Supporting Information

Highly Regio- and Stereoselective Asymmetric Bromoazidation of Chiral α,β -Unsaturated Carboxylic Acid Derivatives: Scope and Limitations

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General Experimental Methods

All reactions were conducted with oven-dried glassware under an atmosphere of argon (Ar). Commercial grade reagents were used without further purification. Solvents were dried and distilled following usual protocols. Flash chromatography was carried out using Silica-gel (230-400 mesh). TLC was performed on aluminium-backed plates coated with silica gel 60 with F₂₅₄ indicator.

The ¹H NMR spectra were measured on 200 and 500 MHz and ¹³C NMR spectra were measured with 50 and 125 MHz using CDCl₃ as a solvent. ¹H NMR chemical shifts are

expressed in parts per million (δ) downfield to CHCl_3 ($\delta = 7.26$); ^{13}C NMR chemical shifts are expressed in parts per million (δ) relative to the central CDCl_3 resonance ($\delta = 77.0$). Coupling constant in ^1H NMR are expressed in Hertz. Substrates **1**, **5** and **8** were synthesized following the literature procedures.¹⁻⁴

***anti*-(4*S*,2'*R*,3'*R*)-3-(3'-Azido-2'-bromo-3'-phenyl-propionyl)-4-isopropyl-oxazolidin-2-one and *anti*-(4*S*,2'*S*,3'*S*)-3-(3'-Azido-2'-bromo-3'-phenyl-propionyl)-4-isopropyl-oxazolidin-2-one (2a/3a):** Non-separable mixture of diastereomers; white solid, mp 72-90 °C; IR (KBr, cm^{-1}): 512, 574, 615, 641, 705, 772, 974, 998, 1021, 1052, 1110, 1143, 1205, 1230, 1275, 1303, 1344, 1364, 1390, 1455, 1488, 1700 (CO), 1777 (CO), 2109 (N_3), 2878, 2926, 2970, 3035; ^1H NMR (200MHz, CDCl_3): δ 0.95 (t, $J = 6.9$ Hz, 6H), 2.25-2.60 (m, 1H), 4.1-4.45 (m, 2H), 4.45-4.65 (m, 1H), 5.25 (d, $J = 11.5$ Hz, 0.6H), 5.30 (d, $J = 10.3$ Hz, 0.4H), 5.95 (d, $J = 11.5$ Hz, 0.6H), 5.99 (d, $J = 10.3$ Hz, 0.4H), 7.20-7.65 (m, 5H); ^{13}C NMR (major isomer; 50MHz, CDCl_3): δ 14.7, 17.8, 28.4, 49.3, 58.8, 62.9, 64.0, 128.4 (2C), 129.1(2C), 129.5, 136.8, 153.6, 167.5. Anal. Calcd for $\text{C}_{15}\text{H}_{17}\text{BrN}_4\text{O}_3$: C, 47.26; H, 4.49; N, 14.70. Found: C, 47.56; H, 4.35; N, 14.66.

***anti*-(4*S*,2'*R*,3'*R*)-3-[3'-Azido-2'-bromo-3'-(4-methoxyphenyl)-propionyl]-4-isopropyl-oxazolidin-2-one and *anti*-(4*S*,2'*S*,3'*S*)-3-[3'-Azido-2'-bromo-3'-(4-methoxyphenyl)-propionyl]-4-isopropyl-oxazolidin-2-one (2b/3b):** Non-separable mixture of diastereoisomers; White solid, mp 68-85 °C; IR (KBr, cm^{-1}): 558, 609, 658, 701, 772, 787, 836, 971, 1019, 1055, 1078, 1104, 1118, 1142, 1180, 1205, 1257, 1299, 1340, 1388, 1464, 1485, 1516, 1610, 1699 (CO), 1779 (CO), 2107 (N_3), 2840, 2875,

