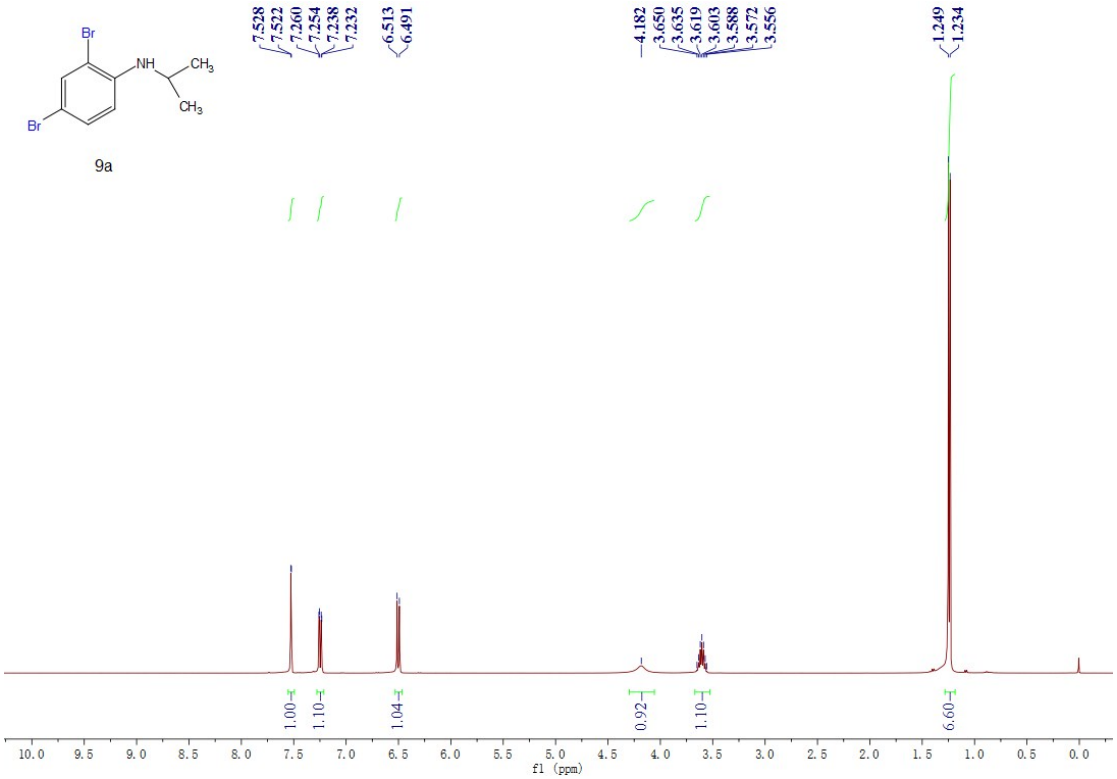

195.308
167.158
150.308
136.416
132.392
128.695
126.429
126.097
63.701
58.606
43.995
14.085
Br
O
O
O
6a
CH3
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

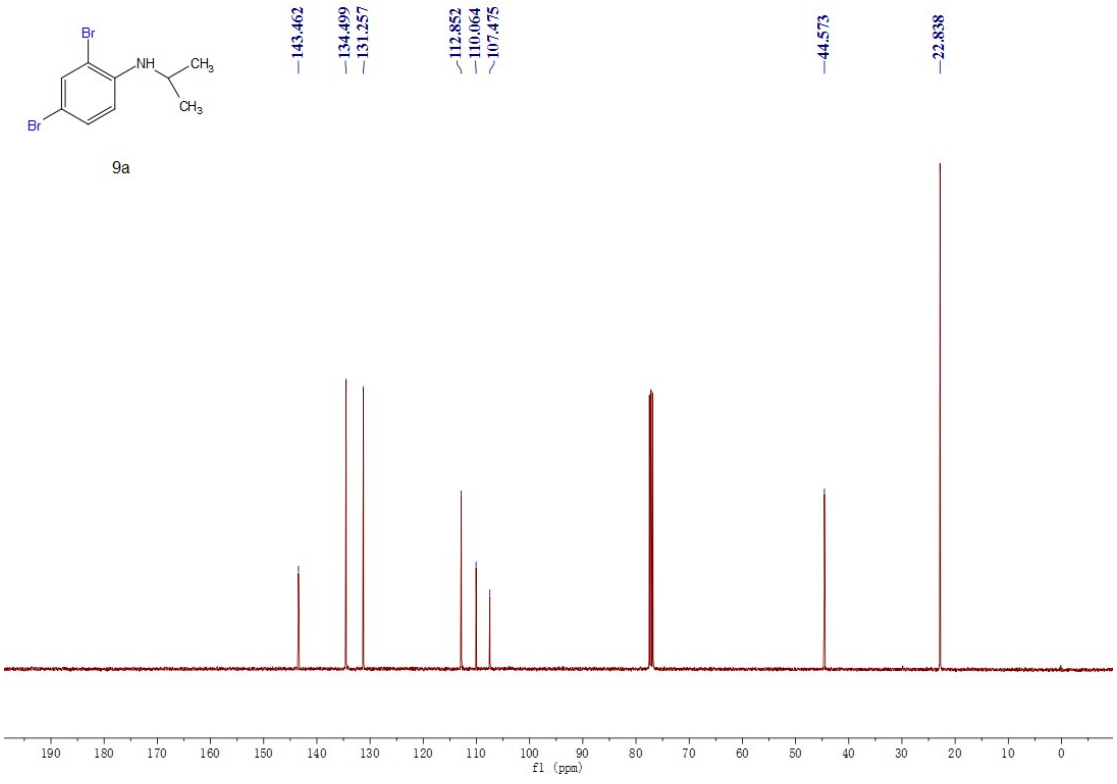

7.680
7.674
7.367
7.361
7.345
7.339
7.260
6.946
6.924
2.771
Br
CH3
N
CH3
Br
7a
1.00
1.04
1.04
6.47
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

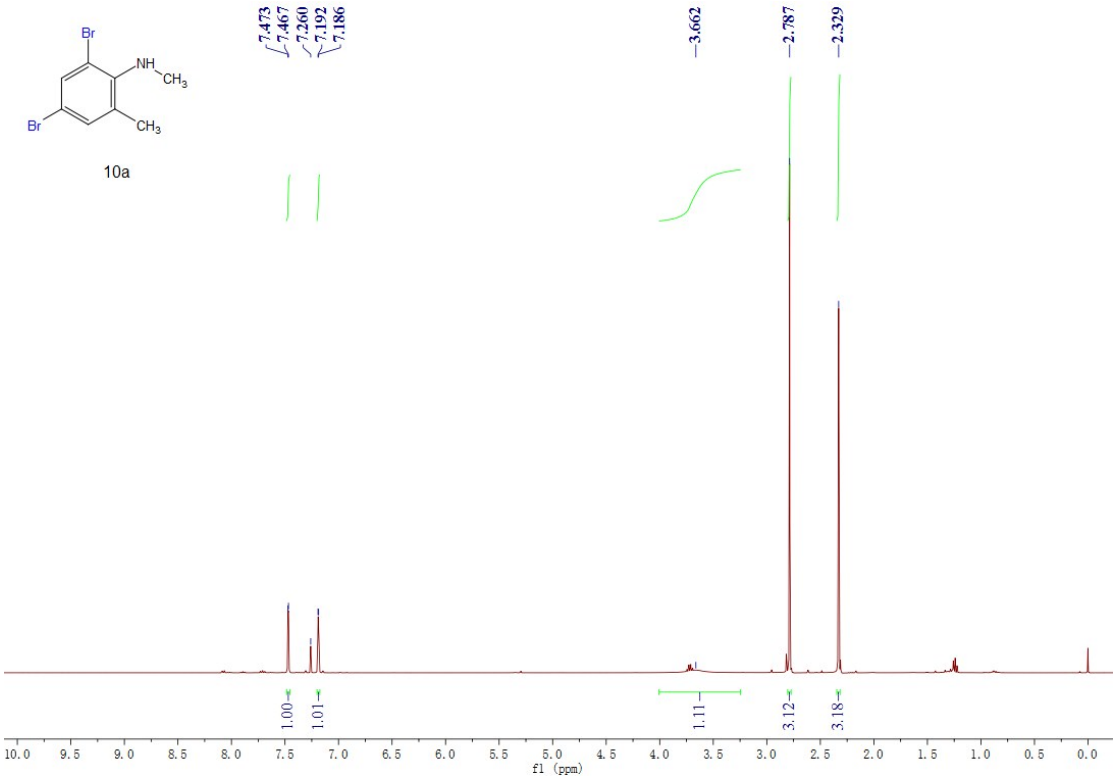

151.196
136.127
131.098
121.740
119.753
115.466
44.187
Br
CH3
N
CH3
Br
7a
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

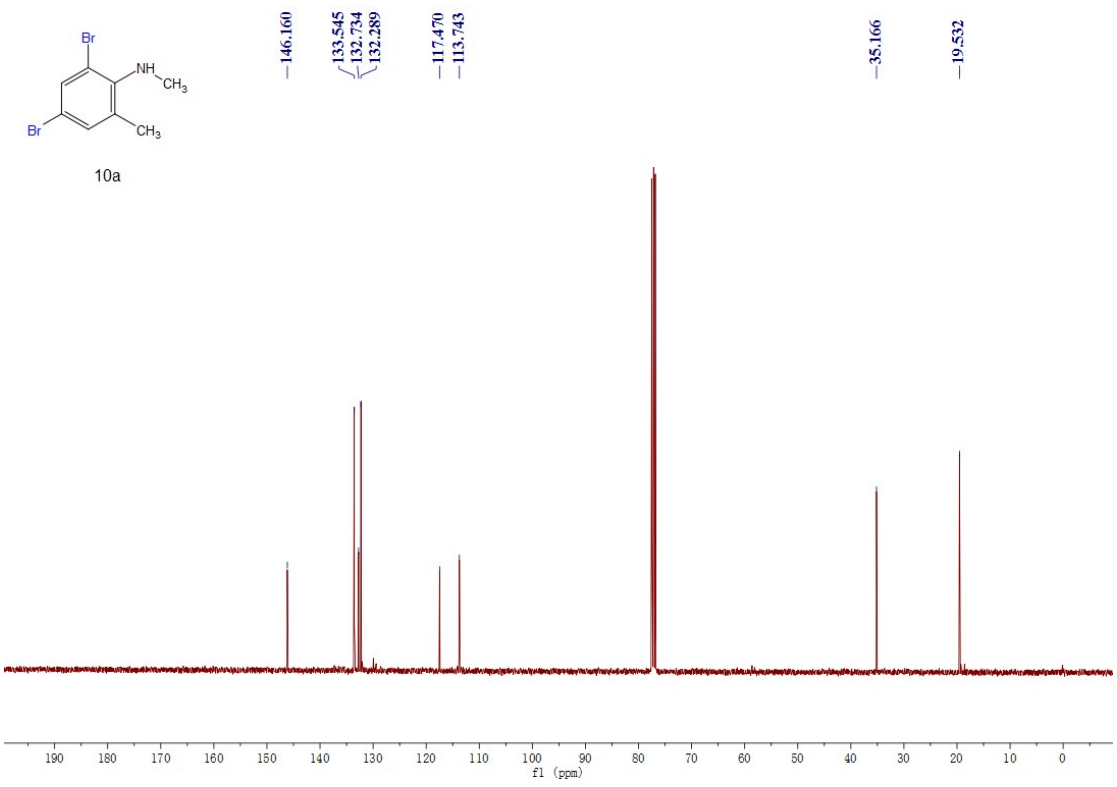

Br
NH
CH3
Br
8a
7.533
7.528
7.277
7.271
7.260
7.255
7.250
6.511
6.489
4.318
3.194
3.176
3.158
3.140
1.322
1.305
1.287
1.00
1.21
1.05
0.87
2.15
3.31
f1 (ppm)

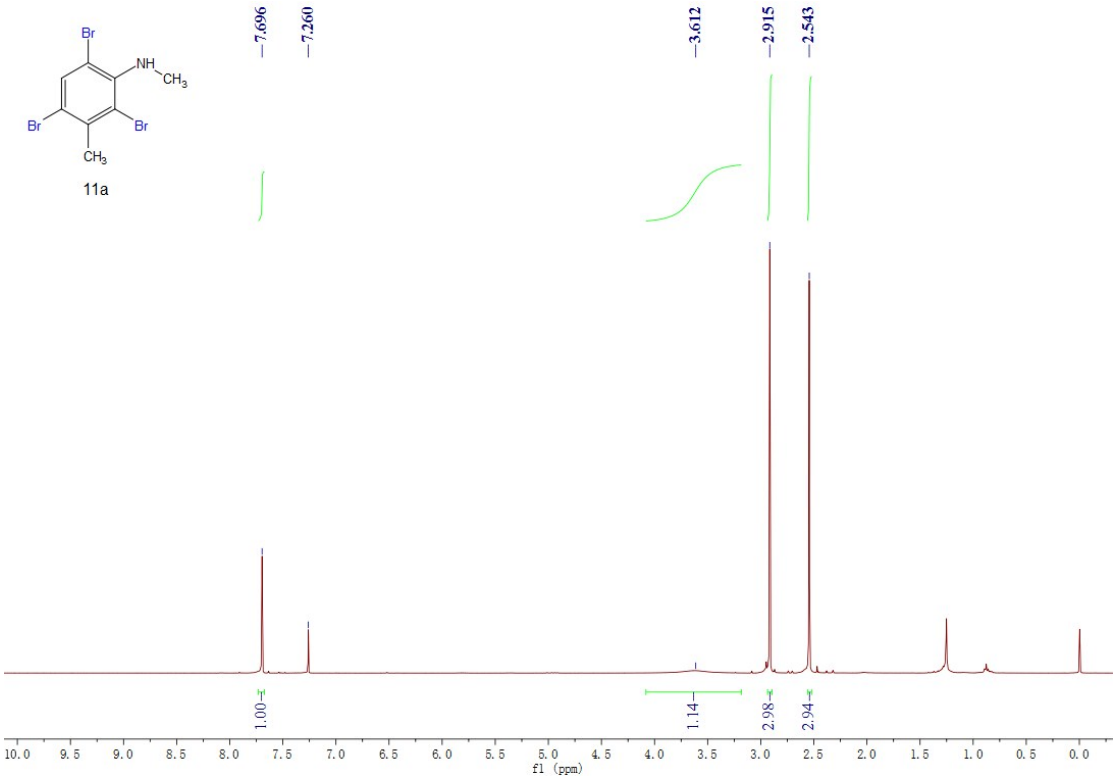

Br
NH
CH3
Br
8a
144.243
134.349
131.331
112.399
109.875
107.941
38.636
14.626
f1 (ppm)

