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Supporting Information

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Enantioselective Intramolecular Michael Reaction Catalyzed by *N*-Hetercyclic Carbenes

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General Information

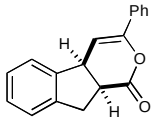
All reactions were carried out under a nitrogen atmosphere in flame-dried glassware with magnetic stirring. CH_2Cl_2 was purified by passage through a bed of activated alumina.[1] Reagents were purified prior to use unless otherwise stated following the guidelines of Perrin and Armarego.[2] Purification of reaction products was carried out by flash chromatography using EM Reagent silica gel 60 (230-400 mesh). Analytical thin layer chromatography was performed on EM Reagent 0.25 mm silica gel 60-F plates. Visualization was accomplished with UV light and ceric ammonium nitrate stain or potassium permangenate stain followed by heating. Infrared spectra were recorded on a Perkin Elmer 1600 series FT-IR spectrometer. ^{1}H-NMR spectra were recorded on a Varian Inova 500 (500 MHz) spectrometer and are reported in ppm using solvent as an internal standard ($CDCl_3$ at 7.26 ppm). Data are reported as (ap = apparent, s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet, b = broad; coupling constant(s) in Hz; integration. Proton-decoupled ^{13}C-NMR spectra were recorded on a Varian Inova 500 (125 MHz) spectrometer and are reported in ppm using solvent as an internal standard ($CDCl_3$ at 77.0 ppm). Mass spectra data were obtained on a Varian 1200 Quadrupole Mass Spectrometer and Micromass Quadro II Spectrometer.

Enals **1a**, **1b**, **1c**, **1d**, **1e**, **9**, and **10** were prepared according to List.[3] Enal **13** was prepared according to Roush.[4]

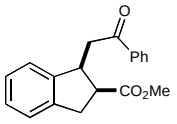
General Procedure for Intramolecular Michael Reaction

To a flame-dried 10 mL round bottom flask containing a magnetic stirring bar was added azolium salt **D** (4.2 mg, 0.01 mmol) and the corresponding enal (0.1 mmol). The flask was then sealed with rubber septum and placed under positive pressure of nitrogen. The heterogeneous mixture was then diluted with CH_2Cl_2 (2 mL, 0.05 M). Once the material dissolved, diisopropylethylamine (2 μL, 0.01 mmol) was added via syringe. The reaction stirred at 23 °C under N_2 atmosphere until complete consumption of enal (as observed by thin layer chromatography). Methanol (5 ml) was added to the reaction and stirred at 23 °C under N_2 for five hours. The mixture was partially concentrated under reduced pressure and the remaining residue was purified by silica gel chromatography (5% EtOAc/Hexanes) affording the pure annulation product.

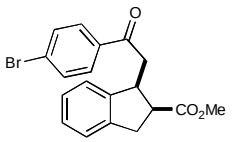
1. Pangborn, A. B.; Giardello, M. A.; Grubbs, R. H.; Rosen, R. K.; Timmers, F. J. *Organometal.* **1996**, *15*, 1518-1520.
2. Perrin, D. D. and Armarego, W. L. *Purification of Laboratory Chemicals;* 3rd Ed., Pergamon Press, Oxford. 1988.
3. Yang, J.-W.; Hechavarria, M.; List, B. *J. Am. Chem. Soc.* **2005**, *127*, 15036-15037
4. Frank, S. A.; Mergott, D. J.; Roush, W. R. *J. Am. Chem. Soc.* **2002**, *124*, 2404-2405.



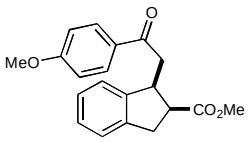
(4aS,9aS)-3-phenyl-9,9a-dihydro-4a*H*-2-oxa-fluoren-1-one (3): Prepared according to general procedure excluding the methanol addition using (*E*)-3-(2-((*E*)-3-oxo-3-phenylprop-1-enyl)phenyl)prop-2-enal (52 mg, 0.2 mmol) to afford 36 mg (68%) of **3** as a white solid. Methanol was not added to quench the reaction. Analytical data for **3**: IR (film) 2914, 2850, 1757, 1199, 1137, 1090, 1022, 757 cm^{-1}; ^1H NMR (500 MHz, $CDCl_3$) δ 7.65 (d, *J* = 7.1 Hz, 2H), 7.31 (m, 7H), 7.37 (d, *J* = 4.2 Hz, 1H), 4.25 (m, 1H), 3.54 (m, 2H), 3.42 (m, 1H); ^{13}C NMR (125 MHz, $CDCl_3$) 170.55, 148.62, 143.36, 132.58, 129.36, 128.71, 127.86, 127.74, 125.11, 124.98, 123.96, 100.68, 42.74, 42.42, 36.30; LRMS (ES): Mass calcd for $C_{18}H_{14}O_2$ $[M+H]^+$, 263.1. Found $[M+H]^+$, 263.1; $[\alpha]_D$: 57.5 ($CHCl_3$, c = 0.15, er = 99.5:0.5). Enantiomeric ratio was measured by HPLC (Chiralcel AD-H, 15% IPA/Hexanes, 1 mL/min, Rt_1 = 9.14, Rt_2 = 14.18).



(1*S*,2*S*)-methyl 1-(2-oxo-2-phenylethyl)-2,3-dihydro-1*H*-indene-2-carboxylate (4): Prepared according to general procedure using (*E*)-3-(2-((*E*)-3-oxo-3-phenylprop-1-enyl)phenyl)prop-2-enal (52 mg, 0.2 mmol) to afford 40 mg (69%) of **4** as a colorless oil. Analytical data for **4**: IR (film) 3024, 2947, 1730, 1685, 1442, 1365 cm^{-1}; ^1H NMR (500 MHz, $CDCl_3$) δ 7.95 (d, *J* = 7.3 Hz, 2H), 7.57 (t, *J* = 7.3 Hz, 1H), 7.46 (t, *J* = 7.6 Hz, 2H), 7.27 (d, *J* = 6.4 Hz, 1H), 7.19 (m, 3H), 4.28 (q, *J* = 7.3 Hz, 1H), 3.59 (m, 4H), 3.42 (m, 2H), 3.15 (m, 2H); ^{13}C NMR (125 MHz, $CDCl_3$) 198.72, 174.72, 144.87, 137.26, 133.32, 128.84, 128.26, 127.53, 127.08, 124.81, 124.35, 51.90, 47.69, 42.75, 40.81, 34.73; LRMS (ES): Mass calcd for $C_{19}H_{18}O_3$ $[M+H]^+$, 295.3. Found $[M+H]^+$, 295.5; $[\alpha]_D$: -16.6 (CH_2Cl_2, c = 1.0, er = 99.5:0.5). Enantiomeric ratio was measured by HPLC (Chiralcel AD-H, 15% IPA/Hexanes, 1 mL/min, Rt_1 = 8.84, Rt_2 = 13.88).

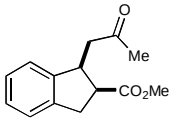


(1*S*,2*S*)-methyl 1-(2-(4-bromophenyl)-2-oxoethyl)-2,3-dihydro-1*H*-indene-2-carboxylate (5): Prepared according to general procedure using (*E*)-3-(2-((*E*)-3-(4-bromophenyl)-3-oxoprop-1-enyl)phenyl)prop-2-enal (34 mg, 0.1 mmol) to afford 23 mg (62%) of **5** as a colorless oil. Analytical data for **5**: IR (film) 3023, 2949, 1729, 1687, 1435, 1365 cm^{-1}; ^1H NMR (500 MHz, $CDCl_3$) δ 7.80 (d, *J* = 8.3 Hz, 2H), 7.59 (d, *J* = 8.5 Hz, 2H), 7.26 (d, *J* = 8.5 Hz, 1H), 7.21 (m, 3H), 4.25 (m, 1H), 3.60 (m, 4H), 3.40 (m, 2H), 3.16 (m, 2H); ^{13}C NMR (125 MHz, $CDCl_3$) d 197.76, 174.72, 144.66, 141.53, 135.94, 132.15, 129.79, 128.50, 127.62, 127.13, 124.86, 124.28, 51.96, 47.57, 42.69, 40.78, 34.74; LRMS (ES): Mass calcd for $C_{19}H_{17}BrO_3$ $[M+H]^+$, 373.2. Found $[M+H]^+$, 373.4; $[\alpha]_D$: -16.6 (CH_2Cl_2, c = 0.5, er = 99.5:0.5). Enantiomeric ratio was measured by HPLC (Chiralcel AD-H, 20% IPA/Hexanes, 1 mL/min, Rt_1 = 8.10, Rt_2 = 9.40).

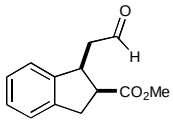


(1*S*,2*S*)-methyl 1-(2-(4-methoxyphenyl)-2-oxoethyl)-2,3-dihydro-1*H*-indene-2-carboxylate (6): Prepared according to general procedure using (*E*)-3-(2-((*E*)-3-(4-methoxyphenyl)-3-oxoprop-1-enyl)phenyl)prop-2-enal (29 mg, 0.1 mmol) to afford 26 mg (80%)

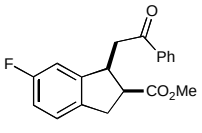
of **6** as a yellow oil. Analytical data for **6**: IR (film) 3006, 2949, 2841, 1730, 1674, 1600, 1508 cm^{-1}; ^1H NMR (500 MHz, $CDCl_3$) δ 7.92 (d, *J* = 7.8 Hz, 2H), 7.25 (m, 1H), 7.20 (m, 3H), 6.92 (d, *J* = 8.9 Hz, 2H), 4.26 (m, 1H), 3.87 (s, *3*H), 3.59 (m, 4H), 3.37 (m, 2H), 3.10 (m, 2H); ^{13}C NMR (125 MHz, $CDCl_3$) d 197.19, 174.74, 163.71, 144.98, 141.58, 130.53, 130.37, 127.46, 127.04, 113.95, 55.17, 51.90. 47.73, 42.86, 40.37, 34.68; LRMS (ES): Mass calcd for $C_{20}H_{20}O_4$ $[M+H]^+$, 325.4. Found $[M+H]^+$, 325.5; $[\alpha]_D$: -28.9 (CH_2Cl_2, c = 1.0, er = 99.5:0.5). Enantiomeric ratio was measured by HPLC (Chiralcel AD-H, 15% IPA/Hexanes, 1 mL/min, Rt_1 = 11.41, Rt_2 = 14.05).



(1*S*,2*S*)-methyl 1-(2-oxopropyl)-2,3-dihydro-1*H*-indene-2-carboxylate (7): Prepared according to general procedure using (*E*)-3-(2-((*E*)-3-oxobut-1-enyl)phenyl)prop-2-enal (20 mg, 0.1 mmol) to afford 14 mg (59%) of **7** as a colorless oil. Analytical data for **7**: IR (film) 3020, 2950, 1727, 1435, 1365 cm^{-1}; ^1H NMR (500 MHz, $CDCl_3$) δ 7.20 (m, 4H), 4.35 (m, 1H), 3.68 (s, 3H), 3.49 (q, *J* = 8.3, 1H), 3.29 (dd, *J* = 15.9, 8.9 Hz, 1H), 3.06 (dd, *J* = 15.9, 7.9 Hz, 1H), 2.86 (dd, *J* = 18.1, 8.3 Hz, 1H), 2.63 (dd, *J* = 11.9, 6.1 Hz, 1H), 2.13 (s, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 207.33, 174.75, 144.75, 141.43, 127.49, 127.10, 124.78, 124.15, 51.94, 47.44, 45.58, 42.44, 34.60, 30.68; LRMS (ES): Mass calcd for $C_{14}H_{16}O_3$ $[M+H]^+$, 233.3. Found $[M+H]^+$, 233.5; $[\alpha]_D$: -26.4 (CH_2Cl_2, c = 1.0, er = 99.5:0.5). Enantiomeric ratio was measured by HPLC (Chiralcel AD-H, 1% IPA/Hexanes, 0.5 mL/min, Rt_1 = 23.39, Rt_2 = 25.01).

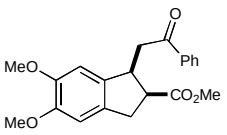


(1*S*,2*S*)-methyl 1-(2-oxoethyl)-2,3-dihydro-1*H*-indene-2-carboxylate (8): Prepared according to general procedure using (2*E*,2'*E*)-3,3'-(1,2-phenylene)diprop-2-enal (37 mg, 0.2 mmol) to afford 29 mg (68%) of **8** as a colorless oil. Analytical data for **8**: IR (film) 3023, 2922, 1727, 1436, 1367 cm^{-1}; ^1H NMR (500 MHz, $CDCl_3$) δ 9.80 (s, 1H), 7.24 (m, 4H), 4.07 (m, 1H), 3.70 (s, 3H), 3.53 (q, *J* = 8.2 Hz, 1H), 3.35 (dd, *J* = 15.9, 8.8 Hz, 1H), 3.09 (dd, *J* = 15.9, 8.2 Hz, 1H), 2.82 (dd, *J* = 7.6, 0.9 Hz, 1H), 2.65 (dd, *J* = 17.7, 6.4 Hz, 1H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 200.87, 174.24, 144.19, 141.35, 127.70, 127.21, 124.91, 124.20, 51.99, 47.63, 46.11, 41.40, 34.33; LRMS (ES): Mass calcd for $C_{13}H_{14}O_3$ $[M+H]^+$, 219.3. Found $[M+H]^+$, 219.6; $[\alpha]_D$: -34.8 (CH_2Cl_2, c = 1.0, er = 99.5:0.5). Enantiomeric ratio was measured by HPLC (Chiralcel AD-H, 3% IPA/Hexanes, 1 mL/min, Rt_1 = 8.33, Rt_2 = 9.14).

