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Supporting Information

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Supporting information

General Remarks: ^{1}H NMR spectra were recorded on a Bruker DRX 500 (500 MHz). Chemical shifts are reported in ppm from tetramethylsilane with the solvent resonance as the internal standard ($CDCl_3$: d 7.26 ppm). Data are reported as follows: chemical shift (ppm), multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, br = broad, m = multiplet), coupling constants (Hz) and intergration. ^{13}C NMR spectra were recorded on a Bruker DRX 500 (125 MHz) with complete proton decoupling. Chemical shifts are reported in ppm from tetramethylsilane with the solvent resonance as the internal standard (CDCl3; d 77.0 ppm). Infared (IR) spectra were recorded on a *Perking-Elmer* spectrometer 881 as ATR (attenuated total reflectance), u_{max} are in cm^{-1}. Bands are characterized as broad (br), strong (s), medium (m), and weak (w). Mass spectra (EI) were recorded on a *Finnigan* MAT 95 SQ at the Mass Spectrometry Facility, TU Berlin. Ionisation was performed at 70 eV. *M/z* are reported in *u*, intensities are reported in percent relative to the most intensive signal (100).

General Procedures for the RRM experiments:

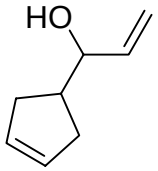
Method a: For determination of conversion and diastereoselectivity the substrate was dissolved in ethylene-saturated $CDCl_3$ in an NMR-tube. The atmosphere was exchanged with ethylene and a solution of the ruthenium catalyst in abs. $CDCl_3$ was added. The tube was immediately shaken vigorously and left at room temperature or put in a preheated oil bath.

Method b: Same procedure as *Method a*, but a Molybdenium catalyst and C_6D_6 as a solvent were used.

Method c: For characterisation and preparation (0.2 – 1 mmol), the substrate was dissolved in CH_2Cl_2 (c = 0.02 M), which had been saturated with ethylene. The catalyst was dissolved in absolute CH_2Cl_2 and added to the solution at the reaction temperature (see *tables*). After complete conversion, 1 ml ethylvinylether was added and the solution was stirred at room temperature for further 30 min. The solvent was destilled over a short *vigreux* colonne and the residue was purified by column chromatography. The eluent was removed by destillation over a short *vigreux* colonne.

The diastereoselectivities and conversions were determined by method a and b. The compounds were prepared in a preparative scale by method c.

8a VB: 1-Cyclopent-3-enyl-prop-2-en-1-ol



^{1}H-NMR (500 MHz, $CDCl_3$, 25°C): δ = 5.87 (ddd, J_H = 17.0 Hz, 10.4 Hz, 6.3 Hz, 1 H), 5.64-5.69 (m, 2 H), 5.26 (d, J = 17.0 Hz, 1 H), 5.18 (d, J = 10.2 Hz, 1 H), 4.03 (dd, J = 5.4 Hz, 9.9 Hz, 1 H), 2.36-2.51 (m, 3 H), 2.13-2.21 (m, 1 H)

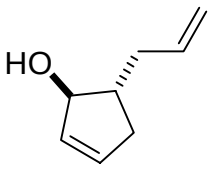
^{13}C – NMR (125.8 MHz): 139.9 (CH), 129.9 (CH), 129.8 (CH), 115.6 (CH_2), 77.1 (CH), 42.8 (CH), 35.3 (CH_2), 34.8 (CH_2)

IR: 3361 (*s*), 3054 (*m*), 2929 (*s*), 2851 (*s*), 1642 (*w*), 1442 (*m*), 1026 (*s*), 991 (*vs*), 921 (*vs*), 684 (*s*)

EI – MS: 123 (1, $[M-H]^+$), 106 (50, $[M-H_2O]^+$), 91 (45), 67 (100)

HR –MS: calculated for $[M-H_2O]^+$: 106.0783, found: 106.0772

8b: 5-Allyl-cyclopent-2-enol



Method c, Column chromatography (SiO_2, ether/pentane 1/5) yielded 67 % of the pure, *trans*-configured product.