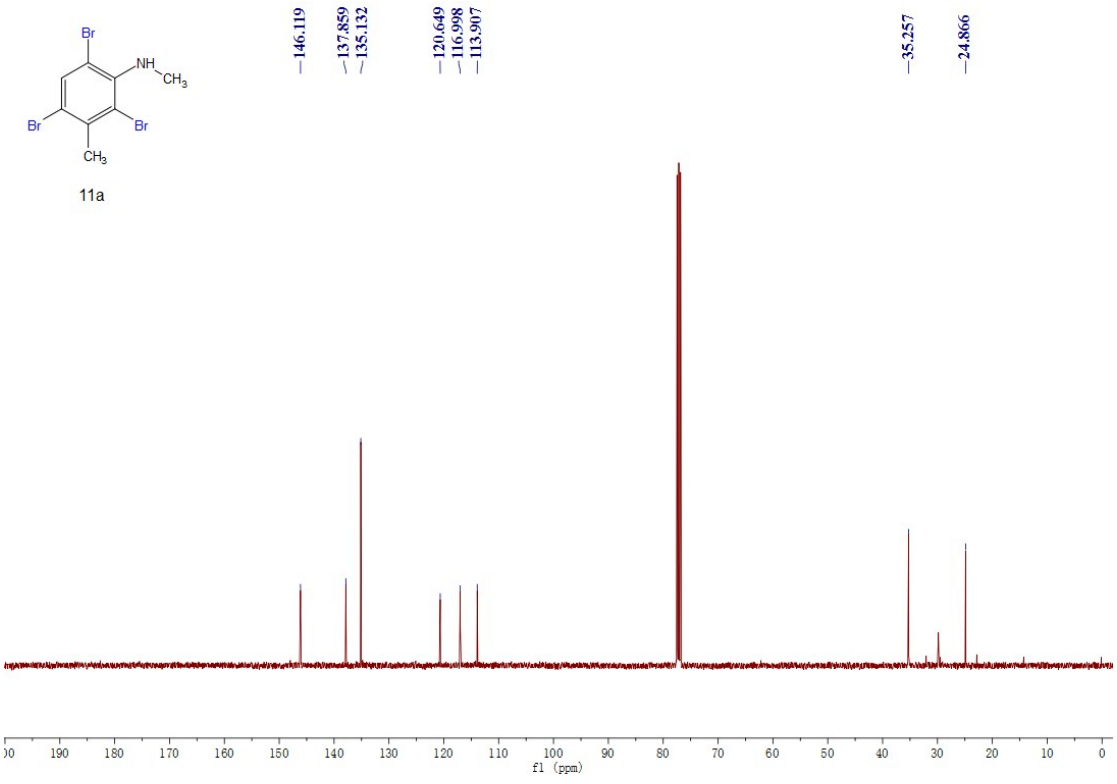

Br
NH
CH3
CH3
Br
9a
7.528
7.522
7.260
7.254
7.238
7.232
6.513
6.491
4.182
3.650
3.635
3.619
3.603
3.588
3.572
3.556
1.249
1.234
1.00
1.10
1.04
0.92
1.10
6.60
f1 (ppm)

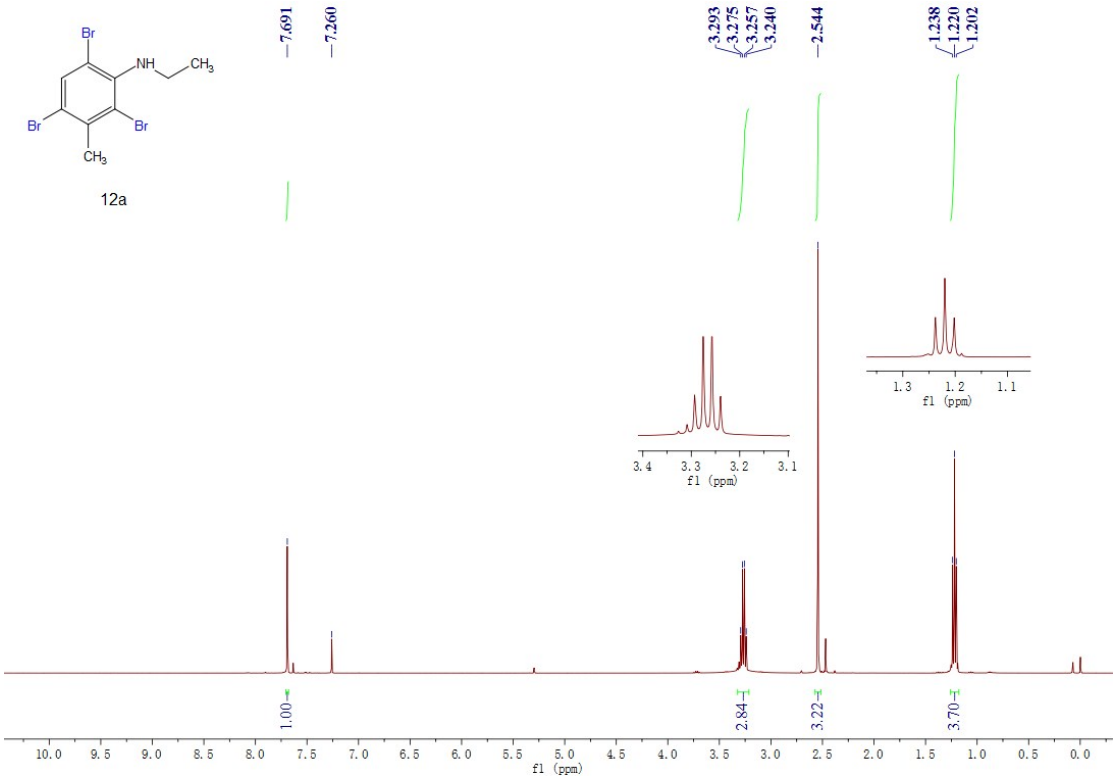

Br
NH
CH3
CH3
Br
9a
143.462
134.499
131.257
112.852
110.064
107.475
44.573
22.838
f1 (ppm)


Br
NH
CH3
Br
CH3
10a
7.473
7.467
7.260
7.192
7.186
3.662
2.787
2.329
1.00
1.01
1.11
3.12
3.18
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

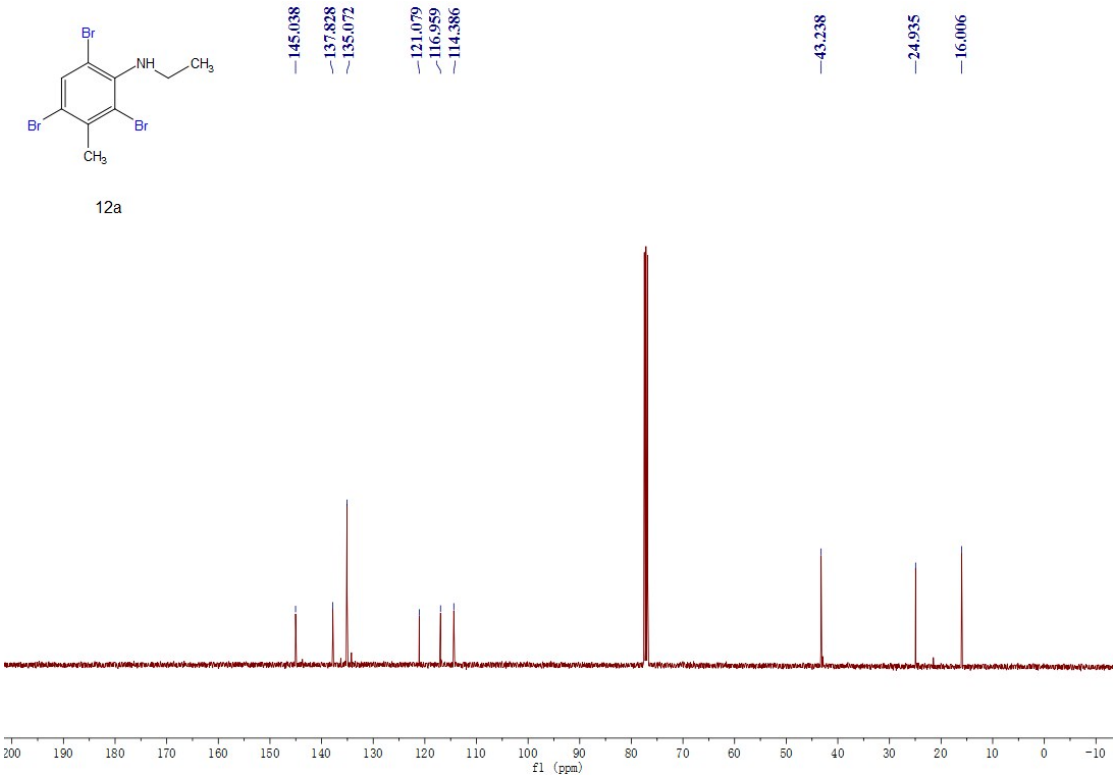

Br
NH
CH3
Br
CH3
10a
146.160
133.545
132.734
132.289
117.470
113.743
35.166
19.532
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)


Br
NH
CH3
Br
Br
CH3
11a
7.696
7.260
3.612
2.915
2.543
1.00
1.14
2.98
2.94
f1 (ppm)

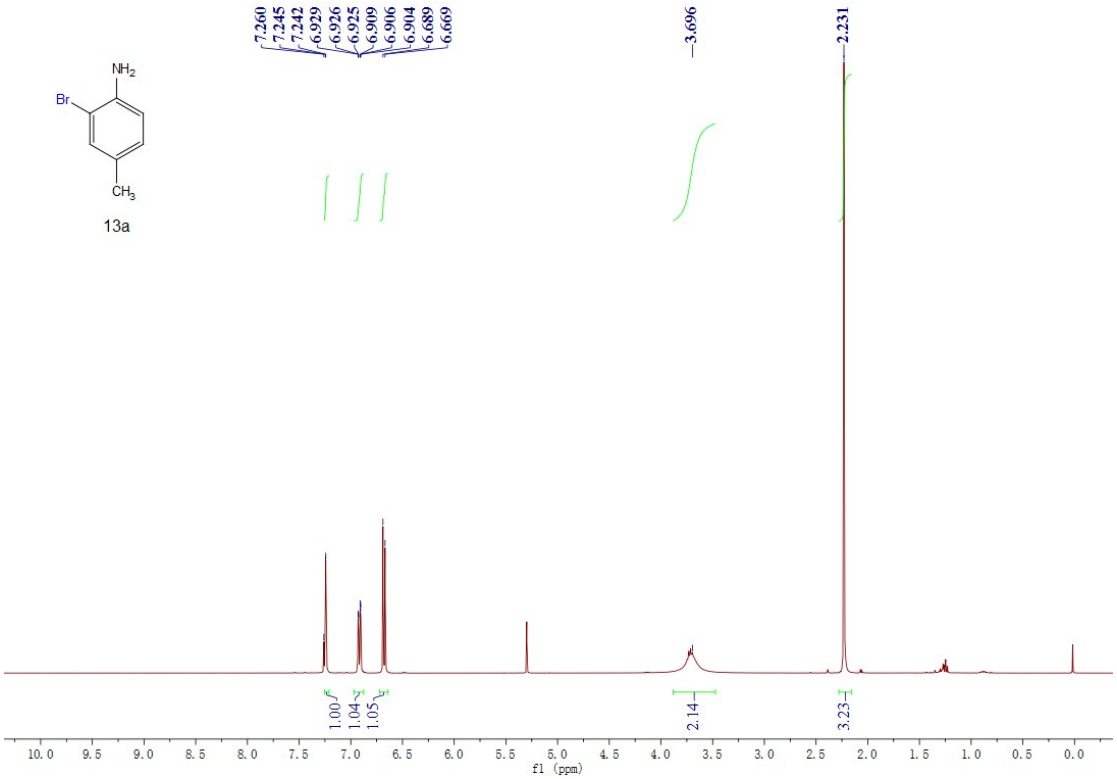

Br
NH
CH3
Br
Br
CH3
11a
146.119
137.859
135.132
120.649
116.998
113.907
35.257
24.866
f1 (ppm)

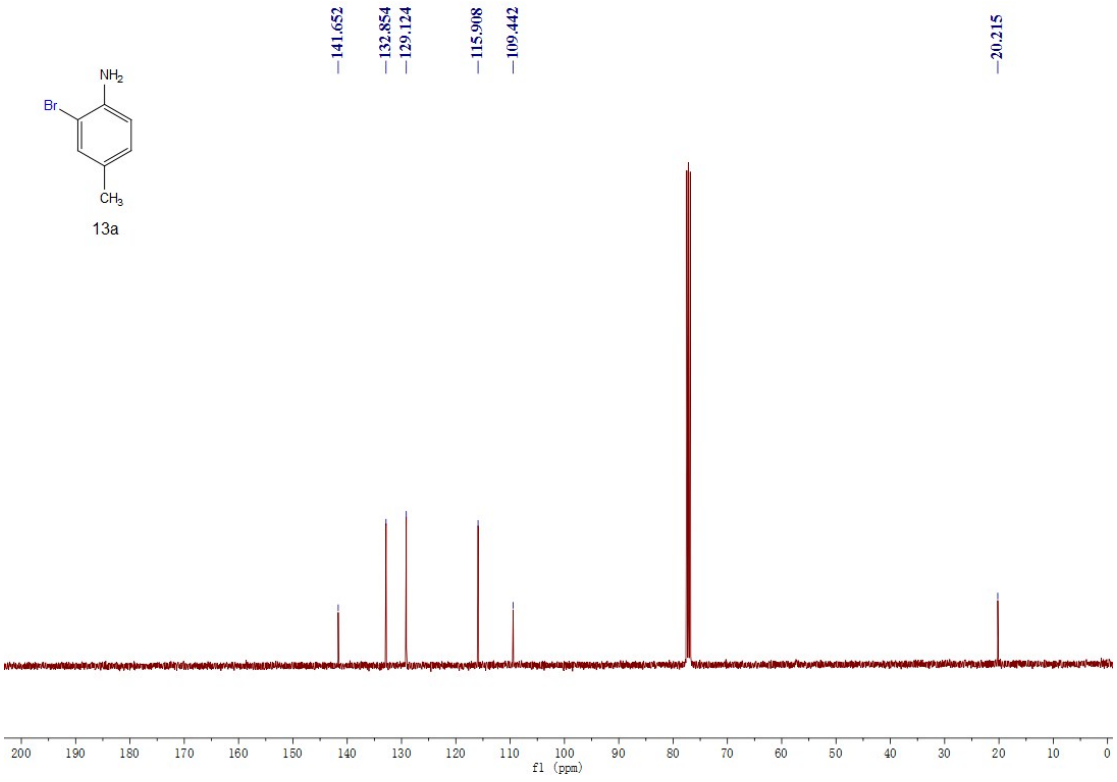

Br
NH
CH3
Br
Br
CH3
7.691
7.260
3.293
3.275
3.257
3.240
2.544
1.238
1.220
1.202
1.00
2.84
3.22
3.70
f1 (ppm)

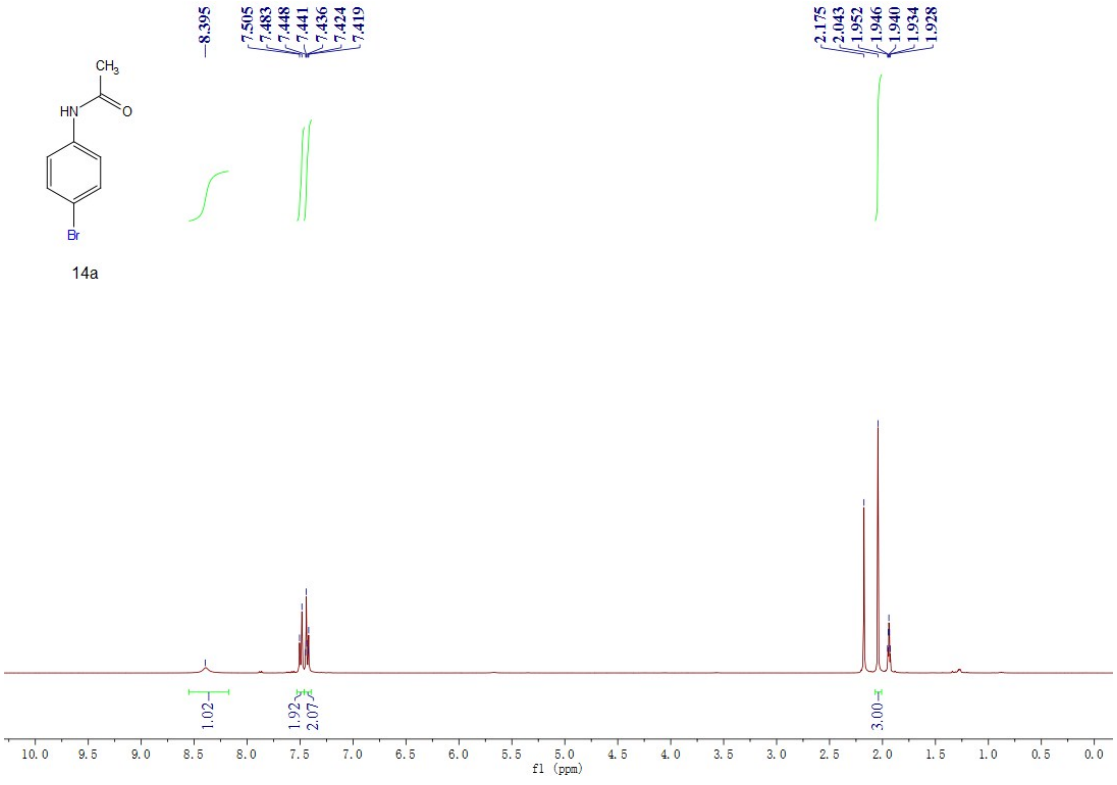
12a


Br
NH
CH3
Br
Br
CH3
145.038
137.828
135.072
121.079
116.959
114.386
43.238
24.935
16.006
f1 (ppm)