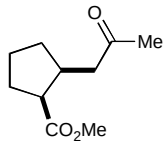


(1*S*,2*S*)-methyl 6-fluoro-1-(2-oxo-2-phenylethyl)-2,3-dihydro-1*H*-indene-2-carboxylate (10): Prepared according to general procedure using (2*E*,2'*E*)-3,3'-(4-fluoro-1,2-phenylene)diprop-2-enal (56 mg, 0.2 mmol) to afford 42 mg (68%) of **10** as a colorless oil. Analytical data for **10**: IR (film) 3060, 2951, 2851, 1732, 1685, 1597, 1436, 1230, 1168, 813, 753, 690 cm^{-1}; ^1H NMR (500 MHz, $CDCl_3$) δ 7.93 (d, *J* = 7.9 Hz, 2H), 7.56 (t, *J* = 7.6 Hz, 1H), 7.45 (t, *J* = 7.6 Hz, 2H), 7.16 (m, 2H), 6.88 (m, 2H), 4.23 (q, *J* = 7.3 Hz, 1H), 3.62 (q, *J* = 7.9 Hz, 1H), 3.56 (s, 3H), 3.40 (dd, *J* = 17.7, 17.7 Hz, 1H), 3.30 (dd, *J* = 15.6, 7.9 Hz, 1H), 3.14 (dd, *J* = 17.7, 6.4 Hz, 1H), 3.06 (dd, *J* = 15.6, 7.9 Hz, 1H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 198.34, 174.38, 163.40, 161.46, 146.98, 146.92, 137.08, 136.90, 133.45,

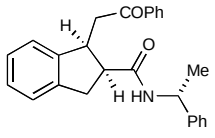
128.24, 125.69, 125.63, 114.47, 114.29, 111.68, 111.50, 51.95, 48.20, 42.68, 40.42, 33.90: LRMS (ES): Mass calcd for $C_{19}H_{17}FO_3$ $[M+H]^+$, 313.3. Found $[M+H]^+$, 313.4; $[\alpha]_D$: -21.9 (CH_2Cl_2, c = 1.0, er = 99.5:0.5). Enantiomeric ratio was measured by HPLC (Chiralcel OD-H, 2.5% EtOH/2.5% IPA/95% Hexanes, 1 mL/min, Rt_1 = 8.80, Rt_2 = 9.54).



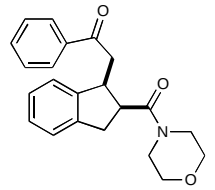
(1*S*,2*S*)-methyl 5,6-dimethoxy-1-(2-oxo-2-phenylethyl)-2,3-dihydro-1*H*-indene-2-carboxylate (12): Prepared according to general procedure using (2*E*,2'*E*)-3,3'-(4,5-dimethoxy-1,2-phenylene)diprop-2-enal (32 mg, 0.1 mmol) to afford 26 mg (73%) of **12** as a yellow solid. Analytical data for **12**: IR (film) 3061, 2948, 1729, 1684, 1563, 1449 cm^{-1}; ^1H NMR (500 MHz, $CDCl_3$) δ 7.92 (d, *J* = 7.3 Hz, 2H), 7.55 (m, 1H), 7.45 (m, 2H), 6.78 (s, 1H), 6.74 (s, 1H), 4.20 (m, 1H), 3.87 (s, 3H), 3.80 (s, 3H), 3.60 (m, 4H), 3.35 (m, 2H), 3.12 (dd, *J* = 17.4, 6.7 Hz, 1H), 3.05 (dd, *J* = 15.5, 8.3 Hz, 1H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 199.04, 174.64, 148.92, 148.49, 137.33, 136.39, 133.34, 133.00, 128.25, 107.82, 107.74, 56.27, 56.25, 51.92, 48.24, 42.84, 40.91, 34.46; LRMS (ES): Mass calcd for $C_{21}H_{22}O_5$ $[M+H]^+$, 355.4. Found $[M+H]^+$, 355.4; $[\alpha]_D$: -9.3 (CH_2Cl_2, c = 1.0, er = 99.5:0.5). Enantiomeric ratio was measured by HPLC (Chiralcel AD-H, 15% IPA/Hexanes, 1 mL/min, Rt_1 = 8.29, Rt_2 = 10.99).



(1S,2S) methyl 2-(2-oxopropyl)cyclopentanecarboxylate (14): To a flame-dried 50 mL round bottom flask was added azolium salt **D** (46 mg, 0.11 mmol. The flask was then sealed with rubber septum and put N_2 atmosphere. A mixture of (2*E*,6*E*)-8-oxonona-2,6-dienal (80 mg, 0.53 mmol) and CH_2Cl_2 (10 mL, 0.05 M) was added via syringe. Diisopropylethylamine (18.6 μL, 0.11 mmol) was then added via syringe. The reaction stirred at 23 °C under N_2 atmosphere. Methanol (20 ml) and diisopropylethylamine (0.53 mmol) were added to the reaction after six hours. The reaction was then stirred under nitrogen at 23 °C for 12 hr. The mixture was then taken up in pentane and washed with water. The layers were then separated. The aqueous layer was then extracted with pentane (2 x 20 ml). The combined organic layers were dried with Na_2SO_4, filtered, and condensed under reduced pressure. The mixture was then purified by flash chromatography on silica gel (25% ether/pentane) to afford 64 mg (66%) of **14** as a yellow oil. Analytical data for **14**: IR (film) 2953, 2872, 1730, 1721, 1435, 1361, 1168 cm^{-1}; ^1H NMR (500 MHz, $CDCl_3$) δ 3.66 (s, 3H), 2.93(m, 1H), 2.61 (m, 2H), 2.41 (m, 1H), 2.14 (s, 3H), 1.90 (m, 4H), 1.54 (m, 1H), 1.32 (m, 1H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 208.14, 176.06, 51.51, 46.64. 45.36, 38.37, 31.63, 30.50, 28.62, 23.83; LRMS (ES): Mass calcd for $C_{10}H_{16}O_3$ $[3M+Na]^+$, 575.3. Found $[3M+Na]^+$, 575.8; $[\alpha]_D$: 42.2 ($CHCl_3$, c = 0.5, er = 99.5:0.5). Enantiomeric ratio was measured by GC (Beta Dex 225, 23.00 psi, 80 °C – 170 °C, Rt_1 = 33.81, Rt_2 = 34.05).

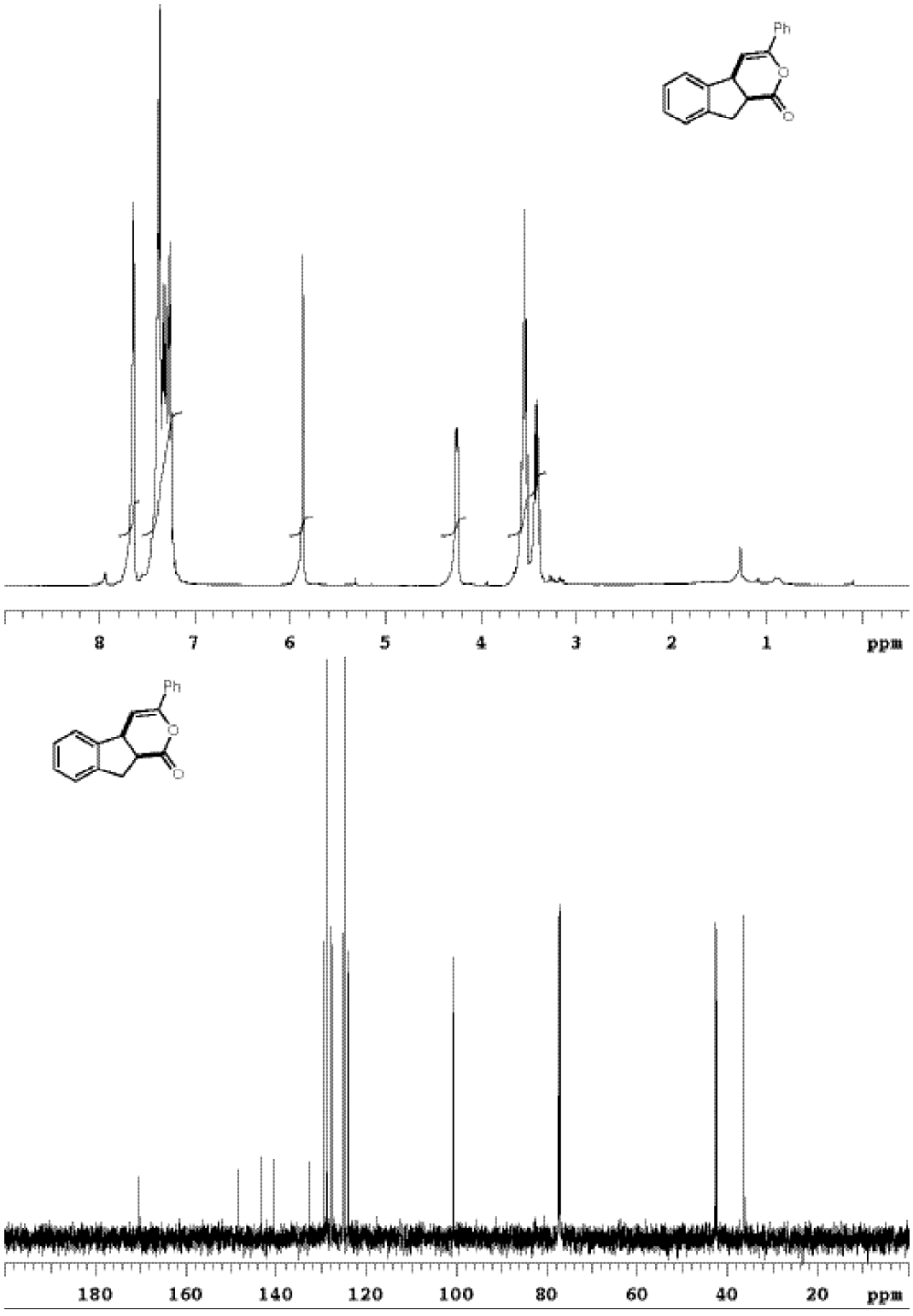


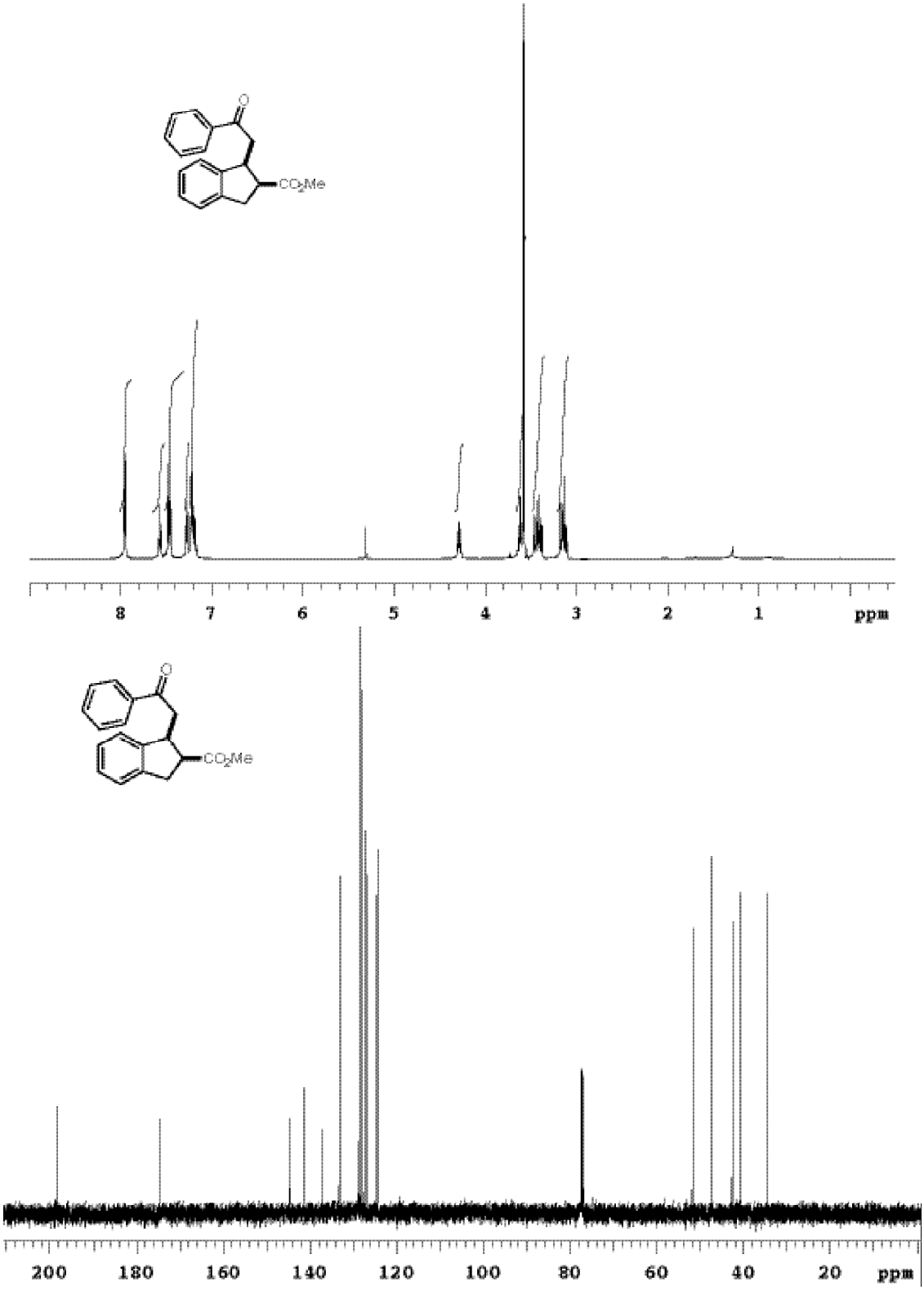
(1*S*,2*S*)-1-(2-oxo-2-phenylethyl)-*N*-((*R*)-1-phenylethyl)-2,3-dihydro-1*H*-indene-2-carboxamide (17): Prepared according to general procedure using (*E*)-3-(2-((*E*)-3-oxo-3-phenylprop-1-enyl)phenyl)prop-2-enal (52 mg, 0.2 mmol) to afford 70 mg (68%) of **17** as a white solid. Upon consumption of enal, (*S*)-α-methyl benzylamine (3 equiv.) was added via syringe to the reaction flask after 3 hr. The reaction stirred at 23 °C for an additional 6 hr. Analytical data for **17**: IR (film) 3315, 3062, 3029, 2974, 2928, 1682,1640, 1534, 1239, 1215, 1000, 747, 691 cm^{-1}; ^1H NMR (500 MHz, $CDCl_3$) δ 7.78 (d, *J* = 7.7 Hz, 2H), 7.55 (t, *J* = 7.3 Hz, 1H), 7.40 (t, *J* = 7.5 Hz, 2H), 7.26 (d, J = 7.7 Hz, 1H), 7.15 (m, 6H), 7.06 (m, 2H), 6.06 (d, *J* = 7.3 Hz, 1H), 4.98 (m, 1H), 4.12 (m, 1H), 3.42 (m, 2H), 3.21 (m, 2H), 3.09 (m, 1H) 1.43 (d, *J* = 6.9 Hz, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 199.67, 172.61, 144.93, 143.36, 142.34, 137.03, 133.27, 128.71, 128.33, 127.39, 127.37, 126.84, 126.38, 124.69, 124.02, 49.38, 49.22, 42.87, 40.47, 35.13, 22.04; LRMS (electrospray): Mass calcd for $C_{26}H_{25}NO_2$ $[M+H]^+$, 384.2. Found $[M+H]^+$, 384.7; $[\alpha]_D$: -100.0 (MeOH, c = 0.3, er = 99.5:0.5).