2961, 3016; ^1H NMR (200MHz, CDCl_3): δ 0.78-1.15 (m, 6H), 2.35-2.65 (m, 1H), 3.83 (s, 3H), 4.20-4.45 (m, 2H), 4.45-4.65 (m, 1H), 5.02 (d, J = 10.6 Hz, 0.55H), 5.04 (d, J = 10.4 Hz, 0.45H), 5.88 (d, J = 10.4 Hz, 0.45H), 5.93 (d, J = 10.6 Hz, 0.55H), 6.95 (d, J = 8.51 Hz, 2H), 7.25-7.40 (m, 2H); ^{13}C NMR (major isomer; 50MHz, CDCl_3): δ 14.6, 17.8, 28.4, 43.3, 55.3, 59.1, 63.7, 66.9, 114.2 (2C), 127.1, 129.5 (2C), 153.2, 160.3, 167.9; ^{13}C NMR (minor isomer; 50MHz, CDCl_3): δ 14.8, 17.8, 28.1, 43.6, 55.3, 58.5, 63.7, 66.1, 114.2 (2C), 127.2, 129.5 (2C), 153.1, 160.3, 167.7. Anal. Calcd for $\text{C}_{16}\text{H}_{19}\text{BrN}_4\text{O}_4$: C, 46.73; H, 4.66; N, 13.62. Found: C, 47.02; H, 4.66; N, 13.33.

***anti*-(2*R*,2'*R*,3'*R*)-*N*-[3'-Azido-2'-bromo-3'-phenyl-propionyl]-bornanesultam and *anti*-(2*R*,2'*S*,3'*S*)-*N*-[3'-Azido-2'-bromo-3'-phenyl-propionyl]-bornanesultam**

(6a/7a): Non-separable mixture of diastereoisomers; White solid, mp 140-155 °C; IR (KBr, cm^{-1}): 498, 533, 544, 618, 697, 760, 1057, 1070, 1119, 1140, 1168, 1225, 1272, 1311, 1332, 1392, 1456, 1692 (CO), 2112 (N_3), 2343, 2361, 2939, 2963, 2991; ^1H NMR (200 MHz, CDCl_3): δ 0.95 (s, 0.9H), 0.99 (s, 2.1H), 1.16 (s, 2.1H), 1.26 (s, 0.9H), 1.35-1.55 (m, 2H), 1.80-2.05 (m, 3H), 2.05-2.50 (m, 2H), 3.42 (d, J = 3.0 Hz, 0.6H), 3.57 (d, J = 2.3 Hz, 1.4H), 3.64 (dd, J = 3.6, 7.4 Hz, 0.3H), 4.03 (dd, J = 5.2, 7.6 Hz, 0.7H), 4.90-5.40 (m, 2H), 7.24-7.60 (m, 5H); ^{13}C NMR (major isomer; 50MHz, CDCl_3): δ 19.7, 20.5, 26.2, 32.6, 37.7, 44.2, 47.8, 47.9, 48.7, 52.8, 65.1, 65.8, 128.3 (2C), 128.9 (2C), 129.2, 136.8, 165.1. Anal. Calcd for $\text{C}_{19}\text{H}_{23}\text{BrN}_4\text{O}_3\text{S}$: C, 48.83; H, 4.96; N, 11.99. Found: C, 49.01; H, 4.86; N, 11.79. Diastereomeric ratio was determined by HPLC [ZORBAX Eclipse XBD-C18 column, acetonitrile/water (80/20 v/v), 1 mL/min, 250 nm].

***anti*-(2*R*,2'*R*,3'*R*)-*N*-[3'-Azido-2'-bromo-3'-(3,4-dimethoxyphenyl)-propionyl]-**

bornanesultam (6c): White solid, mp 150-152 °C; $[\alpha]_D^{25} = -111.88$ (*c* 0.53, CHCl₃); IR (KBr, cm⁻¹): 500, 543, 533, 668, 769, 1027, 1061, 1116, 1139, 1166, 1215, 1257, 1266, 1300, 1331, 1461, 1520, 1689 (CO), 2104 (N₃), 2362, 2936, 2964; ¹H NMR (200MHz, CDCl₃): δ 0.972 (s, 3H), 1.16 (s, 3H), 1.20-1.50 (m, 3H), 1.75-2.0 (m, 3H), 2.05-2.20 (m, 1H), 3.52 (s, 2H), 3.87 (s, 3H), 3.89 (s, 3H), 3.90-4.10 (m, 1H), 4.85-5.05 (m, 2H), 6.80-6.97 (m, 3H); ¹³C NMR (50MHz, CDCl₃): δ 19.8, 20.6, 26.4, 32.7, 37.4, 44.5, 45.2, 47.9, 48.9, 52.9, 55.9, 56.0, 65.0, 66.3, 110.9, 111.1, 120.9, 127.5, 149.3, 149.9, 166.3. Anal. Calcd for C₂₁H₂₇BrN₄O₅S: C, 47.82; H, 5.16; N, 10.62. Found: C, 48.02; H, 5.45; N, 10.35. Diastereomeric ratio was determined by HPLC [ZORBAX Eclipse XBD-C18 column, acetonitrile/water (80/20 v/v), 1 mL/min, 250 nm].

