Supporting Information

Pd(0)-Catalyzed Amphiphilic Activation of Bis-Allyl Alcohol and Ether

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A general procedure for the α -alkylation of aldehydes: To a solution of Pd(OAc)₂ (22.6 mg, 0.1 mmol), PPh₃ (53.0 mg, 0.2 mmol), and LiCl (44.0 mg, 1.0 mmol), in dry THF (5 mL) were successively added 2-phenylpropionaldehyde (135 mg, 1.0 mmol), 2-methylenepropane-1,3-diol (97 mg, 1.1 mmol), triethylamine (124.9 mg, 1.2 mmol), and triethylborane (2.4 mmol, 1.0 M hexane solution) via syringe at ambient temperature under N₂. The mixture (yellow suspension all through the reaction) was stirred at ambient temperature for 12 h. The mixture was diluted with EtOAc and washed with 2 N HCl, sat. NaHCO₃, and then brine. The extract was dried (MgSO₄) and concentrated in vacuo and the residual oil was subjected to column chromatography over silica gel (hexane/EtOAc = 6/1 v/v) to give **3a** (195 mg, 93%, *R_f* = 0.5; hexane/EtOAc = 2/1 v/v).

A general procedure for the intramolecular nucleophilic alkylation of aldehydes: To a solution of Pd(OAc)₂ (22.6 mg, 0.1 mmol), PPh₃ (53.0 mg, 0.2 mmol), and **3a** (204 mg, 1.0 mmol) in dry THF (5 mL) were successively added triethylborane (2.4 mmol, 1.0 M hexane solution) via syringe at ambient temperature under N₂. The mixture (blown solution) was stirred at ambient temperature for 39 h. The mixture was diluted with EtOAc and washed with 2 N HCl, sat. NaHCO₃, and then brine. The extract was dried (MgSO₄) and concentrated in vacuo and the residual oil was subjected to column chromatography over silica gel (hexane/EtOAc = 6/1 v/v) to give **6a** (155 mg, 82%, *R_f* = 0.6; hexane/EtOAc = 2/1 v/v).

3-Methyl-5-methylene-3-phenyl-tetrahydro-pyran-2-ol (3a): IR (neat) 3392 (s), 3061 (w) 3032 (w), 1654 (w), 1601 (w), 1498 (m), 1446 (m), 1373 (w), 1249 (w), 1029 (m), 898 (m), 698 (m) cm^{-1} ; ^1H NMR (CDCl_3 , 400 MHz): (**major isomer**) δ 1.33 (s, 3 H), 2.35 (d, $J = 12.8$ Hz, 1 H), 2.59 (d, $J = 3.7$ Hz, 1 H), 3.13 (d, $J = 12.8$ Hz, 1 H), 3.97 (d, $J = 12.5$ Hz, 1 H), 4.52 (d, $J = 12.5$ Hz, 1 H), 4.87 (s, 1 H), 4.94 (s, 1 H), 5.17 (d, $J = 3.7$ Hz, 1 H), 7.20-7.47 (m, 5 H); (**minor isomer**) δ 1.36 (s, 1 H), 2.42 (d, $J = 14.1$ Hz, 1 H), 2.71 (d, $J = 14.1$ Hz, 1H), 3.01 (d, $J = 4.8$ Hz, 1 H), 4.11 (d, $J = 12.5$ Hz, 1 H), 4.52 (d, $J = 12.5$ Hz, 1 H), 4.81 (s, 1 H), 4.90 (s, 1 H), 5.13 (d, $J = 4.8$ Hz, 1 H), 7.20-7.47 (m, 5 H); ^{13}C NMR (CDCl_3 , 100 MHz): (**major**) δ 25.3, 37.3, 43.3, 64.2, 97.6, 110.8, 125.8, 126.2, 128.2, 141.4, 145.4; (**minor**) δ 18.7, 42.9, 43.7, 68.7, 98.8, 111.1, 125.8, 126.2, 128.1, 140.5, 145.1; High-resolution MS, Calcd for $\text{C}_{13}\text{H}_{16}\text{O}_2$: 204.1150. Found m/z (relative intensity): 204.1181 (M^+ , 3), 187 (0.3), 175 (0.3) 158 (100).