^{1}H-NMR (500 MHz, $CDCl_3$, 25°C): δ = 5.79-5.86 (m, 2 H), 5.73-5.77 (m, 1 H), 5.05 (dd, J = 17.1 Hz, 1.5 Hz, 1 H), 5.03 (dd, J = 10.2 Hz, 0.7 Hz, 1 H), 4.51 (bs, 1 H), 2.58-2.61 (m, 1 H), 2.25-2.33 (m, 1 H), 2.12-2.20 (m, 1H), 2.04-2.11 (m, 1H), 1.93-2.00 (m, 1 H)

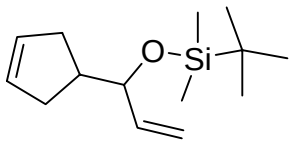
^{13}C – NMR (125.8 MHz): 137.2 (CH), 134.0 (CH), 132.9 (CH), 116.0 (CH_2), 82.9 (CH), 47.3 (CH), 38.4 (CH_2), 37.2 (CH_2)

IR : 3349 (*s*), 3058 (*m*), 2923 (*vs*), 2852 (*s*), 1707 (*m*), 1641 (*m*), 1439 (*s*), 1354 (*s*), 1004 (*s*), 911 (*vs*), 726 (*s*)

EI – MS: 124 (4, $[M]^+$), 106 (8, $[M-H_2O]^+$), 95 (44), 83 (100), 82 (72), 55 (48)

HR –MS: calculated for $[M]^+$: 124.0888, found: 124.0900

9a: tert-Butyl-(1-cyclopent-3-enyl-allyloxy)-dimethyl-silane



^{1}H-NMR (500 MHz, $CDCl_3$, 25°C): δ = 5.77 (ddd, *J* = 17.2 Hz, 10.2 Hz, 6.5 Hz, 1 H), 5.58-5.61 (m, 2 H), 5.15 (d, *J* = 17.2 Hz, 1 H), 5.04 (d, *J*= 10.2 Hz, 1 H), 3.97 (dd, *J* = 6.5 Hz, 5.9 Hz, 1 H), 2.20-2.42 (m, 4 H), 2.08-2.15 (m, 1 H), 0.89 (s, 9 H), 0.05 (s, 3 H), 0.02 (s, 3 H)

^{13}C – NMR (125.8 MHz): 140.7 (CH), 130.0 (CH), 129.8 (CH), 114.6 (CH_2), 77.3 (CH), 44.1 (CH), 35.1 (CH_2), 34.9 (CH_2), 25.9 (CH_3), 18.3 (C), -4.0 (CH_3), -4.8 (CH_3)

IR : 3055 (*w*), 2956 (*s*), 2929 (*vs*), 2856 (*s*), 1472 (*m*), 1252 (*s*), 1075 (*s*), 836 (*vs*), 775 (*vs*)

EI – MS: 238 (1, $[M-H]^+$), 181 (64, $[M-C_4H_9]^+$), 115 (50), 75 (100)

HR –MS: calculated for $[M-H]^+$: 237.1675, found: 237.1679

9b: (5-Allyl-cyclopent-2-enyloxy)-tert-butyl-dimethyl-silane

Method c, column chromatography (SiO_2, ether/pentane 1/100) yielded 68 % of a single isomer.

^{1}H-NMR (500 MHz, $CDCl_3$, 25°C): δ = 5.75-5.85 (m, 2 H), 5.66 (ddd, *J* = 5.8 Hz, 4.0 Hz, 2.0 Hz. 1H), 5.05 (dd, *J* = 17.2 Hz, 1.5 Hz, 1 H), 4.99 (dd, *J* = 10.3 Hz, 1.1 Hz, 1 H), 4.51 (dd, *J* = 4.2 Hz, 2.7 Hz, 1 H), 2.54-2.62 (m, 1 H), 2.30-2.37 (m, 1H), 2.03-2.16 (m, 2 H), 1.86-1.95 (m, 1 H), 0.90 (s, 9 H), 0.08 (s, 6 H)

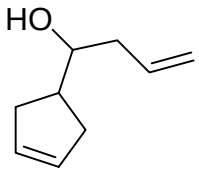
^{13}C – NMR (125.8 MHz): 137.4 (CH), 133.5 (CH), 132.7 (CH), 115.7 (CH_2), 83.1 (CH), 47.0 (CH), 38.1 (CH_2), 36.7 (CH_2), 26.0 (CH_3), 18.4 (C), -4.2 (CH_3), -4.4 (CH_3)

IR : 3061 (*m*), 2956 (*s*) 2856 (*s*), 1641 (*w*), 1256 (*s*), 1069 (*s*), 865 (*vs*), 835 (*vs*), 774 (*vs*)

EI – MS: 237 (<1, $[M-H]^+$), 181 (44, $[M-C_4H_9]^+$), 75 (100)