***anti*-(2*R*,2'*R*,3'*R*)-*N*-[3'-Azido-2'-bromo-3'-(4-chloro-phenyl)-propionyl]**

bornanesultam (6f): Non-separable mixture of diastereomers and undesired compounds; White solid, mp 101-105 °C; IR (KBr,cm⁻¹): 499, 536, 546, 668, 760, 835, 1015, 1057, 1137, 1167,1219, 1273, 1337, 1392, 1412,1493, 1698 (CO), 2111 (N₃), 2855, 2925, 2961; ¹H NMR (major isomer, 200MHz, CDCl₃): δ 0.99 (s, 3H), 1.16 (s, 3H), 1.35-1.50 (m, 2H), 1.85-2.05 (m, 3H), 2.05-2.25 (m, 2H), 3.57 (d, *J* = 2.7 Hz, 2H), 4.02 (dd, *J* = 7.4, 5.2 Hz, 1H), 5.05 (d, *J* = 10.5 Hz, 1H), 5.22 (d, *J* = 10.4 Hz, 1H), 7.30-7.55 (m, 4H); ¹³C NMR (major isomer, 125 MHz, CDCl₃): δ 20.3, 21.1, 26.8, 33.1,38.3, 44.9, 47.4, 48.4, 49.4, 53.4, 65.7, 66.2, 129.7 (2C), 130.2 (2C), 135.7, 135.9, 165.5. Diastereomeric ratio was determined by HPLC [ZORBAX Eclipse XBD-C18 column, acetonitrile/water (75/25 v/v), 1 mL/min, 250 nm].

***anti*-(2*R*,2'*R*,3'*R*)-*N*-[3'-Azido-2'-bromo-3'-(4-nitro-phenyl)-propionyl]-**

bornanesultam (6g): Non-separable mixture of diastereomers and undesired compounds; White solid, mp 105-110 °C; IR (KBr, cm⁻¹): 535, 546, 763, 1137, 1168, 1220, 1347, 1525, 1698 (CO), 2111 (N₃), 2925, 2961; ¹H NMR (major isomer, 500 MHz, CDCl₃): δ 1.02 (s, 3H), 1.17 (s, 3H), 1.35-1.43 (m, 1H), 1.44-1.52 (m, 1H), 1.86-2.02 (m, 3H), 2.11-2.17 (m, 1H), 2.17-2.22 (m, 1H), 3.57 (d, *J* = 13.8 Hz, 1H), 3.63 (d, *J* = 13.8 Hz, 1H), 4.04 (dd, *J* = 7.7, 5.1 Hz, 1H), 5.30 (quasi t, *J* = 9.2 Hz, 2H), 7.68 (d, *J* = 8.7 Hz, 2H), 8.27 (d, *J* = 8.7 Hz, 2H); ¹³C NMR (major isomer, 125 MHz, CDCl₃): δ 20.2, 21.0, 26.8, 33.1, 38.3, 44.9, 46.3, 48.4, 49.4, 53.4, 65.7, 66.0, 124.6 (2C), 130.1 (2C), 144.4, 148.6, 165.2. Diastereomeric ratio was determined by HPLC [ZORBAX Eclipse XBD-C18 column, acetonitrile/water (75/25 v/v), 1 mL/min, 250 nm].

***anti*-(2'*R*,3'*R*,2*S*,5*S*)-1-[3'-Azido-2'-bromo-3'-(2-naphthyl)-propionyl]-2,5-diphenylpyrrolidine (9b):** White solid, mp 181-183 °C; [α]_D²⁵ = -190.85 (*c* 0.19, CHCl₃); IR (KBr, cm⁻¹): 482, 531, 612, 702, 756, 810, 1028, 1076, 1172, 1202, 1261, 1341, 1416, 1451, 1660 (CO), 2096 (N₃), 2342, 2362, 2850, 2919; ¹H NMR (200 MHz, CDCl₃): δ 1.70-2.0 (m, 2H), 2.35-2.70 (m, 2H), 4.22 (d, *J* = 10.3 Hz, 1H), 5.09 (d, *J* = 10.3 Hz, 1H), 6.75 (d, *J* = 8.5 Hz, 1H), 7.10-7.55 (m, 12H), 7.60-7.80 (m, 4H); ¹³C NMR (50 MHz, CDCl₃): δ 30.6, 32.9, 45.6, 62.4 (2C), 66.6, 124.1, 125.1 (3C), 125.7, 126.4, 126.5, 126.9, 127.7, 127.9, 128.1, 128.5 (3C), 128.6, 129.2 (3C), 132.8, 133.4, 142.1, 143.0, 166.1. Anal. Calcd for C₂₉H₂₅BrN₄O: C, 66.29; H, 4.80; N, 10.66. Found: C, 66.41; H, 5.09; N, 10.79.

