Supporting Information

for

Enantioselective N-heterocyclic carbene catalyzed synthesis of functionalized indenes

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I. General experimental

Proton (^{1}H) and carbon (^{13}C) NMR spectra were recorded in deuterated solvents on Varian NMR spectrometers (400 MHz and 800 MHz) and calibrated to residual solvent peaks. Multiplicities are abbreviated as follows: s = singlet, d = doublet, t = triplet, q = quatet, pent = pentet, sext = sextet, m = multiplet and br = broad. 2D correlation spectra were recorded on a Bruker DRX400 spectrometer. Infrared spectra (ν_{max}) were recorded on an Agilent Cary 630 FTIR Spectrometer. High resolution mass spectra (HRMS, ESI) were recorded on a Bruker BioApex 47e FTMS fitted with an Analytical electrospray source using NaI for accurate mass calibration. Analytical chiral HPLC was performed with a Perkin Elmer Series 225 HPLC or Agilent Series 1260 using Chiralpak AD-H or AS-H, Chiralcel OJ-H (4.6 mm x 25 cm) obtained from Daicel Chemical Industries, Ltd. or using RegisCell™ 5μm column (4.6 mm x 25 cm) obtained from Regis Technologies, Inc., with visualization at 254 nm or staining solutions of anisaldehyde or $KMnO_4$. Optical rotations were measured with a PolAAr 3005 polarimeter at 589nm.

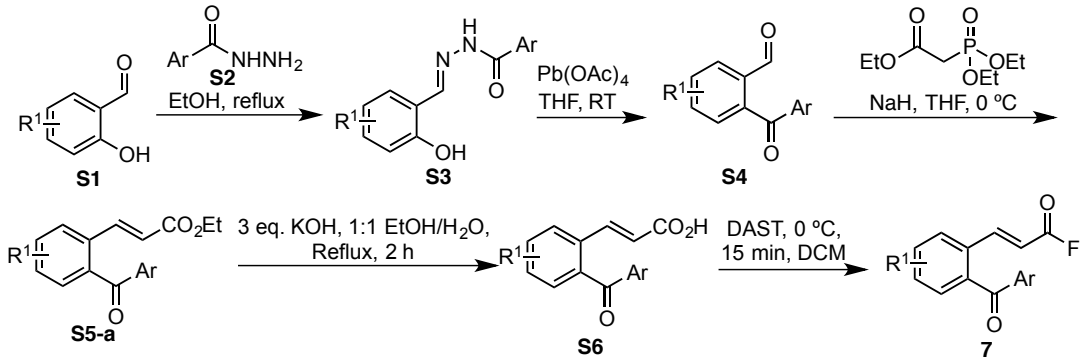
Flash column chromatography was performed on silica gel (Davisil LC60A, 40-63 μm silica media) using compressed air. Thin layer chromatography (TLC) was performed using aluminium-backed plates coated with 0.2 mm silica (Merck, DC-Platten, Kieselgel; 60 F254 plates). Eluted plates were visualized using a 254 nm UV lamp and/or by treatment with a suitable stain followed by heating. Concentration under reduced pressure was performed on a rotary evaporator with a water bath temperature of 40 °C, except for toluene where temperature was set to 60 °C.

The starting materials and reagents were purchased from Sigma-Aldrich or Oakwood and were used as supplied or, in the case of some liquids, distilled. Tetrahydrofuran (THF) was distilled from sodium benzophenone ketyl and acetonitrile (CH_3CN) and dichloromethane (CH_2Cl_2) were dried by passing over activated alumina. Unless otherwise stated, all reactions were conducted in flame-dried glassware under a N_2 atmosphere. “Salt-free” generation of carbene catalyst was filtered through syringe filters (hydrophobic, 25mm × 0.2 μm) purchased from Merck Pty. Ltd.

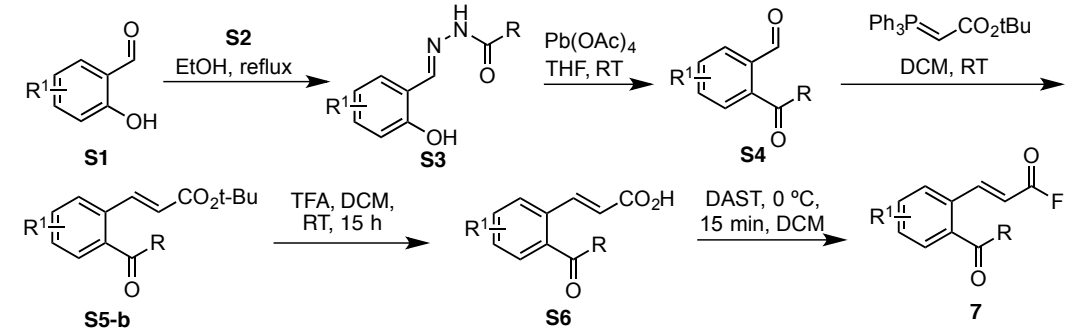
II. Chiral indene synthesis.

II-1. Preparation of α,β-unsaturated carboxylic acid fluorides

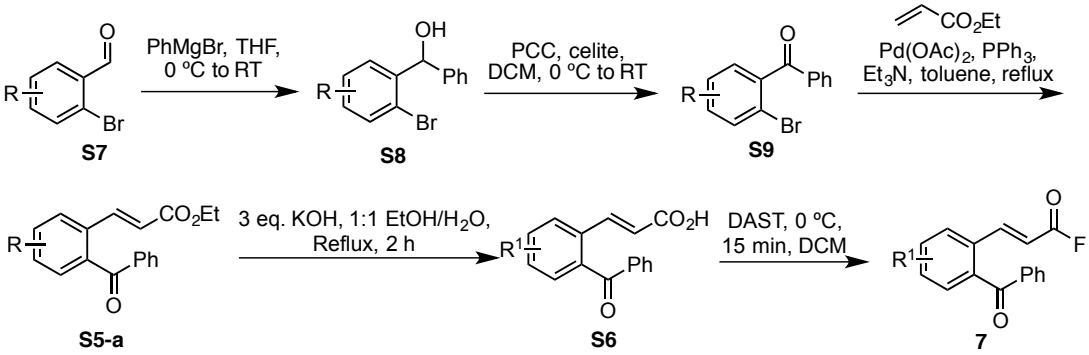
General procedure A (G-A):



General procedure B (G-B):



General procedure C (G-C):



Hydrozone S3 formation (in G-A and G-B)

Following reported synthesis[1]: acylhydrazine **S2** (10 mmol) was added to a solution of the corresponding salicylaldehyde derivative **S1** (10 mmol) in EtOH (50 mL) and the mixture was heated to reflux. The reaction was monitored by TLC (2-16h). The mixture was cooled to room temperature, concentrated and washed with hexanes. The solid was recrystallized from MeOH, and dried *in vacuo*. The hydrazones **S3** were essentially pure and some of them existed as a mixture of *E* and *Z* isomers.

2-Ketobenzaldehydes S4 from oxidation of hydrazones to (in G-A and G-B)

Following reported synthesis[1]: $Pb(OAc)_4$ (2.44g, 5.5 mmol) was added in 3 portions to a stirring solution of hydrazone **S3** (5.0 mmol) in THF (25 mL). The mixture turned orange immediately with a mild evolution of N_2 gas. The mixture was stirred at room temperature for 2-3 h (monitored by TLC). The solid was filtered off by passing the mixture through a pad of celite and washed with Et_2O. The

1. (a) Phan, D. H.; Kim, B.; Dong, V. M. *J. Am. Chem. Soc.* **2009**, *131*, 15608; (b) Dethe, D. H.; Murhade, G. M. *Chem. Commun.* **2015**, *51*, 10891.

combined filtrate was washed with saturated aqueous $NaHCO_3$ and then brine, dried over Na_2SO_4, filtered and concentrated under reduced pressure. The residue was purified via flash column chromatography over silica gel (EtOAc/Hexanes as the eluents) and 2-ketobenzaldehyde **S4** were obtained.

Ethyl esters S5-a from HWE reaction (in G-A)

To a stirred suspension of NaH (60% in mineral oil, 1.1 equiv.) in anhydrous THF (0.05 M) was added slowly a solution of phosphonate (1.1 equiv.) in THF (0.1 M) at 0 °C. Upon completion of effervescence, a solution of the corresponding 2-ketobenzaldehyde **S4** (1.0 equiv.) in THF (0.2 M) was added in one portion. The resultant mixture was stirred overnight at room temperature. The reaction mixture was quenched with saturated aqueous NH_4Cl solution. The aqueous layer was extracted with EtOAc (2 x 30 mL), and the combined organic layers were washed with brine, dried over $MgSO_4$, filtered and the solvent was removed under reduced pressure. Then residue was purified via flash column chromatography over silica gel with EtOAc/hexanes as the eluents and ethyl esters **S5-a** were obtained.

***tert*-Butyl esters S5-b from Wittig reaction (in G-B)**

To a solution of 2-ketobenzaldyde **S4** in DCM (0.1 M) was added a solution of *tert*-butyl ester phosphorus ylide in DCM (0.2 M) and the reaction was stirred for 2 h. The solvent was removed and residue was suspended in ether and the precipitations were removed by filtration and solid washed with ether. The combined filtrate was concentrated under reduced pressure and residue was purified by flash column chromatography over silica gel with EtOAc/hexanes as the eluents, affording the desired *tert*-butyl ester products **S5-b**.

***o*-Bromophenyl ketones S9 (G-C)**

To a stirred solution of 2-bromobenzaldehyde **S7** (1 equiv.) in anhydrous THF (0.1 M) was added dropwise a solution of phenyl magnesium bromide (1.0 M in Et_2O, 1.5 equiv.) at 0 °C. The resultant mixture was stirred for 4 hours at room temperature, before being treated with saturated aqueous NH_4Cl solution. The aqueous layer was extracted with ether (2 x 30 mL), and the combined organic layers were washed with brine, dried over $MgSO_4$, filtered and evaporated under reduced pressure. The crude product **S8** was dissolved in DCM (0.1 M), celite was added, and the mixtrue was treated with PCC (1.5 equiv.) and stirred for 1–3 h. Upon completion (as monitored by TLC analysis), the reaction mixture was concentrated in reduced pressure, suspended in ether, filtered through a pad of celite and concentrated under reduced pressure. The crude residue was purified by column chromatography over silica (EtOAc/hexanes as the eluent) to afford the desired ketones **S9**.

Ethyl esters S5-a from Heck reactions (G-C)

To an oven-dried Schlenk tube under N_2 were added *o*-bromophenyl ketones **S9** (10.0 mmol), $Pd(OAc)_2$ (0.5 mmol, 5 mol%), Ph_3P (1.0 mmol, 10 mol%), Et_3N (30.0 mmol), and anhydrous toluene (25 mL), and this was followed by the addition of ethyl acrylate (30.0 mmol). The resulting mixture was stirred at 110 °C for 24 h. The reaction was cooled to room temperature, quenched by the addition of saturated aqueous NH_4Cl, followed by extraction with EtOAc (3 × 15 mL). The combined organic extracts were washed with brine and dried (Na_2SO_4). The filtrate was concentrated under reduced pressure and residue purified by column chromatography over silica gel, affording the desired ester products **S5-a**.

Acids S6 from hydrolysis of ethyl esters (in G-A and G-C)

To a solution of esters in EtOH (1 M) was added KOH (3 eq. dissolved in water, 3 M) at room temperature and refluxed for 2 hours. The mixture was cooled to room temperature and acidified to pH <1.0 with 2N HCl. The precipitations were collected and washed with water (3 x 30 mL). The solid was dried in air, affording the desired products **S6**. In some cases, the dried solid was recrystallized in EtOAc/hexanes.

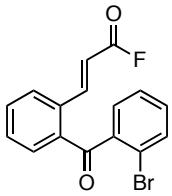
Acids S6 from *tert*-butyl esters S5b (in G-B)

Following reported synthesis[2]: Trifluoroacetic acid (18 mmol, 1.5 mL) was added in one portion to a solution of the ester **S5-b** (3 mmol, 1 equiv.) in dichloromethane (3 mL). The resultant dark brown solution was maintained at 23°C for 15 h. The solution was concentrated and the residual trifluoroacetic acid was removed by being suspended in ether (5 mL) and concentration in *vacuo*. This procedure was repeated twice. The beige solid was then washed with ether by filtration to afford the desired acids **S6**.

Preparation of α,β-unsaturated carboxylic acid fluorides 7 (in G-A, G-B and G-C)

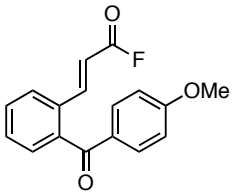
Following reported synthesis[3]: To a suspension of the appropriate α,β-unsaturated carboxylic acid **S6** (5 mmol) in CH_2Cl_2 (5 ml) at 0 °C was added diethylaminosulfur trifluoride (DAST, 0.73 ml, 5.5 mmol). After stirring at 0 °C for 15 minutes, the reaction was quenched by slow addition of $NaHCO_3$ (5 ml of a saturated aqueous solution) at 0 ºC. Until no more gas release from the mixture, the mixture was extracted with CH_2Cl_2 (3 x 5 ml), the organic phase dried (Na_2SO_4), concentrated under reduced pressure. The crude product was purified via passing through a short column of celite (These electron-deficient acid fluorides are generally unstable to survive a column chromatography over silica gel). After removal of the solvent, the oily products were dried in *vacuo* to afford desired acid fluorides **7**. If not solidified, the oily products were re-dissolved in ether, concentrated and dried in *vacuo*. This process might be repeated for a few times until the products solidified except for **7e** and **7i**, which were sticky oil with any attempt.

(*E*)-3-(2-(2-bromobenzoyl)phenyl)acryloyl fluoride (7a)



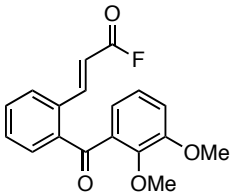
Following the general procedure, the title compound was obtained as yellow solid (1.22g, 73% yield). MP 64-66 ºC. IR ν_{max} 2964, 1796, 1664, 1246, 1186, 1110, 928, 759, 738 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 8.40 (d, *J* = 15.8 Hz, 1H), 7.70 (brd, *J* = 7.9, 1H), 7.66 – 7.59 (m, 2H), 7.51 – 7.36 (m, 5H), 6.31 (dd, *J* = 15.8, 8.7 Hz, 1H). ^{13}C NMR (75 MHz, $CDCl_3$) δ 197.0, 156.9 (d, *J* = 340.4 Hz), 150.6 (d, *J* = 5.4 Hz), 140.5, 137.7, 135.0, 133.9, 133.1, 132.6, 132.0, 130.8, 130.6, 128.8, 127.8, 127.8, 115.3 (d, *J* = 66.2 Hz).

(*E*)-3-(2-(4-methoxybenzoyl)phenyl)acryloyl fluoride (7b)



Following the general procedure G-A, the title compound was obtained as pale yellow solid (1.29g, 91% yield). MP 91-93 ºC. IR ν_{max} 2847 (week), 1792, 1594, 1509, 1257, 1195, 1173, 930, 839, 759, 737 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 7.93 (d, *J* = 15.9 Hz, 1H), 7.82 – 7.68 (m, 1H), 7.77 (AA'BB' *J* = 8.9 Hz, 2H), 7.60 – 7.48 (m, 2H), 7.49 – 7.40 (m, 1H), 6.94 (AA'BB', *J* = 8.9 Hz, 2H), 6.31 (dd, *J* = 15.9, 7.8 Hz, 1H), 3.87 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 195.5, 164.6, 156.8 (d, *J* = 339.7 Hz), 149.0 (d, *J* = 5.5 Hz), 140.9, 133.1, 132.6, 130.9, 130.8, 130.3, 129.5, 127.8, 114.7 (d, *J* = 66.9 Hz), 114.3, 55.9. HRMS (ESI) *m/z*: Found $(M–HF+H)^+$ $C_{17}H_{13}O_3^+$ 265.0862, requires 265.0859.

(*E*)-3-(2-(2,3-dimethoxybenzoyl)phenyl)acryloyl fluoride (7c)



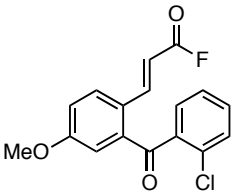
Following the general procedure, the title compound was obtained as white solid (1.23g, 78% yield). m.p. 96-98 ºC. IR ν_{max} 2942, 1798, 1649, 1475, 1315, 1263, 1193, 1064, 1003, 954, 829, 761, 742 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 8.28 (d, *J* = 15.8 Hz, 1H), 7.72 – 7.67 (m, 1H), 7.58 – 7.50 (m, 1H), 7.47 – 7.42 (m, 2H), 7.25 – 6.94 (m, 3H), 6.31 (dd, *J* = 15.8, 8.5 Hz, 1H), 3.88 (s, 3H), 3.55 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 197.3, 157.0 (d, *J* = 340.1 Hz), 153.3, 150.4 (d, *J* = 5.2 Hz), 148.3, 140.8, 134.2, 133.4, 131.9, 130.7,

[2] Myers, A. G.; Glatthar, R.; Hammond, M.; Harrington, P. M.; Kuo, E. Y.; Liang, J.; Schaus, S. E.; Wu, Y.; Xiang, J.-N. *J. Am. Chem. Soc.* **2002**, *124*, 5380.

[3] (a) Bappert, E.; Muller, P.; Fu, G. C. *Chem. Commun.* **2006**, 2604; (b) Levens, A.; Zhang, C.; Candish, L.; Forsyth, C. M.; Lupton, D. W. *Org. Lett.* **2015**, *17*, 5332; (c) Levens, A.; Ametovski, A.; Lupton, D. W. *Angew. Chem. Int. Ed.* **2016**, *55*, 16136.

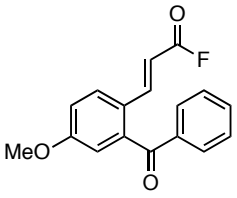
130.7, 128.1, 124.5, 121.6, 116.3, 114.9 (d, J = 66.1 Hz), 61.6, 56.3. HRMS (ESI) *m*/*z*: Found (M–HF+H)$^+$ $C_{18}H_{15}O_4^+$ 295.0967, requires 295.0965.

(*E*)-3-(2-(2-chlorobenzoyl)-4-methoxyphenyl)acryloyl fluoride (7d)



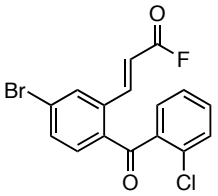
Following the general procedure G-A, the title compound was obtained deep red solid (1.04g, 65% yield). MP 76-78 ºC. IR ν_{max} 2842, 1794, 1594, 1295, 1258, 1214, 1096, 1035, 958, 758 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.22 (d, J = 15.8 Hz, 1H), 7.71 – 7.67 (m, 1H), 7.52 – 7.42 (m, 3H), 7.41 – 7.36 (m, 1H), 7.13 – 7.08 (m, 1H), 6.93 (d, J = 2.6 Hz, 1H), 6.22 (dd, J = 15.8, 8.6 Hz, 1H), 3.81 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 196.1, 161.7, 157.3 (d, J = 339.0 Hz), 149.4 (d, J = 5.2 Hz), 140.5, 138.3, 132.9, 132.7, 131.0, 130.9, 130.2, 127.3, 126.5, 117.7, 117.1, 113.0 (d, J = 65.9 Hz), 56.0.

(*E*)-3-(2-benzoyl-4-methoxyphenyl)acryloyl fluoride (7e)



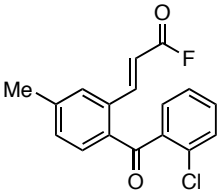
Following the general procedure G-C, the title compound was obtained as pale yellow sticky oil (1.0g, 70% yield). IR ν_{max} 2841, 2362, 1788, 1657, 1592, 1489, 1278, 1213, 1086, 1031, 957, 820, 715 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.83 (d, J = 15.7 Hz, 1H), 7.82 – 7.79 (m, 2H), 7.74 (d, J = 8.8 Hz, 1H), 7.68 – 7.58 (m, 1H), 7.54 – 7.43 (m, 2H), 7.12 – 7.06 (m, 1H), 6.94 (d, J = 2.7 Hz, 1H), 6.20 (dd, J = 15.7, 7.8 Hz, 1H), 3.84 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 196.7, 161.7, 157.2 (d, J = 338.2 Hz), 148.2 (d, J = 5.6 Hz), 142.2, 137.1, 134.3, 130.6, 129.6, 129.0, 124.9, 117.0, 114.7, 112.0 (d, J = 67.0 Hz), 56.0. HRMS (ESI) *m*/*z*: Found (M–HF+H)$^+$ $C_{18}H_{15}O_4^+$ 265.0861, requires 265.0859.

(*E*)-3-(5-bromo-2-(2-chlorobenzoyl)phenyl)acryloyl fluoride (7f)



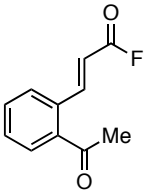
Following the general procedure G-A, the title compound was obtained as yellow solid (1.16g, 63% yield). MP 94.5-96 ºC. IR ν_{max} 2360, 1802, 1669, 1632, 1296, 1192, 1104, 939, 746 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.28 (d, J = 15.8 Hz, 1H), 7.82 (d, J = 1.9 Hz, 1H), 7.60 (dd, J = 8.3, 1.9 Hz, 1H), 7.55 – 7.37 (m, 4H), 7.32 (d, J = 8.3 Hz, 1H), 6.30 (dd, J = 15.8, 8.2 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 195.4, 156.4 (d, J = 342.3 Hz), 148.9 (d, J = 5.1 Hz), 138.2, 136.9, 136.5, 133.7, 133.0(1), 132.9(5), 132.5, 131.8, 130.9, 130.7, 127.9, 127.5, 116.6 (d, J = 66.3 Hz).

(*E*)-3-(2-(2-chlorobenzoyl)-5-methylphenyl)acryloyl fluoride (7g)



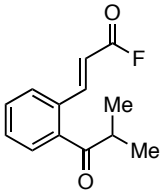
Following the general procedure G-A, the title compound was obtained as deep red solid (757mg, 50% yield). MP 62-64 ºC. IR ν_{max} 1786, 1658, 1288, 1194, 1053, 961, 826, 763, 738 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.30 (d, J = 15.8 Hz, 1H), 7.61 (d, J = 8.0 Hz, 1H), 7.54 – 7.43 (m, 3H), 7.43 – 7.35 (m, 2H), 7.23 (s, 1H), 6.27 (dd, J = 15.8, 8.7 Hz, 1H), 2.37 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 196.5, 157.1 (d, J = 341.0 Hz), 150.2 (d, J = 5.4 Hz), 141.7, 138.7, 138.6, 133.6, 132.7, 132.6, 132.0, 131.8, 130.9, 130.8, 128.6, 127.3, 114.4 (d, J = 66.1 Hz), 21.7. HRMS (ESI) *m*/*z*: Found (M–HF+H)$^+$ $C_{17}H_{12}ClO_2^+$ 283.0524, requires 283.0520.

(*E*)-3-(2-acetylphenyl)acryloyl fluoride (7h)



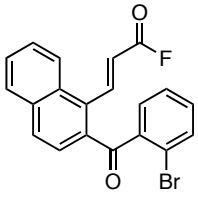
Following the general procedure G-B, the title compound was obtained as white solid (586mg, 61% yield). MP 89-91 ºC. IR ν_{max} 3075, 1795, 1671, 1626, 1259, 1195, 1097, 973, 840, 755 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.38 (d, J = 15.8 Hz, 1H), 8.03 – 7.83 (m, 1H), 7.72 – 7.50 (m, 3H), 6.20 (dd, J = 15.8, 8.6 Hz, 1H), 2.65 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 200.4, 157.0 (d, J = 340.2 Hz), 151.8 (d, J = 5.3 Hz), 138.3, 134.2, 132.7, 131.0, 130.1, 129.0, 114.9 (d, J = 66.3 Hz), 29.1. HRMS (ESI) *m*/*z*: Found (M–HF+H)$^+$ $C_{11}H_9O_2^+$ 173.0598, requires 173.0597.

(*E*)-3-(2-isobutyrylphenyl)acryloyl fluoride (7i)



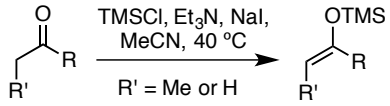
Following the general procedure G-B, except that it was purified by distillation (130 ºC, 1.5 mBar), the title compound was obtained as pale yellow oil (750 mg, 68% yield). IR ν_{max} 2973, 1796, 1680, 1626, 1214, 1190, 1102, 975, 760 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 8.13 (d, *J* = 15.8 Hz, 1H), 7.74 – 7.70 (m, 1H), 7.65 – 7.62 (m, 1H), 7.59 – 7.51 (m, 2H), 6.24 (dd, *J* = 15.8, 8.2 Hz, 1H), 3.42 (sept, *J* = 6.9 Hz, 1H), 1.21 (d, *J* = 6.9 Hz, 6H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 207.6, 157.0 (d, *J* = 339.9 Hz), 151.0 (d, *J* = 5.4 Hz), 139.3, 133.9, 132.0, 131.0, 128.8, 128.6, 114.8 (d, *J* = 66.4), 38.6, 18.9. HRMS (ESI) *m/z*: Found $(M–HF+H)^+$ $C_{13}H_{13}O_2^+$ 201.0911, requires 201.0910.

(*E*)-3-(2-(2-bromobenzoyl)naphthalen-1-yl)acryloyl fluoride (7j)



Following the general procedure G-B, the title compound was obtained as yellow solid (1.32g, 69% yield). MP 97-99 ºC. IR ν_{max} 3060, 1803, 1669, 1633, 1289, 1241, 1203, 1110, 757 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 8.38 (d, *J* = 16.1 Hz, 1H), 8.13 – 8.06 (m, 1H), 7.97 – 7.87 (m, 2H), 7.73 – 7.56 (m, 4H), 7.47 – 7.32 (m, 3H), 6.12 (dd, *J* = 16.1, 7.6 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 197.2, 156.1 (d, *J* = 342.0), 150.2 (d, *J* = 5.8 Hz), 140.8, 135.4, 134.9, 134.2, 134.1, 132.7, 130.9, 130.8, 130.0, 129.0, 128.9, 128.3, 127.9, 126.6, 126.4, 121.0, 120.6 (d, *J* = 66.3 Hz). HRMS (ESI) *m/z*: Found $(M-HF+OH)^-$ $C_{20}H_{12}BrO_3^-$ 378.9972, requires 378.9975.

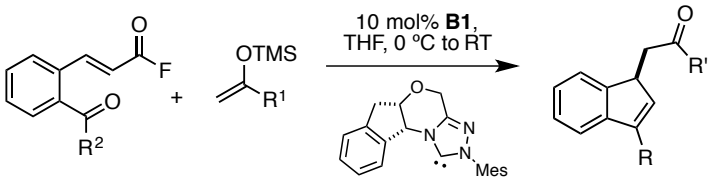
II-2. Preparation of trimethylsilyl enol ethers



S10 **8**

Following reported synthesis[4], the trimethylsilyl enol ethers **8** were prepared from the corresponding ketones **S12**: To a 100 mL flask was loaded a mixture of ketone **S10** (25 mmol) and sodium iodide (4.5 g, 30 mmol) under nitrogen, and dry acetonitrile (30 mL). The resulting solution was stirred for 5 min at room temperature, and triethylamine (4.2 mL, 30 mmol) was added, followed by chlorotrimethylsilane (3.82 mL, 30 mmol). The reaction mixture was then stirred at 40 °C overnight. After cooled to room temperature, the reaction was quenched with cold pentane (50 mL) and ice water (50 mL). The organic phase was separated, and the aqueous layer was extracted with pentane (30 mL). The combined organics were washed with brine and then dried over anhydrous $MgSO_4$. The solvent was removed first in *vacuo* by rotatory evaporator, and the residue was distilled under reduced pressure to provide pure silyl enol ethers **8**.

II-3. Preparation of chiral indenes



7 **8** **B1** **6**

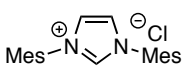
Sub millimolar scale: To a flame-dried RBF charged with precatalyst **B1**•HBF_4 (4.2 mg, 0.01 mmol) and toluene (0.5 mL) was added KHMDS (0.02 mL, 0.01 mmol). The resulting solution was stirred at room temperature for 30 minutes before the solution was filtered through a 50 μm syringe filter in N_2. The filtrate was dried in a Schlenk under vacuum carefully for 30 min and the residue dissolved in 0.5 mL THF. The salt-free solution of NHC catalyst **B1** was then transferred via cannula to a solution of

4. Shen, H.; Li, J.; Liu, Q.; Pan, J.; Huang, R.; Xiong, Y. *J. Org. Chem.* **2015**, *80*, 7212.

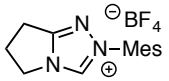
acid fluoride **7** (0.1 mmol) and trimethylsilyl enol ether **8** (0.12 mmol) in THF (0.5 mL) at 0 ºC. The reaction was stirred at 0ºC for 5 min and the ice-water bath was then removed. Upon completion (1-2 h), the resulting mixture was concentrated under reduced pressure and purified via column chromatography (EtOAc:hexanes, SiO_2) to afford indenes **6**.

Millimolar scale (Synthesis of 6y): To a flame-dried RBF charged with precatalyst **B1**•HBF_4 (42 mg, 0.1 mmol) and toluene (5 mL) was added KHMDS (0.2 mL, 0.1 mmol). The resulting solution was stirred at room temperature for 30 minutes before the solution was filtered through a 50 µm syringe filter in N_2. The filtrate was dried in a Schlenk under vacuum carefully for 30 min and the residue dissolved in 5 mL of THF. The salt-free solution of NHC catalyst **B1** was transferred via cannula to a solution of acid fluoride **7g** (302 mg, 1 mmol) and ((1-(2-methoxyphenyl)vinyl)oxy)trimethylsilane **8** (222 mg, 1.2 mmol) in THF (5 mL) at 0 ºC. The reaction was stirred at 0 ºC for 5 min and the ice-water bath was then removed. Upon completion (2 h), the resulting mixture was concentrated under reduced pressure and purified via column chromatography (5% Acetone:hexanes, SiO_2) to afford a yellow oild which solidified to give indenes **6y** (200 mg, 57% yield).

All racemic samples were obtained with achiral precatalyst IMes•HCl, except otherwise mentioned with precatalyst **C**•HBF_4. And filtration for generation of free NHC catalyst was not performed when racemic samples were prepared.

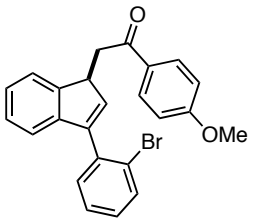


IMes•HCl



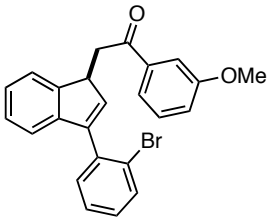
C•HBF_4

2-(3-(2-Bromophenyl)-1*H*-inden-1-yl)-1-(4-methoxyphenyl)ethan-1-one (6a)



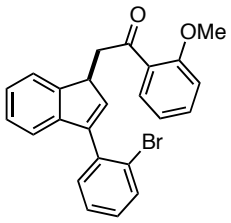
Following general procedure, the title compound was obtained as colorless oil. 17.5 mg (42% yield). R*f* 0.52 (7:3 v/v hexanes:EtOAc). HPLC AD-H 5µm, λ = 254 nm, hexane : i-PrOH = 95:5, 1.0 mL/min, fraction t_r = 15.80 (major) and 14.36 (minor); e.r. = 97:3. $[\alpha]_D^{25}$ = +9.0º (*c* = 0.61, $CHCl_3$); IR ν_{max} 2962, 1673, 1598, 1509, 1258, 1220, 1166, 1013, 800, 759 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 7.99 (AA'BB', *J* = 8.9 Hz, 2H), 7.73 – 7.64 (m, 1H), 7.53 – 7.48 (m, 1H), 7.41 – 7.35 (m, 2H), 7.30 – 7.20 (m, 3H), 7.17 – 7.12 (m, 1H), 6.95 (AA'BB', *J* = 8.9 Hz, 2H), 6.61 (d, *J* = 2.0 Hz, 1H), 4.33 (ddd, *J* = 8.6, 6.2, 2.0 Hz, 1H), 3.88 (s, 3H), 3.46 (dd, *J* = 17.1, 6.2 Hz, 1H), 3.17 (dd, *J* = 17.1, 8.6 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 197.5, 164.0, 147.5, 144.0, 143.8, 138.4, 137.1, 133.4, 131.3, 130.8, 130.3, 129.4, 127.6, 127.0, 125.6, 123.7, 123.4, 121.4, 114.1, 55.8, 45.5, 40.3. HRMS (ESI) *m*/*z*: Found $(M+H)^+$ $C_{24}H_{20}{}^{79}BrO_2{}^+$ 419.0634, requires 419.0641.

(*S*)-2-(3-(2-bromophenyl)-1*H*-inden-1-yl)-1-(3-methoxyphenyl)ethan-1-one (6b)



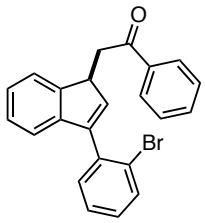
Following general procedure, the title compound was obtained as colorless oil. 23 mg (55% yield). R*f* 0.28 (95:5 v/v hexanes:EtOAc). HPLC AD-H 5µm, λ = 254 nm, hexane : i-PrOH = 92:8, 1.0 mL/min, fraction t_r = 9.76 (major) and 8.44 (minor); e.r. = 92:8. $[\alpha]_D^{25}$ = +12.3º (*c* = 0.83, $CHCl_3$). IR ν_{max} 2965, 1683, 1428, 1254, 1021, 737 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 7.71 – 7.63 (m, 1H), 7.60 – 7.53 (m, 2H), 7.54 – 7.46 (m, 1H), 7.42 – 7.32 (m, 3H), 7.32 – 7.20 (m, 3H), 7.17 – 7.08 (m, 2H), 6.61 (d, *J* = 2.0 Hz, 1H), 4.33 (ddd, *J* = 8.6, 6.0, 2.0 Hz, 1H), 3.86 (s, 3H), 3.51 (dd, *J* = 17.5, 6.0 Hz, 1H), 3.21 (dd, *J* = 17.5, 8.6 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 198.8, 160.2, 147.4, 144.1, 144.0, 138.5, 138.1, 137.1, 133.4, 131.3, 130.0, 129.5, 127.6, 127.1, 125.7, 123.7, 123.4, 121.4, 121.2, 120.2, 112.7, 55.8, 45.3, 40.9. HRMS (ESI) *m*/*z*: Found $(M+H)^+$ $C_{24}H_{20}{}^{79}BrO_2{}^+$ 419.0642, requires 419.0641.

(*S*)-2-(3-(2-bromophenyl)-1*H*-inden-1-yl)-1-(2-methoxyphenyl)ethan-1-one (6c)



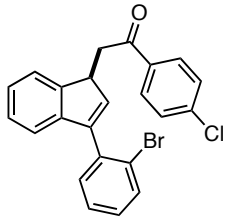
Following general procedure, the title compound was obtained as colorless oil. 18 mg (43% yield). R*f* 0.22 (95:5 v/v hexanes:EtOAc). 5% Acetone in hexanes was used as the eluent for flash chromatography. HPLC AD-H 5µm, λ = 254 nm, hexane : i-PrOH = 99:1, 1.0 mL/min, fraction t_r = 12.49 (major) and 10.34 (minor); e.r. = 99:1. $[\alpha]_D^{25}$ = +50.5º (*c* = 0.55, $CHCl_3$). IR ν_{max} 2962, 2923, 1739, 1259, 1084, 1018, 794 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 7.82 (dd, *J* = 7.8, 1.8 Hz, 1H), 7.72 – 7.63 (m, 1H), 7.57 – 7.43 (m, 2H), 7.42 – 7.32 (m, 2H), 7.30 – 7.20 (m, 3H), 7.19 – 7.11 (m, 1H), 7.07 – 7.01 (m, 1H), 6.99 – 6.94 (m, 1H), 6.62 (d, *J* = 2.0 Hz, 1H), 4.31 (ddd, *J* = 8.8, 6.0, 2.0 Hz, 1H), 3.87 (s, 3H), 3.55 (dd, *J* = 17.6, 6.0 Hz, 1H), 3.21 (dd, *J* = 17.6, 8.8 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 201.2, 159.1, 147.7, 144.1, 143.6, 138.7, 137.3, 134.1, 133.4, 131.4, 130.8, 129.4, 128.4, 127.6, 126.8, 125.5, 123.7, 123.5, 121.3, 121.1, 111.9, 55.8, 45.8, 45.7. HRMS (ESI) *m*/*z*: Found $(M+H)^+$ $C_{24}H_{20}{}^{79}BrO_2{}^+$ 419.0647, requires 419.0641.

2-(3-(2-Bromophenyl)-1*H*-inden-1-yl)-1-phenylethan-1-one (6d)



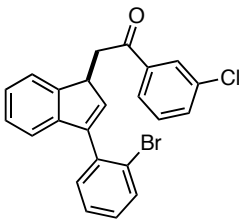
Following general procedure, the title compound was obtained as pale yellow oil. 20 mg (51% yield). R*f* 0.25 (9:1 *v*/*v* hexanes:EtOAc). HPLC AD-H 5µm, λ = 254 nm, hexane : i-PrOH = 97:3, 1.0 mL/min, fraction t_r = 12.31 min (major) and 9.67 min (minor); e.r. = 95:5. $[\alpha]_D^{25}$ = +43.3º (*c* = 0.25, $CHCl_3$). IR ν_{max} 2961, 1639, 1532, 1259, 1175, 1149, 1091, 1014, 795 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 8.21 – 7.93 (m, 2H), 7.71 – 7.65 (m, 1H), 7.63 – 7.55 (m, 1H), 7.53 – 7.45 (m, 3H), 7.40 – 7.35 (m, 2H), 7.31 – 7.20 (m, 3H), 7.17 – 7.13 (m, 1H), 6.62 (d, *J* = 2.0 Hz, 1H), 4.34 (ddd, *J* = 8.6, 6.2, 2.0 Hz, 1H), 3.52 (dd, *J* = 17.5, 6.2 Hz, 1H), 3.23 (dd, *J* = 17.5, 8.6 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 199.0, 147.4, 144.1, 144.0, 138.2, 137.2, 137.1, 133.6, 133.4, 131.3, 129.5, 129.0, 128.5, 127.6, 127.1, 125.7, 123.7, 123.5, 121.4, 45.3, 40.8. HRMS (ESI) *m*/*z*: Found $(M+H)^+$ $C_{23}H_{18}{}^{79}BrO^+$ 389.0547, requires 389.0536.

(*S*)-2-(3-(2-bromophenyl)-1*H*-inden-1-yl)-1-(4-chlorophenyl)ethan-1-one (6e)



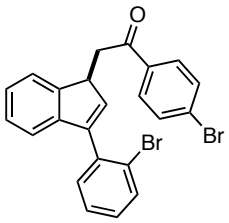
Following general procedure, the title compound was obtained as pale yellow oil. 28 mg (66% yield). R*f* 0.35 (95:5 v/v hexanes:EtOAc). HPLC AD-H 5µm, λ = 254 nm, hexane : i-PrOH = 95 : 5, 1.0 mL/min, fraction t_r = 10.80 (major) and 9.60 (minor); e.r. = 88:12. $[\alpha]_D^{25}$ = +16.9º (*c* = 0.62, $CHCl_3$). IR ν_{max} 2921, 1685, 1588, 1400, 1259, 1090, 1007, 760 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 7.84 (AA'BB', *J* = 8.6 Hz, 2H), 7.58 (brd, *J* = 8.0 Hz, 1H), 7.41 – 7.37 (m, 1H), 7.34 (AA'BB', *J* = 8.6 Hz, 2H), 7.29 – 7.22 (m, 2H), 7.21 – 7.10 (m, 3H), 7.09 – 7.01 (m, 1H), 6.49 (d, *J* = 2.0 Hz, 1H), 4.21 (ddd, *J* = 8.4, 6.2, 2.0 Hz, 1H), 3.38 (dd, *J* = 17.5, 6.2 Hz, 1H), 3.08 (dd, *J* = 17.5, 8.4 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 197.8, 147.2, 144.1, 144.0, 140.1, 137.9, 137.0, 135.4, 133.4, 131.3, 129.9, 129.5, 129.3, 127.6, 127.1, 125.7, 123.6, 123.4, 121.5, 45.2, 40.7. HRMS (ESI) *m*/*z*: Found $(M+H)^+$ $C_{23}H_{17}{}^{79}BrClO^+$ 423.0149, requires 423.0146.

(*S*)-2-(3-(2-Bromophenyl)-1*H*-inden-1-yl)-1-(3-chlorophenyl)ethan-1-one (6f)



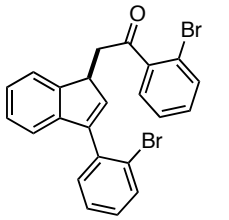
Following general procedure, the title compound was obtained as colorless oil. 27 mg (64% yield). R*f* 0.35 (95:5 *v*/*v* hexanes:EtOAc). HPLC AD-H 5µm, λ = 254 nm, hexane : i-PrOH = 90 : 10, 1.0 mL/min, fraction t_r = 7.64 (major) and 6.72 (minor); e.r. = 87:13. IR ν_{max} 2922, 1687, 1423, 1220, 1023, 741, 680Ncm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 7.99 (t, *J* = 1.9 Hz, 1H), 7.91 – 7.84 (m, 1H), 7.69 (dt, *J* = 8.0, 0.8 Hz, 1H), 7.56 (ddd, *J* = 8.0, 2.1, 1.1 Hz, 1H), 7.54 – 7.46 (m, 1H), 7.42 (t, *J* = 8.0 Hz, 1H), 7.39 – 7.34 (m, 2H), 7.31 – 7.22 (m, 3H), 7.18 – 7.13 (m, 1H), 6.60 (d, *J* = 2.0 Hz, 1H), 4.32 (ddd, *J* = 8.4, 6.1, 2.0 Hz, 1H), 3.50 (dd, *J* = 17.6, 6.1 Hz, 1H), 3.20 (dd, *J* = 17.6, 8.4 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 197.7, 147.1, 144.2, 144.0, 138.6, 137.8, 137.0, 135.4, 133.6, 133.4, 131.3, 130.4, 129.5, 128.7, 127.6, 127.2, 126.6, 125.7, 123.6, 123.4, 121.5, 45.1, 40.9. HRMS (ESI) *m*/*z*: Found $(M+H)^+$ $C_{23}H_{17}{}^{79}BrClO^+$ 423.0135, requires 423.0146.

1-(4-bromophenyl)-2-(3-(2-bromophenyl)-1*H*-inden-1-yl)ethan-1-one (6g)



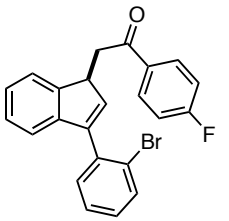
Following general procedure, the title compound was obtained as colorless oil. 25 mg (53% yield). R*f* 0.45 (9:1 v/v hexanes:EtOAc). HPLC AD-H 5μm, λ = 254 nm, hexane : i-PrOH = 98:2, 1.0 mL/min, fraction t_r = 16.47 (major) and 14.35 (minor); e.r. = 92:8. $[\alpha]_D^{25}$ = +17.3º (*c* = 0.58, $CHCl_3$). IR ν_{max} 3061, 1686, 1585, 1397, 1221, 1006, 757 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 7.87 (AA'BB', *J* = 8.6 Hz, 2H), 7.71 – 7.66 (m, 1H), 7.62 (AA'BB', *J* = 8.6 Hz, 2H), 7.52 – 7.46 (m, 1H), 7.40 – 7.34 (m, 2H), 7.32 – 7.21 (m, 3H), 7.19 – 7.09 (m, 1H), 6.59 (d, *J* = 2.0 Hz, 1H), 4.31 (ddd, *J* = 8.6, 6.2, 2.0 Hz, 1H), 3.48 (dd, *J* = 17.5, 6.2 Hz, 1H), 3.18 (dd, *J* = 17.5, 8.6 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 197.7, 146.9, 143.9, 143.7, 137.6, 136.7, 135.5, 133.1, 132.0, 131.0, 129.7, 129.2, 128.6, 127.3, 126.8, 125.4, 123.3, 123.1, 121.2, 44.9, 40.4. HRMS (ESI) *m*/*z*: Found $(M+H)^+$ $C_{23}H_{17}{}^{81}Br_2O^+$ 470.9600, requires 470.9600.

(*S*)-1-(2-Bromophenyl)-2-(3-(2-bromophenyl)-1*H*-inden-1-yl)ethan-1-one (6h)



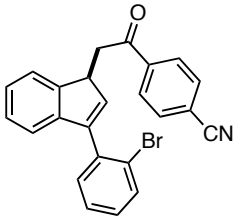
Following general procedure, the title compound was obtained as colorless oil. 26 mg (58% yield). Racemic sample was obtained from achiral precatalyst **C**•HBF_4. R*f* 0.25 (9:1 v/v hexanes:EtOAc). HPLC AD-H 5μm, λ = 254 nm, hexane : i-PrOH = 95:5, 1.0 mL/min, fraction t_r = 12.69 (major) and 10.15 (minor); e.r. = 90:10. $[\alpha]_D^{25}$ = +27.3º (*c* = 0.86, $CHCl_3$). IR ν_{max} 2922, 2853, 1681, 1260, 1071, 1008, 799 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 7.72 – 7.67 (m, 1H), 7.65 – 7.60 (m, 1H), 7.54 – 7.50 (m, 1H), 7.43 (dd, *J* = 7.6, 1.8 Hz, 1H), 7.40 – 7.34 (m, 3H), 7.33 – 7.21 (m, 4H), 7.16 – 7.11 (m, 1H), 6.63 (d, *J* = 2.0 Hz, 1H), 4.30 (ddd, *J* = 8.6, 6.1, 2.0 Hz, 1H), 3.47 (dd, *J* = 17.7, 6.1 Hz, 1H), 3.19 (dd, *J* = 17.7, 8.6 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 202.9, 146.9, 144.1, 144.0, 141.7, 137.6, 137.0, 134.2, 133.4, 132.1, 131.3, 129.5, 129.0, 127.8, 127.6, 127.1, 125.7, 123.7, 123.5, 121.4, 119.2, 45.3, 44.6. HRMS (ESI) *m*/*z*: Found $(M+H)^+$ $C_{23}H_{17}{}^{79}Br\,{}^{81}BrO^+$ 468.9622, requires 468.9620.

(*S*)-2-(3-(2-Bromophenyl)-1*H*-inden-1-yl)-1-(4-fluorophenyl)ethan-1-one (6i)



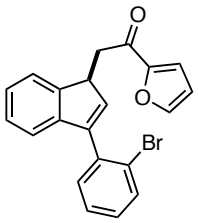
Following general procedure, the title compound was obtained as pale yellow oil. 21 mg (52% yield). R*f* 0.43 (8:2 v/v hexanes:EtOAc). HPLC AD-H 5μm, λ = 254 nm, hexane : i-PrOH = 95:5, 1.0 mL/min, fraction t_r = 10.24 (major) and 8.87 (minor); e.r. = 94:6. $[\alpha]_D^{25}$ = +81.8º (*c* = 0.15, $CHCl_3$). IR ν_{max} 2924, 1685, 1596, 1226, 1155, 1025, 770, 741 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 8.09 – 7.91 (m, 2H), 7.69 – 7.64 (m, 1H), 7.54 – 7.45 (m, 1H), 7.41 – 7.33 (m, 2H), 7.32 – 7.19 (m, 3H), 7.19 – 7.06 (m, 3H), 6.59 (d, *J* = 2.0 Hz, 1H), 4.31 (ddd, *J* = 8.6, 6.2, 2.0 Hz, 1H), 3.47 (dd, *J* = 17.4, 6.2 Hz, 1H), 3.18 (dd, *J* = 17.4, 8.6 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 197.4, 166.2 (d, *J* = 256.0 Hz), 147.2, 144.1, 144.0, 138.0, 137.0, 133.6 (d, *J* = 3.0 Hz), 133.4, 131.3, 131.2 (d, *J* = 9.4 Hz), 129.5, 127.6, 127.1, 125.7, 123.7, 123.4, 121.5, 116.1 (d, *J* = 22.0 Hz), 45.2, 40.7. HRMS (ESI) *m*/*z*: Found $(M+H)^+$ $C_{23}H_{17}{}^{79}BrFO^+$ 407.0440, requires 407.0441.

(*S*)-2-(3-(2-Bromophenyl)-1*H*-inden-1-yl)-1-(4-cyanophenyl)ethan-1-one (6j)



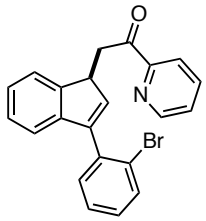
Following general procedure, the title compound was obtained as colorless oil. 27.5 mg (66% yield). Racemic sample was obtained from achiral precatalyst **C**•HBF_4. R*f* 0.20 (95:5 v/v hexanes:EtOAc). HPLC AS-H 5μm, λ = 254 nm, hexane : i-PrOH = 90 : 10, 1.0 mL/min, fraction t_r = 38.19 (major) and 37.74 (minor); e.r. = 77:23. IR ν_{max} 2962, 1685, 1259, 1087, 1019, 795 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 8.08 (AA'BB', *J* = 8.7 Hz, 2H), 7.78 (AA'BB', *J* = 8.7 Hz, 2H), 7.72 – 7.63 (m, 1H), 7.52 – 7.45 (m, 1H), 7.42 – 7.33 (m, 2H), 7.33 – 7.21 (m, 3H), 7.19 – 7.10 (m, 1H), 6.58 (d, *J* = 2.0 Hz, 1H), 4.31 (ddd, *J* = 8.4, 6.2, 2.0 Hz, 1H), 3.53 (dd, *J* = 17.7, 6.2 Hz, 1H), 3.23 (dd, *J* = 17.7, 8.4 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 197.7, 146.9, 144.4, 144.0, 140.0, 137.4, 136.8, 133.4, 132.9, 131.2, 129.6, 128.9, 127.6, 127.3, 125.8, 123.6, 123.4, 121.6, 118.2, 116.9, 45.0, 41.2. HRMS (ESI) *m*/*z*: Found $(M+H)^+$ $C_{24}H_{17}{}^{79}BrNO^+$ 414.0426, requires 414.0488.

(*S*)-2-(3-(2-Bromophenyl)-1*H*-inden-1-yl)-1-(furan-2-yl)ethan-1-one (6k)



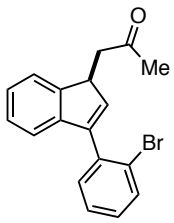
Following general procedure, the title compound was obtained as colorless oil. 22.7 mg (58% yield). R*f* 0.18 (9:1 v/v hexanes:EtOAc). HPLC AD-H 5μm, λ = 254 nm, hexane : i-PrOH = 90:10, 1.0 mL/min, fraction t_r = 8.44 (major) and 7.44 (minor); e.r. = 92:8. $[\alpha]_D^{25}$ = +52.5º (*c* = 0.93, $CHCl_3$). IR ν_{max} 3061, 1671, 1566, 1465, 1021, 907, 758, 733 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 7.68 – 7.63 (m, 1H), 7.58 (dd, *J* = 1.7, 0.8 Hz, 1H), 7.51 – 7.44 (m, 1H), 7.39 – 7.30 (m, 2H), 7.28 – 7.18 (m, 4H), 7.14 – 7.08 (m, 1H), 6.55 (d, *J* = 2.0 Hz, 1H), 6.53 (dd, *J* = 3.6, 1.7 Hz, 1H), 4.26 (ddd, *J* = 8.7, 6.5, 2.0 Hz, 1H), 3.34 (dd, *J* = 16.8, 6.5 Hz, 1H), 3.05 (dd, *J* = 16.8, 8.7 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 188.1, 152.9, 147.1, 147.0, 144.1, 144.0, 137.8, 137.0, 133.4, 131.3, 129.5, 127.6, 127.1, 125.7, 123.7, 123.4, 121.4, 117.8, 112.7, 45.1, 40.5. HRMS (ESI) *m*/*z*: Found $(M+H)^+$ $C_{21}H_{16}{}^{79}BrO_2^+$ 379.0287, requires 379.0328; $C_{21}H_{16}{}^{81}BrO_2^+$ 381.0272, requires 381.0308.

(*S*)-2-(3-(2-Bromophenyl)-1*H*-inden-1-yl)-1-(pyridin-2-yl)ethan-1-one (6l)



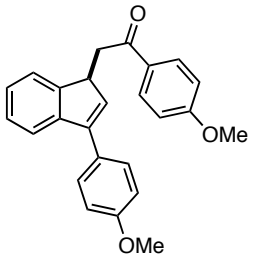
Following general procedure, the title compound was obtained as pale yellow oil. 23.3 mg (60% yield). R*f* 0.18 (9:1 v/v hexanes:EtOAc). HPLC AD-H 5μm, λ = 254 nm, hexane : i-PrOH = 95:5, 1.0 mL/min, fraction t_r = 8.65 (major) and 7.06 (minor); e.r. = 93:7. $[\alpha]_D^{25}$ = +74.2º (*c* = 0.79, $CHCl_3$). IR ν_{max} 2921, 1692, 1260, 1091, 1044, 1022, 992, 799, 772, 674 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 8.69 – 8.64 (m, 1H), 8.14 (dt, *J* = 7.8, 1.1 Hz, 1H), 7.87 (td, *J* = 7.8, 1.7 Hz, 1H), 7.70 – 7.65 (m, 1H), 7.58 – 7.49 (m, 1H), 7.51 – 7.45 (m, 1H), 7.40 – 7.32 (m, 2H), 7.29 – 7.20 (m, 3H), 7.16 – 7.11 (m, 1H), 6.63 (d, *J* = 2.0 Hz, 1H), 4.31 (ddd, *J* = 8.6, 6.2, 2.0 Hz, 1H), 3.83 (dd, *J* = 18.1, 6.2 Hz, 1H), 3.48 (dd, *J* = 18.1, 8.6 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 200.8, 153.6, 149.4, 147.5, 144.0, 143.9, 138.2, 137.3, 137.2, 133.4, 131.4, 129.4, 127.6, 127.5, 126.9, 125.5, 123.8, 123.5, 122.2, 121.3, 45.2, 40.1. HRMS (ESI) *m*/*z*: Found $(M+H)^+$ $C_{22}H_{17}{}^{79}BrN^+$ 390.0484, requires 390.0488.

(*S*)-1-(3-(2-Bromophenyl)-1*H*-inden-1-yl)propan-2-one (6m)



Following general procedure, the title compound was obtained as pale yellow oil. 12 mg (37% yield). R*f* 0.25 (9:1 *v*/*v* hexanes:EtOAc). HPLC AD-H 5μm, λ = 254 nm, hexane : i-PrOH = 98:2, 1.0 mL/min, fraction t_r = 9.56 (major) and 8.27 (minor); e.r. = 96:4. $[\alpha]_D^{25}$ = +30.0º (*c* = 0.53, $CHCl_3$). IR ν_{max} 3061, 1714, 1593, 1466, 1357, 1154, 1023, 756, 739 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 7.68 – 7.64 (m, 1H), 7.46 – 7.40 (m, 1H), 7.39 – 7.31 (m, 2H), 7.28 – 7.17 (m, 3H), 7.13 – 7.07 (m, 1H), 6.51 (d, *J* = 2.0 Hz, 1H), δ 4.10 (ddd, *J* = 8.3, 6.4, 2.0 Hz, 1H), 2.95 (dd, *J* = 17.5, 6.4 Hz, 1H), 2.69 (dd, *J* = 17.5, 8.3 Hz, 1H), 2.21 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 207.6, 147.1, 144.0(1), 143.9(6), 137.7, 137.0, 133.4, 131.3, 129.5, 127.6, 127.0, 125.7, 123.5, 123.4, 121.4, 45.4, 45.0, 30.7. HRMS (ESI) *m*/*z*: Found $(M+H)^+$ $C_{18}H_{16}{}^{79}BrO^+$ 327.0373, requires 327.0379.

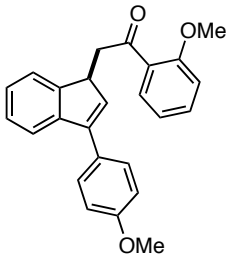
(*S*)-1-(4-Methoxyphenyl)-2-(3-(4-methoxyphenyl)-1*H*-inden-1-yl)ethan-1-one (6n)



Following general procedure but with 5% acetone in hexanes as the eluent for flash column chromatography, the title compound was obtained as colorless oil. 17 mg (46% yield). R*f* 0.11 (9:1 *v*/*v* hexanes:EtOAc). HPLC AD-H 5μm, λ = 254 nm, hexane : i-PrOH = 90:10, 1.0 mL/min, fraction t_r = 27.38 (major) and 20.85 (minor); e.r. = 91:9. $[\alpha]_D^{25}$ = –3.24º (*c* = 0.50, $CHCl_3$). IR ν_{max} 2924, 1711, 1673, 1599, 1509, 1256, 1002, 791 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 7.98 (AA'BB', *J* = 8.8 Hz, 2H), 7.61 – 7.53 (m, 1H), 7.54 (AA'BB', *J* = 8.8 Hz, 2H), 7.51 – 7.48 (m, 1H), 7.36 – 7.29 (m, 1H), 7.28 – 7.21 (m, 1H), 6.98 (AA'BB', *J* = 8.8 Hz, 2H), 6.94 (AA'BB' *J* = 8.8 Hz, 2H), 6.57 (d, *J* = 2.2 Hz, 1H), 4.25 (ddd, *J* = 8.8, 6.0, 2.2 Hz, 1H), 3.87 (s, 3H), 3.86 (s, 3H), 3.44 (dd, *J* = 17.2, 6.0 Hz, 1H), 3.11 (dd, *J* = 17.2, 8.8 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 197.7, 163.9, 159.6, 148.7, 144.0,

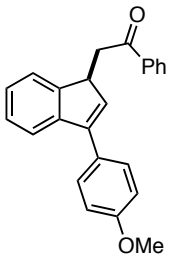
143.9, 135.2, 130.8, 130.3, 129.2, 128.6, 127.1, 125.5, 123.8, 120.9, 114.3, 114.1, 55.8, 55.7, 45.0, 40.6. HRMS (ESI) *m/z*: Found $(M+H)^+$ $C_{25}H_{23}O_3^+$ 371.1649, requires 371.1642.

(*S*)-1-(2-Methoxyphenyl)-2-(3-(4-methoxyphenyl)-1*H*-inden-1-yl)ethan-1-one (6o)



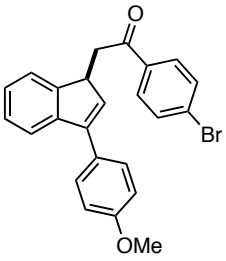
Following general procedure, the title compound was obtained as colorless oil. 14 mg (38% yield). R*f* 0.18 (9:1 v/v hexanes:EtOAc). HPLC AD-H 5μm, λ = 254 nm, hexane : i-PrOH = 85:15, 1.0 mL/min, fraction t_r = 30.42 (major) and 13.32 (minor); e.r. = 97:3. $[\alpha]_D^{25}$ = –39.0º (*c* = 0.48, $CHCl_3$). IR ν_{max} 2932, 1668, 1596, 1508, 1459, 1244, 1176, 1022, 754 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 7.85 – 7.79 (m, 1H), 7.65 – 7.43 (m, 5H), 7.35 – 7.29 (m, 1H), 7.28 – 7.20 (m, 1H), 7.07 – 7.00 (m, 1H), 7.00 – 6.92 (m, 3H), 6.58 (d, *J* = 2.2 Hz, 1H), δ 4.23 (ddd, *J* = 8.8, 6.0, 2.2 Hz, 1H), 3.85(9) (s, 3H), 3.85(5) (s, 3H), 3.52 (dd, *J* = 17.6, 6.0 Hz, 1H), 3.16 (dd, *J* = 17.6, 8.8 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 201.3, 159.5, 159.1, 148.9, 143.9, 143.6, 135.5, 134.0, 130.8, 129.1, 128.7, 128.4, 126.9, 125.4, 123.8, 121.1, 120.8, 114.3, 111.9, 55.8, 55.7, 46.0, 45.3. HRMS (ESI) *m/z*: Found $(M+H)^+$ $C_{25}H_{23}O_3^+$ 371.1645, requires 371.1642. HRMS (ESI) *m/z*: Found $(M+Na)^+$ $C_{25}H_{22}NaO_3^+$ 393.1461, requires 393.1461.

(*S*)-2-(3-(4-Methoxyphenyl)-1*H*-inden-1-yl)-1-phenylethan-1-one (6p)



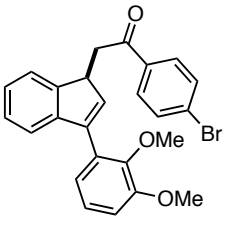
Following general procedure, the title compound was obtained as colorless oil. 18 mg (53% yield). R*f* 0.22 (9:1 v/v hexanes:EtOAc). HPLC AD-H 5μm, λ = 254 nm, hexane : i-PrOH = 90 : 10, 1.0 mL/min, fraction t_r = 19.90 (major) and 11.72 (minor); e.r. = 89:11. $[\alpha]_D^{25}$ = +24.1º (*c* = 0.63, $CHCl_3$). IR ν_{max} 2923, 1687, 1505, 1450, 1220, 1177, 1021, 1001, 816, 772, 746, 693 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 8.25 – 7.86 (m, 2H), 7.61 – 7.52 (m, 2H), 7.54 (AA'BB', *J* = 8.7 Hz, 2H), 7.48 (m, 3H), 7.36 – 7.31 (m, 1H), 7.25 (td, *J* = 7.4, 1.2 Hz, 1H), 6.99 (AA'BB', *J* = 8.7 Hz, 2H), 6.58 (d, *J* = 2.2 Hz, 1H), 4.26 (ddd, *J* = 8.8, 6.0, 2.2 Hz, 1H), 3.86 (s, 3H), 3.50 (dd, *J* = 17.4, 6.0 Hz, 1H), 3.17 (dd, *J* = 17.4, 8.8 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 199.2, 159.7, 148.6, 144.2, 143.9, 137.3, 134.9, 133.6, 129.2, 129.0, 128.6, 128.5, 127.1, 125.6, 123.8, 121.0, 114.4, 55.7, 44.8, 41.1. HRMS (ESI) *m/z*: Found $(M+H)^+$ $C_{24}H_{21}O_2^+$ 341.1530, requires 341.1536.

(*S*)-1-(4-Bromophenyl)-2-(3-(4-methoxyphenyl)-1*H*-inden-1-yl)ethan-1-one (6q)



Following general procedure, the title compound was obtained as pale yellow oil. 32 mg (77% yield). R*f* 0.25 (9:1 v/v hexanes:EtOAc). HPLC AD-H 5μm, λ = 254 nm, hexane : i-PrOH = 95 : 5, 1.0 mL/min, fraction t_r = 32.11 (major) and 22.00 (minor); e.r. = 71:29. $[\alpha]_D^{25}$ = -23.8º (*c* = 0.34, $CHCl_3$). IR ν_{max} 2938, 1687, 1583, 1506, 1248, 1221, 1174, 1006, 824, 768, 742 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 7.85 (AA'BB', *J* = 8.6 Hz, 2H), 7.61 (AA'BB', *J* = 8.6 Hz, 2H), 7.57 (brd, *J* = 7.6 Hz, 1H), 7.53 (AA'BB', *J* = 8.8 Hz, 2H), 7.50 – 7.45 (m, 1H), 7.33 (ddd, *J* = 8.0, 7.6, 1.1 Hz, 1H), 7.29 – 7.21 (m, 1H), 6.98 (AA'BB', *J* = 8.8 Hz, 2H), 6.55 (d, *J* = 2.2 Hz, 1H), 4.23 (ddd, *J* = 8.6, 6.0, 2.2 Hz, 1H), 3.86 (s, 3H), 3.43 (dd, *J* = 17.5, 6.0 Hz, 1H), 3.12 (dd, *J* = 17.5, 8.6 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 198.1, 159.6, 148.3, 144.3, 143.8, 135.9, 134.6, 132.3, 132.2, 130.2, 130.0, 129.1, 128.8, 128.4, 127.2, 125.6, 123.8, 121.0, 114.3, 55.7, 44.6, 41.0. HRMS (ESI) *m/z*: Found $(M+H)^+$ $C_{24}H_{20}{}^{79}BrO_2^+$ 419.0635, requires 419.0641.

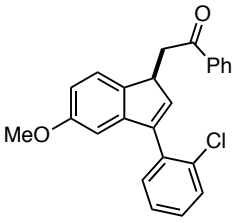
1-(4-Bromophenyl)-2-(3-(2,3-dimethoxyphenyl)-1H-inden-1-yl)ethan-1-one (6r)



Following general procedure, the title compound was obtained as yellow solid. 32.5 mg (72% yield). R*f* 0.29 (8:2 v/v hexanes:EtOAc). HPLC AD-H 5μm, λ = 254 nm, hexane : i-PrOH = 90 : 10, 1.0 mL/min, fraction t_r = 19.75 (major) and 13.83 (minor); e.r. = 54:46. IR ν_{max} 2932, 1683, 1583, 1470, 1268, 1221, 1069, 1004, 750 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 7.86 (AA'BB', *J* = 8.6 Hz, 2H), 7.61 (AA'BB', *J* = 8.6 Hz, 2H), 7.50 – 7.44 (m, 1H), 7.39 – 7.31 (m, 1H), 7.31 – 7.20 (m, 2H), 7.14 – 7.08 (m, 1H), 7.00 – 6.92 (m, 2H), 6.63 (d, *J* = 2.1 Hz, 1H), 4.29 (ddd, *J* = 8.4, 6.2, 2.1 Hz, 1H), 3.92 (s, 3H), 3.63 (s, 3H), 3.46 (dd, *J* = 17.4, 6.2 Hz, 1H), 3.15 (dd, *J* = 17.4, 8.4 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 198.1, 153.4, 147.4, 147.3(7), 144.4,

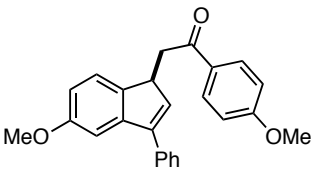
141.6, 137.2, 135.9, 132.3, 130.2, 130.0, 128.8, 127.1, 125.4, 124.2, 123.3, 122.7, 121.9, 112.3, 61.1, 56.3, 45.1, 40.9. HRMS (ESI) *m/z*: Found $(M+H)^+$ $C_{25}H_{22}{}^{79}BrO_3{}^+$ 449.0745, requires 449.0747.