3-(4-tert-Butyl-benzyl)-3-methyl-5-methylene-tetrahydro-pyran-2-ol (3b): IR (neat) 3390 (s), 3055 (m), 3025 (m), 1656 (w), 1614 (w), 1463 (m), 1411 (m), 1392 (m), 1251 (m), 1020 (s), 898 (m), 690 (m) cm^{-1} ; ^1H NMR (CDCl_3 , 400 MHz): (**major isomer**) δ 0.91 (s, 3 H), 1.31 (s, 9 H), 1.85 (d, $J = 13.4$ Hz, 1 H), 2.52 (d, $J = 13.4$ Hz, 1 H), 2.62 (d, $J = 13.2$ Hz, 1 H), 2.65 (d, $J = 13.2$ Hz, 1 H), 3.80 (brd, $J = 3.7$ Hz, 1 H), 3.94 (d, $J = 12.2$ Hz, 1 H), 4.33 (d, $J = 12.2$ Hz, 1 H), 4.65 (br, 1 H), 4.77 (s, 1 H), 4.87 (s, 1 H), 7.09 (d, $J = 8.2$ Hz, 2 H), 7.27 (d, $J = 8.2$ Hz, 2 H); (**minor isomer**) δ 0.88 (s, 3 H), 1.31 (s, 9 H), 2.07 (d, $J = 14.2$ Hz, 1 H), 2.18 (d, $J = 14.2$ Hz, 1 H), 2.58 (d, $J = 13.2$ Hz, 1 H), 2.74 (d, $J = 13.2$ Hz, 1 H), 3.73 (brd, $J = 3.7$ Hz, 1 H), 3.91 (d, $J = 12.1$ Hz, 1 H), 4.45 (d, $J = 12.1$ Hz, 1 H), 4.65 (br, 1 H), 4.74 (s, 1 H), 4.85 (s, 1 H), 7.13 (d, $J = 8.2$ Hz, 2 H), 7.27 (d, $J = 8.2$ Hz, 2 H); ^{13}C NMR (CDCl_3 , 100 MHz): (**major isomer**) δ 21.4, 31.4, 39.6, 39.8, 39.9, 42.9, 66.8, 66.9, 67.0, 98.1, 110.6, 110.7, 110.8, 124.7, 130.4, 134.5, 141.5, 148.7; (**minor isomer**) δ 19.2, 34.3, 39.3, 39.8, 39.9, 41.4, 65.5, 65.6, 65.7, 98.1, 110.4, 110.5, 110.6, 124.7, 130.4, 134.8, 141.6, 148.8; High-resolution MS, Calcd for $\text{C}_{18}\text{H}_{26}\text{O}_2$: 274.1933. Found m/z (relative intensity): 274.1929 (M^+ , 45),

259 (3), 228 (2), 213 (100).

4-Methylene-2-oxa-spiro[5.5]undecan-1-ol (3c): IR (neat) 3390 (m), 3072 (m), 1656 (w), 1454 (m), 1164 (s), 893 (m) cm^{-1} ; ^1H NMR (CDCl_3 , 400 MHz): δ 1.17-1.53 (m, 10 H), 2.01 (d, $J = 13.2$ Hz, 1 H), 2.41 (d, $J = 13.2$ Hz, 1 H), 2.88 (br, 1 H), 3.89 (d, $J = 12.3$ Hz, 1 H), 4.40 (d, $J = 12.3$ Hz, 1 H), 4.72 (s, 1 H), 4.74 (s, 1 H), 4.80 (s, 1 H); ^{13}C NMR (CDCl_3 , 100 MHz): δ 20.9, 21.0, 26.2, 31.9, 32.1, 36.4, 38.5, 65.3, 97.9, 109.7, 141.4; High-resolution MS, Calcd for $\text{C}_{11}\text{H}_{18}\text{O}_2$: 182.1307. Found m/z (relative intensity): 182.1279 (M^+ , 30), 165 (7), 136 (100).