HR –MS: calculated for $[M-H]^+$: 237.1675, found: 237.1679

10a: 1-Cyclopent-3-enyl-but-3-en-1-ol



^{1}H-NMR (500 MHz, $CDCl_3$), 25°C: δ = 5.81-5.91 (m, 1H), 5.66-5.8 (m, 2 H), 5.13-5.19 (m, 2 H), 3.59 (ddd, J = 10.3 Hz, 7.4 Hz, 3.7 Hz, 1 H), 2.27-2.51 (m, 5 H), 2.10-2.18 (m, 2 H), 1.62 (d, $^{3}J_{HH}$ = 3.7 Hz, 1H)

^{13}C-NMR (128.5 MHz): δ = 135.1 (CH), 130.3 (CH), 129.7 (CH), 118.2 (CH_2), 74.3 (CH), 43.2 (CH), 40.4 (CH_2), 35.6 (CH_2), 34.8 (CH_2)

IR : 3441 (*s*), 3054 (*w*), 2929 (*s*), 2842 (*m*), 1709 (*vs*), 1362 (*m*), 912 (*vs*), 701 (*s*)

EI – MS: 120 (6, $[M\text{-}H_2O]^+$), 97 (35, $M\text{-}C_3H_5]^+$), 79 (100), 67 (63)

HR – MS: calculated for $[M\text{-}H_2O]^+$: 120.0939, found: 120.0931

10b (2 diastereomers): 6-Allyl-cyclohex-3-enol

Method c, Column chromatography (SiO_2, ether/pentane 1/6) yielded 80 % of a colourless liquid as a mixture of isomers.

^{1}H-NMR (500 MHz, $CDCl_3$, 25°C): δ = 5.76-5.86 (m, 1 H), 5.53-5.62 (m, 2 H), 5.00-5.10 (m, 2 H), 3.98 (ddd, 1H, J = 9.7 Hz, 3.9 Hz, 1 H, *cis*), 3.69 (ddd, 1 H, J= 8.6 Hz, 5.1 Hz, *trans*), 1.75-2.43 (m, 7 H)

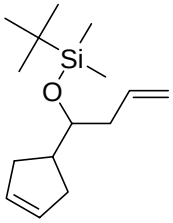
^{13}C – NMR (125.8 MHz): 137.2 (CH), 137.0 (CH), 126.6 (CH), 126.2 (CH), 124.0 (CH), 123.3 (CH), 116.3 (CH_2), 116.2 (CH_2), 70.8 (CH), 67.2 (CH), 41.5 (CH), 39.9 (CH), 37.7 (CH_2), 36.6 (CH_2), 36.1 (CH_2), 33.9 (CH_2), 33.8 (CH_2), 29.6 (CH_2), 27.0 (CH_2)

IR : 3367 (*s*), 3025 (*m*), 2902 (*s*), 2840 (*m*), 1640 (*m*), 1436 (*m*), 1045 (*s*), 910 (*vs*), 663 (*vs*)

EI – MS: 120 (12, $[M\text{-}H_2O]^+$), 96 (84), 79 (100), 55 (56)

HR –MS: calculated for $[M\text{-}H_2O]^+$: 120.0939, found: 120.0933

11a: tert-Butyl-(1-cyclopent-3-enyl-but-3-enyloxy)-dimethyl-silane



^{1}H-NMR (500 MHz, $CDCl_3$), 25°C: δ = 5.84-5.91 (m, 1H), 5.61-5.68 (m, 2 H), 5.00-5.07 (m, 2 H), 3.68 (dd, *J* = 5.6 Hz, 5.6 Hz, 1 H), 2.10-2.46 (m, 7 H), 0.88 (s, CH_3, 9 H), 0.06 (s, CH_3, 3 H), 0.05 (s, CH_3, 3 H)

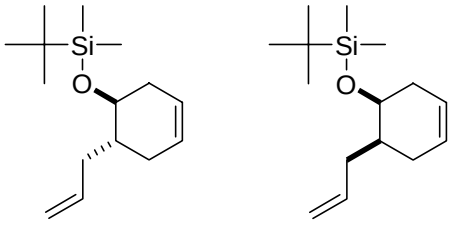
^{13}C-NMR (128.5 MHz): δ = 135.4 (CH), 130.3 (CH), 129.8 (CH), 116.6 (CH_2), 75.1 (CH), 42.9 (CH), 40.4 (CH_2), 35.1 (CH_2), 34.8 (CH_2), 26.0 (CH_3), 18.2 (C), -3.9 (CH_3), -4.5 (CH_3)

IR : 3340 (*m*), 3055 (*w*), 2956 (*m*), 2928 (*s*), 2856 (*m*), 1641 (*w*), 1472 (*w*), 1256 (*m*), 1071 (*m*), 836 (*vs*), 774 (*s*)

EI – MS: 251 (<1, $[M-H]^+$), 211 (40, $M-C_3H_5]^+$), 195 (18, $[M-C_4H_9]^+$), 129 (100), 73 (64)

HR – MS: calculated for $[M-H]^+$: 251.1831, found: 251.1817

11b (2 diastereomers): (6-Allyl-cyclohex-3-enyloxy)-tert-butyl-dimethyl-silane



Method c, Column chromatography (SiO_2, ether/pentane 1/200) yielded 57 % of the *trans*-Produkt as colourless liquid.