***anti*-(2'*R*,3'*R*,2*S*,5*S*)-1-[3'-Azido-2'-bromo-3'-(3,4-dimethoxy-phenyl)-propionyl]-2,5-diphenyl-pyrrolidine (9c):** Brownish solid, mp 156-158 °C; $[\alpha]_D^{25} = -245.49$ (*c* 0.21, CHCl₃); IR (KBr, cm⁻¹): 668, 702, 756, 806, 1027, 1078, 1145, 1221, 1261, 1422, 1451, 1465, 1494, 1517, 1596, 1659 (CO), 2105 (N₃), 2342, 2361, 2854, 2929, 3026; ¹H NMR (200MHz, CDCl₃): δ 1.75-1.95 (m, 2H), 2.40-2.70 (m, 2H), 3.66 (s, 3H), 3.82 (s, 3H), 4.07 (d, *J* = 10.4 Hz, 1H), 4.84 (d, *J* = 10.4 Hz, 1H), 5.34 (d, *J* = 7.7 Hz, 1H), 5.59 (d, *J* = 7.7 Hz, 1H), 6.50 (dd, *J* = 2.0, 8.2 Hz, 1H), 6.72 (d, *J* = 8.2 Hz, 1H), 7.10-7.50 (m, 10H); ¹³C NMR (50MHz, CDCl₃): δ 30.6, 32.9, 46.0, 55.7 (2C), 62.4 (2C), 66.2, 109.7, 110.6, 120.8, 125.1 (2C), 125.7 (2C), 126.9, 127.9, 128.3, 128.5 (2C), 129.1 (2C), 142.0, 143.1, 149.0, 149.4, 166.1. Anal. Calcd for C₂₇H₂₇BrN₄O₃: C, 60.57; H, 5.08; N, 10.46. Found: C, 60.26; H, 5.46; N, 10.73.

***anti*-(2'*R*,3'*R*,2*S*,5*S*)-1-[3'-Azido-2'-bromo-3'-(4-chloro-phenyl)-propionyl]-2,5-diphenyl-pyrrolidine (9f):** Non-separable mixture of diastereomers with undesired compounds; White solid, mp 162-166 °C; IR (KBr, cm⁻¹): 701, 772, 1094, 1219, 1420, 1492, 1508, 1560, 1655 (CO), 2102 (N₃), 2923; ¹H NMR (major isomer, 500 MHz, CDCl₃): δ 1.82 (dd, *J* = 6.0, 12.5 Hz, 1H), 1.90 (dd, *J* = 6.0, 12.5 Hz, 1H), 2.45-2.056 (m, 1H), 2.56-2.65 (m, 1H), 4.01 (d, *J* = 10.5 Hz, 1H), 5.25 (d, *J* = 10.5 Hz, 1H), 5.38 (d, *J* = 8.0 Hz, 1H), 5.58 (d, *J* = 8.0 Hz, 1H), 7.03 (d, *J* = 8.5 Hz, 2H), 7.016-7.30 (m, 5H), 7.30-7.50 (m, 7H); ¹³C NMR (major isomer, 125 MHz, CDCl₃): δ 30.9, 33.4, 47.3, 62.8, 63.1, 64.2, 125.4 (2C), 126.6 (2C), 127.4, 128.6, 129.1 (2C), 129.51 (2C), 129.55 (2C), 129.8 (2C), 135.3, 136.6, 142.7, 142.9.