1-(2-Benzyloxymethyl-allyl)-cyclohexanecarboxaldehyde (4a) : IR (neat) 3030 (w), 1724 (s), 1645 (w), 1452 (m), 1095 (m), 1074 (m), 908 (m), 736 (m), 698 (m) cm^{-1} ; ^1H NMR (CDCl_3 , 400 MHz): δ 1.20-1.40 (m, 6 H), 1.51-1.58 (m, 2 H), 1.84-1.87 (m, 2 H), 2.29 (s, 2 H), 3.83 (s, 2 H), 4.43 (s, 2 H), 4.91 (s, 1 H), 5.13 (s, 1 H), 7.25-7.37 (m, 5 H), 9.45 (s, 1 H); ^{13}C NMR (CDCl_3 , 100 MHz): δ 22.3, 25.6, 31.3, 39.8, 49.5, 71.9, 73.4, 116.2, 127.4, 127.6, 128.2, 138.2, 141.3, 206.4; High-resolution MS, Calcd for $\text{C}_{18}\text{H}_{14}\text{O}_2$: 272.1776. Found m/z (relative intensity): 272.1793 (M^+ , 100), 243 (50).

1-(2-Benzyloxymethyl-allyl)-cyclohex-2-enecarbaldehyde (4b): IR (neat) 3028 (m), 1722 (vs), 1647 (m), 1496 (m), 1454 (s), 1346 (m), 1028 (m), 908 (s), 734 (m), 698 (m) cm^{-1} ; ^1H NMR (CDCl_3 , 400 MHz): δ 1.49-1.65 (m, 4 H), 1.90-1.99 (m, 2 H), 2.39 (s, 2 H), 3.87 (s, 2 H), 4.44 (s, 2 H), 4.95 (s, 1 H), 5.16 (s, 1 H), 5.53 (d, $J = 10.1$ Hz, 1 H), 5.94 (dm, $J = 10.1$ Hz, 1H), 7.25-7.34 (m, 5 H), 9.45 (s, 1 H); ^{13}C NMR (CDCl_3 , 100 MHz): δ 18.8, 24.7, 27.7, 39.5, 50.7, 71.9, 73.2, 116.3, 126.4, 127.4, 127.6, 128.2, 131.5, 138.0, 141.5, 202.5; High-resolution MS, Calcd for $\text{C}_{18}\text{H}_{22}\text{O}_2$: 270.1620. Found m/z (relative intensity): 241.1608 ($\text{M}^+ - \text{CHO}$, 100).

2-(2-Benzyloxymethyl-2-propenyl)-2-methyl-3-oxo-3-phenylpropanal (4c): IR (neat) 3063 (m), 1726 (s), 1678 (s), 1097 (m), 914 (w), 698 (m) cm^{-1} ; ^1H NMR (CDCl_3 , 400 MHz): δ 1.42 (s, 3 H), 2.88 (d, $J = 14.6$ Hz, 1 H), 2.97 (d, $J = 14.6$ Hz, 1 H), 3.79 (s, 2 H), 4.33 (s, 2 H), 4.95 (s, 1 H), 5.12 (s, 1 H), 7.06 - 7.95 (m, 10 H), 9.82 (s, 1 H); ^{13}C NMR (CDCl_3 , 100 MHz): δ 18.5, 37.5, 62.6, 71.9, 73.2, 117.2, 127.4, 127.5, 128.2, 128.5, 128.7, 132.6, 136.4, 137.8, 140.6, 199.1, 200.5; MS, Calcd for $\text{C}_{21}\text{H}_{22}\text{O}_3$: 322.1569. Found m/e (relative intensity): 322.1566 (M^+ , 15), 294 (100).