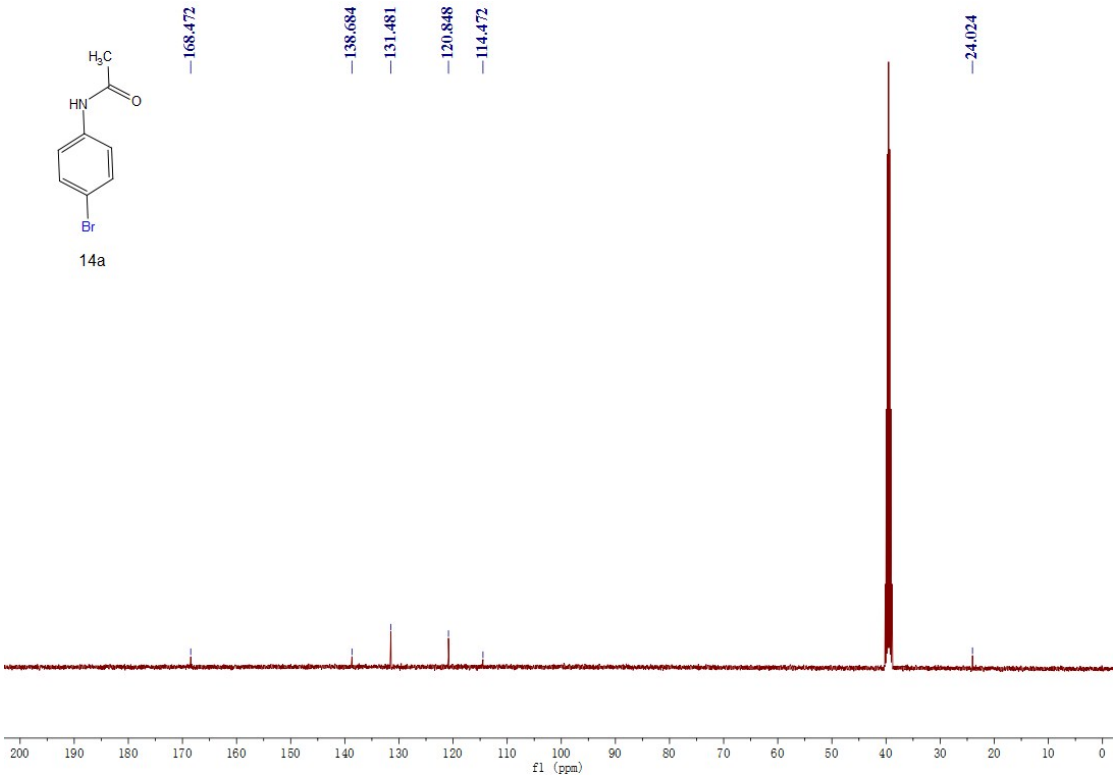
12a


7.260
7.245
7.242
6.929
6.926
6.925
6.909
6.906
6.904
6.689
6.669
3.696
2.231
NH2
Br
CH3
13a
1.00
1.04
1.05
2.14
3.23
f1 (ppm)

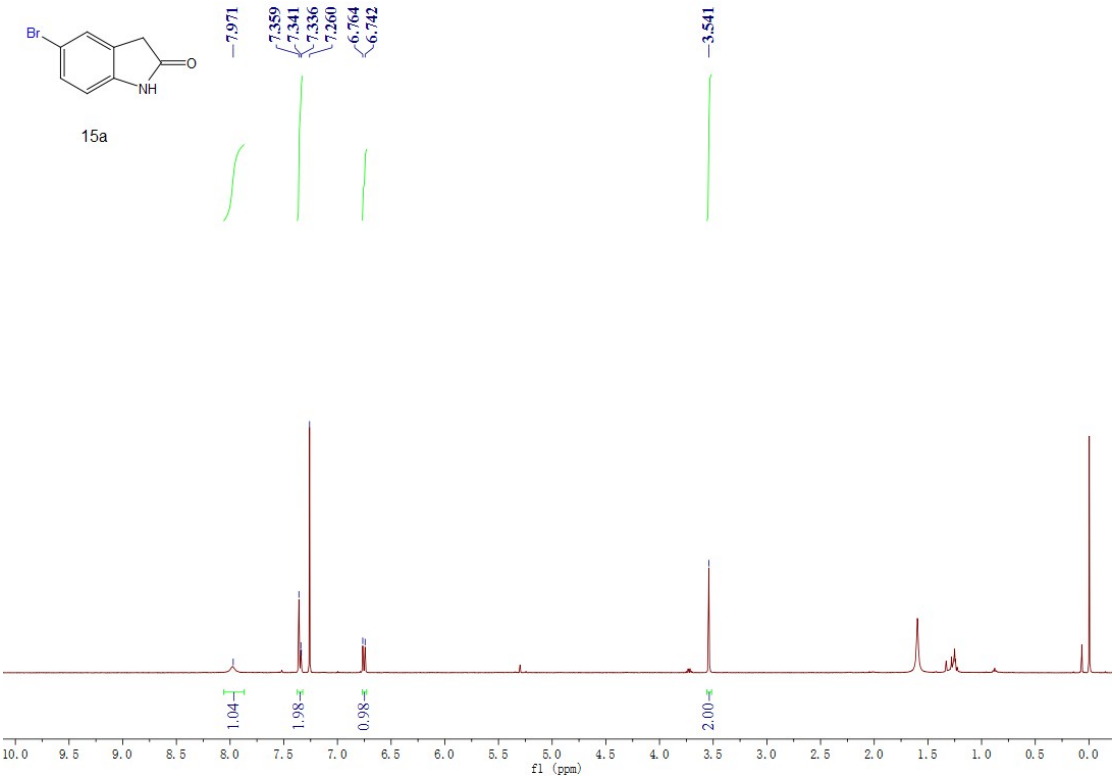

141.652
132.854
129.124
115.908
109.442
20.215
NH2
Br
CH3
13a
f1 (ppm)

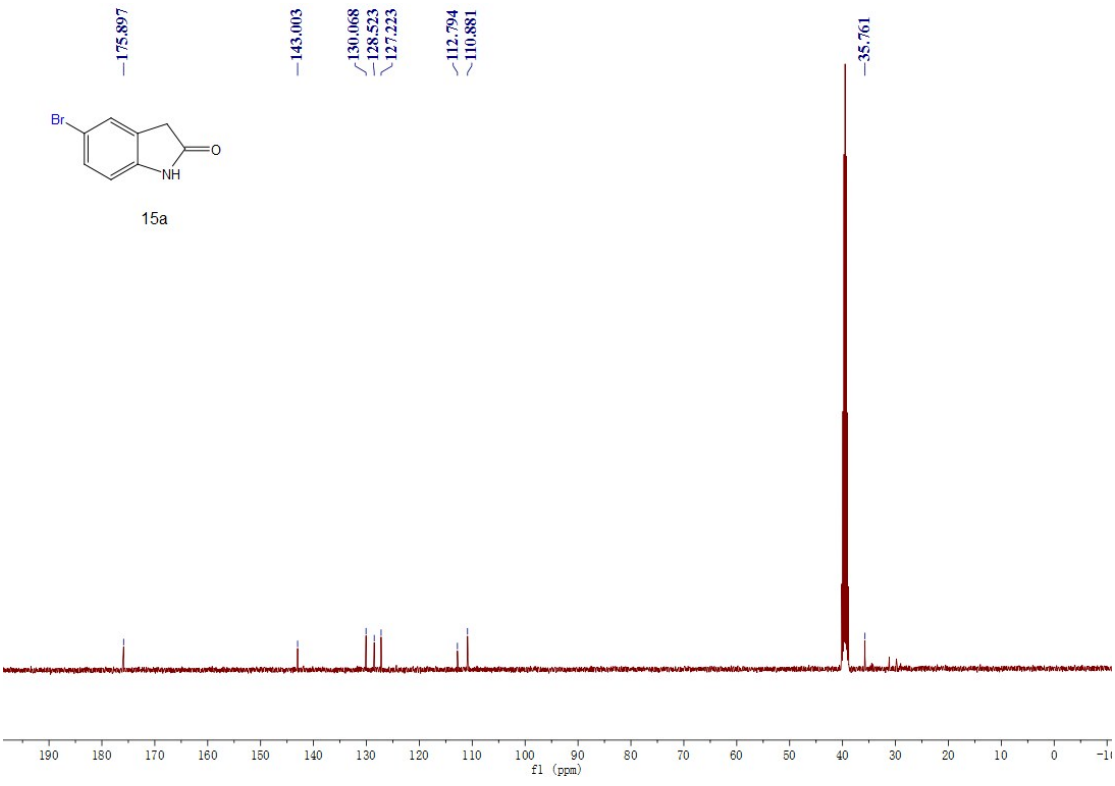

8.395
7.505
7.483
7.448
7.441
7.436
7.424
7.419
2.175
2.043
1.952
1.946
1.940
1.934
1.928
CH3
HN
O
Br
1.02
1.92
2.07
3.00
f1 (ppm)

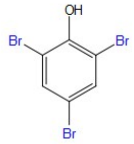
14a


168.472
138.684
131.481
120.848
114.472
24.024
H3C
HN
O
Br
f1 (ppm)

14a

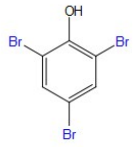

Br
O
NH
15a
7.971
7.359
7.341
7.336
7.260
6.764
6.742
3.541
1.04
1.98
0.98
2.00
f1 (ppm)


Br
O
NH
15a
175.897
143.003
130.068
128.523
127.223
112.794
110.881
35.761
f1 (ppm)


OH
Br
Br
Br

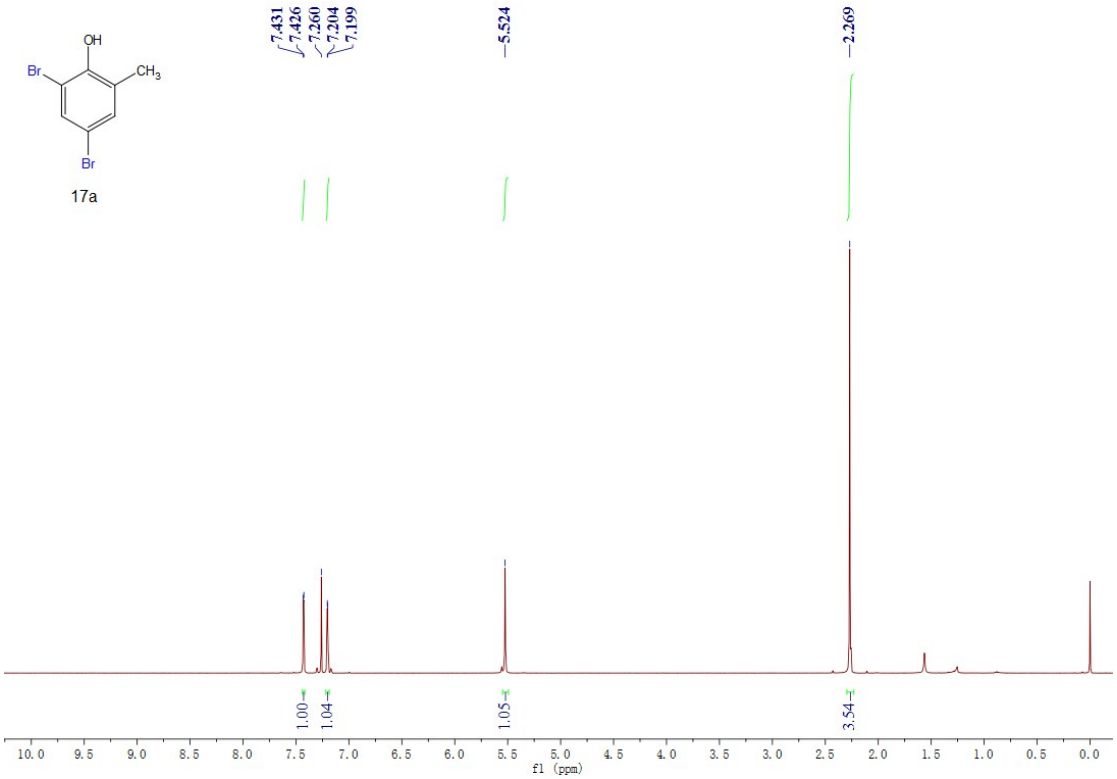
16a

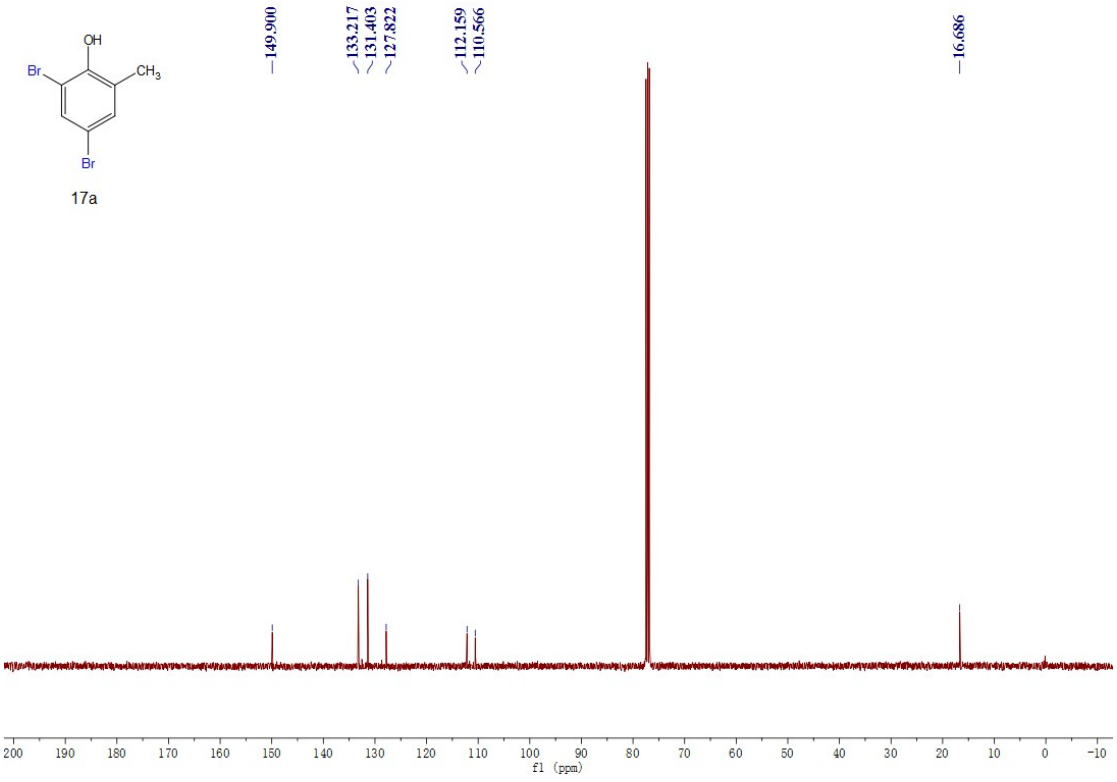
7.592
7.260
5.865
2.00
0.92
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

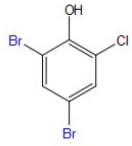

OH
Br
Br
Br

16a

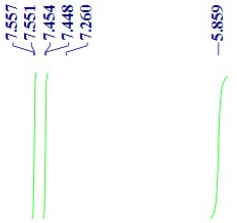
149.090
134.377
112.845
110.553
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