2-(3-(2-Chlorophenyl)-5-methoxy-1*H*-inden-1-yl)-1-phenylethan-1-one (6s)



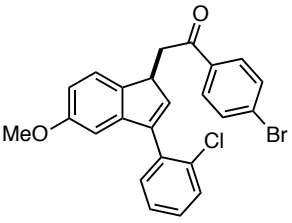
Following general procedure, the title compound was obtained as a colorless oil. 18 mg (48% yield). R*f* 0.38 (8:2 v/v hexanes:EtOAc). HPLC AD-H 5μm, λ = 254 nm, hexane : i-PrOH = 90:10, 1.0 mL/min, fraction t_r = 10.38 (major) and 9.67 (minor); e.r. = 90:10. $[\alpha]_D^{25}$ = 46.2º (*c* = 4.33, $CHCl_3$). IR ν_{max} 2963, 1599, 1476, 1259, 1082, 1025, 1007, 795, 755, 688 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 8.04 – 7.98 (m, 2H), 7.62 – 7.55 (m, 1H), 7.51 – 7.45 (m, 3H), 7.41 – 7.36 (m, 2H), 7.34 – 7.29 (m, 2H), 6.79 (dd, *J* = 8.2, 2.4 Hz, 1H), 6.72 (d, *J* = 2.4 Hz, 1H), 6.66 (d, *J* = 2.0 Hz, 1H), 4.28 (ddd, *J* = 8.4, 6.4, 2.0 Hz, 1H), 3.78 (s, 3H), 3.47 (dd, *J* = 17.4, 6.4 Hz, 1H), 3.21 (dd, *J* = 17.4, 8.4 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 198.9, 159.4, 145.3, 142.0, 139.6, 139.4, 137.0, 134.7, 133.4, 133.3, 131.1, 130.0, 129.1, 128.8, 128.3, 126.3, 124.0, 111.2, 106.9, 55.7, 44.5, 40.8. HRMS (ESI) *m/z*: Found $(M+H)^+$ $C_{24}H_{20}ClO_2{}^+$ 375.1149, requires 375.1146.

(*S*)-2-(5-methoxy-3-phenyl-1*H*-inden-1-yl)-1-(4-methoxyphenyl)ethan-1-one (6t)



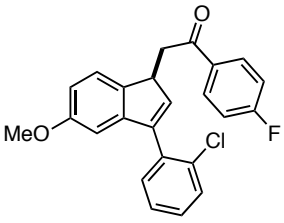
Following general procedure, the title compound was obtained as a colorless oil. 16 mg (43% yield). R*f* 0.23 (8:2 *v*/*v* hexanes:EtOAc). HPLC AS-H 5μm, λ = 254 nm, hexane : i-PrOH = 97:3, 1.0 mL/min, fraction t_r = 31.38 (major) and 34.58 (minor); e.r. = 91:9. $[\alpha]_D^{25}$ = –35.8º (*c* = 0.55, $CHCl_3$). IR ν_{max} 2962, 1670, 1596, 1255, 1222, 1169, 1025, 831, 700 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 7.97 (AA'BB', *J* = 9.0 Hz, 2H), 7.62 – 7.54 (m, 2H), 7.48 – 7.42 (m, 2H), 7.41 – 7.36 (m, 2H), 7.11 (d, *J* = 2.4 Hz, 1H), 6.94 (AA'BB', *J* = 9.0 Hz, 2H), 6.80 (dd, *J* = 8.2, 2.4, 1H), 6.65 (d, *J* = 2.1 Hz, 1H), 4.22 (ddd, *J* = 8.6, 6.4, 2.1 Hz, 1H), 3.87 (s, 3H), 3.82 (s, 3H), 3.39 (dd, *J* = 17.1, 6.4 Hz, 1H), 3.11 (dd, *J* = 17.1, 8.6 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 197.7, 164.0, 159.6, 145.1, 144.4, 140.8, 137.7, 136.0, 130.9, 130.8, 130.4, 128.9, 128.0, 124.3, 114.2, 111.2, 107.1, 56.0, 55.8, 44.5, 40.7. HRMS (ESI) *m/z*: Found $(M+H)^+$ $C_{25}H_{23}O_3{}^+$ 371.1645, requires 371.1642.

2-(3-(2-chlorophenyl)-5-methoxy-1*H*-inden-1-yl)-1-(4-bromorophenyl)ethan-1-one (6u)



Following general procedure, the title compound was obtained as a colorless oil. 27 mg (59% yield). R*f* 0.44 (8:2 v/v hexanes:EtOAc). HPLC RegisCell™ 5μm, λ = 254 nm, hexane : i-PrOH = 95 : 5, 1.0 mL/min, fraction t_r = 8.84 (major) and 9.84 (minor); e.r. = 84:16. $[\alpha]_D^{25}$ = –30.9º (*c* = 0.20, $CHCl_3$). IR ν_{max} 2921, 2852, 1686, 1584, 1461, 1376, 1259, 1009, 795 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 7.86 (AA'BB', *J* = 8.6 Hz, 2H), 7.61 (AA'BB', *J* = 8.6 Hz, 2H), 7.53 – 7.45 (m, 1H), 7.44 – 7.35 (m, 2H), 7.36 – 7.27 (m, 2H), 6.79 (dd, *J* = 8.2, 2.4, 1H), 6.71 (d, *J* = 2.4 Hz, 1H), 6.62 (d, *J* = 2.0 Hz, 1H), 4.26 (ddd, *J* = 8.4, 6.4, 2.0, 1H), 3.77 (s, 3H), 3.42 (dd, *J* = 17.4, 6.4 Hz, 1H), 3.17 (dd, *J* = 17.4, 8.4 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 197.8, 159.4, 145.3, 142.2, 139.3, 135.6, 134.6, 133.3, 132.1, 132.0, 131.0, 130.0, 129.8, 129.1, 128.6, 126.8, 123.9, 111.2, 107.0, 55.7, 44.3, 40.8. HRMS (ESI) *m/z*: Found $(M+H)^+$ $C_{24}H_{19}{}^{79}BrClO_2{}^+$ 453.0249, requires 453.0251.

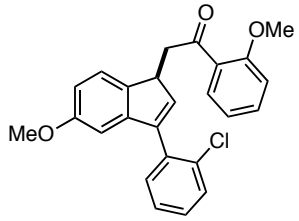
2-(3-(2-Chlorophenyl)-5-methoxy-1*H*-inden-1-yl)-1-(4-fluorophenyl)ethan-1-one (6v)



Following general procedure, the title compound was obtained as a colorless oil. 26 mg (66% yield). R*f* 0.42 (8:2 v/v hexanes:EtOAc). HPLC AD-H 5μm, λ = 254 nm, hexane : i-PrOH = 95 : 5, 1.0 mL/min, fraction t_r = 14.90 (major) and 13.94 (minor); e.r. = 83:17. $[\alpha]_D^{25}$ = +54.6º (*c* = 0.86, $CHCl_3$). IR ν_{max} 2934, 1684, 1594, 1476, 1216, 1154, 1031, 812, 749 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 8.07 – 7.97 (m, 2H), 7.52 – 7.45 (m, 1H), 7.41 – 7.35 (m, 2H), 7.35 – 7.29 (m, 2H), 7.18 – 7.09 (m, 2H), 6.79 (dd, *J* = 8.2, 2.2 Hz, 1H), 6.72 (d, *J* = 2.2 Hz, 1H), 6.63 (d, *J* = 1.6 Hz, 1H), 4.26 (ddd, *J* = 8.4, 6.4, 1.6 Hz, 1H), 3.78 (s, 3H), 3.43 (dd, *J* = 17.4, 6.4 Hz, 1H), 3.18 (dd, *J* = 17.4, 8.4 Hz, 1H). ^{13}C

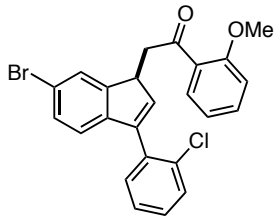
NMR (101 MHz, $CDCl_3$) δ 196.1, 164.8 (d, *J* = 256.0 Hz), 158.2, 144.2, 141.0, 138.2, 138.1, 133.5, 132.3 (d, *J* = 3.0 Hz), 132.1, 129.9, 129.8 (d, *J* = 9.4 Hz), 128.9, 128.0, 125.7, 122.8, 114.9 (d, *J* = 22.0 Hz), 114.7, 110.1, 105.8, 54.5, 43.3, 39.6. HRMS (ESI) *m*/*z*: Found $(M+H)^+$ $C_{24}H_{19}ClFO_2^+$ 393.1049, requires 393.1052.

(*S*)-2-(3-(2-Chlorophenyl)-5-methoxy-1*H*-inden-1-yl)-1-(2-methoxyphenyl)ethan-1-one (6w)



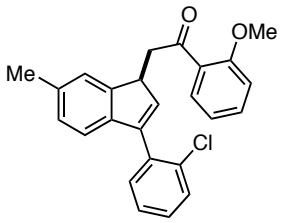
Following general procedure, the title compound was obtained as a colorless oil. 24 mg (59% yield). R*f* 0.18 (9:1 *v*/*v* hexanes:EtOAc). HPLC AD-H 5μm, λ = 254 nm, hexane : i-PrOH = 90:10, 1.0 mL/min, fraction t_r = 17.42 (major) and 14.79 (minor); e.r. = 97:3. $[\alpha]_D^{25}$ = +49.8º (*c* = 1.34, $CHCl_3$). IR ν_{max} 2924, 1658, 1595, 1481, 1423, 1244, 1022, 756 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 7.77 (dd, *J* = 7.8, 1.8 Hz, 1H), 7.54 – 7.40 (m, 2H), 7.40 – 7.31 (m, 2H), 7.33 – 7.23 (m, 2H), 7.00 (td, *J* = 7.6, 1.0 Hz, 1H), 6.95 – 6.89 (m, 1H), 6.75 (dd, *J* = 8.2, 2.4 Hz, 1H), 6.68 (d, *J* = 2.4 Hz, 1H), 6.62 (d, *J* = 2.0 Hz, 1H), 4.21 (ddd, 8.6, 6.2, 2.0 Hz, 1H), 3.83 (s, 3H), 3.74 (s, 3H), 3.46 (dd, *J* = 17.6, 6.2 Hz, 1H), 3.16 (dd, *J* = 17.6, 8.6 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 201.2, 159.4, 159.0, 145.5, 141.8, 140.3, 139.9, 135.0, 134.0, 133.5, 131.4, 130.8, 130.2, 129.2, 128.4, 127.0, 124.1, 121.1, 111.9, 111.3, 107.0, 55.9, 55.8, 46.0, 45.1. HRMS (ESI) *m*/*z*: Found $(M+H)^+$ $C_{25}H_{22}ClO_3^+$ 405.1253, requires 405.1252.

(*S*)-2-(6-Bromo-3-(2-chlorophenyl)-1*H*-inden-1-yl)-1-(2-methoxyphenyl)ethan-1-one (6x)



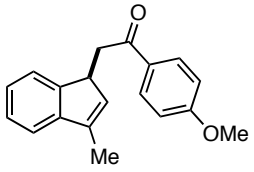
Following general procedure, the title compound was obtained as a pale yellow solid. 25 mg (55% yield). R*f* 0.25 (9:1 v/v hexanes:EtOAc). Crystals for single crystal XRD were breed in iPrOH/hexane (v/v 50:50) solution by slow evaporation of the solvent and the absolute configuration was determined. HPLC AD-H 5μm, λ = 254 nm, hexane : i-PrOH = 90:10, 1.0 mL/min, fraction t_r = 14.73 (major) and 9.53 (minor); e.r. = 95:5. $[\alpha]_D^{25}$ = +112.7º (*c* = 0.78, $CHCl_3$). IR ν_{max} 2922, 2852, 1665, 1596, 1462, 1435, 1244, 1019, 756 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 7.81 (dd, *J* = 7.7, 1.8 Hz, 1H), 7.65 – 7.62 (m, 1H), 7.54 – 7.44 (m, 2H), 7.40 – 7.35 (m, 2H), 7.34 – 7.29 (m, 2H), 7.07 – 6.95 (m, 3H), 6.61 (d, *J* = 2.0 Hz, 1H), 4.30 (ddd, *J* = 8.4, 6.2, 2.0 Hz, 1H), 3.89 (s, 3H), 3.49 (dd, *J* = 17.8, 6.2 Hz, 1H), 3.22 (dd, *J* = 17.8, 8.4 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 200.6, 159.1, 149.8, 143.0, 141.5, 139.2, 134.6, 134.2, 133.5, 131.3, 130.8, 130.2, 129.9, 129.4, 128.1, 127.1(2), 127.0(8), 122.5, 121.1, 119.7, 111.9, 55.9, 45.8, 45.4. HRMS (ESI) *m*/*z*: Found $(M+H)^+$ $C_{24}H_{19}{}^{79}BrClO_2^+$ 453.0170, requires 453.0251; $C_{24}H_{19}{}^{81}BrClO_2^+$ 455.0175, requires 455.0231.

(*S*)-2-(3-(2-chlorophenyl)-6-methyl-1*H*-inden-1-yl)-1-(2-methoxyphenyl)ethan-1-one (6y)



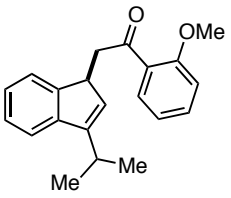
Following general procedure but with 5% acetone in hexanes as the eluent for flash column chromatography, the title compound was obtained as pale yellow oil. 23 mg (59% yield). A 1 mmol reaction was also performed with 10% chiral catalyst and the title compound was obtained 200 mg (57%). R*f* 0.30 (9:1 v/v hexanes:EtOAc). HPLC AS-H 5μm, λ = 254 nm, hexane : i-PrOH = 98:2, 1.0 mL/min, fraction t_r = 14.19 (major) and 11.96 (minor); e.r. = 98:2 (1 mmol scale reaction was also 98:2 er). $[\alpha]_D^{25}$ = –113.7º (*c* = 0.56, $CHCl_3$). IR ν_{max} 2961, 1637, 1543, 1260, 1175, 1093, 1020, 797 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 7.79 (dd, *J* = 7.7, 1.8 Hz, 1H), 7.49 – 7.41 (m, 2H), 7.39 – 7.33 (m, 2H), 7.32 – 7.26 (m, 2H), 7.07 – 6.96 (m, 2H), 6.95 – 6.91 (m, 2H), 6.60 (d, *J* = 2.0 Hz, 1H), 4.24 (ddd, *J* = 8.9, 6.0, 2.0 Hz, 1H), 3.84 (s, 3H), 3.50 (dd, *J* = 17.6, 6.0 Hz, 1H), 3.16 (dd, *J* = 17.6, 8.9 Hz, 1H), 2.33 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 201.2, 159.1, 144.9, 144.4, 141.8, 139.2, 136.6, 135.3, 134.0, 133.6, 131.4, 130.8, 130.1, 129.1, 128.4, 126.9, 126.3, 123.4, 121.8, 121.1, 111.9, 55.8, 45.9, 45.5, 21.8. HRMS (ESI) *m*/*z*: Found $(M+H)^+$ $C_{25}H_{22}ClO_2^+$ 389.1304, requires 389.1303.

1-(4-Methoxyphenyl)-2-(3-methyl-1*H*-inden-1-yl)ethan-1-one (6z)



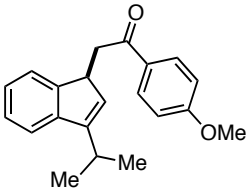
Following general procedure, the title compound was obtained as colorless oil. 12.8 mg (46% yield). R*f* 0.32 (9:1 v/v hexanes:EtOAc). HPLC OJ-H 5μm, λ = 254 nm, hexane : i-PrOH = 91:9, 1.0 mL/min, fraction t_r = 14.92 (major) and 13.19 (minor); e.r. = 91:9. $[\alpha]_D^{25}$ = –78.5º (*c* = 0.30, $CHCl_3$). IR ν_{max} 2914, 1673, 1598, 1509, 1258, 1166, 1015, 829, 759 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 7.96 (AA'BB', *J* = 9.0 Hz, 2H), 7.44 – 7.39 (m, 1H), 7.34 – 7.30 (m, 2H), 7.24 – 7.16 (m, 1H), 6.93 (AA'BB', *J* = 9.0 Hz, 2H), 6.27 – 6.22 (m, 1H), 4.15 – 4.02 (m, 1H), 3.87 (s, 3H), 3.33 (dd, *J* = 17.0, 6.2 Hz, 1H), 2.99 (dd, *J* = 17.0, 8.8 Hz, 1H), 2.14 (t, *J* = 1.8 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 197.9, 163.9, 148.1, 145.8, 139.5, 134.3, 130.7, 130.4, 127.0, 125.2, 123.3, 119.4, 114.1, 55.8, 44.7, 40.6, 13.3. HRMS (ESI) *m/z*: Found $(M+H)^+$ $C_{19}H_{19}O_2^+$ 279.1375, requires 279.1380.

2-(3-Isopropyl-1*H*-inden-1-yl)-1-(2-methoxyphenyl)ethan-1-one (6za)



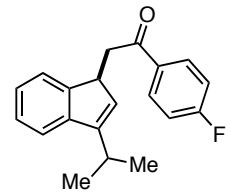
Following general procedure, the title compound was obtained as colorless oil. 16 mg (52% yield). R*f* 0.32 (9:1 v/v hexanes:EtOAc). HPLC AD-H 5μm, λ = 254 nm, hexane : i-PrOH = 90:10, 1.0 mL/min, fraction t_r = 7.58 (major) and 6.77 (minor); e.r. = 98:2. $[\alpha]_D^{25}$ = +187.5º (*c* = 0.69, $CHCl_3$). IR ν_{max} 2963, 1666, 1594, 1454, 1244, 1164, 1003, 740 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 7.81 (dd, *J* = 7.6, 1.8 Hz, 1H), 7.51 – 7.41 (m, 2H), 7.37 (d, *J* = 7.6 Hz, 1H), 7.32 – 7.27 (m, 1H), 7.23 – 7.15 (m, 1H), 7.08 – 7.00 (m, 1H), 6.95 (d, *J* = 8.4 Hz, 1H), 6.27 – 6.22 (s, 1H), 4.10 – 4.00 (m, 1H), 3.86 (s, 3H), 3.45 (dd, *J* = 17.5, 5.7 Hz, 1H), 3.03 (dd, *J* = 17.5, 9.1 Hz, 1H), 2.96 – 2.84 (m, 1H), 1.28 (s, 3H), 1.26 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 201.6, 159.0, 150.2, 148.8, 144.8, 133.9, 131.1, 130.8, 128.5, 126.7, 125.0, 123.5, 121.0, 119.8, 111.9, 55.8, 46.1, 44.8, 27.2, 22.2(0), 22.1(5). HRMS (ESI) *m/z*: Found $(M+H)^+$ $C_{21}H_{23}O_2^+$ 307.1676, requires 307.1693.

2-(3-isopropyl-1*H*-inden-1-yl)-1-(4-methoxyphenyl)ethan-1-one (6zb)



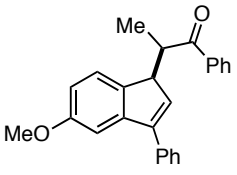
Following general procedure, the title compound was obtained as a colorless oil. 10.5 mg (34% yield). R*f* 0.32 (9:1 v/v hexanes:EtOAc). HPLC OJ-H 5μm, λ = 254 nm, hexane : i-PrOH = 98:2, 1.0 mL/min, fraction t_r = 15.37 (major) and 22.15 (minor); e.r. = 94:6. $[\alpha]_D^{25}$ = +105.6º (*c* = 0.72, $CHCl_3$). IR ν_{max} 2961, 2924, 1677, 1600, 1260, 1169, 1016, 800 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 7.97 (AA'BB', *J* = 9.0 Hz, 2H), 7.46 – 7.41 (m, 1H), 7.40 – 7.35 (m, 1H), 7.33 – 7.27 (m, 1H), 7.22 – 7.16 (m, 1H), 6.94 (AA'BB', *J* = 9.0 Hz, 2H), 6.24 (t, *J* = 1.7 Hz, 1H), 4.12 – 4.02 (m, 1H), 3.87 (s, 3H), 3.36 (dd, *J* = 17.1, 5.9 Hz, 1H), 2.98 (dd, *J* = 17.1, 9.0 Hz, 1H), 2.90 (m, 1H), 1.27 (d, *J* = 1.0 Hz, 3H), 1.25 (d, *J* = 1.0 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 197.9, 163.9, 150.6, 148.6, 144.8, 130.9, 130.8, 130.4, 126.9, 125.1, 123.5, 119.9, 114.1, 55.8, 44.5, 40.8, 27.2, 22.2, 22.1. HRMS (ESI) *m/z*: Found $(M+H)^+$ $C_{21}H_{23}O_2^+$ 307.1699, requires 307.1693.

1-(4-Fluorophenyl)-2-(3-isopropyl-1*H*-inden-1-yl)ethan-1-one (6zc)



Following general procedure, the title compound was obtained as colorless oil. 17 mg (58% yield). R*f* 0.25 (95:5 v/v hexanes:EtOAc). HPLC OJ-H 5μm, λ = 254 nm, hexane : i-PrOH = 98 : 2, 1.0 mL/min, fraction t_r = 7.44 (major) and 9.44 (minor); e.r. = 88:12. IR ν_{max} 2961, 1685, 1595, 1227, 1155, 1008, 833, 771, 741 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 8.05 – 7.92 (m, 2H), 7.45 – 7.45 (m, 2H), 7.34 – 7.28 (m, 1H), 7.23 – 7.17 (m, 1H), 7.17 – 7.10 (m, 2H), 6.23 (brs, 1H), 4.11 – 4.01 (m, 1H), 3.38 (dd, *J* = 17.4, 5.9 Hz, 1H), 3.01 (dd, *J* = 17.4, 8.9 Hz, 1H), 2.95 – 2.82 (m, 1H), 1.27 (d, *J* = 2.0 Hz, 3H), 1.26 (d, *J* = 2.0 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 197.8, 166.1 (d, *J* = 256.5 Hz), 150.9, 148.3, 144.7, 133.72 (d, *J* = 3.0 Hz), 131.12 (d, *J* = 10.0 Hz), 130.5, 127.0, 125.2, 123.5, 120.0, 116.1(d, *J* = 22.2 Hz), 44.3, 41.1, 27.2, 22.2, 22.1. HRMS (ESI) *m/z*: Found $(M+H)^+$ $C_{20}H_{20}FO^+$ 295.1472, requires 295.1493.

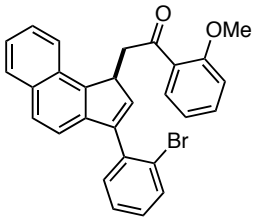
2-(5-Methoxy-3-phenyl-1*H*-inden-1-yl)-1-phenylpropan-1-one (6zd)



Following general procedure, the title compound was obtained as colorless oil. 15 mg (44% yield) as a mixture of diastereoisomers. d.r. 3:1. R*f* 0.26 (9:1 v/v hexanes:EtOAc). HPLC AD-H 5μm, λ = 254 nm, hexane : i-PrOH = 90:10,

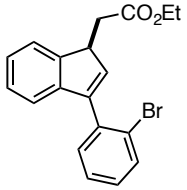
1.0 mL/min, fraction t_r = 9.11 (major) and 10.87 (minor); e.r. = 97:3 for major diastereoisomer (82:18 for minor diastereoisomer). IR ν_{max} 2933, 1677, 1447, 1218, 970, 699 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) major: δ 8.08 – 8.01 (m, 2H), 7.64 – 7.58 (m, 2H), 7.54 – 7.49 (m, 2H), 7.49 – 7.42 (m, 3H), 7.41 – 7.38 (m, 1 H), 7.33 – 7.28 (m, 1H), 7.10 (d, *J* = 2.4 Hz, 1H), 6.75 (dd, *J* = 8.2, 2.4 Hz, 1H), 6.67 (d, *J* = 2.1 Hz, 1H), 4.06 – 4.01 (m, 1H), 3.86 (pent, *J* = 7.0 Hz, 1H), 3.81 (s, 3H), 1.11 (d, *J* = 7.0 Hz, 3H); minor: δ 7.99 – 7.94 (m, 2H), 7.65 – 7.35 (m, 9H), 7.08 (d, *J* = 2.4 Hz, 1H), 6.79 (dd, *J* = 8.3, 2.4 Hz, 1H), 6.47 (d, *J* = 2.1 Hz, 1H), 4.00 – 3.95 (m, 1H), 3.82 (s, 3H), 3.78 – 3.70 (m, 1H), 1.28 (d, *J* = 7.0 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) major: δ 203.8, 159.6, 145.6, 145.5, 139.4, 136.8, 136.1, 135.3, 133.4, 129.1, 128.9, 128.8, 128.1, 128.0, 124.2, 111.1, 107.0, 55.9, 50.5, 43.6, 14.6. HRMS (ESI) *m/z*: Found $(M+H)^+$ $C_{25}H_{23}O_2^+$ 355.1685, requires 355.1693.

(*S*)-2-(3-(2-bromophenyl)-1*H*-cyclopenta[*a*]naphthalen-1-yl)-1-(2-methoxyphenyl)ethan-1-one (6ze)



Following general procedure, the title compound was obtained as a pale yellow solid. 34 mg (72% yield). R*f* 0.25 (9:1 v/v hexanes:EtOAc). HPLC AD-H 5μm, λ = 254 nm, hexane : i-PrOH = 90:10, 1.0 mL/min, fraction t_r = 25.31 (major) and 12.67 (minor); e.r. = 60:40. $[\alpha]_D^{25}$ = +19.1° (*c* = 1.93, $CHCl_3$). IR ν_{max} 2968, 1669, 1596, 1434, 1242, 1022, 818, 751 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 8.00 (d, *J* = 8.2 Hz, 1H), 7.89 (d, *J* = 8.2 Hz, 1H), 7.85 – 7.72 (m, 2H), 7.67 – 7.65 (m, 1H), 7.54 – 7.47 (m, 1H), 7.47 – 7.27 (m, 5H), 7.25 – 7.18 (m, 1H), 7.05 – 6.96 (m, 1H), 6.90 (d, *J* = 8.4 Hz, 1H), 6.78 (d, *J* = 1.9 Hz, 1H), 4.63 (brd, *J* = 11.2 Hz, 1H), 4.05 (dd, *J* = 18.0, 3.3 Hz, 1H), 3.77 (s, 3H), 2.97 (dd, *J* = 18.0, 11.2 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 201.4, 159.0, 143.9, 143.0, 141.7, 139.3, 137.4, 134.0, 133.3, 132.4, 131.5, 130.8, 129.8, 129.6, 129.5, 128.4, 127.8, 127.7, 126.6, 124.9, 123.8, 123.6, 121.1, 120.7, 111.9, 55.8, 46.4, 45.4. HRMS (ESI) *m/z*: Found $(M+Na)^+$ $C_{28}H_{21}{}^{79}BrNaO_2^+$ 491.0618, requires 491.0617.

Ethyl (*S*)-2-(3-(2-bromophenyl)-1*H*-inden-1-yl)acetate (12)

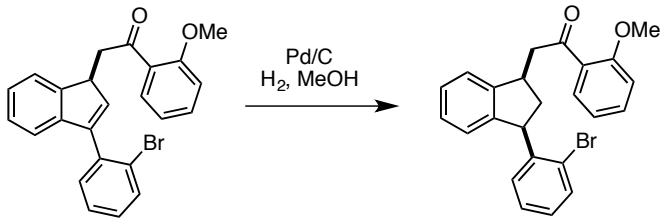


Following general procedure, the title compound was obtained as colorless oil with an unidentified impurity which could not be separated. 11 mg (31% yield). R*f* 0.27 (95:5 v/v hexanes:EtOAc). HPLC AD-H 5μm, λ = 254 nm, hexane : i-PrOH = 95:5, 1.0 mL/min, fraction t_r = 6.10 (major) and 5.20 (minor); e.r. = 54:46. IR ν_{max} 2979, 1730, 1464, 1369, 1214, 1152, 1024, 741 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 7.71 – 7.66 (m, 1H), 7.55 – 7.44 (m, 1H), 7.42 – 7.34 (m, 2H), 7.31 – 7.19 (m, 3H), 7.16 – 7.10 (m, 1H), 6.56 (d, *J* = 2.0 Hz, 1H), 4.24 (qd, *J* = 7.2, 1.6 Hz, 2H), 4.05 (ddd, *J* = 9.0, 6.6, 2.0 Hz, 1H), 2.84 (dd, *J* = 15.9, 6.6 Hz, 1H), 2.53 (dd, *J* = 15.9, 9.0 Hz, 1H), 1.30 (t, *J* = 7.2 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.7, 146.6, 144.2, 144.0, 137.5, 137.0, 133.4, 131.3, 129.5, 127.6, 127.2, 125.7, 123.5, 123.4, 121.4, 61.1, 46.0, 36.6, 14.6. HRMS (ESI) *m/z*: Found $(M+H)^+$ $C_{19}H_{18}{}^{79}BrO_2^+$ 357.0465, requires 357.0485.

II-4. Derivatization

Reduction of indene to indane

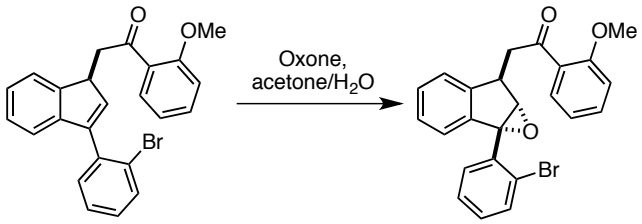
2-((1*R*,3*R*)-3-(2-bromophenyl)-2,3-dihydro-1*H*-inden-1-yl)-1-(2-methoxyphenyl)-ethan-1-one (9c)



In a 10 mL RBF, indene (45 mg, 0.11 mol) was dissolved in MeOH (2 mL) and Pd/C (5%) was added. Then a septum was put on the RBF and then a balloon with H_2 gas was plugged in with the needle tip emersed in the MeOH mixture. The reaction was stirred overnight, diluted with ether, and filtered. After removal of the solvent of the filtrate, the residue was purified by flash chromatography.

Colorless oil, 36 mg (80%) as a single diastereoisomer (confirmed by 2-D NMRs, see spectra). R*f* 0.20 (9:1 *v*/*v* hexanes:EtOAc). HPLC RegisCell™ 5µm, λ = 254 nm, hexane : i-PrOH = 99:1, 1.0 mL/min, fraction t_r = 20.06 (major) and 21.33 (minor); e.r. = 95:5. $[\alpha]_D^{25}$ = –38.9º (*c* = 0.79, $CHCl_3$). IR ν_{max} 2941, 1669, 1596, 1433, 1242, 1022, 750, 700 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ 7.73 (dd, *J* = 7.7, 1.9 Hz, 1H), 7.50 – 7.44 (m, 1H), 7.33 – 7.28 (m, 2H), 7.28 – 7.25 (m, 1H), 7.25 – 7.19 (m, 3H), 7.18 – 7.13 (m, 1H), 7.04 – 6.95 (m, 1H), 6.99 – 6.95 (m, 1H), 6.93 – 6.90 (m, 1H), 4.28 (dd, *J* = 10.6, 7.4 Hz, 1H), 3.89 (s, 3H), 3.86 – 3.75 (m, 1H), 3.69 (dd, *J* = 17.1, 4.9 Hz, 1H), 3.21 (dd, *J* = 17.1, 8.6 Hz, 1H), 2.87 (dt, *J* = 12.4, 7.4 Hz, 1H), 1.72 (dt, *J* = 12.4, 10.6 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 202.1, 158.8, 147.3, 147.2, 145.1, 133.8, 130.6, 128.9, 128.8, 128.7, 127.0(2), 126.9(6), 126.7, 125.2, 123.4, 121.1, 111.9, 55.8, 50.9, 49.8, 45.1, 40.0 (2 peaks missing or overlaped). HRMS (ESI) *m/z*: Found $(M+H)^+$ $C_{24}H_{22}{}^{81}BrO_2{}^+$ 423.0778, requires 423.0777.

2-((1a*S*,6*R*,6a*S*)-1a-(2-bromophenyl)-1a,6a-dihydro-6*H*-indeno[1,2-*b*]oxiren-6-yl)-1-(2-methoxyphenyl)ethan-1-one (10c)



To a 25-mL RBF were added sodium bicarbonate (29 mg, 0.35 mol), water (1.0 mL), acetone (1.0 mL), ethyl acetate (1.0 mL), and indene (16 mg, 0.07 mol) and were stirred vigorously. An aqueous Oxone solution (22 mg, water 1.0 mL) was added dropwise over 1 h at 20 to 25 °C. The reaction mixture was stirred for an additional 1 h. And another portion of oxone (11 mg) was added and the reaction was stirred for another 1 h. The organic layer was separated and washed with 20% (w/v) aqueous sodium chloride (5 mL) and then evaporated. The residue was purified by silica gel chromatograpy (silica gel). The desired product was obtained as colorless oil (72%). d.r. 2:1. HPLC AD-H 5µm, λ = 254 nm, hexane : i-PrOH = 95:5, 1.0 mL/min, fraction tr = 36.78 (major) and 38.46 (minor); e.r. = 99:1 (minor diastereoisomer: fraction tr = 20.14 (major) and 32.97 (minor)); e.r. = 97:3). $[\alpha]_D^{25}$ = +3.5º (c = 0.74, $CHCl_3$). IR ν_{max} 2924, 1657, 1594, 1482, 1432, 1246, 1022, 756, 741 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) major isomer: δ 7.80 (dd, *J* = 7.7, 1.8 Hz, 1H), 7.69 (dd, *J* = 7.7, 1.8 Hz, 1H), 7.62 – 7.55 (m, 1H), 7.53 – 7.45 (m, 1H), 7.45 – 7.38 (m, 1H), 7.38 – 7.33 (m, 1H), 7.31 – 7.23 (m, 2H), 7.19 – 7.11 (m, 1H), 7.07 – 7.01 (m, 2H), 6.98 – 6.95 (m, 1H), 4.15 (s, 1H), 4.14 – 4.06 (m, 1H), 3.86 (s, 3H), 3.60 – 3.45 (m, 2H); minor isomer: δ 7.85 (dd, *J* = 7.8, 1.8 Hz, 1H), 7.66 – 7.62 (m, 1H), 7.62 – 7.55 (m, 1H), 7.53 – 7.45 (m, 1H), 7.45 – 7.38 (m, 1H), 7.31 – 7.23 (m, 3H), 7.19 – 7.11 (m, 1H), 7.07 – 7.01 (m, 2H), 7.00 – 6.98 (m, 1H), 4.39 (d, *J* = 2.9 Hz, 1H), 4.14 – 4.06 (m, 1H), 3.91 (s, 3H), 3.60 – 3.45 (m, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) mixed: δ 200.9, 200.2, 159.3, 159.0, 147.2, 146.3, 142.8, 142.4, 135.4, 135.1, 134.2(1), 134.1(7), 132.8(4), 132.8(2), 131.0, 130.8, 130.6, 130.2(3), 130.1(8), 129.0, 128.9, 128.3, 128.1, 127.8, 127.6, 126.8(2), 126.7(6), 126.3, 125.5, 124.7, 124.6, 123.2, 121.2, 121.0, 111.9(7), 119.9(6), 70.3, 69.9, 69.5, 67.3, 55.9, 46.9, 45.1, 42.0, 41.2 (three peaks, one aliphatic and two aromatic, are missing or overlaped). HRMS (ESI) *m/z*: Found $(M+H)^+$ $C_{24}H_{20}{}^{79}BrO_3{}^+$ 435.0586, requires 435.0590; $C_{24}H_{20}{}^{81}BrO_3{}^+$ 437.0581, requires 437.0570.

III. X-ray crystal structures

Table S1. Crystal data and structure refinement

Identification code	shelx
Name	**6x**
Empirical formula	C24 H18 Br Cl O2
Formula weight	453.73
Temperature	123(2) K
Wavelength	1.54184 A
Crystal system, space group	Monoclinic, P2(1)
Unit cell dimensions	*a* = 9.5385(4) A alpha = 90 deg.
	b = 7.8621(3) A beta = 96.183(4) deg.
	c = 13.4830(7) A gamma = 90 deg.
Volume	1005.24(7) A^3
Z, Calculated density	2, 1.499 Mg/m^3
Absorption coefficient	4.657 mm^-1
F(000)	460
Crystal size	0.18 x 0.04 x 0.04 mm
Theta range for data collection	4.663 to 66.867 deg.
Limiting indices	-11<=h<=11, -9<=k<=9, -16<=l<=15
Reflections collected / unique	10294 / 3565 [R(int) = 0.0381]
Completeness to theta = 66.867	99.7 %
Absorption correction	Semi-empirical from equivalents
Max. and min. transmission	1.00000 and 0.63383
Refinement method	Full-matrix least-squares on F^2
Data / restraints / parameters	3565 / 1 / 254
Goodness-of-fit on F^2	1.029
Final R indices [I>2sigma(I)]	R1 = 0.0268, wR2 = 0.0654
R indices (all data)	R1 = 0.0279, wR2 = 0.0662
Absolute structure parameter	-0.014(11)
Extinction coefficient	n/a
Largest diff. peak and hole	0.252 and -0.367 e.A^-3

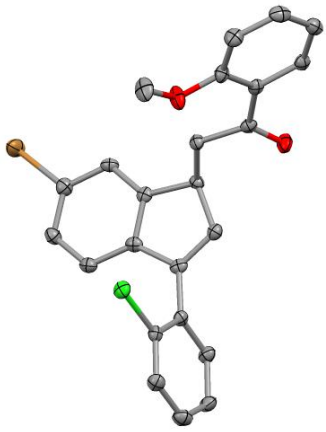
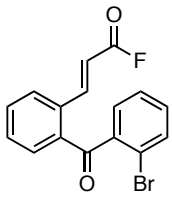
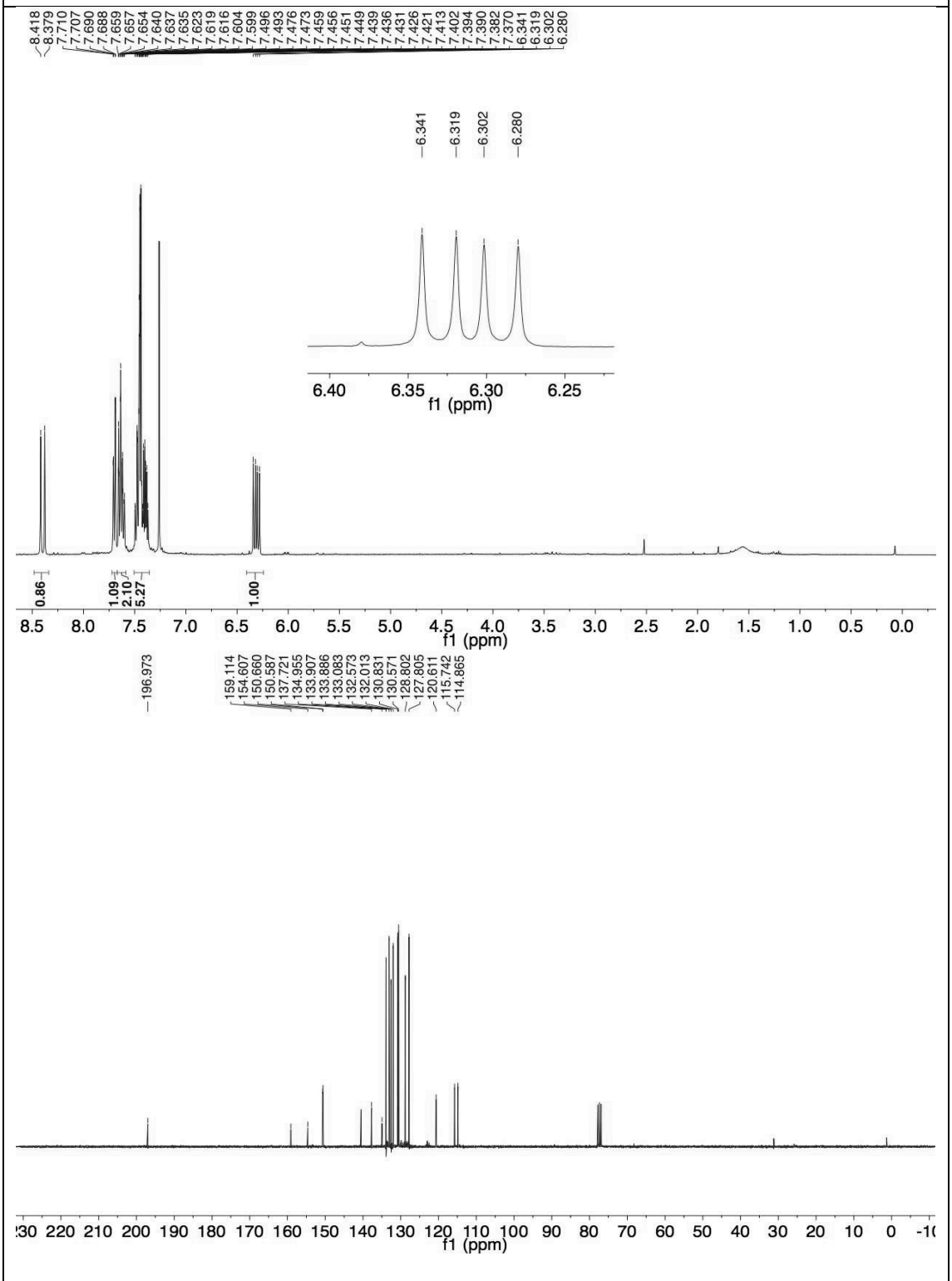


Figure S1. Molecular diagram of $C_{24}H_{18}BrClO_2$ with non-hydrogen atoms represented by 50% thermal ellipsoids.

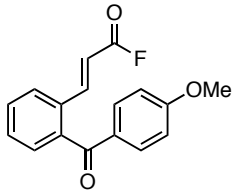
IV. ^{1}H, ^{13}C-NMR spectra and HPLC traces

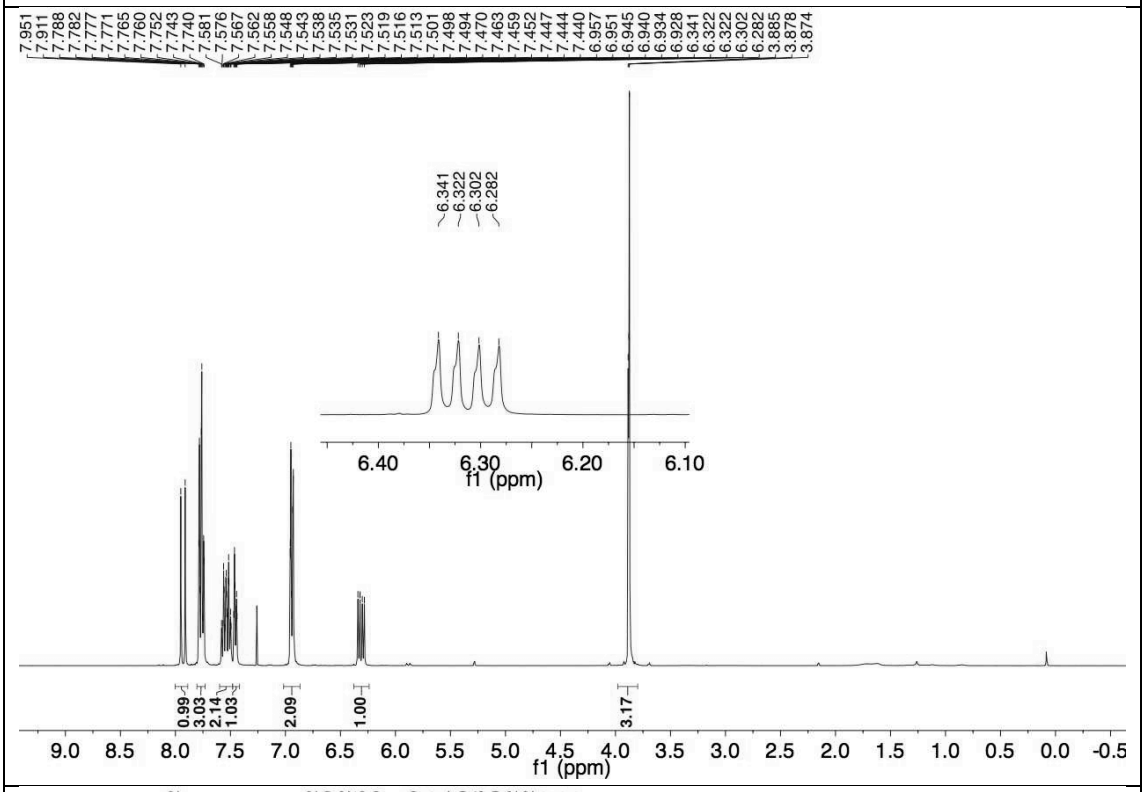
(*E*)-3-(2-(2-bromobenzoyl)phenyl)acryloyl fluoride (7a)

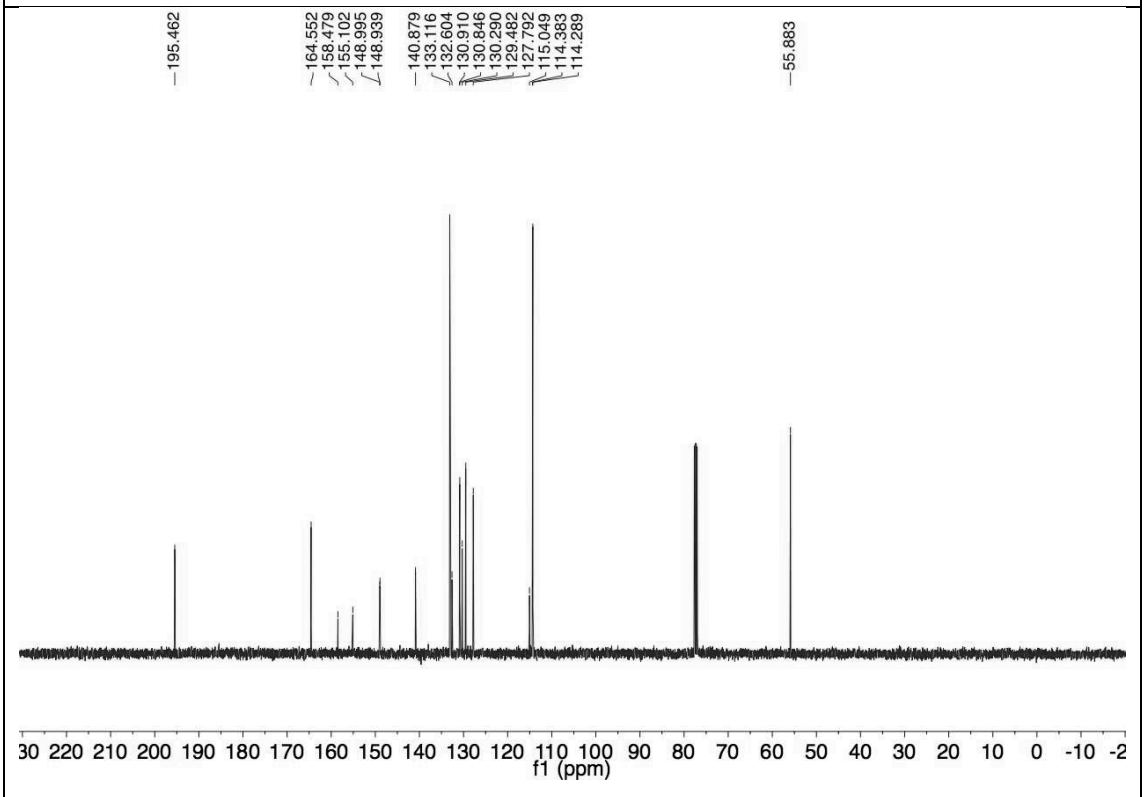




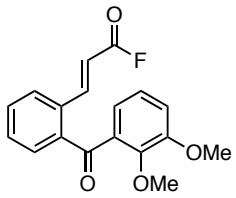
(*E*)-3-(2-(4-methoxybenzoyl)phenyl)acryloyl fluoride (7b)

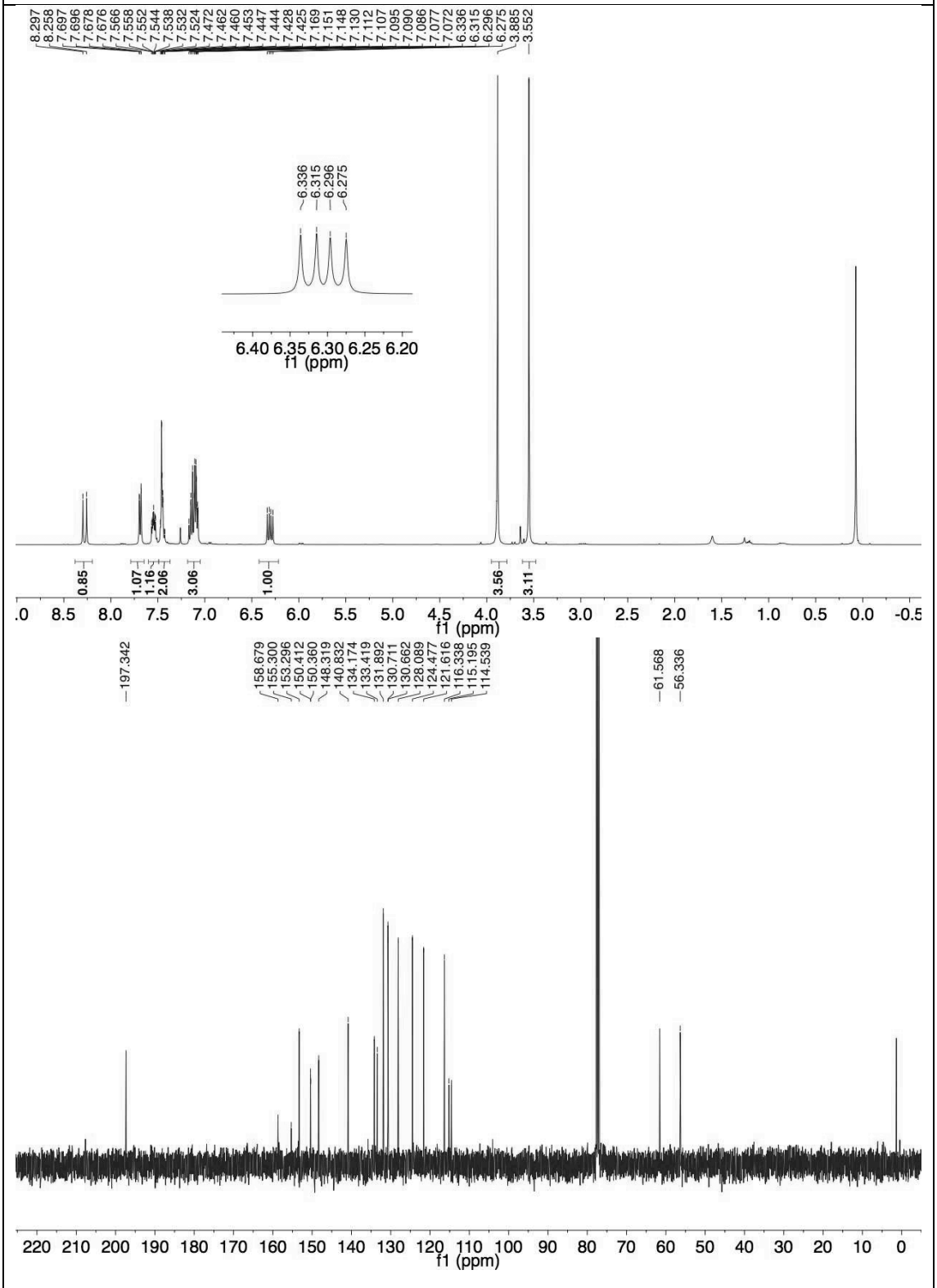




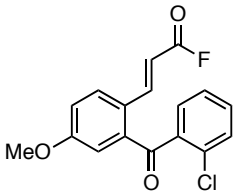


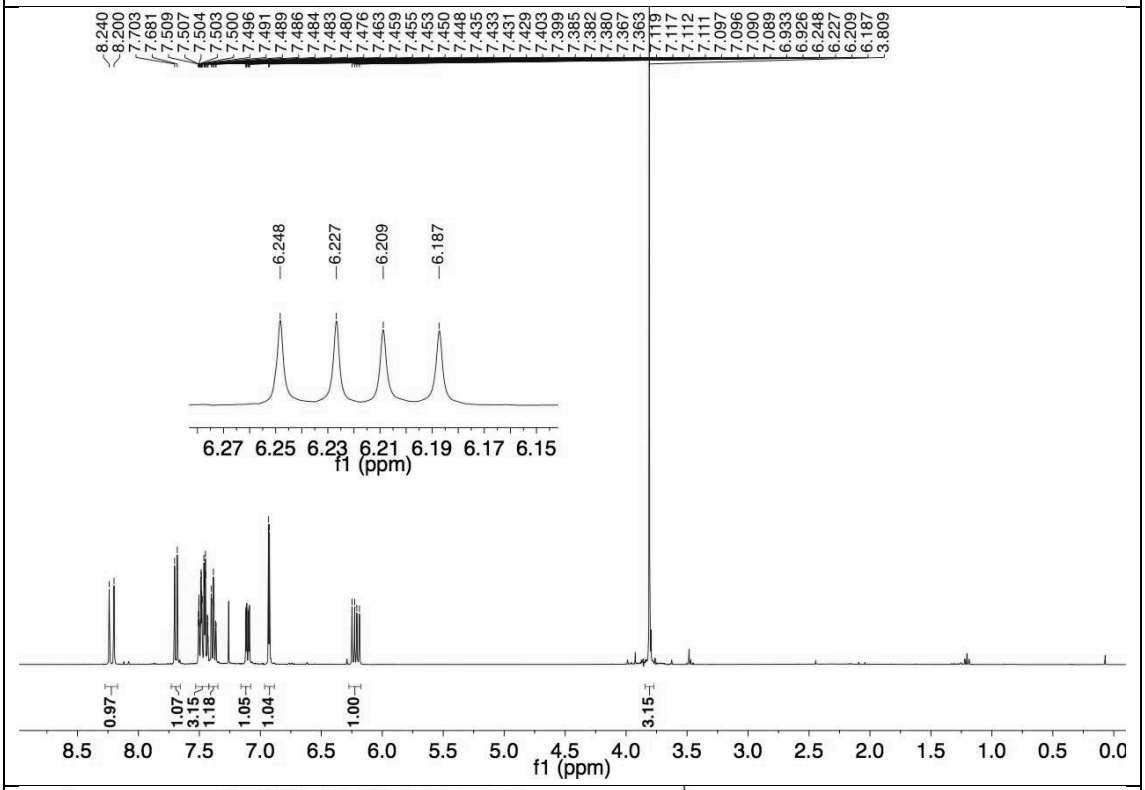
(*E*)-3-(2-(2,3-dimethoxybenzoyl)phenyl)acryloyl fluoride (7c)

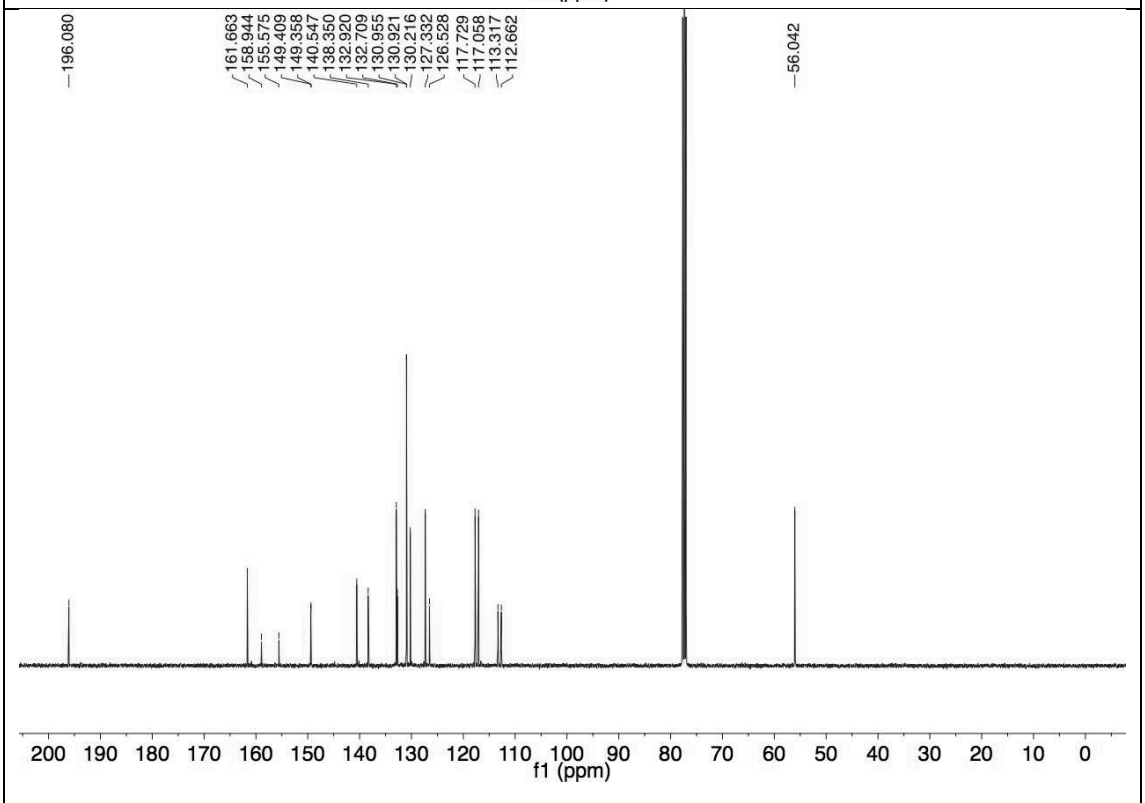




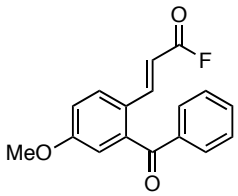
(*E*)-3-(2-(2-chlorobenzoyl)-4-methoxyphenyl)acryloyl fluoride (7d)

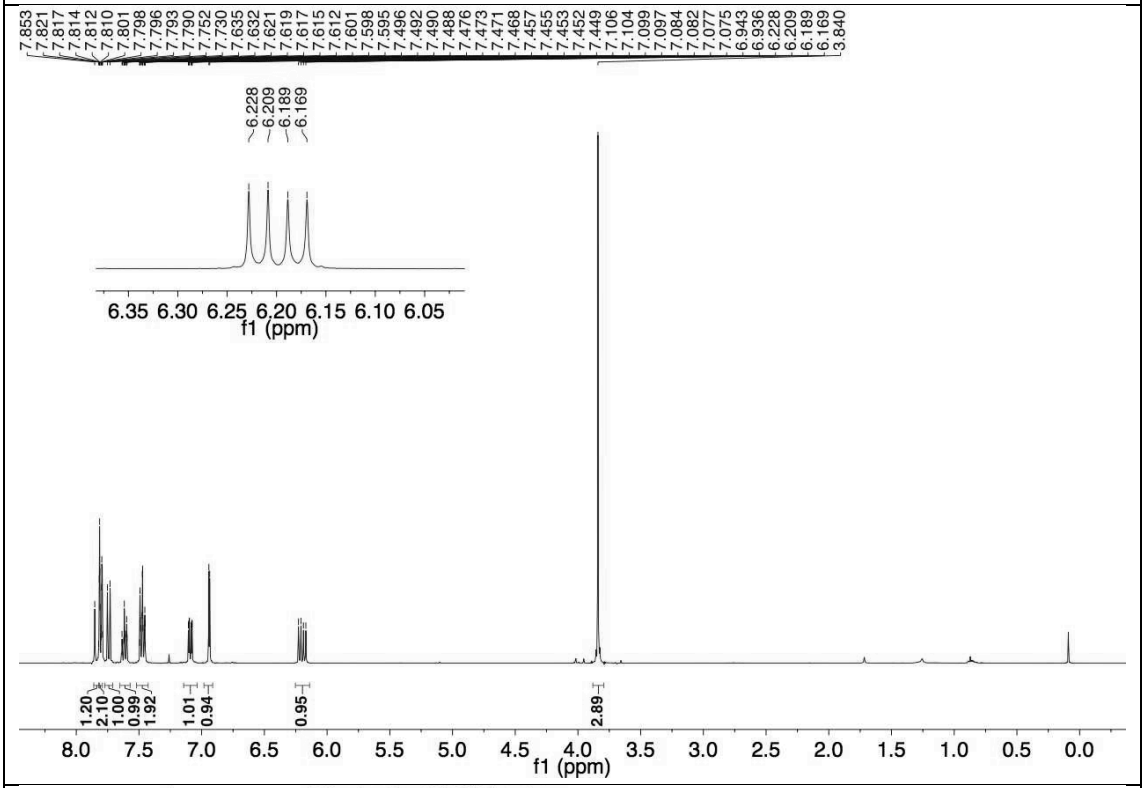


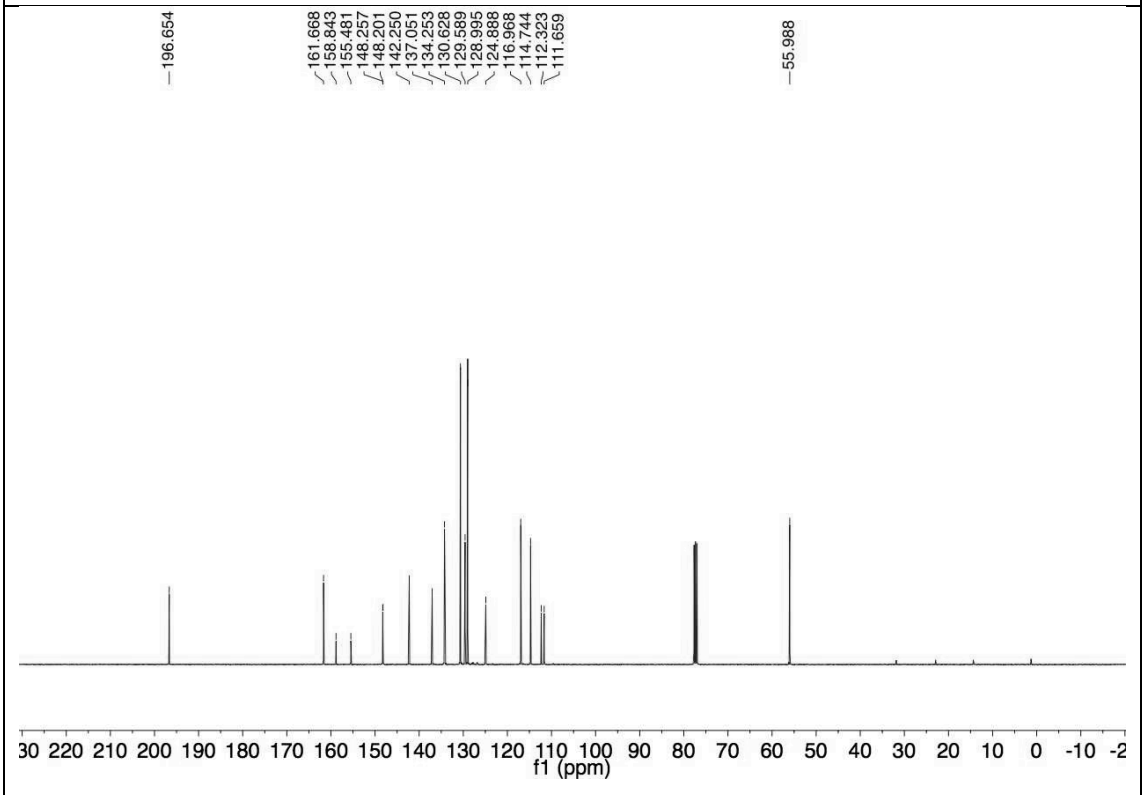




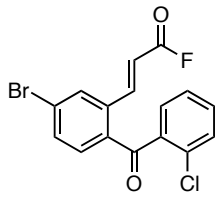
(*E*)-3-(2-benzoyl-4-methoxyphenyl)acryloyl fluoride (7e)