1-Benzyloxy-4-methylene-2-oxa-spiro[5.5]undecane (5a): IR (neat) 3068 (w), 3030 (w), 1651 (w), 1496 (w), 1454 (s), 1342 (w), 1249 (w), 1026 (s), 900 (m), 734 (m), 698

(m) cm^{-1} ; ^1H NMR (CDCl_3 , 400 MHz): δ 1.19-1.61 (m, 10 H), 2.14 (d, $J = 13.6$ Hz, 1 H), 2.41 (d, $J = 13.6$ Hz, 1 H), 3.87 (d, $J = 12.1$ Hz, 1 H), 4.28 (d, $J = 12.1$ Hz, 1 H), 4.44 (s, 1 H), 4.51 (d, $J = 12.3$ Hz, 1 H), 4.71 (s, 1 H), 4.78 (d, $J = 12.3$ Hz, 1 H), 4.80 (s, 1 H); ^{13}C NMR (CDCl_3 , 100 MHz): δ 21.0, 21.1, 26.2, 31.9, 33.4, 36.9, 38.4, 64.6, 68.9, 102.0, 109.4, 127.3, 127.4, 128.1, 138.3, 141.8; High-resolution MS, Calcd for $\text{C}_{18}\text{H}_{14}\text{O}_2$: 272.1776. Found m/z (relative intensity): 272.1778 (M^+ , 100), 243 (37).

1-Benzyloxy-3-(3-methyl-but-1-enyl)-5-methylene-3-phenyl-tetrahydro-pyran

(5b): IR (neat) 3068 (m), 3028 (m), 1652 (m), 1496 (m), 1454 (m), 1342 (m), 1109 (s), 1026 (vs), 906 (s), 732 (m), 698 (m) cm^{-1} ; ^1H NMR (CDCl_3 , 400 MHz): (**major isomer**) δ 1.44–1.74 (m, 4 H), 1.92-1.95 (m, 2 H), 2.05 (d, $J = 13.0$ Hz, 1 H), 2.53 (d, $J = 13.0$ Hz, 1 H), 3.91 (d, $J = 12.1$ Hz, 1 H), 4.33 (d, $J = 12.1$ Hz, 1 H), 4.42 (s, 1 H), 4.52 (d, $J = 12.5$ Hz, 1 H), 4.72 (s, 2 H), 4.79 (d, $J = 12.5$ Hz, 1 H), 5.69-5.78 (m, 2 H), 7.26-7.37 (m, 5 H); (**minor isomer**) δ 1.44–1.74 (m, 4 H), 1.92-1.95 (m, 2 H), 1.95 (d, $J = 13.0$ Hz, 1 H), 2.64 (d, $J = 13.0$ Hz, 1 H), 3.87 (d, $J = 12.1$ Hz, 1 H), 4.30 (d, $J = 12.1$ Hz, 1 H), 4.44 (s, 1 H), 4.52 (d, $J = 12.5$ Hz, 1 H), 4.79 (d, $J = 12.5$ Hz, 1 H), 4.83 (s, 1 H), 4.86 (s, 1 H), 5.69–5.78 (m, 2 H), 7.26-7.37 (m, 5 H); ^{13}C NMR (CDCl_3 , 100 MHz): (**major isomer**) δ 18.1, 25.3, 31.1, 39.7, 40.0, 64.7, 64.8, 64.9, 68.8, 68.9, 69.0, 101.5, 101.6, 110.2, 127.5, 128.3, 131.0, 138.3, 141.5; (**minor isomer**) δ 18.5, 25.2, 30.1, 39.2, 40.1, 64.1, 64.2, 64.3, 69.1, 69.2, 69.3, 102.1, 102.2, 110.2, 127.7, 127.9, 128.3, 128.5, 131.8, 138.3, 141.4; High-resolution MS, Calcd for $\text{C}_{18}\text{H}_{22}\text{O}_2$: 270.1620. Found m/z (relative intensity): 270.1628 (M^+ , 100).