***anti*-(2'*R*,3'*R*,2*S*,5*S*)-1-[3'-Azido-2'-bromo-3'-(4-nitro-phenyl)-propionyl]-2,5-diphenyl-pyrrolidine and *anti*-(2'*S*,3'*S*,2*S*,5*S*)-1-[3'-Azido-2'-bromo-3'-(4-nitro-phenyl)-propionyl]-2,5-diphenyl-pyrrolidine (9g):** Non-separable mixture of diastereomers and undesired compounds; White solid, mp 125-135 °C; IR (KBr, cm⁻¹): 702, 756, 861, 1112, 1208, 1348, 1421, 1451, 1494, 1524, 1607, 1659 (CO), 2110 (N₃), 2854, 2925, 3028; ¹H NMR (1:1 mixture of diastereomers, 500 MHz, CDCl₃): δ 1.84 (dd, *J* = 6.0, 12.0 Hz, 1H), 1.85-1.95 (m, 1H), 2.45-2.67 (m, 2H), 4.03 (d, *J* = 10.5 Hz, 0.5H), 4.04 (d, *J* = 10.5 Hz, 0.5H), 5.024-5.042 (m, 2H), 5.60 (quasi t, *J* = 7.5 Hz, 1H), 6.99 (d, *J* = 9.0 Hz, 1H), 7.20-7.30 (m, 4H), 7.30-7.53 (m, 7H), 8.10 (d, *J* = 8.5 Hz, 1H), 8.13 (d, *J* = 8.5 Hz, 1H); ¹³C NMR (1:1 mixture of diastereomers, 125 MHz, CDCl₃): δ 30.9 (0.5C), 31.0 (0.5C), 33.3 (0.5C), 33.4 (0.5C), 45.5 (0.5C), 46.1 (0.5C), 62.86 (0.5C), 62.89 (0.5C), 62.96 (0.5C), 63.25 (0.5C), 64.1 (0.5C), 65.8 (0.5C), 124.1, 124.5, 125.4, 125.5, 126.0, 126.6, 127.48 (0.5C), 127.53 (0.5C), 128.63 (0.5C), 128.69 (0.5C), 129.0, 129.1, 129.2, 129.5, 129.6, 129.7, 142.3 (0.5C), 142.6 (0.5C), 142.9 (0.5C), 143.3 (0.5C), 143.9 (0.5C), 145.1 (0.5C), 148.39 (0.5C), 148.45 (0.5C), 164.9 (0.5C), 165.9 (0.5C). Diastereomeric ratio was determined by HPLC [ZORBAX Eclipse XBD-C18 column, acetonitrile/water (70/30 v/v), 1 mL/min, 250 nm].

***anti*-(2'*R*,3'*R*,2*S*,5*S*)-1-(3'-Azido-2'-bromo-butanoyl)-2,5-diphenyl-pyrrolidine (9h):** Gummy liquid; [α]_D²⁵ = -103.56 (*c* 0.5, CHCl₃); IR (KBr, cm⁻¹): 701, 772, 1028, 1219, 1259, 1414, 1451, 1461, 1494, 1659 (CO), 2103 (N₃), 2919; ¹H NMR (200MHz, CDCl₃): δ 1.26 (d, *J* = 6.5 Hz, 3H), 1.60-2.00 (m, 2H), 2.30-2.75 (m, 2H), 3.29 (d, *J* = 9.2 Hz,

1H), 3.85-4.05 (m, 1H), 5.40 (d, $J = 8.0$ Hz, 1H), 5.53 (d, $J = 8.0$ Hz, 1H), 7.10-7.50 (m, 10H); ^{13}C NMR (50MHz, CDCl_3): δ 17.4, 30.4, 32.9, 47.1, 57.6, 62.2 (2C), 125.1 (2C), 125.2 (2C), 126.9, 127.9, 128.5 (2C), 129.1 (2C), 142.3, 142.8, 166.1. Anal. Calcd for $\text{C}_{20}\text{H}_{21}\text{BrN}_4\text{O}$: C, 58.12; H, 5.12; N, 13.56. Found: C, 58.32; H, 5.28; N, 13.64.