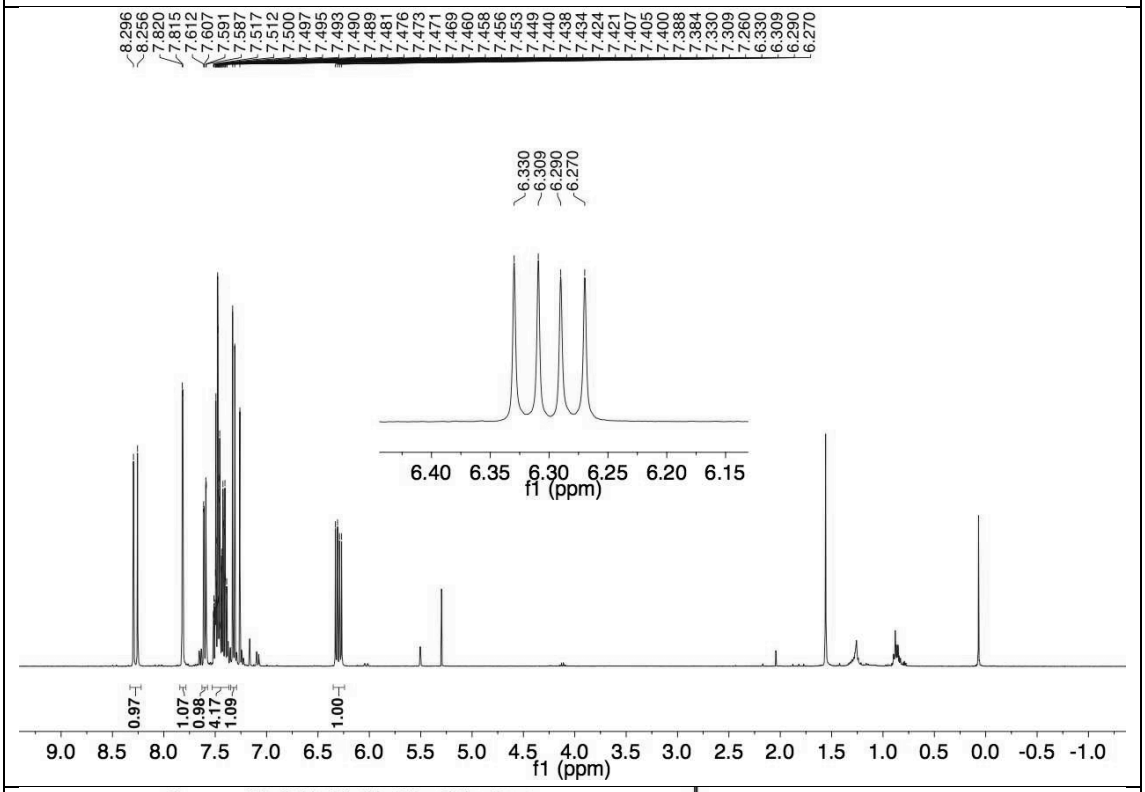


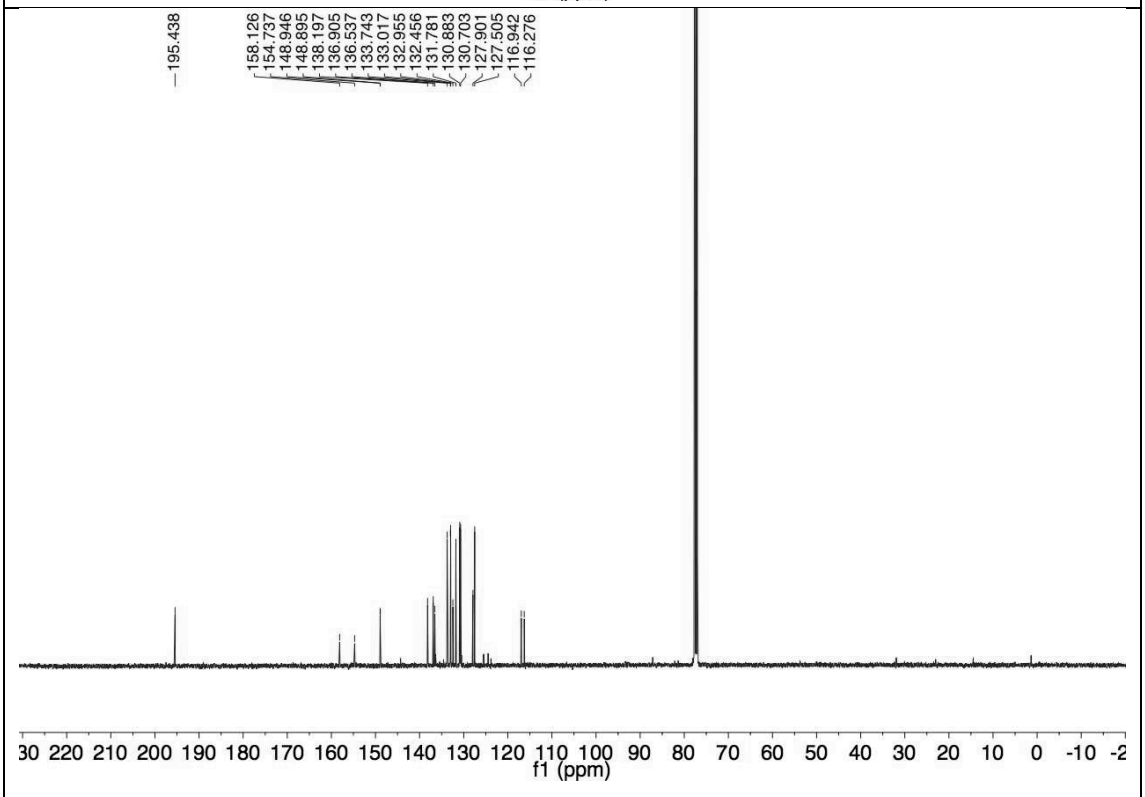




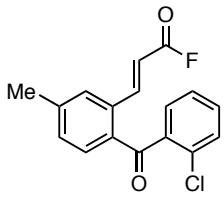
(*E*)-3-(5-bromo-2-(2-chlorobenzoyl)phenyl)acryloyl fluoride (7f)

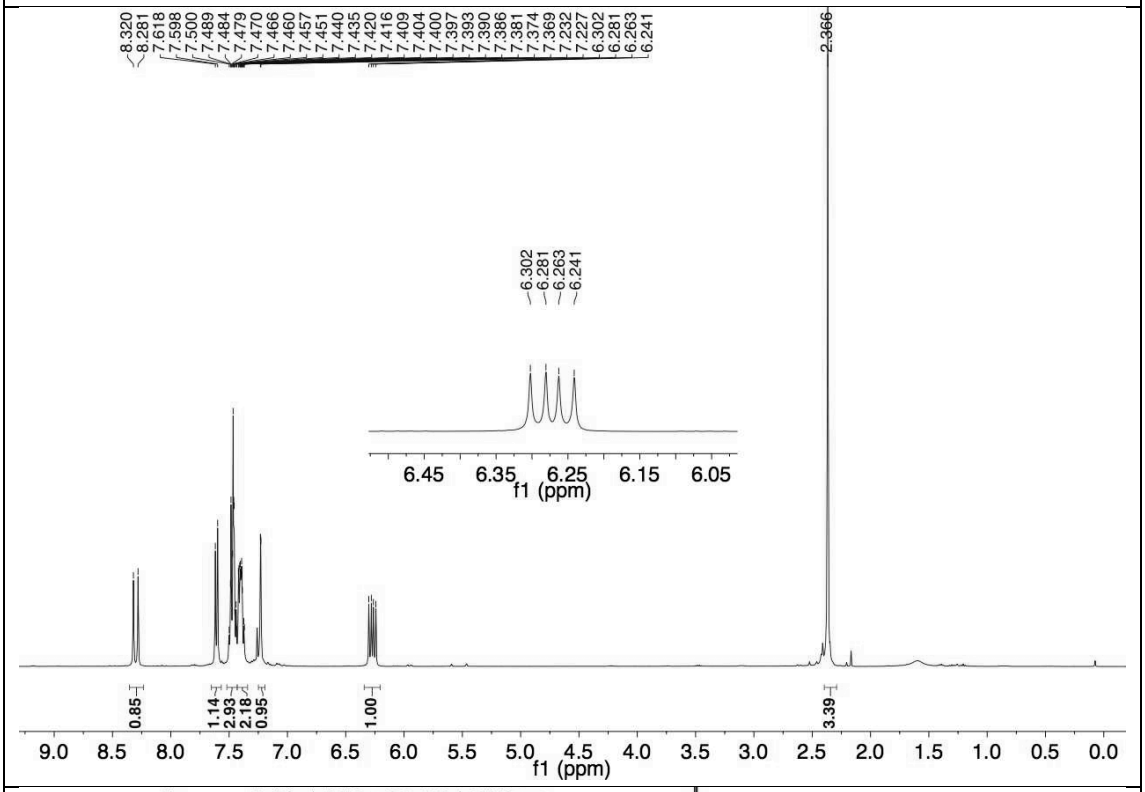


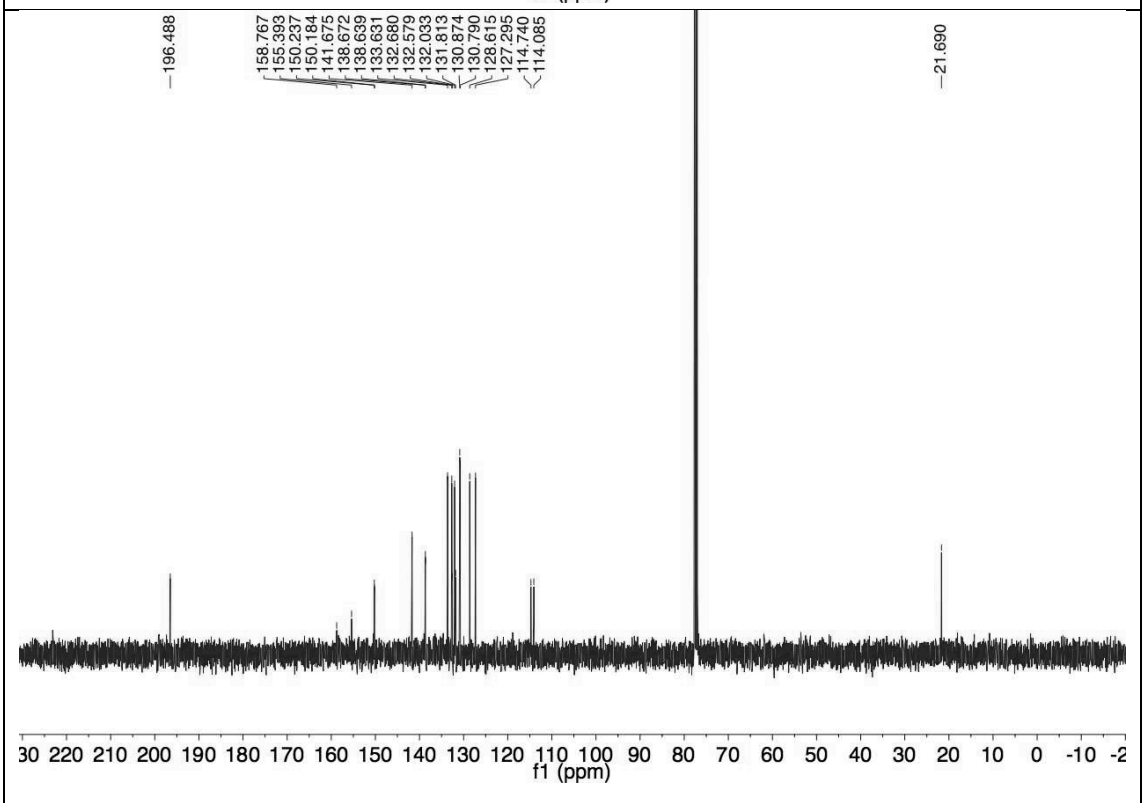




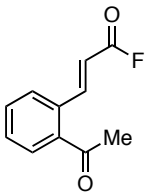
(*E*)-3-(2-(2-chlorobenzoyl)-5-methylphenyl)acryloyl fluoride (7g)

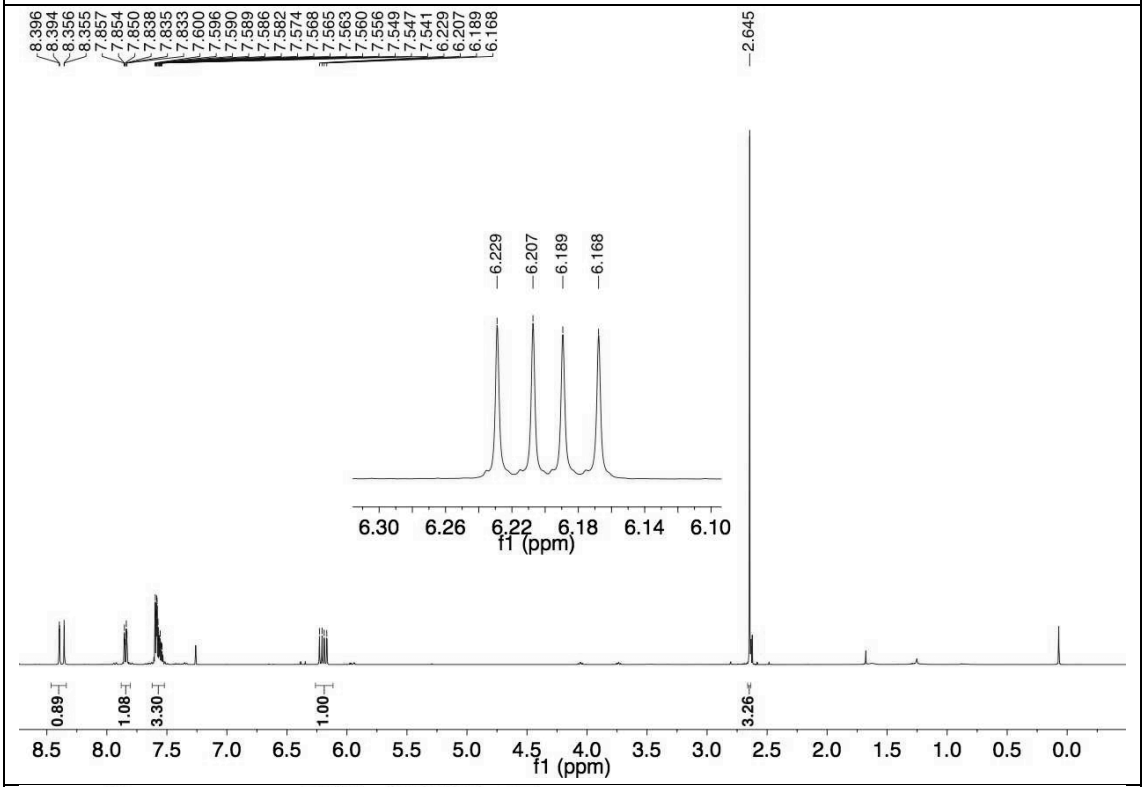


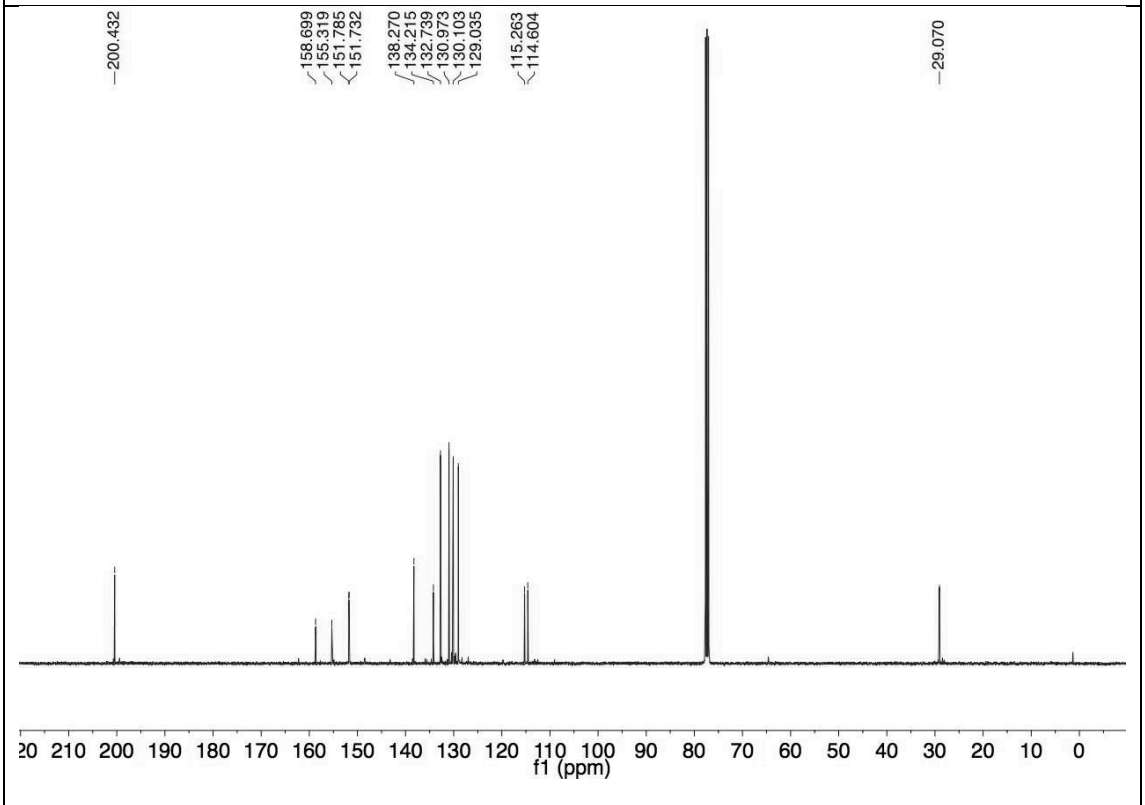




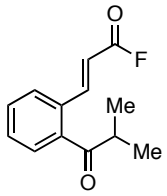
(*E*)-3-(2-acetylphenyl)acryloyl fluoride (7h)

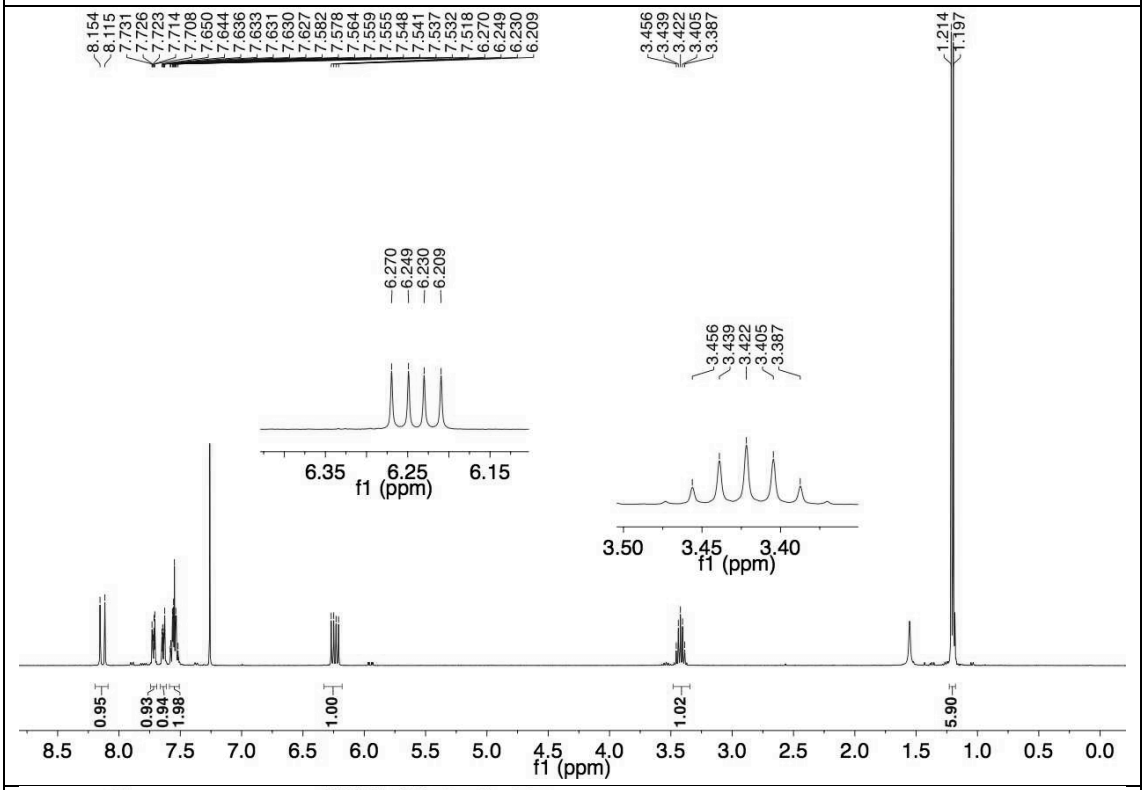


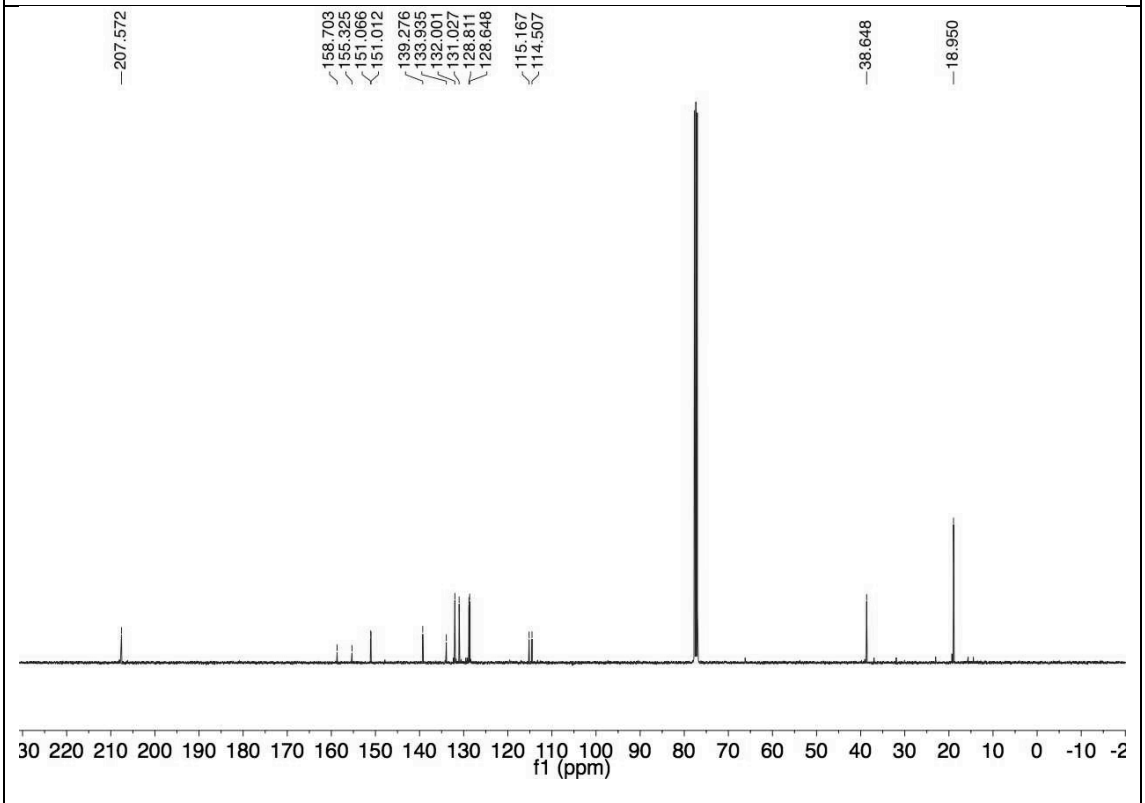




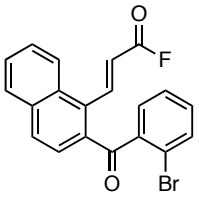
(*E*)-3-(2-isobutyrylphenyl)acryloyl fluoride (7i)

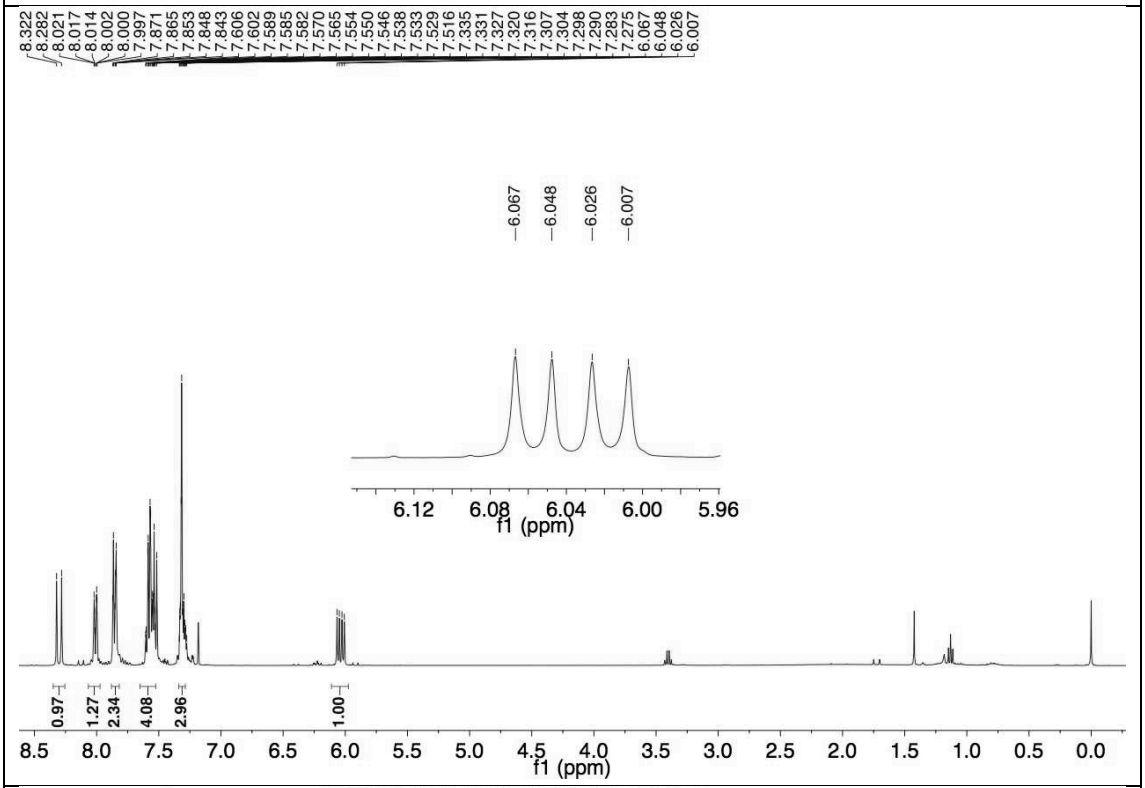


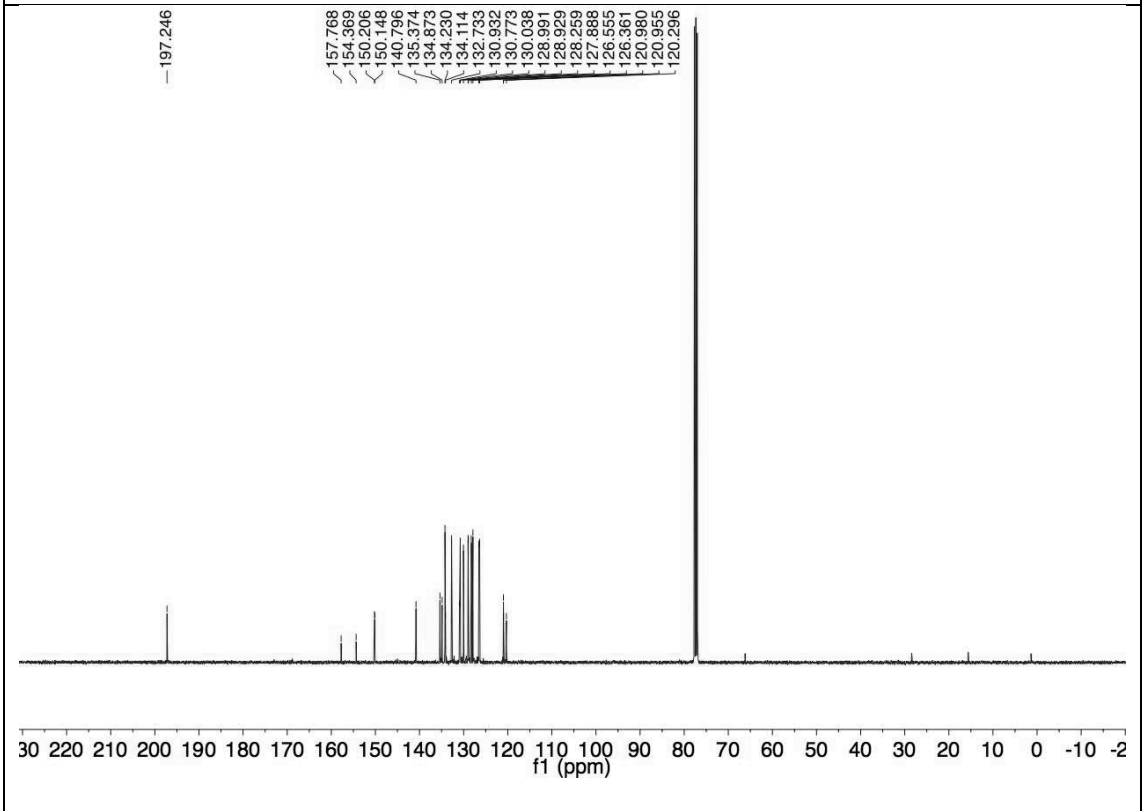




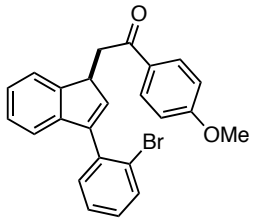
(*E*)-3-(2-(2-bromobenzoyl)naphthalen-1-yl)acryloyl fluoride (7j)

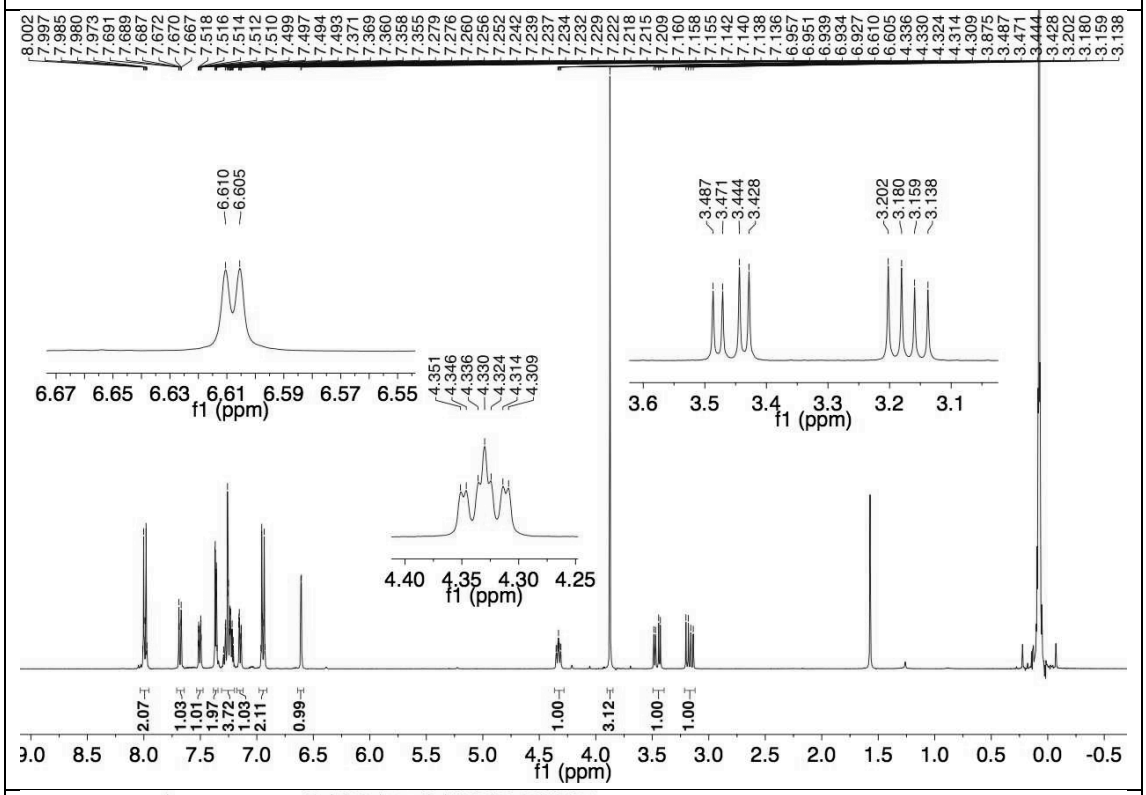


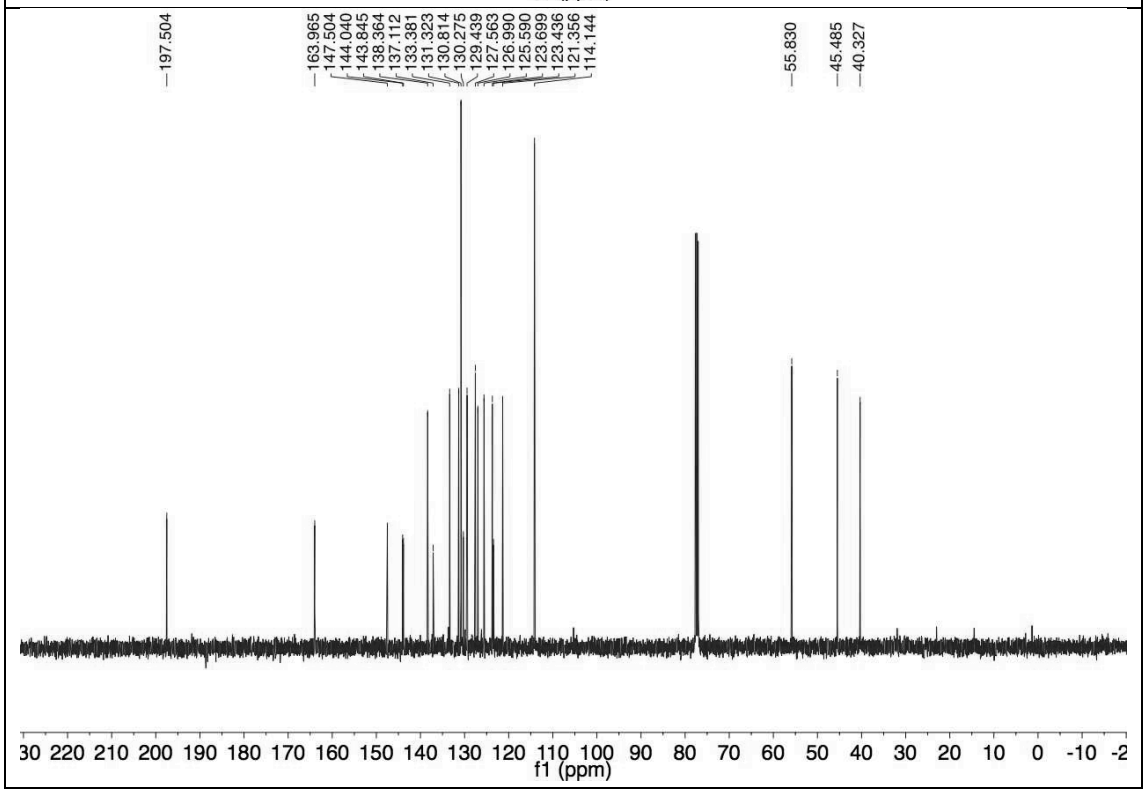


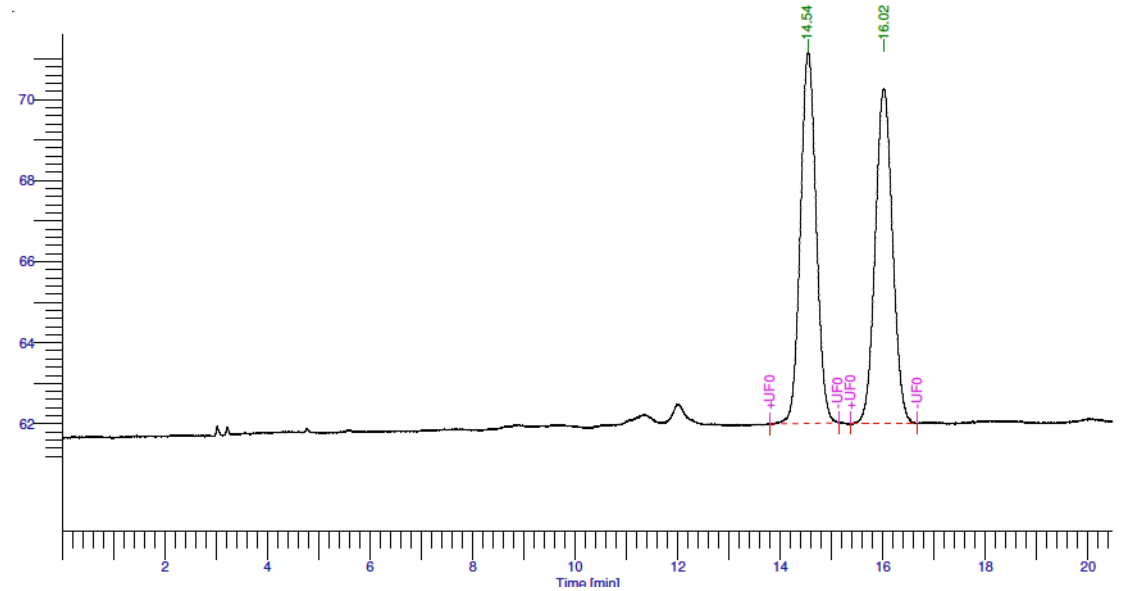


2-(3-(2-Bromophenyl)-1*H*-inden-1-yl)-1-(4-methoxyphenyl)ethan-1-one (6a)

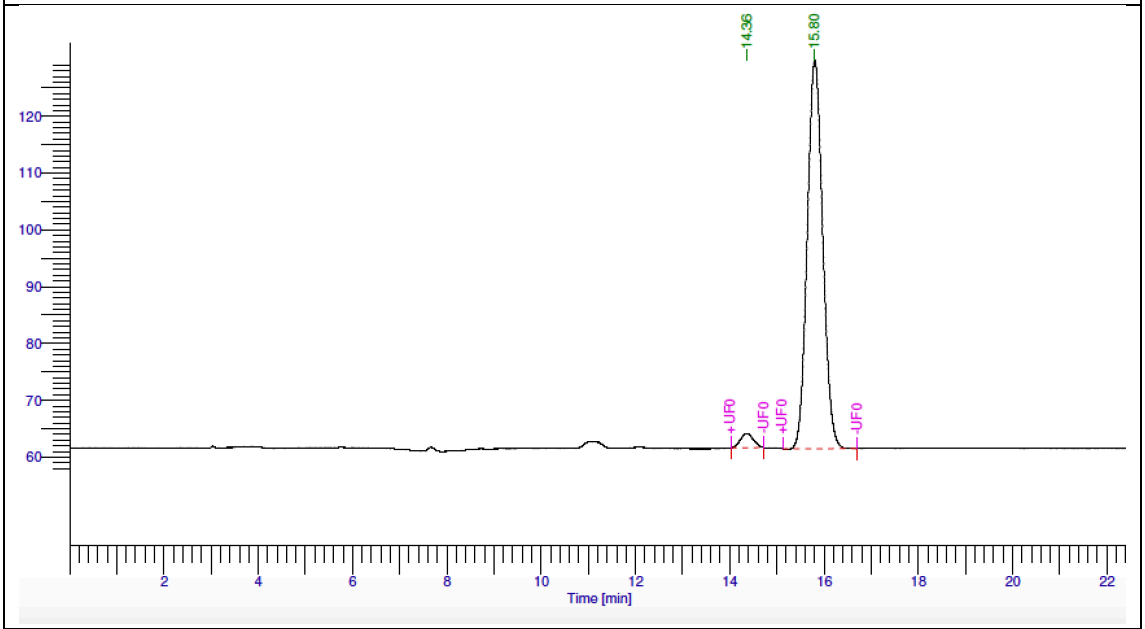






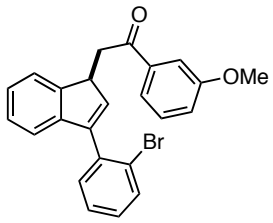


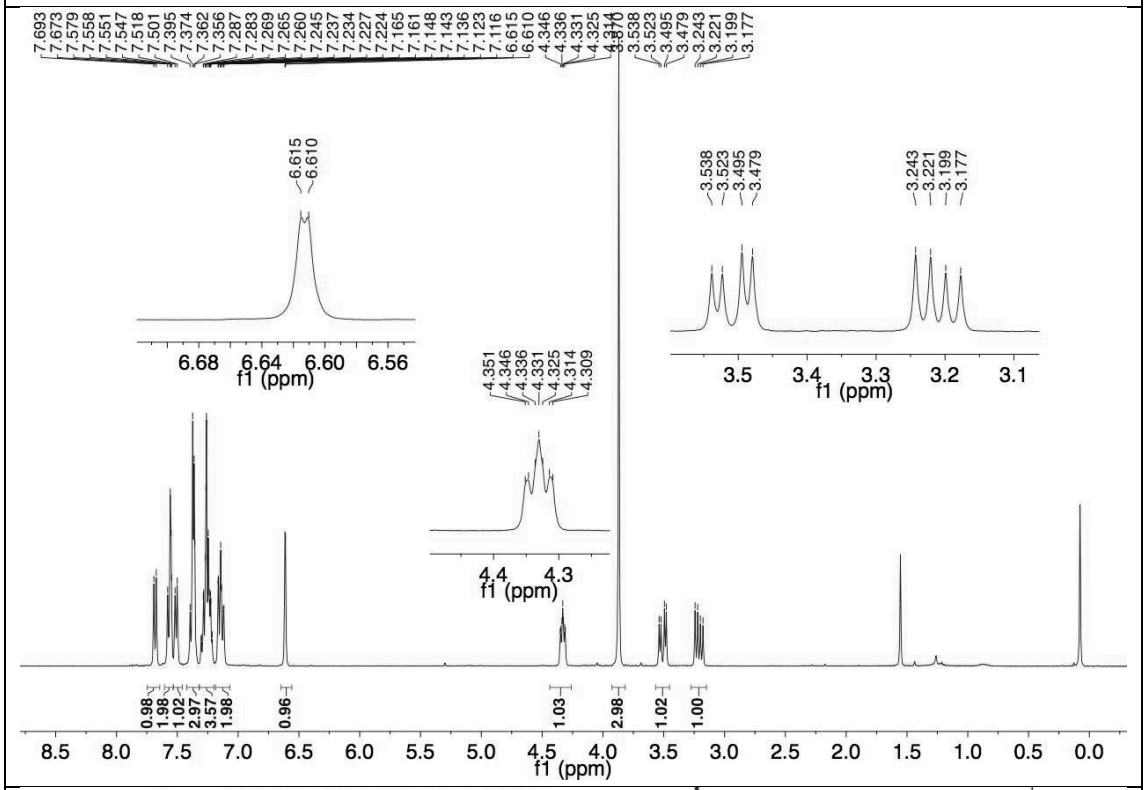
Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
14.542	195274.82	9168.10	50.27	50.27
16.023	193212.78	8248.29	49.73	49.73
	388487.61	17416.39	100.00	100.00

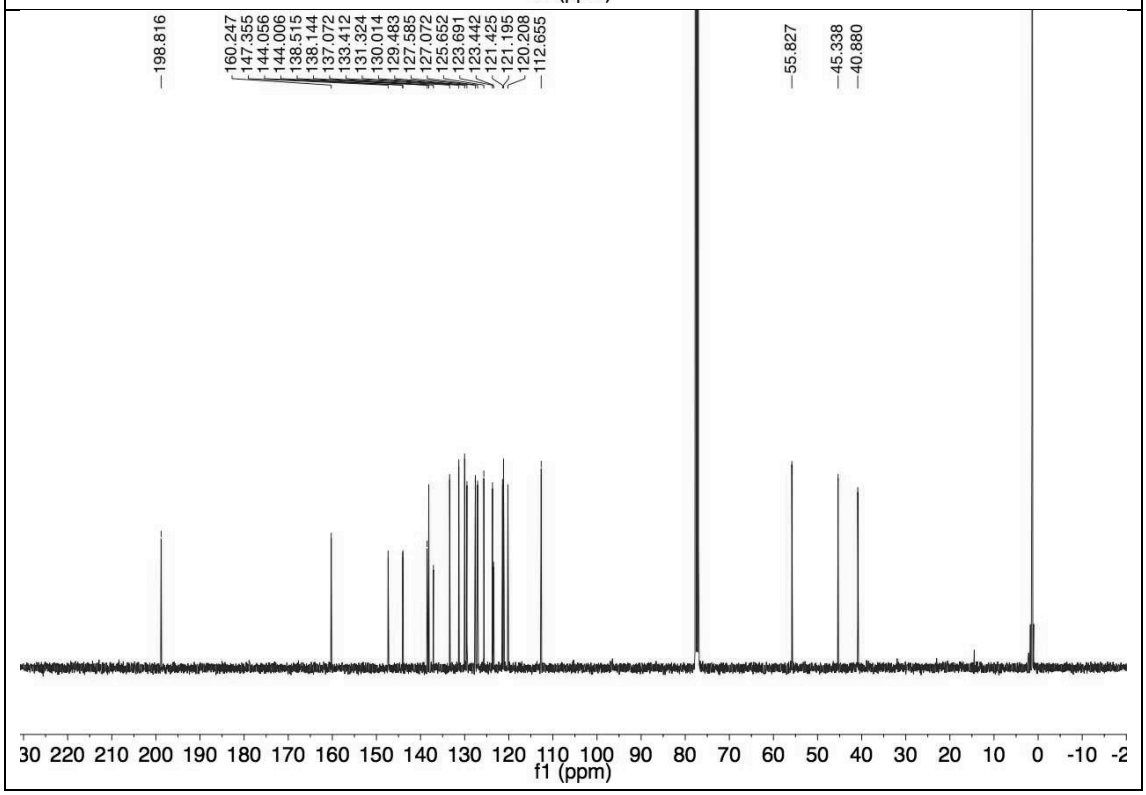


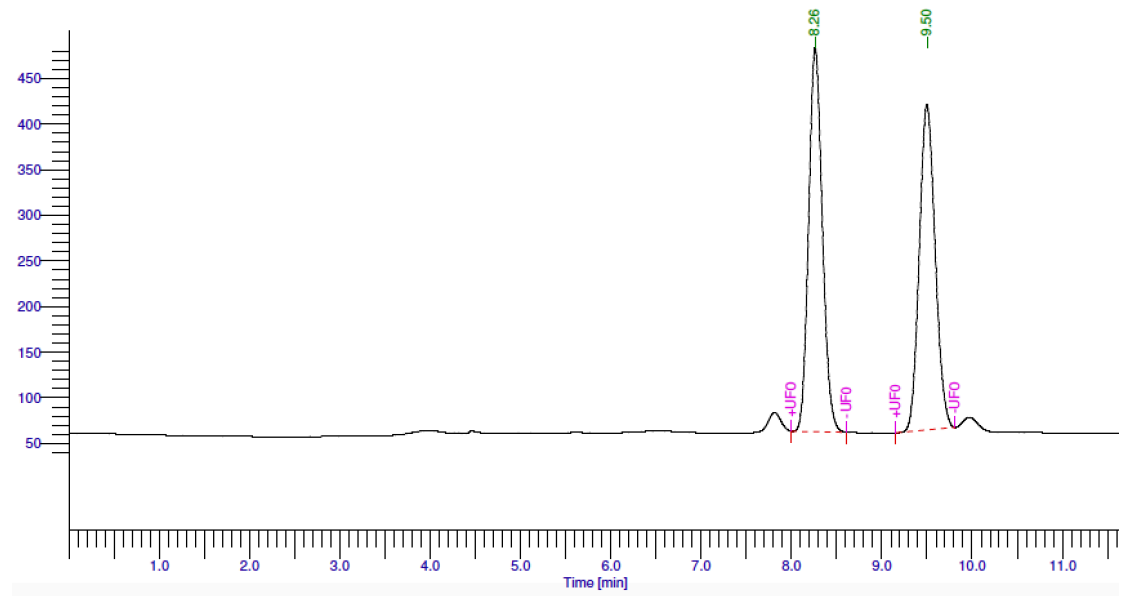
Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
14.362	48264.22	2506.22	3.00	3.00
15.800	1561060.44	68301.91	97.00	97.00
	1609324.66	70808.13	100.00	100.00

(*S*)-2-(3-(2-bromophenyl)-1*H*-inden-1-yl)-1-(3-methoxyphenyl)ethan-1-one (6b)

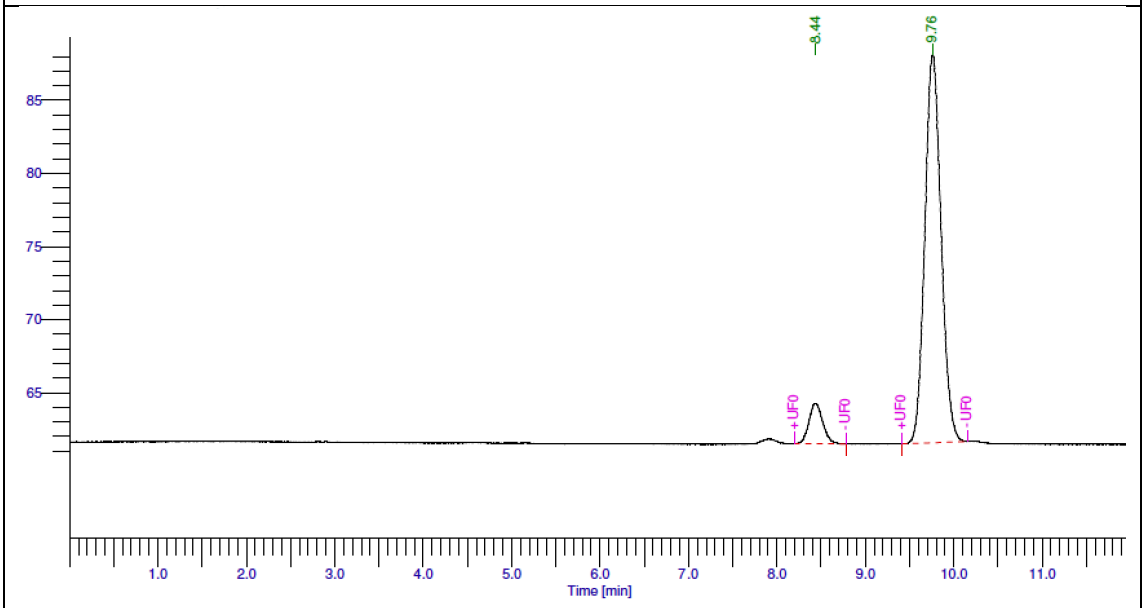






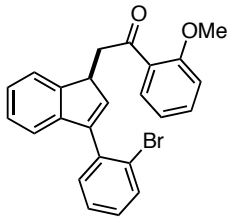


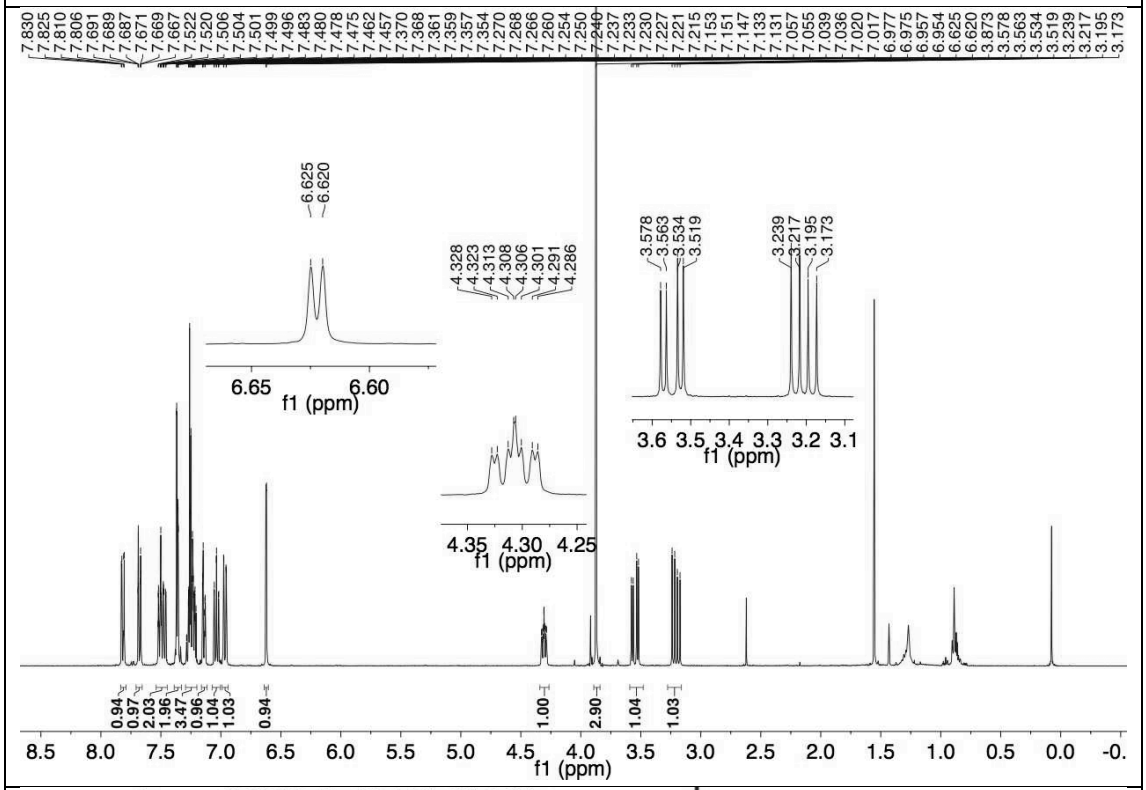
Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
8.263	4439265.03	420608.38	50.48	50.48
9.500	4355635.63	356283.62	49.52	49.52
	8794900.66	776892.00	100.00	100.00

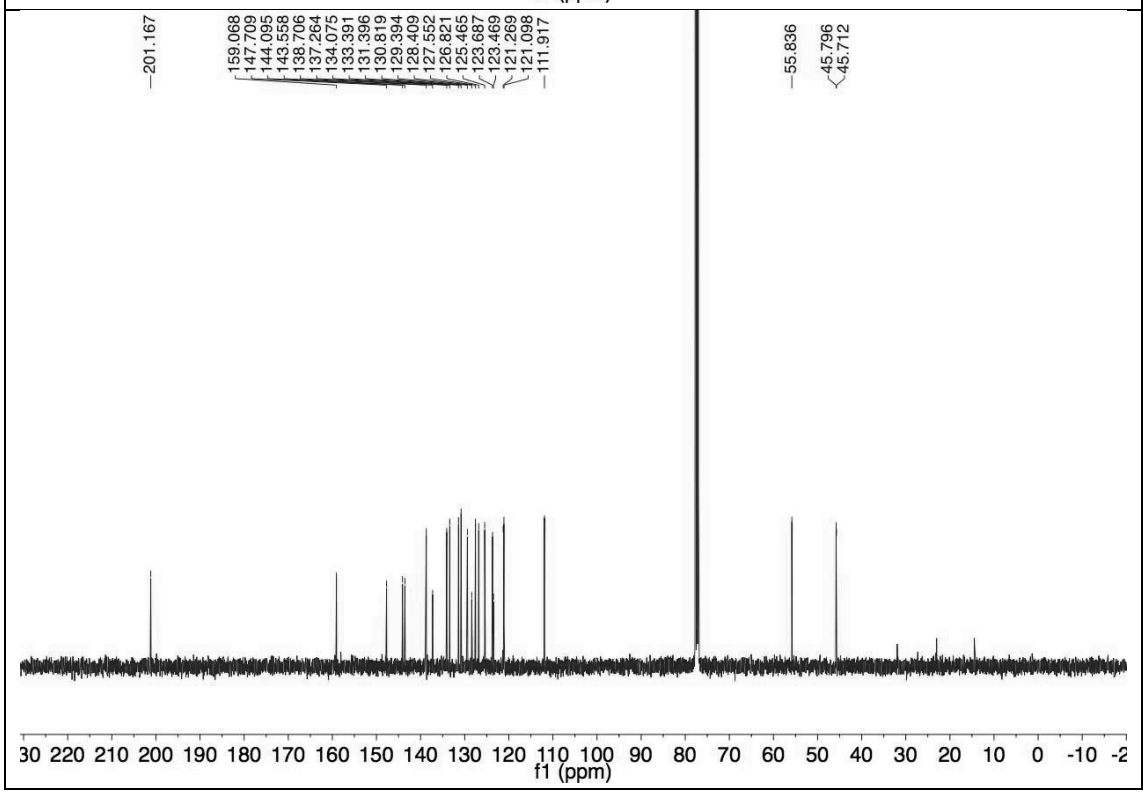


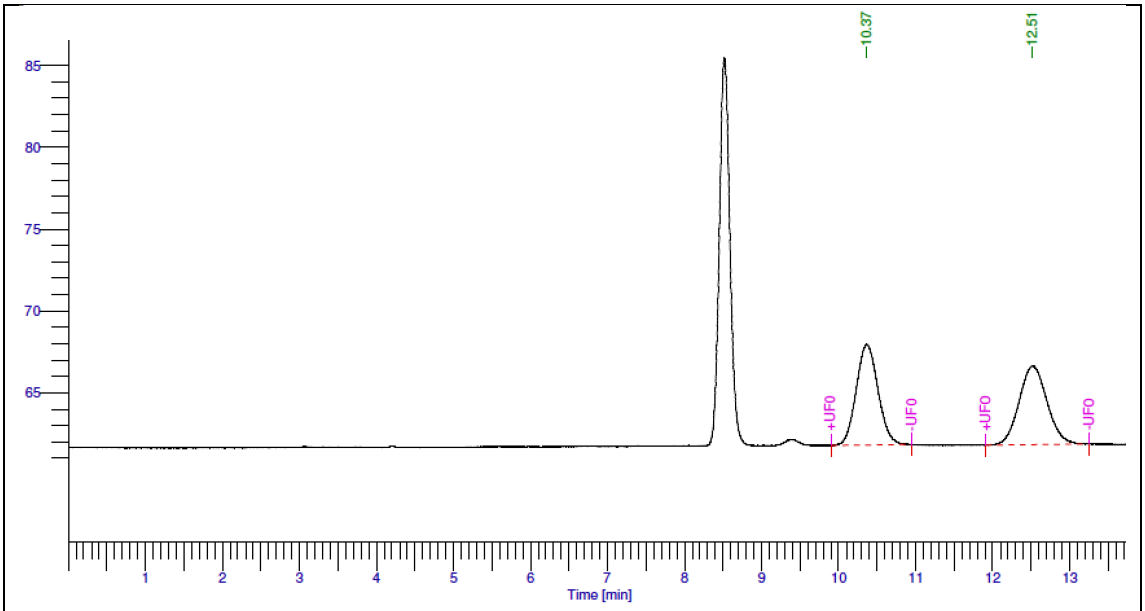
Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
8.435	30017.83	2776.21	8.13	8.13
9.760	339326.92	26554.79	91.87	91.87
	369344.75	29330.99	100.00	100.00

(*S*)-2-(3-(2-bromophenyl)-1*H*-inden-1-yl)-1-(2-methoxyphenyl)ethan-1-one (6c)

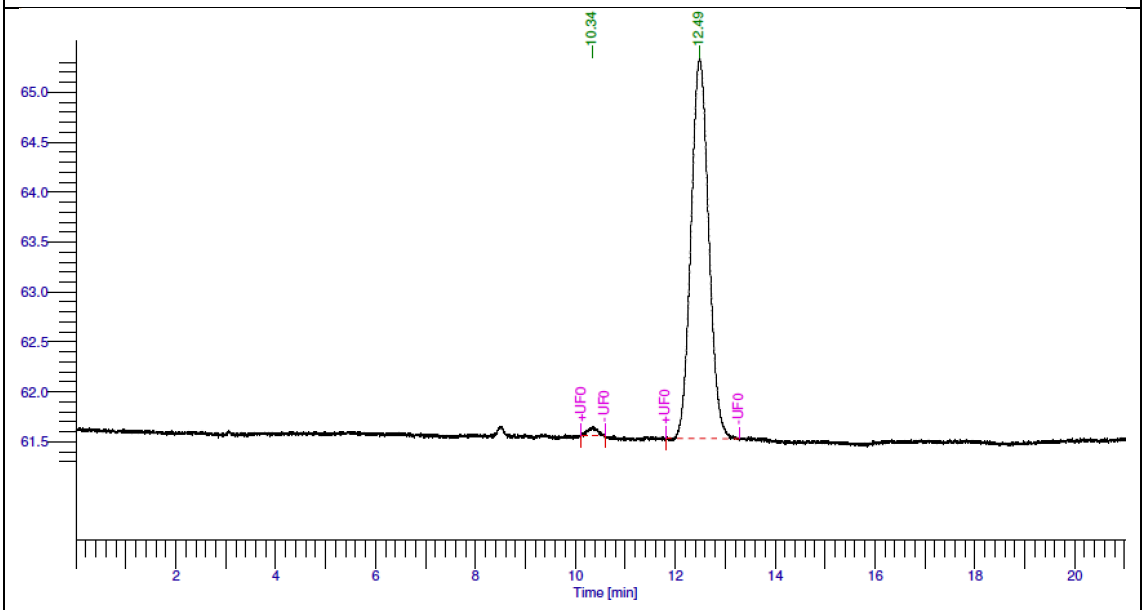






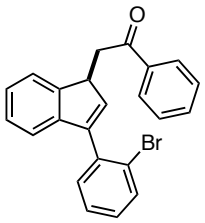


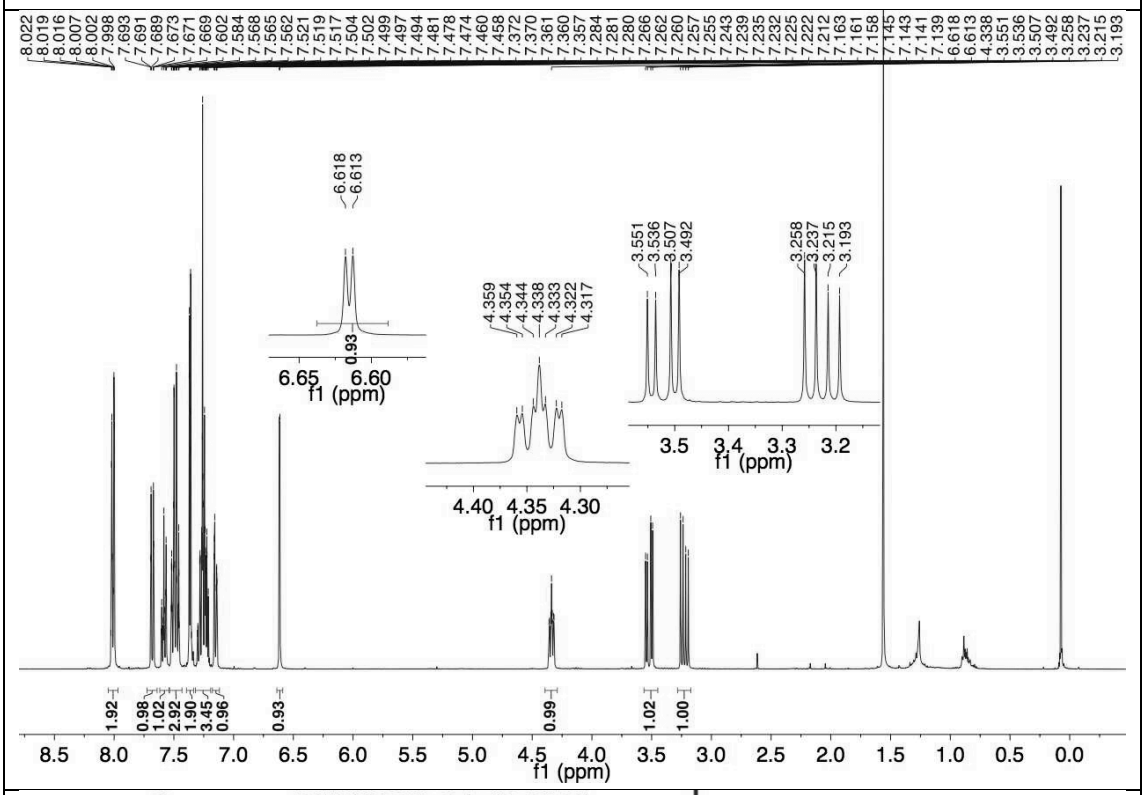
Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
10.367	121061.12	6152.60	49.91	49.91
12.513	121504.84	4813.34	50.09	50.09
	242565.95	10965.93	100.00	100.00

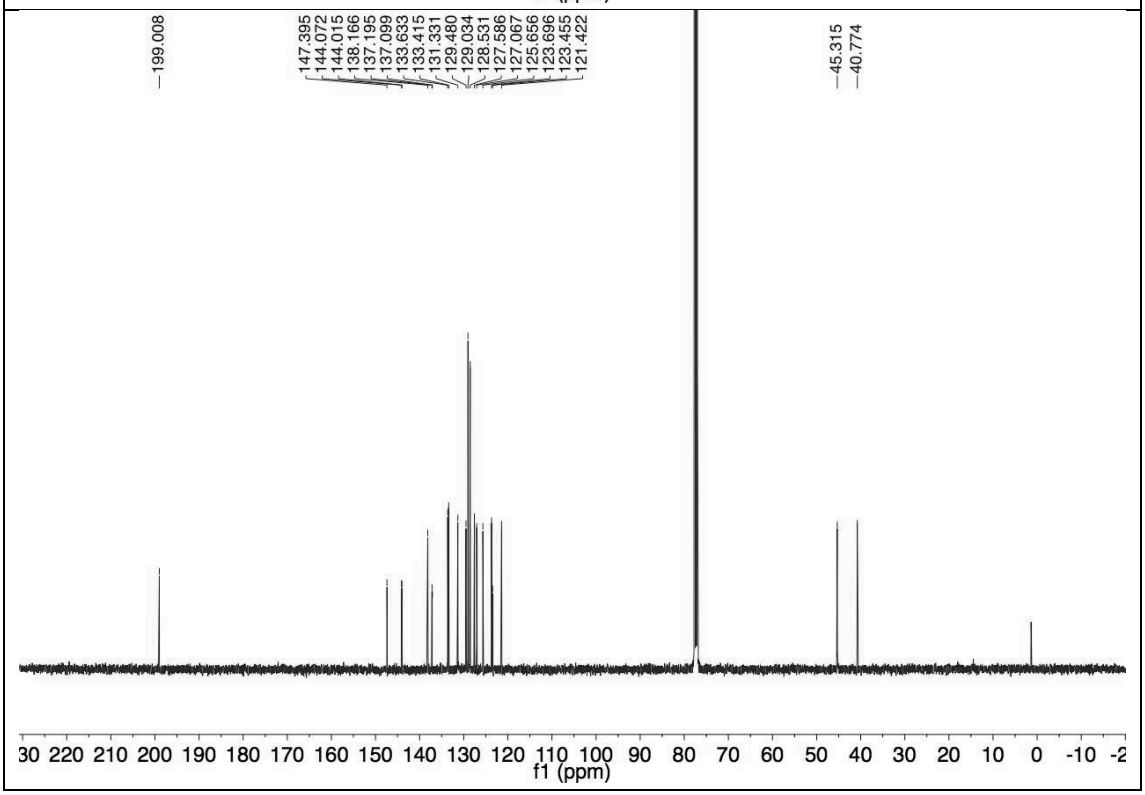


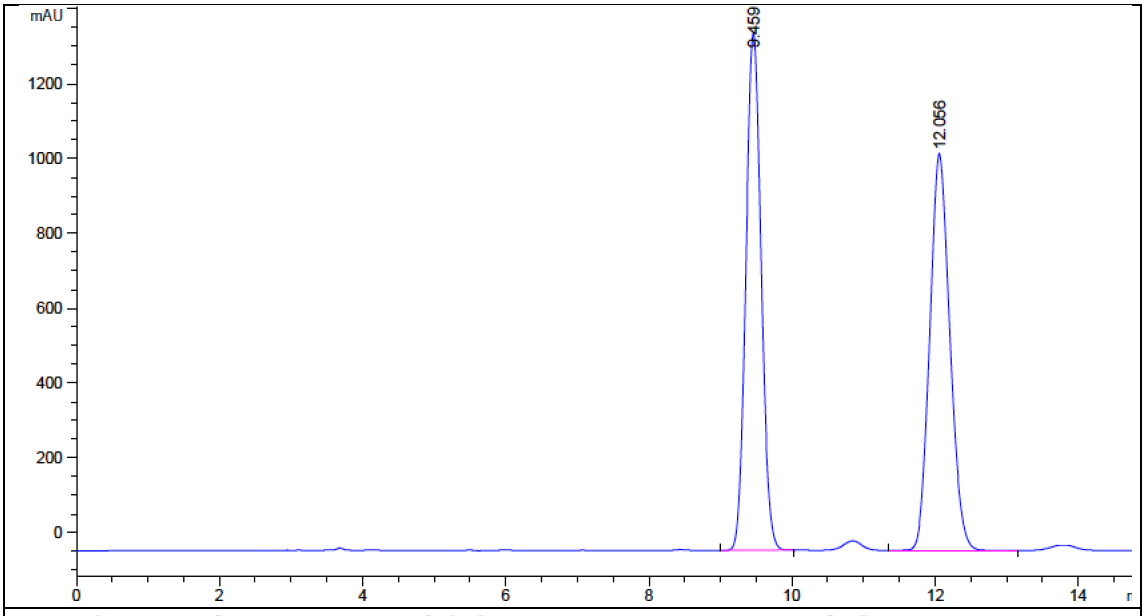
Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
10.337	1090.42	85.63	1.15	1.15
12.487	93525.14	3813.25	98.85	98.85
	94615.56	3898.87	100.00	100.00