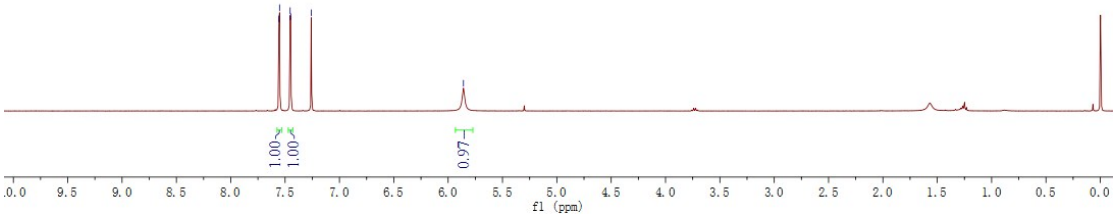

OH
Br
CH3
Br
17a
7.431
7.426
7.260
7.204
7.199
5.524
2.269
1.00
1.04
1.05
3.54
f1 (ppm)

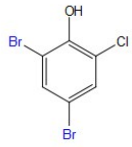

OH
Br
CH3
Br
17a
149.900
133.217
131.403
127.822
112.159
110.566
16.686
f1 (ppm)


OH
Br
Cl
Br

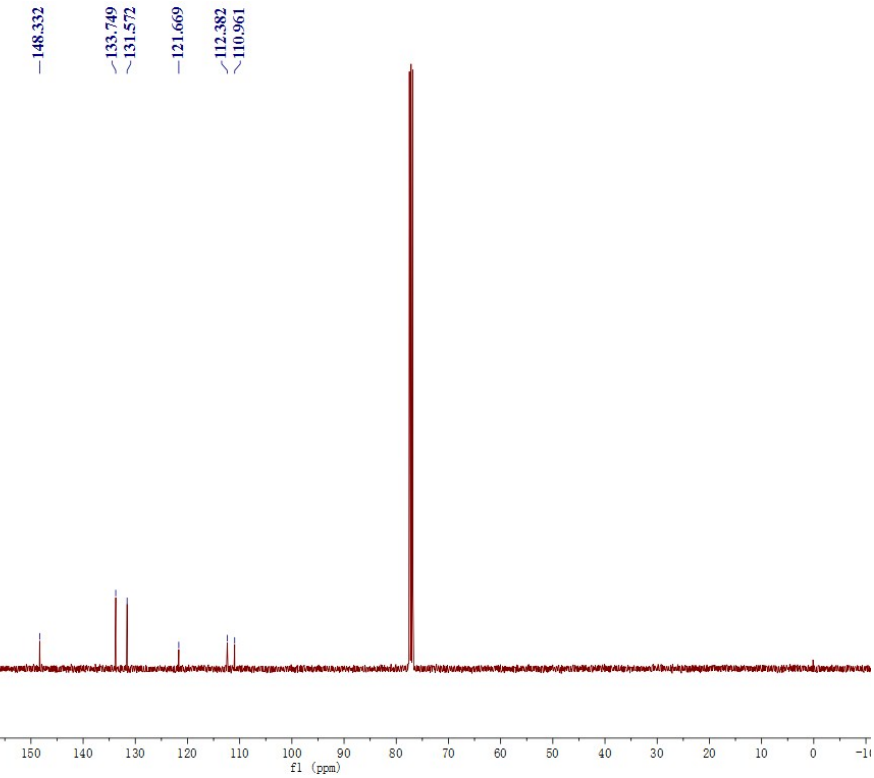
18a

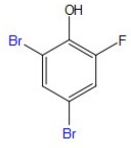

7.557
7.551
7.454
7.448
7.260
5.859


1.00
1.00
0.97
f1 (ppm)

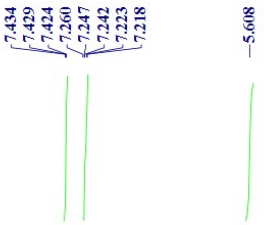

OH
Br
Cl
Br

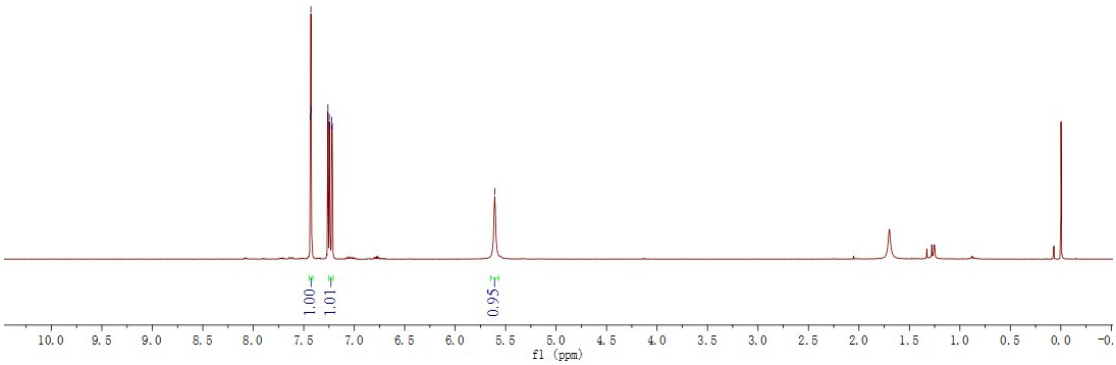
18a

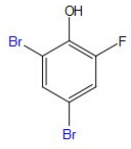

148.332
133.749
131.572
121.669
112.382
110.961
f1 (ppm)


OH
Br
F
Br

19a


7.434
7.429
7.424
7.260
7.247
7.242
7.223
7.218
5.608

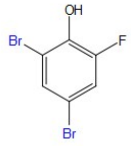

1.00
1.01
0.95
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)


OH
Br
F
Br

19a

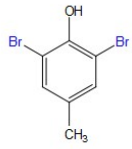

152.066
149.585
141.296
141.153
130.261
130.223
119.332
119.118
111.795
111.703
111.546
111.520

190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -1
f1 (ppm)


OH
Br
F
Br

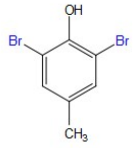
19a

-131.034
190 170 150 130 110 90 70 50 30 10 -10 -30 -50 -70 -90 -110 -130 -150 -170 -190
f1 (ppm)


OH
Br
Br
CH3

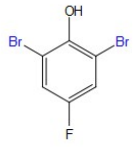
20a

7.260
5.706
2.257
2.78
1.00
3.47
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)


OH
Br
Br
CH3

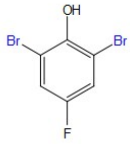
20a

147.258
132.542
109.554
100.124
20.121
f1 (ppm)


OH
Br
Br
F

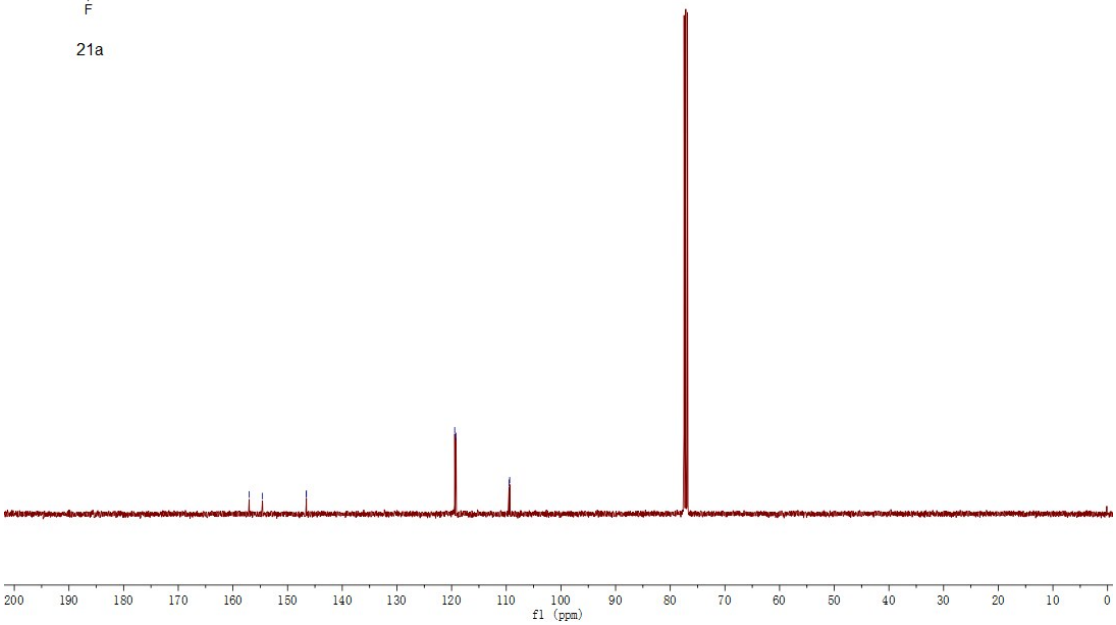
21a

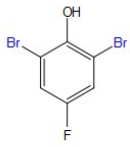
7.264
7.260
7.241
5.697
0.96
1.00
1.01
f1 (ppm)



21a

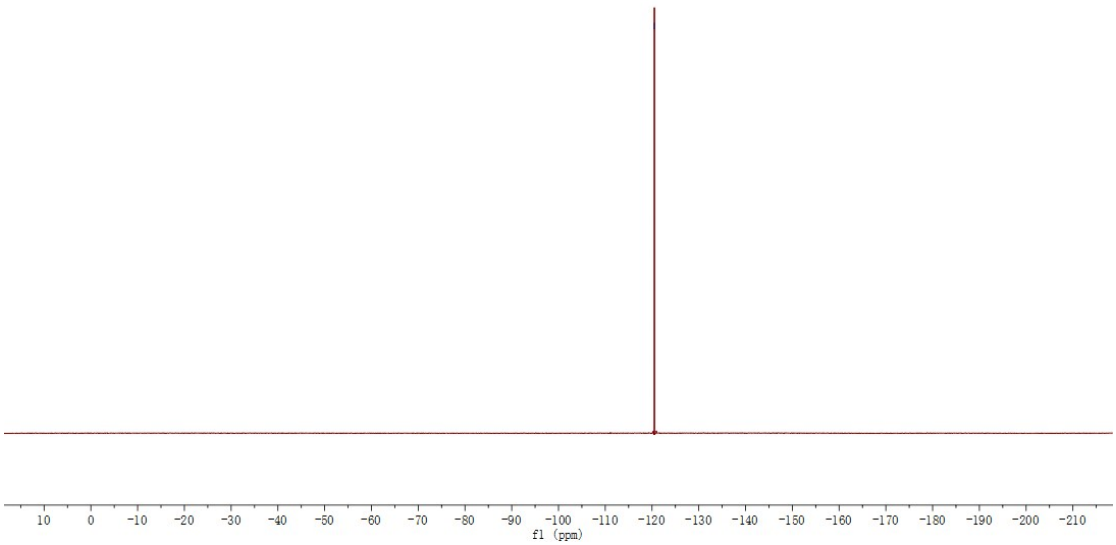
157.039
154.588
146.589
146.556
119.433
119.179
109.482
109.378