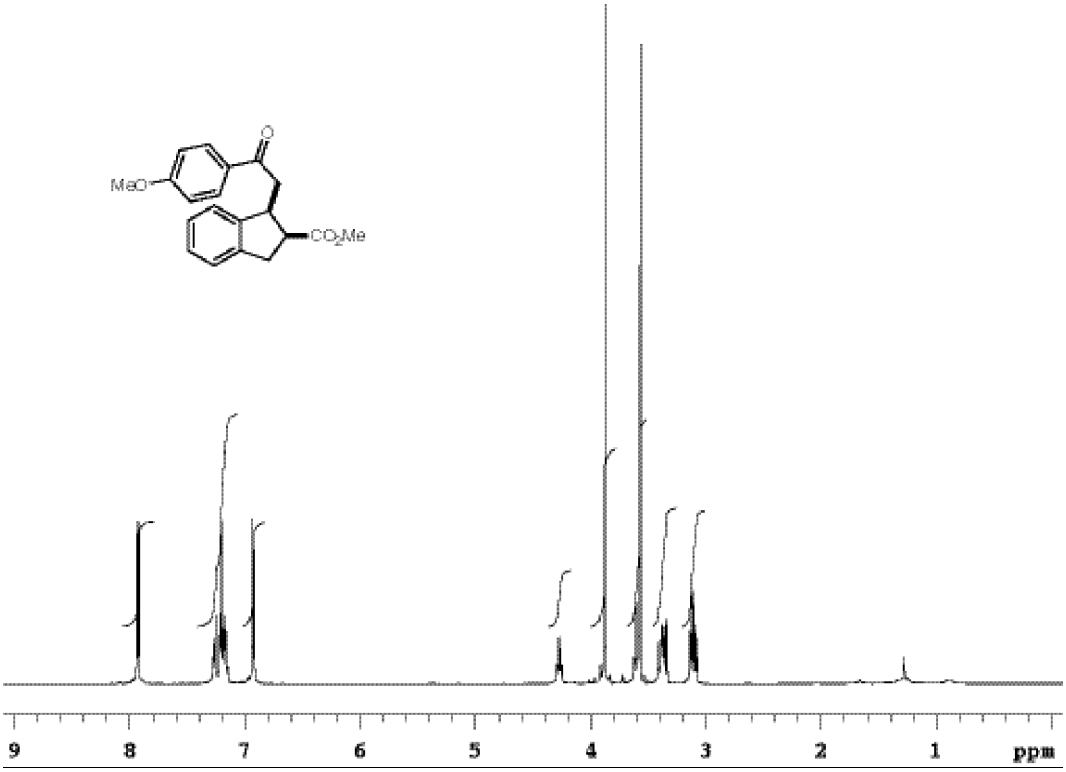


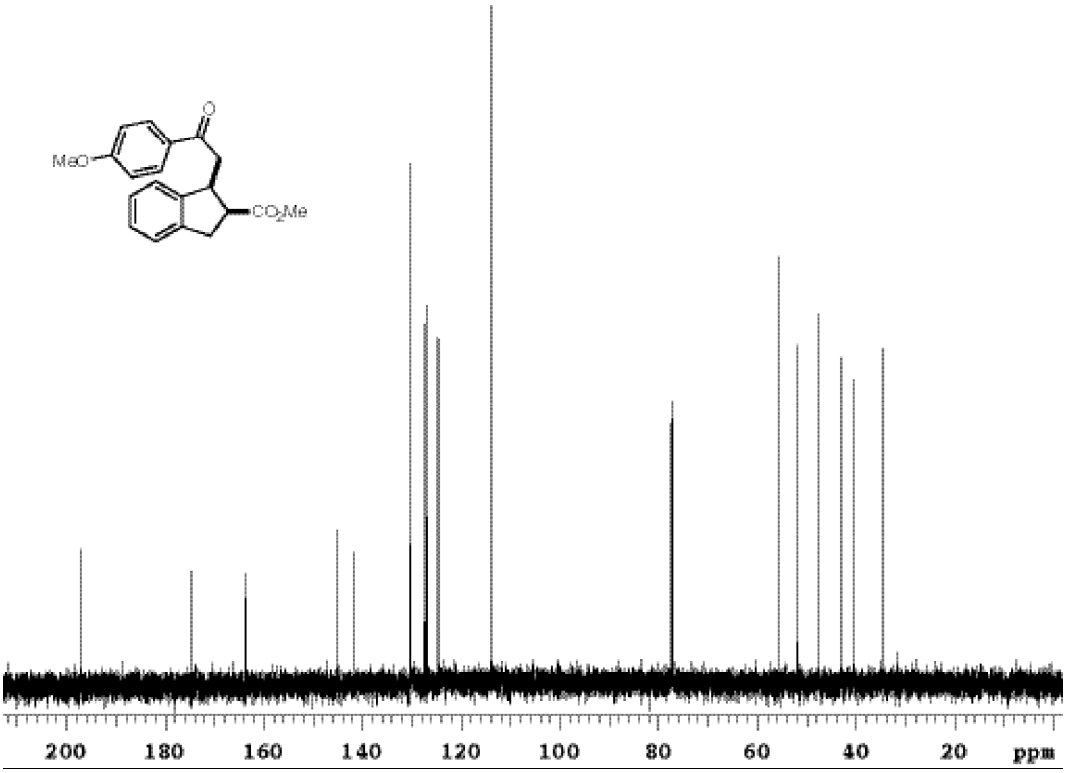
2-((1*S*,2*S*)-2-(morpholine-4-carbonyl)-2,3-dihydro-1*H*-inden-1-yl)-1-phenylethanone (18): Prepared according to general procedure using (*E*)-3-(2-((*E*)-3-oxo-3-phenylprop-1-enyl)phenyl)prop-2-enal (52 mg, 0.2 mmol) to afford 49 mg (70%) of **18** as a white solid. Upon consumption of the enal, morpholine (5 equiv.) was added via syringe to the reaction flask after 3 hr. The reaction stirred at room temperature for an additional 3 hr. Solvent was then removed *in vacuo*. The mixture was purified via flash chromatography on silica gel (15% EtOAC/Hexanes). Analytical data for **16**: IR (film) 3062, 2960, 2586, 1682, 1634, 1442, 1230, 1115 cm^{-1}; ^1H NMR (500 MHz, $CDCl_3$) δ 7.92 (d, *J* = 7.6 Hz, 2H), 7.54 (m, 1H), 7.43 (m, 2H), 7.27 (d, *J* = 4.9 Hz, 1H), 7.20 (m, 3H), 4.21 (m, 1H) , 3.60 (m, 11H), 2.94 (m, 2H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 198.75, 171.57, 145.28, 141.95, 137.10, 133.36, 128.77, 127.43, 124.76, 124.22, 66.84, 66.62, 46.30, 44.88, 42.15, 42.09, 40.81, 35.00; LRMS (ES): Exact mass calcd for $C_{22}H_{23}NO_3$ $[2M+Na]^+$, 721.3. Found $[2M+Na]^+$, 721.9; $[\alpha]_D$: –72.4 (CH_2Cl_2, c = 1.0, er = 99.5:0.5).