^{1}H-NMR (500 MHz, $CDCl_3$, 25°C), *trans*: δ = 5.73-5.78 (m, 1 H), 5.53-5.72 (m, 2 H), 5.02 (d, *J* = 16.6 Hz, 1 H), 4.99 (d, *J* = 9.6 Hz, 1 H), 3.59 (dt, *J* = 8.5 Hz, 5.8 Hz, 1 H) 2.53-2.58 (m, 1 H), 2.19-2.32 (m, 2 H), 1.98-2.05 (m, 1 H), 1.75-1.82 (m, 1H), 1.62-1.69 (m, 2 H), 0.90 (s, 9 H), 0.07 (s, 6 H), *cis*: δ = 5.74-5.84 (m, 1 H), 5.48-5.63 (m, 1 H), 5.02 (d, *J* = 17.5 Hz, 1H), 4.98 (d, *J* = 9.6 Hz, 1 H), 3.96 (ddd, *J* = 4.7 Hz, 4.8 Hz, 2.4 Hz 1H), 2.13-2.28 (m, 2H), 1.89-2.07 (m, 4 H), 1.65-1.72 (m, 1 H), 0.88 (s, 9 H), 0.05 (s, 6 H)

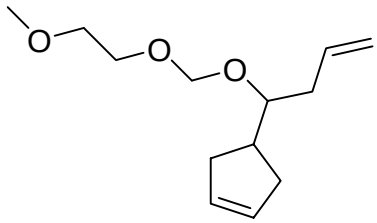
^{13}C – NMR (125.8 MHz), *trans*: 137.4 (CH), 136.3 (CH), 124.4 (CH), 115.8 (CH_2), 71.6 (CH), 40.6 (CH), 36.7 (CH_2), 35.2 (CH_2), 30.2 (CH_2), 26.0 (CH_3), 18.2 (C), -4.0 (CH_3), -4.7 (CH_3), *cis*: δ = 138.1 (CH), 126.1 (CH), 123.8 (CH), 115.5 (CH_2), 68.5 (CH), 38.9 (CH), 34.4 (CH_2), 33.5 (CH_2), 27.6 (CH_2), 25.9 (CH_3), 18.2 (C), -4.3 (CH_3), -4.7 (CH_3)

IR : 3027 (*m*), 2956 (*s*), 2928 (*s*), 2857 (*s*), 1641 (*w*), 1472 (*m*), 1096 (*vs*), 836 (*vs*), 774 (*vs*)

EI – MS: 195 (12, $[M\text{-}C_9H_9]^+$), 189 (20), 147 (100), 75 (22)

HR –MS: calculated for $[M\text{-}C_4H_9]^+$: 195.1205, found: 195.1210

12a: 4-[1-(2-Methoxy-ethoxymethoxy)-but-3-enyl]-cyclopentene



^{1}H-NMR (500 MHz, $CDCl_3$, 25°C): δ = 5.85 (ddt, *J* = 15.5 Hz, 10.5 Hz, 7.2 Hz, 1H), 5.64-5.70 (m, 2 H), 5.08 (d, *J* = 15.5 Hz, 1 H), 5.04 (d, *J* = 10.5 Hz, 1 H), 4.78 (d, *J* = 7.2 Hz, 1 H), 4.75 (d, *J*= 7.2 Hz, 1H), 3.68-3.78 (m, 2 H), 3.61-3.65 (m, 1 H), 3.54-3.57 (m, 2 H), 3.39 (s, 3 H), 2.41-2.55 (m, 2 H), 2.32-2.40 (m, 2 H), 2.19-2.31 (m, 2H), 2.10-2.17 (m, 1 H)