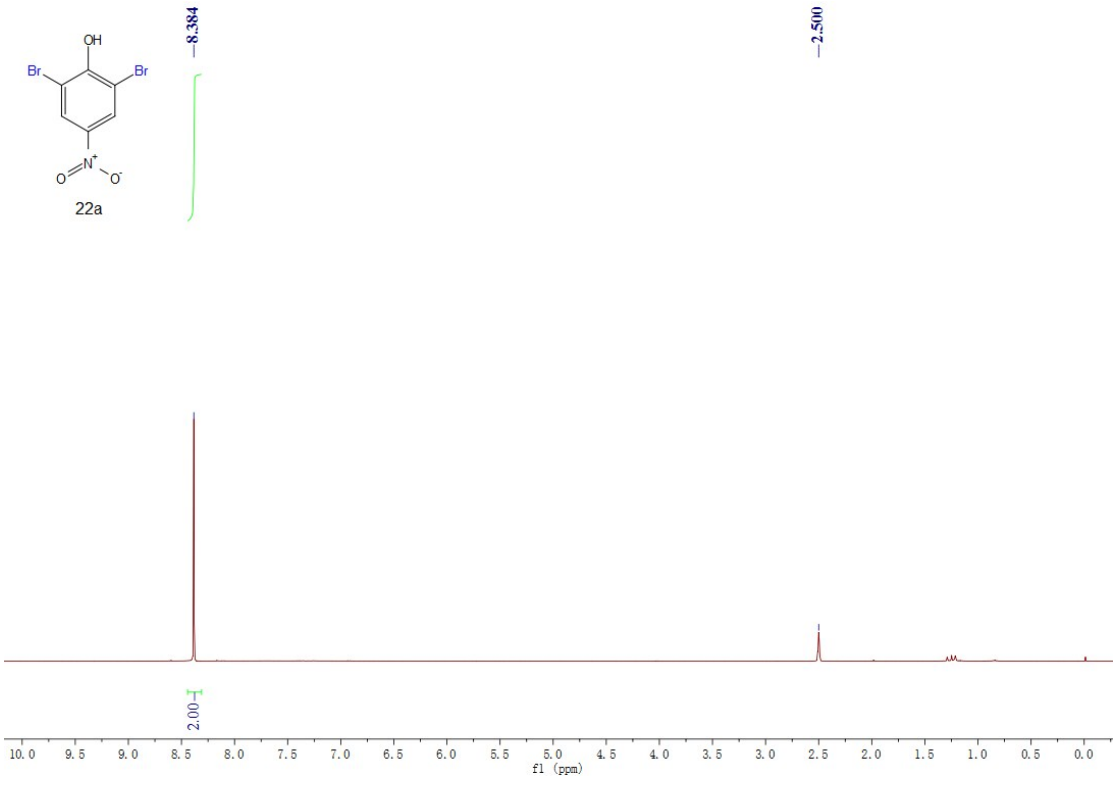


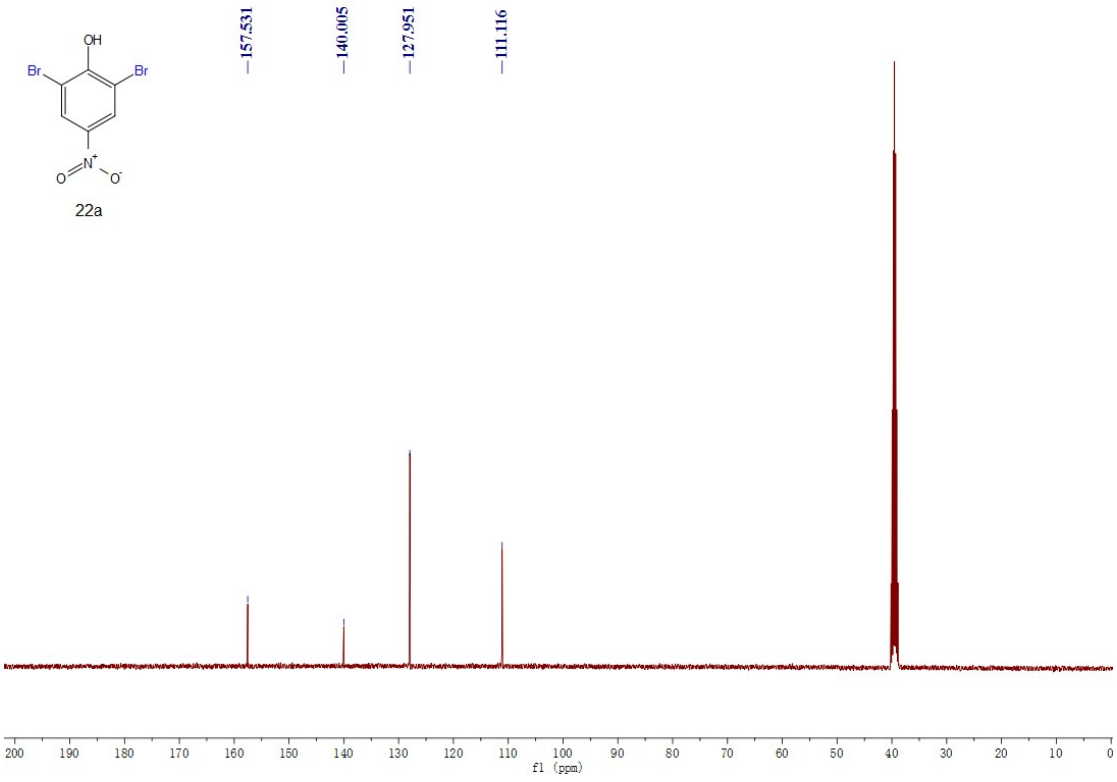


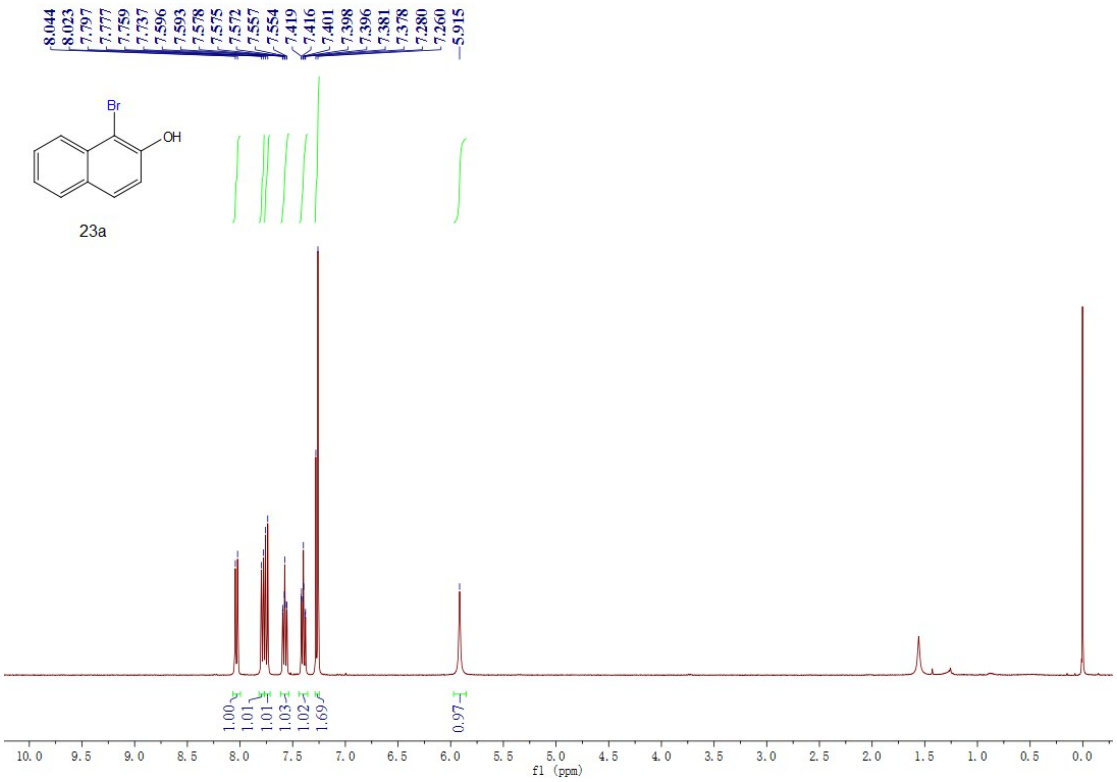
21a

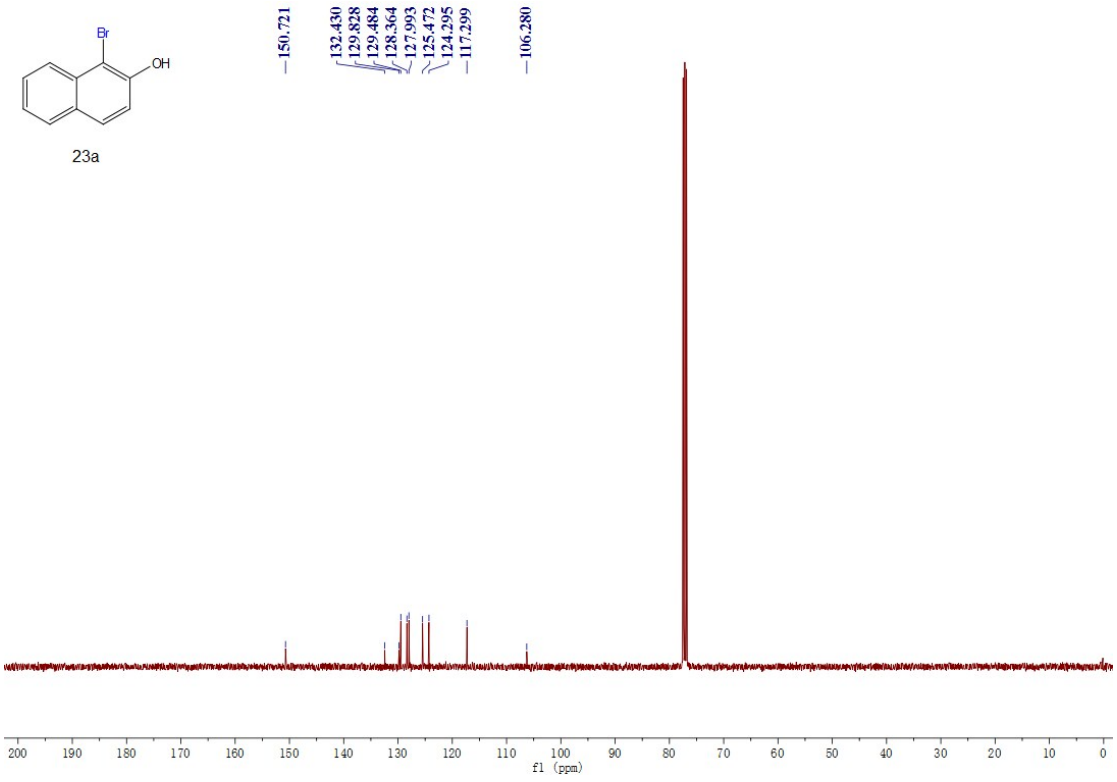
-120.498

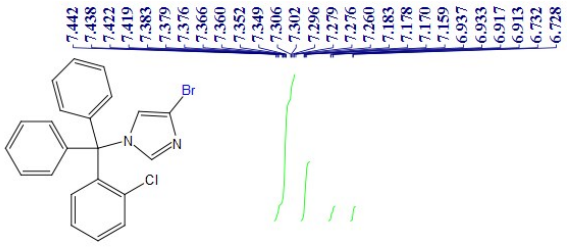



OH
Br
Br
O
N+
O-
22a
8.384
2.500
2.00
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

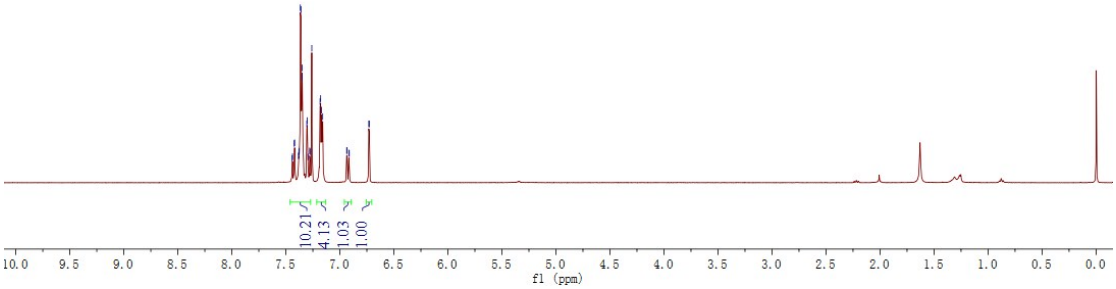

OH
Br
Br
O
N+
O-
22a
157.531
140.005
127.951
111.116
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

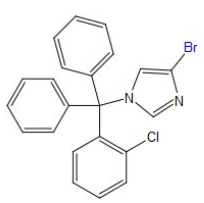

8.044
8.023
7.797
7.777
7.759
7.737
7.596
7.593
7.578
7.575
7.572
7.557
7.554
7.419
7.416
7.401
7.398
7.396
7.381
7.378
7.280
7.260
5.915
Br
OH
23a
1.00
1.01
1.01
1.03
1.02
1.69
0.97
f1 (ppm)


150.721
132.430
129.828
129.484
128.364
127.993
125.472
124.295
117.299
106.280
Br
OH
23a
f1 (ppm)


7.442
7.438
7.422
7.419
7.383
7.379
7.376
7.366
7.360
7.352
7.349
7.306
7.302
7.296
7.279
7.276
7.260
7.183
7.178
7.170
7.159
6.937
6.933
6.917
6.913
6.732
6.728
Br
N
N
Cl

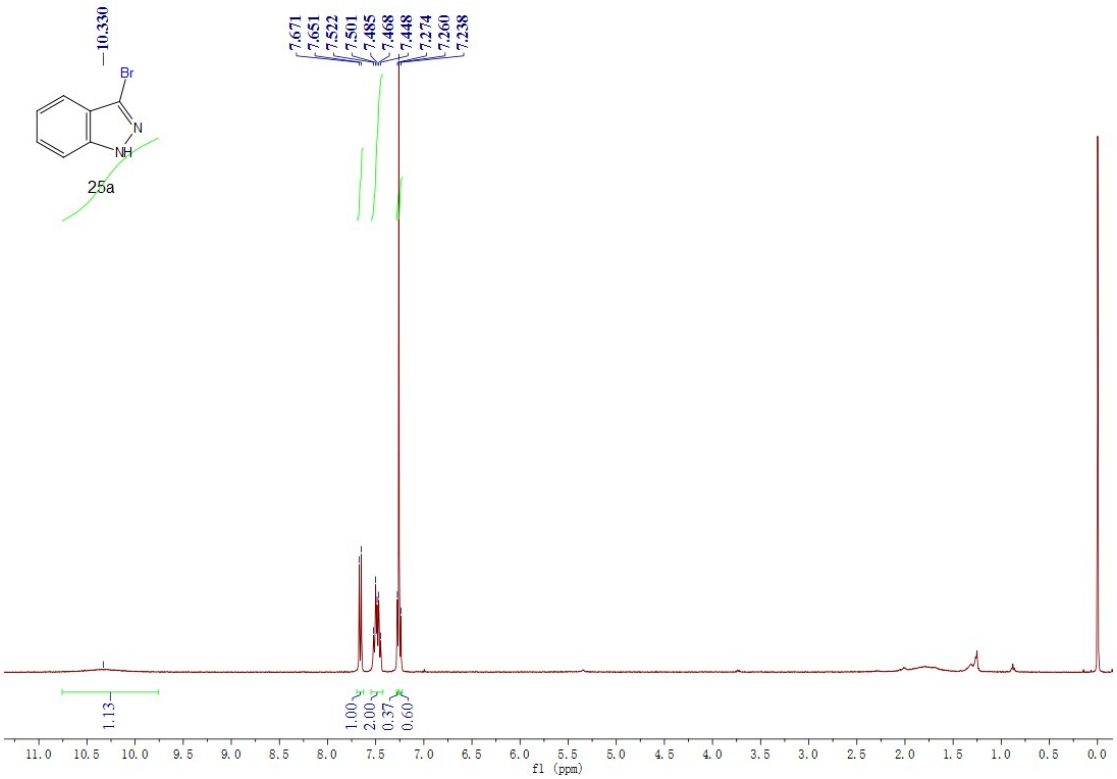
24a

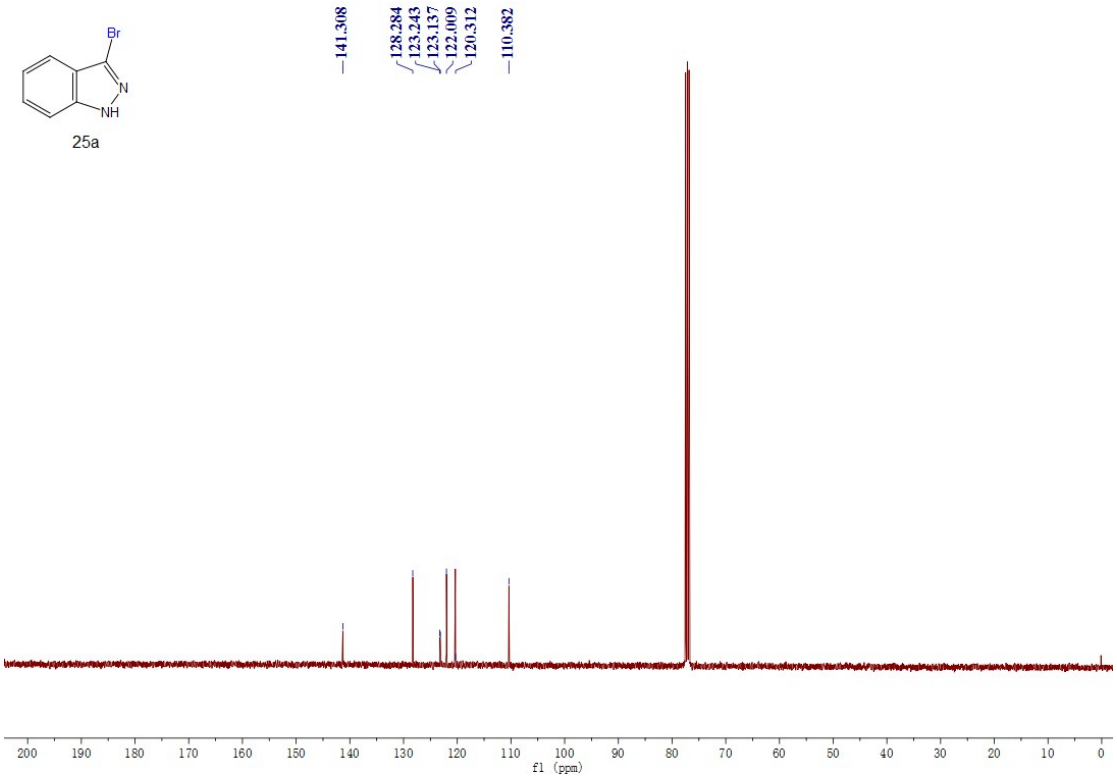

10.21
4.13
1.03
1.00
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

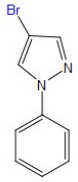

Br
N
N
Cl

24a

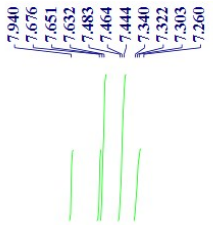
140.198
139.772
138.821
135.637
132.499
130.482
130.263
130.236
128.594
128.333
127.305
120.810
114.870
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

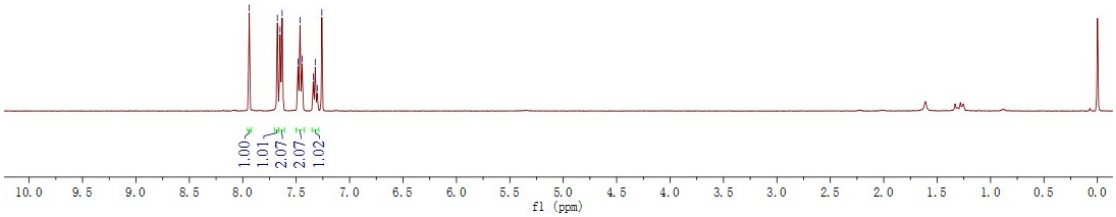

10.330
7.671
7.651
7.522
7.501
7.485
7.468
7.448
7.274
7.260
7.238
Br
N
NH
25a
1.13
1.00
2.00
0.37
0.60
f1 (ppm)

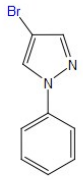

141.308
128.284
123.243
123.137
122.009
120.312
110.382
Br
N
NH
25a
f1 (ppm)