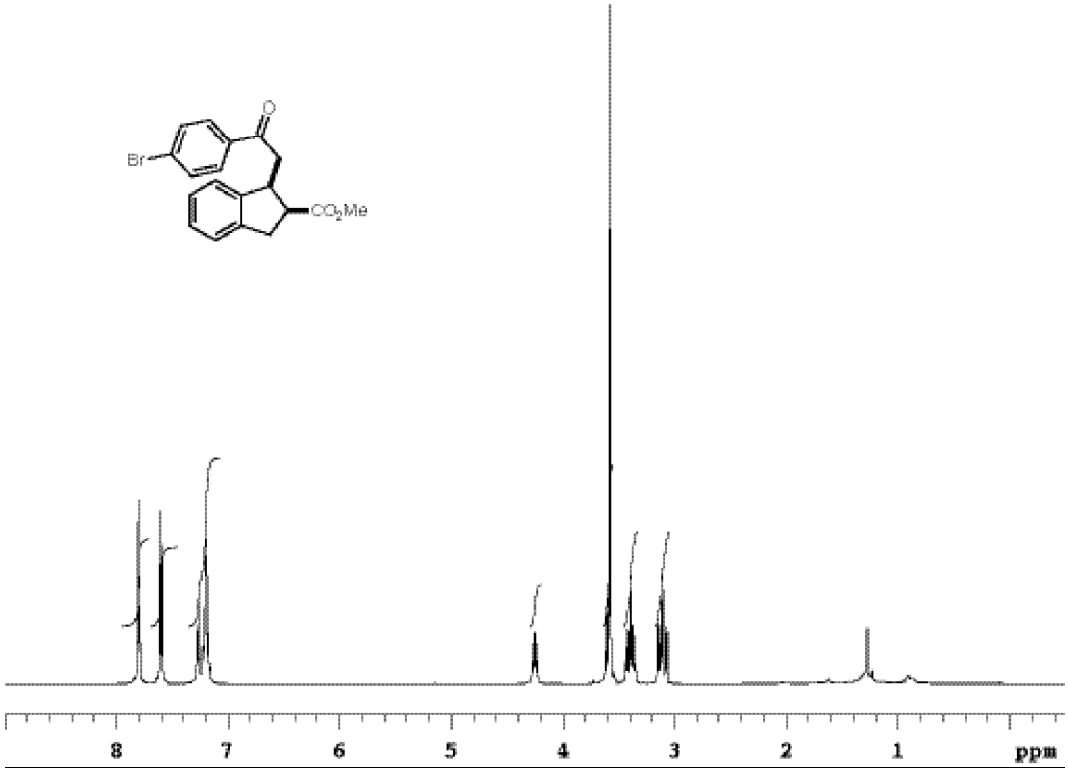
Selected NMR Spectra

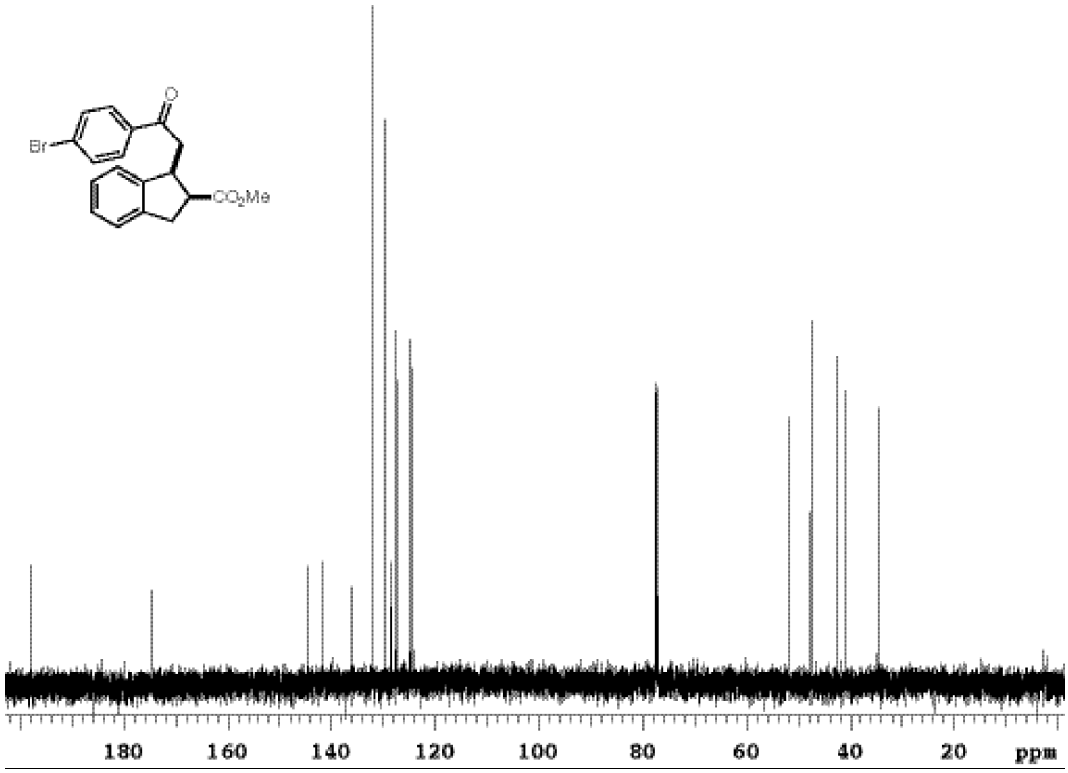


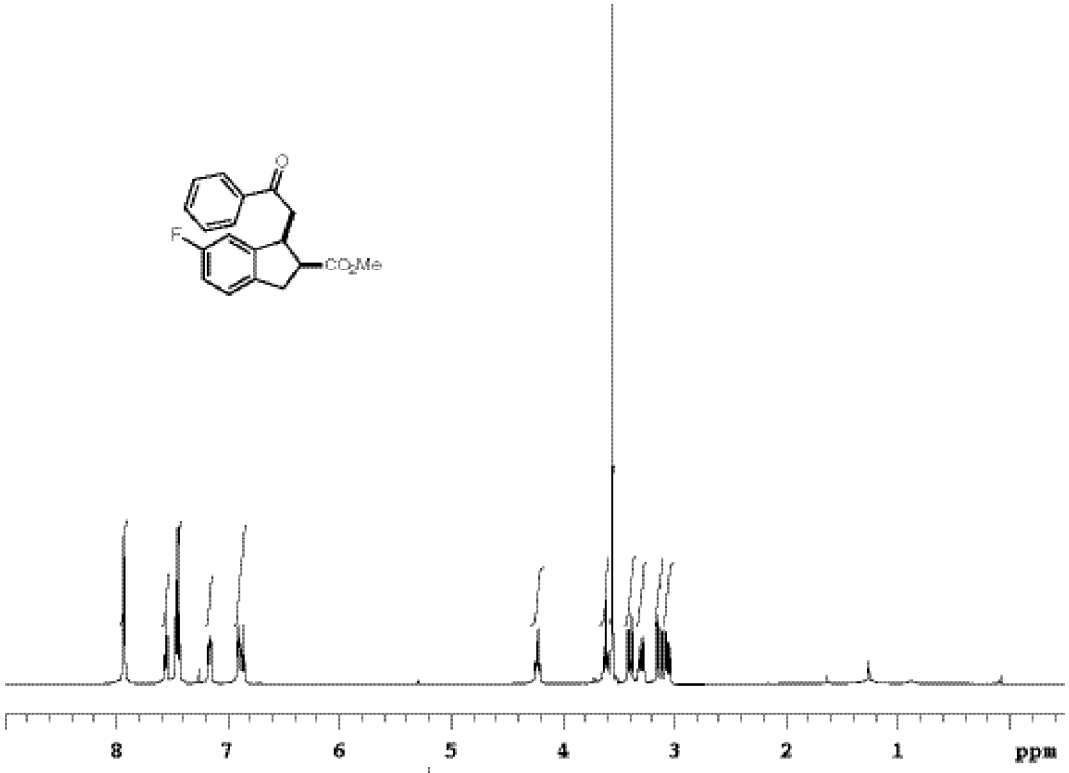

O
CO2Me
8
7
6
5
4
3
2
1
ppm
O
CO2Me
200
180
160
140
120
100
80
60
40
20
ppm

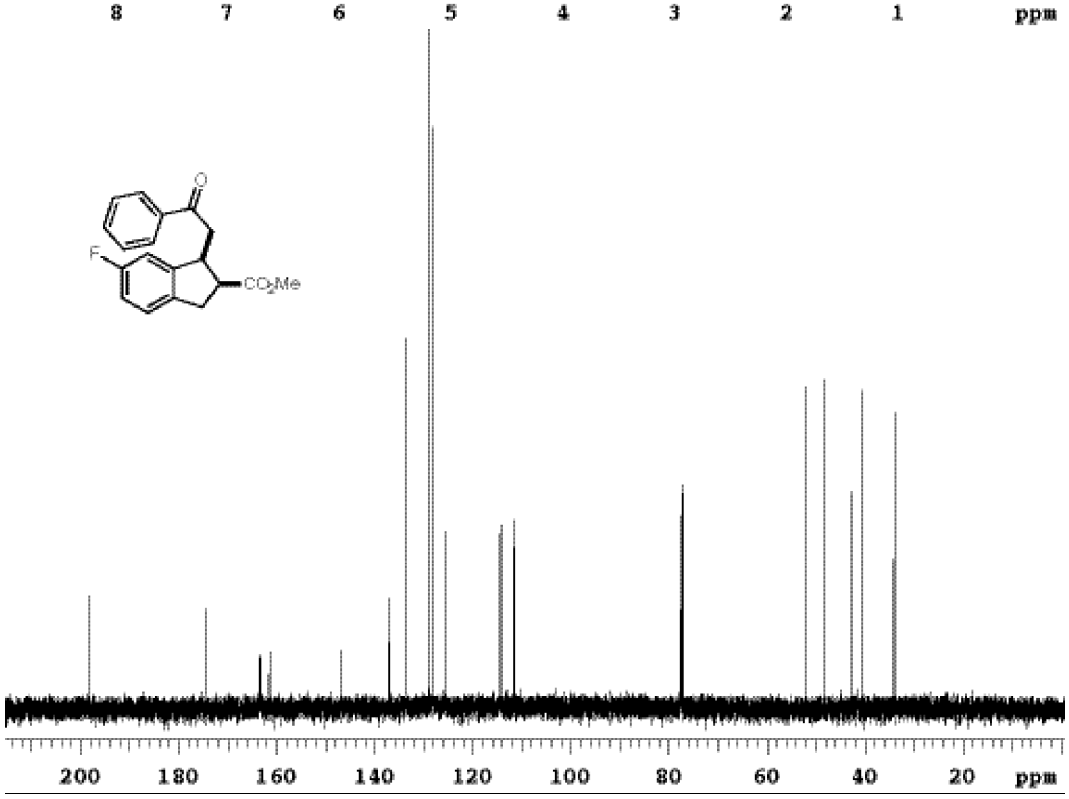

MeO
O
CO2Me
9
8
7
6
5
4
3
2
1
ppm

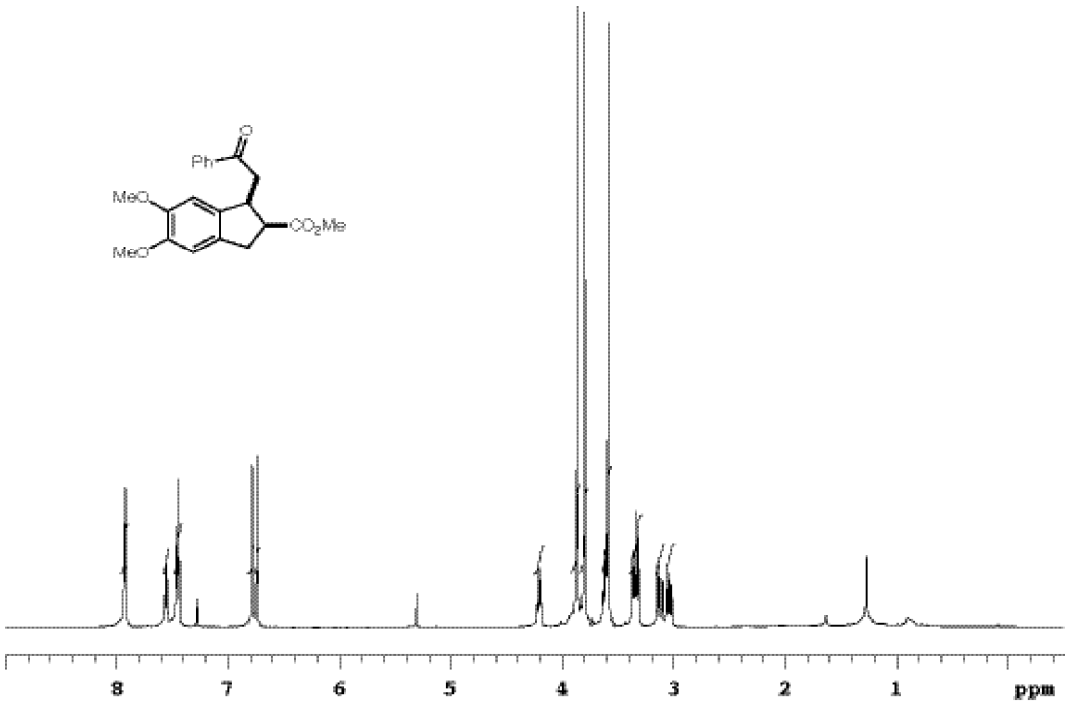

MeO
O
CO2Me
200
180
160
140
120
100
80
60
40
20
ppm

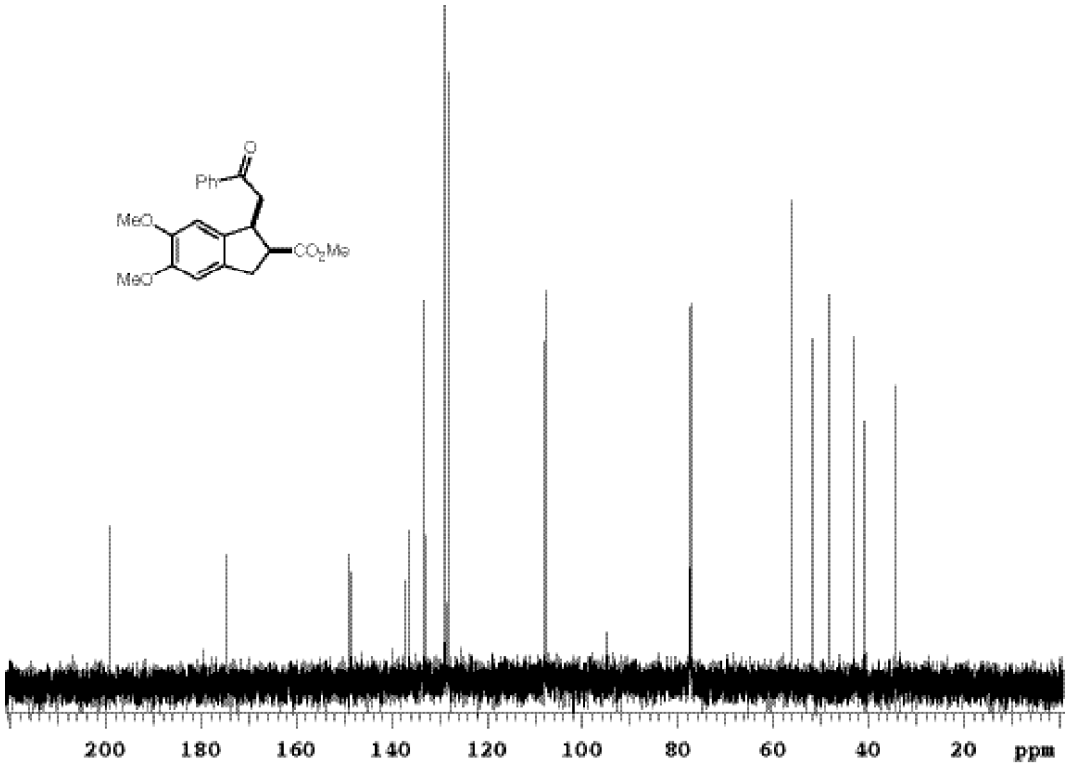

Br
O
CO2Me
8
7
6
5
4
3
2
1
ppm

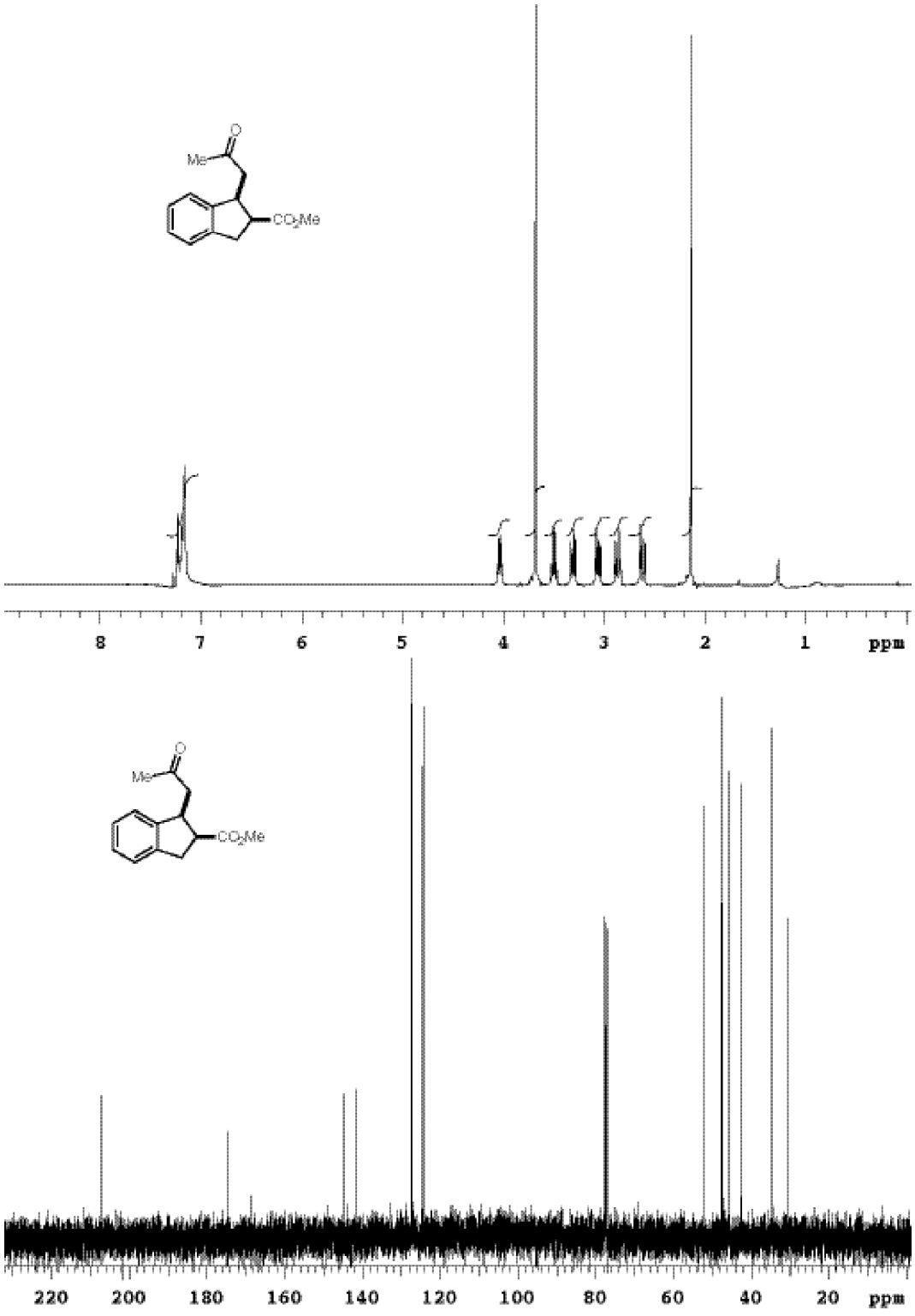

Br
O