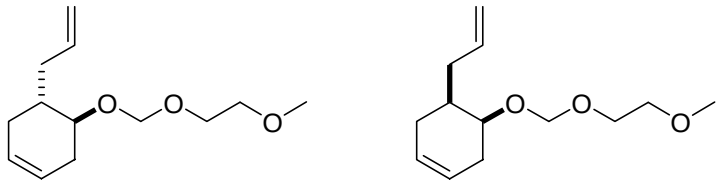
^{13}C – NMR (125.8 MHz): 134.9 (CH), 130.2 (CH), 129.8 (CH), 117.1 (CH_2), 94.8 (CH_2), 80.7 (CH), 71.8 (CH_2), 67.2 (CH_2), 59.1 (CH_3), 41.1 (CH), 37.2 (CH_2), 35.2 (CH_2)

IR : 3053 (*s*), 2927 (*s*), 2883 (*s*), 1641 (*w*), 1450 (*w*), 1133 (*s*), 1107 (*s*), 1041 (*vs*), 914 (*m*), 695 (*m*)

EI – MS: 185 (2, $[M]^+$), 161 (6, $[M\text{-}CH_2]^+$), 109 (12), 89 (100)

HR –MS: calculated for $[M\text{-}C_3H_5]^+$: 185.1178, found: 185.1180

12b: (two diastereomers): 4-Allyl-5-(2-methoxy-ethoxymethoxy)-cyclohexene



Method c, column chromatography (SiO_2, ether/pentane 1/10) yielded 70 % of a fruity smelling liquid.

^{1}H-NMR (500 MHz, $CDCl_3$, 25°C): δ = 5.87 (ddd, *J* = 17.4 Hz, 10.2 Hz, 6.9 Hz, 1 H), 5.51-5.70 (m, 2 H), 5.03 (d, *J* = 10.2 Hz, 1 H), 5.01 (d, *J* = 17.4 Hz, 1 H), 4.75-4.86 (m, 2 H), 3.92 (ddd, *J* = 7.0 Hz, 4.5 Hz, 2.5 Hz, 1 H, *cis*), 3.68-3.76 (m, 2 H), 3.61 (ddd, *J* = 8.2 Hz, 6.2 Hz, 1.6 Hz, 1H, *trans*), 3.53-3.58 (m, 2 H), 3.39 (s, 3 H), 2.38-2.47 (m, 1H, 1H *anti*), 2.19-2.24 (m, 2 H, 1 H *syn*), 1.80-2.10 (m, 3H)

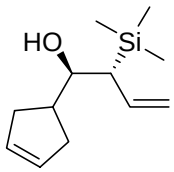
^{13}C – NMR (125.8 MHz): 137.6 (CH), 136.9 (CH), 126.4 (CH), 126.1 (CH), 116.1 (CH_2), 115.9 CH_2), 94.4 (CH_2), 75.8 (CH), 74.4 (CH), 71.9 (CH_2), 67.1 (CH_2), 59.1 (CH), 37.8 (CH), 37.0 (CH), 36.3 (CH_2), 34.8 (CH_2), 31.6 (CH_2), 30.9 (CH_2), 30.1 (CH_2), 29.1 (CH_2)

IR : 3026 (*m*), 2923 (*s*), 1640 (*w*), 1451 (*m*), 1110 (*s*), 1045 (*vs*), 911 (*m*), 667 (*m*)

EI – MS: 185 (<1, $[M\text{-}C_3H_5]^+$), 151 (4, $[M\text{-}C_3H_7O_2]^+$), 121 (18, $[M\text{-}C_4H_9O_3]^+$), 89 (100), 79 (62), 59 (84)

HR –MS: calculated for $[M\text{-}C_3H_5]^+$: 185.1178, found: 185.1190

13a: 1-Cyclopent-3-enyl-2-trimethylsilanyl-but-3-en-1-ol



^{1}H-NMR (500 MHz, $CDCl_3$, 25°C): δ = 5.87 (ddd, *J* = 17.4 Hz, 10.5 Hz, 10.2 Hz, 1 H), 5.64-5.71 (m, 2 H), 5.01 (d, *J* = 10.2 Hz, 1 H), 4.92 (d, *J* = 17.4 Hz, 1 H), 3.69-3.74 (m, 1 H), 2.33-2.48 (m, 3 H), 2.19-2.27 (m, 1 H), 1.95-2.03 (m, 1H), 1.74 (dd, *J* = 10.5 Hz, 3.4 Hz, 1 H), 1.46 (d, *J* = 10.3 Hz, 1H), 0.06 (s, 9 H)

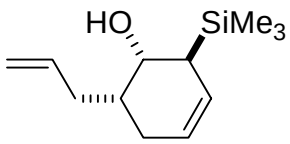
^{13}C – NMR (125.8 MHz): 135.5 (CH), 130.0 (CH), 129.9 (CH), 114.8 (CH_2), 76.2 (CH), 43.8 (CH), 41.1 (CH), 35.6 (CH_2), 35.4 (CH_2), -2.1 (CH_3)