2-(3-(2-Bromophenyl)-1*H*-inden-1-yl)-1-phenylethan-1-one (6d)

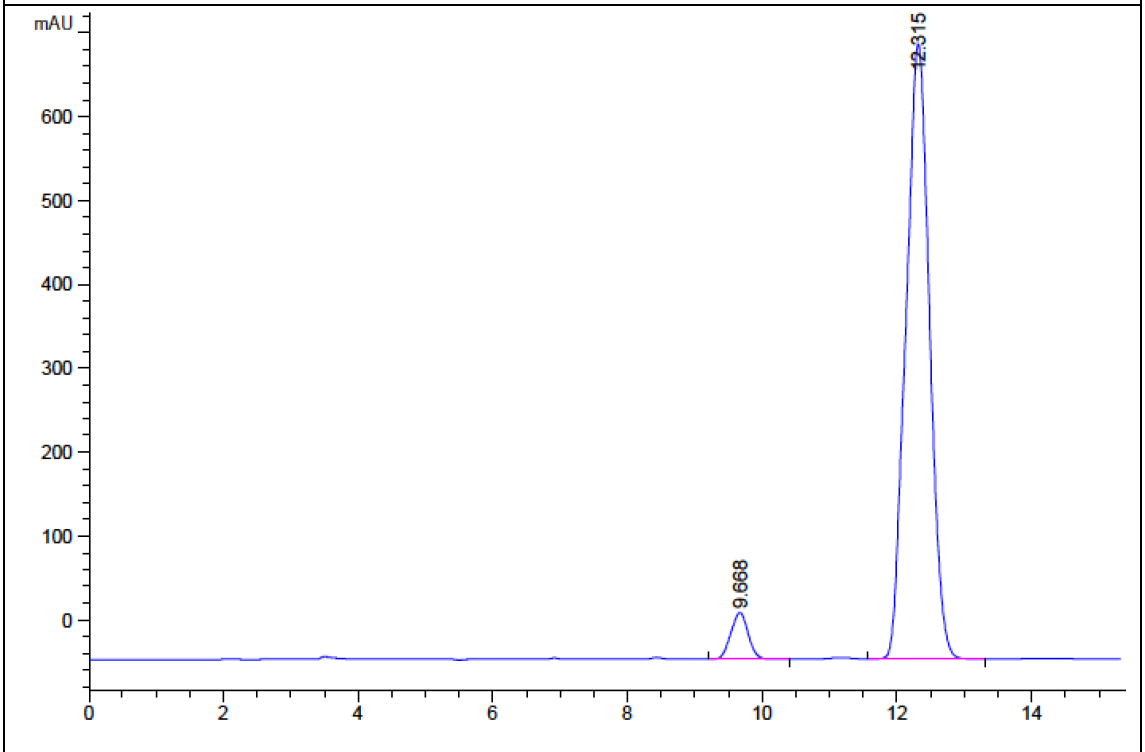






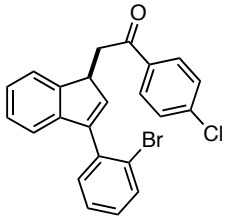


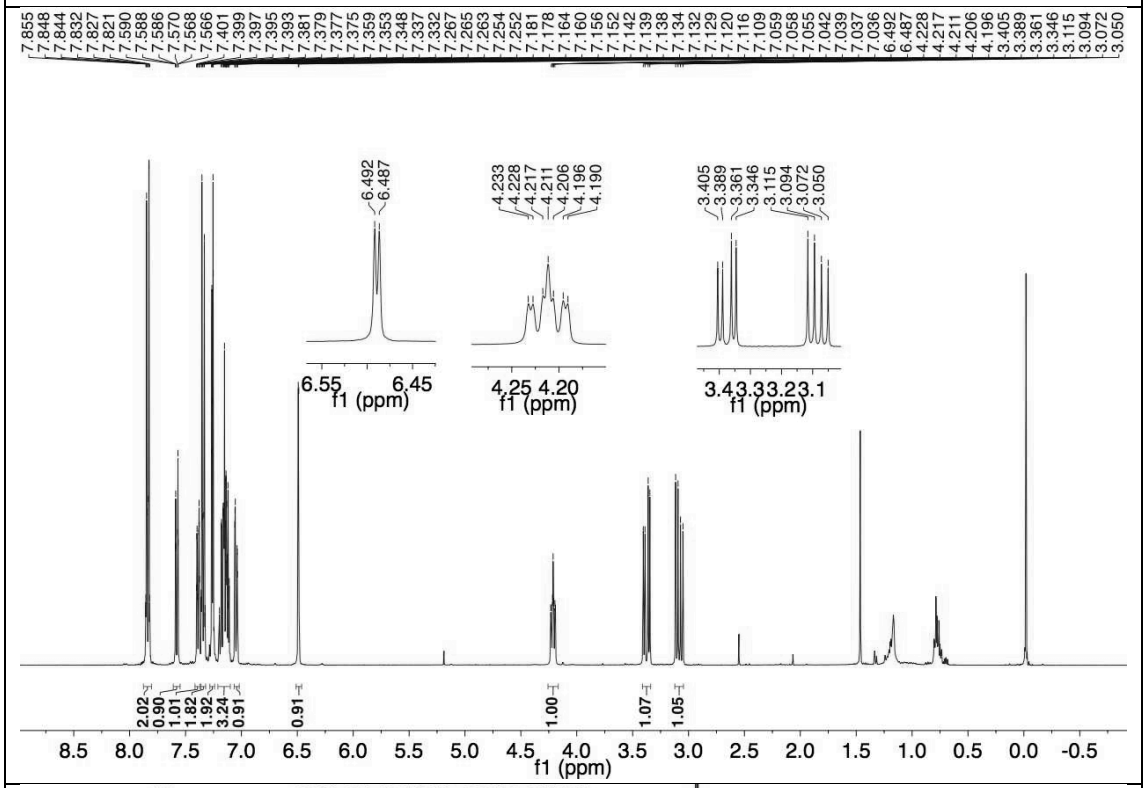
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	9.459	BB	0.2310	2.05046e4	1382.83630	49.7390
2	12.056	BB	0.2958	2.07198e4	1061.37207	50.2610

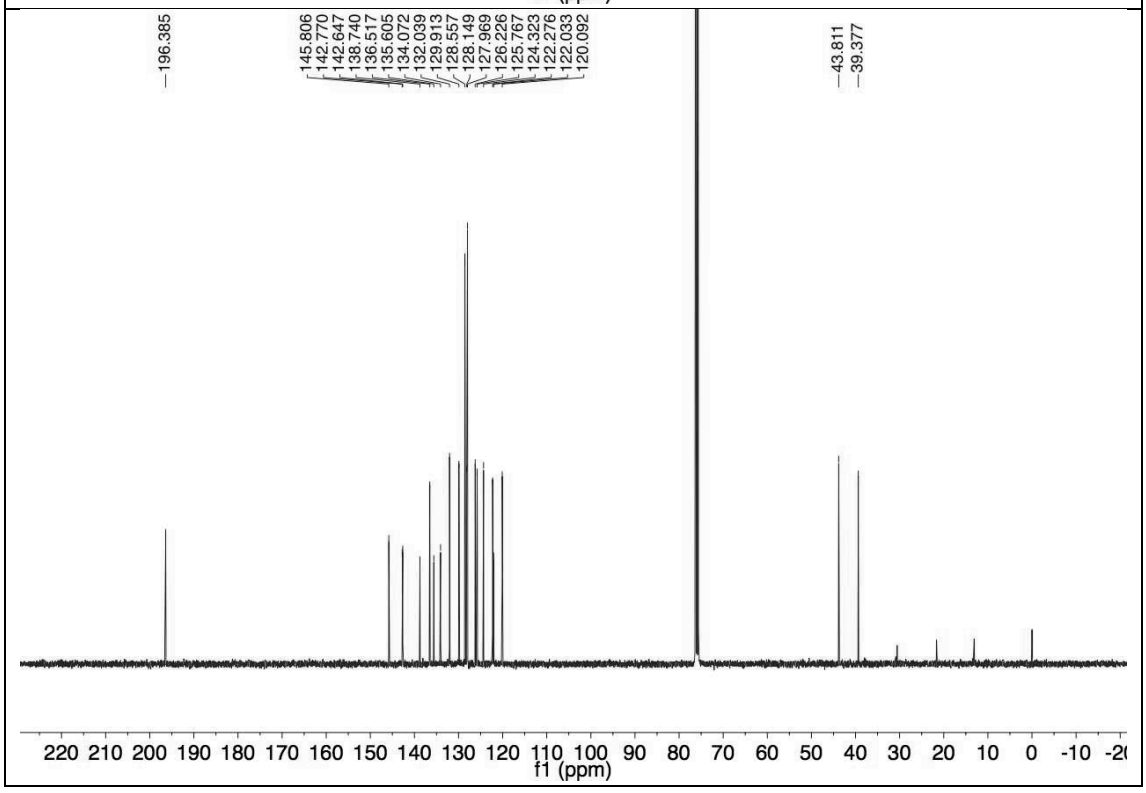


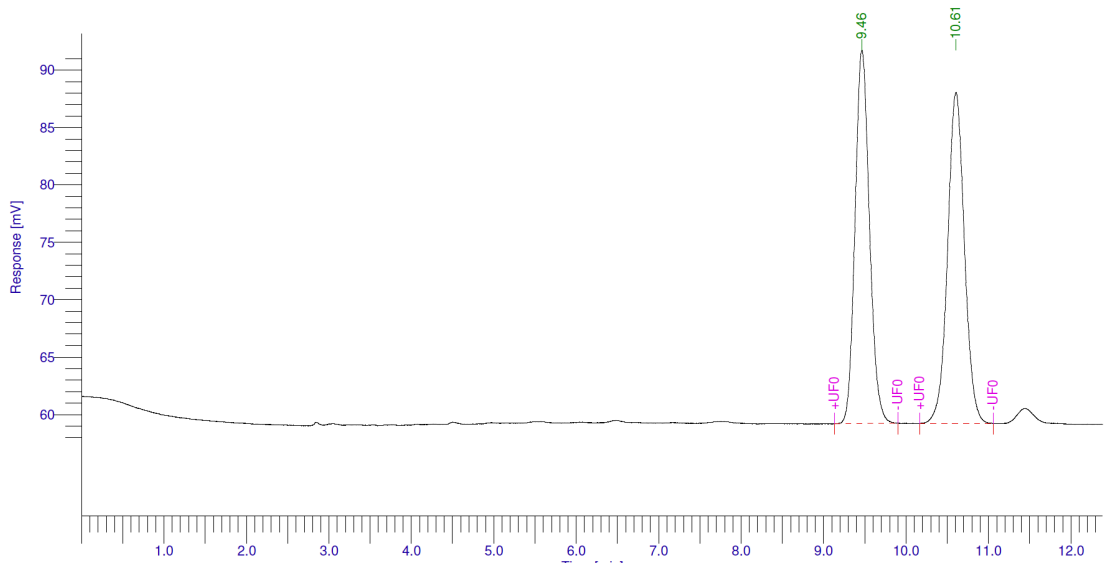
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	9.668	BB	0.2837	983.18384	55.23812	5.2369
2	12.315	BB	0.3611	1.77908e4	733.08661	94.7631

(*S*)-2-(3-(2-bromophenyl)-1H-inden-1-yl)-1-(4-chlorophenyl)ethan-1-one (6e)

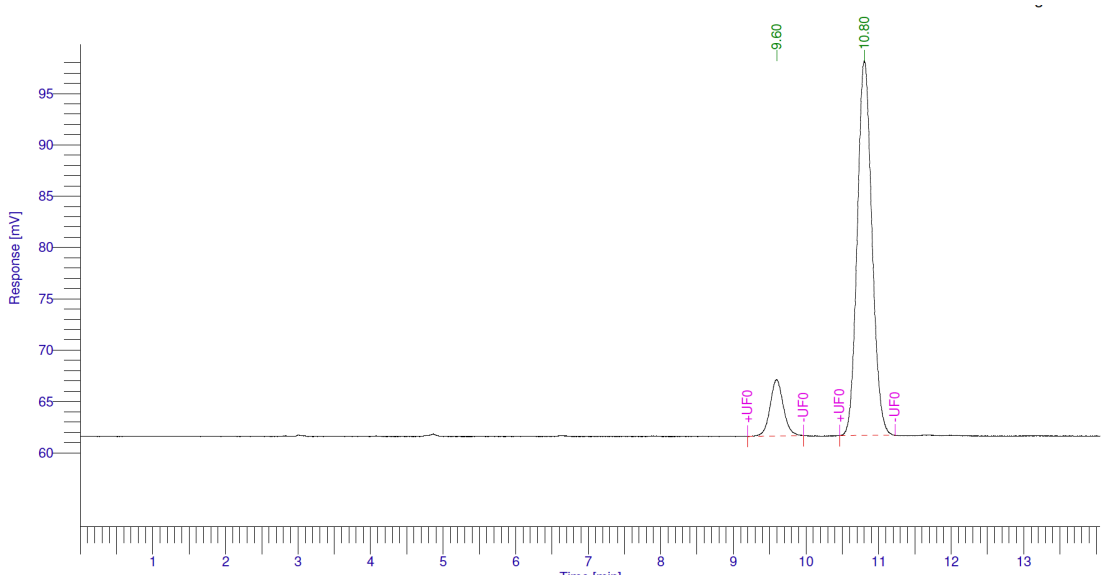






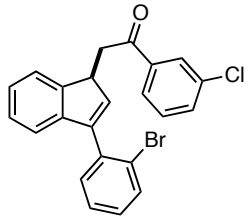


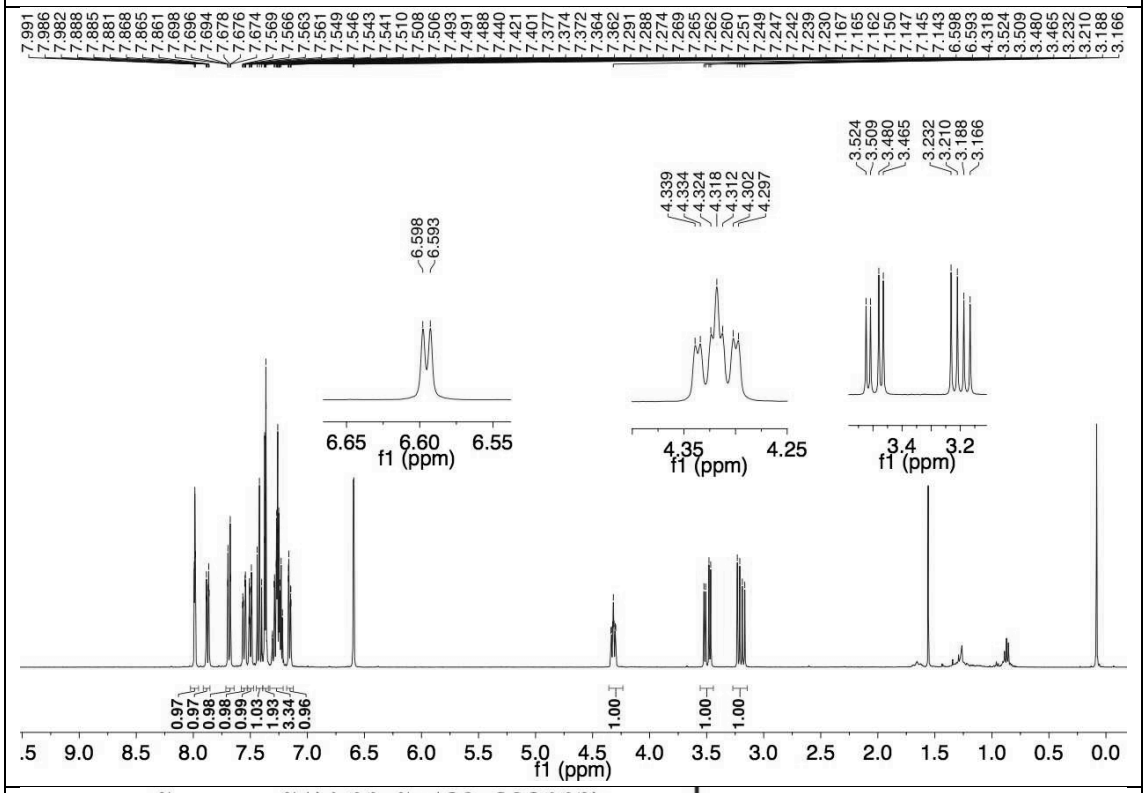
Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		9.463	395507.45	32536.26	49.06	49.06
2		10.605	410601.31	28859.30	50.94	50.94
			806108.76	61395.57	100.00	100.00

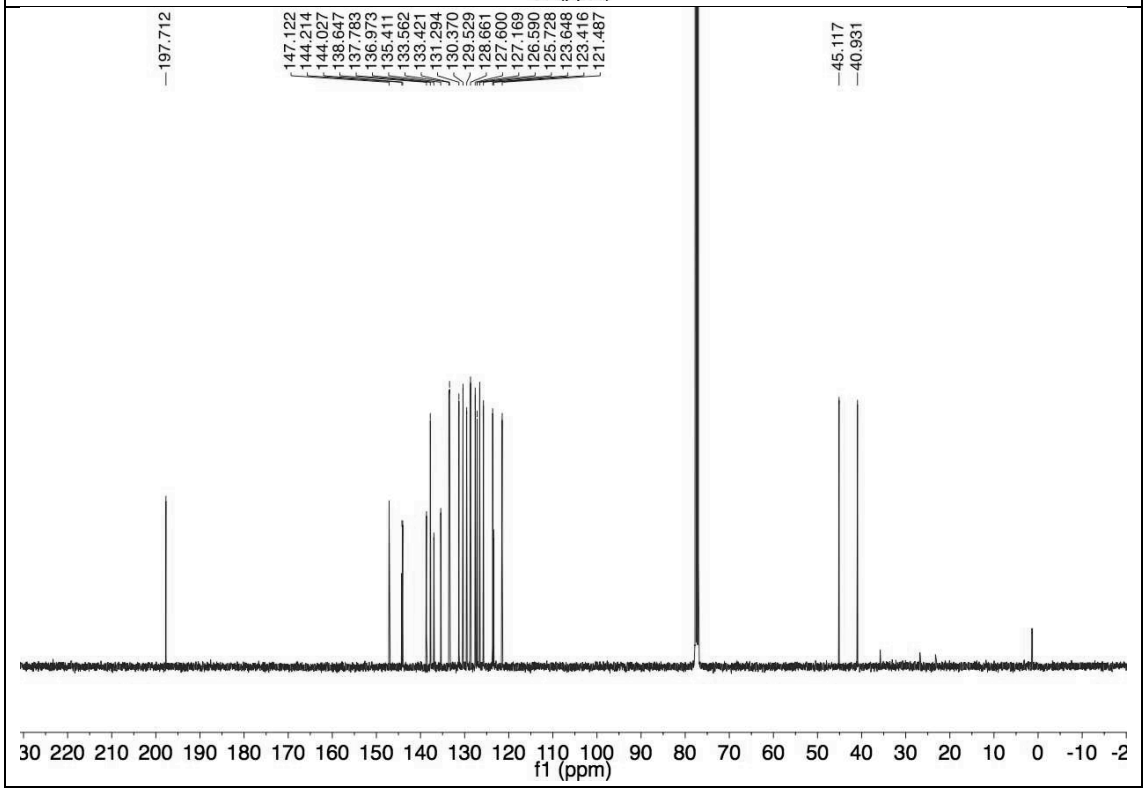


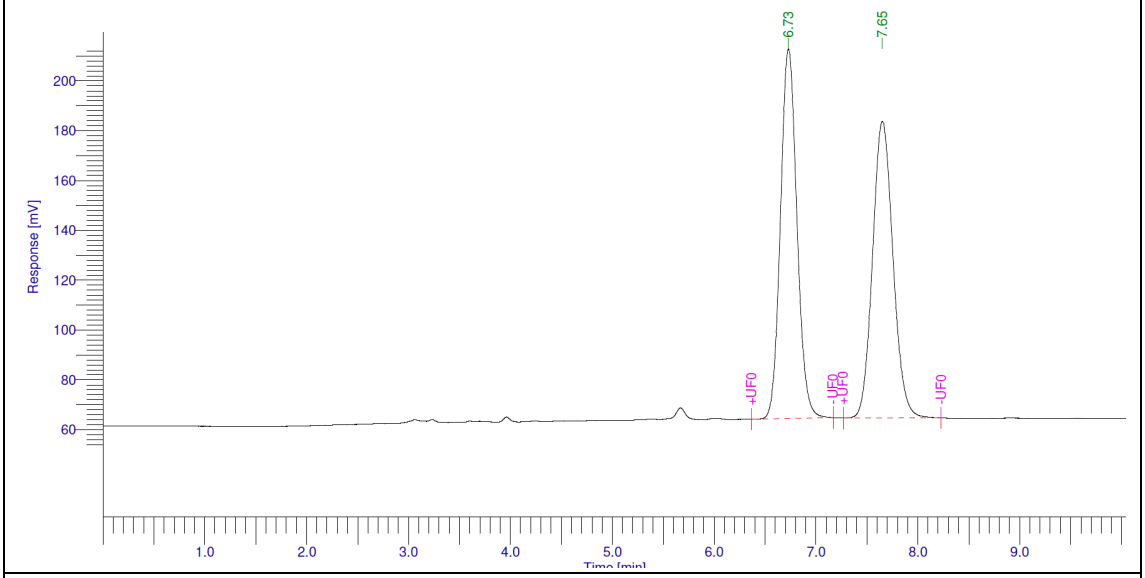
Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		9.598	69776.48	5490.33	11.98	11.98
2		10.803	512471.35	36485.10	88.02	88.02
			582247.83	41975.43	100.00	100.00

(*S*)-2-(3-(2-bromophenyl)-1*H*-inden-1-yl)-1-(3-chlorophenyl)ethan-1-one (6f)

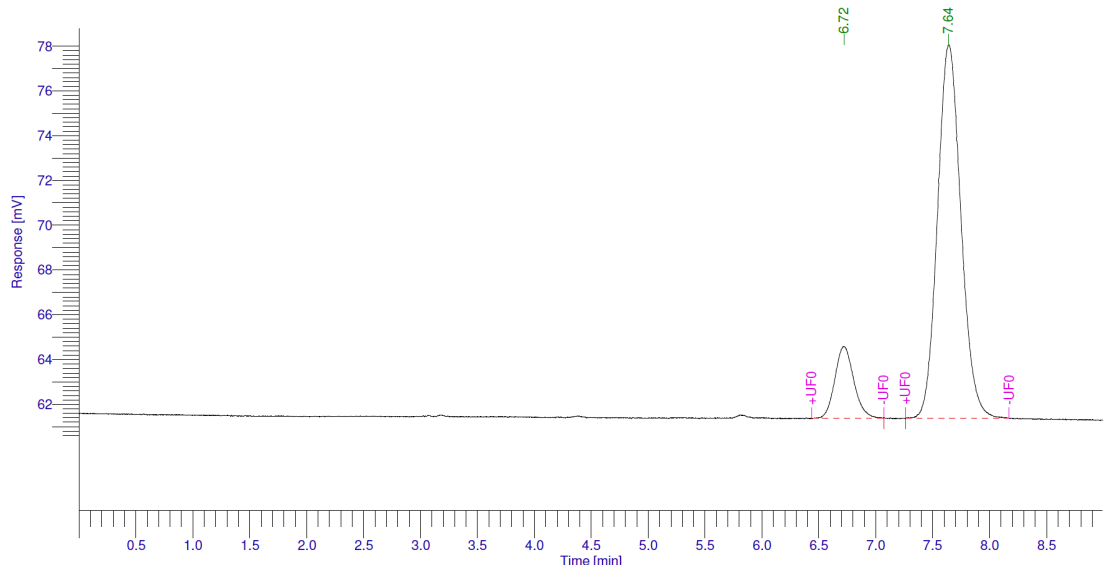






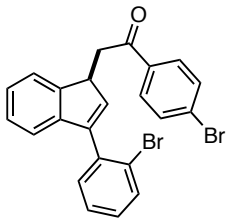


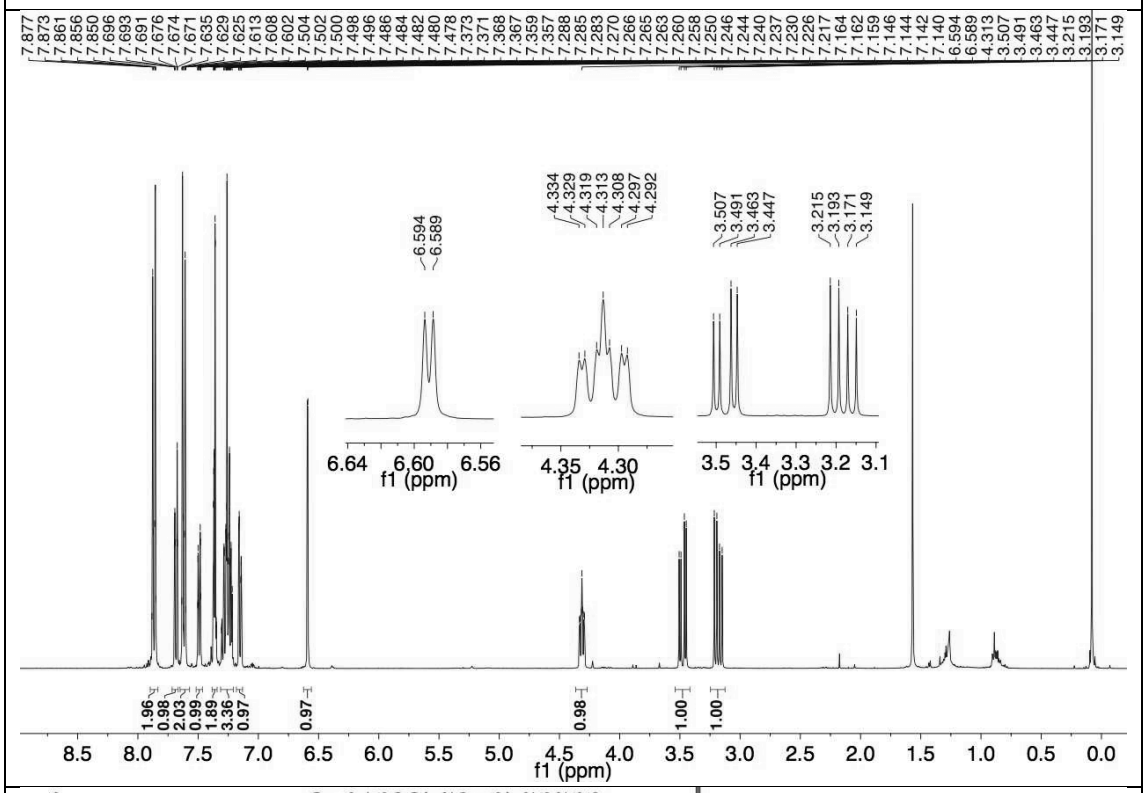
Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		6.728	1665841.95	148487.25	50.04	50.04
2		7.652	1663010.21	119089.28	49.96	49.96
			3328852.16	267576.52	100.00	100.00

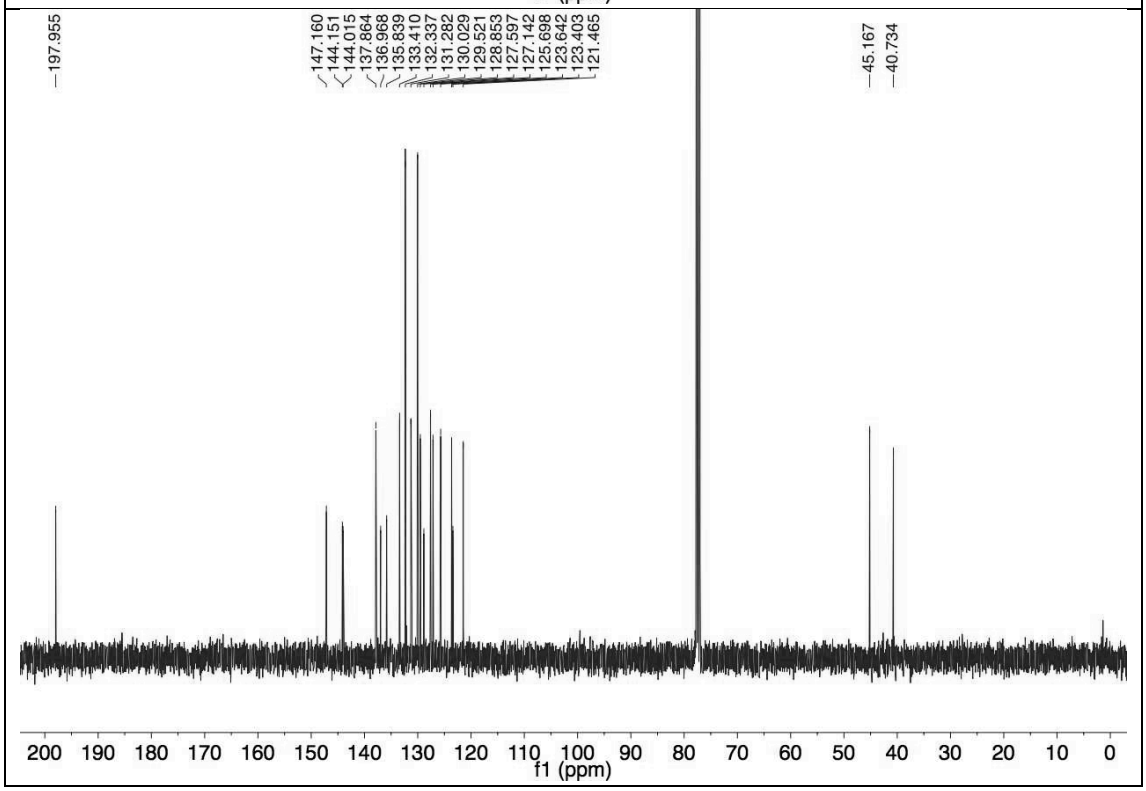


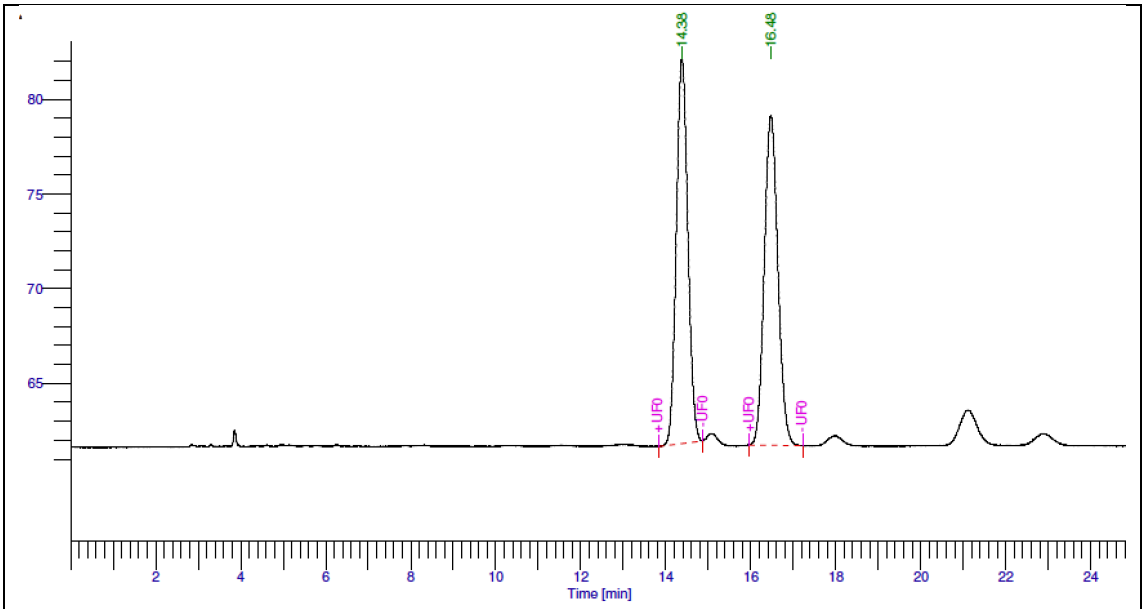
Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		6.722	36853.11	3200.69	13.34	13.34
2		7.640	239416.82	16691.42	86.66	86.66
			276269.92	19892.11	100.00	100.00

1-(4-bromophenyl)-2-(3-(2-bromophenyl)-1*H*-inden-1-yl)ethan-1-one (6g)

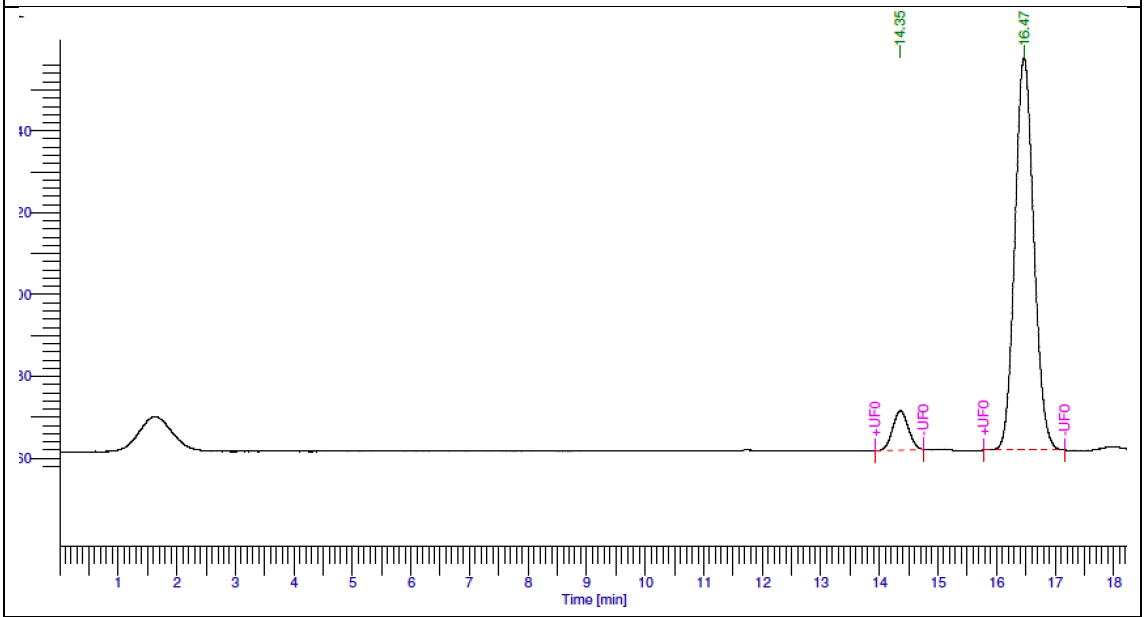






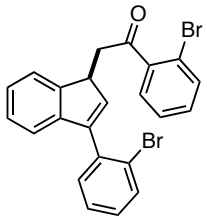


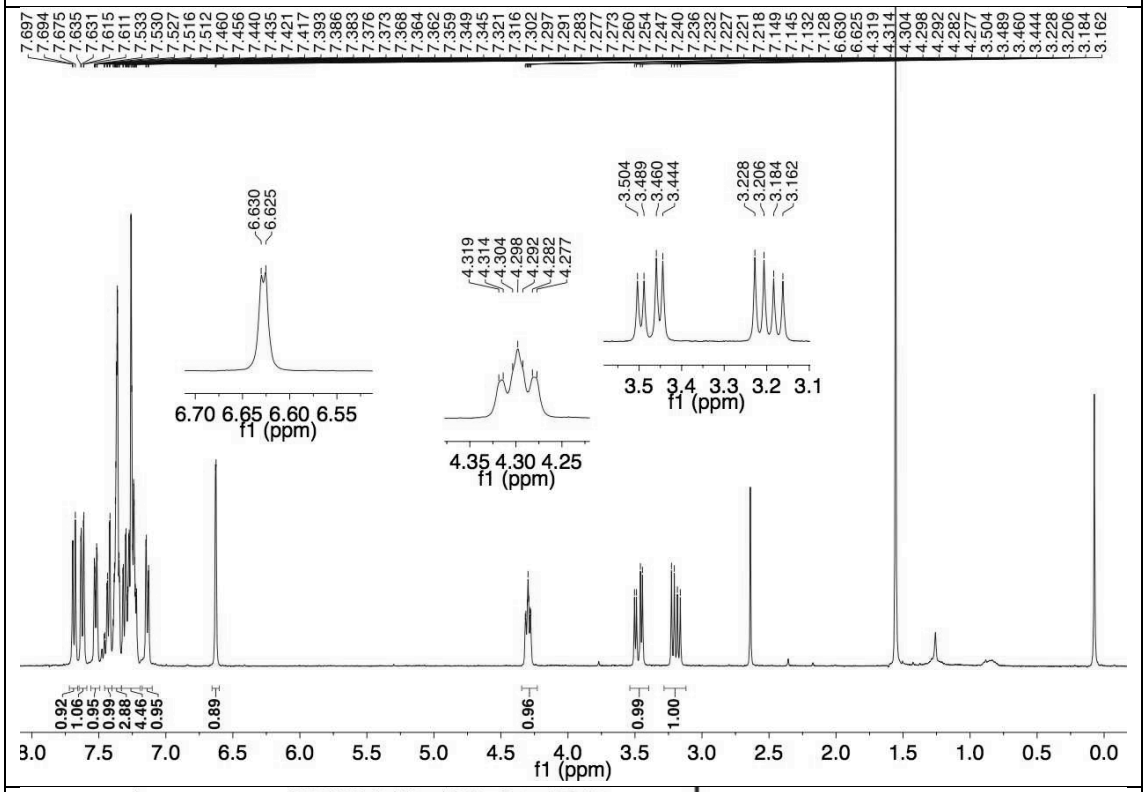
Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
14.380	382186.33	20315.65	49.66	49.66
16.477	387425.99	17431.65	50.34	50.34
	769612.32	37747.30	100.00	100.00

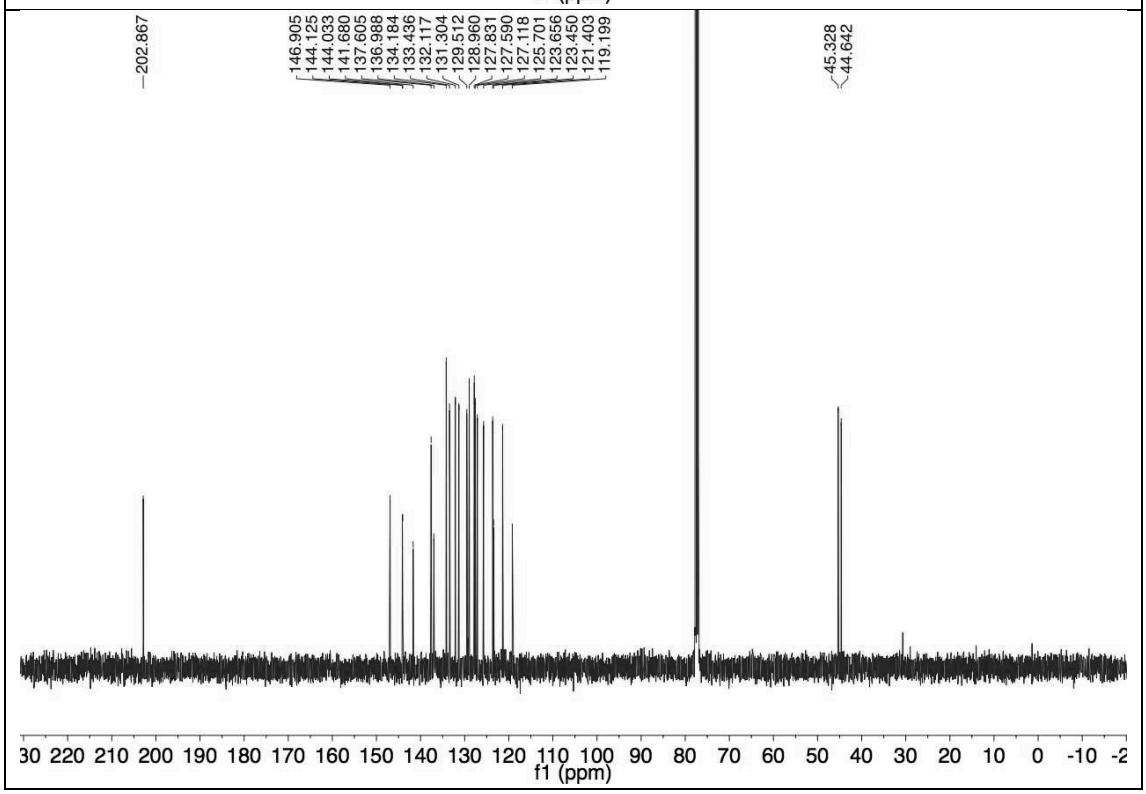


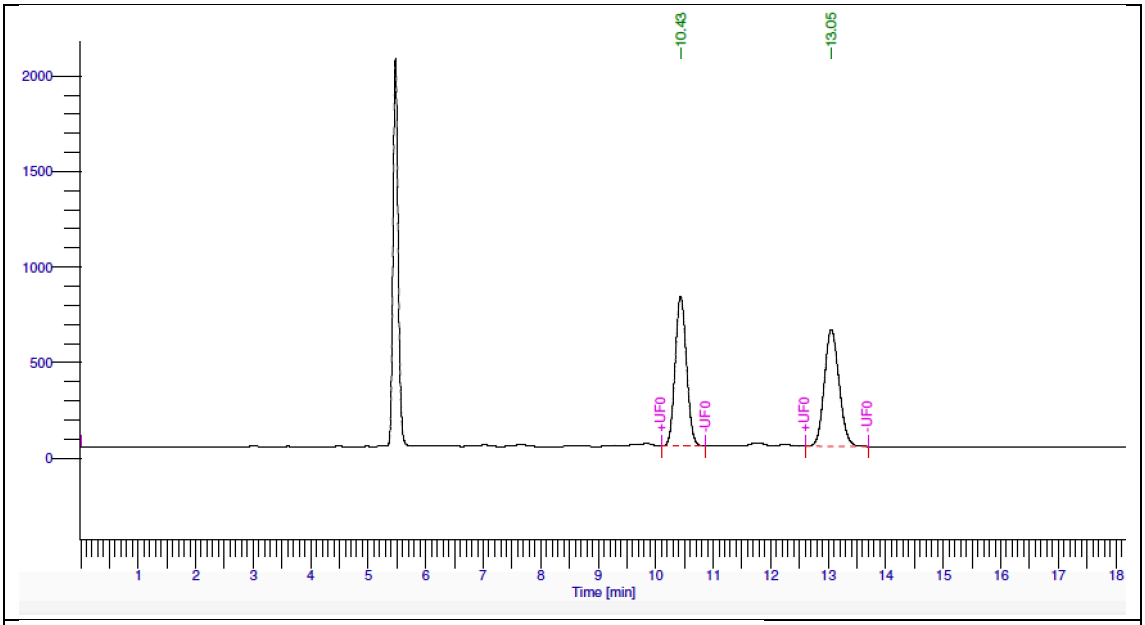
Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
14.353	179223.35	9638.04	7.68	7.68
16.467	2153264.04	95890.79	92.32	92.32
	2332487.39	105528.83	100.00	100.00

(*S*)-1-(2-Bromophenyl)-2-(3-(2-bromophenyl)-1*H*-inden-1-yl)ethan-1-one (6h)

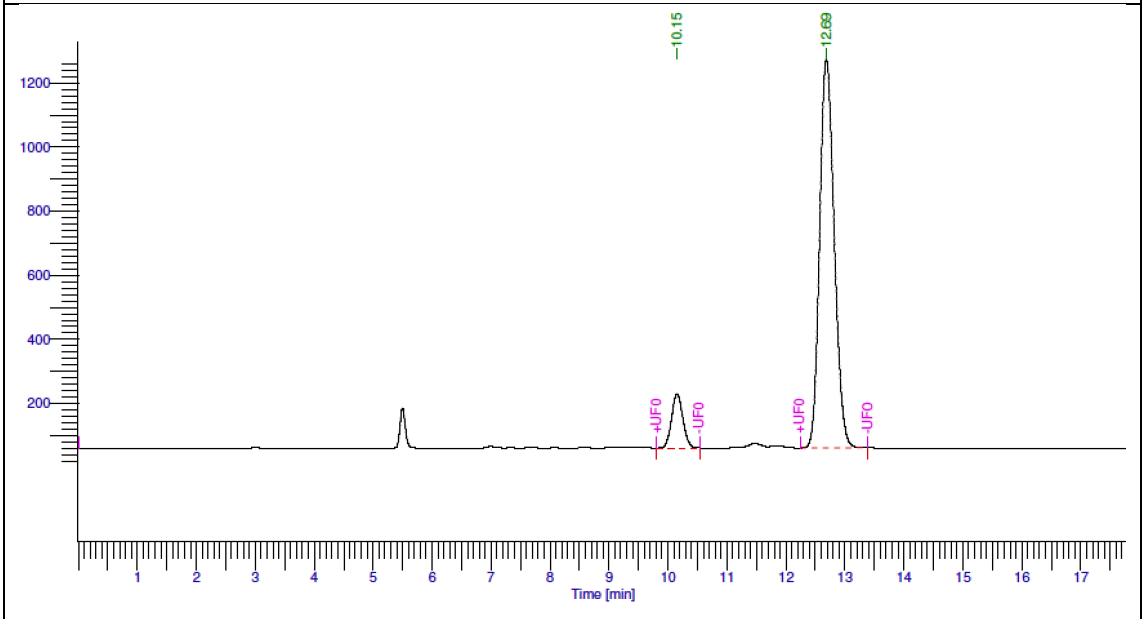






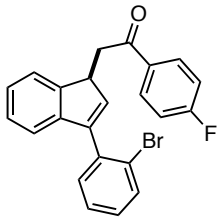


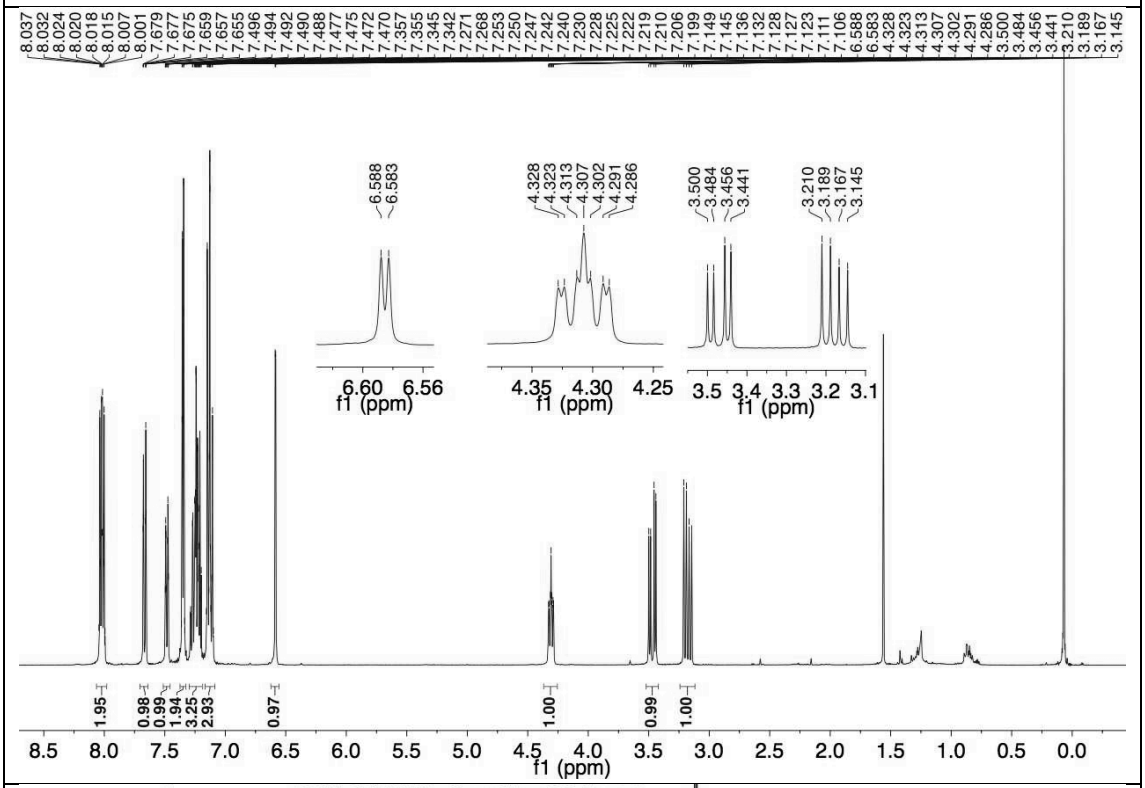
Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
10.433	10754645.86	783463.17	49.75	49.75
13.052	10860951.83	609761.46	50.25	50.25
	21615597.69	1.39e+06	100.00	100.00

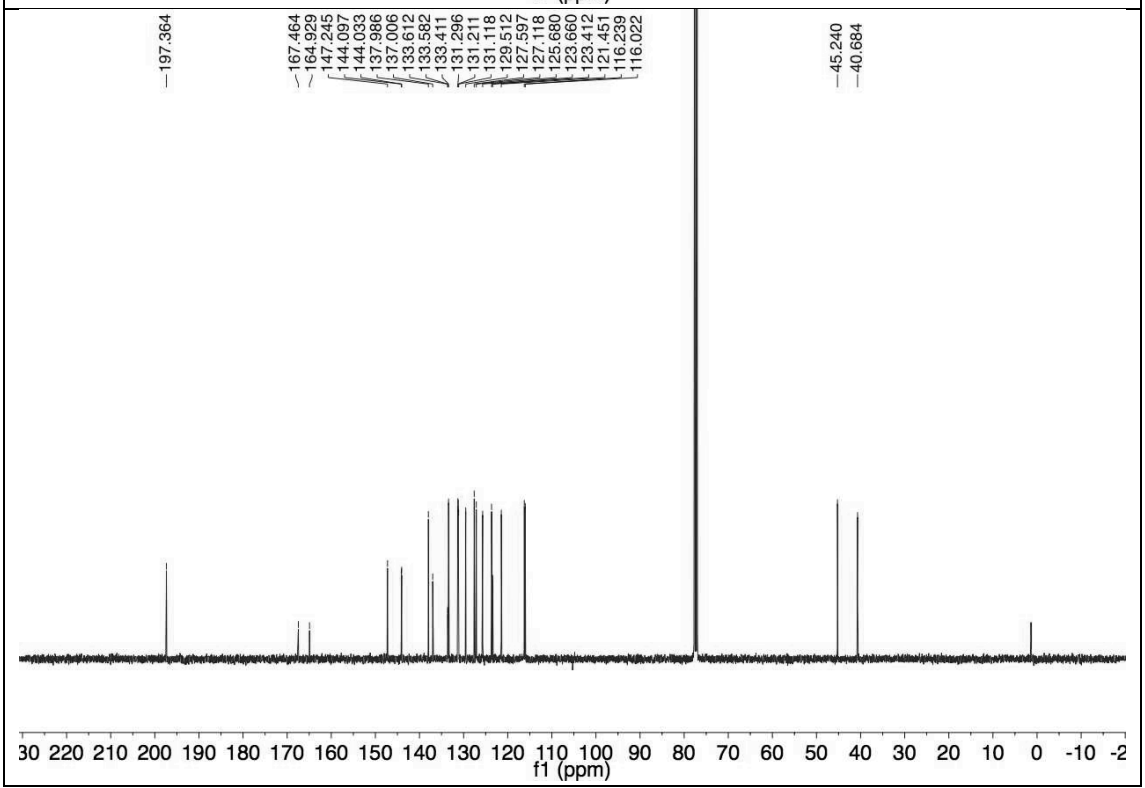


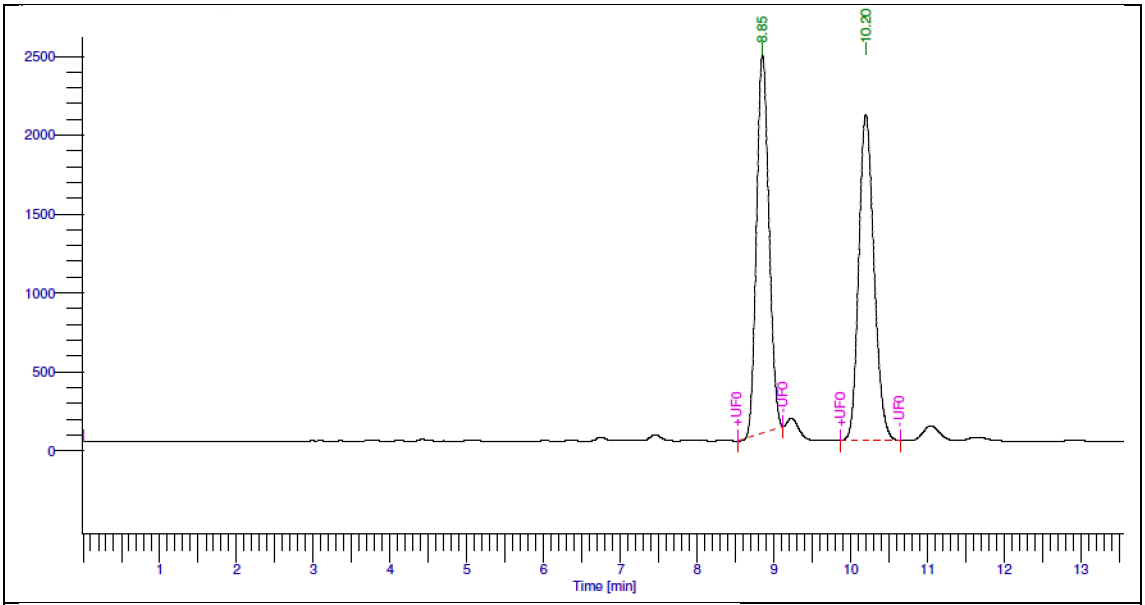
Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
10.153	2234029.59	168599.40	9.71	9.71
12.685	20767970.55	1.21e+06	90.29	90.29
	23002000.14	1.38e+06	100.00	100.00

(*S*)-2-(3-(2-Bromophenyl)-1*H*-inden-1-yl)-1-(4-fluorophenyl)ethan-1-one (6i)

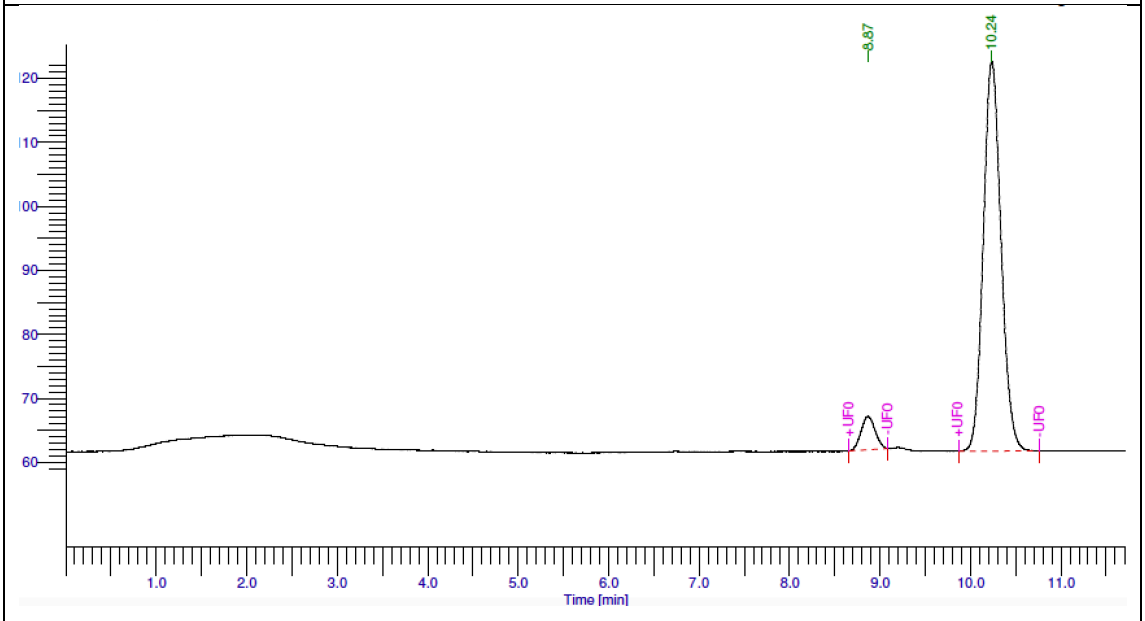






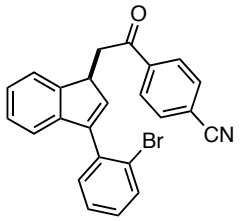


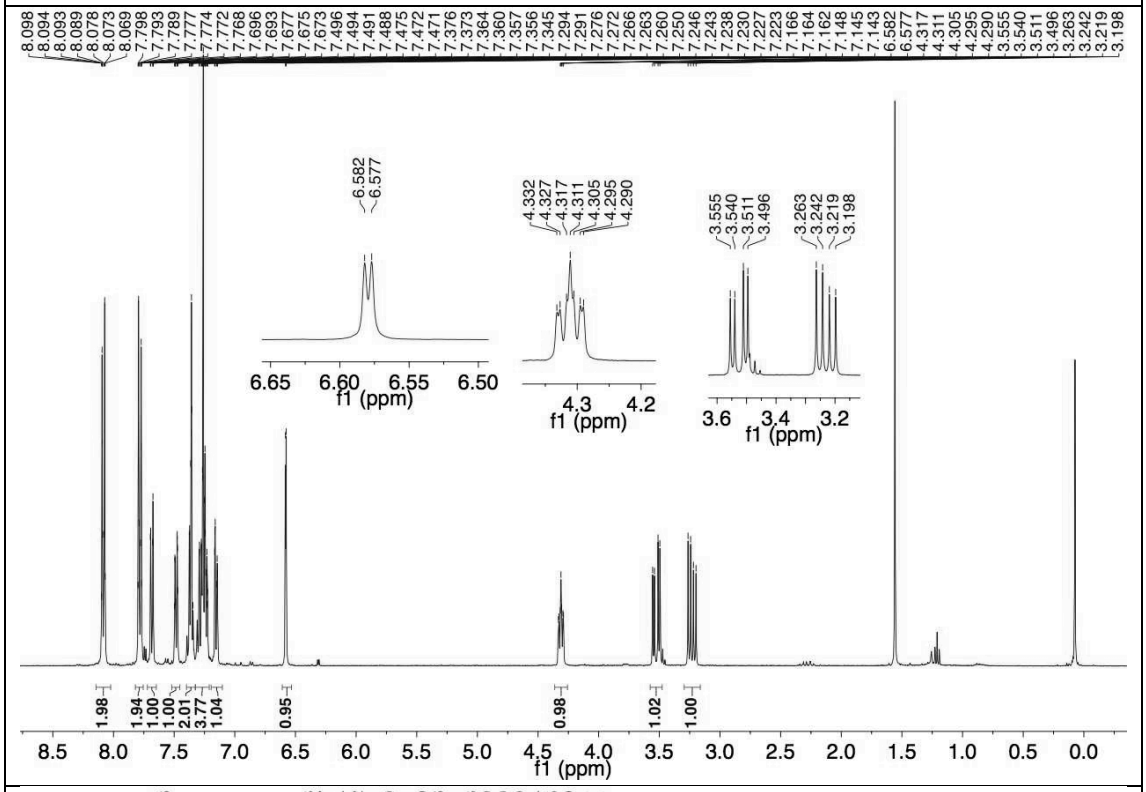
Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
8.852	26924163.22	2.40e+06	48.54	48.54
10.197	28545710.99	2.06e+06	51.46	51.46
	55469874.21	4.46e+06	100.00	100.00

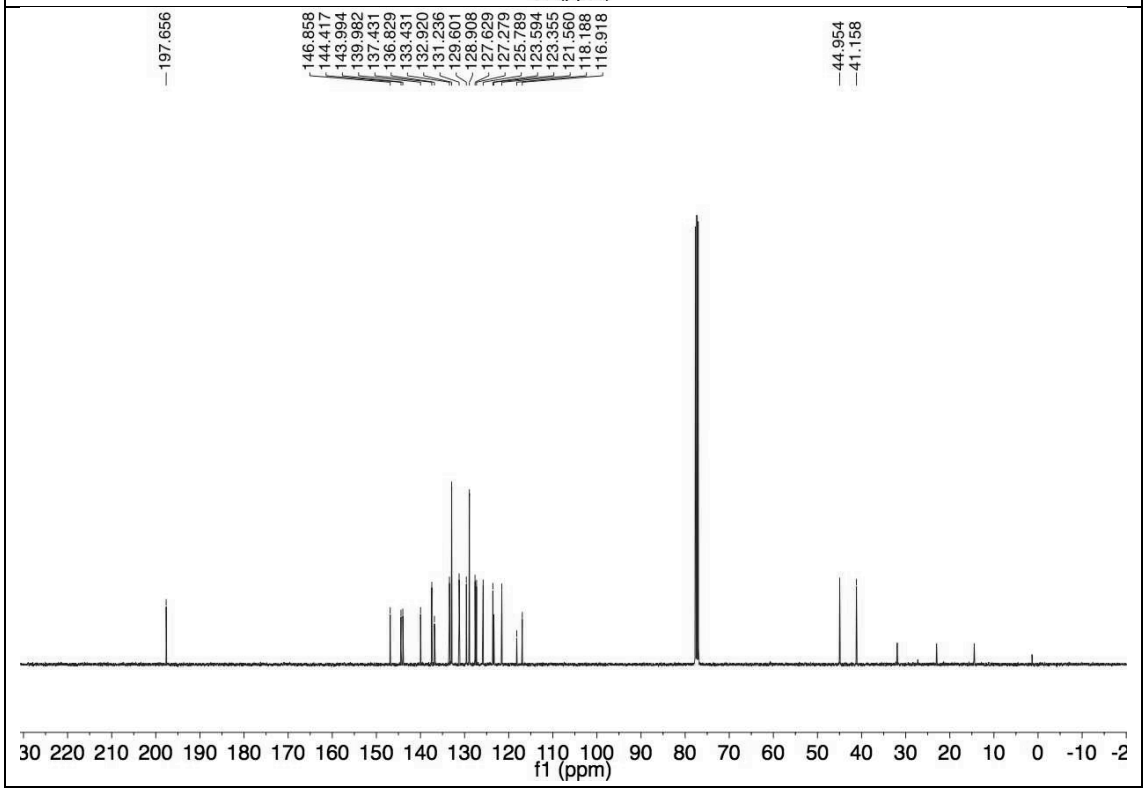


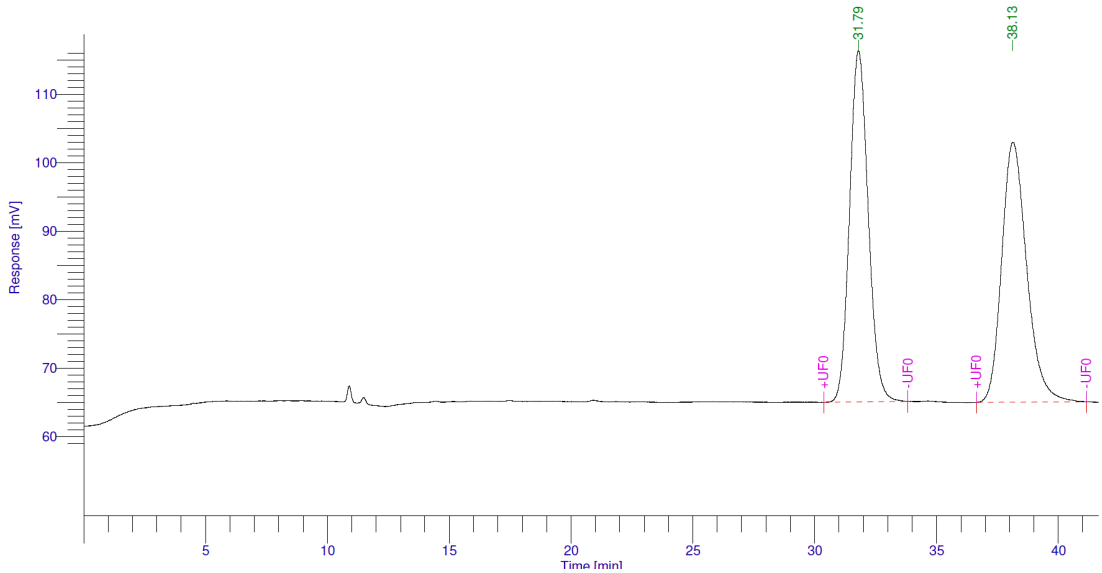
Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		8.867	56584.30	5231.41	6.37	6.37
2		10.235	831570.41	60881.11	93.63	93.63
			888154.71	66112.52	100.00	100.00