CO2Me
180
160
140
120
100
80
60
40
20
ppm

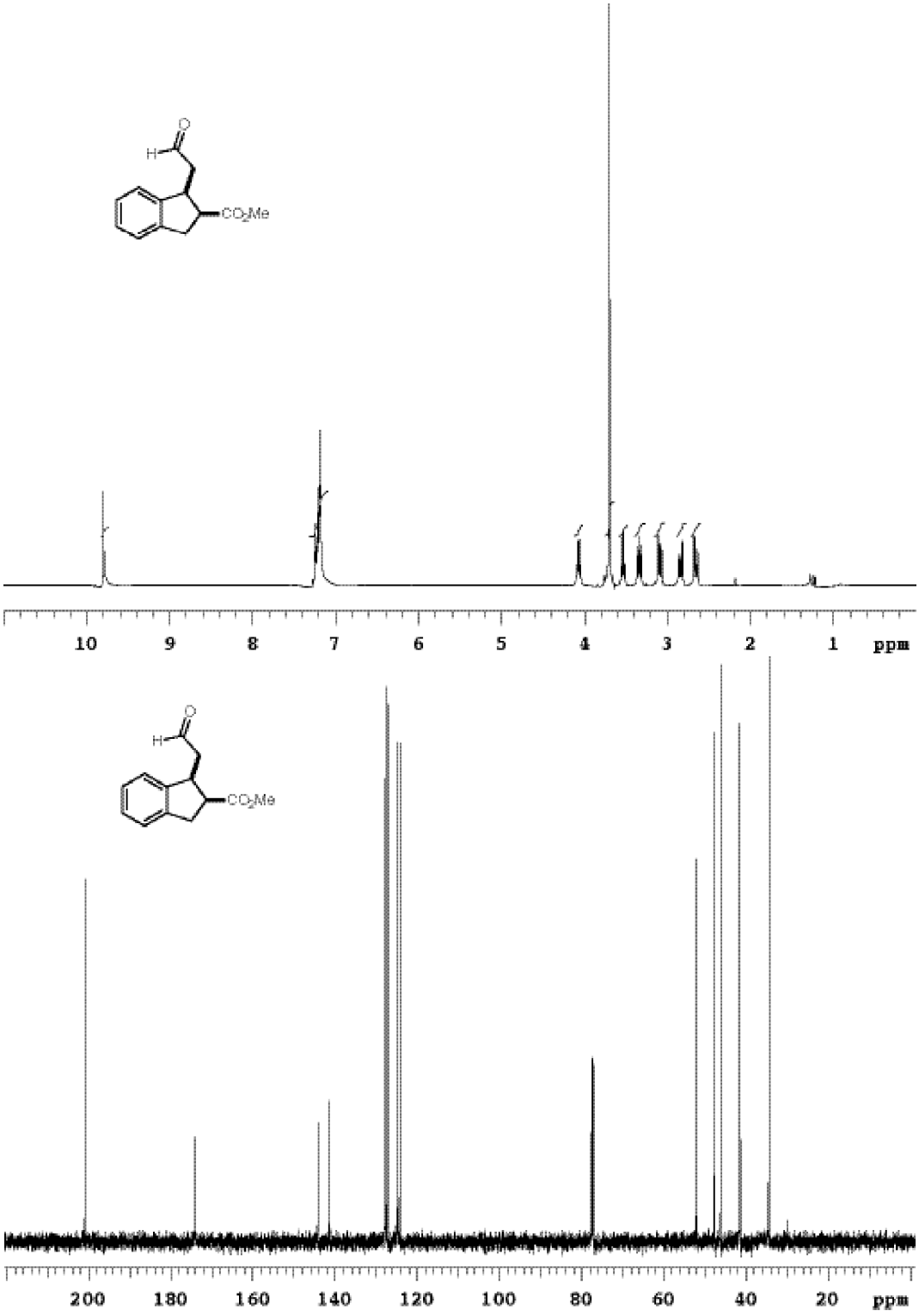

O
F
CO2Me
8
7
6
5
4
3
2
1
ppm

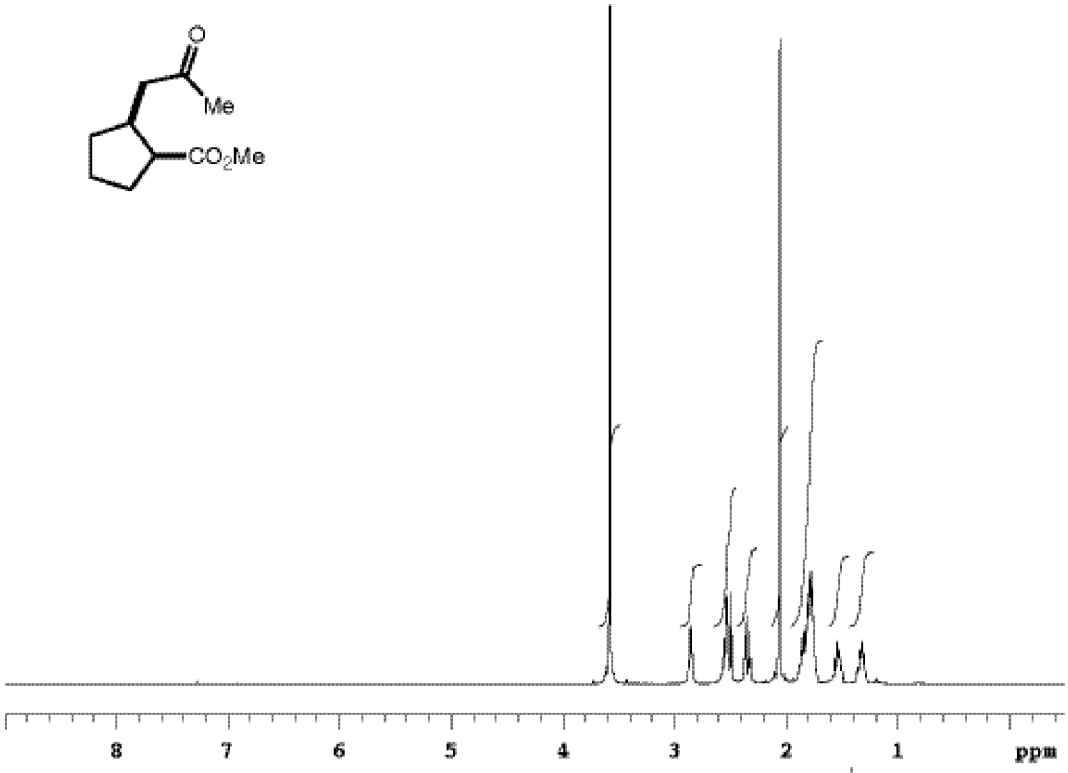

O
F
CO2Me
200
180
160
140
120
100
80
60
40
20
ppm

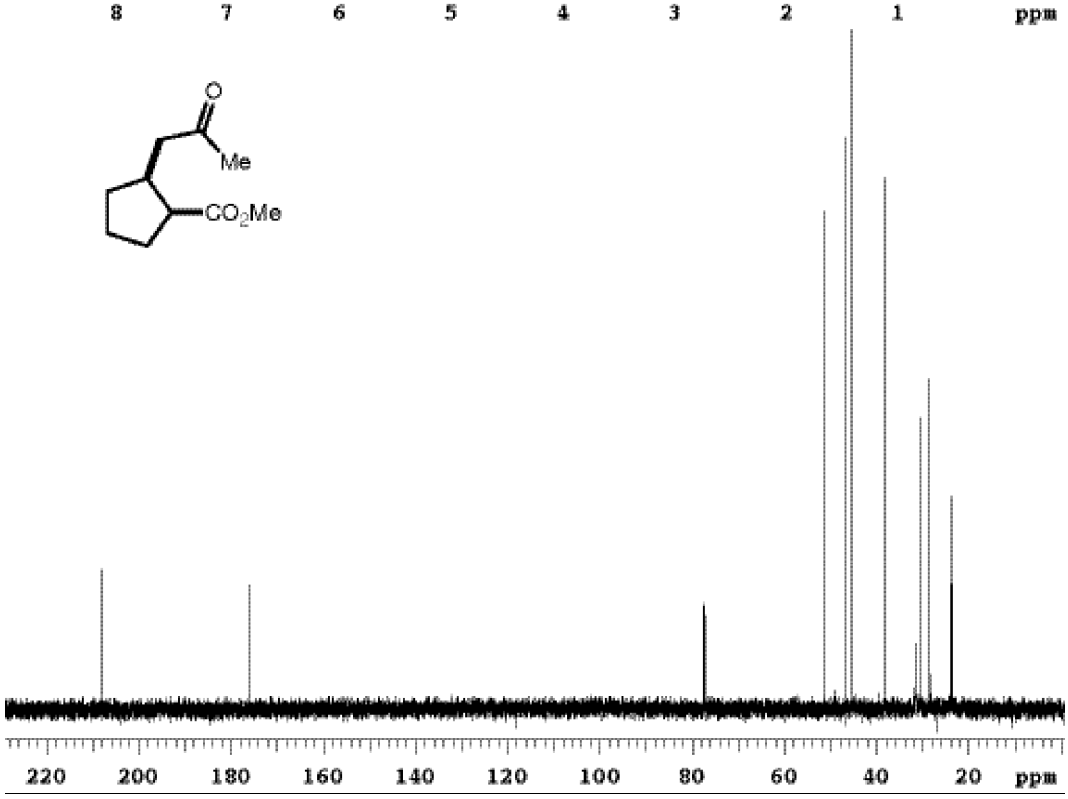

Ph
O
MeO
MeO
CO2Me
8
7
6
5
4
3
2
1
ppm

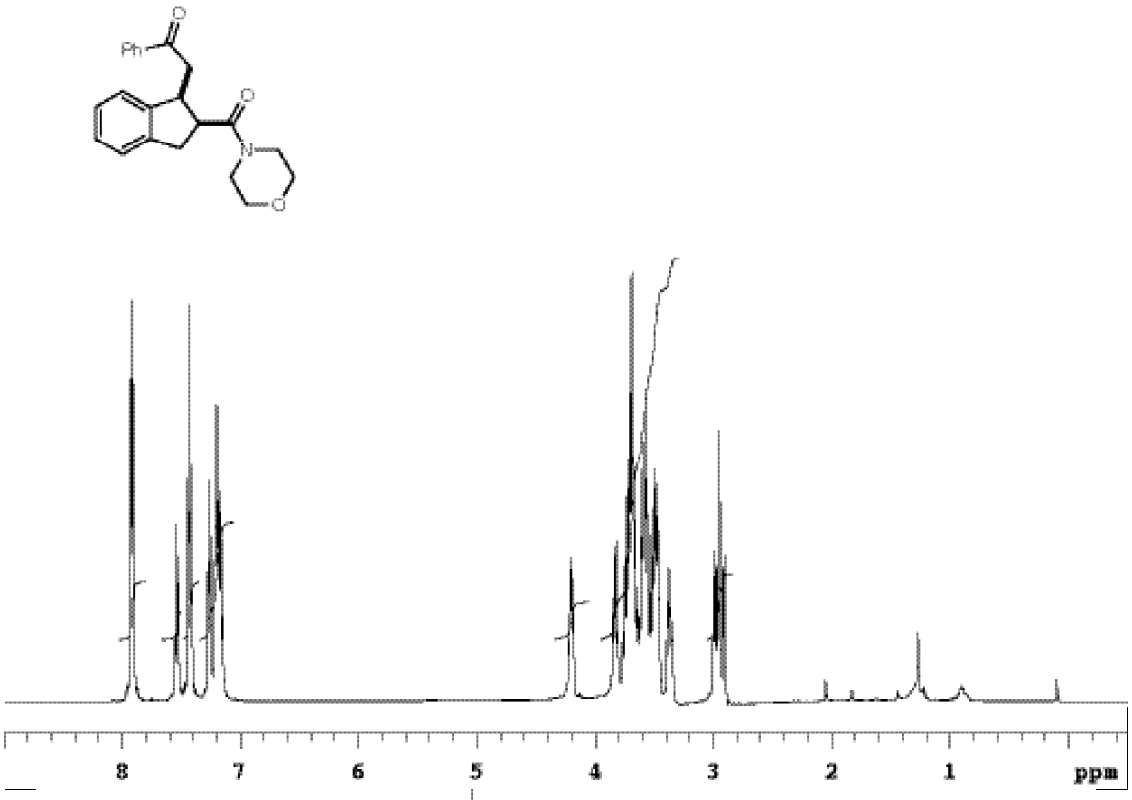

Ph
O
MeO
MeO
CO2Me
200
180
160
140
120
100
80
60
40
20
ppm

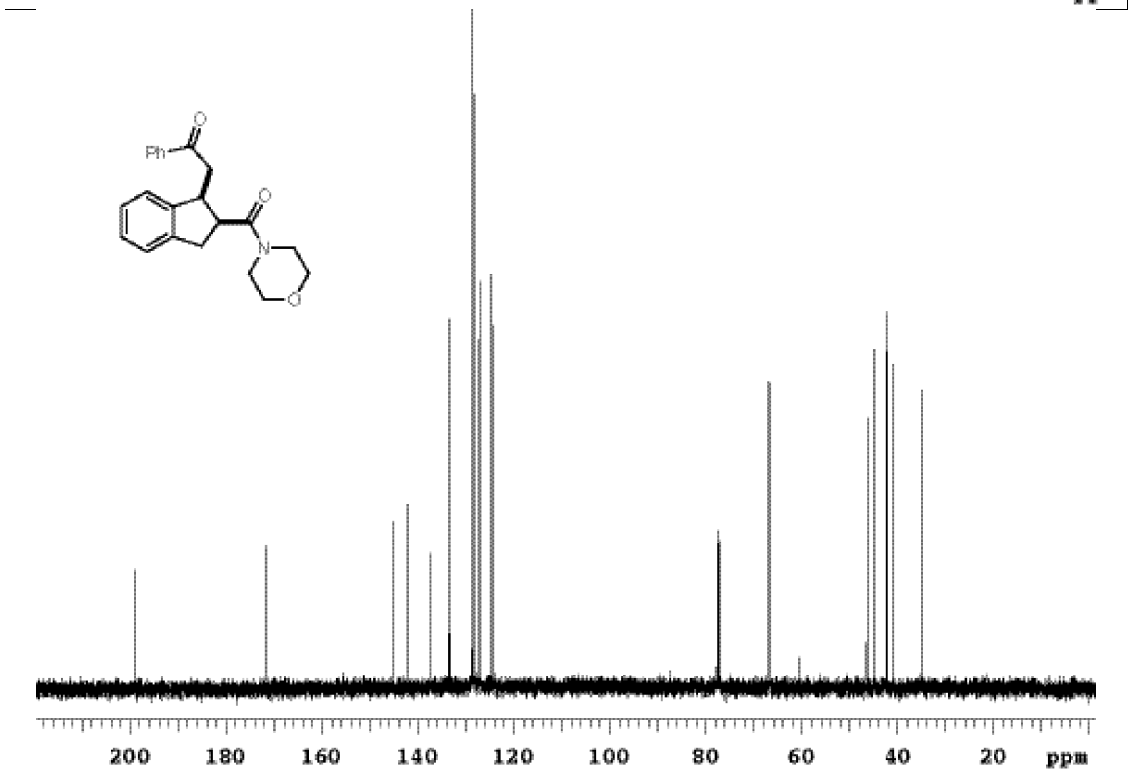

Me
O
CO2Me
8
7
6
5
4
3
2
1
ppm
Me
O
CO2Me
220
200
180
160
140
120
100
80
60
40
20
ppm