Br
N
N

26a

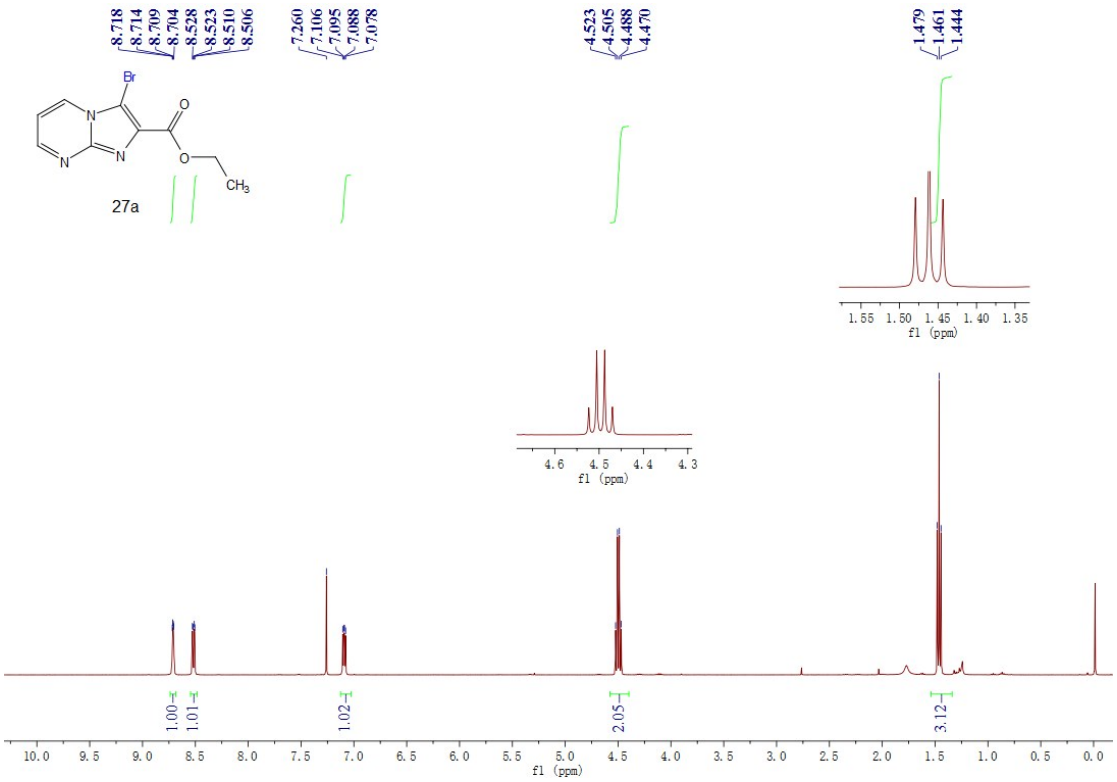

7.940
7.676
7.651
7.632
7.483
7.464
7.444
7.340
7.322
7.303
7.260

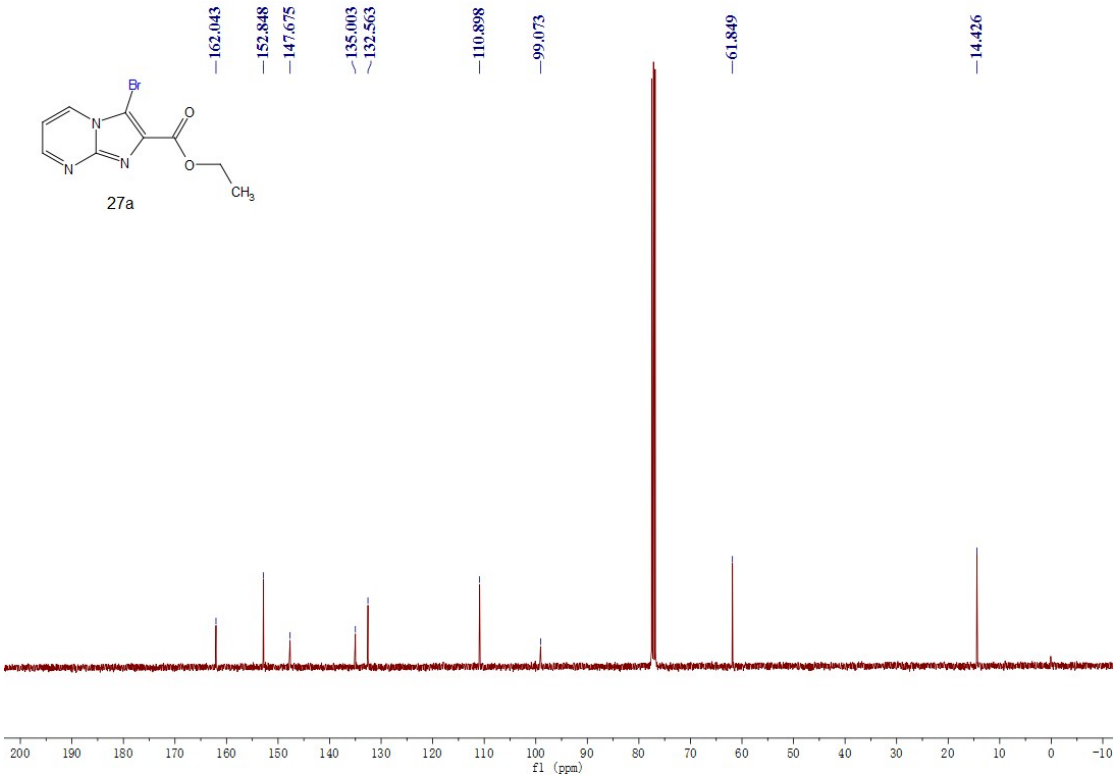

1.00
1.01
2.07
2.07
1.02
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

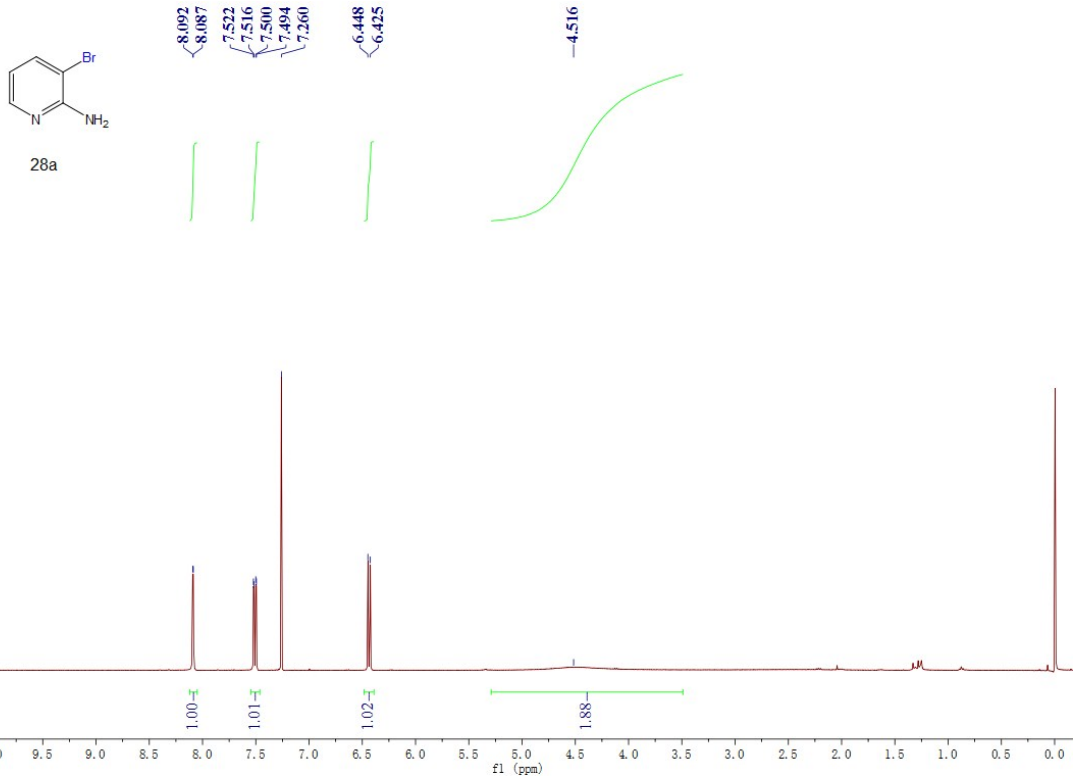

Br
N
N

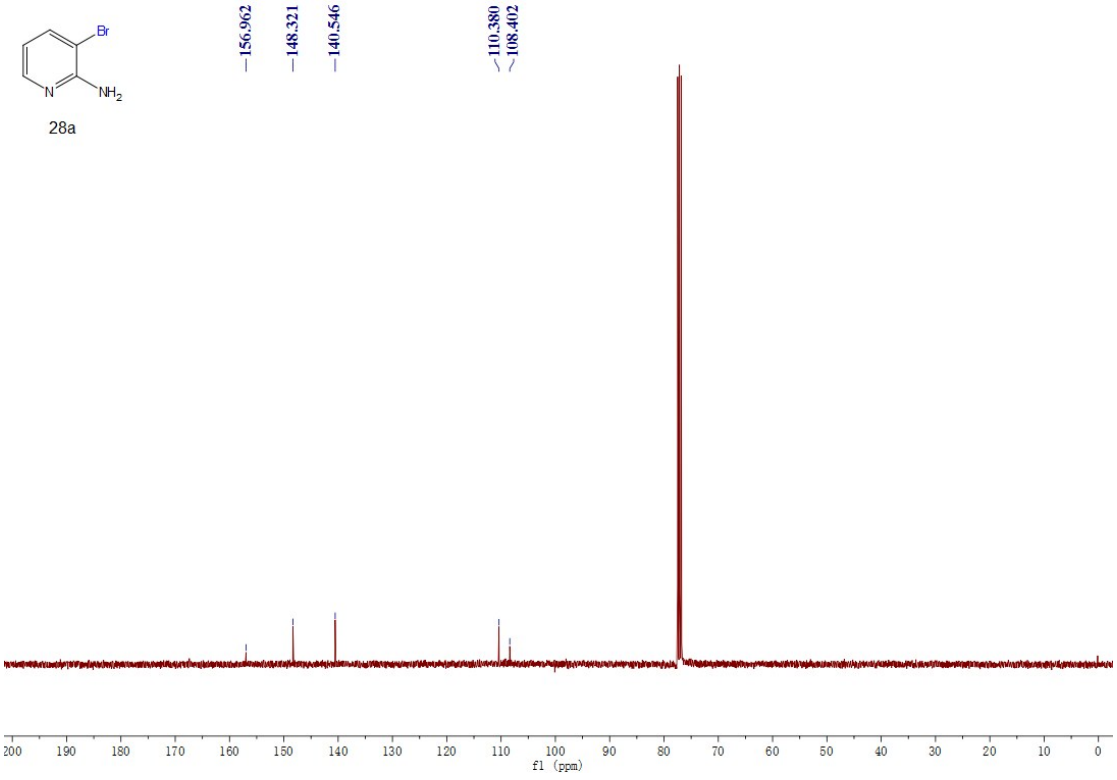
26a

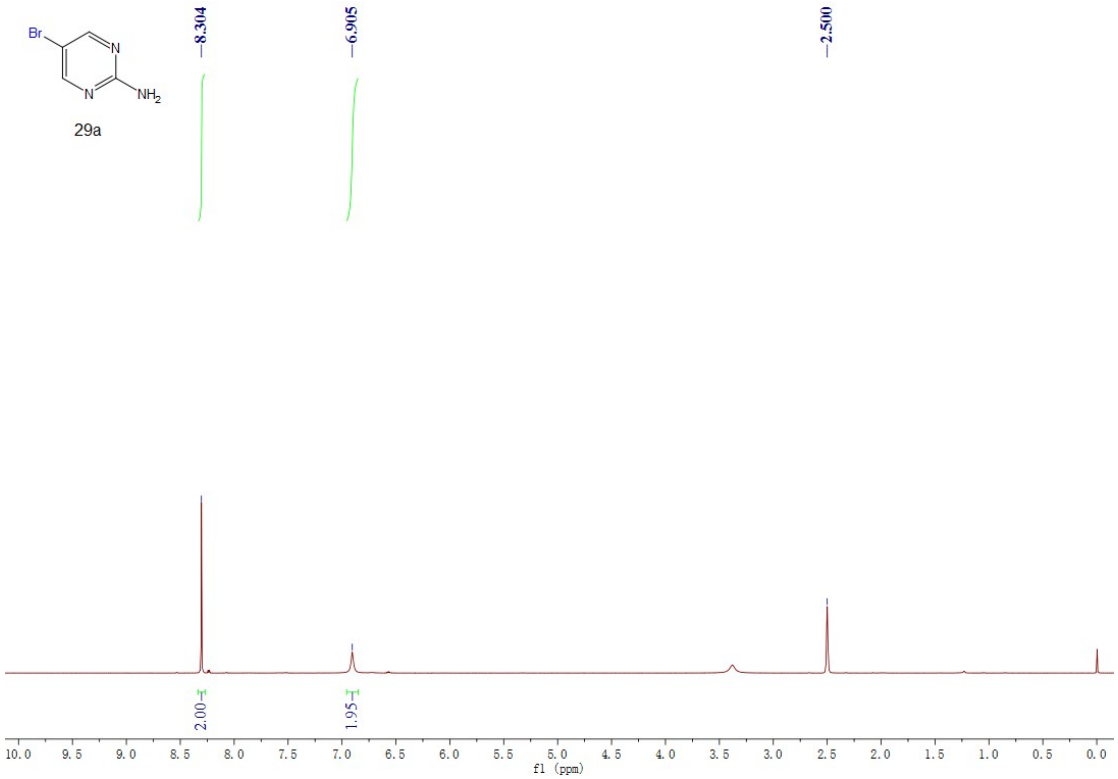
141.643
139.742
129.680
127.188
127.153
119.154
95.755
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

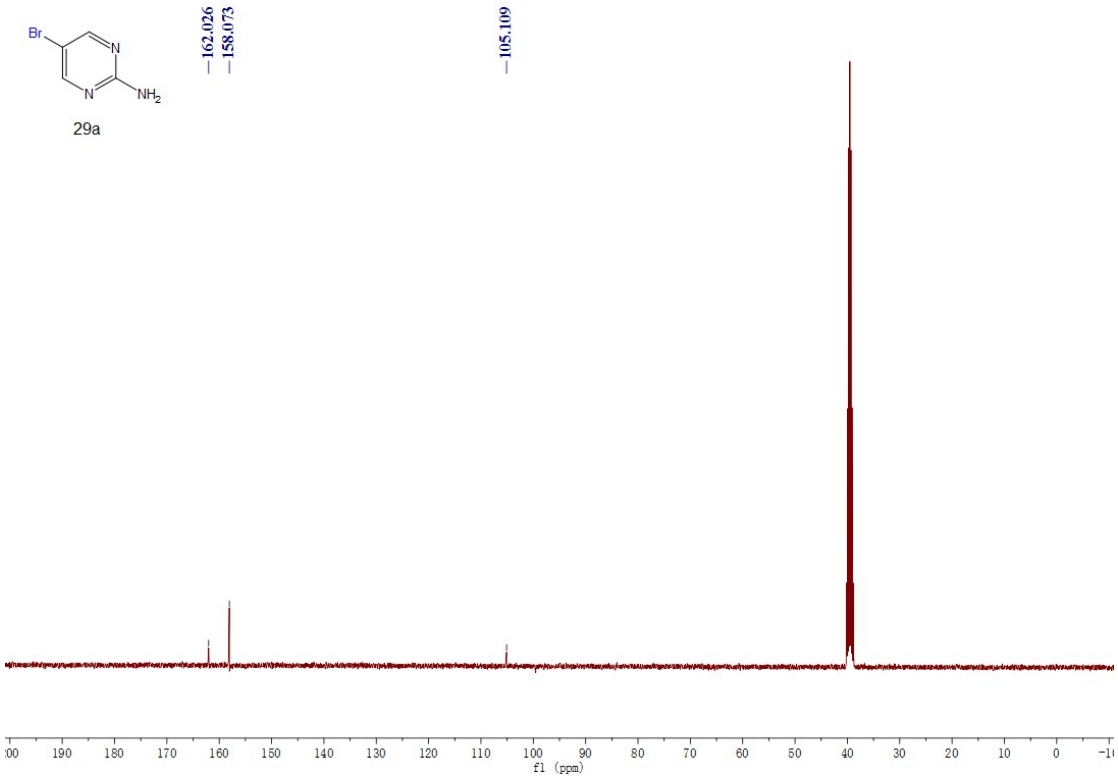

8.718
8.714
8.709
8.704
8.528
8.523
8.510
8.506
7.260
7.106
7.095
7.088
7.078
4.523
4.505
4.488
4.470
1.479
1.461
1.444
Br
O
N
N
N
O
CH3
27a
1.00
1.01
1.02
2.05
3.12
f1 (ppm)