IR : 3493 (*m*), 3054 (*w*), 2953 (*m*), 1719 (*w*), 1623 (*m*), 1246 (*s*), 901 (*s*), 855 (*s*), 838 (*vs*), 701 (*m*)

EI – MS: 211 (<1, $[M+H]^+$), 143 (36, $[M\text{-}C_5H_7]^+$), 73 (100, $[C_3H_9Si]^+$), 66 (58)

HR –MS: calculated for $[M]^+$: 211.1518, found: 211.1526

13b: 6-Allyl-2-trimethylsilanyl-cyclohex-3-enol



Method c, column chromatography (SiO_2, ether/pentane 1/100) yielded 40 % of a single diastereoisomer.

^{1}H-NMR (500 MHz, $CDCl_3$, 25°C): δ = 5.81 (ddt, *J* = 17.0 Hz, 10.1 Hz, 7.1 Hz, 1 H), 5.68-5.71 (m, 1 H), 5.53-5.56 (m, 1 H), 5.07 (d, *J* = 17.0 Hz, 1 H), 5.02 (d, *J* = 10.1 Hz, 1 H), 3.99

(dd, *J* = 8.8 Hz , 2.4 Hz , 1 H), 2.16-2.20 (m, 1 H), 2.2.06-2.11 (m, 2 H), 1.64-1.88 (m, 3 H), 0.09 (s, 9 H)

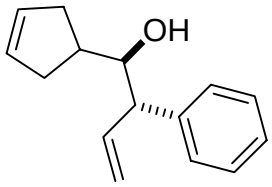
^{13}C – NMR (125.8 MHz): 137.0 (CH), 124.9 (CH), 124.7 (CH), 116.1 (CH_2), 69.5 (CH), 39.0 (CH), 37.7 (CH_2), 35.2 (CH), 26.2 (CH_2), -2.1 (CH_3)

IR : 3499 (*br*), 3076 (*w*), 3016 (*m*), 2952 (*m*), 2920 (*m*), 1711 (*w*), 1641 (*m*), 1246 (*s*), 913 (*s*), 837 (*vs*), 719 (*s*)

EI – MS: 193 (<1, $[M\text{-}H_2O]^+$), 177 (<1, $[M\text{- }CH_3\text{-}H_2O]^+$), 120 (12), 79 (100), 73 (24, $[C_3H_9Si]^+$), 66 (8)

HR –MS: calculated for $[M\text{-}CH_3\text{-}H_2O]^+$: 177.1099, found: 177.1087

14a: 1-Cyclopent-3-enyl-2-phenyl-but-3-en-1-ol



^{1}H-NMR (500 MHz, $CDCl_3$, 25°C): δ = 7.29-7.36 (m, 5 H), 6.19 (ddd, *J* = 16.5 Hz, 10.0 Hz, 9.4 Hz, 1 H), 5.61-5.70 (m, 2 H), 5.24 (d, *J* = 10.0 Hz, 1 H), 5.21 (d, *J* = 16.5 Hz, 1 H), 3.80-3.85 (m, 1 H), 3.33 (dd, *J* = 8.8 Hz, 7.3 Hz, 1 H), 2.20-2.41 (m, 5 H), 1.76 (d, *J* = 3.1, 1 H)

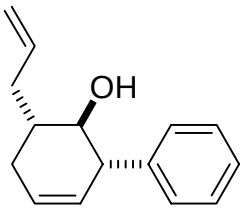
^{13}C – NMR (125.8 MHz): 141.6 (C), 138.1 (CH), 130.2 (CH), 129.8 (CH), 128.8 (CH), 128.0 (CH), 127.0 (CH), 126.7 (CH), 117.9 (CH_2), 77.3 (CH), 55.8 (CH), 36.9 (CH_2), 33.4 (CH_2)

IR : 3569 (*m*), 3456 (*m*), 3054 (*w*), 2924 (*s*), 2847 (*m*), 1638 (*w*), 1601 (*w*), 1452 (*m*), 918 (*s*), 701 (*vs*)

EI – MS: 214 (<1, $[M]^+$), 118 (100, $[C_9H_{710}]^+$), 91 (12)

HR –MS: calculated for $[M]^+$: 214.1358, found: 214.1350

14b: 6-Allyl-2-phenyl-cyclohex-3-enol



Method c, column chromatography (SiO_2, ether/pentane 1/10) yielded 65 % of a single diastereoisomer.