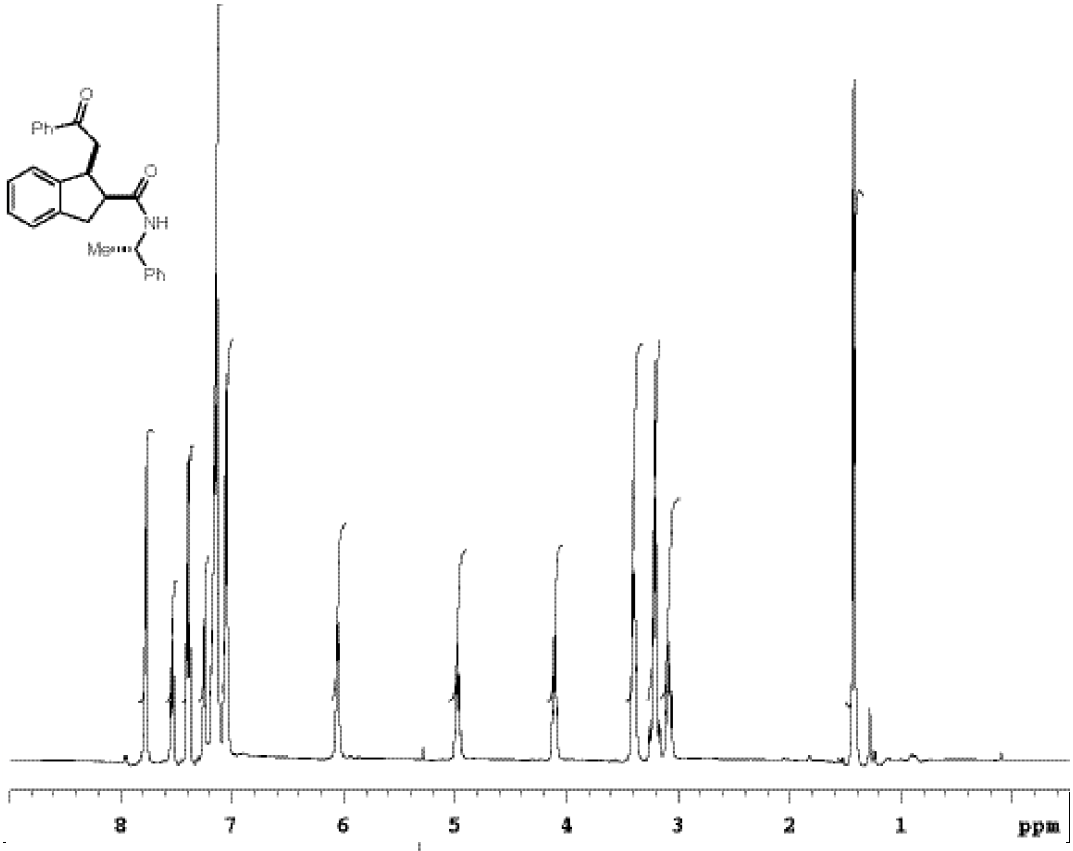

O
H
CO2Me
10
9
8
7
6
5
4
3
2
1
ppm
O
H
CO2Me
200
180
160
140
120
100
80
60
40
20
ppm

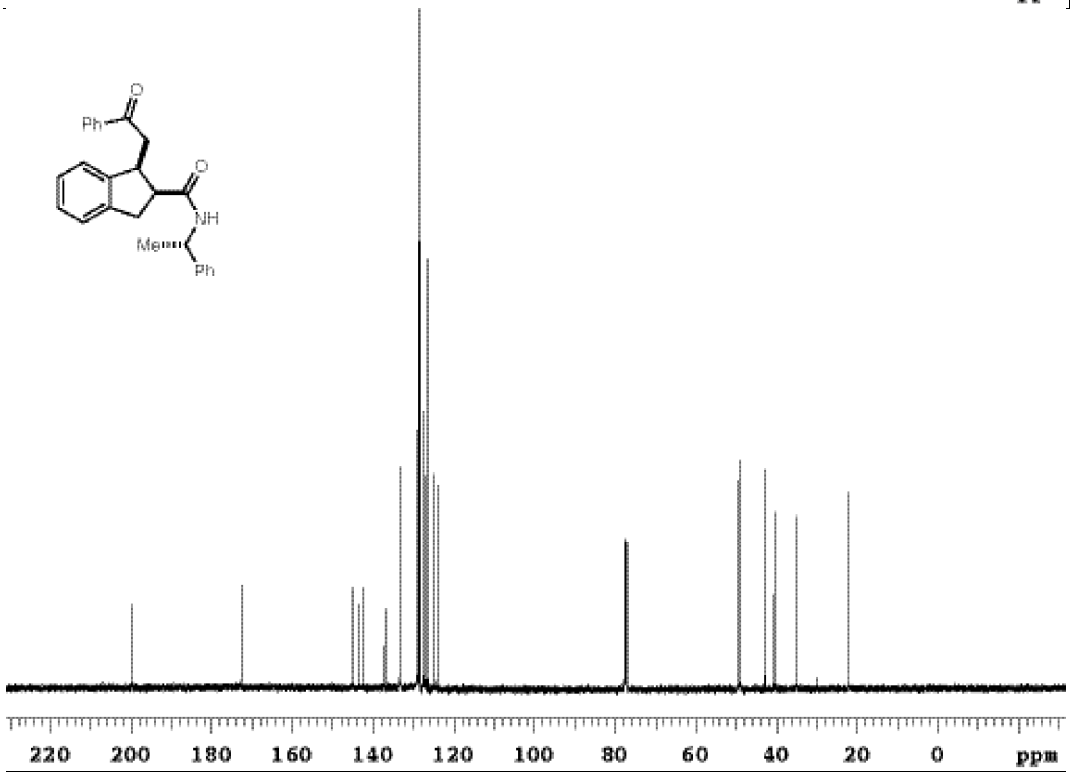

Me
CO2Me
8
7
6
5
4
3
2
1
ppm


Me
CO2Me
220
200
180
160
140
120
100
80
60
40
20
ppm


Ph
O
O
N
O
8
7
6
5
4
3
2
1
ppm


Ph
O
O
N
O
200
180
160
140
120
100
80
60
40
20
ppm


Ph
O
O
NH
Me
Ph
8
7
6
5
4
3
2
1
ppm


Ph
O
O
NH
Me
Ph
220
200
180
160
140
120
100
80
60
40
20
0
ppm

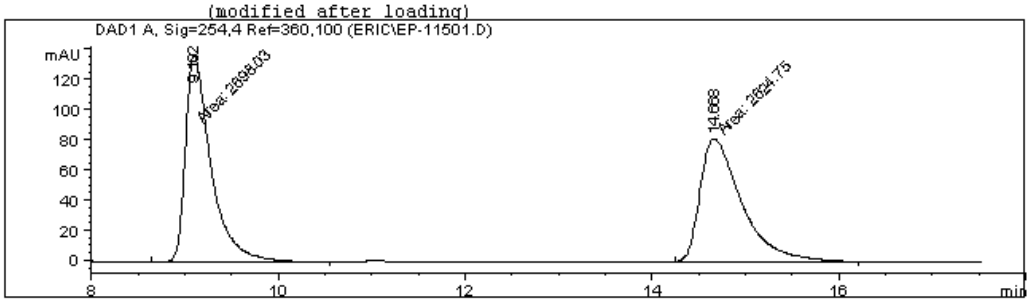
HPLC and GC Traces of Racemic and Enantioenriched Compounds

Racemic 3

Data File C:\HPCHEM\2\DATA\ERIC\EP-11501.D Sample Name: EP2-115

racemic

```
======================================================================
Injection Date  : 9/18/2006 4:21:21 PM
Sample Name     : EP2-115                          Location : Vial 41
Acq. Operator   : Eric
                                                  Inj Volume : 5 µl
Acq. Method     : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 9/18/2006 4:21:42 PM by Eric
                  (modified after loading)
Analysis Method : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 11/8/2006 1:11:17 AM by MANABU
                  (modified after loading)
```



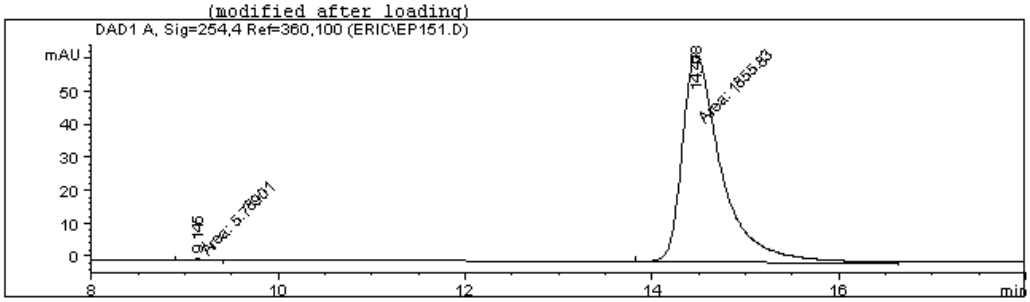

```
======================================================================
                          Area Percent Report
======================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=254,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   9.102 MM    0.3262 2698.03345  137.85426  50.6884
   2  14.668 MM    0.5318 2624.75024   82.25320  49.3116

Totals :                  5322.78369  220.10747

 Results obtained with enhanced integrator!
======================================================================
                          *** End of Report ***
```

Enantioenriched 3

Data File C:\HPCHEM\2\DATA\ERIC\EP151.D Sample Name: EP-02-151

chiral

```
==========================================================================
Injection Date  : 10/2/2006 8:36:28 AM
Sample Name     : EP-02-151                     Location : Vial 41
Acq. Operator   : mmb
                                               Inj Volume : 5 µl
Acq. Method     : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 10/2/2006 8:26:26 AM by mmb
                  (modified after loading)
Analysis Method : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 11/8/2006 1:10:55 AM by MANABU
                  (modified after loading)
```



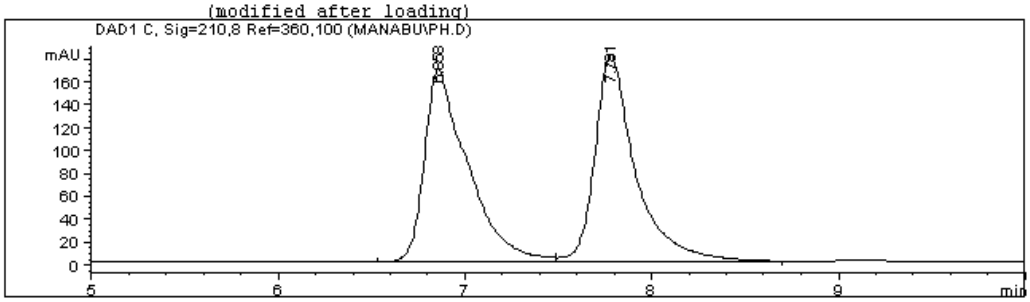

```
==========================================================================
                          Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=254,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   9.145 MM    0.3217    5.78901 2.99910e-1   0.3110
   2  14.478 MM    0.4919 1855.82959   62.87340  99.6890

Totals :                  1861.61860   63.17331

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

Racemic 4

Data File C:\HPCHEM\2\DATA\MANABU\PH.D Sample Name: Ph

AD-H 15%

```
==========================================================================
Injection Date  : 11/7/2006 1:43:14 PM
Sample Name     : Ph                              Location : Vial 1
Acq. Operator   : MANABU
                                                 Inj Volume : 20 µl
Acq. Method     : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 11/7/2006 1:50:58 PM by MANABU
                  (modified after loading)
Analysis Method : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 11/7/2006 1:57:43 PM by MANABU
                  (modified after loading)
```



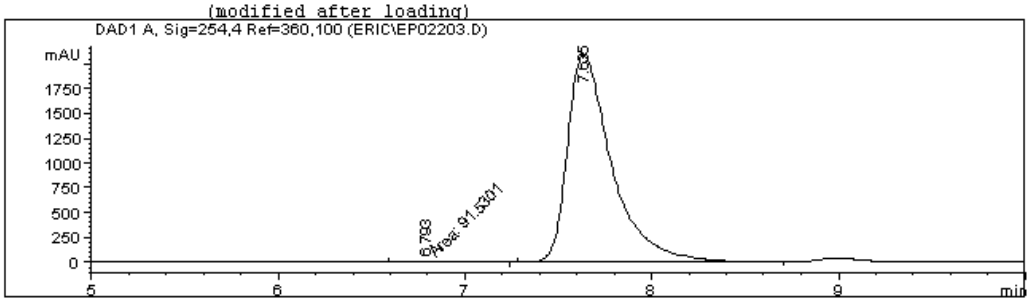