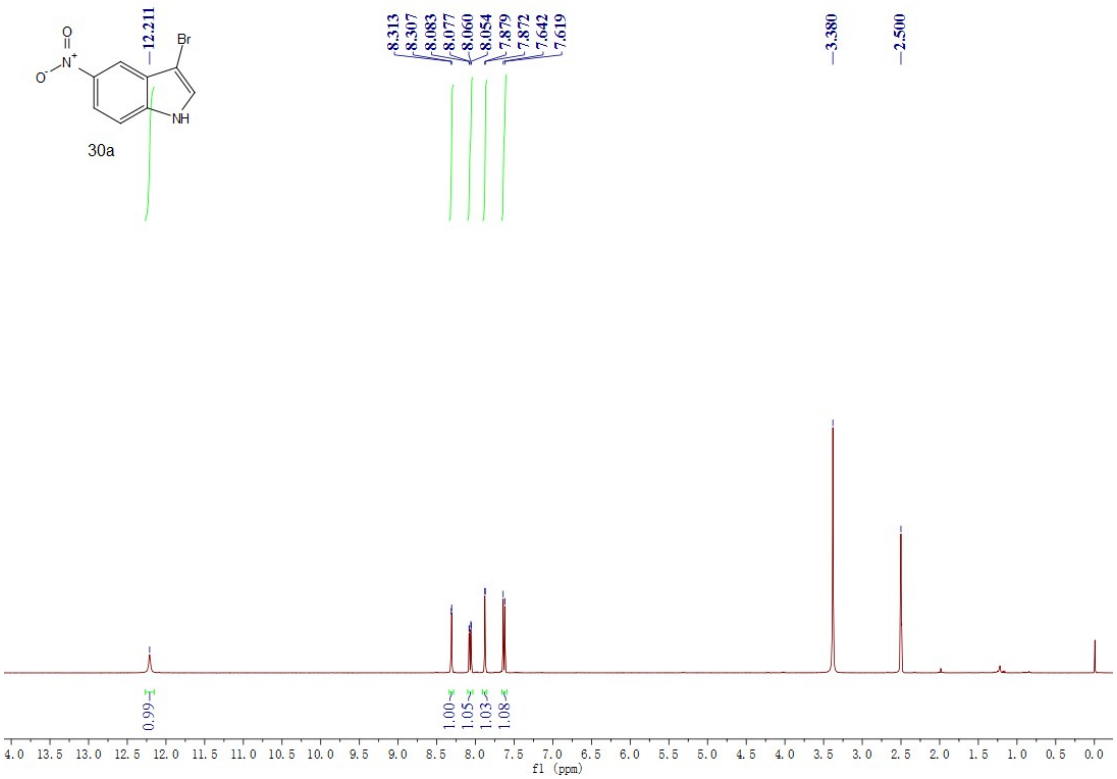

162.043
152.848
147.675
135.003
132.563
110.898
99.073
61.849
14.426
Br
O
N
N
N
O
CH3
27a
f1 (ppm)

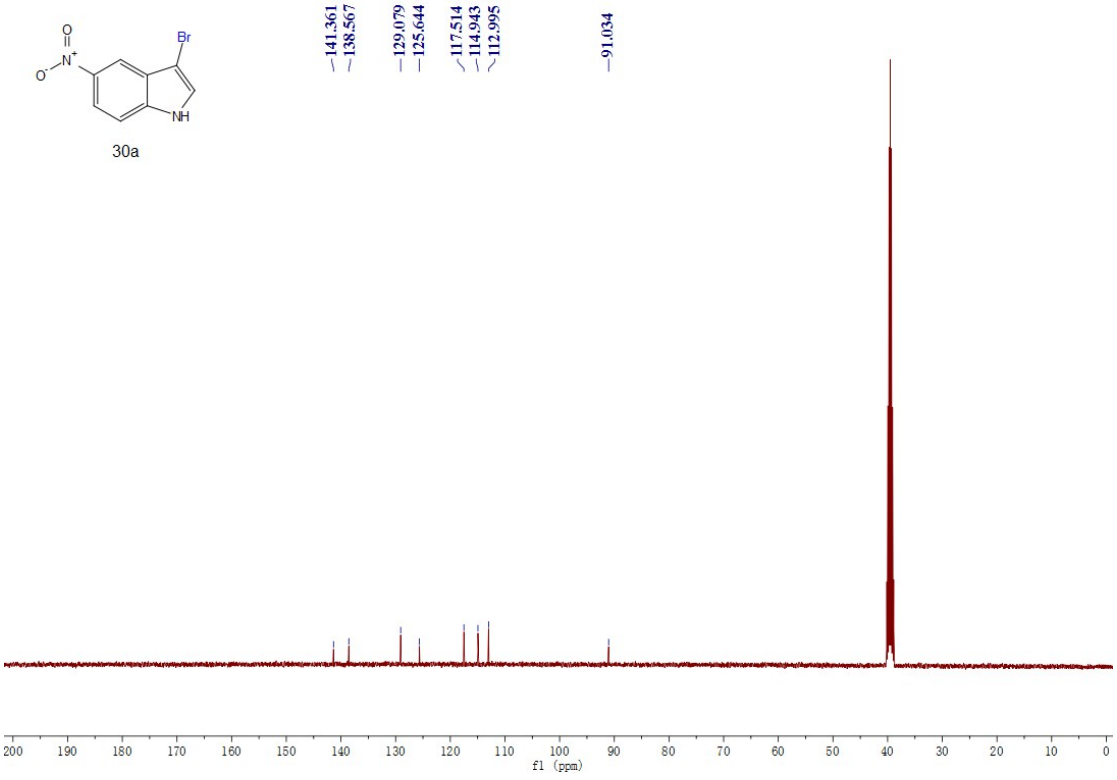

8.092
8.087
7.522
7.516
7.500
7.494
7.260
6.448
6.425
4.516
Br
N
NH2
28a
1.00
1.01
1.02
1.88
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

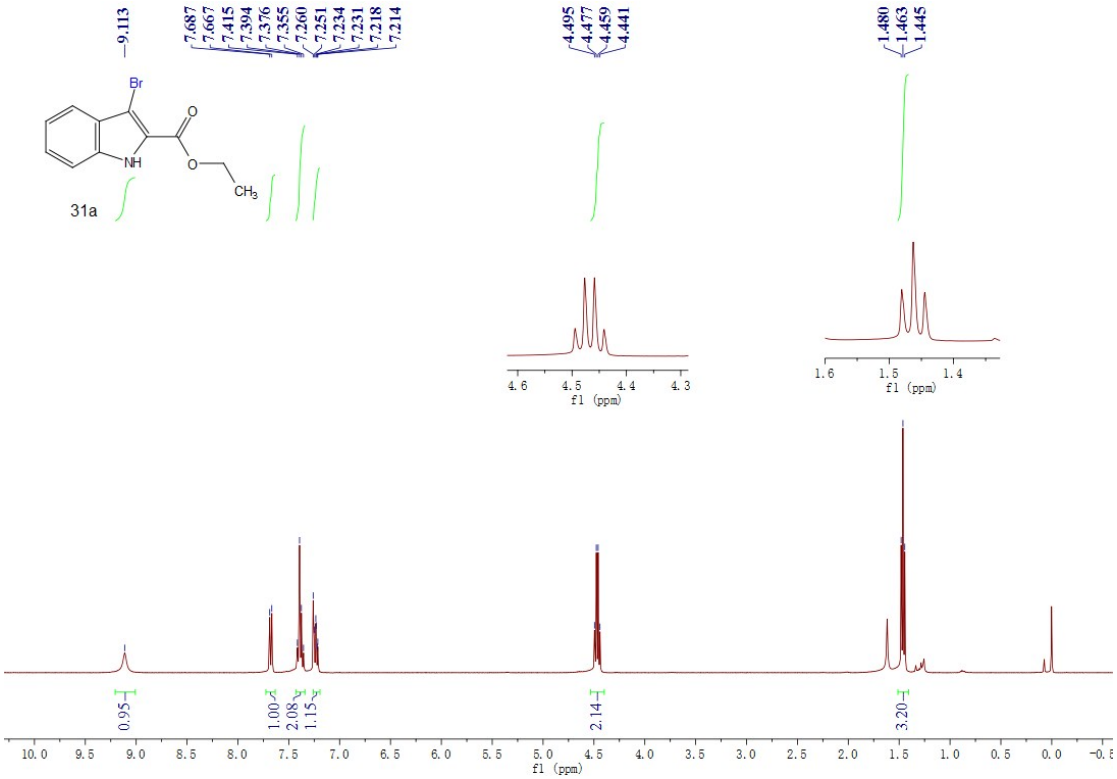

156.962
148.321
140.546
110.380
108.402
Br
N
NH2
28a
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

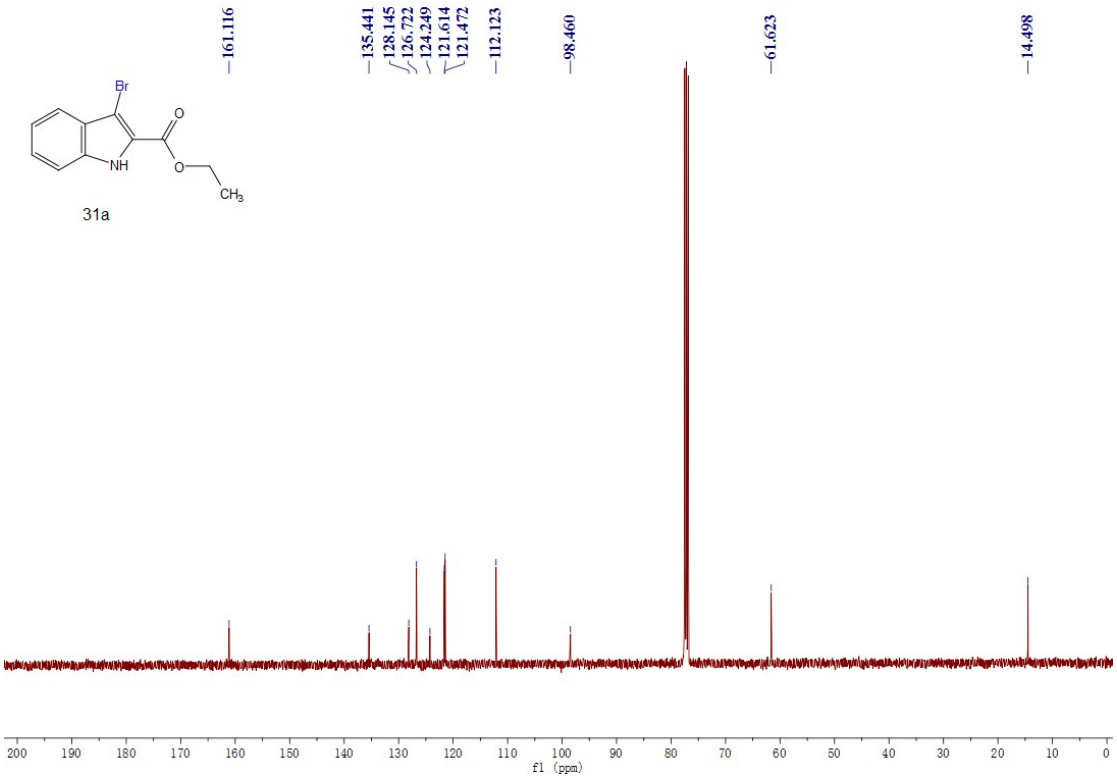

Br
N
N
NH2
29a
8.304
6.905
2.500
2.00
1.95
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

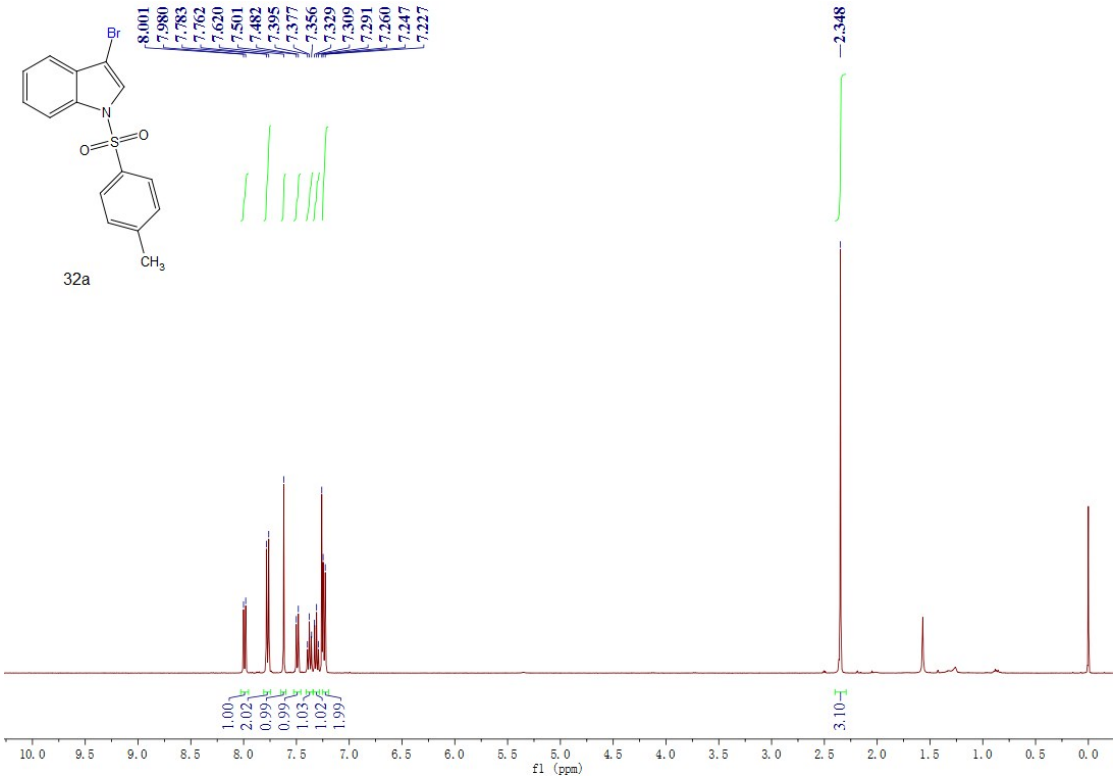

Br
N
N
NH2
29a
162.026
158.073
105.109
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

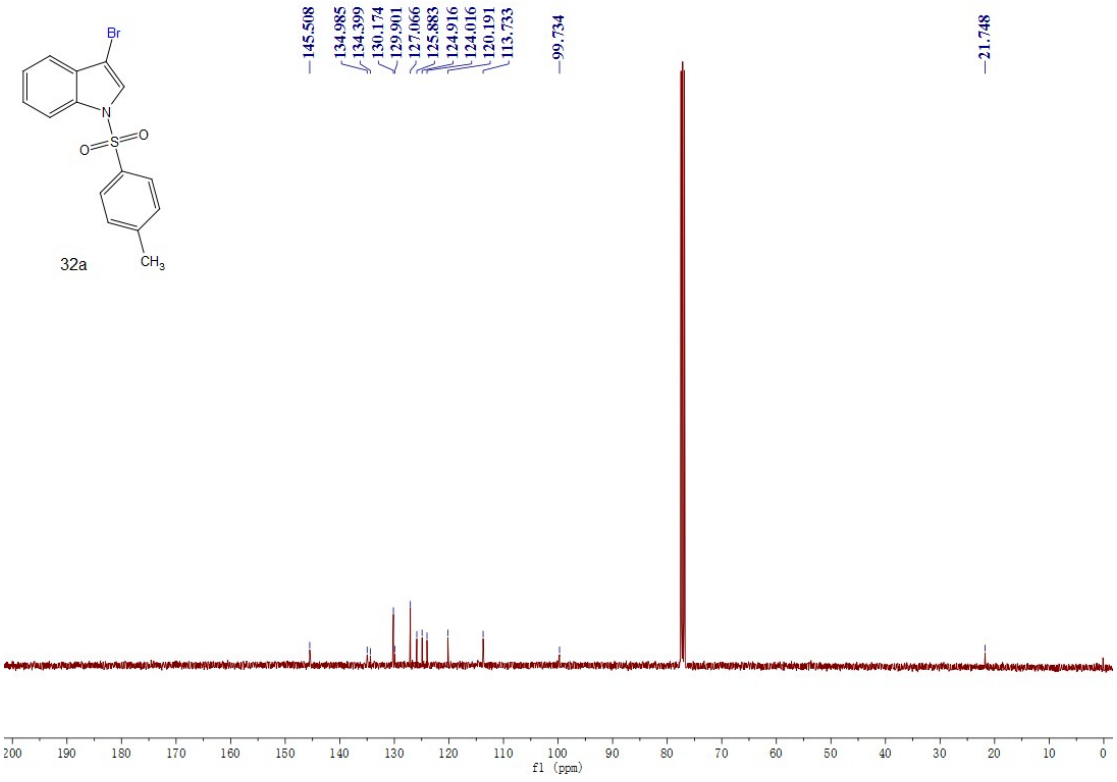

12.211
8.313
8.307
8.083
8.077
8.060
8.054
7.879
7.872
7.642
7.619
3.380
2.500
Br
NH
30a
0.99
1.00
1.05
1.03
1.08
f1 (ppm)