***anti*-(2'*R*,3'*R*,2*S*,5*S*)-1-(3'-Azido-2'-bromo-nonanoyl)-2,5-diphenyl-pyrrolidine (9i):**

Gummy liquid; $[\alpha]_{\text{D}}^{25} = -112.12$ (c 0.5, CDCl_3); IR (KBr, cm^{-1}): 701, 756, 804, 1029, 1078, 1168, 1207, 1262, 1347, 1414, 1451, 1666 (CO), 2105 (N_3), 2856, 2926; ^1H NMR (200MHz, CDCl_3): δ 0.84 (t, $J = 12.2$ Hz, 3H), 1.20 (br s, 8H), 1.65-1.95 (m, 3H), 1.95-2.15 (m, 1H), 2.30-2.65 (m, 2H), 4.26 (d, $J = 10.7$ Hz, 1H), 4.41 (ddd, $J = 2.3, 8.6, 10.7$ Hz, 1H), 5.36 (d, $J = 7.7$ Hz, 1H), 5.51 (d, $J = 7.7$ Hz, 1H), 7.05-7.55 (m, 10H); ^{13}C NMR (125MHz, CDCl_3): 14.4, 22.9, 26.4, 28.7, 30.9, 31.9, 33.4, 35.5, 47.9, 52.4, 62.86, 62.98, 125.5 (2C), 126.4 (2C), 127.3, 128.3, 128.8 (2C), 129.3 (2C), 142.82, 142.86, 166.0. Anal. Calcd for $\text{C}_{25}\text{H}_{31}\text{BrN}_4\text{O}$: C, 62.11; H, 6.46; N, 11.59. Found: C, 62.27; H, 6.60; N, 11.35.

3*R*-Azido-2*R*-bromo-3-(4-methoxy-phenyl)-propionic acid (10b): Gummy liquid; $[\alpha]_{\text{D}}^{32} = -53.29$ (c 0.2, CHCl_3); IR (KBr, cm^{-1}): 556, 668, 763, 830, 1032, 1178, 1253, 1515, 1611, 1731 (CO), 2107 (N_3), 2851, 2925; ^1H NMR (200 MHz, CDCl_3): δ 3.52 (br s $-\text{CO}_2\text{H}$), 3.83 (s, 3H), 4.30 (d, $J = 10.4$ Hz, 1H), 4.90 (d, $J = 10.4$ Hz, 1H), 6.95 (d, $J = 8.2$ Hz, 2H), 7.29 (d, $J = 8.2$ Hz, 2H); ^{13}C NMR (125 MHz, CDCl_3): δ 46.4, 55.7, 67.1, 114.7 (2C), 127.3, 129.6 (2C), 160.8, 172.5. Anal. Calcd for $\text{C}_{10}\text{H}_{10}\text{BrN}_3\text{O}_3$: C, 40.02; H, 3.36; N, 14.00. Found: C, 40.21; H, 3.25; N, 13.85.

ORTEP diagram of compound 9c with thermal ellipsoid at 30% probability level

Reference:

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3. Aldous, D. J.; Dutton, W. M.; Steel, P. G. *Tetrahedron: Asymmetry* **2000**, *11*, 2455-2462.
4. Rajagopalan, S.; Raman, P. V. A. *Org. Synth. Coll. Vol. III*, p 425, Wiley, **1955**.

Compound 6b: ¹H Spectrum

Compound 6b: ¹³C Spectrum

Compound 6b: DEPT-135 Spectrum

Compound 6c: ^1H Spectrum

Compound 6c: ^{13}C Spectrum

Compound 6c: DEPT-135 Spectrum

Compounds 6f and 7f alongwith undesired compounds: ^1H Spectrum

Compounds 6f and 7f alongwith undesired compounds: ^{13}C Spectrum

Compounds 6f and 7f alongwith undesired compounds: DEPT-135 Spectrum

Compound 6g and 7g alongwith undesired compound: ^1H Spectrum

Compounds 6g and 7g alongwith undesired compounds: ¹³C Spectrum

Compounds 6g and 7g alongwith undesired compounds: DEPT-135 Spectrum

Compound 9a: ¹H Spectrum

Compound 9a: ¹³C Spectrum

Compound 9a: DEPT-135 Spectrum

Compound 9b: ^1H Spectrum

Compound 9c: ¹H Spectrum

Compound 9c: ¹³C Spectrum

Compound 9c:DEPT-135 Spectrum

Compound 9f and minor diastereomer alongwith undesired compounds: ^1H Spectrum

Compound 9f and minor diastereomer alongwith undesired compounds: ¹³C Spectrum

**Compound 9f and minor diastereomer alongwith undesired compounds:
DEPT-135 Spectrum**

Compound 9g and minor diastereomer alongwith undesired compounds: ^1H Spectrum

Compound 9g and minor diastereomer alongwith undesired compounds: ^{13}C Spectrum

**Compound 9g and minor diastereomer along with undesired compounds:
DEPT-135 Spectrum**

Compound 9h: ¹H Spectrum

Compound 9h: ¹³C Spectrum

Compound 9h: DEPT-135 Spectrum

Compound 9i: ^1H Spectrum

Compound 9i: ^{13}C Spectrum

Compound 9i: DEPT-135 Spectrum

Compound 10b: ¹H Spectrum

Compound 10b: ¹³C Spectrum

Compound 10b: DEPT-135 Spectrum