```
==========================================================================
                          Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 C, Sig=210,8 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   6.858 VV    0.2233 2700.54321  168.21289  49.6053
   2   7.781 VB    0.2192 2743.51733  180.64406  50.3947

Totals :                   5444.06055  348.85695

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

Enantioenriched 4

Data File C:\HPCHEM\2\DATA\ERIC\EP02203.D Sample Name: EP-02-203

pure

```
==================================================================
Injection Date  : 10/30/2006 10:46:54 AM
Sample Name     : EP-02-203                    Location : Vial 41
Acq. Operator   : mmb
                                             Inj Volume : 5 µl
Acq. Method     : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 10/30/2006 9:17:03 AM by mmb
                  (modified after loading)
Analysis Method : C:\HPCHEM\2\METHODS\SCHWIN1.M
Last changed    : 11/7/2006 4:48:54 PM by MANABU
                  (modified after loading)
```

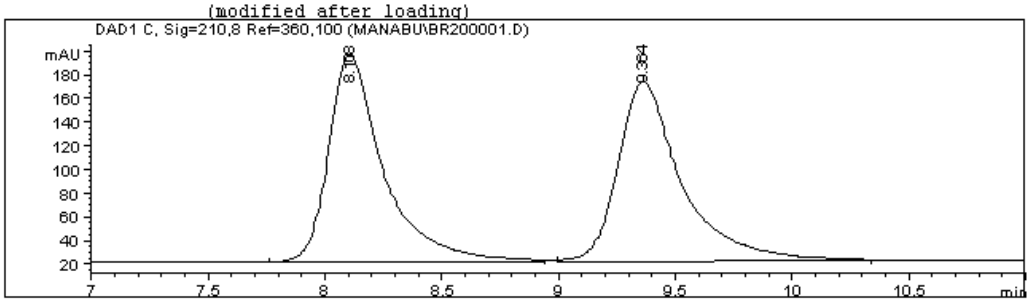



```
==================================================================
                        Area Percent Report
==================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=254,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   6.793 MM    0.2606   91.53013    5.85323   0.2630
   2   7.635 BV    0.2500 3.47052e4  2086.98047  99.7370

Totals :                   3.47967e4  2092.83370

 Results obtained with enhanced integrator!
==================================================================
                        *** End of Report ***
```

Racemic 5

Data File C:\HPCHEM\2\DATA\MANABU\BR200001.D Sample Name: br2

```
==================================================================
Injection Date  : 11/14/2006 2:53:31 PM
Sample Name     : br2                          Location : Vial 35
Acq. Operator   : DAN
                                               Inj Volume : 5 µl
Acq. Method     : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 11/14/2006 2:52:08 PM by DAN
                  (modified after loading)
Analysis Method : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 11/14/2006 3:24:30 PM by DAN
                  (modified after loading)
```

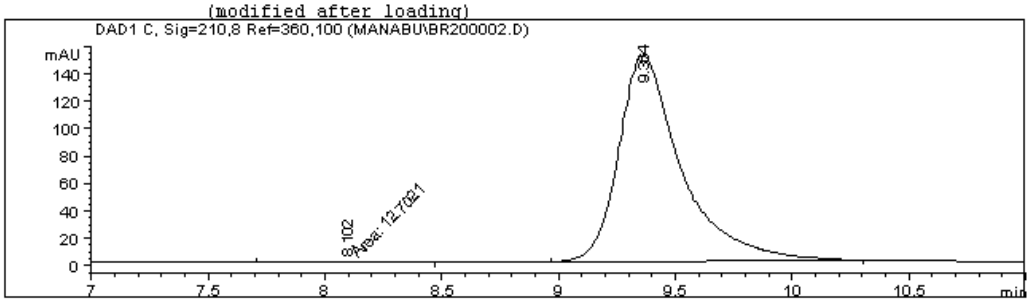



```
==================================================================
                        Area Percent Report
==================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 C, Sig=210,8 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   8.108 BB    0.2363 2841.84619  174.22916  49.9502
   2   9.364 BB    0.2760 2847.51367  151.02719  50.0498

Totals :                  5689.35986  325.25635

 Results obtained with enhanced integrator!
==================================================================
                        *** End of Report ***
```

Enantioenriched 5

Data File C:\HPCHEM\2\DATA\MANABU\BR200002.D Sample Name: br2

```
==================================================================
Injection Date  : 11/14/2006 3:09:10 PM
Sample Name     : br2                          Location : Vial 55
Acq. Operator   : DAN
                                              Inj Volume : 5 µl
Acq. Method     : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 11/14/2006 2:52:08 PM by DAN
                  (modified after loading)
Analysis Method : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 11/14/2006 3:23:59 PM by DAN
                  (modified after loading)
```

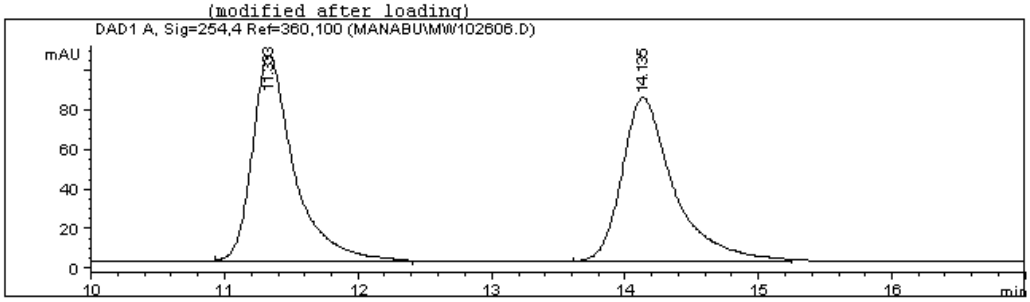



```
==================================================================
                        Area Percent Report
==================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 C, Sig=210,8 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   8.102 MM    0.4302   12.70207 4.92102e-1   0.4484
   2   9.364 BB    0.2727 2820.13818  150.45482  99.5516

Totals :                   2832.84025  150.94692

 Results obtained with enhanced integrator!
==================================================================
                          *** End of Report ***
```

Racemic 6

Data File C:\HPCHEM\2\DATA\MANABU\MW102606.D Sample Name: MW102606

```
==================================================================
Injection Date  : 10/26/2006 9:55:28 AM
Sample Name     : MW102606                      Location : Vial 1
Acq. Operator   : mmb
                                                Inj Volume : 5 µl
Acq. Method     : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 10/26/2006 8:25:54 AM by mmb
                  (modified after loading)
Analysis Method : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 11/7/2006 1:50:48 PM by MANABU
                  (modified after loading)
```



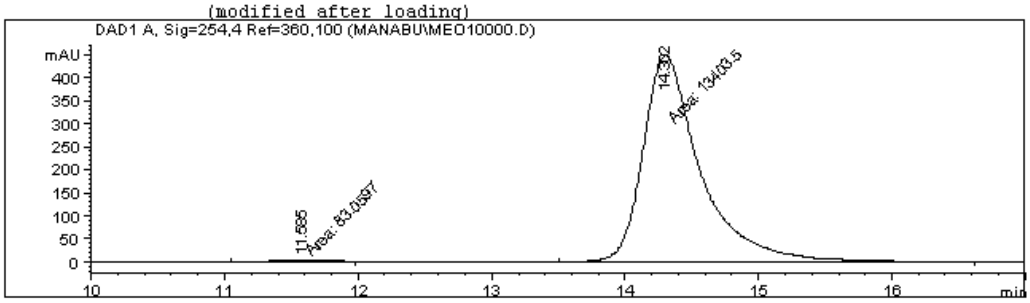

```
==================================================================
                        Area Percent Report
==================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=254,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1  11.333 BB    0.3161 2243.50635  103.81903  50.2785
   2  14.135 BB    0.3961 2218.65283   82.40121  49.7215

Totals :                  4462.15918  186.22025

 Results obtained with enhanced integrator!
==================================================================
                        *** End of Report ***
```

Enantioenriched 6

Data File C:\HPCHEM\2\DATA\MANABU\ME010000.D Sample Name: Me01

chiral

```
==========================================================================
Injection Date  : 11/7/2006 10:50:57 PM
Sample Name     : Me01                          Location : Vial 41
Acq. Operator   : MANABU
                                               Inj Volume : 5 µl
Acq. Method     : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 10/5/2006 10:43:41 AM by mmb
Analysis Method : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 11/7/2006 11:36:55 PM by MANABU
                  (modified after loading)
```



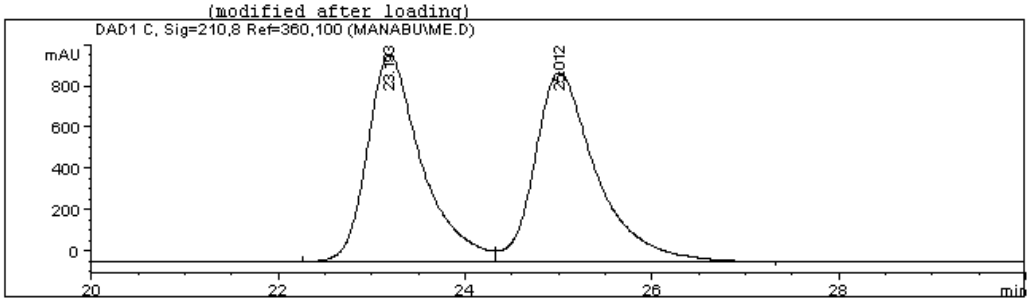

```
==========================================================================
                          Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=254,4 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1  11.585 MM    0.3698   83.05973    3.74339   0.6159
   2  14.302 MM    0.4989 1.34035e4   447.73129  99.3841

Totals :                  1.34866e4   451.47468

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

Racemic 7

Data File C:\HPCHEM\2\DATA\MANABU\ME.D Sample Name: Me

Me

```
==========================================================================
Injection Date  : 10/31/2006 1:44:44 PM
Sample Name     : Me                              Location : Vial 1
Acq. Operator   : mmb
                                                  Inj Volume : 5 µl
Acq. Method     : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 10/31/2006 1:43:34 PM by mmb
                  (modified after loading)
Analysis Method : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 11/7/2006 1:41:13 PM by MANABU
                  (modified after loading)
```



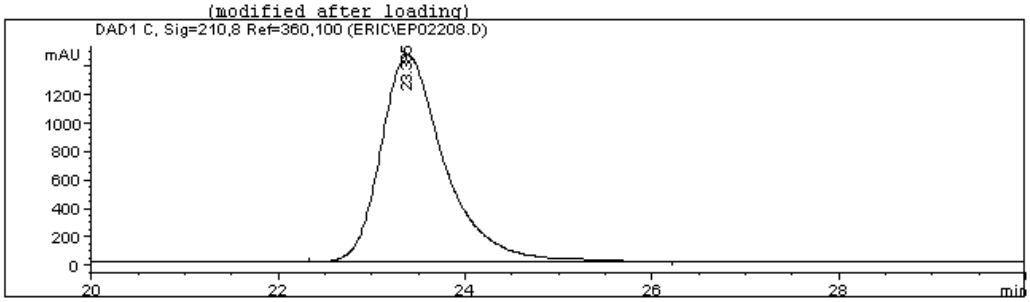

```
==========================================================================
                          Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 C, Sig=210,8 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1  23.193 BV    0.5958 4.05637e4  1003.09741  49.1400
   2  25.012 VB    0.6772 4.19836e4   918.57159  50.8600

Totals :                  8.25473e4  1921.66901

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

Enantioenriched 7

Data File C:\HPCHEM\2\DATA\ERIC\EP02208.D Sample Name: EP-02-208

ee

```
==========================================================================
Injection Date  : 10/31/2006 2:55:51 PM
Sample Name     : EP-02-208                     Location : Vial 41
Acq. Operator   : mmb
                                               Inj Volume : 5 µl
Acq. Method     : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 10/31/2006 2:55:59 PM by mmb
                  (modified after loading)
Analysis Method : C:\HPCHEM\2\METHODS\SCHWIN1.M
Last changed    : 11/7/2006 4:51:25 PM by MANABU
                  (modified after loading)
```



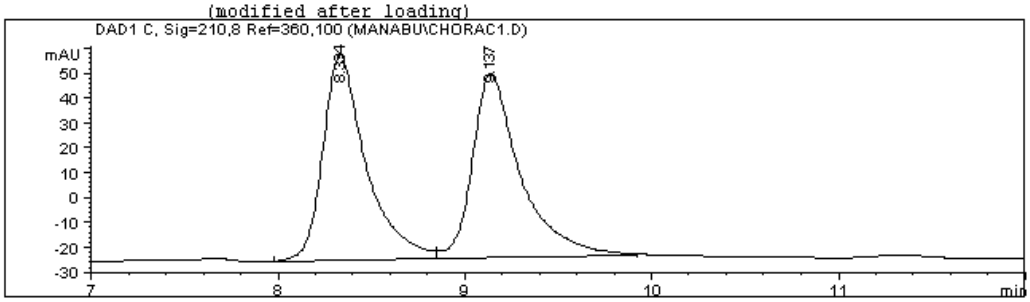

```
==========================================================================
                          Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 C, Sig=210,8 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1  23.385 BB    0.7088 6.87979e4  1451.85193 100.0000

Totals :                  6.87979e4  1451.85193

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

Racemic 8

Data File C:\HPCHEM\2\DATA\MANABU\CHORAC1.D Sample Name: CHOrac

ee

```
==================================================================
Injection Date  : 11/6/2006 10:08:03 PM
Sample Name     : CHOrac                        Location : Vial 1
Acq. Operator   : MANABU
                                               Inj Volume : 20 µl
Acq. Method     : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 11/6/2006 10:10:19 PM by MANABU
                  (modified after loading)
Analysis Method : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 11/7/2006 1:37:49 PM by MANABU
                  (modified after loading)
```



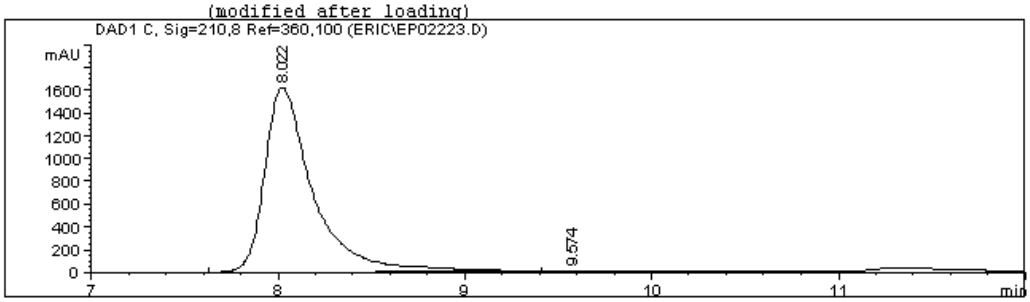