2-Methyl-4-methylene-2-phenyl-cyclopentanal (6a) : IR (neat) 3419 (s), 3080 (m), 1654 (w), 1600 (w), 1498 (m), 1446 (m), 1375 (m), 879 (m), 700 (m) cm^{-1} ; ^1H NMR (CDCl_3 , 400 MHz) δ 1.30 (s, 3 H), 1.79 (brs, 1 H), 2.35 (ddm, $J = 7.3, 17.2$ Hz, 1 H), 2.56 (dm, $J = 16.3$ Hz, 1 H), 2.74 (ddm, $J = 7.3, 17.2$ Hz, 1 H), 2.78 (dm, $J = 16.3$ Hz, 1 H), 4.31 (t, $J = 7.3$ Hz, 1 H), 4.92 (m, 1 H), 4.97 (m, 1 H), 7.17-7.42 (m, 5 H); ^{13}C NMR (CDCl_3 , 100 MHz): δ 20.7, 39.2, 44.9, 48.8, 79.3, 79.4, 107.6, 107.7, 107.8, 125.9, 126.0, 128.3, 146.5, 147.7; High-resolution MS, Calcd for $\text{C}_{13}\text{H}_{16}\text{O}$: 188.1201. Found m/z (relative intensity): 188.1204 (M^+ , 100), 173 (21).

2-(4-tert-Butyl-benzyl)-2-methyl-4-methylene-cyclopentanol (6b): IR (neat) 3436 (s), 3026 (w), 1658 (w), 1600 (w), 1494 (m), 1446 (m), 1363 (m), 877 (m), 700 (m) cm^{-1} ; ^1H NMR (CDCl_3 , 400 MHz): (**major isomer**) δ 0.93 (s, 3 H), 1.31 (s, 9 H), 1.56 (s, 1 H), 2.15 (dm, $J = 16.5$ Hz, 1 H), 2.26 (dm, $J = 16.5$ Hz, 1 H), 2.25-2.38 (m, 1 H), 2.59 (s, 2

H), 2.70-2.85 (m, 1 H), 3.96 (t, $J = 7.4$ Hz, 1 H), 4.87 (s, 2 H), 7.09 (d, $J = 8.2$ Hz, 2 H), 7.27 (d, $J = 8.2$ Hz, 2 H); (**minor isomer**) δ 0.83 (s, 3 H), 1.31 (s, 9 H), 1.95 (dm, $J = 15.6$ Hz, 1 H), 2.33 (dm, $J = 15.6$ Hz, 1 H), 2.52 (dm, $J = 15.9$ Hz, 1 H), 2.64 (dm, $J = 13.7$ Hz, 1 H), 2.74 (dm, $J = 15.9$ Hz, 1 H), 2.76 (dm, $J = 13.7$ Hz, 1 H), 3.82-3.86 (m, 1 H), 4.91 (s, 1 H), 4.95 (s, 1 H), 7.13 (d, $J = 8.2$ Hz, 2 H), 7.27 (d, $J = 8.2$ Hz, 2 H); ^{13}C NMR (CDCl_3 , 100 MHz): (**major isomer**) δ 18.1, 31.4, 34.3, 39.0, 40.4, 44.8, 45.8, 77.7, 107.5, 124.8, 129.7, 135.4, 146.7, 148.8; (**minor**) δ 23.1, 31.4, 34.2, 39.7, 42.9, 43.7, 46.7, 79.5, 107.8, 124.6, 129.8, 136.1, 148.1, 148.4; High-resolution MS, Calcd for $\text{C}_{18}\text{H}_{26}\text{O}$: 258.1984. Found m/z (relative intensity): 258.1982 (M^+ , 100), 243 (32).