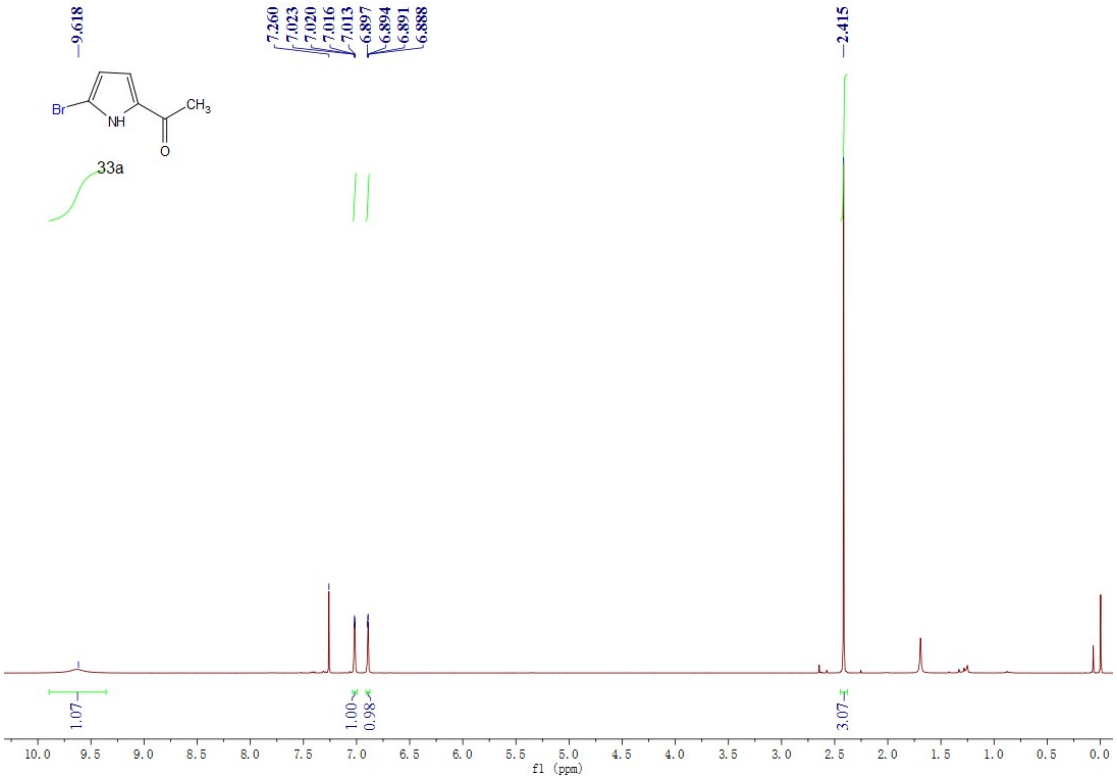

141.361
138.567
129.079
125.644
117.514
114.943
112.995
91.034
Br
NH
30a
f1 (ppm)

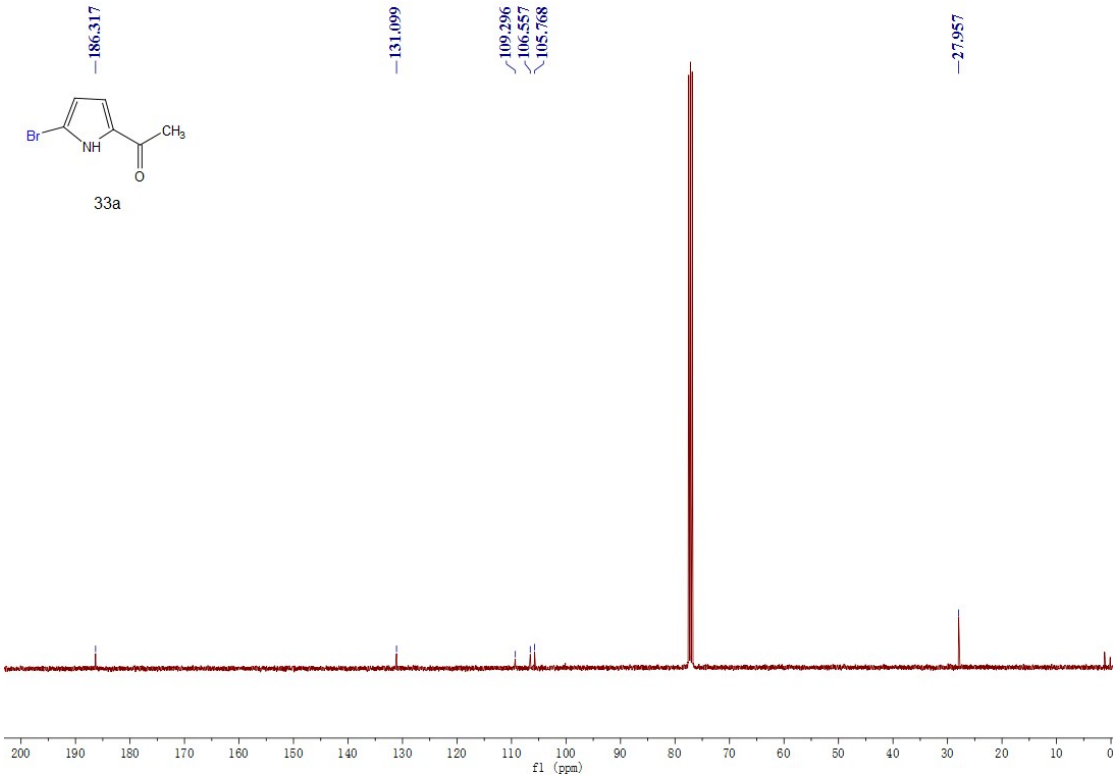

9.113
7.687
7.667
7.415
7.394
7.376
7.355
7.260
7.251
7.234
7.231
7.218
7.214
4.495
4.477
4.459
4.441
1.480
1.463
1.445
Br
NH
O
O
CH3
31a
f1 (ppm)
0.95
1.00
2.08
1.15
2.14
3.20

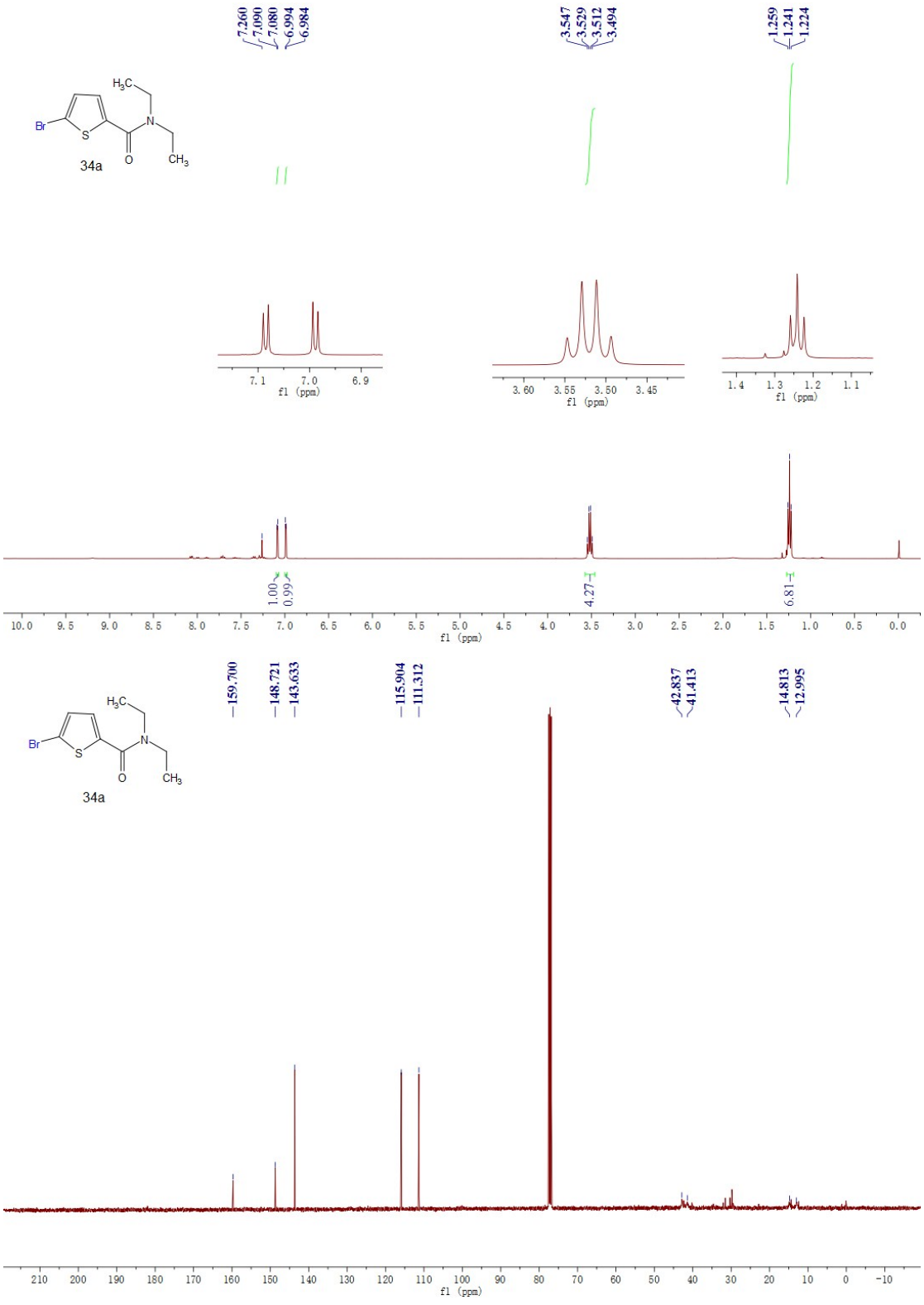

161.116
135.441
128.145
126.722
124.249
121.614
121.472
112.123
98.460
61.623
14.498
Br
NH
O
O
CH3
31a
f1 (ppm)


8.001
7.980
7.783
7.762
7.620
7.501
7.482
7.395
7.377
7.356
7.329
7.309
7.291
7.260
7.247
7.227
2.348
Br
N
O
S
O
CH3
32a
1.00
2.02
0.99
0.99
1.03
1.02
1.99
3.10
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

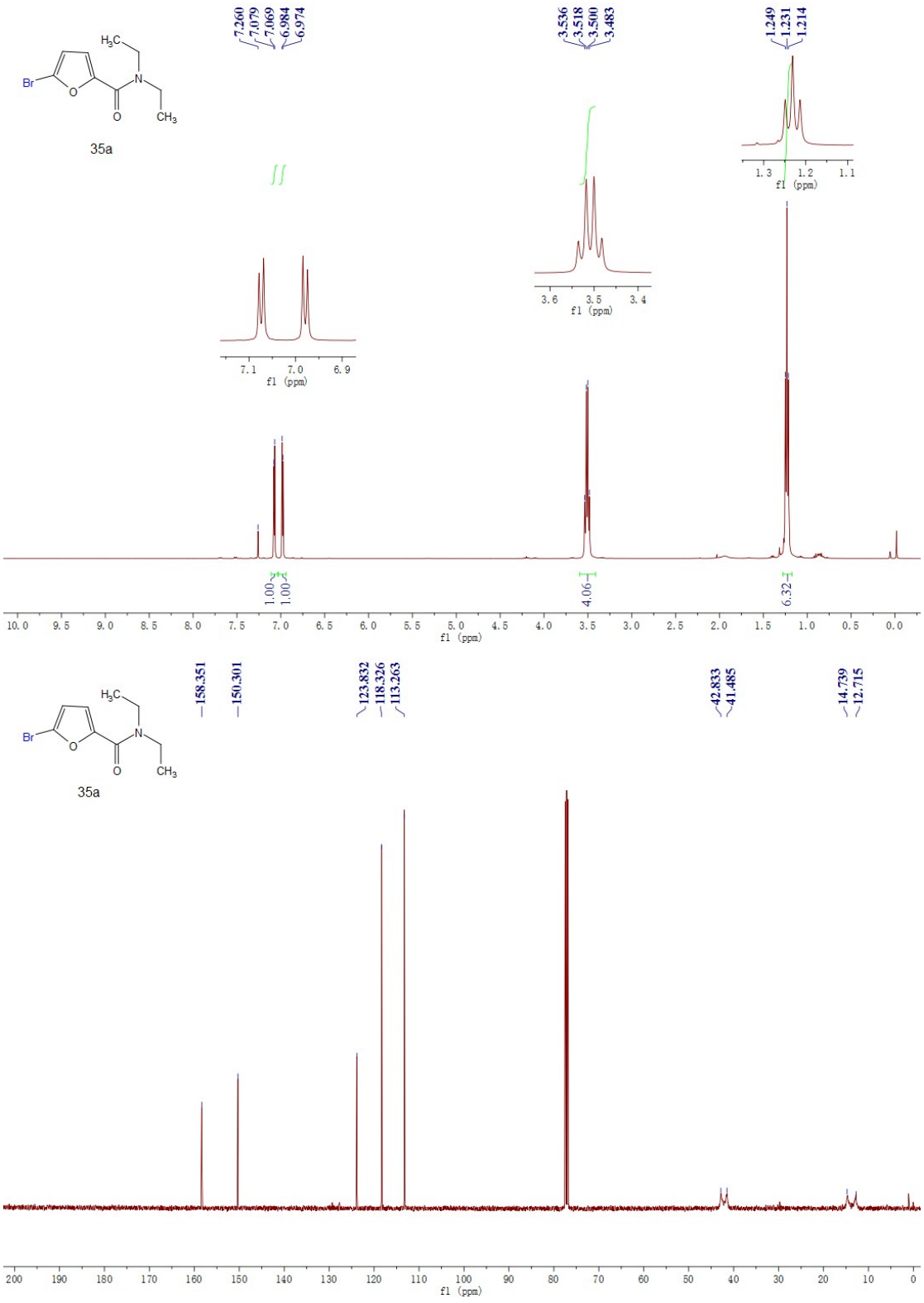

145.508
134.985
134.399
130.174
129.901
127.066
125.883
124.916
124.016
120.191
113.733
99.734
21.748
Br
N
O
S
O
CH3
32a
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)


9.618
7.260
7.023
7.020
7.016
7.013
6.897
6.894
6.891
6.888
2.415
Br
NH
CH3
O
33a
1.07
1.00
0.98
3.07
f1 (ppm)


186.317
131.099
109.296
106.557
105.768
27.957
Br
NH
CH3
O
33a
f1 (ppm)


7.260
7.090
7.080
6.994
6.984
3.547
3.529
3.512
3.494
1.259
1.241
1.224
Br
S
N
O
H3C
CH3
34a
1.00
0.99
4.27
6.81
f1 (ppm)

159.700
148.721
143.633
115.904
111.312
42.837
41.413
14.813
12.995
Br
S
N
O
H3C
CH3
34a
f1 (ppm)



5. Notes and References

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