```
==================================================================
                        Area Percent Report
==================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 C, Sig=210,8 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   8.334 BV    0.2353 1322.68250   82.40218  49.9301
   2   9.137 VB    0.2607 1326.38330   74.13223  50.0699

Totals :                   2649.06580  156.53441

 Results obtained with enhanced integrator!
==================================================================
                          *** End of Report ***
```

Enantioenriched 8

Data File C:\HPCHEM\2\DATA\ERIC\EP02223.D Sample Name: EP-02-223

ee

```
==========================================================================
Injection Date  : 11/6/2006 7:05:54 PM
Sample Name     : EP-02-223                    Location : Vial 41
Acq. Operator   : MANABU
                                             Inj Volume : 5 µl
Acq. Method     : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 11/6/2006 6:53:06 PM by MANABU
                  (modified after loading)
Analysis Method : C:\HPCHEM\2\METHODS\SCHWIN1.M
Last changed    : 11/7/2006 4:30:06 PM by MANABU
                  (modified after loading)
```



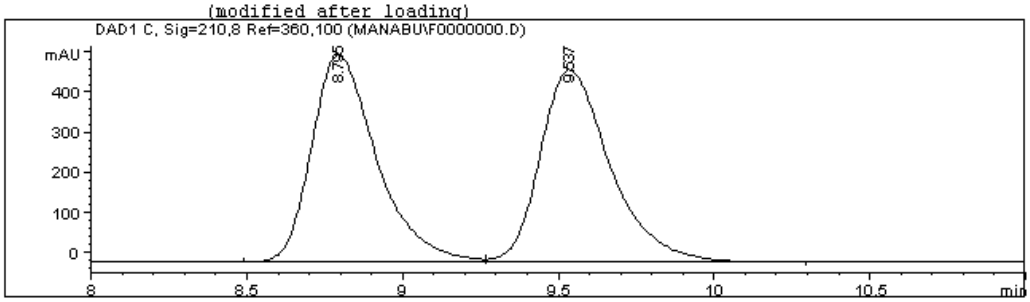

```
==========================================================================
                          Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 C, Sig=210,8 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   8.022 VB    0.2652 2.93498e4  1621.05823  99.3714
   2   9.574 BB    0.3618  185.65695    6.90183   0.6286

Totals :                  2.95354e4  1627.96006

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

Racemic 10

Data File C:\HPCHEM\2\DATA\MANABU\F0000000.D Sample Name: F

EtOH-IPA 2.5 2.5 Hex 99 OD-H

```
==========================================================================
Injection Date  : 11/2/2006 5:53:26 PM
Sample Name     : F                                 Location : Vial 41
Acq. Operator   : mmb
                                                  Inj Volume : 5 µl
Acq. Method     : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 11/2/2006 5:51:22 PM by mmb
                  (modified after loading)
Analysis Method : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 11/7/2006 2:00:38 PM by MANABU
                  (modified after loading)
```



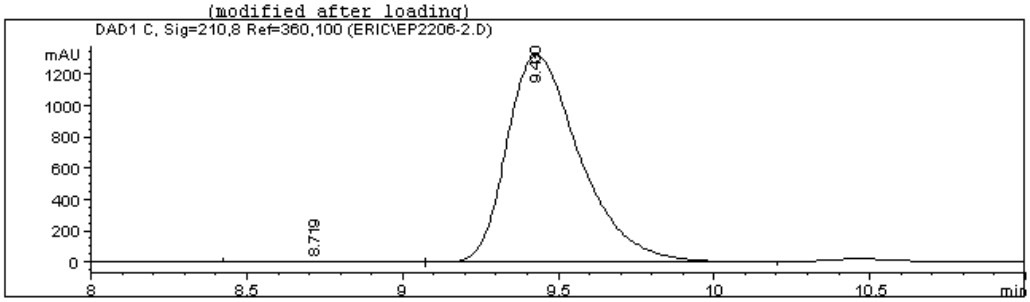

```
==========================================================================
                          Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 C, Sig=210,8 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   8.795 BV    0.2195 7490.45801  515.46973  50.0240
   2   9.537 VB    0.2384 7483.25830  478.72235  49.9760

Totals :                  1.49737e4   994.19208

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

Enantioenriched 10

Data File C:\HPCHEM\2\DATA\ERIC\EP2206-2.D Sample Name: EP-02-206

ee

```
==========================================================================
Injection Date  : 11/2/2006 6:18:46 PM
Sample Name     : EP-02-206                      Location : Vial 41
Acq. Operator   : mmb
                                                 Inj Volume : 5 µl
Acq. Method     : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 11/2/2006 5:51:22 PM by mmb
                  (modified after loading)
Analysis Method : C:\HPCHEM\2\METHODS\SCHWIN1.M
Last changed    : 11/7/2006 4:50:23 PM by MANABU
                  (modified after loading)
```



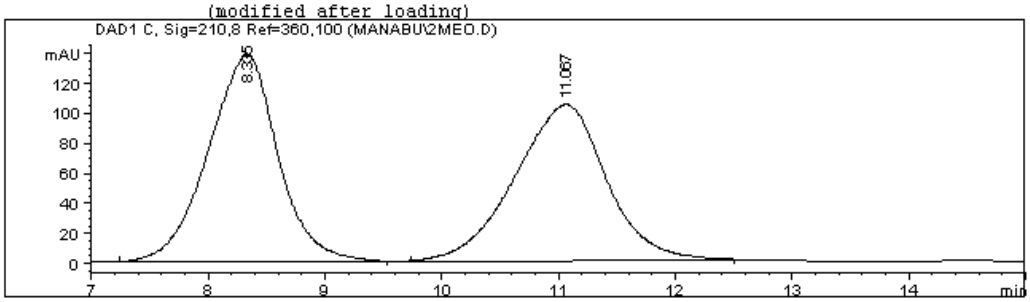

```
==========================================================================
                          Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 C, Sig=210,8 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   8.719 BV    0.2508   89.48604    5.41465   0.4114
   2   9.430 VB    0.2510 2.16637e4  1323.23816  99.5886

Totals :                   2.17532e4  1328.65281

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

Racemic 12

Data File C:\HPCHEM\2\DATA\MANABU\2ME0.D Sample Name: 2Me0

2Me0

```
======================================================================
Injection Date  : 11/1/2006 1:30:46 PM
Sample Name     : 2Me0                          Location : Vial 1
Acq. Operator   : mmb
                                               Inj Volume : 5 µl
Acq. Method     : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 11/1/2006 12:50:58 PM by mmb
                  (modified after loading)
Analysis Method : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 11/7/2006 1:30:19 PM by MANABU
                  (modified after loading)
```



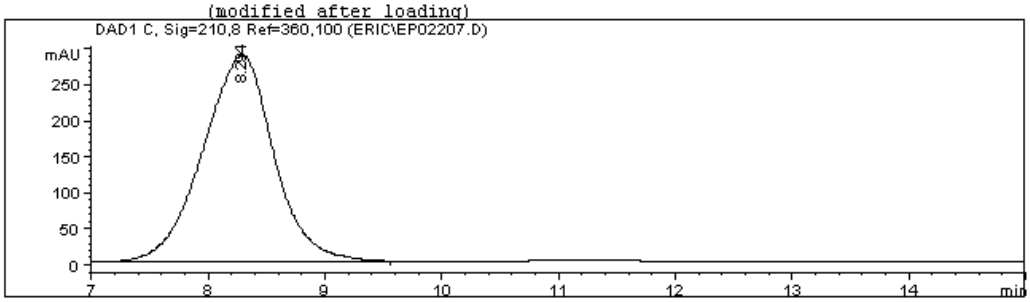

```
======================================================================
                        Area Percent Report
======================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 C, Sig=210,8 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   8.335 BP    0.6417 5699.05176  137.46022  50.3045
   2  11.067 BB    0.8359 5630.04932  103.62591  49.6955

Totals :                  1.13291e4   241.08613

 Results obtained with enhanced integrator!
======================================================================
                          *** End of Report ***
```

Enantioenriched 12

Data File C:\HPCHEM\2\DATA\ERIC\EP02207.D Sample Name: EP-02-207

ee

```
==========================================================================
Injection Date  : 11/1/2006 9:18:58 PM
Sample Name     : EP-02-207                    Location : Vial 41
Acq. Operator   : mmb
                                             Inj Volume : 5 µl
Acq. Method     : C:\HPCHEM\2\METHODS\EPROCKS.M
Last changed    : 11/1/2006 12:50:58 PM by mmb
                  (modified after loading)
Analysis Method : C:\HPCHEM\2\METHODS\SCHWIN1.M
Last changed    : 11/7/2006 5:05:00 PM by MANABU
                  (modified after loading)
```



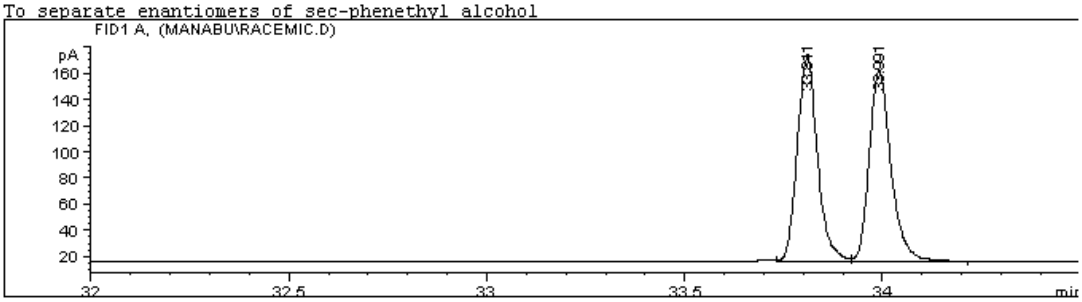

```
==========================================================================
                          Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 C, Sig=210,8 Ref=360,100

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   8.294 BB    0.6574 1.21844e4   286.96872 100.0000

Totals :                  1.21844e4   286.96872

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

Racemic 14

Data File C:\HPCHEM\1\DATA\MANABU\RACEMIC.D Sample Name: racemic

alkyl

```
==========================================================================
Injection Date  : 11/6/06 3:29:49 PM
Sample Name     : racemic                          Location : Vial 21
Acq. Operator   : Manabu                               Inj :  1
                                                  Inj Volume : 3 µl
Acq. Method     : C:\HPCHEM\1\METHODS\MW.M
Last changed    : 11/6/06 3:23:30 PM by BrianA
Analysis Method : C:\HPCHEM\1\METHODS\MW.M
Last changed    : 11/7/06 9:21:13 PM by Manabu
                  (modified after loading)
To separate enantiomers of sec-phenethyl alcohol
```



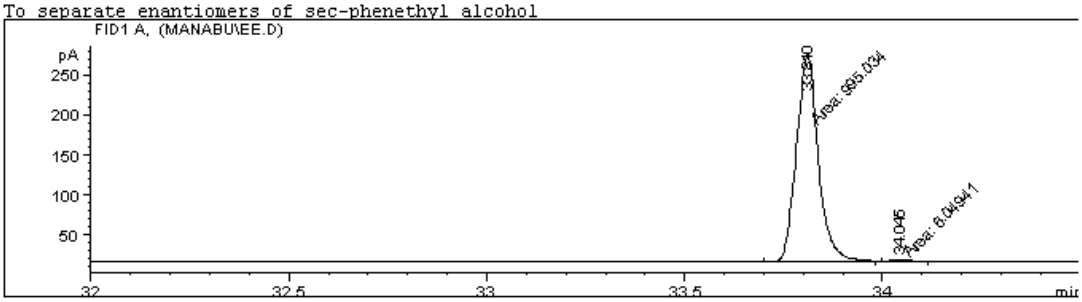

```
==========================================================================
                          Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Sample Amount         :      1.00000  [ng/ul]   (not used in calc.)


Signal 1: FID1 A,

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]   [pA*s]      [pA]        %
----|-------|----|-------|----------|----------|--------|
   1  33.811 VV    0.0496  562.08044  157.67152 50.12238
   2  33.991 VB    0.0560  559.33557  146.71539 49.87762

Totals :                  1121.41602  304.38692

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

Enantioenriched 14

Data File C:\HPCHEM\1\DATA\MANABU\EE.D Sample Name: ee

alkyl

```
==========================================================================
Injection Date  : 11/7/06 7:41:02 PM
Sample Name     : ee                                Location : Vial 25
Acq. Operator   : Manabu                               Inj :  1
                                                  Inj Volume : 3 µl
Acq. Method     : C:\HPCHEM\1\METHODS\MW.M
Last changed    : 11/6/06 3:23:49 PM by BrianA
Analysis Method : C:\HPCHEM\1\METHODS\MW.M
Last changed    : 11/7/06 9:20:35 PM by Manabu
                  (modified after loading)
To separate enantiomers of sec-phenethyl alcohol
```




```
==========================================================================
                          Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Sample Amount         :      1.00000  [ng/ul]   (not used in calc.)


Signal 1: FID1 A,

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]   [pA*s]      [pA]        %
----|-------|----|-------|----------|----------|--------|
   1  33.810 MM    0.0641  995.03387  258.90158 99.39571
   2  34.045 MM    0.0540    6.04941    1.86830  0.60429

Totals :                  1001.08329  260.76989

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

X-Ray Crystallography of Amide 17

X-ray diffraction was performed at –120 °C and raw frame data were processed using SAINT. Molecular structure was solved using direct methods and refined by F2 by full-matrix least-squares techniques. The GOF = 1.084 for 267 variables refined to R1 = 0.0409 for 4634 reflections with $I>2\alpha(I)$. There was no absorption correction of Flack parameters. Further information is contained in the CIF file.