3-Methylene-spiro[4.5]decan-1-ol (6c): IR (neat) 3373 (s), 3070 (w), 1656 (m), 1450 (m), 1377 (w), 875 (m) cm^{-1} ; ^1H NMR (CDCl_3 , 400 MHz): δ 1.22-1.73 (m, 10 H), 2.13 (dm, $J = 16.3$ Hz, 1 H), 2.28 (ddm, $J = 6.4, 17.6$ Hz, 1 H), 2.36 (dm, $J = 16.3$ Hz, 1 H), 2.71 (ddm, $J = 6.4, 17.6$ Hz, 1 H), 3.81 (t, $J = 6.4$ Hz, 1 H), 4.87 (m, 1 H), 4.89 (m, 1 H); ^{13}C NMR (CDCl_3 , 100 MHz): δ 22.9, 26.3, 26.3, 29.8, 35.0, 39.7, 40.9, 45.9, 77.2, 79.4, 107.3, 148.3; High-resolution MS, Calcd for $\text{C}_{11}\text{H}_{18}\text{O}$: 166.1358 Found m/z (relative intensity): 166.1348 (M^+ , 47), 149 (9), 148 (100). **Spiro[4.5]-3-methyldec-3-en-1-ol** (an olefinic isomer of **6c**): ^1H NMR (CDCl_3 , 300 MHz): δ 1.20-1.62 (m, 10 H), 1.69 (s, 3 H), 2.11 (ddm, $J = 6.2, 16.3$ Hz, 1 H), 2.60 (ddm, $J = 6.2, 16.3$ Hz, 1 H), 3.92 (t, $J = 6.2$ Hz, 1 H), 5.39 (s, 1 H).

3-Methylene-spiro[4.5]dec-6-en-1-ol (6d): IR (neat) 3377 (m), 3070 (w), 1654 (m), 1431 (m), 1037 (m), 877 (m), 731 (m) cm^{-1} ; ^1H NMR (CDCl_3 , 400 MHz): (**major isomer**) δ 1.40-1.89 (m, 4 H), 1.97-2.02 (m, 3 H), 2.14 (dm, $J = 16.1$ Hz, 1 H), 2.47 (dm, $J = 16.1$ Hz, 1 H), 2.33 (ddm, $J = 6.7, 17.6$ Hz, 1 H), 2.76 (ddm, $J = 6.7, 17.6$ Hz, 1 H), 3.94 (t, $J = 6.7$ Hz, 1 H), 4.90 (m, 2 H), 5.65 (dm, $J = 10.1$ Hz, 1 H), 5.92 (dm, $J = 10.1$ Hz, 1 H); (**minor isomer**) δ 1.40-1.89 (m, 4 H), 1.97-2.02 (m, 3 H), 2.17 (dm, $J = 16.1$ Hz, 1 H), 2.31 (dm, $J = 16.1$ Hz, 1 H), 2.33 (ddm, $J = 6.7, 17.6$ Hz, 1 H), 2.73 (ddm, $J = 6.7, 17.6$ Hz, 1 H), 3.85 (t, $J = 6.7$ Hz, 1 H), 4.96 (m, 2 H), 5.37 (dm, $J = 9.9$ Hz, 1 H), 5.77 (dm, $J = 9.9$ Hz, 1 H); ^{13}C NMR (CDCl_3 , 100 MHz): (**major isomer**) δ 19.7, 25.2, 26.3, 40.3, 44.5, 46.7, 80.3, 107.7, 128.7, 133.1, 147.7; (**minor isomer**) δ 19.7, 25.3, 33.2, 38.9, 43.7, 46.6, 78.9, 107.4, 129.0, 130.4, 147.1; High-resolution MS, Calcd for $\text{C}_{11}\text{H}_{16}\text{O}$: 164.1201. Found m/z (relative intensity): 164.1193 (M^+ , 84), 147 (17), 146 (100).