(*S*)-4-(2-(3-(2-bromophenyl)-1*H*-inden-1-yl)acetyl)benzonitrile (6j)

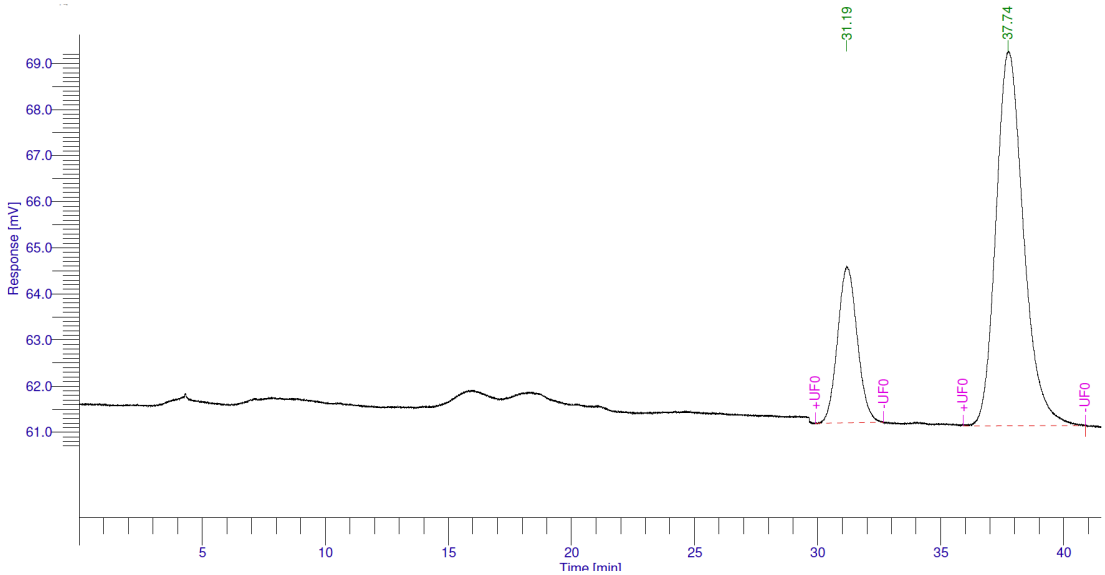






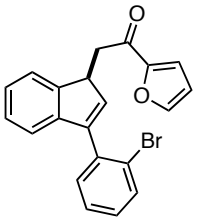


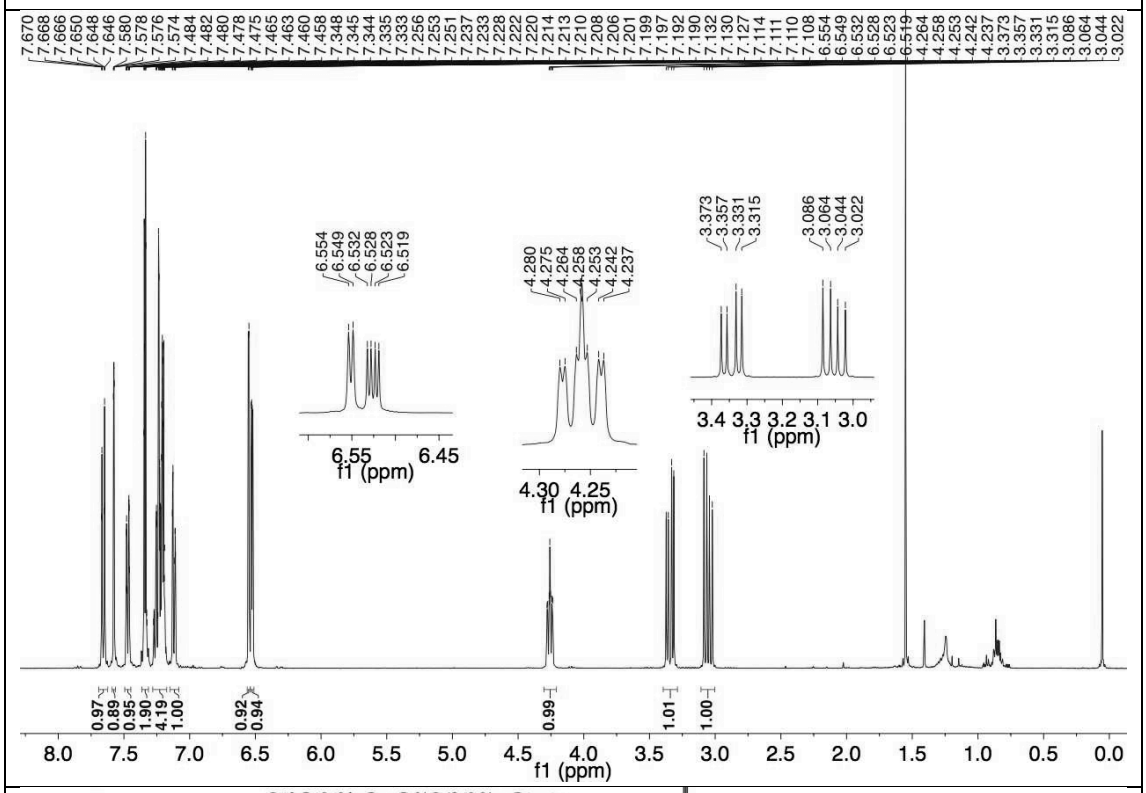
Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		31.793	2727277.84	51244.42	50.21	50.21
2		38.130	2704407.31	37921.66	49.79	49.79
			5431685.15	89166.09	100.00	100.00

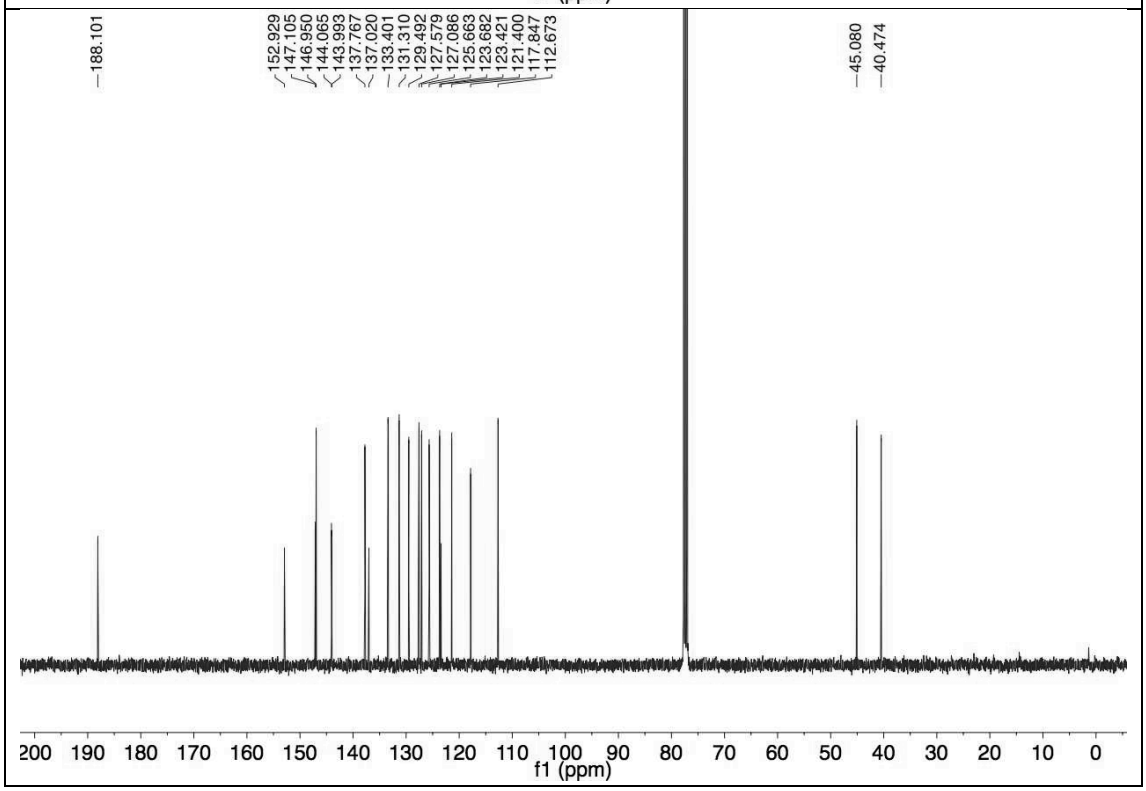


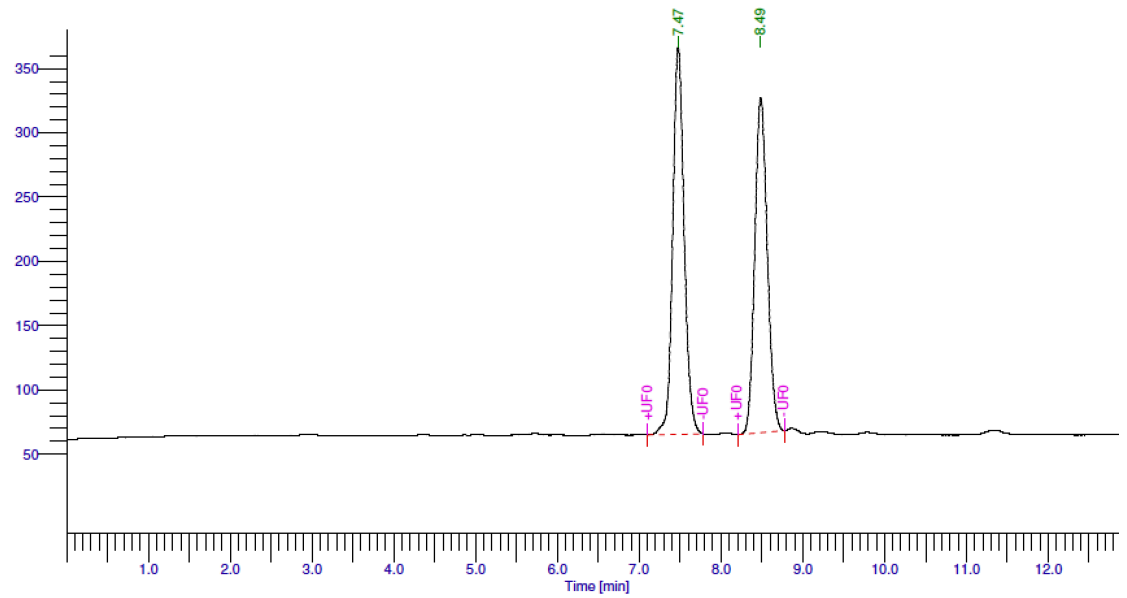
Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		31.188	187918.36	3396.49	22.84	22.84
2		37.743	634719.08	8129.46	77.16	77.16
			822637.44	11525.95	100.00	100.00

(*S*)-2-(3-(2-Bromophenyl)-1*H*-inden-1-yl)-1-(furan-2-yl)ethan-1-one (6k)

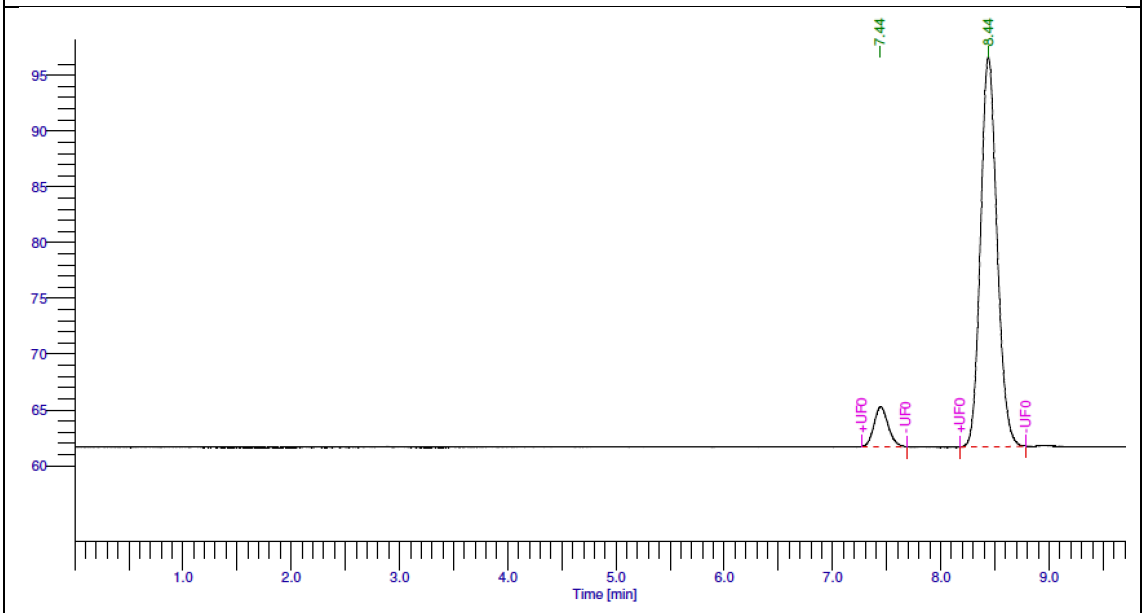






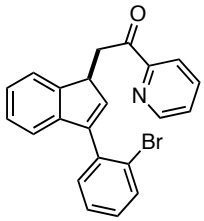


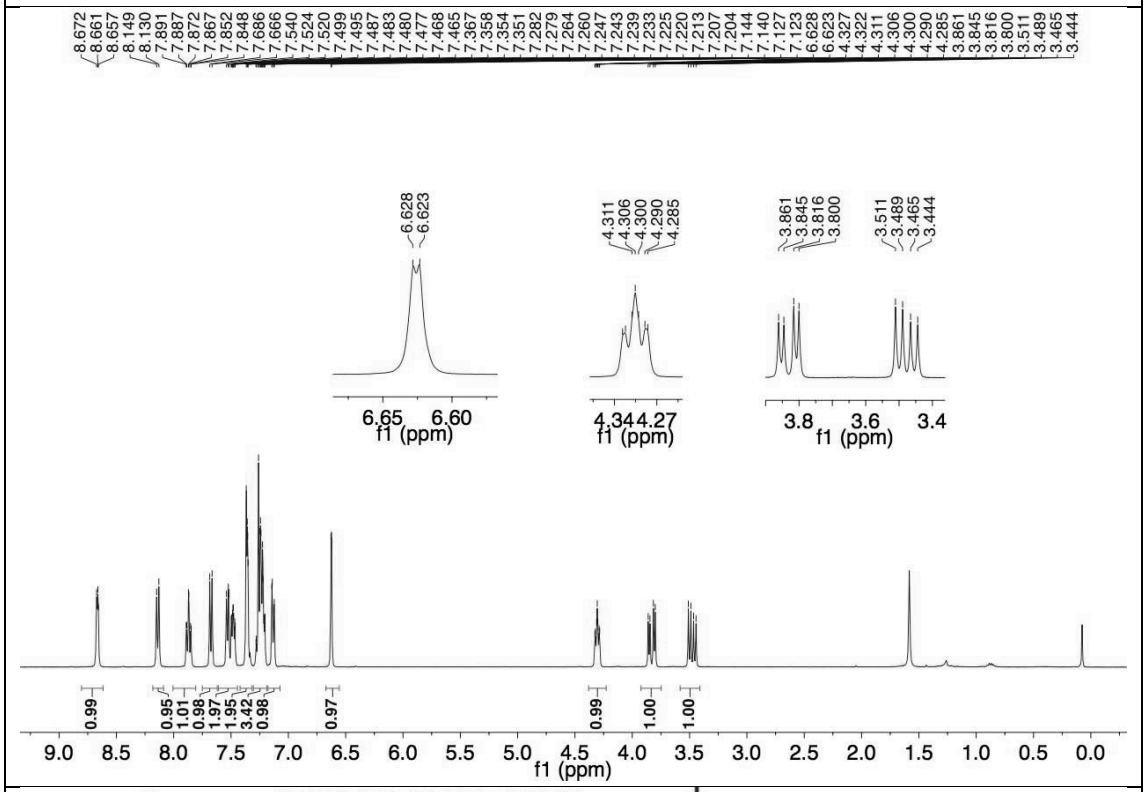
Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
7.475	2919445.64	301176.81	51.36	51.36
8.485	2764461.72	260587.02	48.64	48.64
	5683907.36	561763.82	100.00	100.00

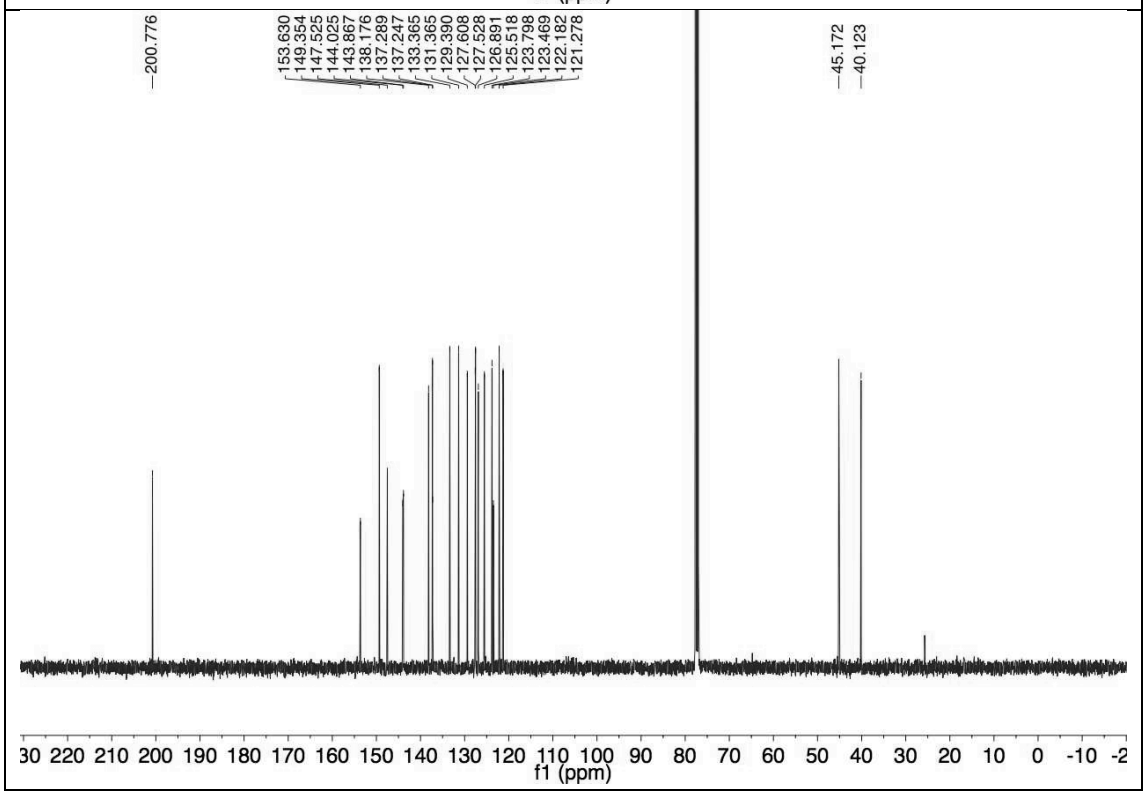


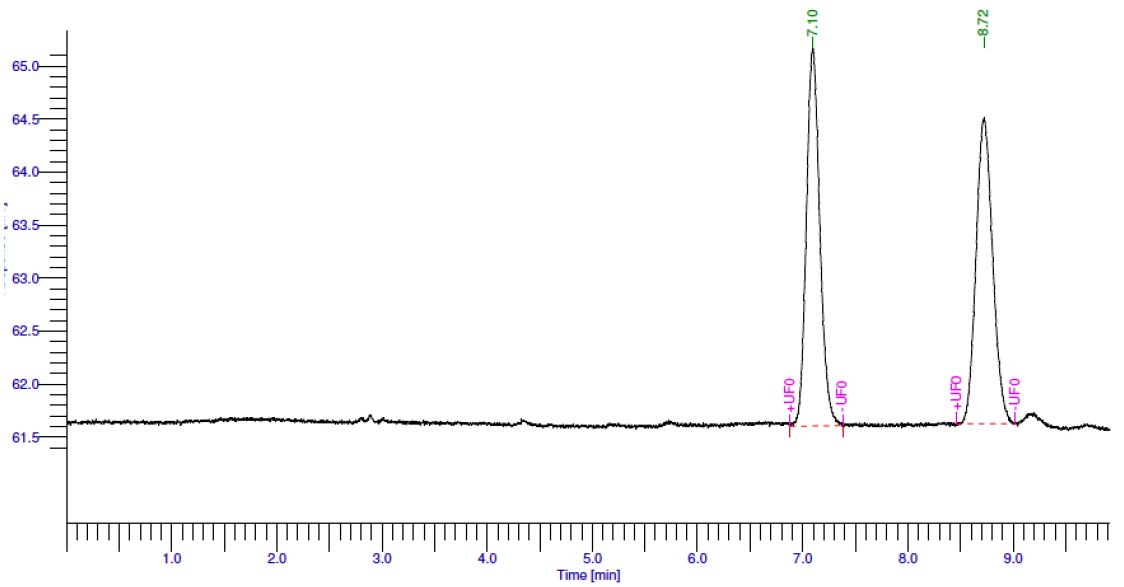
Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
7.442	32754.46	3587.98	8.12	8.12
8.438	370448.08	34924.61	91.88	91.88
	403202.54	38512.58	100.00	100.00

(*S*)-2-(3-(2-Bromophenyl)-1*H*-inden-1-yl)-1-(pyridin-2-yl)ethan-1-one (6l)

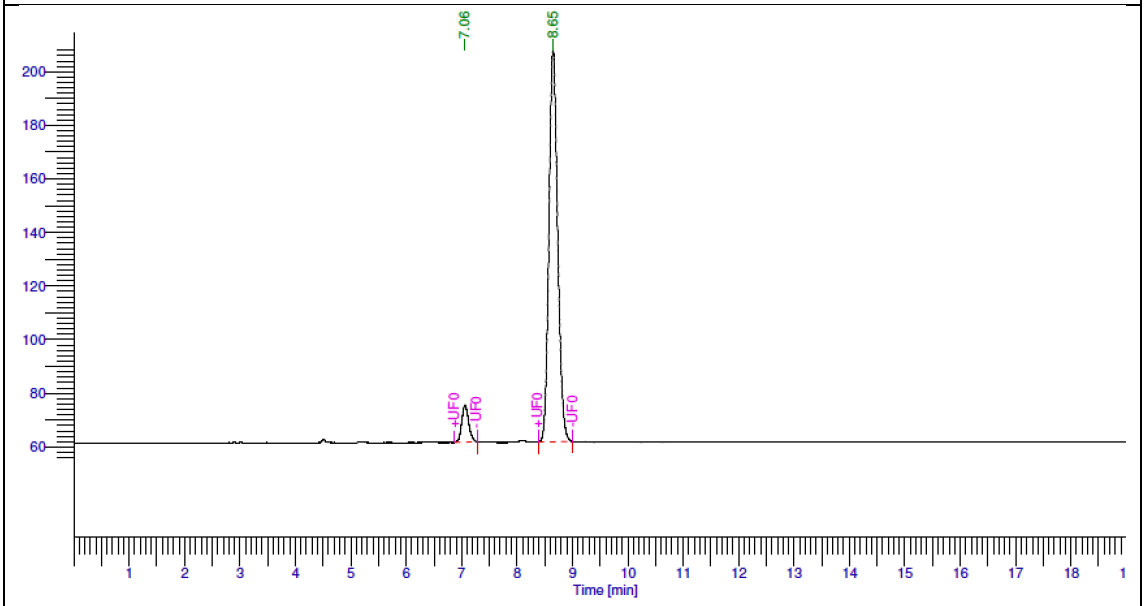






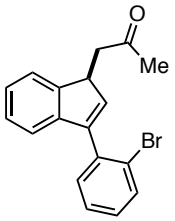


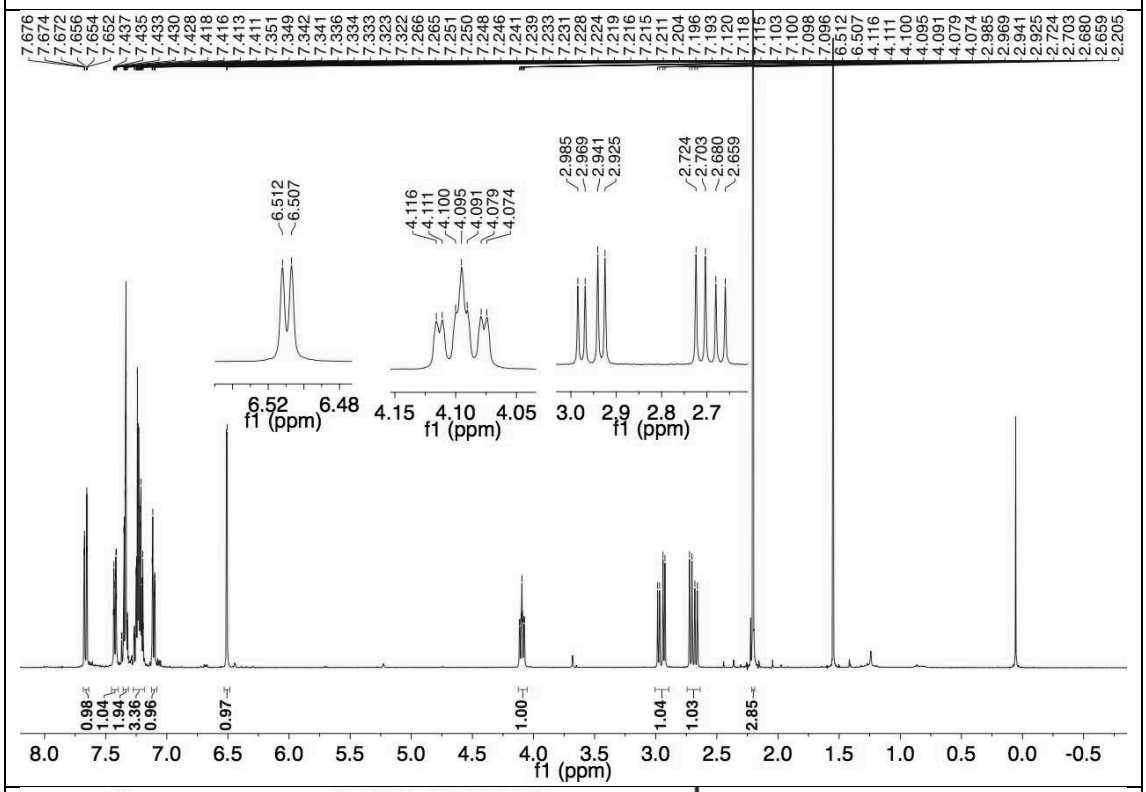
Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
7.097	31754.61	3570.16	50.03	50.03
8.723	31720.32	2883.38	49.97	49.97
	63474.94	6453.53	100.00	100.00

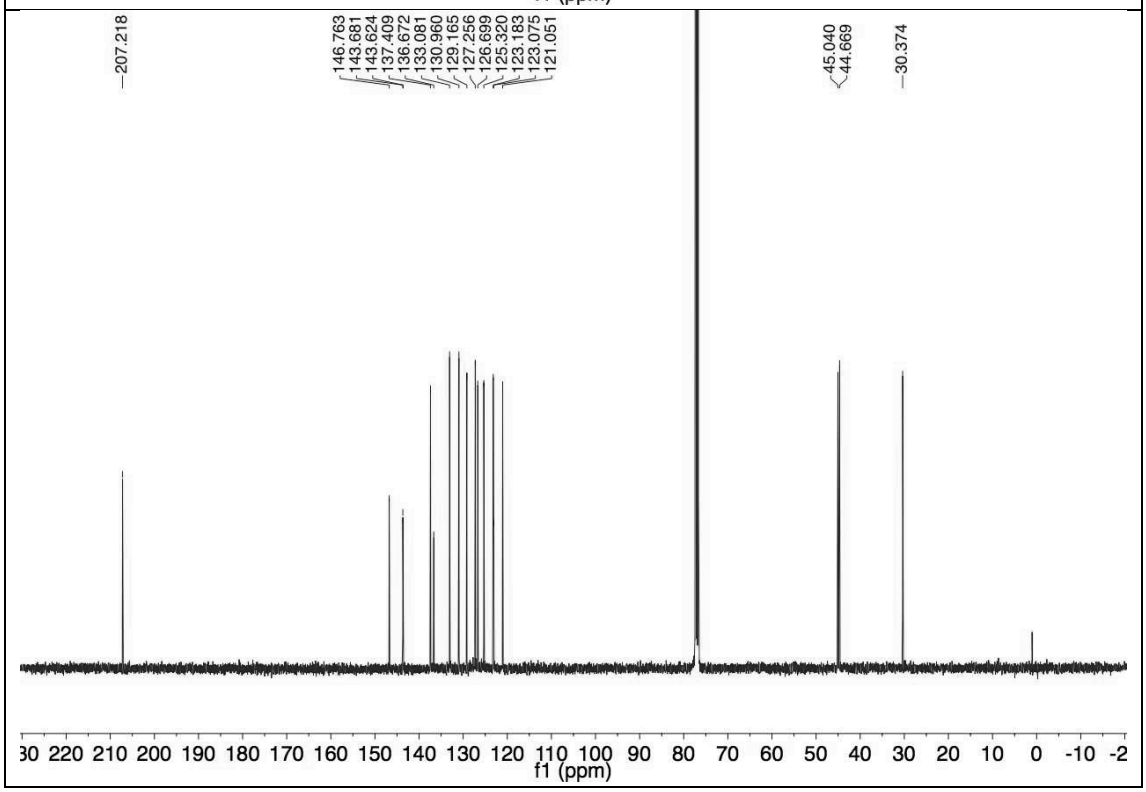


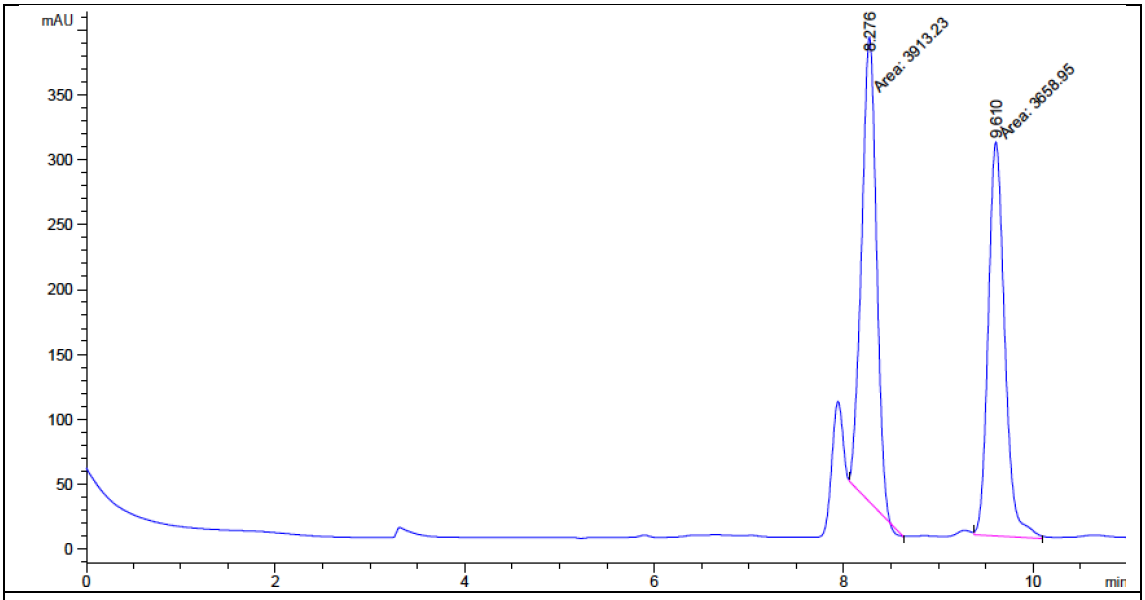
Time [min]	Area [uV*sec]	Height [uV]	Area [%]
7.062	119715.61	13862.78	6.95
8.652	1602001.55	146008.02	93.05
	1721717.15	159870.80	100.00

(*S*)-1-(3-(2-Bromophenyl)-1*H*-inden-1-yl)propan-2-one (6m)

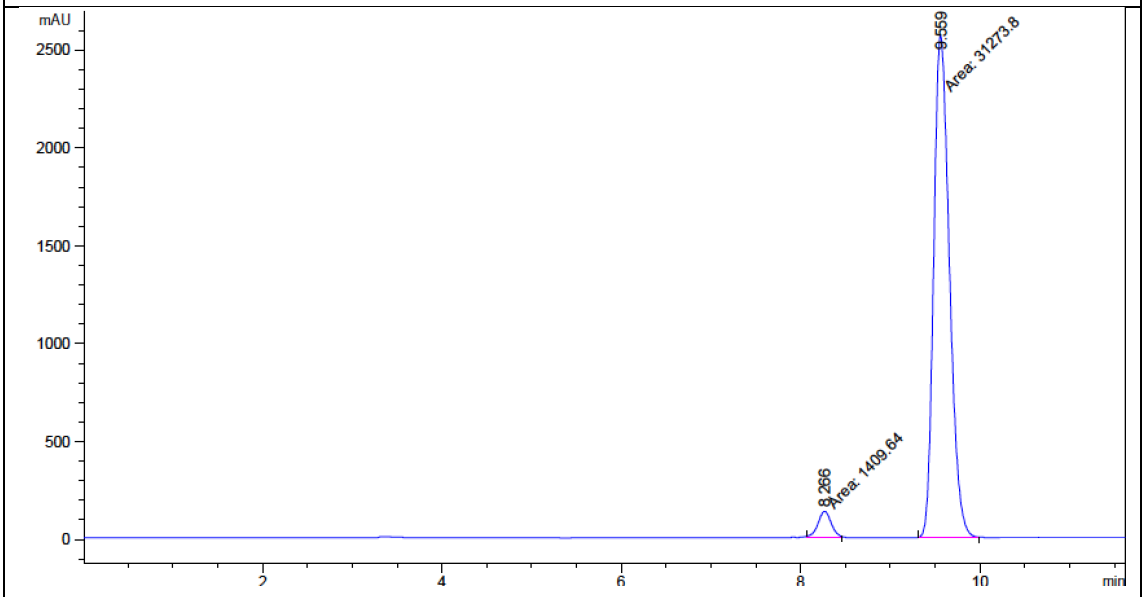






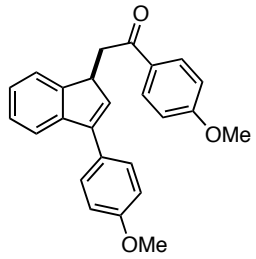


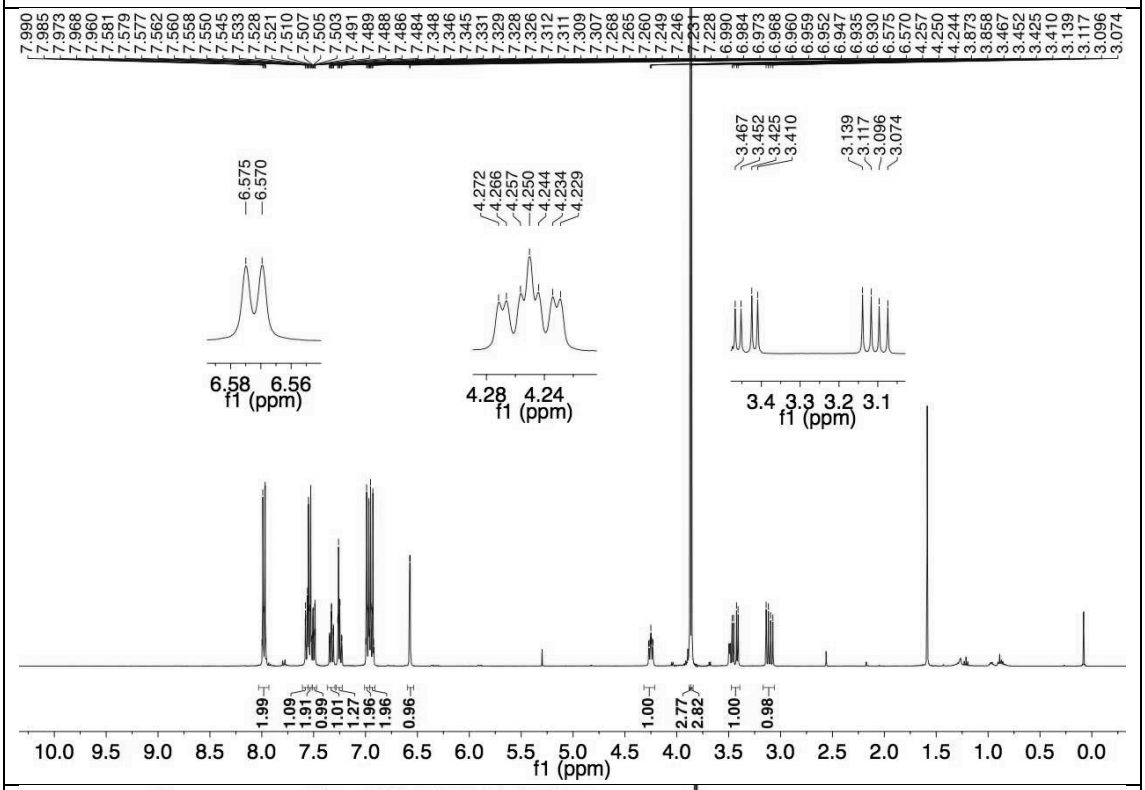
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	8.276	MM	0.1821	3913.22949	358.14429	51.6790
2	9.610	MM	0.2010	3658.95068	303.46652	48.3210

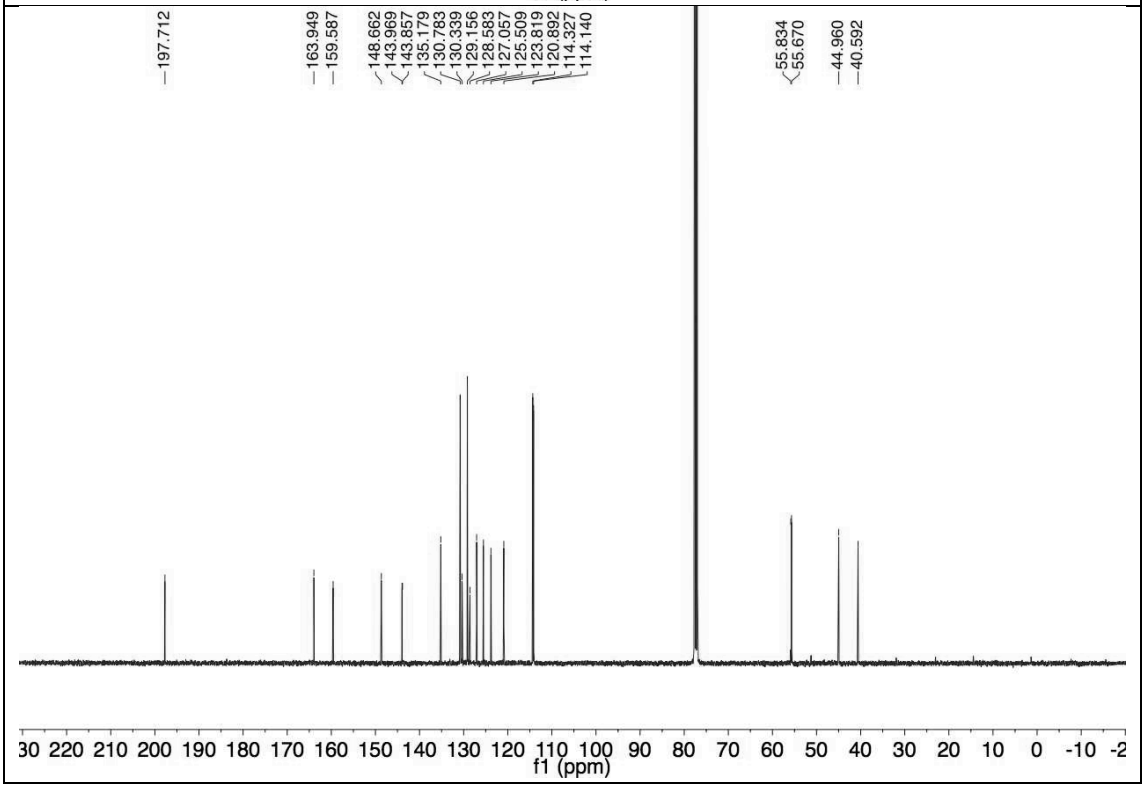


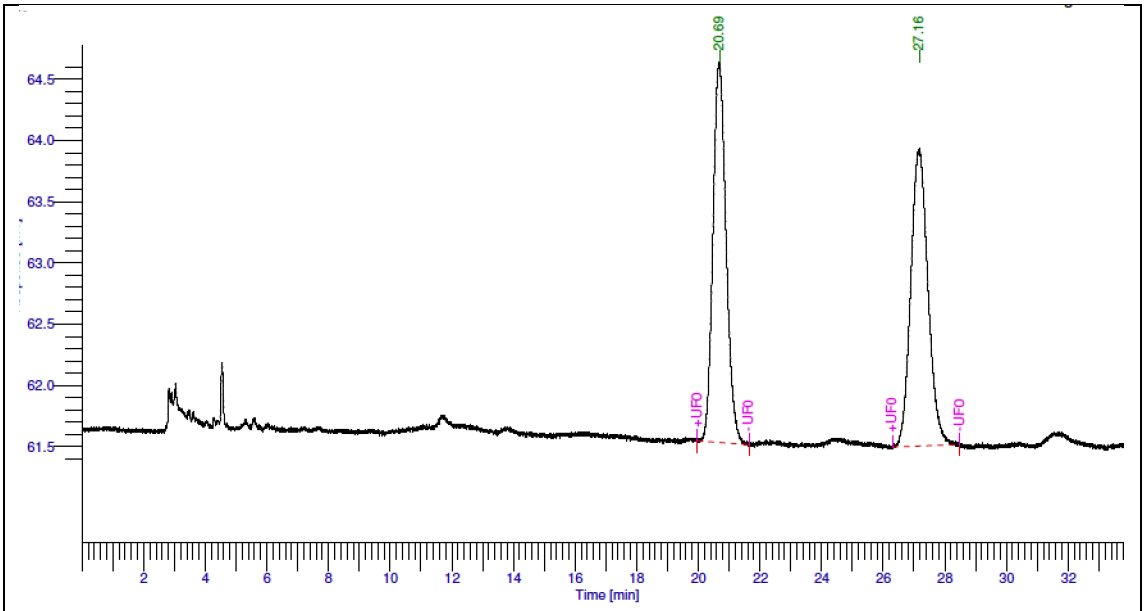
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	8.266	MM	0.1743	1409.64270	134.82944	4.3130
2	9.559	MM	0.2033	3.12738e4	2563.41016	95.6870

(*S*)-1-(4-Methoxyphenyl)-2-(3-(4-methoxyphenyl)-1*H*-inden-1-yl)ethan-1-one (6n)

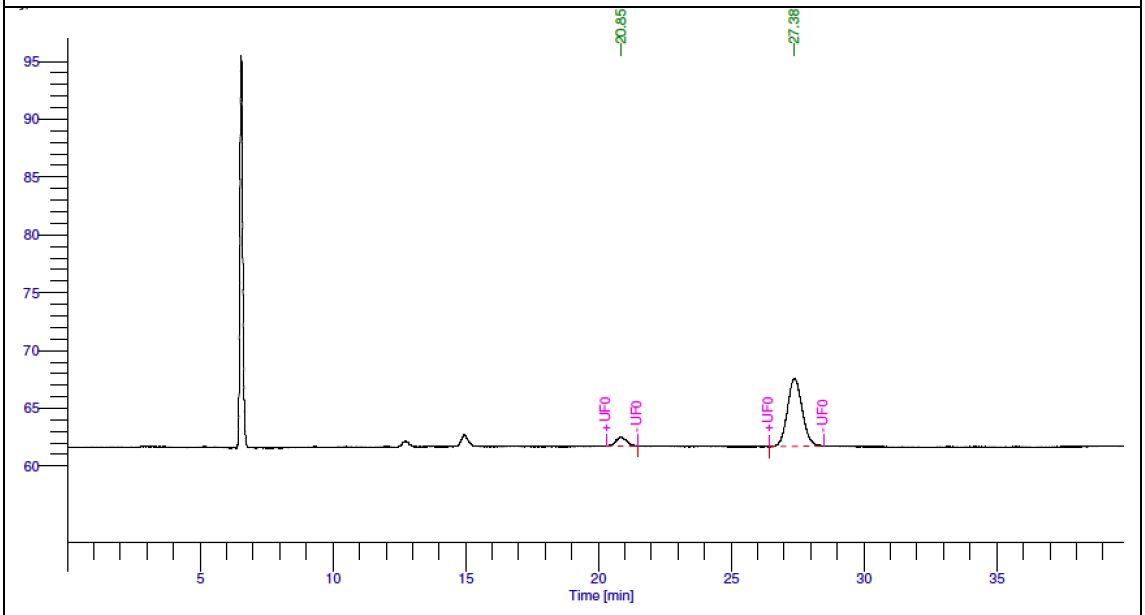






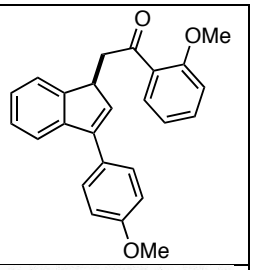


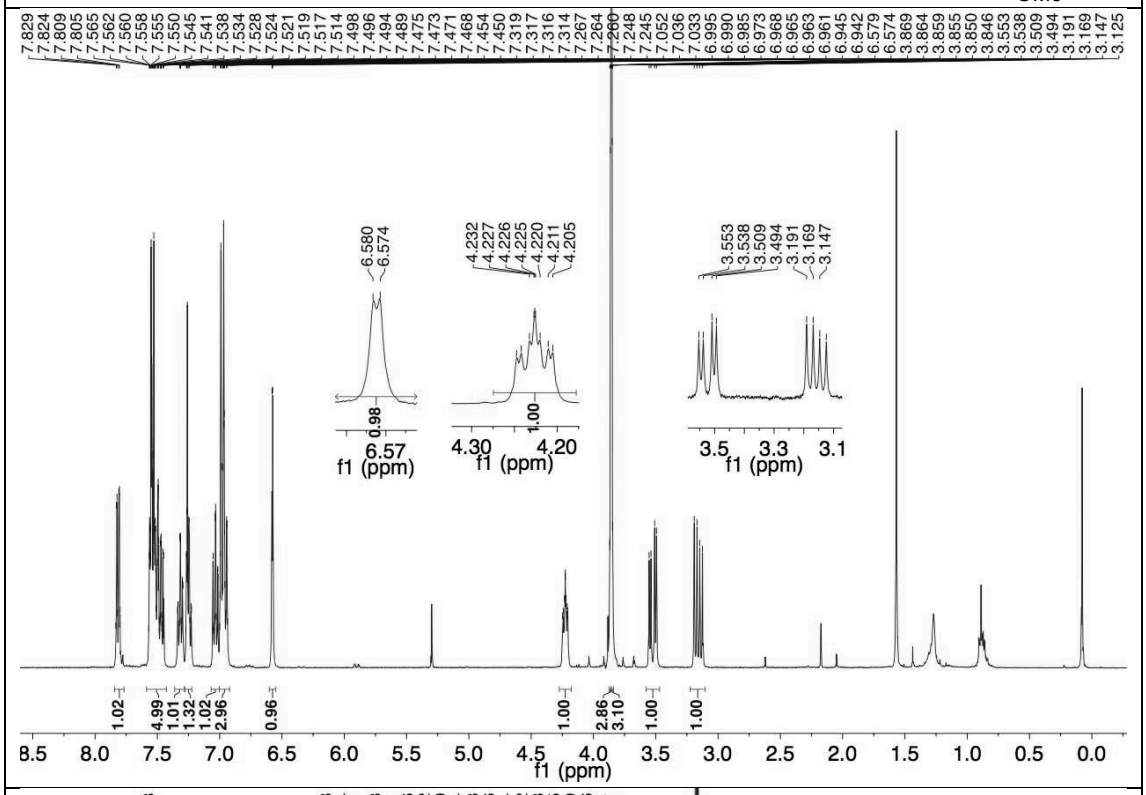
Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
20.687	91809.32	3102.50	49.44	49.44
27.163	93892.07	2427.73	50.56	50.56
	185701.39	5530.22	100.00	100.00

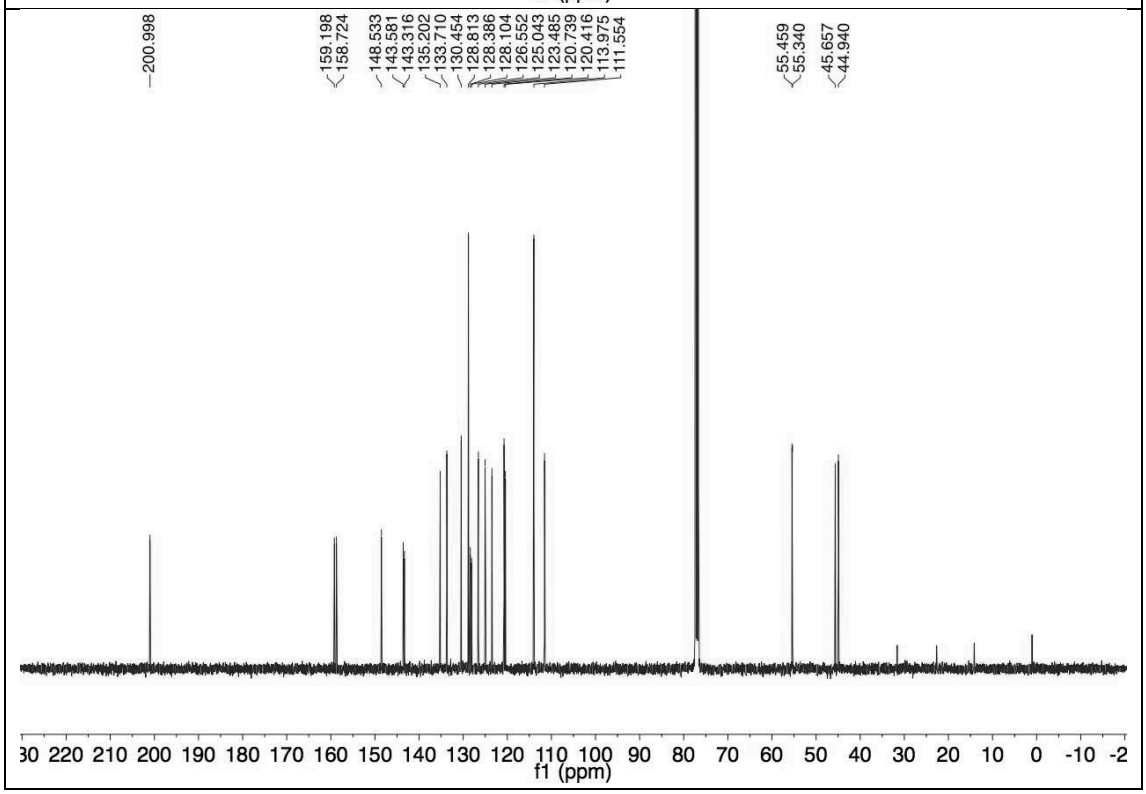


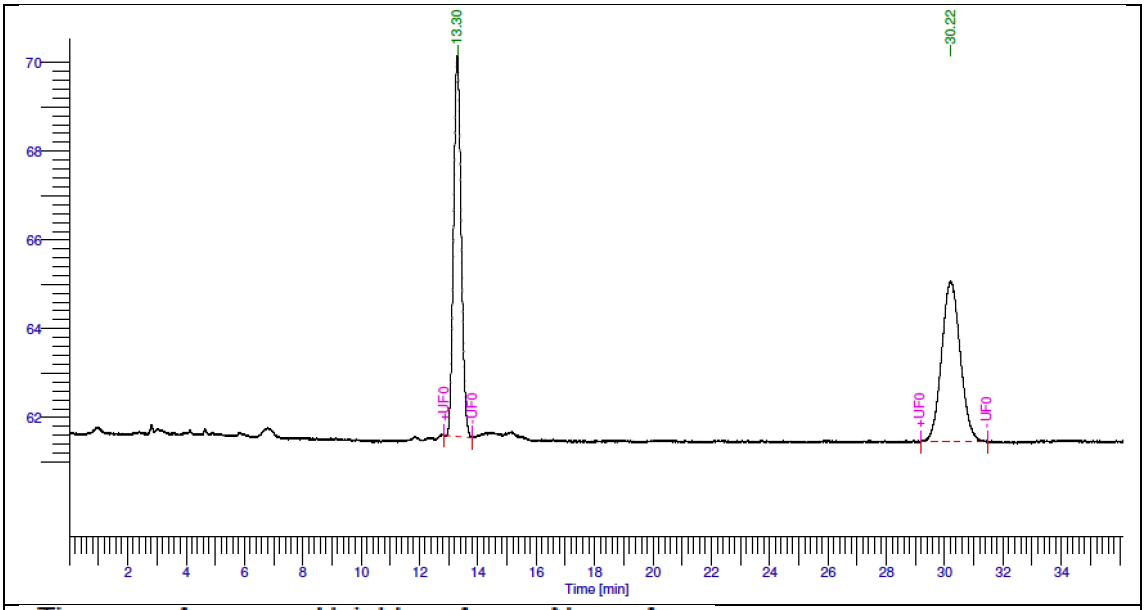
Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
20.853	22029.17	768.14	8.93	8.93
27.375	224623.24	5869.30	91.07	91.07
	246652.41	6637.43	100.00	100.00

(*S*)-1-(2-Methoxyphenyl)-2-(3-(4-methoxyphenyl)-1*H*-inden-1-yl)ethan-1-one (6o)

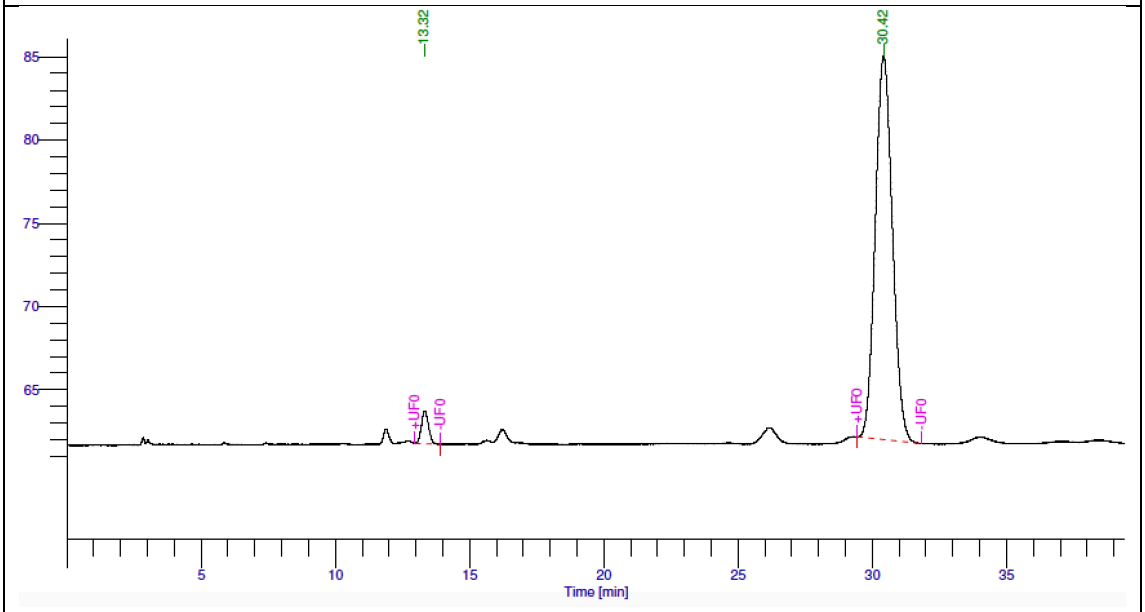






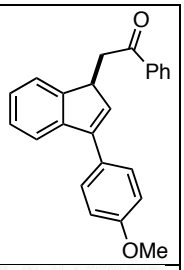


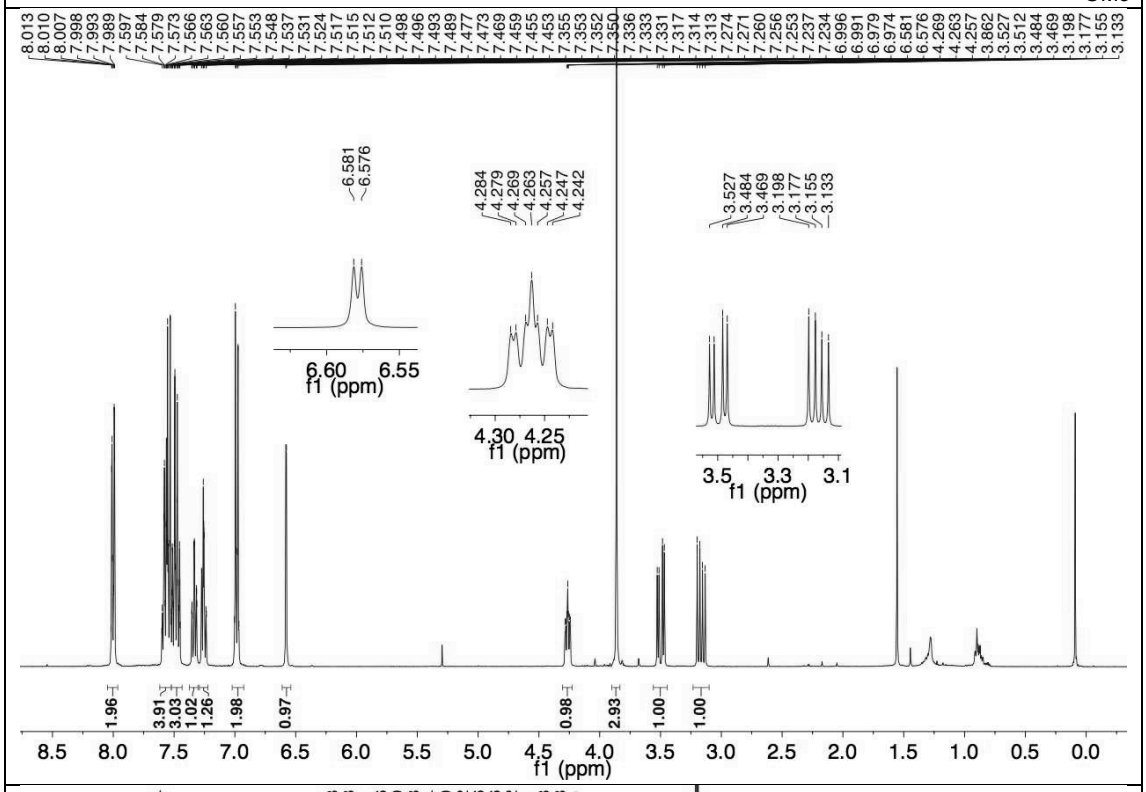
Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
13.300	155186.20	8572.54	49.00	49.00
30.215	161503.43	3624.53	51.00	51.00
	316689.63	12197.07	100.00	100.00

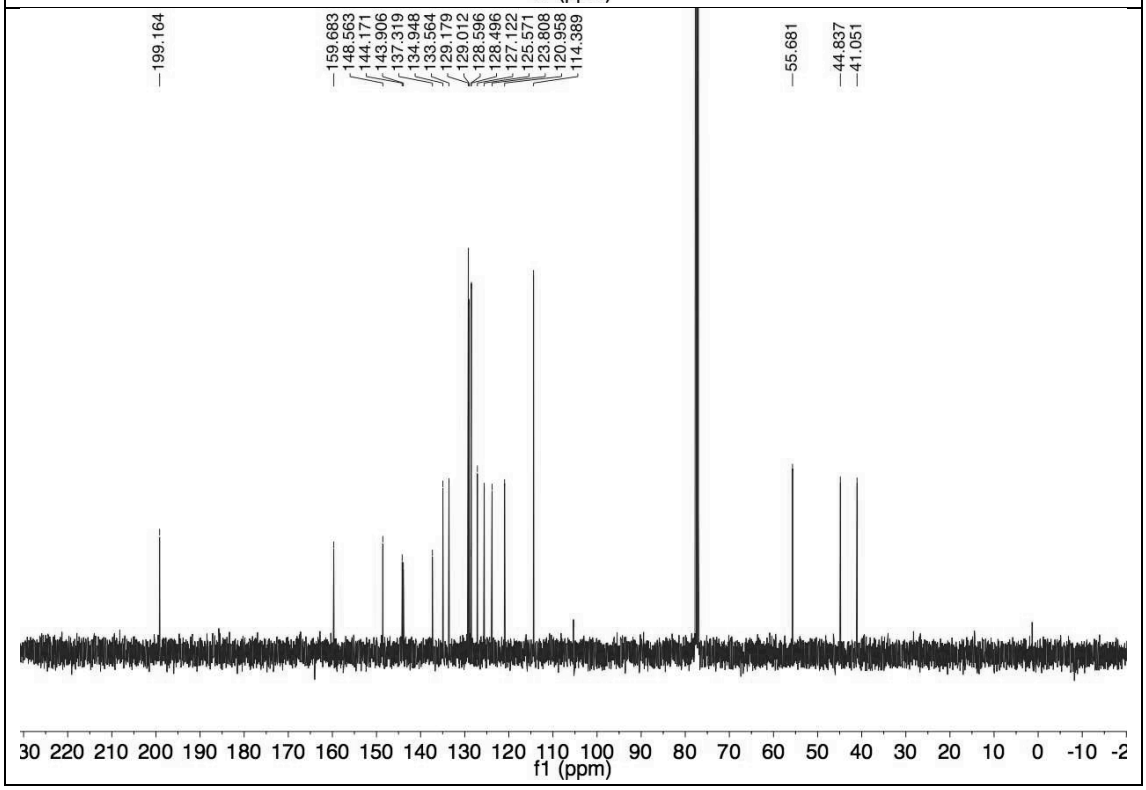


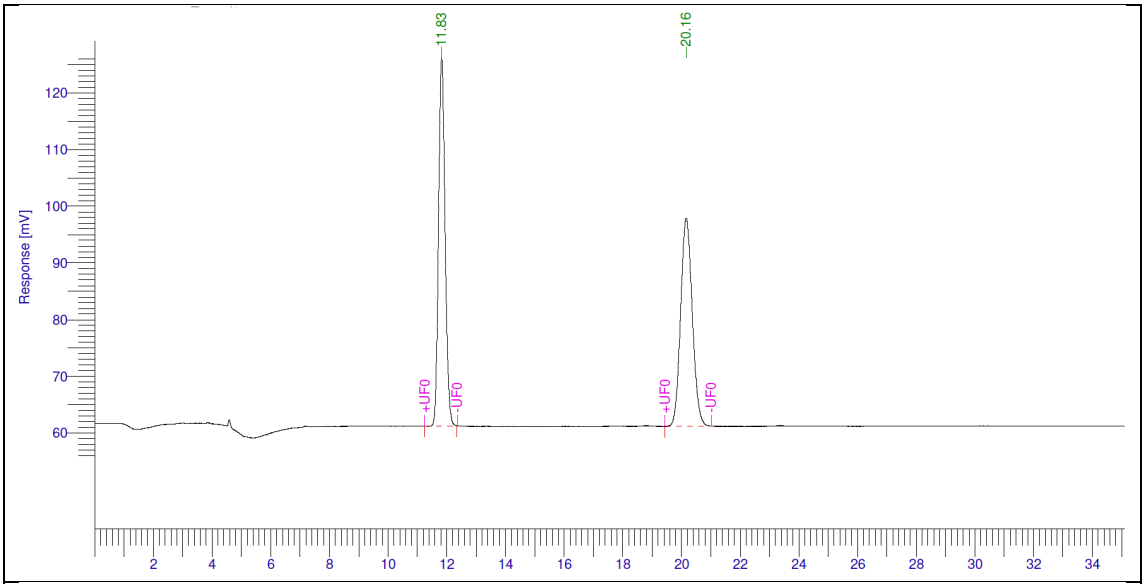
Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
13.325	35677.52	1969.61	3.37	3.37
30.422	1021634.18	23038.07	96.63	96.63
	1057311.70	25007.67	100.00	100.00

(*S*)-2-(3-(4-methoxyphenyl)-1*H*-inden-1-yl)-1-phenylethan-1-one (6p)