^{1}H-NMR (500 MHz, $CDCl_3$, 25°C): δ = 7.21-7.37 (m, 5 H), 6.19 (ddt, J = 17.4 Hz, 10.2 Hz, 7.3 Hz, 1 H), 5.64-5.71 (m, 2 H), 5.01 (d, J = 10.2 Hz, 1 H), 4.92 (d, J = 17.4 Hz, 1 H), 3.69-3.74 (m, 1 H), 2.33-2.48 (m, 3 H), 2.19-2.27 (m, 1 H), 1.95-2.03 (m, 1H), 1.74 (dd, J = 10.5 Hz, 3.4 Hz, 1 H), 1.46 (d, J = 10.3 Hz, 1H), 0.06 (s, 9 H)

^{13}C – NMR (125.8 MHz): *trans:* 141.8 (C), 136.9 (CH), 128.8 (CH), 128.7 (CH), 126.9 (CH), 126.3 (CH), 116.2 (CH_2), 70.6 (CH), 48.7 (CH), 38.8 (CH), 37.7 (CH_2), 25.9 (CH_2)

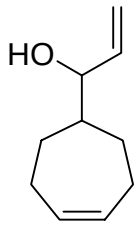
cis: 141.8 (C), 136.9 (CH), 128.7 (CH), 128.6 (CH), 128.5 (CH), 126.9 (CH), 126.2 (CH), 116.2 (CH_2), 70.6 (CH), 48.5 (CH), 38.7 (CH), 37.6 (CH_2), 26.7 (CH_2)

IR : 3043 (*s*), 3063 (*m*), 2928 (*s*), 1642 (*vs*), 1447 (*s*), 1000 (*s*), 765 (*s*), 699 (*vs*)

EI – MS: 214 (12, $[M]^+$), 155 (4, $[M\text{-}C_3H_7O]^+$), 130 (100), 115 (22)

HR –MS: calculated for $[M]^+$: 214.1358, found: 214.1363

15a: 1-Cyclohept-4-enyl-prop-2-en-1-ol



^{1}H-NMR (500 MHz, $CDCl_3$, 25°C): δ = 5.87 (ddd, J= 17.2 Hz, 10.1 Hz, 4.0 Hz, 1 H), 5.78 (t, J = 2.5 Hz, 2 H), 5.22 (d, J = 17.2 Hz, 1 H), 5.16 (d, J = 10.4 Hz, 1 H), 3.99 (dd, J = 9.9 Hz, 5.3 Hz, 1 H), 2.24-2.28 (m, 2 H), 2.01 – 2.07 (m, 2 H), 1.79-1.86 (m, 2 H), 1.66-1.69 (m, 1 H), 1.45 (d, $^3J_{HH}$ = 4.0 Hz, 1 H), 1.18-1.23 (m, 1 H)

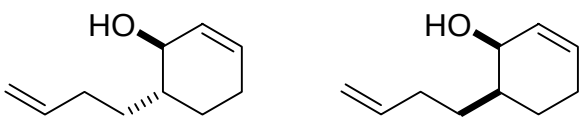
^{13}C – NMR (125.8 MHz): 139.6 (CH), 132.0 (CH), 115.8 (CH_2), 77.8 (CH), 47.9 (CH), 29.0 (CH_2), 28.5 (CH_2), 27.4 (CH_2) 27.2 (CH_2)

IR : 3374 (*br*), 3017 (*m*), 2924 (*vs*), 2857 (*s*), 1653 (*w*), 1442 (*m*), 992 (*vs*), 921 (*vs*), 693 (*s*)

EI – MS: 152 (3, $[M]^+$), 134 (12, $[M\text{-}H_2O$), 95 (100), 67 (96)

HR –MS: calculated for $[M]^+$: 152.1201, found: 152.1210

15b (2 diastereomers): 6-But-3-enyl-cyclohex-2-enol



Method c, Column chromatography (SiO_2, ether/pentane 1/4) yielded 67 % of a colourless liquid.