(2-Hydroxy-1-methyl-4-methylenecyclopentyl) phenyl ketone (6e): IR (neat) 3474

(m), 1668 (s), 1085 (m), 713 (s), 692 (m) cm^{-1} ; ^1H NMR (CDCl_3 , 400 MHz): (**major isomer**) δ 1.43 (s, 3 H), 2.41 (m, 1 H), 2.70 (d, $J = 15.1$ Hz, 1 H), 2.75 (m, 1 H), 2.82 (d, $J = 15.1$ Hz, 1 H), 4.56 (t, $J = 7.8$ Hz, 1 H), 4.94 (s, 1 H), 4.98 (s, 1 H), 7.44 (t, $J = 7.6$ Hz, 2 H), 7.51 (d, $J = 7.6$ Hz, 1 H), 7.88 (d, $J = 7.6$ Hz, 2 H). (**minor isomer**) δ 1.36 (s, 3 H), 2.41 (m, 1 H), 2.63 (d, $J = 15.1$, 1 H), 2.75 (m, 1 H), 2.68 (d, $J = 15.1$ Hz, 1 H), 4.41 (d, $J = 5.1$ Hz, 1 H), 4.98 (br s, 1 H), 5.03 (br s, 1 H), 7.44 (t, $J = 7.6$ Hz, 2 H), 7.51 (d, $J = 7.6$ Hz, 1 H), 7.88 (d, $J = 7.6$ Hz, 2 H); ^{13}C NMR (CDCl_3 , 100 MHz): (**major isomer**) δ 17.9, 36.1, 42.2, 55.5, 75.4, 108.9, 128.1, 128.5, 132.3, 143.4, 207.2. (**minor isomer**) δ 23.3, 38.3, 40.8, 55.5, 79.5, 108.7, 128.1, 128.5, 132.1, 135.6, 206.4; High-resolution MS, Calcd for $\text{C}_{14}\text{H}_{16}\text{O}_2$: 216.1150. Found m/e (relative intensity): 216.1149 (M^+ , 100), 199 (18), 198 (94).

4-Methylene-2,2-diphenyl-cyclopentanol (6f): IR (neat) 3436 (m), 3075 (m), 3023 (m), 1658 (m), 1600 (m), 1494 (m), 1446 (m), 1245 (m), 1033 (m), 877 (m), 700 (s) cm^{-1} ; ^1H NMR (CDCl_3 , 400 MHz): δ 1.43 (d, $J = 7.3$ Hz, 1 H), 2.30 (ddm, $J = 6.4$, 17.0 Hz, 1 H), 2.74 (ddm, $J = 6.4$, 17.0 Hz, 1 H), 2.97 (dm, $J = 16.5$ Hz, 1 H), 3.40 (dm, $J = 16.5$ Hz, 1 H), 4.88 (dd, $J = 7.3$, 6.4 Hz, 1 H), 4.96 (m, 1 H), 5.08 (m, 1 H); ^{13}C NMR (CDCl_3 , 100 MHz): δ 39.4, 43.6, 58.1, 76.6, 107.6, 126.0, 126.5, 127.1, 128.2, 128.4, 128.5, 143.2, 146.2, 146.7; High-resolution MS, Calcd for $\text{C}_{18}\text{H}_{18}\text{O}$: 250.1358 Found m/e (relative intensity): 250.1347 (M^+ , 100), 233 (3).

2-Methyl-4-methylene-2-(naphthalen-2-yl)cyclopentanol (6g): IR (neat) 3404 (m), 1654 (w), 1078 (m), 854 (m), 746 (m) cm^{-1} ; ^1H NMR (CDCl_3 , 400 MHz): δ 1.40 (s, 3 H), 1.82 (br s, 1 H), 2.40 (ddm, $J = 7.3$, 16.8 Hz, 1 H), 2.66 (dm, $J = 16.3$ Hz, 1 H), 2.77 (ddm, $J = 7.3$, 16.8 Hz, 1 H), 2.88 (dm, $J = 16.3$ Hz, 1 H), 4.44 (t, $J = 7.3$ Hz, 1 H), 4.94 (br s, 1 H), 5.01 (br s, 1 H), 7.41 - 7.46 (m, 2 H), 7.55-7.58 (m, 1 H), 7.77 - 7.81 (m, 4 H); ^{13}C NMR (CDCl_3 , 100 MHz): δ 19.8, 29.9, 38.4, 48.0, 78.2, 106.8, 123.1, 123.7, 124.4, 124.9, 126.3, 126.8, 126.9, 130.9, 132.2, 143.9, 145.3; High-resolution MS, Calcd for $\text{C}_{17}\text{H}_{18}\text{O}$: 238.1358. Found m/e (relative intensity): 238.1338 (M^+ , 100).

5a

6d