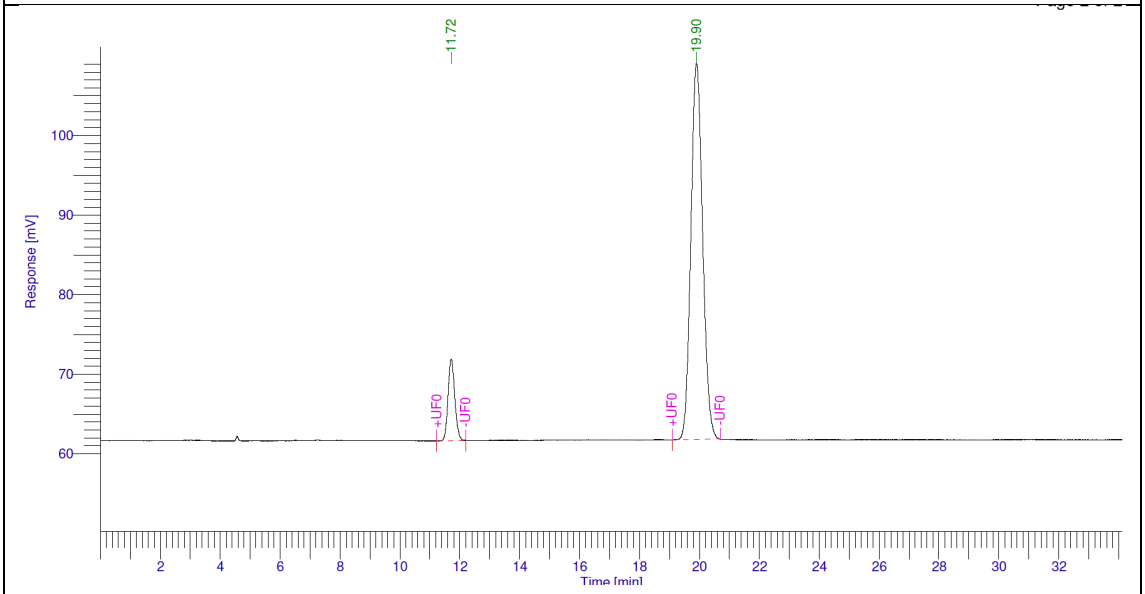






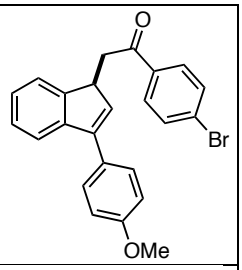


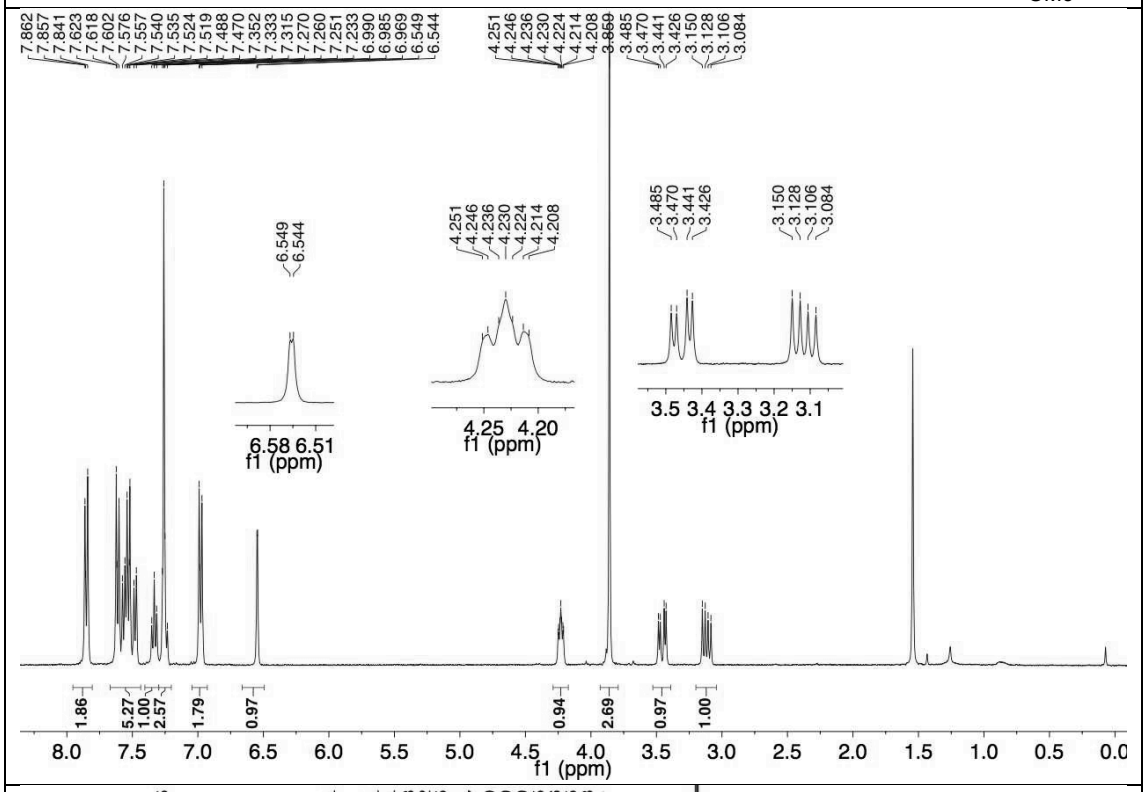
Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		11.827	1003671.61	64966.61	49.86	49.86
2		20.160	1009500.23	36672.30	50.14	50.14
			2013171.84	101638.91	100.00	100.00

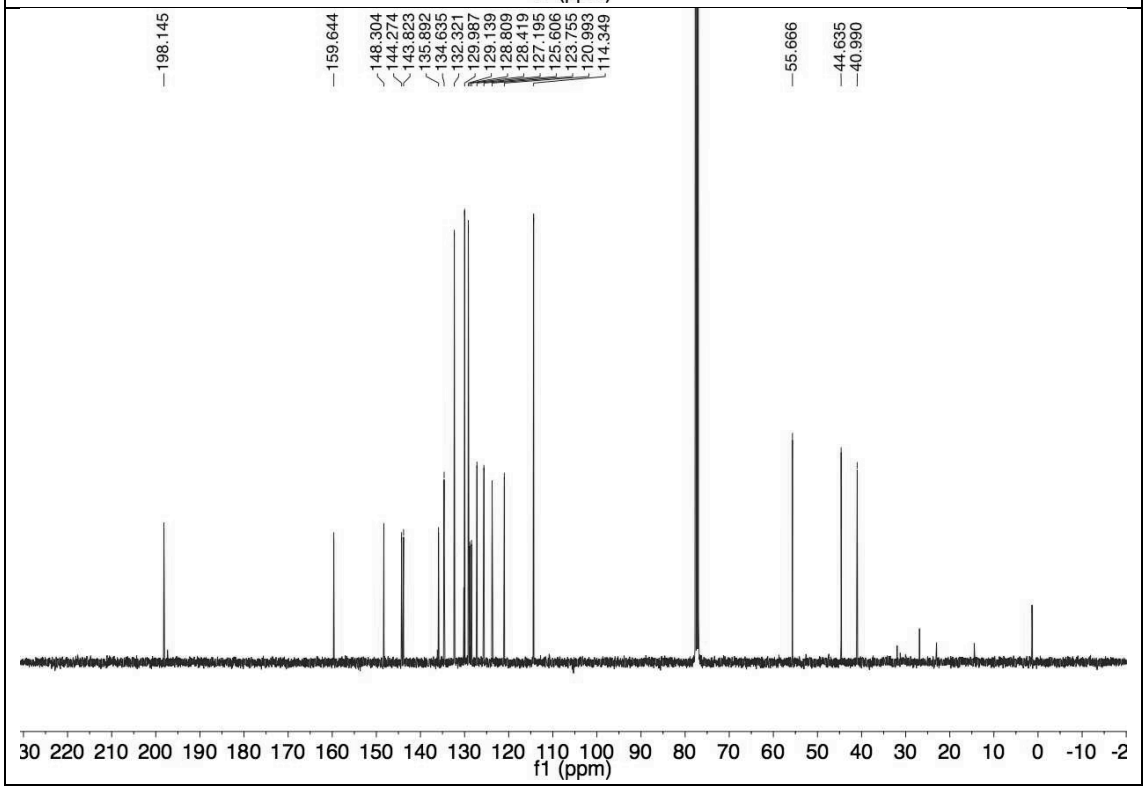


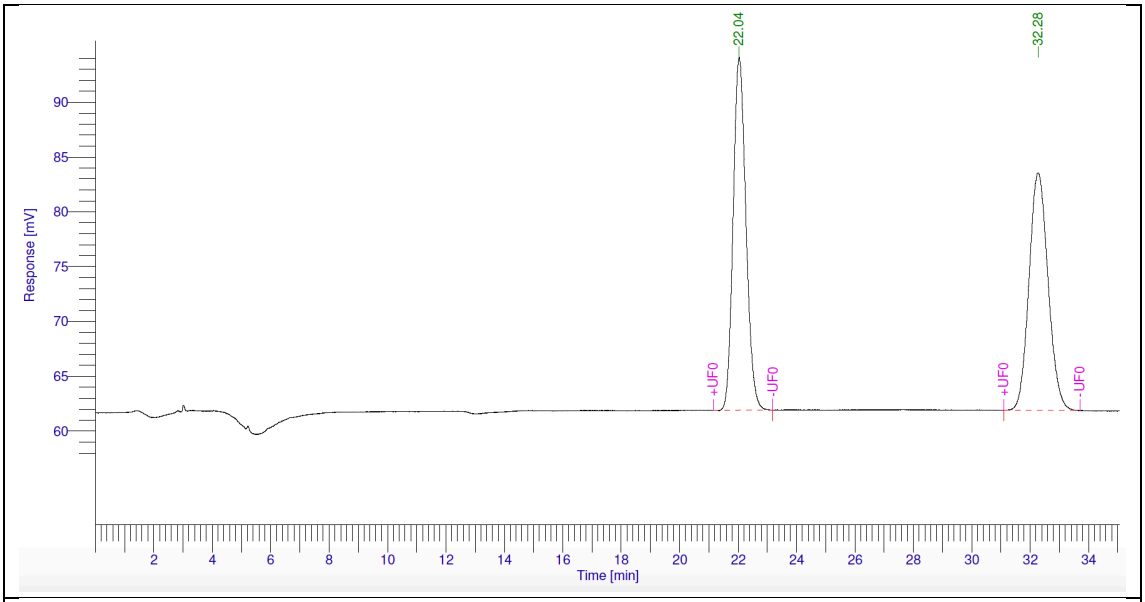
Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		11.715	160474.71	10283.91	11.07	11.07
2		19.903	1288911.62	47248.83	88.93	88.93
			1449386.33	57532.74	100.00	100.00

(*S*)-1-(4-Bromophenyl)-2-(3-(4-methoxyphenyl)-1*H*-inden-1-yl)ethan-1-one (6q)

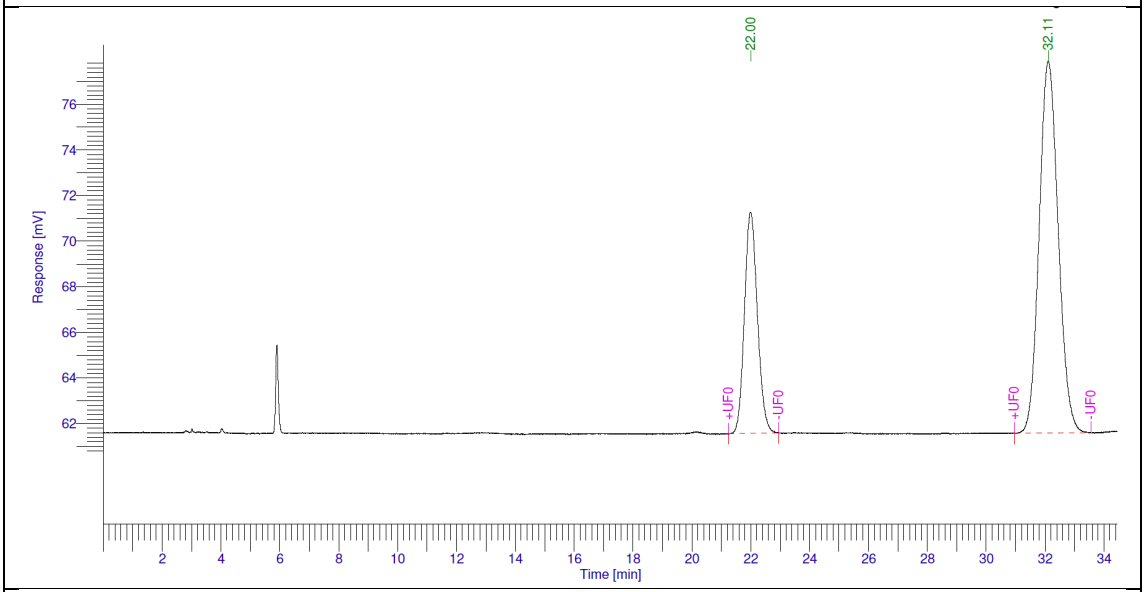






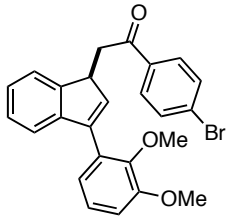


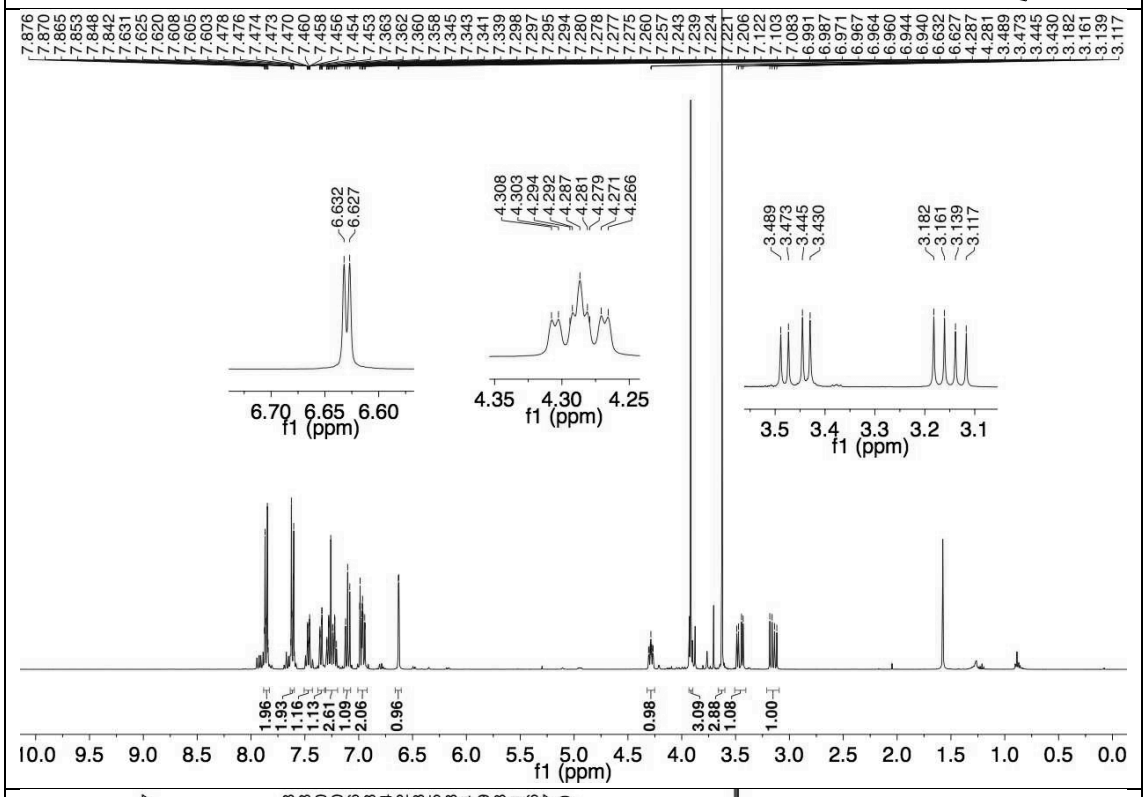
Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		22.035	979503.20	32189.05	49.96	49.96
2		32.277	981252.60	21666.18	50.04	50.04
			1960755.79	53855.22	100.00	100.00

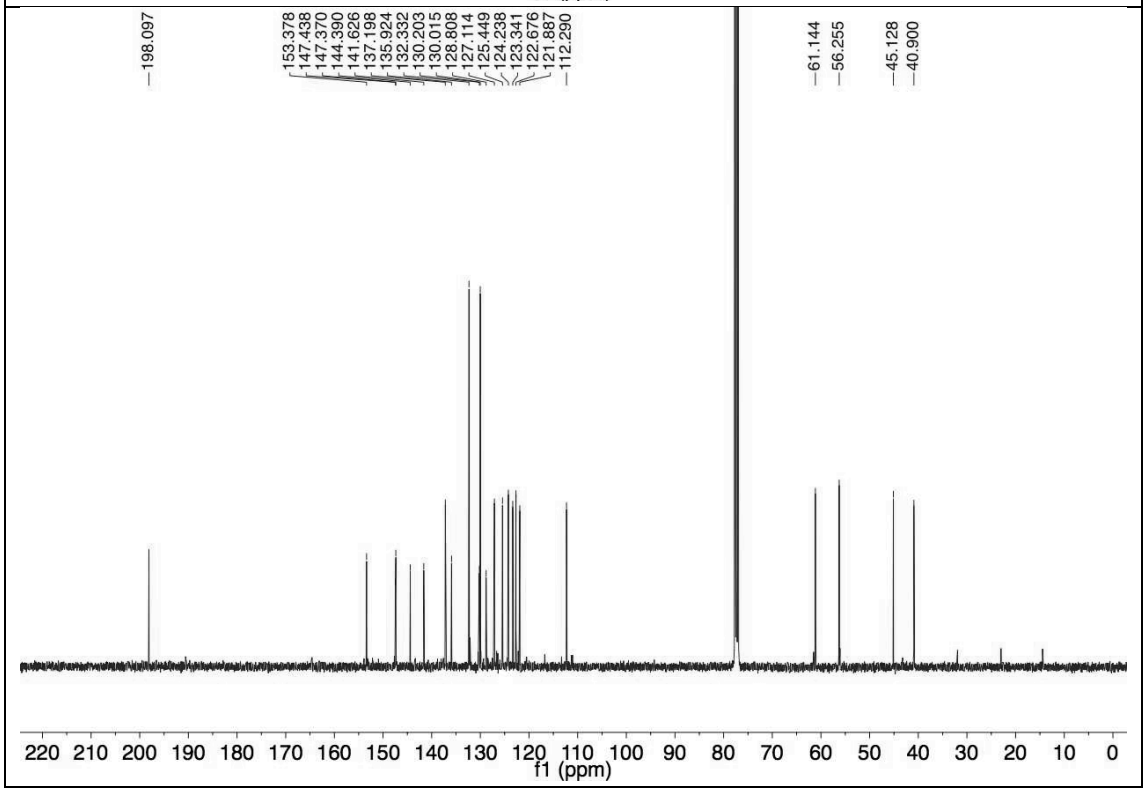


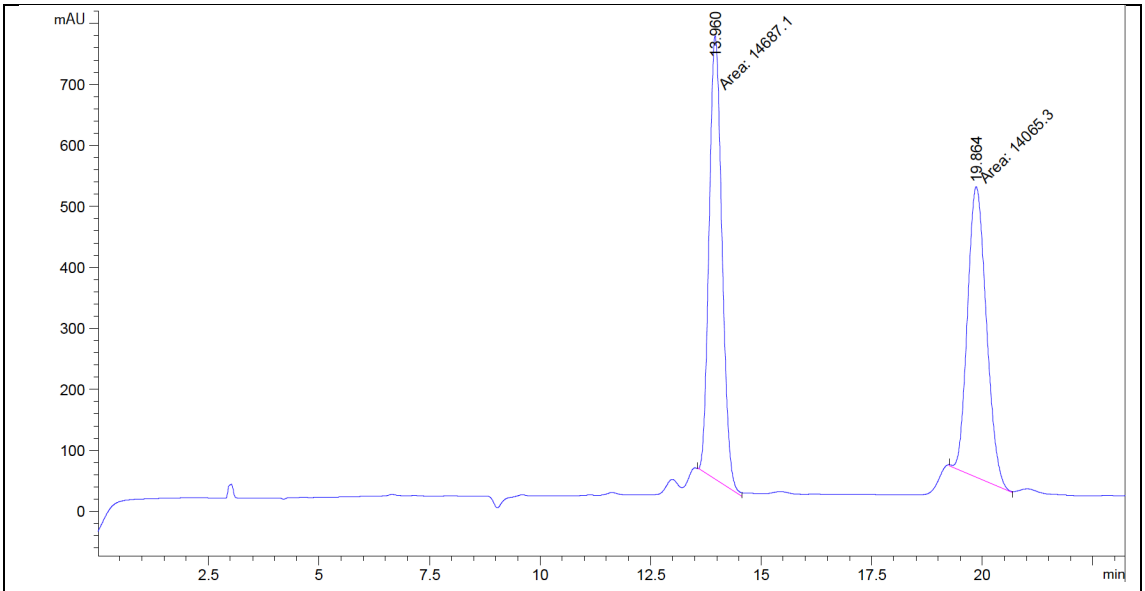
Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		21.998	296370.80	9701.21	28.80	28.80
2		32.108	732613.05	16305.65	71.20	71.20
			1028983.85	26006.85	100.00	100.00

(*S*)-1-(4-bromophenyl)-2-(3-(2,3-dimethoxyphenyl)-1*H*-inden-1-yl)ethan-1-one (6r)

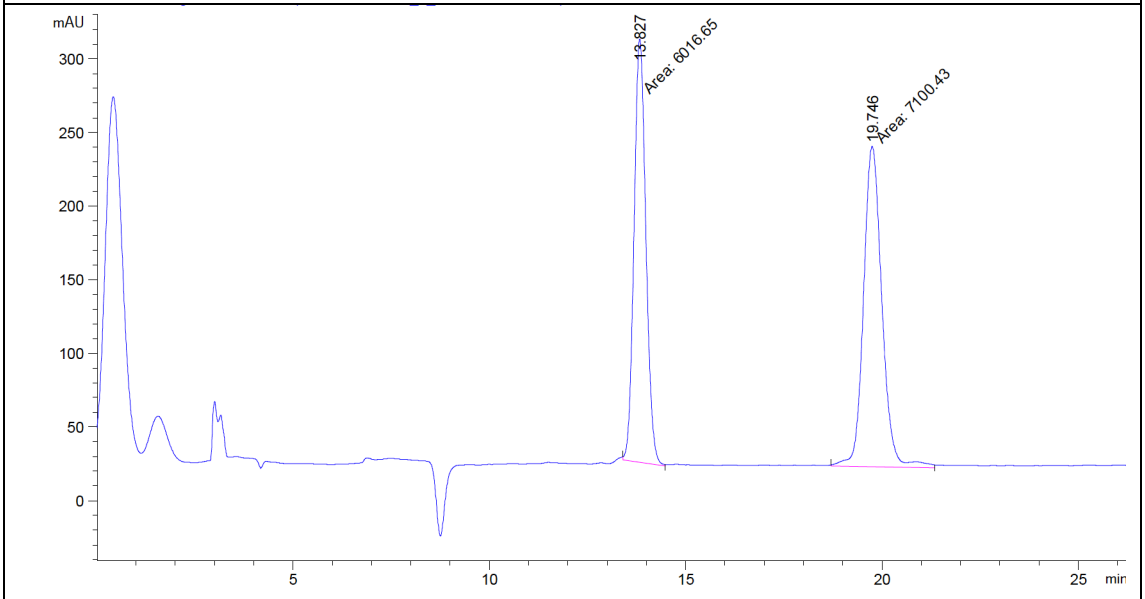






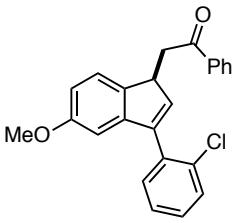


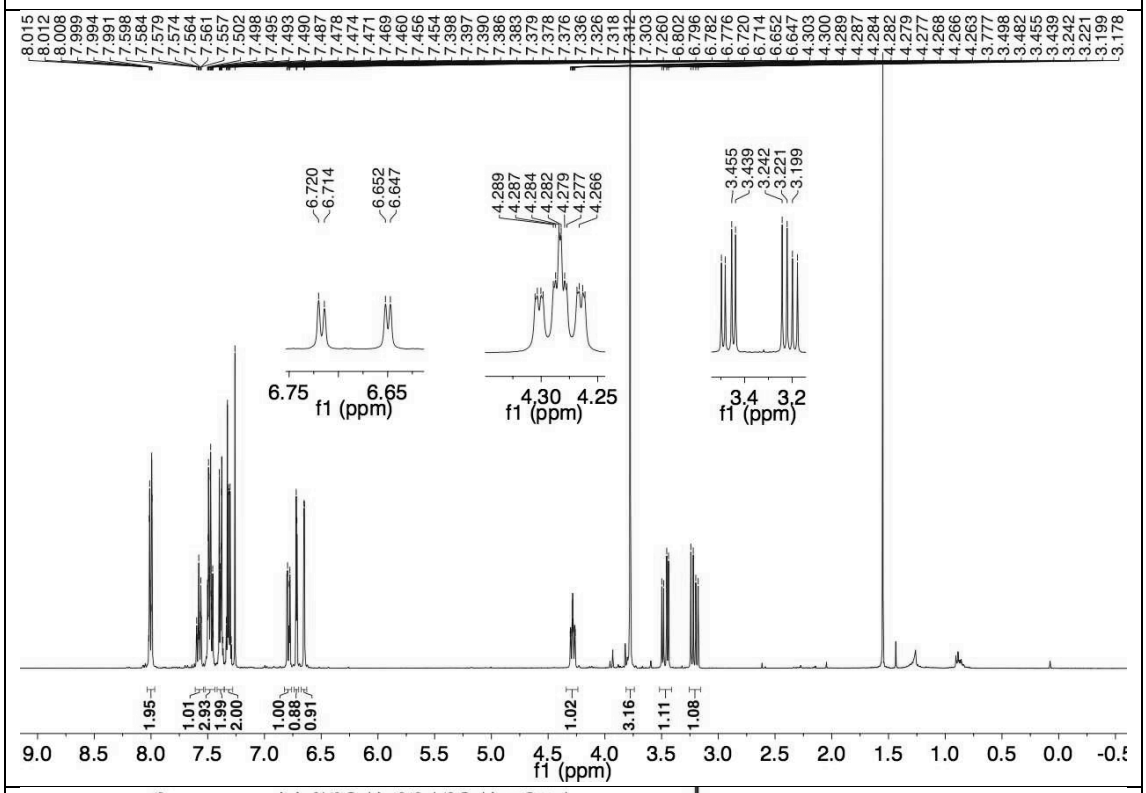
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	13.960	MM	0.3366	1.46871e4	727.19385	51.0814
2	19.864	MM	0.4924	1.40653e4	476.05341	48.9186

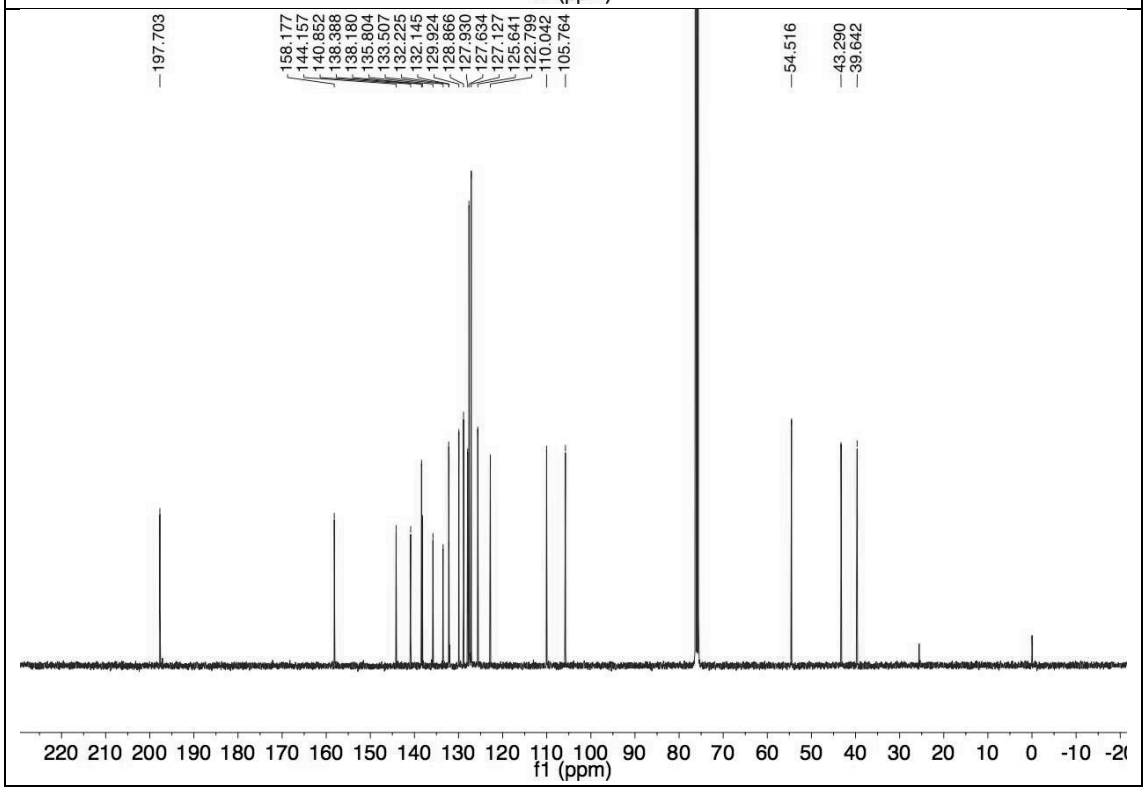


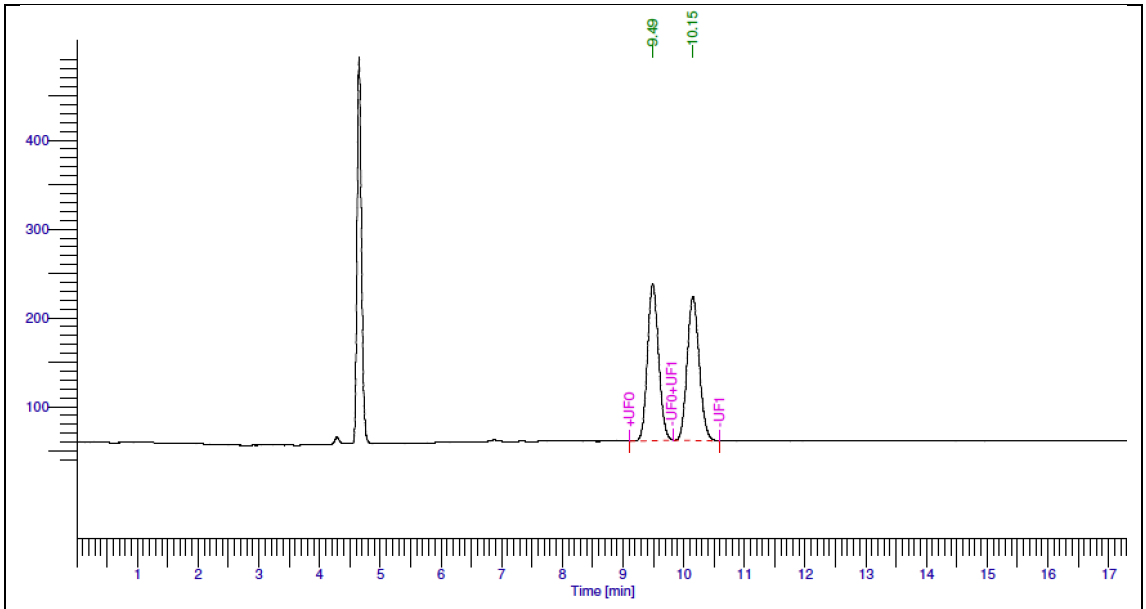
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	13.827	MM	0.3490	6016.65137	287.30945	45.8688
2	19.746	MM	0.5438	7100.42529	217.60913	54.1312

2-(3-(2-Chlorophenyl)-5-methoxy-1*H*-inden-1-yl)-1-phenylethan-1-one (6s)

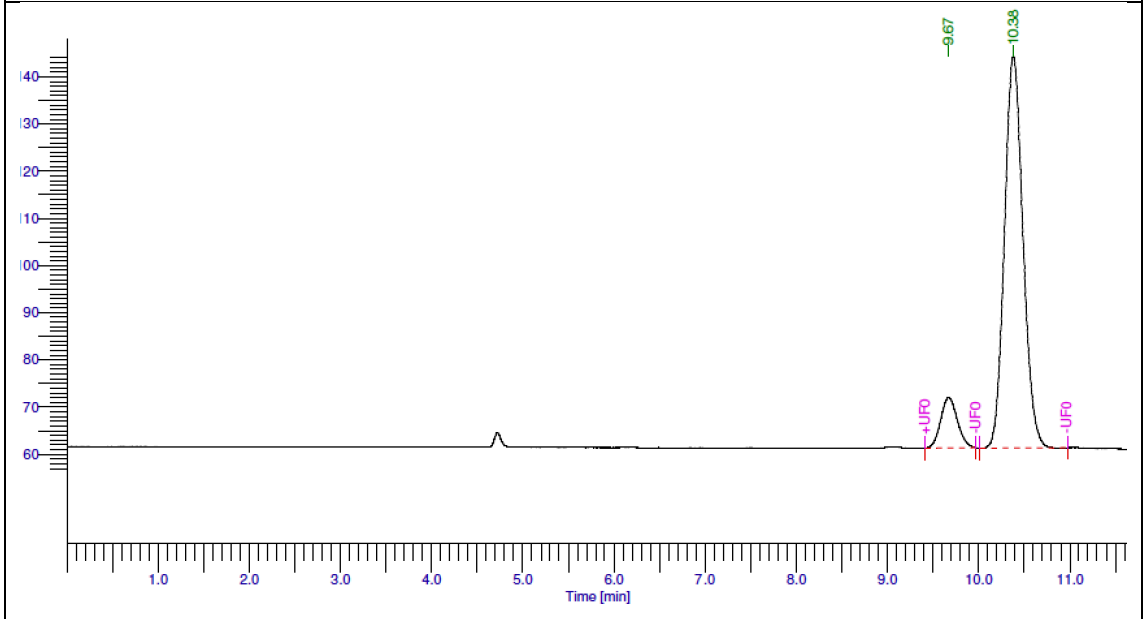






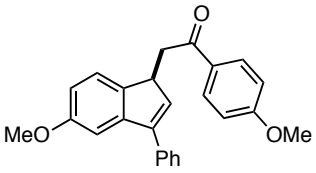


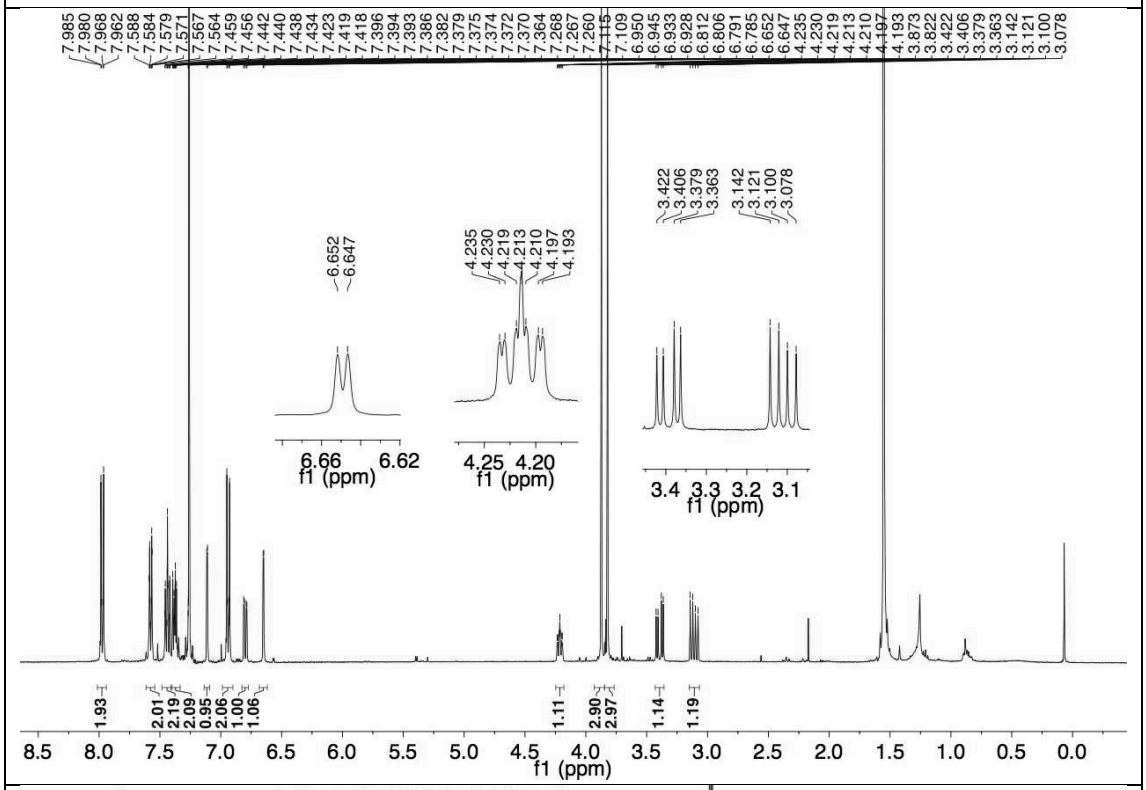
Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
9.488	2247567.95	176509.07	50.12	50.12
10.150	2236770.63	161927.81	49.88	49.88
	4484338.58	338436.88	100.00	100.00

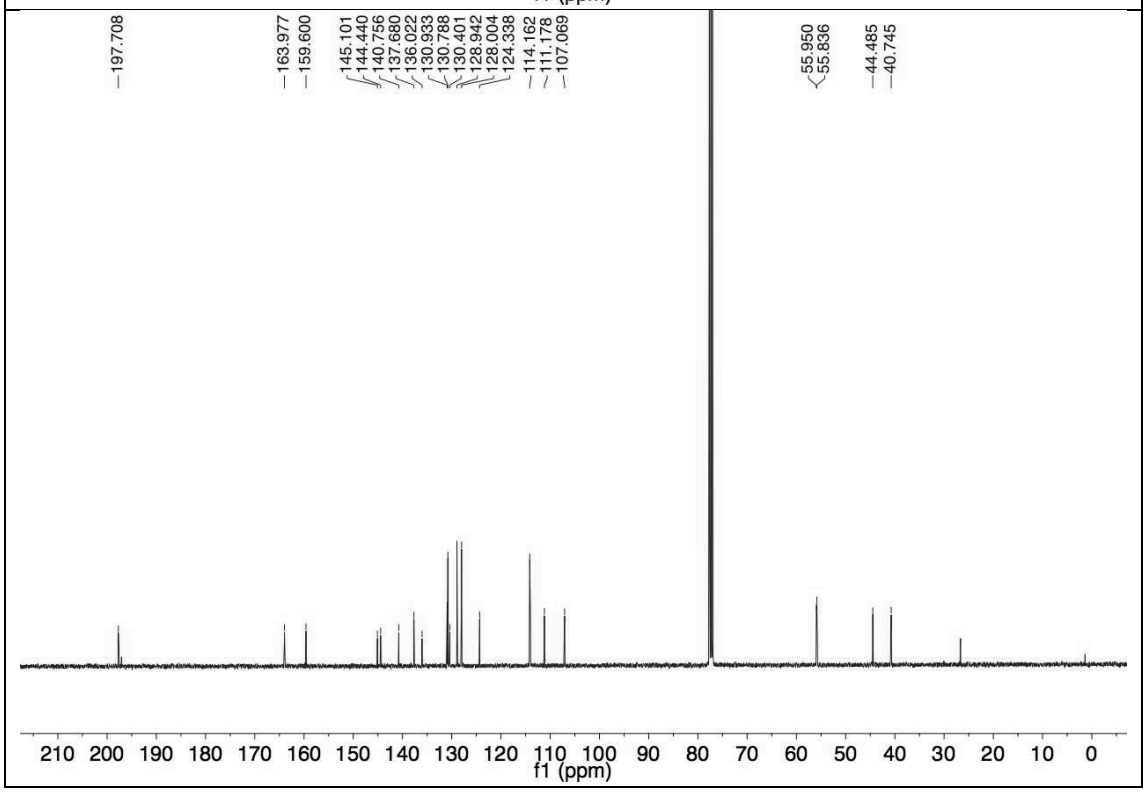


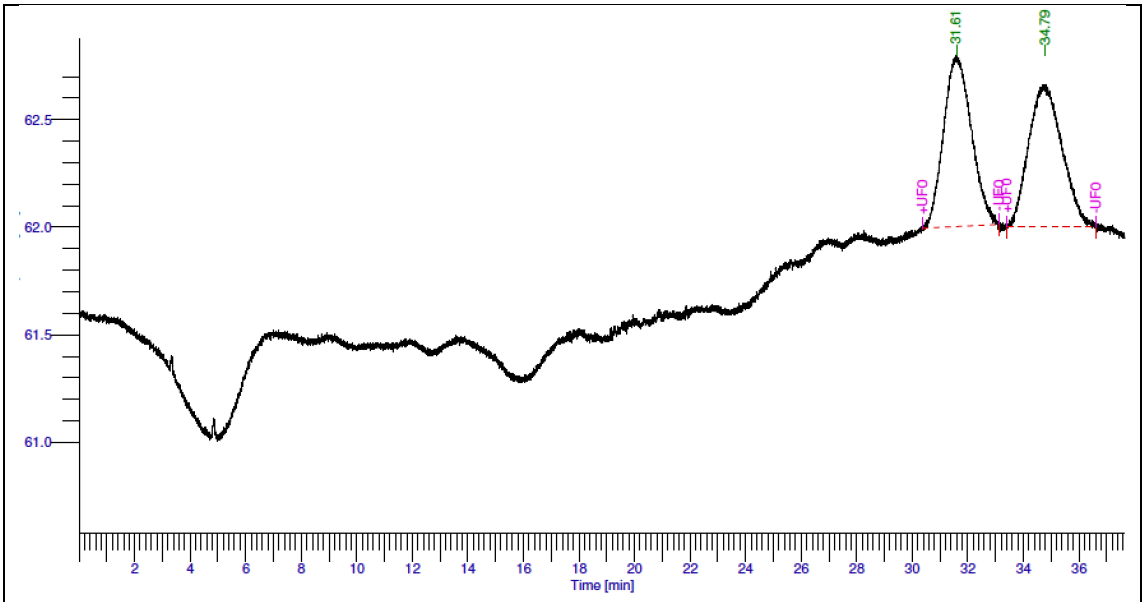
Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
9.668	135671.13	10640.29	10.38	10.38
10.380	1171751.40	82983.16	89.62	89.62
	1307422.53	93623.45	100.00	100.00

(*S*)-2-(5-methoxy-3-phenyl-1*H*-inden-1-yl)-1-(4-methoxyphenyl)ethan-1-one (6t)

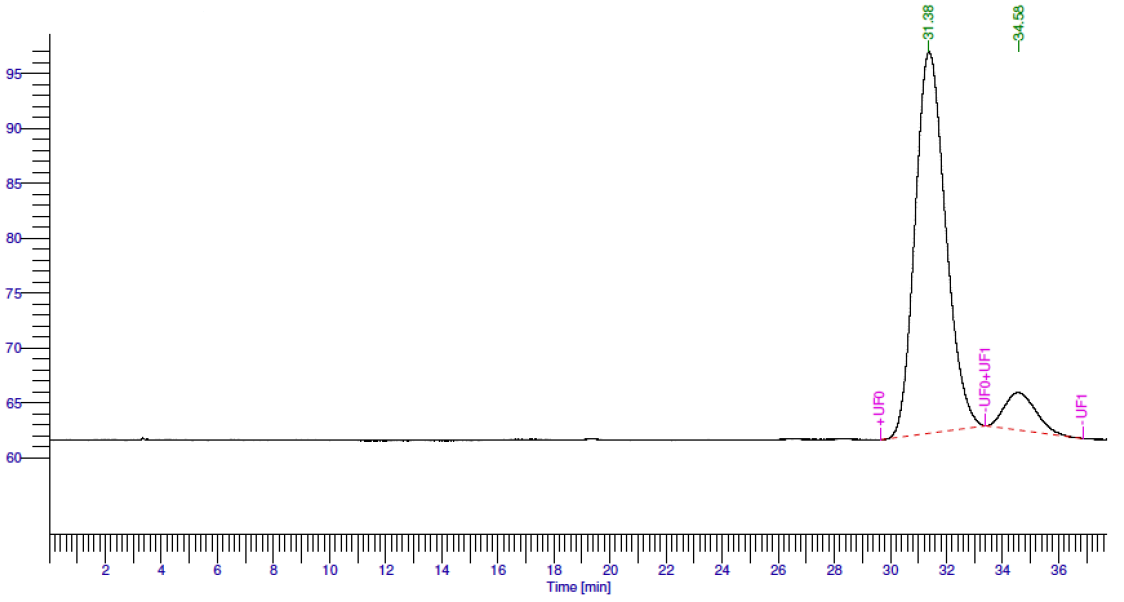






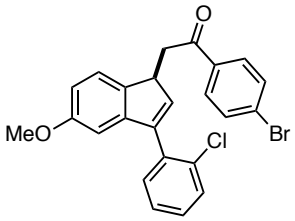


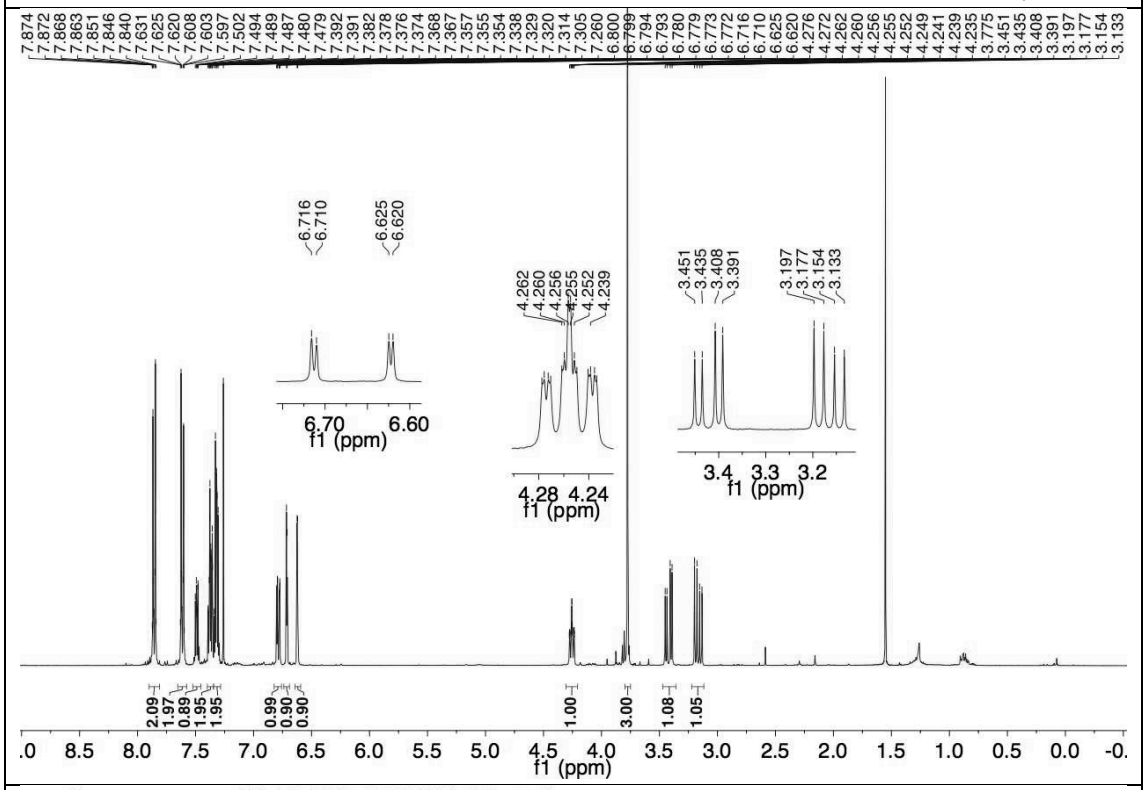
Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
31.605	55183.63	795.21	50.09	50.09
34.787	54990.48	661.40	49.91	49.91
	110174.10	1456.60	100.00	100.00

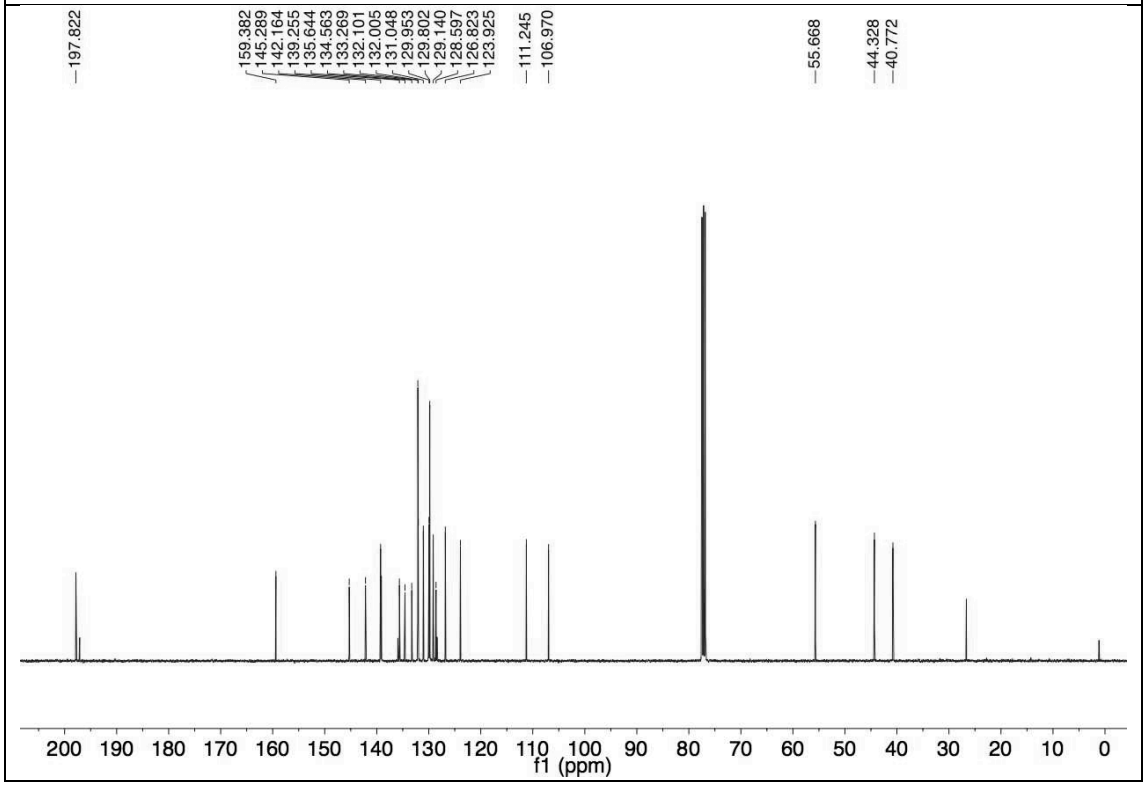


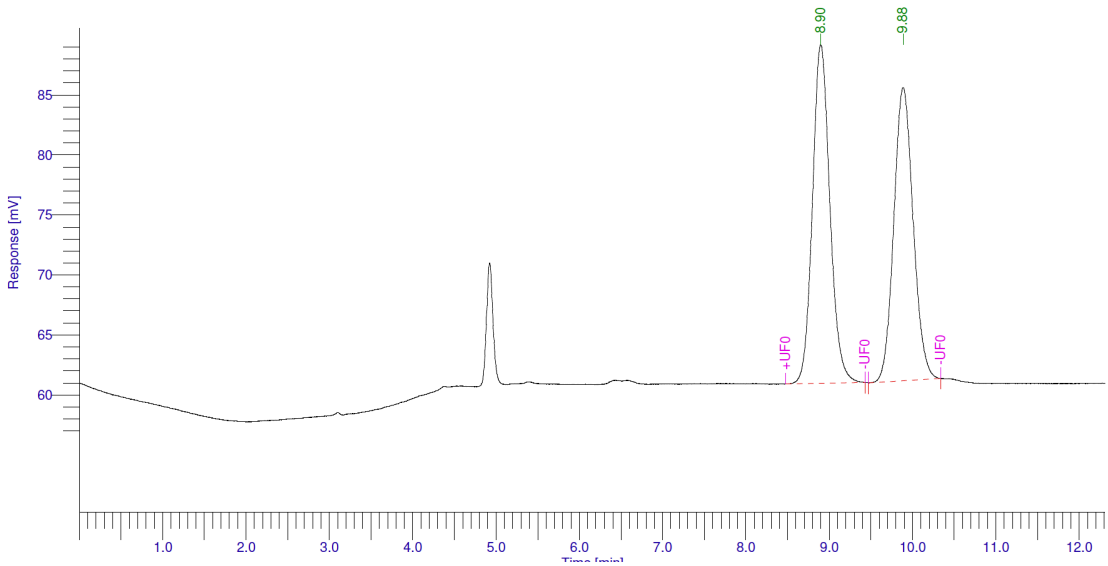
Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
31.378	2633655.00	34777.46	90.81	90.81
34.577	266458.56	3426.73	9.19	9.19
	2900113.57	38204.20	100.00	100.00

2-(3-(2-chlorophenyl)-5-methoxy-1*H*-inden-1-yl)-1-(4-bromorophenyl)ethan-1-one (6u)

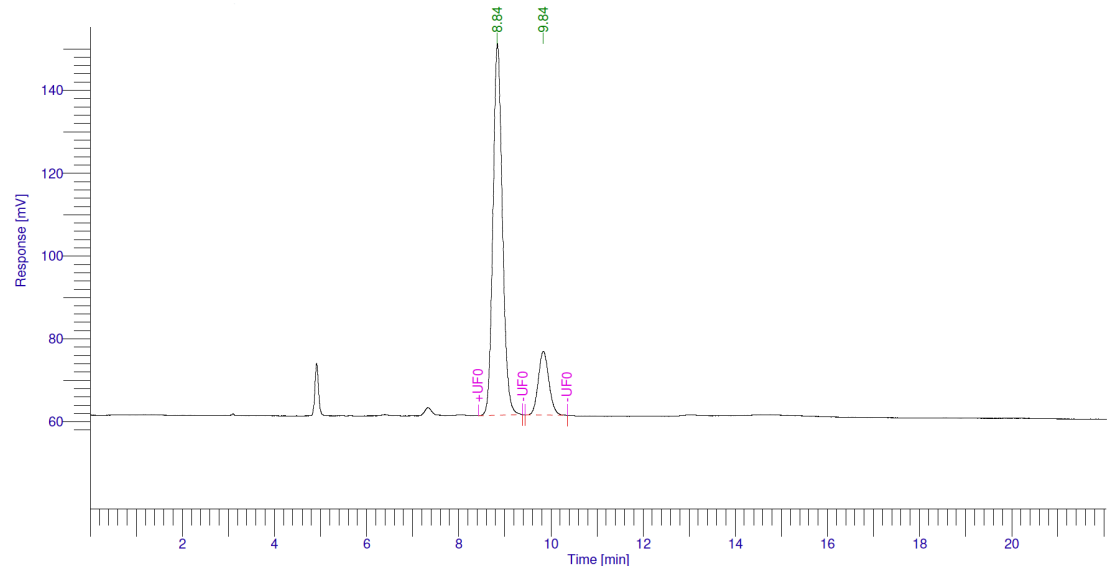






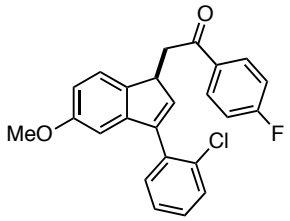


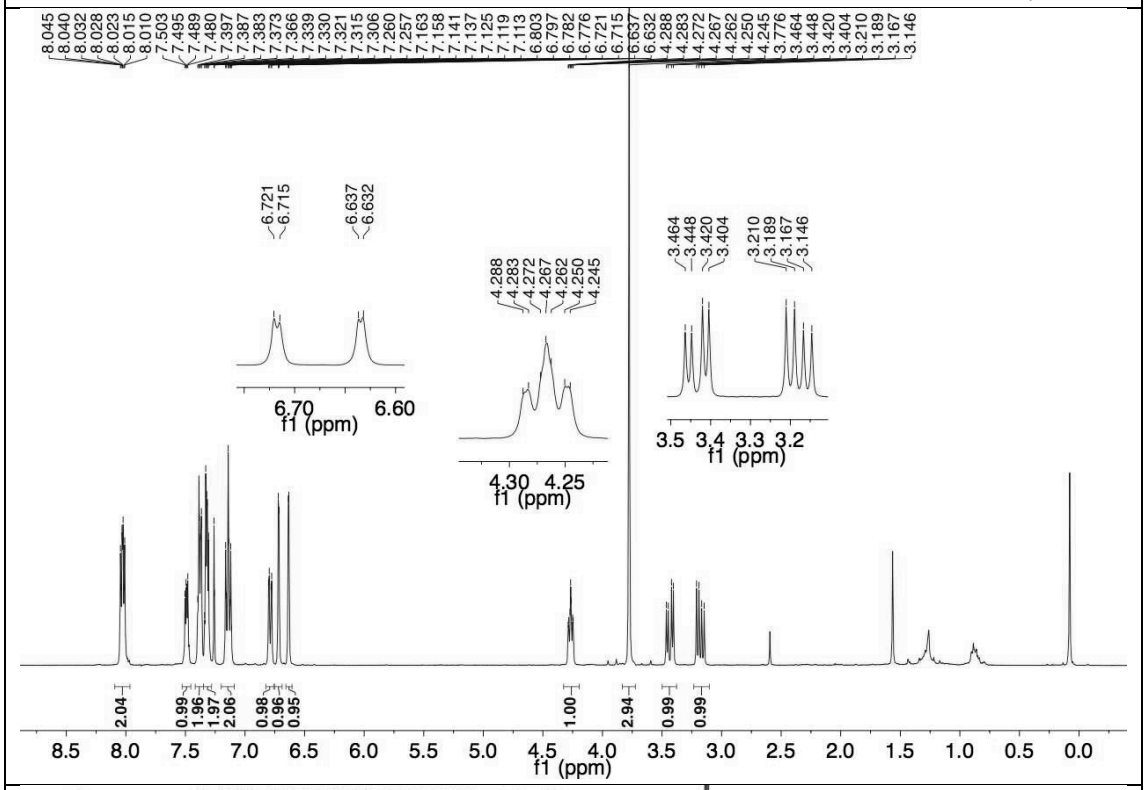
Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		8.897	411239.53	28244.50	51.02	51.02
2		9.885	394783.01	24449.50	48.98	48.98
			806022.54	52694.00	100.00	100.00

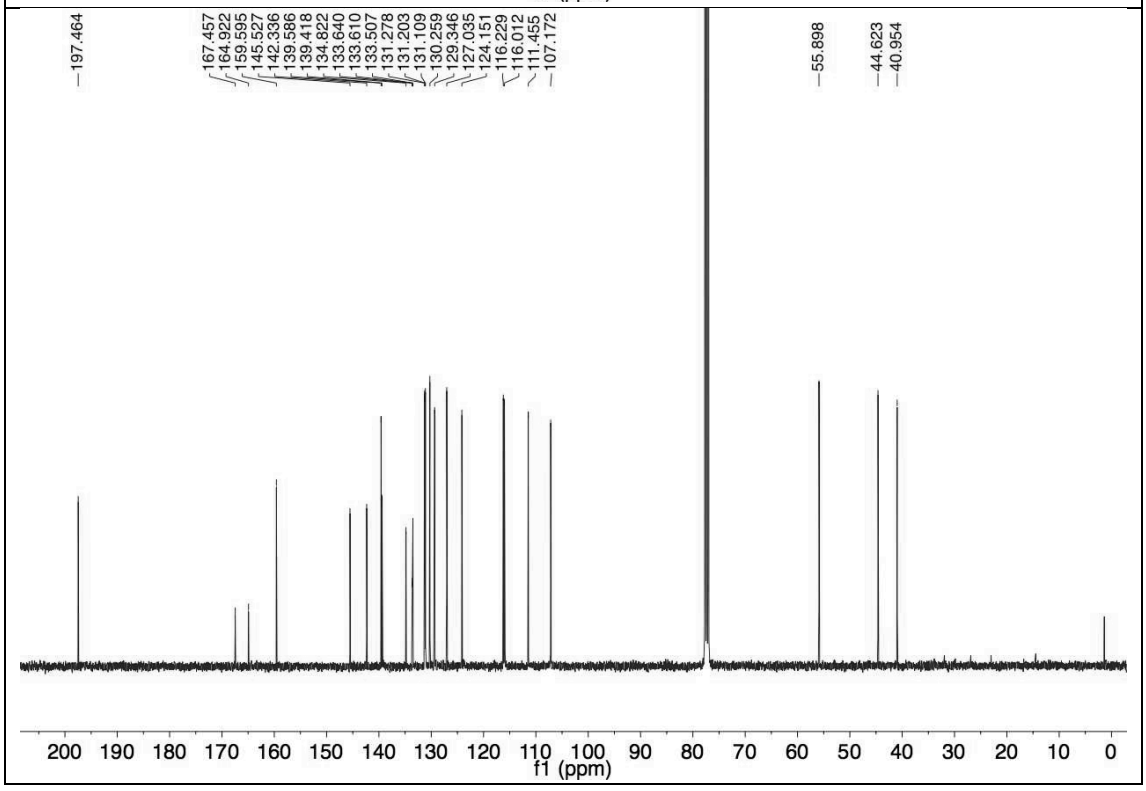


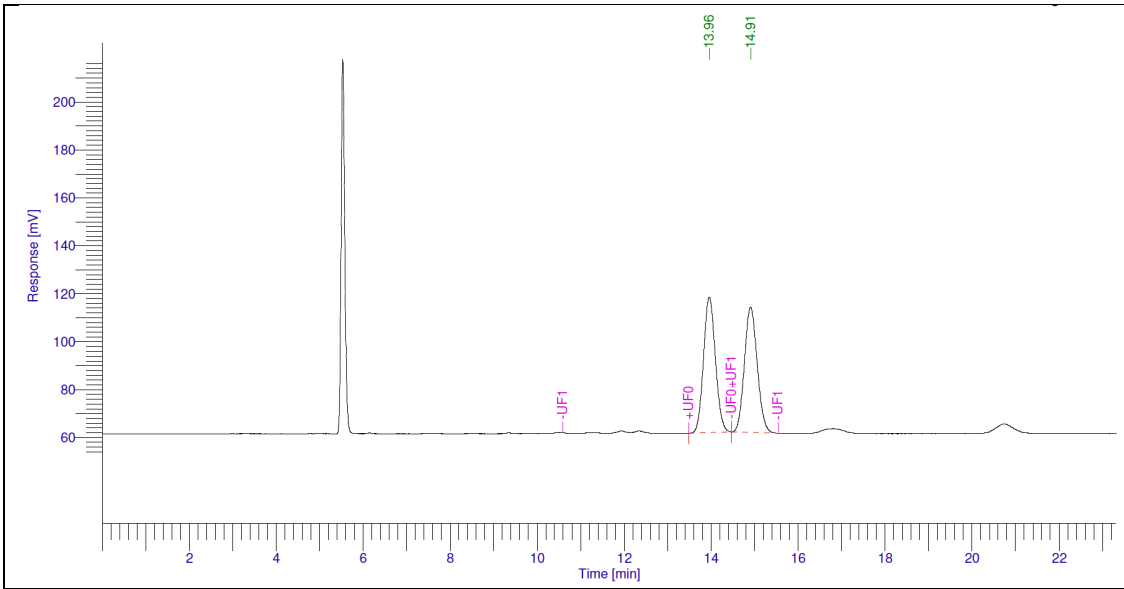
Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		8.838	1277070.10	89706.86	83.89	83.89
2		9.837	245249.38	15402.10	16.11	16.11
			1522319.48	105108.96	100.00	100.00

2-(3-(2-Chlorophenyl)-5-methoxy-1*H*-inden-1-yl)-1-(4-fluorophenyl)ethan-1-one (6v)

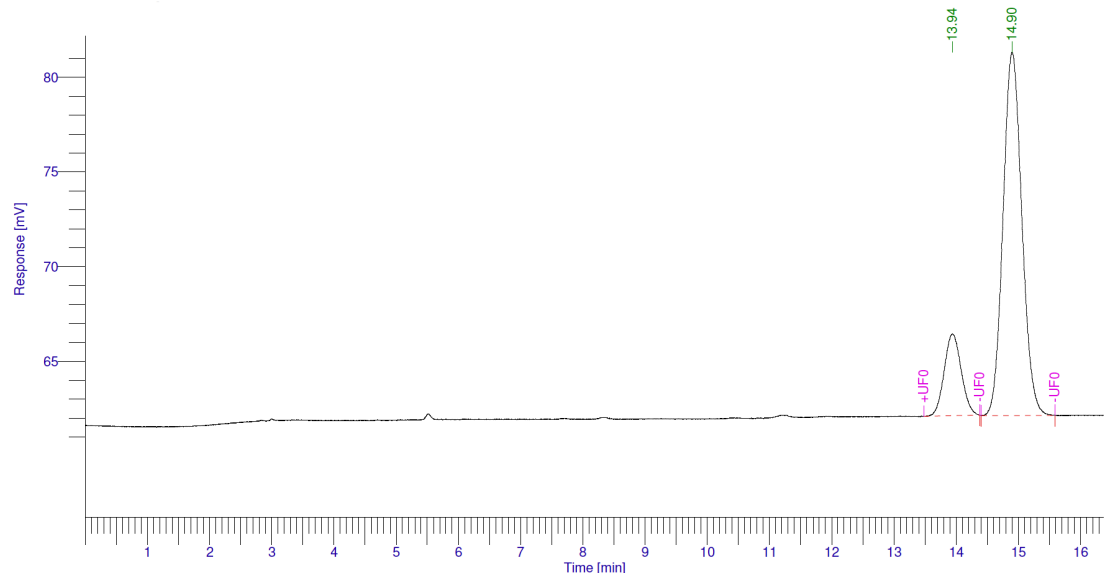






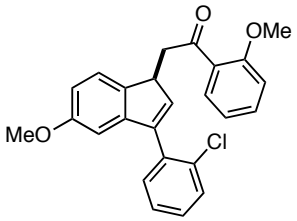


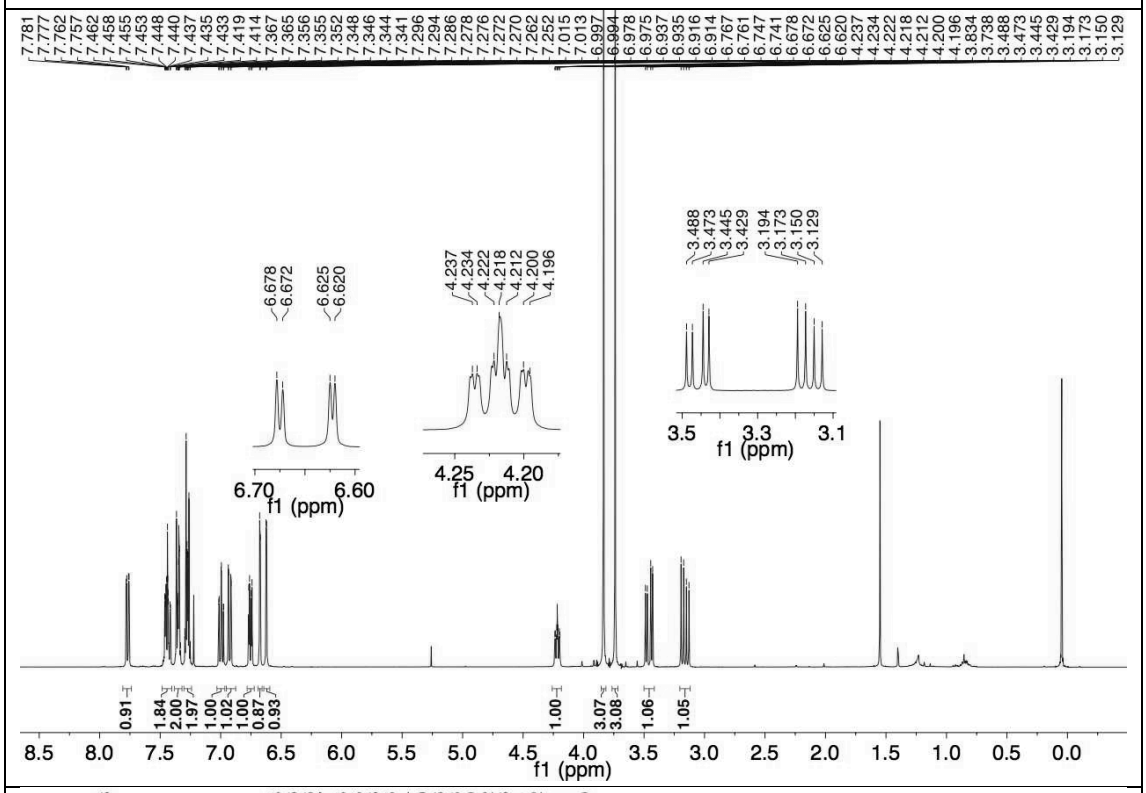
Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		13.955	1073856.55	56572.85	50.00	50.00
2		14.907	1073815.57	52307.35	50.00	50.00
			2147672.12	108880.19	100.00	100.00

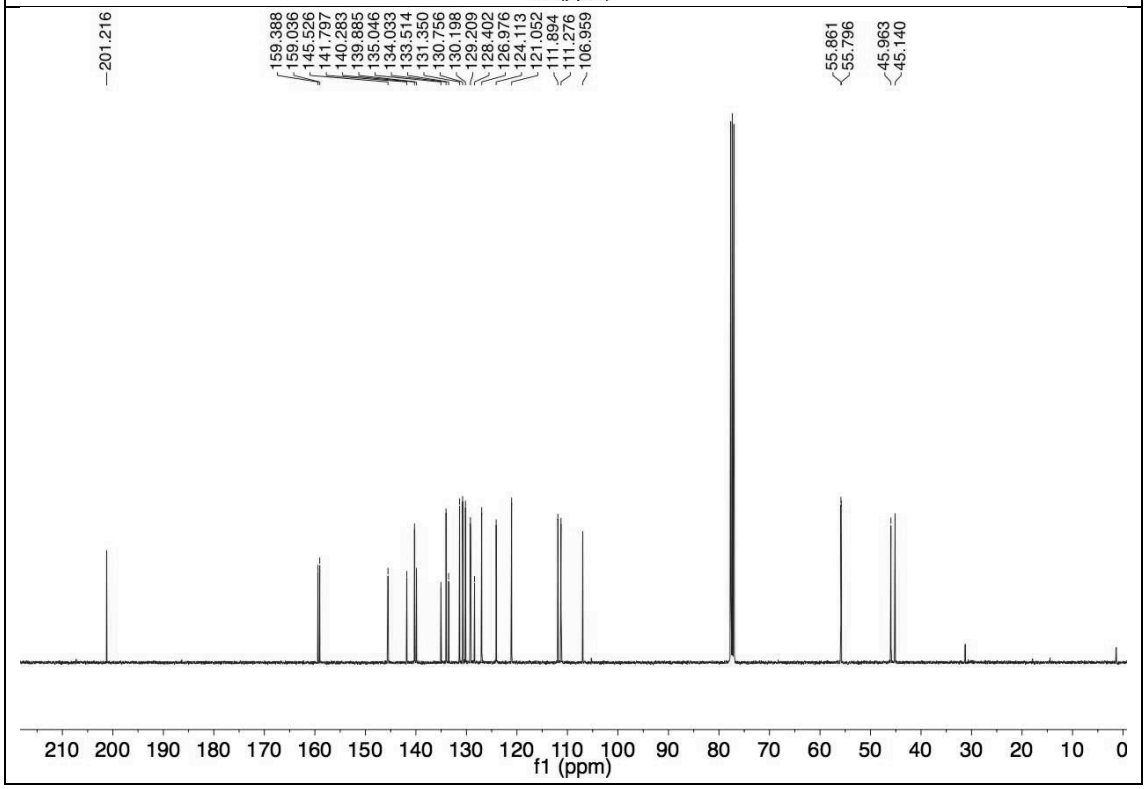


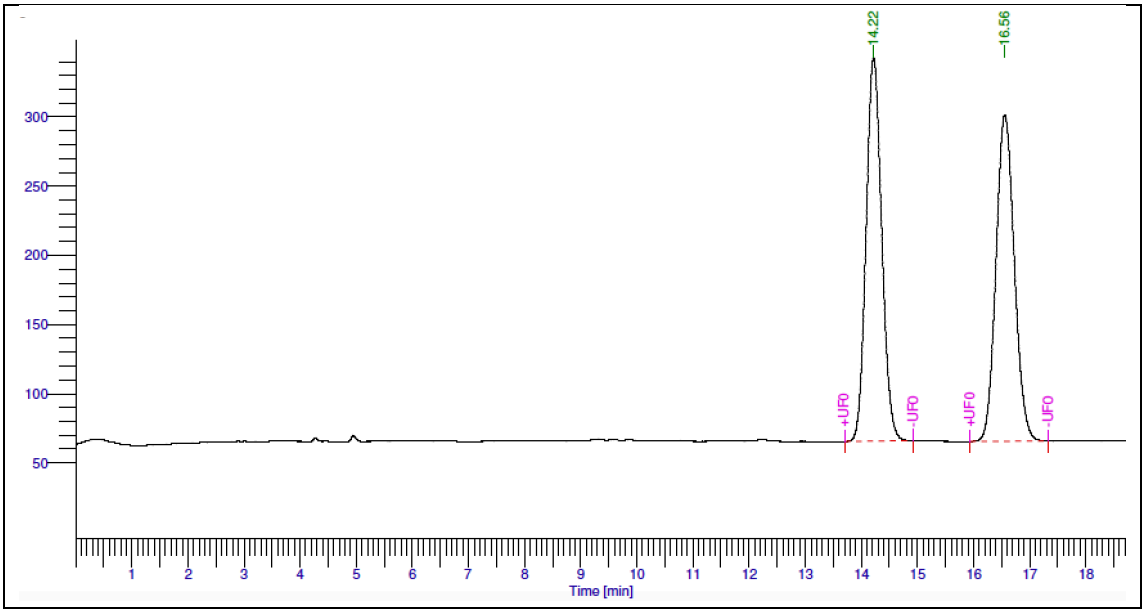
Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		13.938	82138.22	4329.35	16.92	16.92
2		14.900	403210.83	19184.44	83.08	83.08
			485349.05	23513.79	100.00	100.00

(*S*)-2-(3-(2-Chlorophenyl)-5-methoxy-1*H*-inden-1-yl)-1-(2-methoxyphenyl)ethan-1-one (6w)

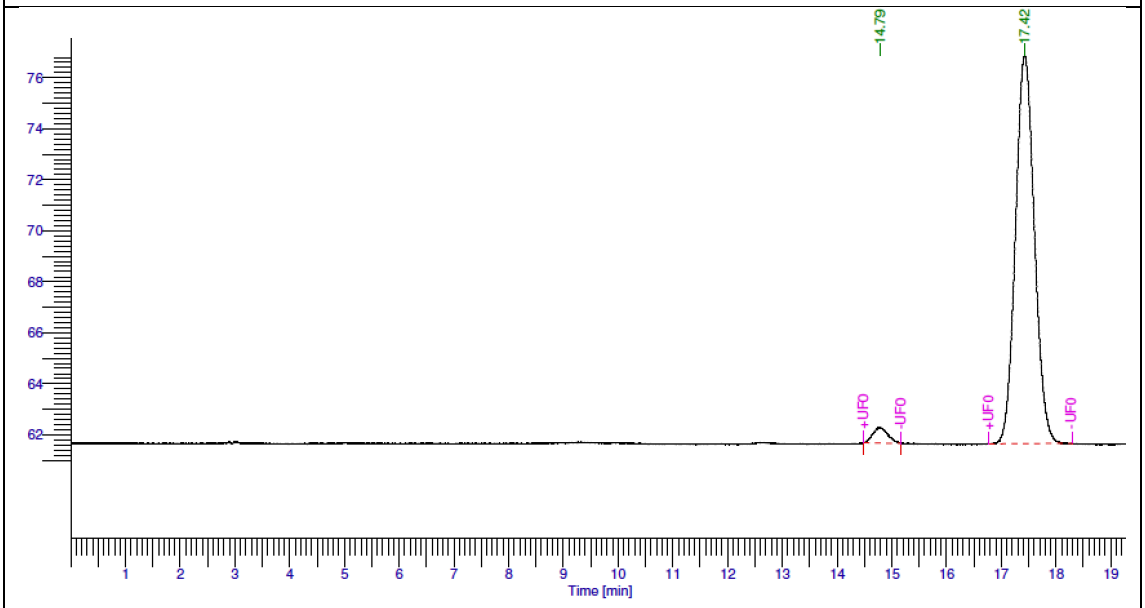






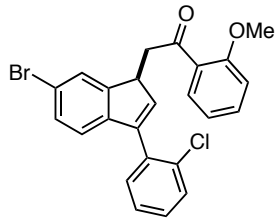


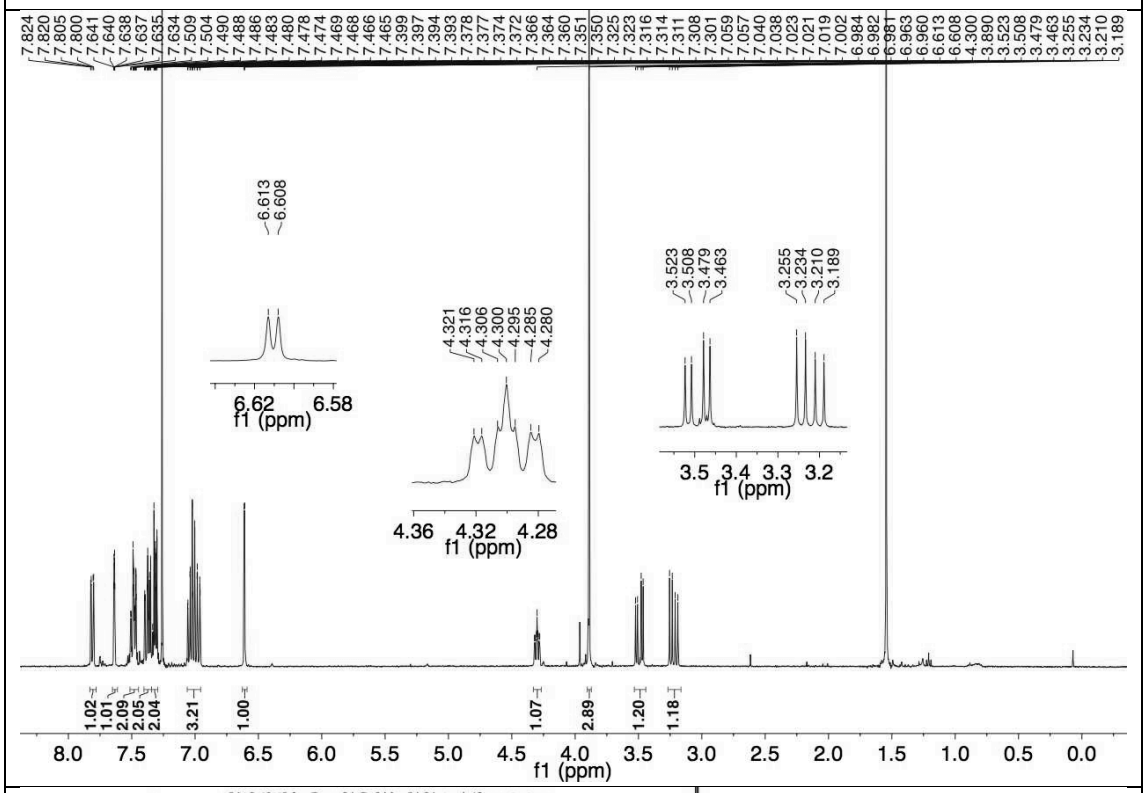
Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
14.217	5352787.92	277323.82	49.96	49.96
16.555	5360820.97	236079.71	50.04	50.04
	10713608.89	513403.53	100.00	100.00

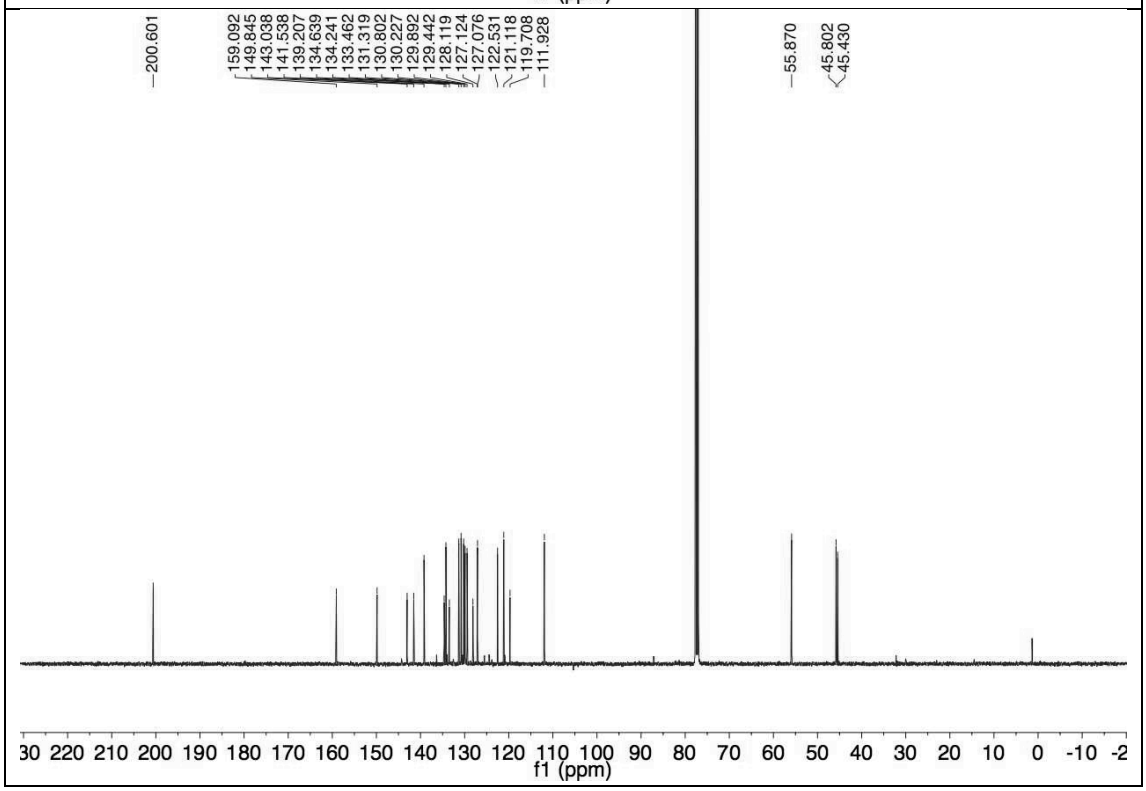


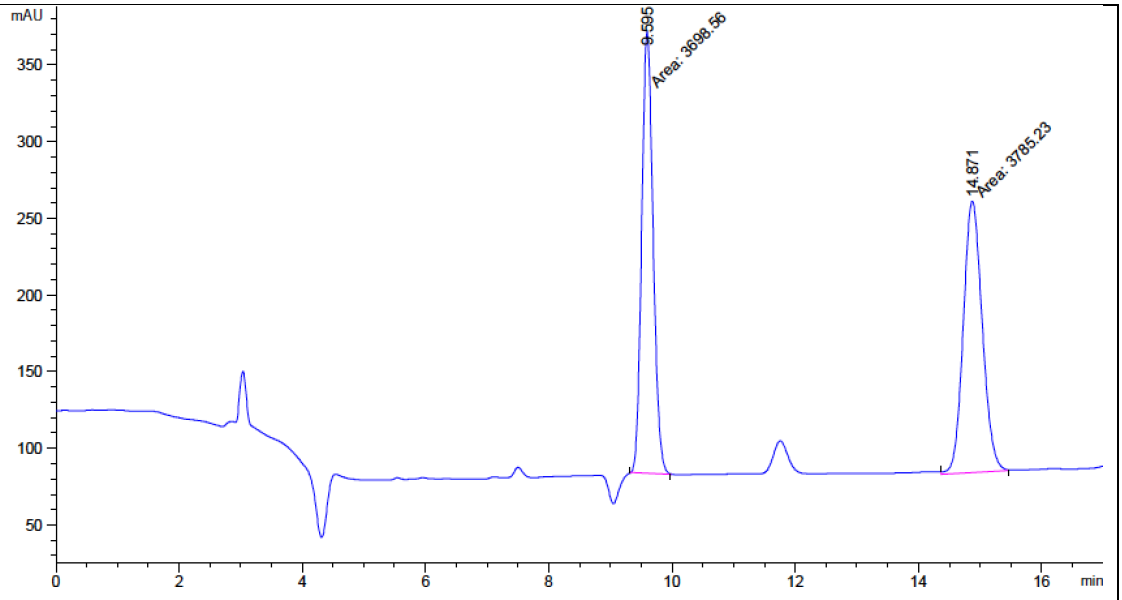
Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
14.788	11345.37	602.47	3.01	3.01
17.423	365958.36	15213.02	96.99	96.99
	377303.73	15815.49	100.00	100.00

(*S*)-2-(6-bromo-3-(2-chlorophenyl)-1*H*-inden-1-yl)-1-(2-methoxyphenyl)ethan-1-one (6x)

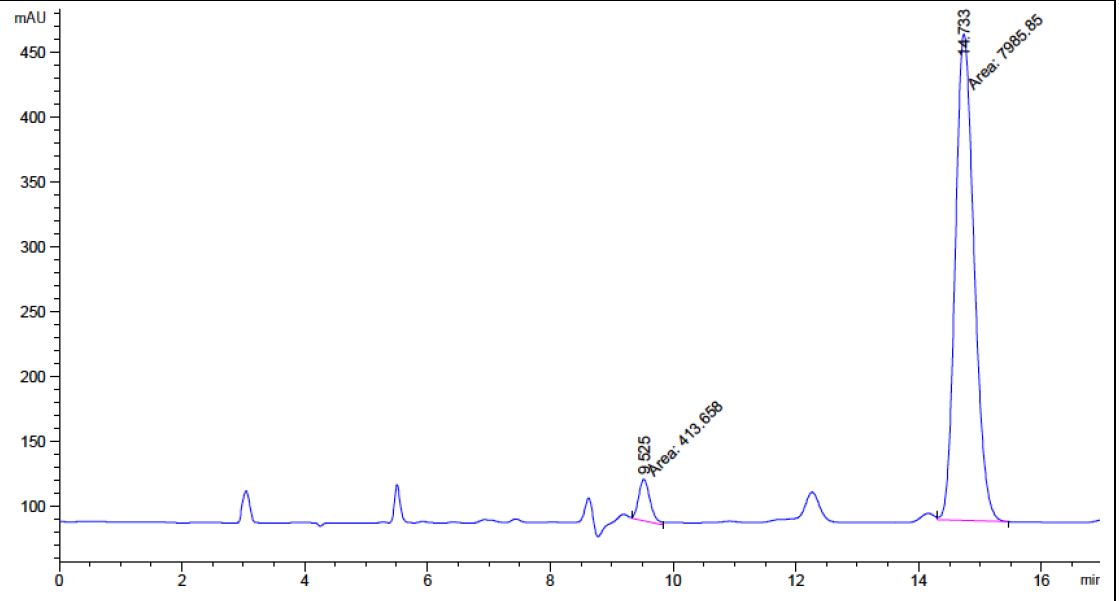






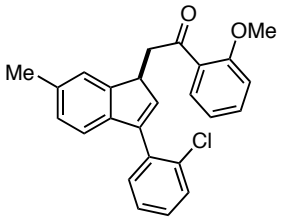


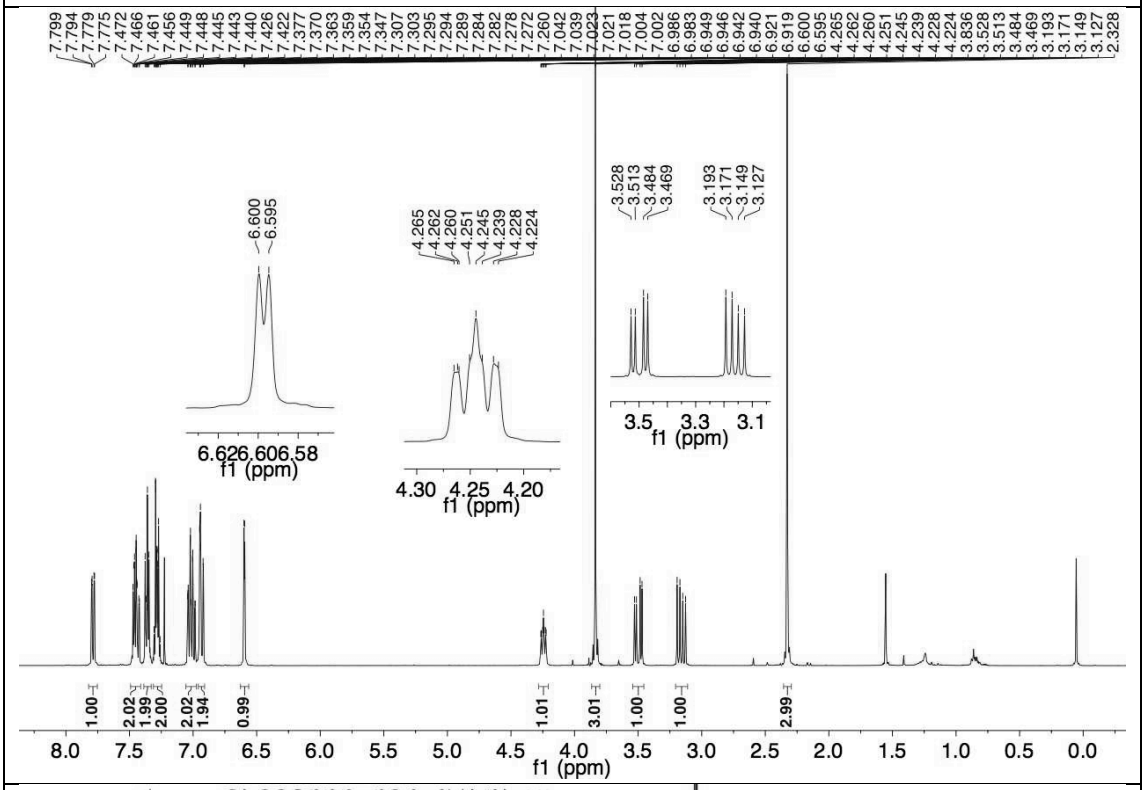
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	9.595	MM	0.2140	3698.56396	288.09210	49.4210
2	14.871	MM	0.3560	3785.22559	177.20154	50.5790

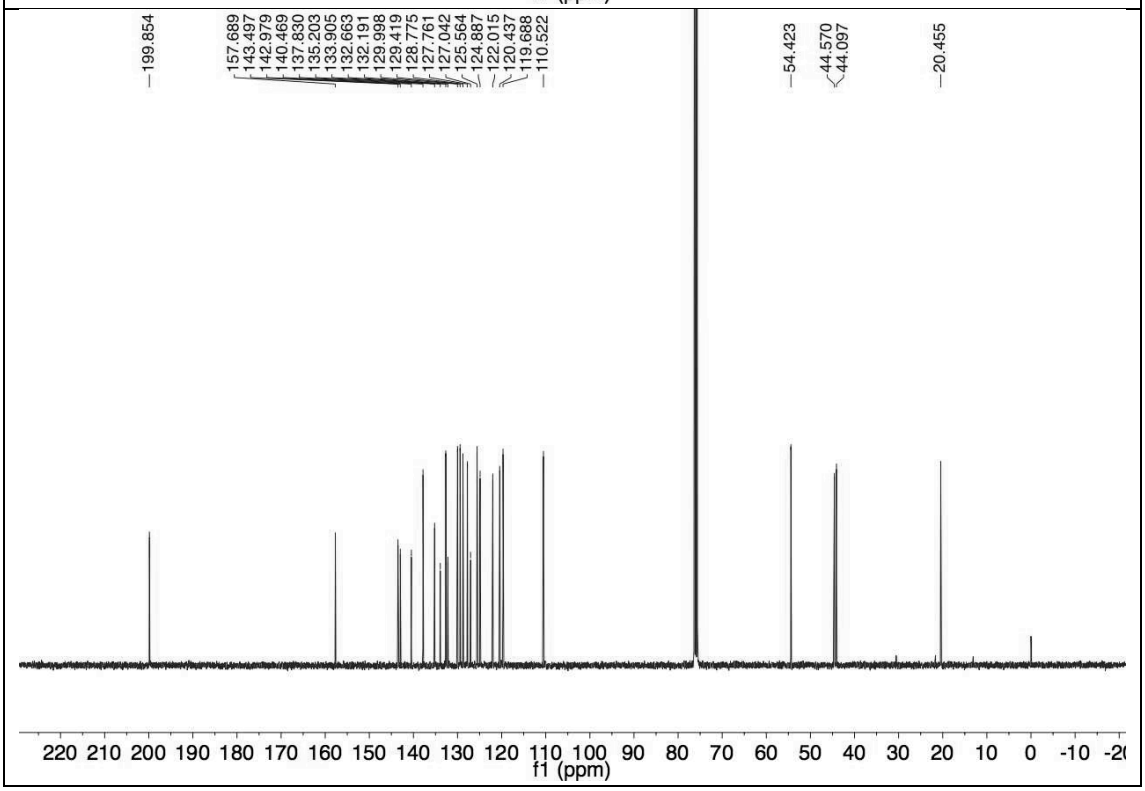


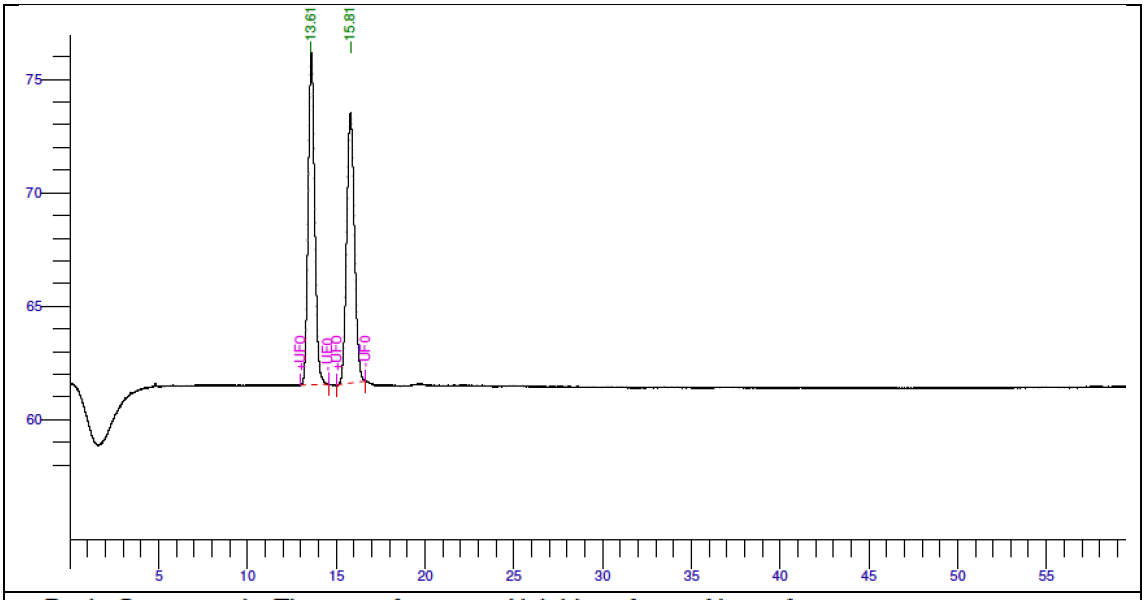
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	9.525	MM	0.2153	413.65842	32.01464	4.9248
2	14.733	MM	0.3548	7985.85010	375.12790	95.0752

(*S*)-2-(3-(2-chlorophenyl)-6-methyl-1*H*-inden-1-yl)-1-(2-methoxyphenyl)ethan-1-one (6y)

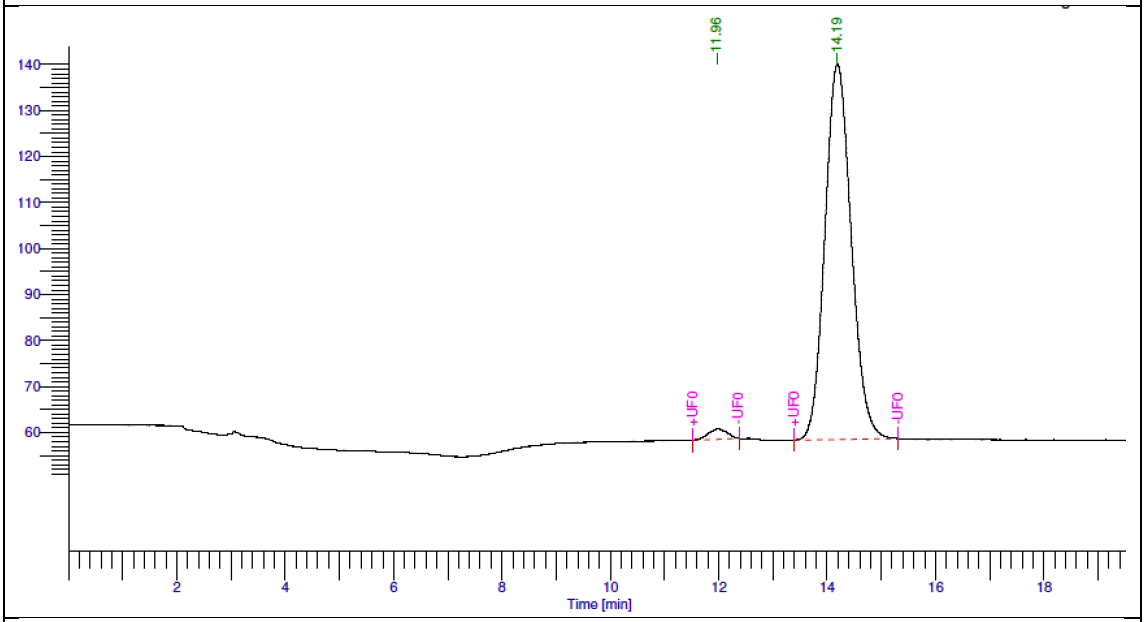






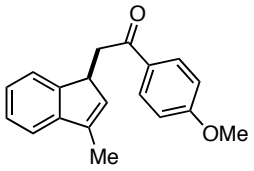


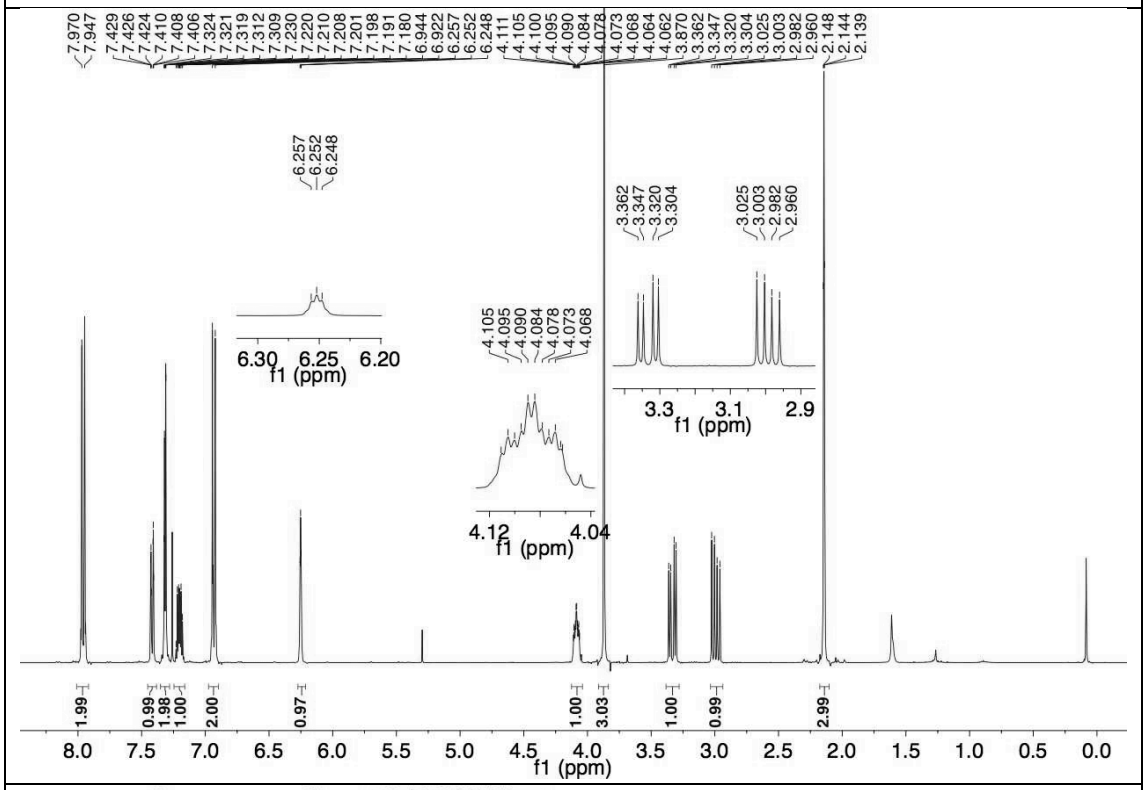
Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		13.605	375965.01	14645.21	50.73	50.73
2		15.813	365192.14	11906.81	49.27	49.27
			741157.16	26552.02	100.00	100.00

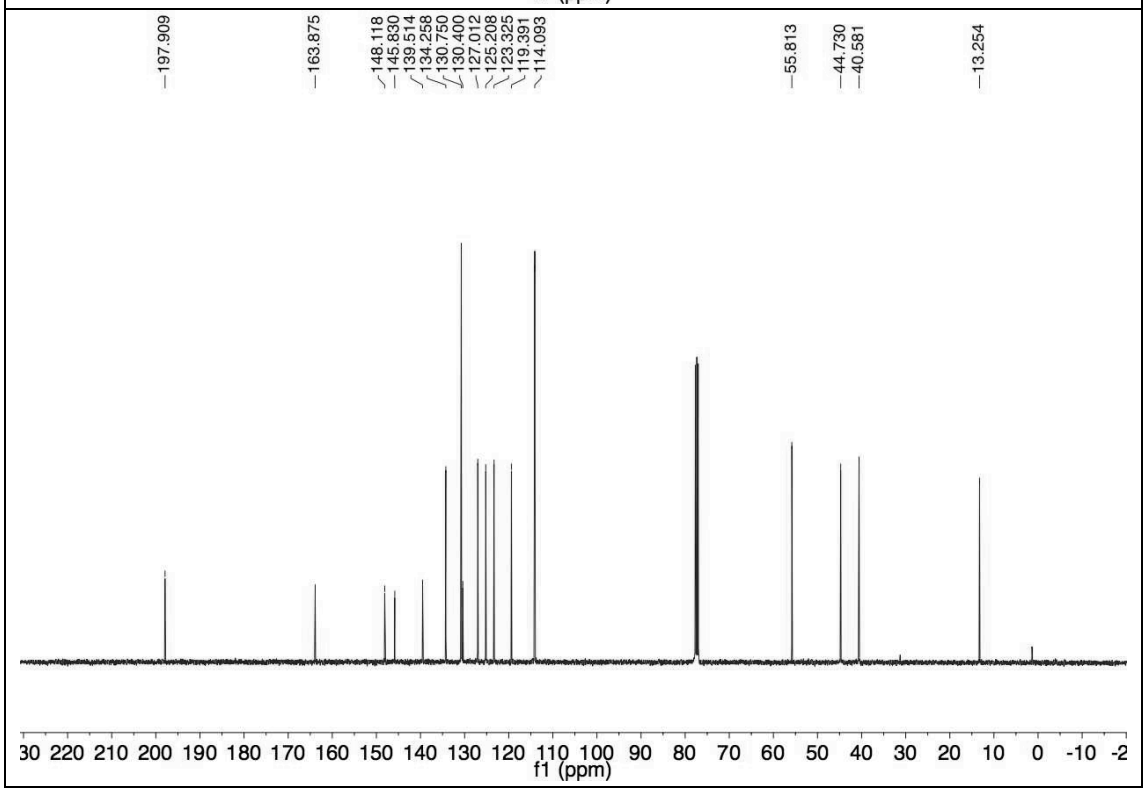


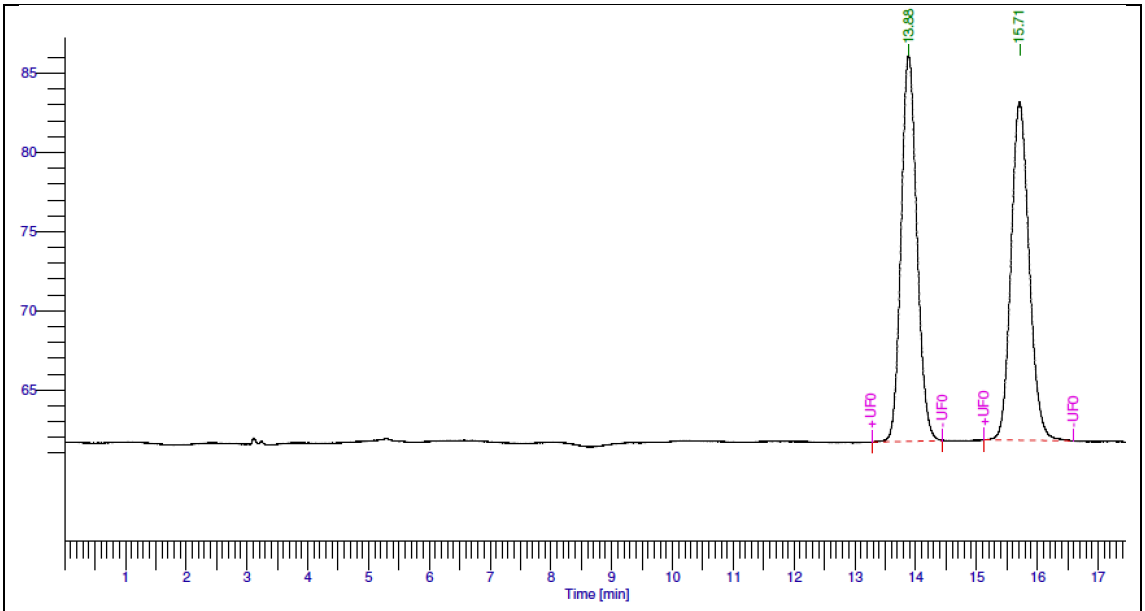
Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		11.962	54532.50	2215.77	1.94	1.94
2		14.187	2754005.64	81593.85	98.06	98.06
			2808538.15	83809.62	100.00	100.00

(*S*)-1-(4-methoxyphenyl)-2-(3-methyl-1*H*-inden-1-yl)ethan-1-one (6z)

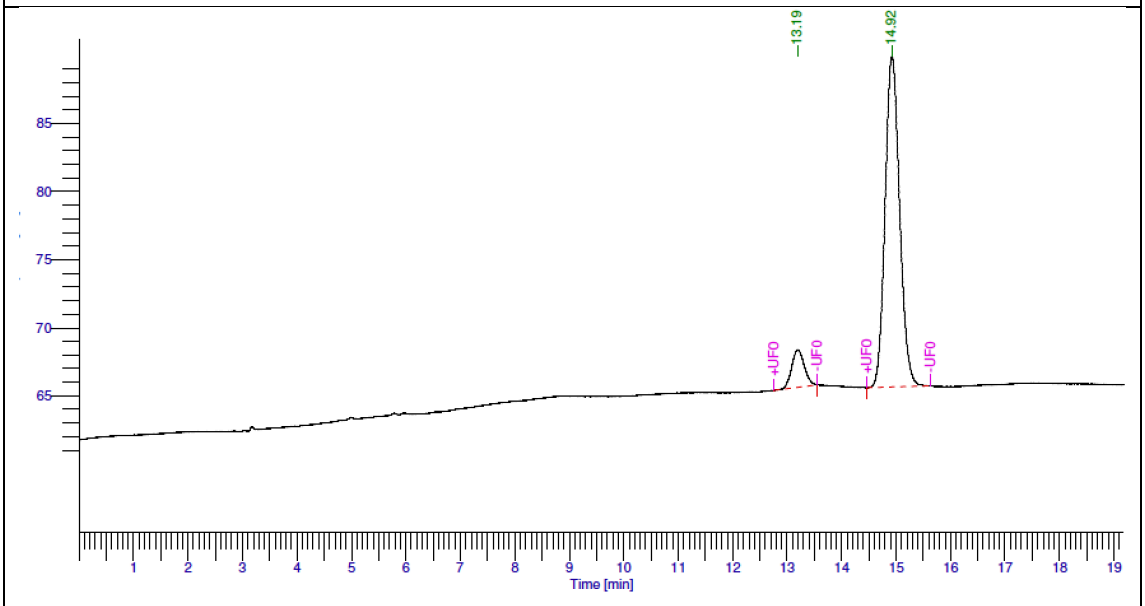






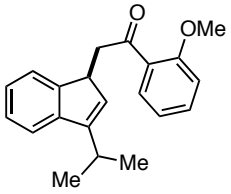


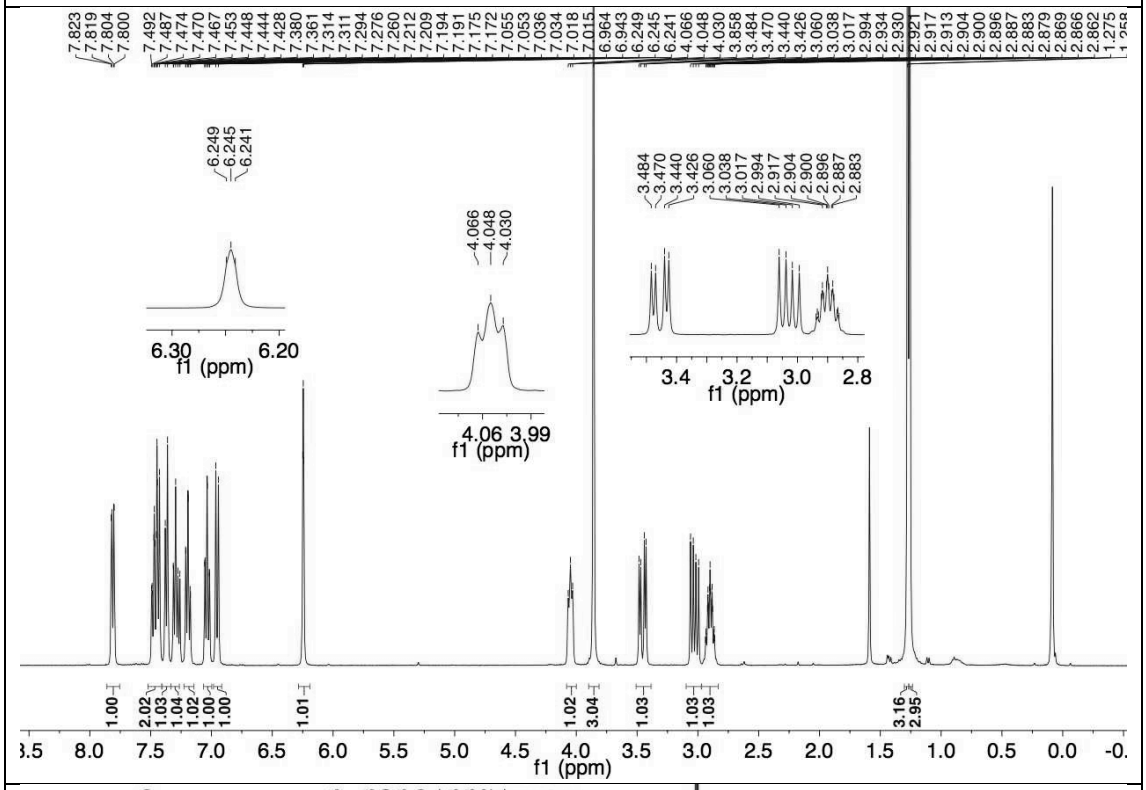
Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]	BL	Raw Amount	Adjusted Amount
1		13.882	439469.63	24368.48	49.86	49.86	MM	0.4395	0.4395
2		15.708	442020.51	21330.51	50.14	50.14	MM	0.4420	0.4420
			881490.14	45698.99	100.00	100.00		0.8815	0.8815

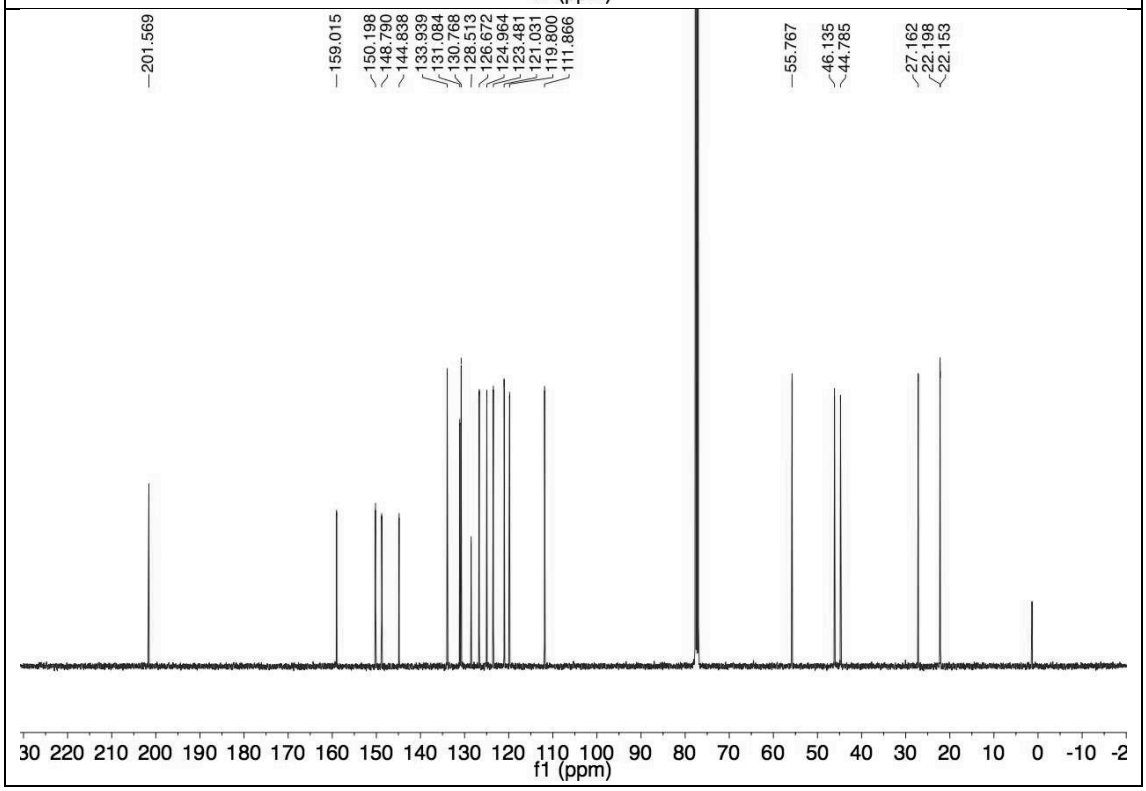


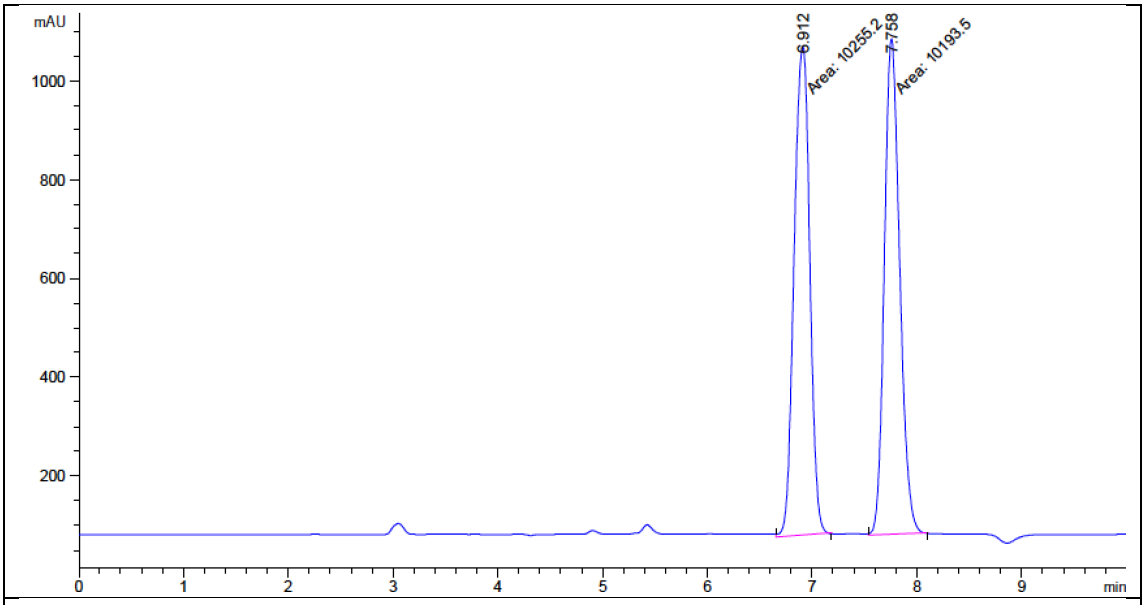
Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		13.190	44438.16	2761.50	8.99	8.99
2		14.922	450105.16	24288.94	91.01	91.01
			494543.31	27050.44	100.00	100.00

2-(3-Isopropyl-1*H*-inden-1-yl)-1-(2-methoxyphenyl)ethan-1-one (6za)

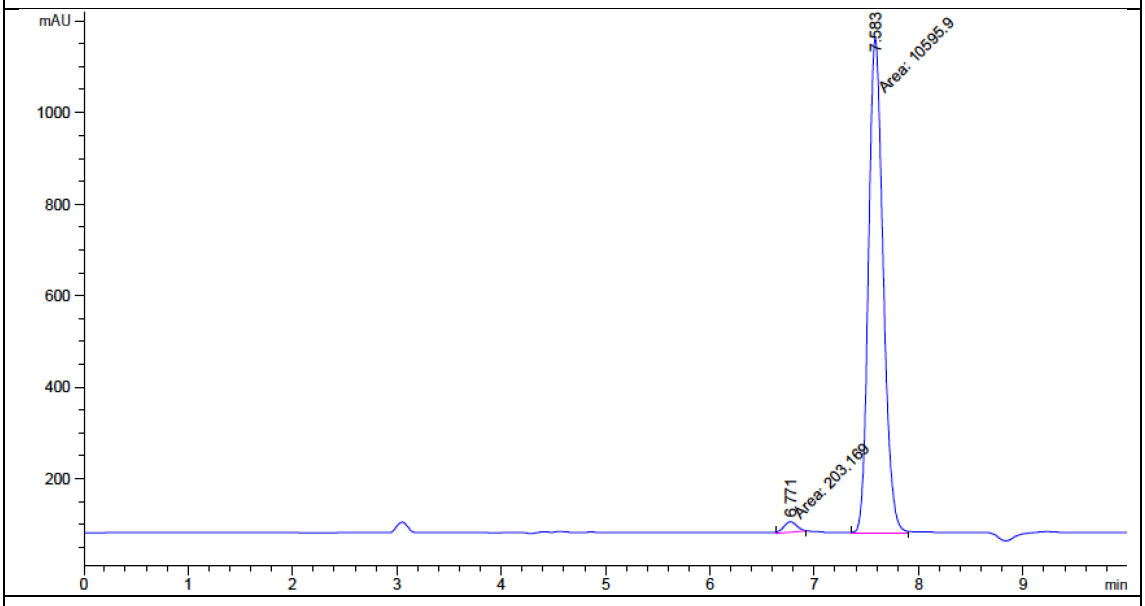






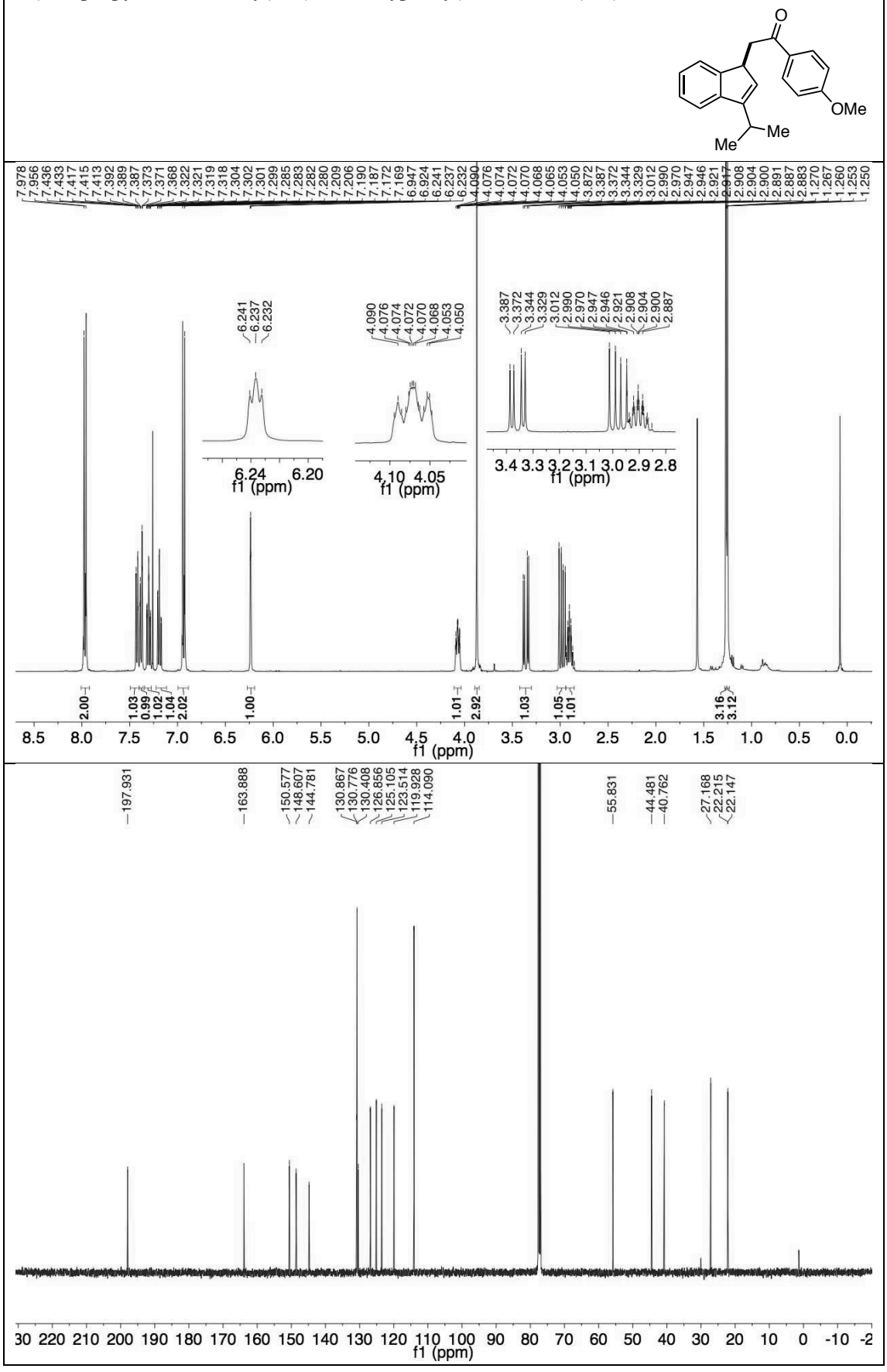


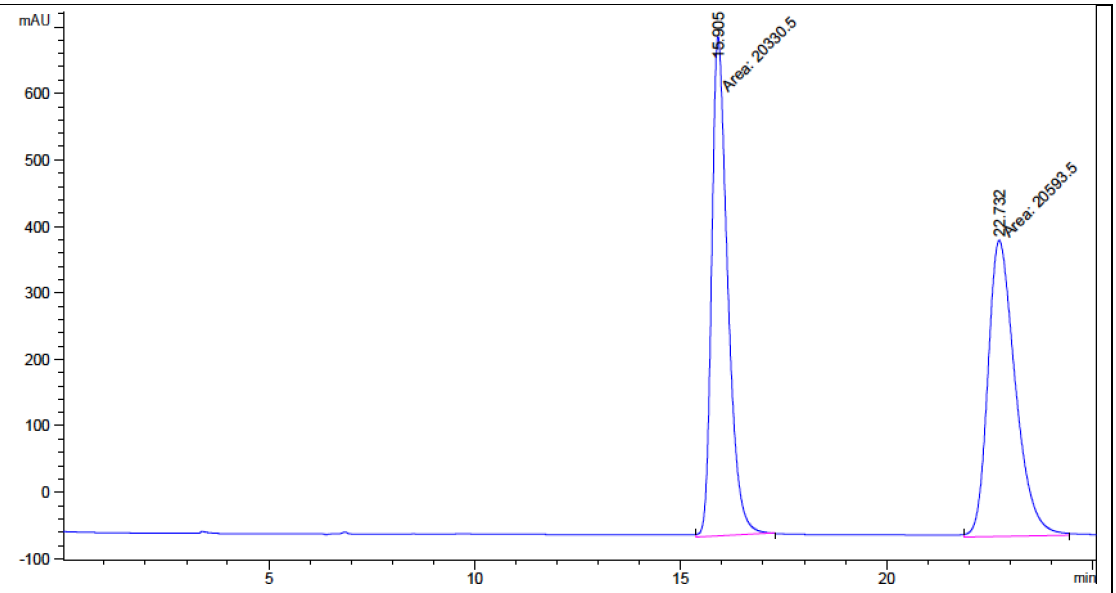
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	6.912	MM	0.1727	1.02552e4	989.56256	50.1509
2	7.758	MM	0.1693	1.01935e4	1003.46320	49.8491



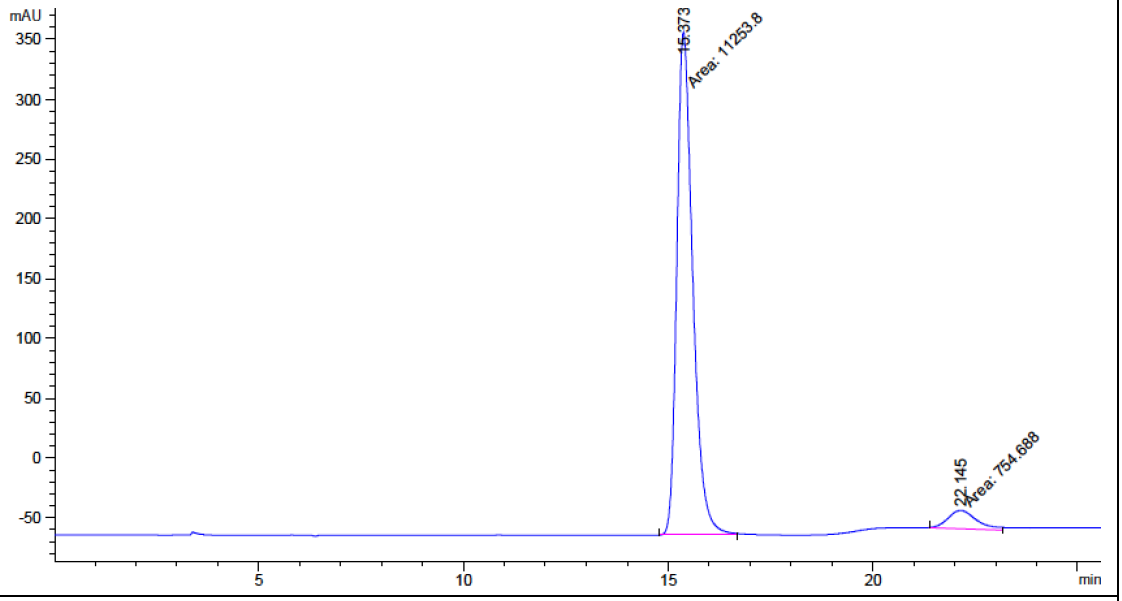
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	6.771	MM	0.1458	203.16879	23.22373	1.8814
2	7.583	MM	0.1628	1.05959e4	1084.53125	98.1186

2-(3-isopropyl-1*H*-inden-1-yl)-1-(4-methoxyphenyl)ethan-1-one (6zb)



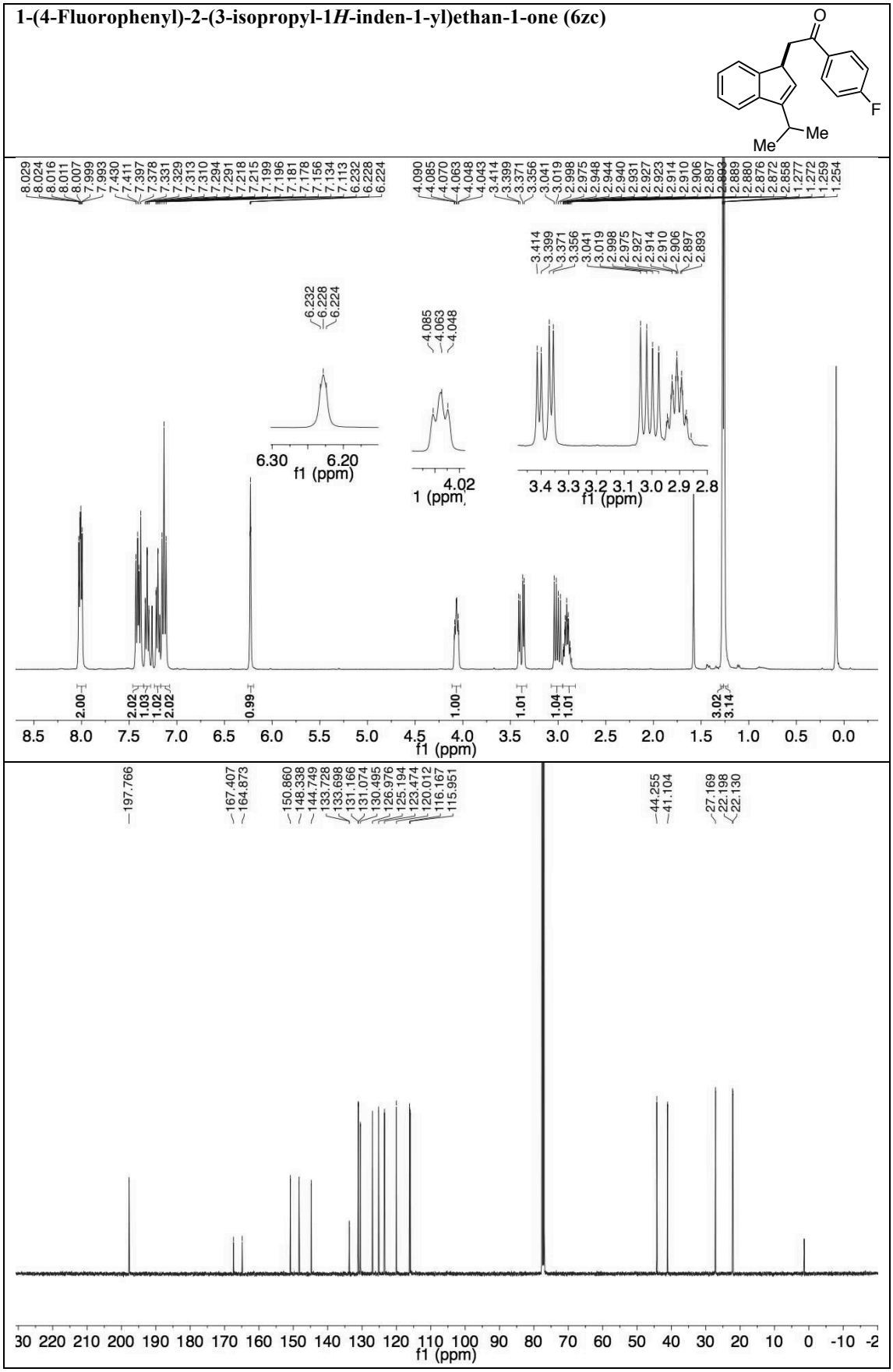


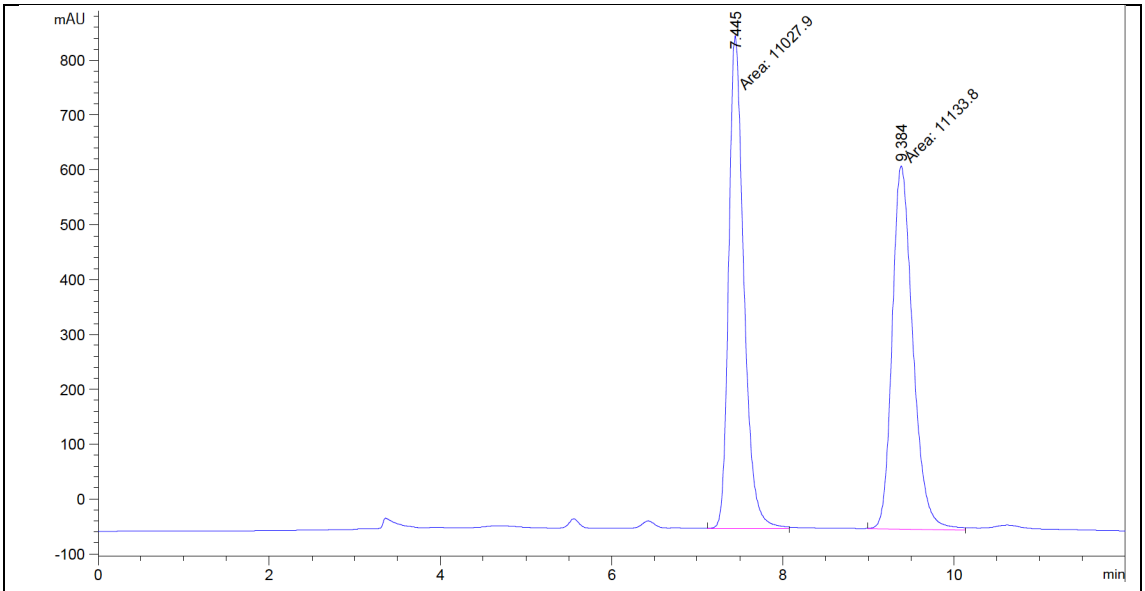
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	15.905	MM	0.4512	2.03305e4	751.05444	49.6786
2	22.732	MM	0.7711	2.05935e4	445.12570	50.3214



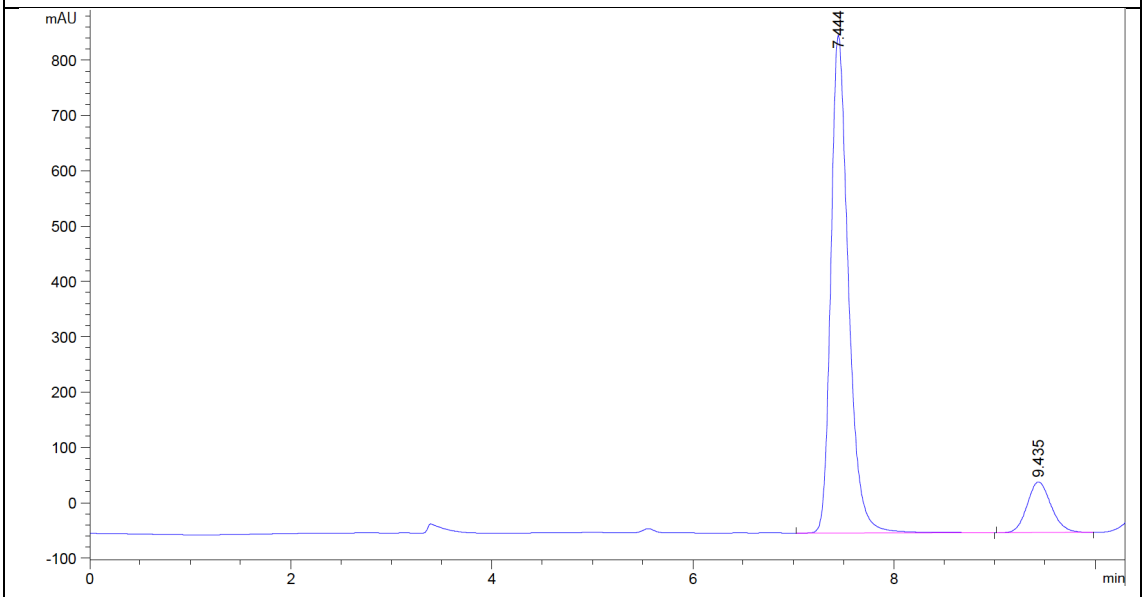
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	15.373	MM	0.4470	1.12538e4	419.65179	93.7154
2	22.145	MM	0.8154	754.68756	15.42496	6.2846

1-(4-Fluorophenyl)-2-(3-isopropyl-1*H*-inden-1-yl)ethan-1-one (6zc)



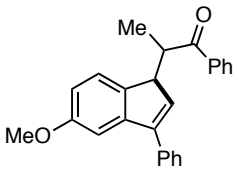


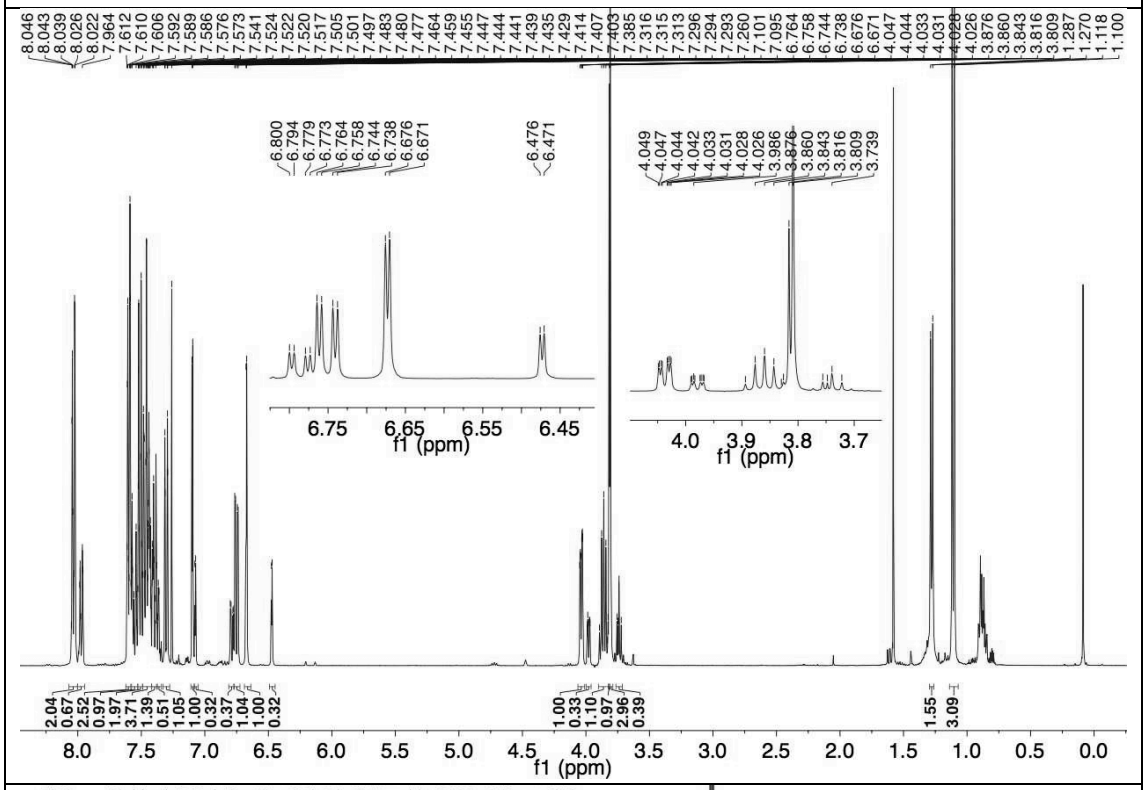
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	7.445	MM	0.2045	1.10279e4	898.91943	49.7613
2	9.384	MM	0.2803	1.11338e4	661.97217	50.2387

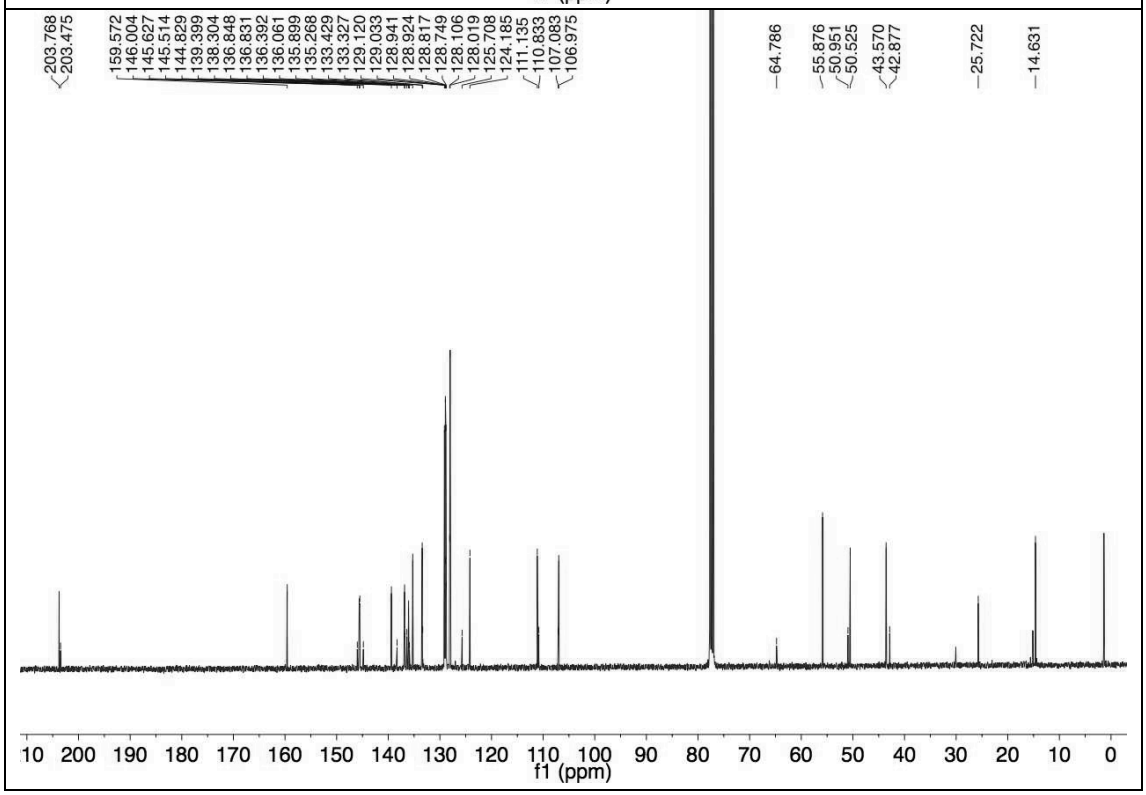


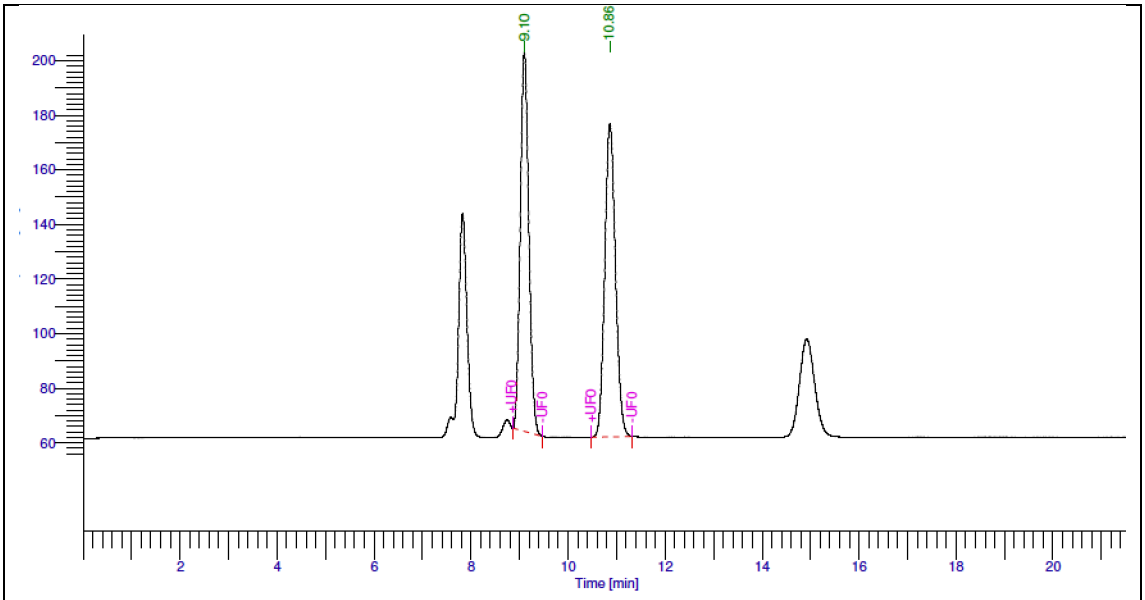
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	7.444	BB	0.1837	1.09322e4	899.81934	87.8191
2	9.435	BB	0.2549	1516.34888	91.71288	12.1809

2-(5-Methoxy-3-phenyl-1*H*-inden-1-yl)-1-phenylpropan-1-one (6zd)

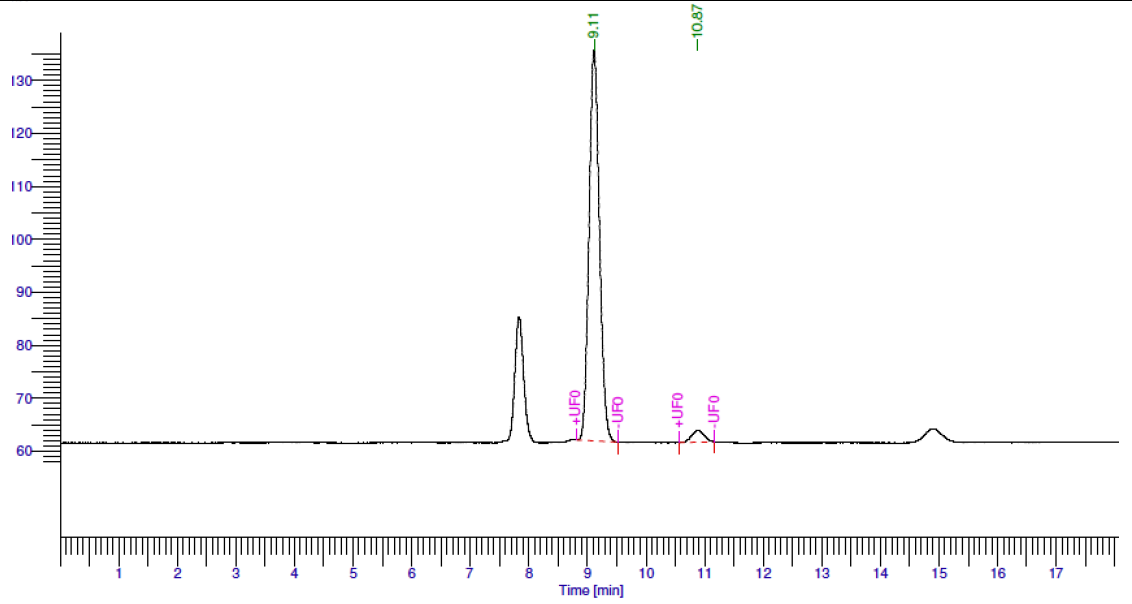






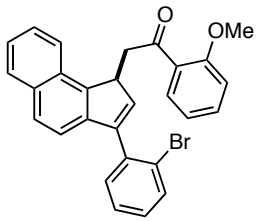


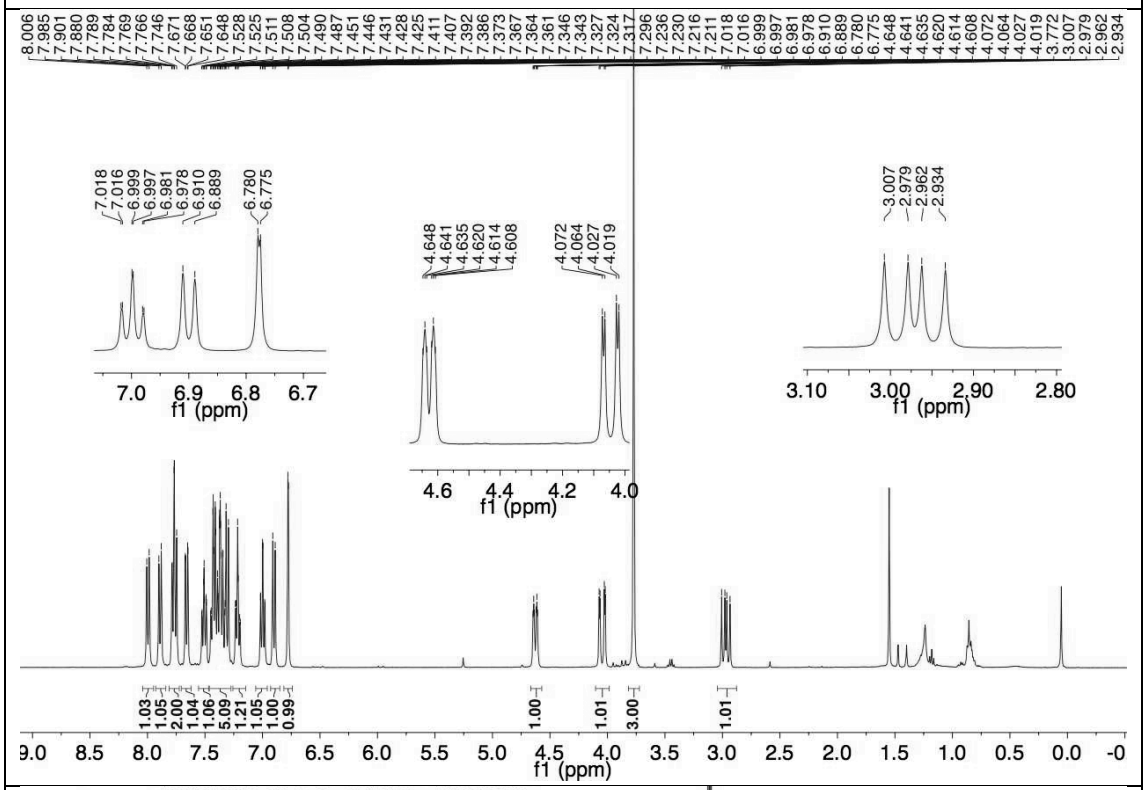
Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		9.098	1702813.88	138962.57	49.18	49.18
2		10.863	1759320.46	114677.53	50.82	50.82
			3462134.34	253640.09	100.00	100.00

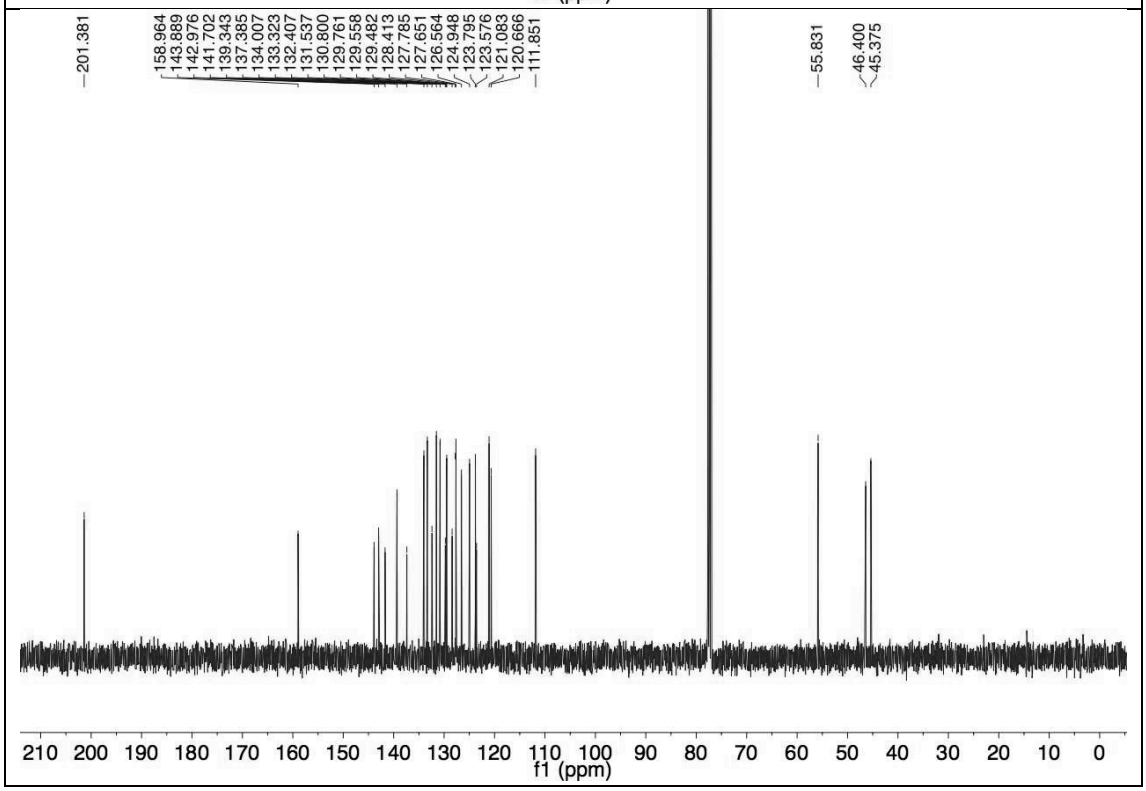


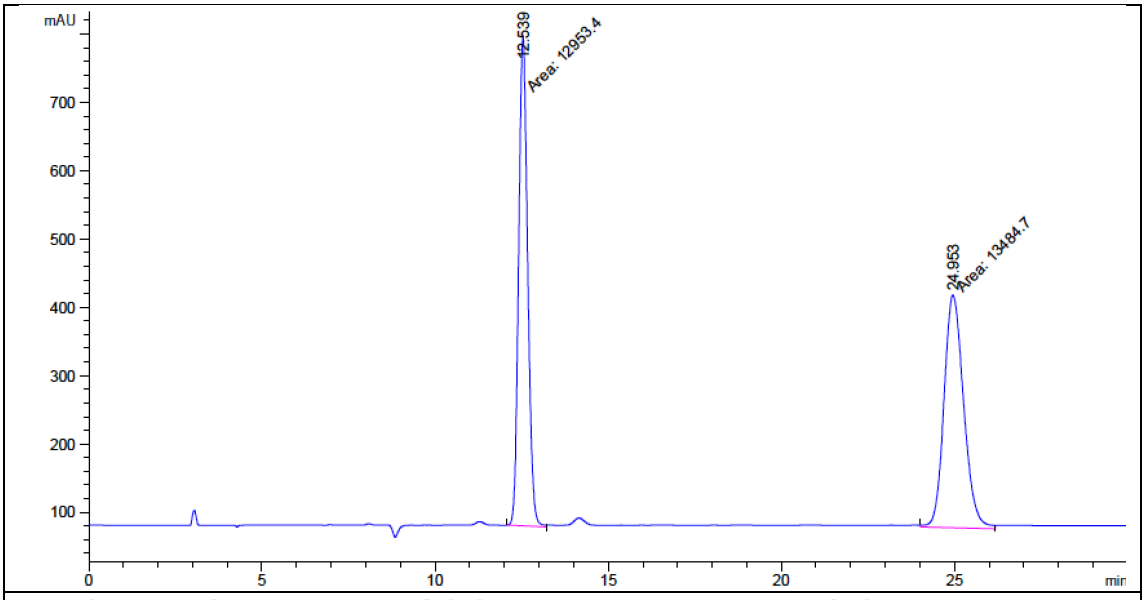
Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		9.113	913291.97	73660.01	96.57	96.57
2		10.873	32446.08	2208.46	3.43	3.43
			945738.05	75868.47	100.00	100.00

(*S*)-2-(3-(2-bromophenyl)-1*H*-cyclopenta[*a*]naphthalen-1-yl)-1-(2-methoxyphenyl)ethan-1-one (6ze)

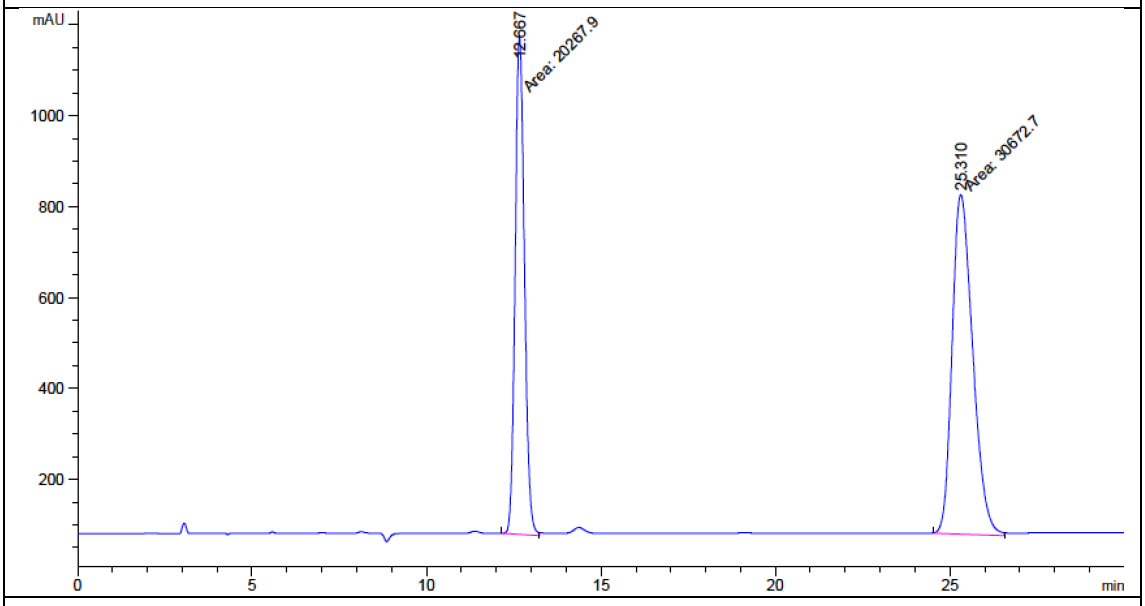






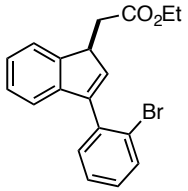


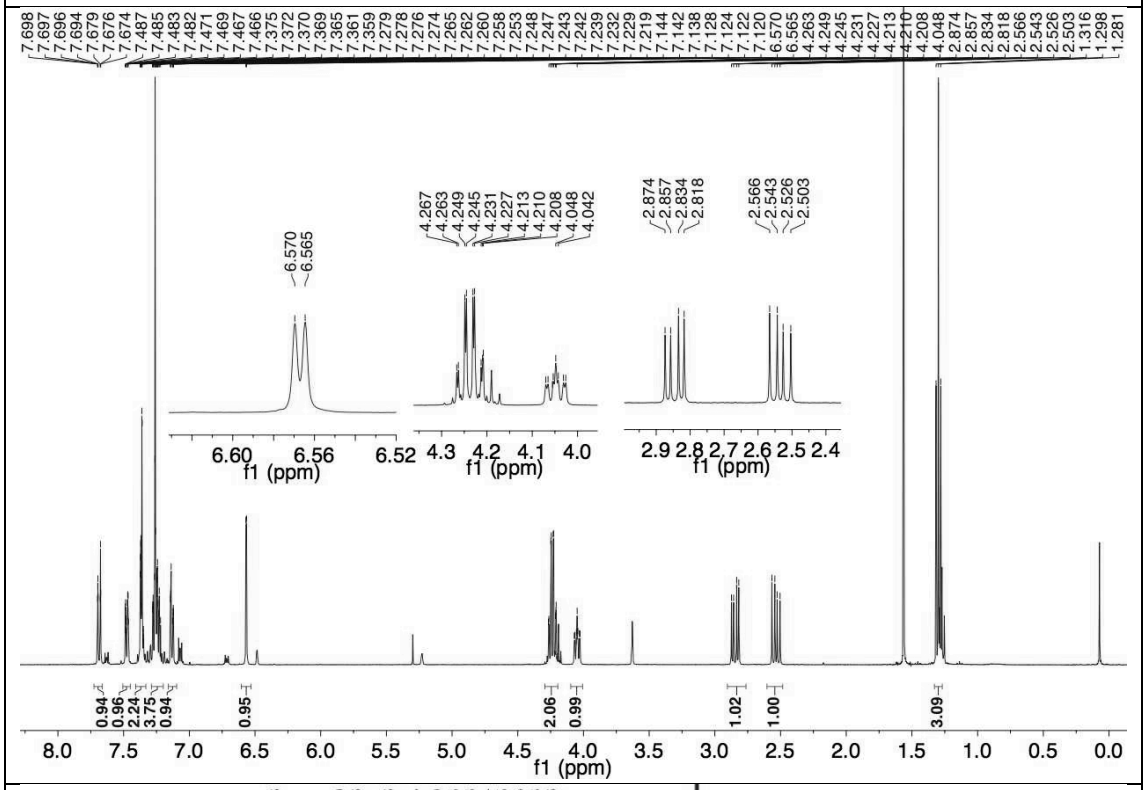
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.539	MM	0.3020	1.29534e4	714.94733	48.9953
2	24.953	MM	0.6601	1.34847e4	340.47217	51.0047

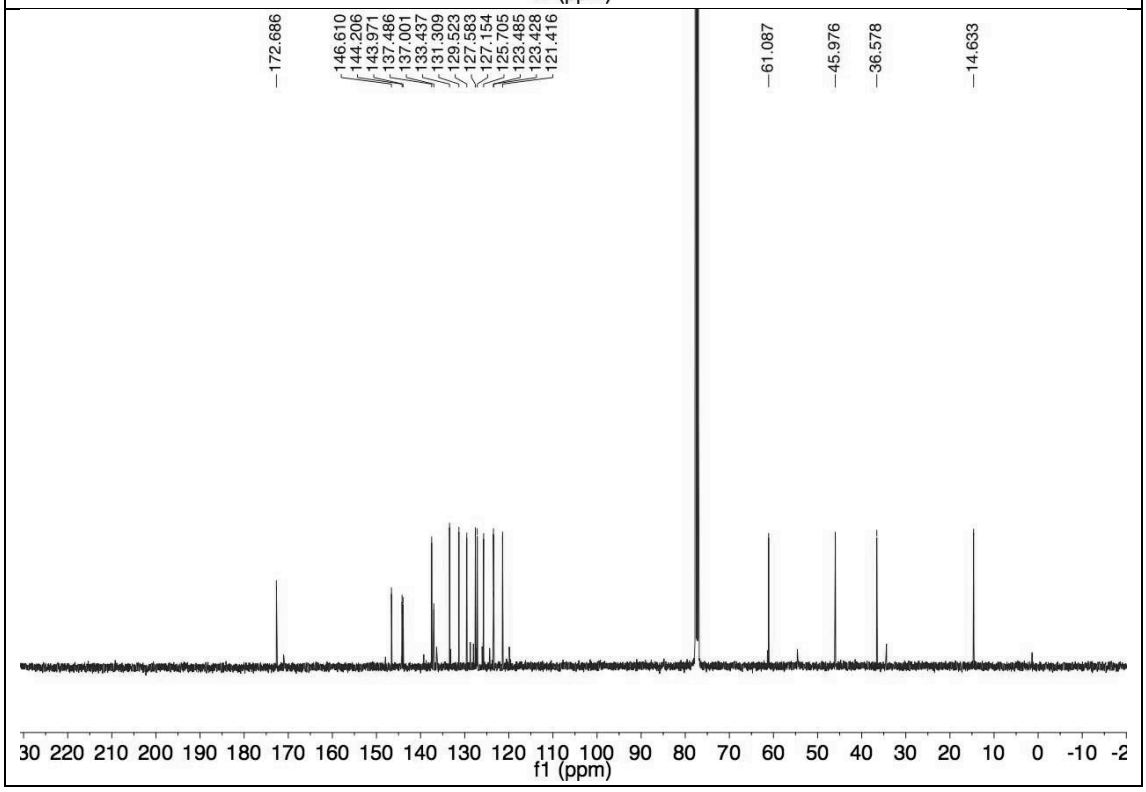


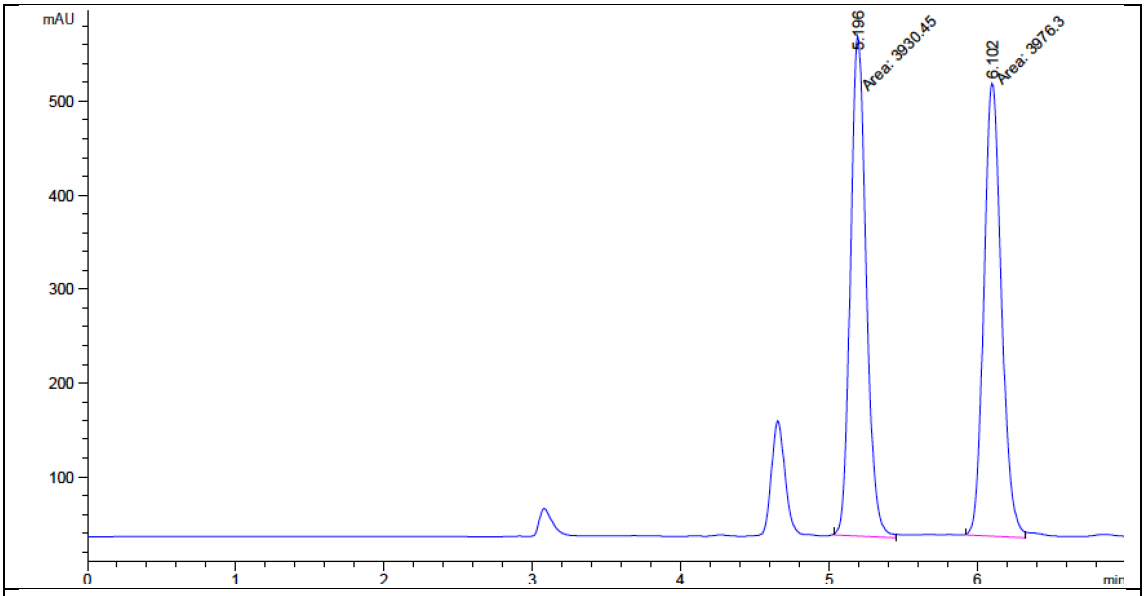
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.667	MM	0.3084	2.02679e4	1095.17725	39.7874
2	25.310	MM	0.6842	3.06727e4	747.13300	60.2126

Ethyl (*S*)-2-(3-(2-bromophenyl)-1*H*-inden-1-yl)acetate (12)

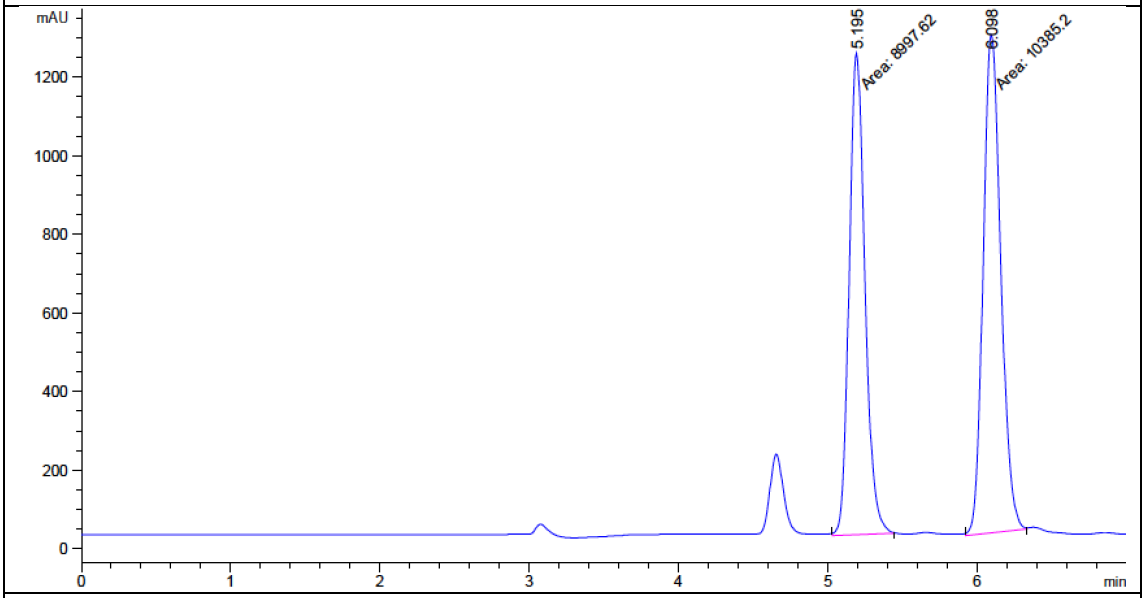






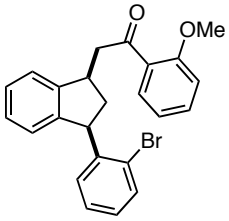


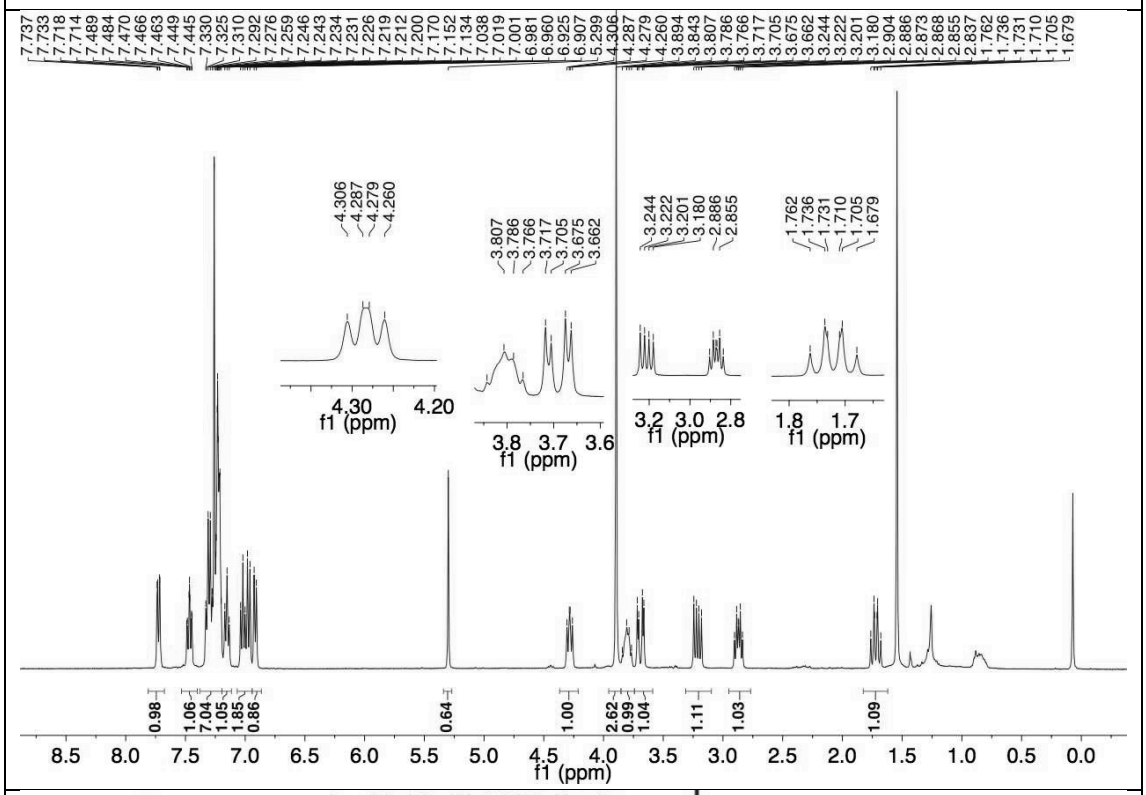
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	5.196	MM	0.1230	3930.44946	532.77789	49.7101
2	6.102	MM	0.1374	3976.29858	482.41324	50.2899

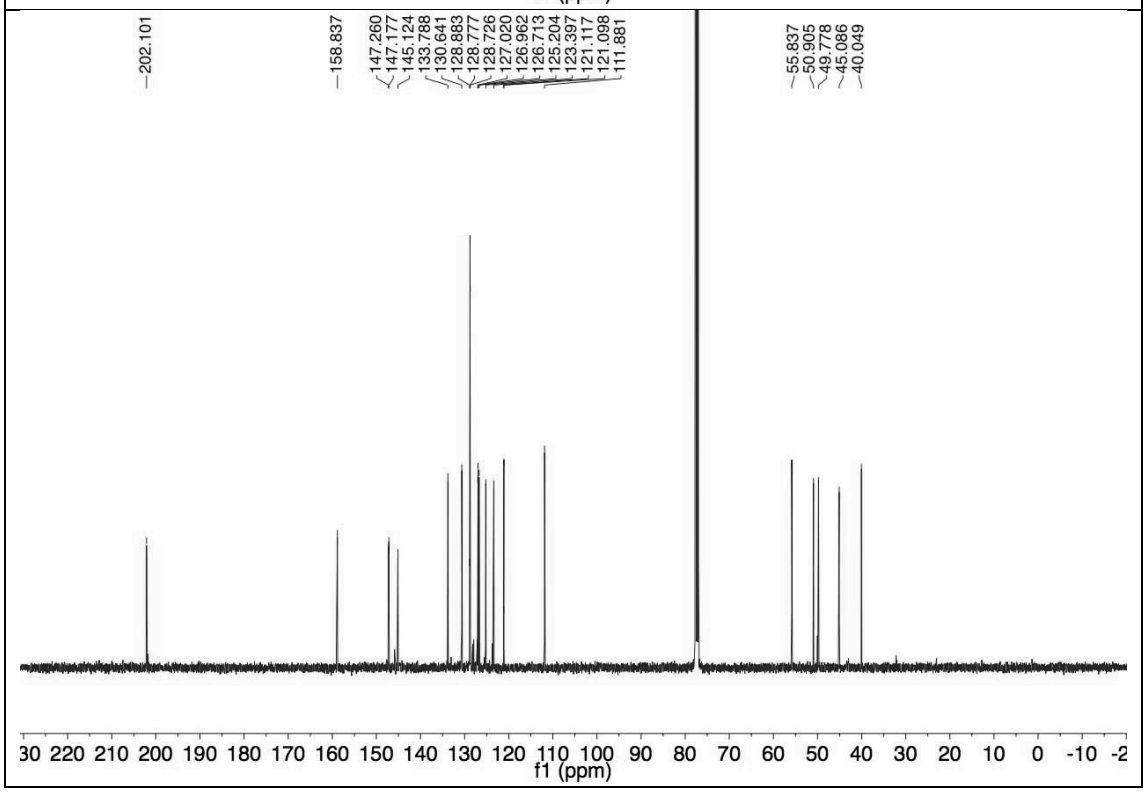


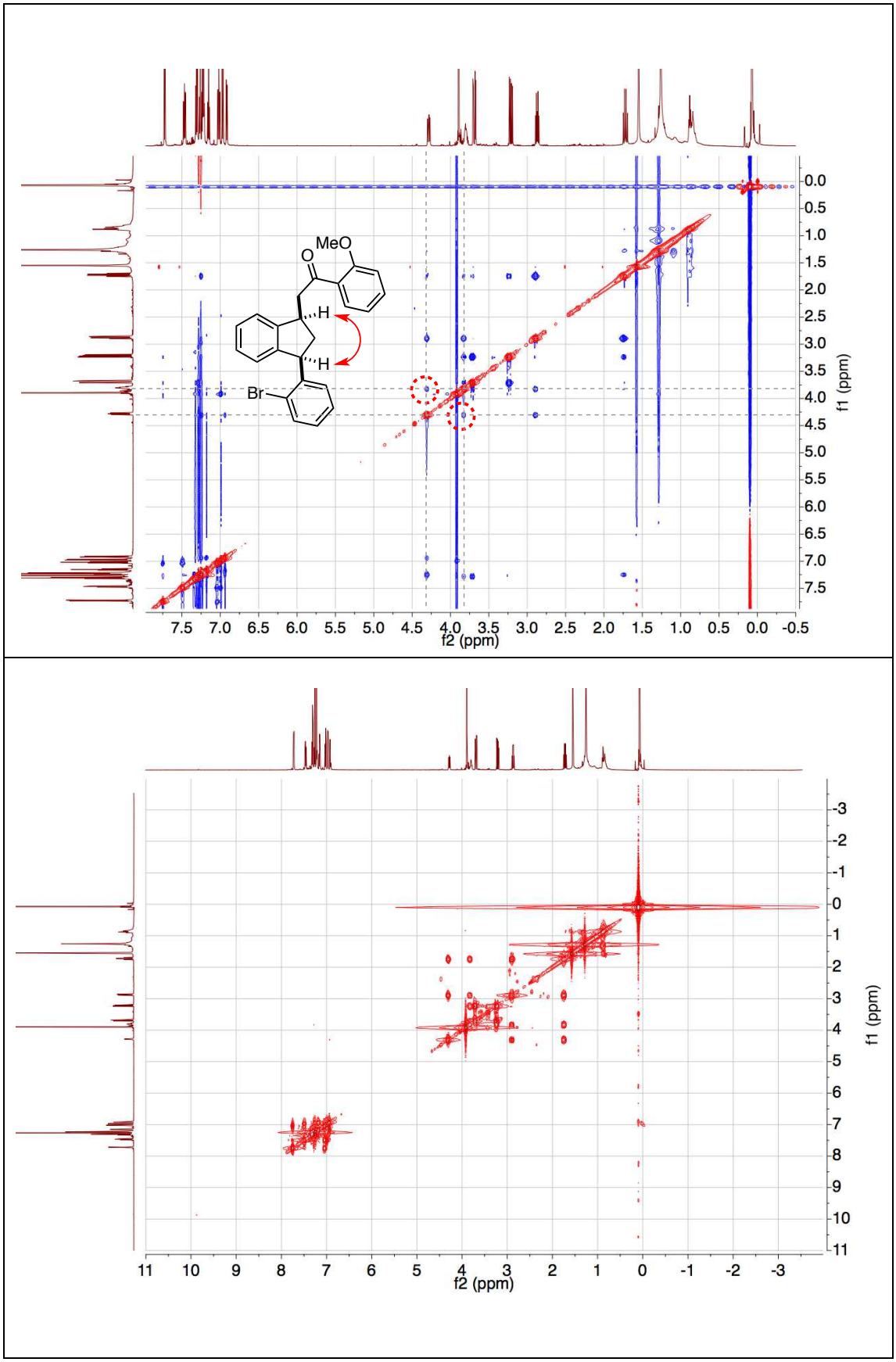
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	5.195	MM	0.1223	8997.61914	1225.68823	46.4205
2	6.098	MM	0.1364	1.03852e4	1268.57898	53.5795

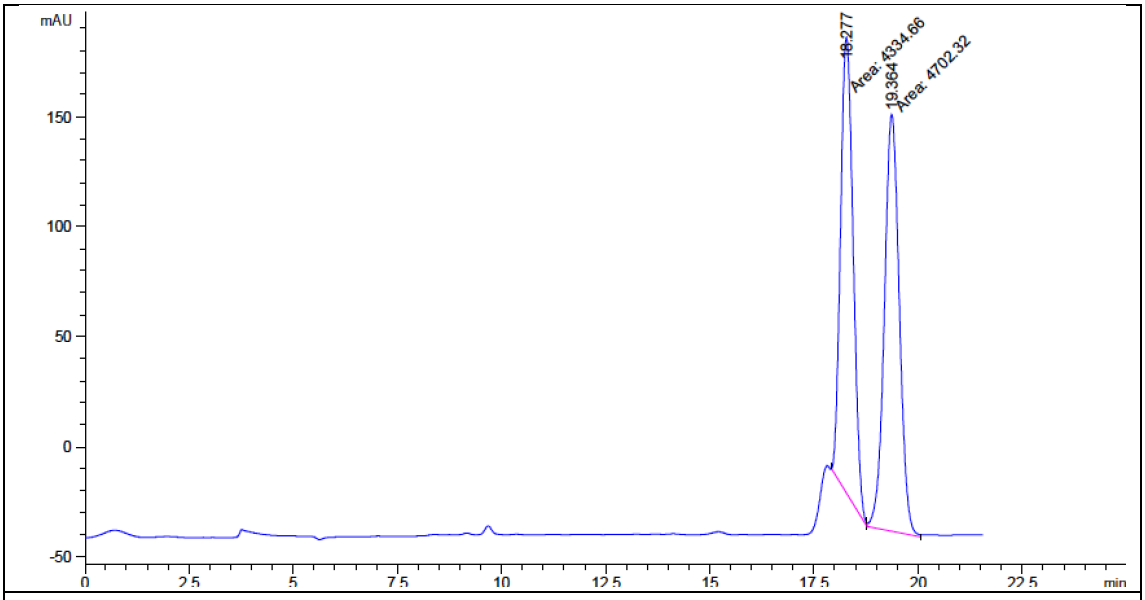
2-((1*R*,3*R*)-3-(2-bromophenyl)-2,3-dihydro-1*H*-inden-1-yl)-1-(2-methoxyphenyl)ethan-1-one (9c)



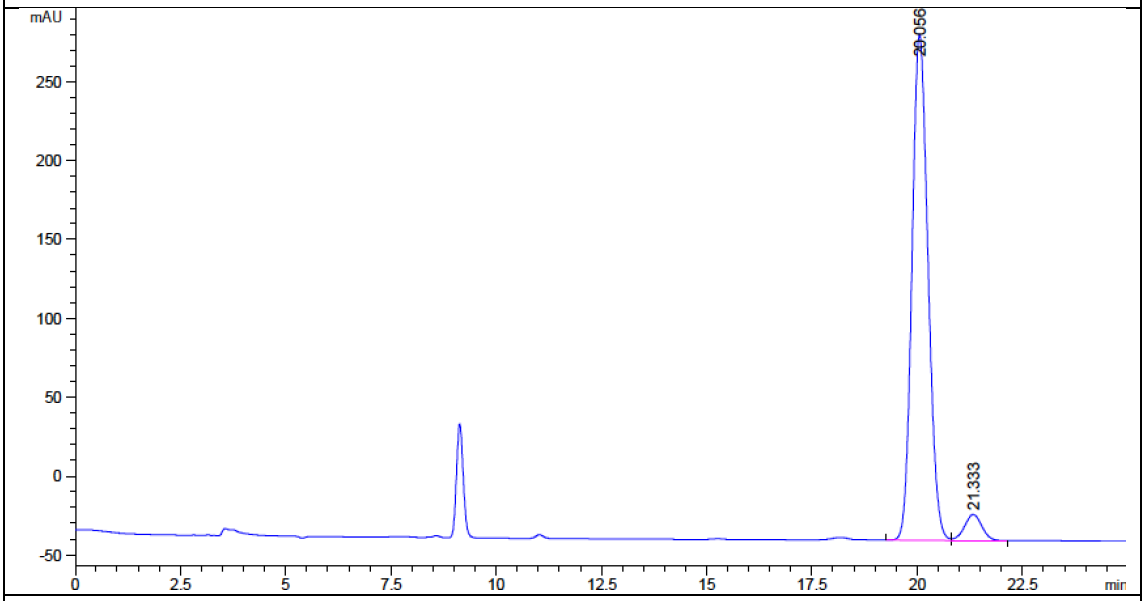





MeO
O
H
H
Br
f1 (ppm)
f2 (ppm)
f1 (ppm)
f2 (ppm)

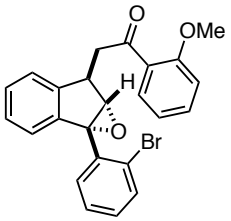


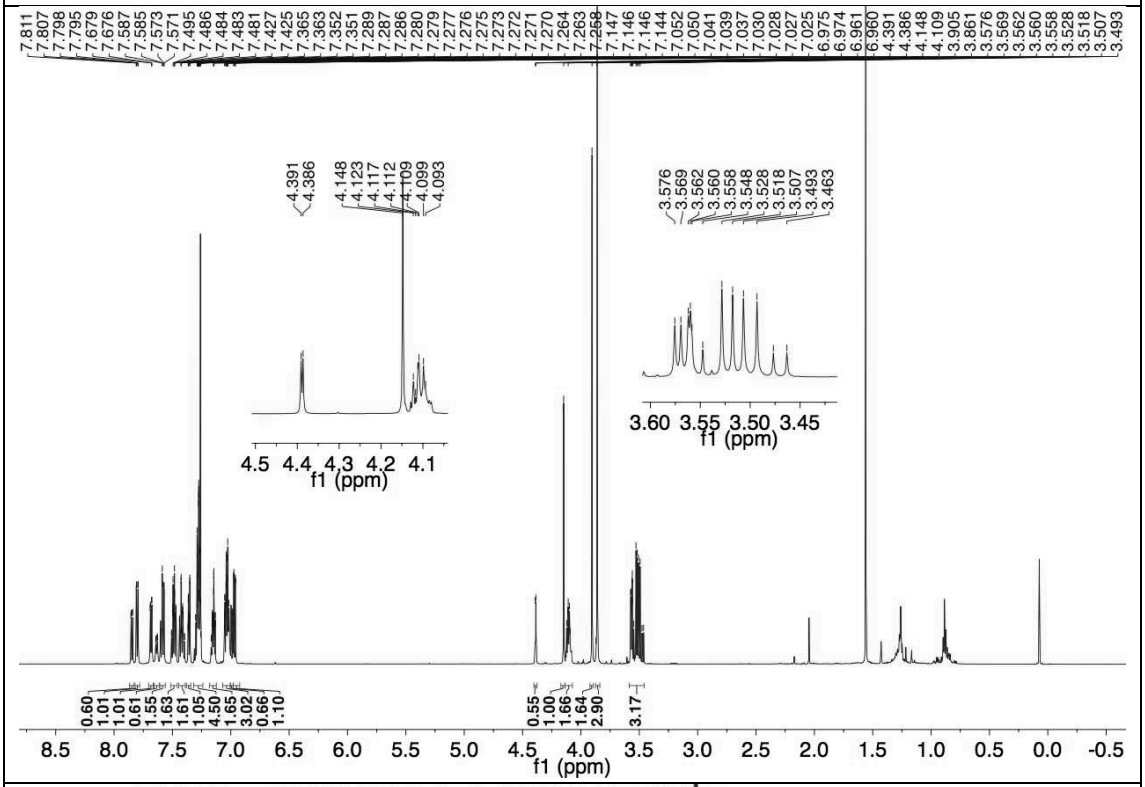
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	18.277	MM	0.3494	4334.65918	206.78624	47.9658
2	19.364	MM	0.4142	4702.31689	189.21019	52.0342

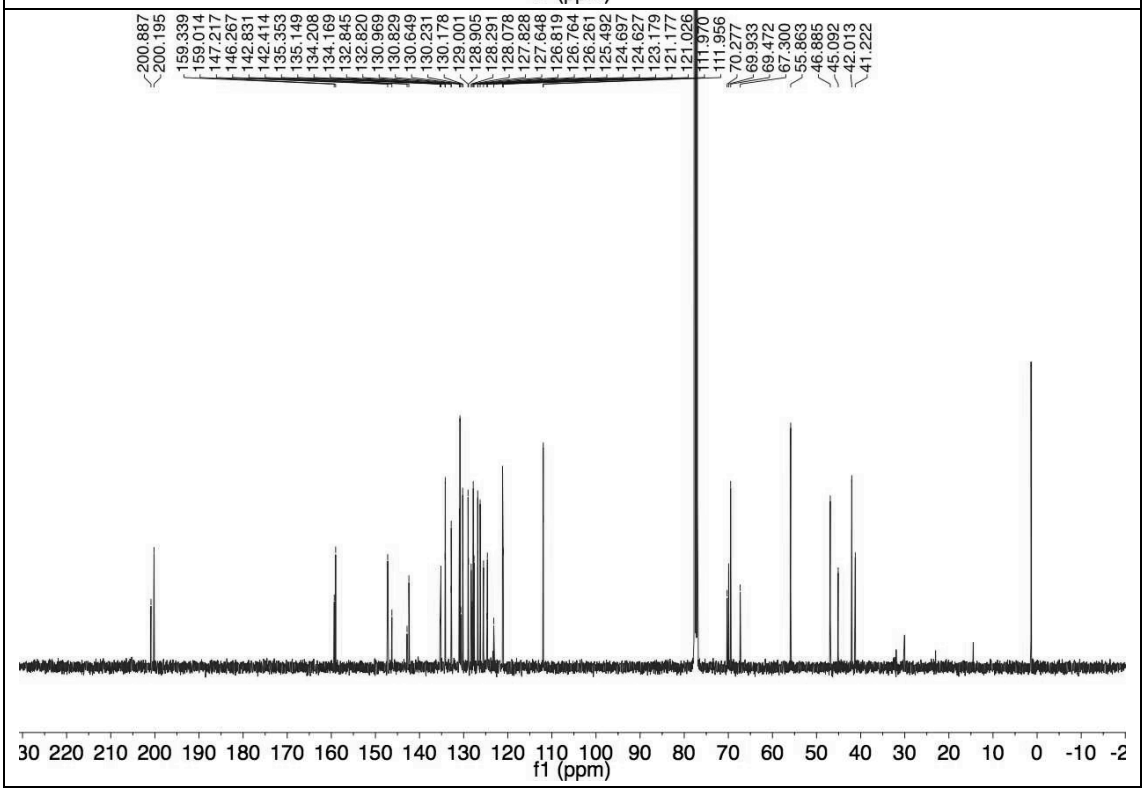


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	20.056	BV	0.4122	8475.44238	320.81369	94.7718
2	21.333	VB	0.4426	467.56198	16.39907	5.2282

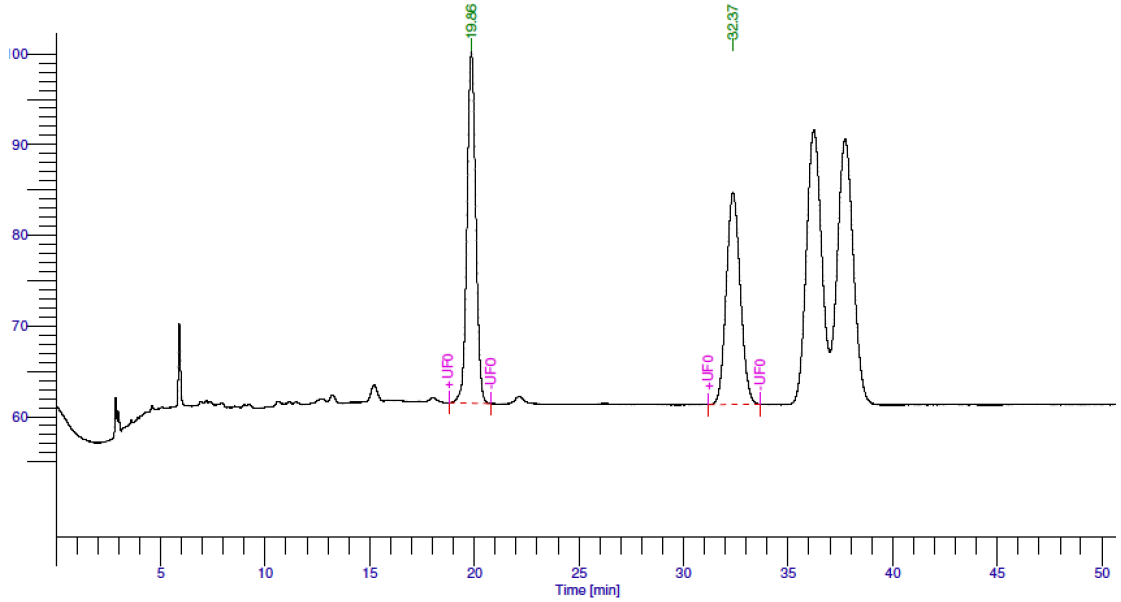
2-((1a*S*,6*R*,6a*S*)-1a-(2-bromophenyl)-1a,6a-dihydro-6*H*-indeno[1,2-*b*]oxiren-6-yl)-1-(2-methoxyphenyl)ethan-1-one (10c)



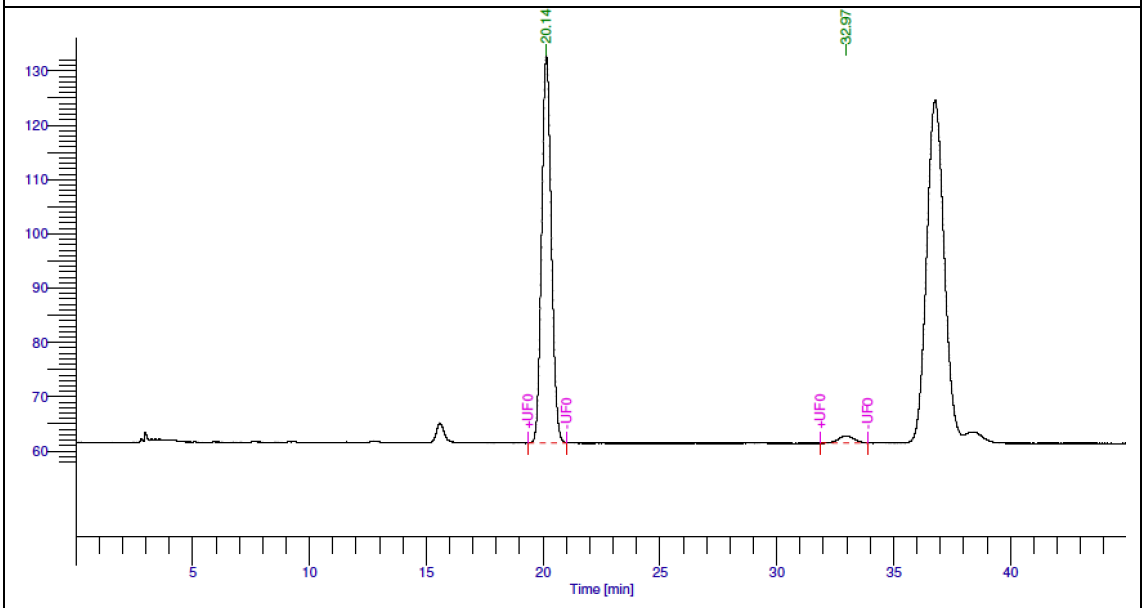




Isomer 1:

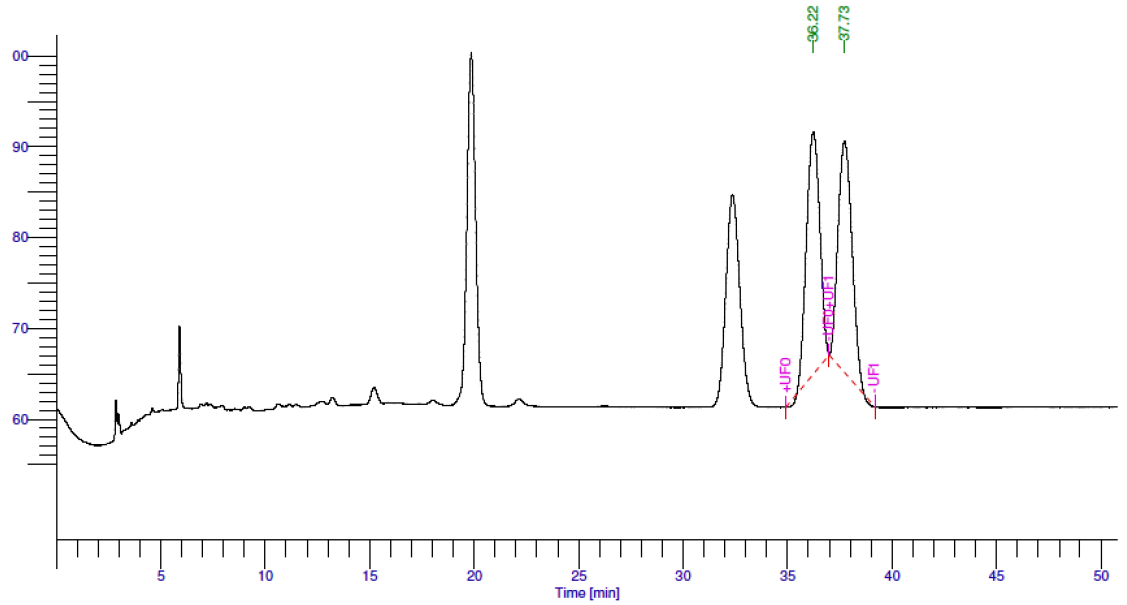


Time [min]	Area [uV*sec]	Height [uV]	Area [%]
19.862	1120356.35	38857.59	50.73
32.372	1087949.70	23329.71	49.27
	2208306.05	62187.31	100.00

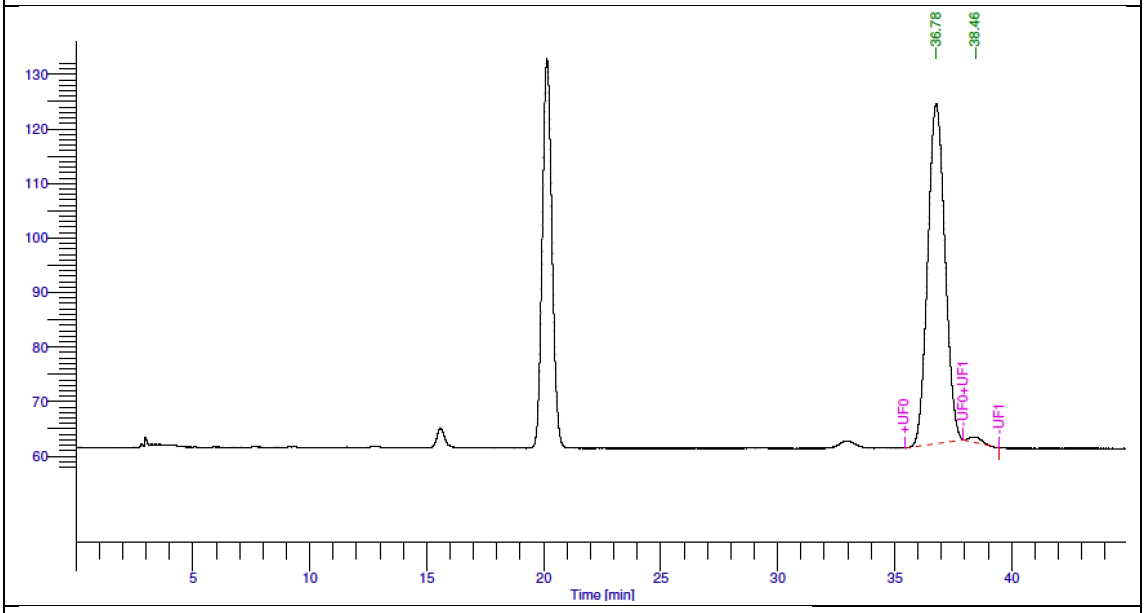


Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
20.140	2048745.25	71373.64	97.11	97.11
32.970	61018.72	1303.46	2.89	2.89
	2109763.97	72677.10	100.00	100.00

Isomer 2:



Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
36.220	1187908.15	26640.82	49.98	49.98
37.732	1188630.93	25481.21	50.02	50.02
	2376539.08	52122.03	100.00	100.00



Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
36.777	3184901.65	62267.04	98.90	98.90
38.457	35373.05	1017.84	1.10	1.10
	3220274.71	63284.87	100.00	100.00