^{1}H-NMR (500 MHz, $CDCl_3$, 25°C): δ = 5.78-5.90 (m, 1 H), 5.69-6.72 (m, 1 H), 5.60-5.63 (m, 1 H), 5.55-5.57 (m, 1 H), 5.00-5.12 (m, 2 H), 3.99 (dd, *J* = 5.5 Hz, 2.8 Hz, 1 H, *cis*), 3.68 (dd, *J* = 8.2 Hz, 5.3 Hz, 1 H, *trans*), 1.70-2.42 (m, 7 H)

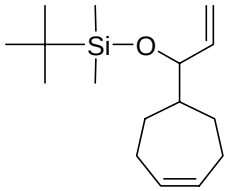
^{13}C – NMR (125.8 MHz, 2 diastereomers): 139.1 (CH), 139.0 (CH), 131.6 (CH), 130.2 (CH), 129.8 (CH), 128.8 (CH), 114.5 (CH_2), 71.3 (CH), 65.7 (CH), 41.5 (CH), 39.6 (CH), 31.3 (CH_2), 31.2 (CH_2), 30.6 (CH_2), 25.8 (CH_2), 25.4 (CH_2), 24.7 (CH_2), 24.5 (CH_2), 22.8 (CH_2)

IR : 3353 (*br*), 3023 (*m*), 2916 (*vs*), 2856 (*s*), 1640 (*m*), 1433 (*m*), 1054 (*s*), 908 (*s*), 683 (*m*)

EI – MS: 152 (8, $[M]^+$), 134 (20, $[M-H_2O]^+$), 109 (38, $[M-C_3H_5]^+$), 97 (37, $[M-C_4H_7]^+$), 70 (100)

HR –MS: calculated for $[M]^+$: 152.1201, found: 152.1210

16a: tert-Butyl-(1-cyclohept-4-enyl-allyloxy)-dimethyl-silane



^{1}H-NMR (500 MHz, $CDCl_3$, 25°C): δ = 5.72-5.82 (m, 3 H), 5.12 (d, *J* = 17.2 Hz, 1 H), 5.06 (d, *J* = 10.3 Hz, 1 H), 3.94 (dd, *J* = 5.7 Hz, 5.7 Hz, 1 H), 2.19-2.28 (m, 2 H), 1.94 – 2.03 (m, 2 H), 1.74-1.82 (m, 2 H), 1.55-1.62 (m, 1 H), 1.08-1.22 (m, 2 H), 0.89 (s, 9 H), 0.04 (s, 3 H), 0.01 (s, 3 H)

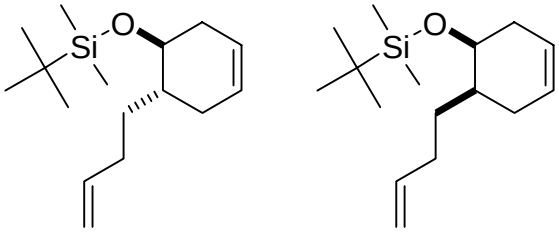
^{13}C – NMR (125.8 MHz): 140.1 (CH), 132.2 (CH), 132.0 (CH), 114.7 (CH_2), 78.5 (CH), 49.0 (CH), 29.0 (CH_2), 28.7 (CH_2), 27.5 (CH_2), 27.4 (CH_2), 26.0 (CH_3), 18.3 (C), -4.2 (CH_3), -4.8 (CH_3)

IR : 3019 (*m*), 2935 (*s*), 2928 (*s*), 2856 (*s*), 1654 (*w*), 1472 (*m*), 1251 (*s*), 1076 (*s*), 863 (*vs*), 775 (*vs*)

EI – MS: 266 (<1, $[M]^+$), 251 (1, $[M-CH_3]^+$), 209 (40, $[M-C_4H_5]^+$), 171 (58, $[M-C_7H_{19}]^+$), 75 (100)

HR –MS: calculated for $[M]^+$: 266.2066, found: 266.2060

16b (two diastereomers): (6-But-3-enyl-cyclohex-2-enyloxy)-tert-butyl-dimethyl-silane



Method c, Column chromatography (SiO_2, ether/pentane 1/200) yielded 97 % of a colourless, liquid.

^{1}H-NMR (500 MHz, $CDCl_3$, 25°C): δ = 5.78-5.87 (m, 1 H), 5.73-5.77 (m, 1 H, *cis*), 5.67-5.73 (m, 1H), 5.54-5.60 (m, 1H, *trans*), 4.97-5.05 (m, 1 H), 4.90-4.97 (m, 1 H), 4.07 (dd, J = 3.7 Hz, 3.7 Hz, 1 H, *cis*), 3.89 (ddd, J = 4.4 Hz, 4.4 Hz, 2.5 Hz, 1H, *trans*), 2.13-2.20 (m, 1 H), 1.89 – 2.11 (m, 7 H, *both isomers*), 1.80-1.88 (m, 1 H), 1.68-1.79 (m, 1 H), 1.40-1.65 (m, 5 H, *both isomers*), 1.12-1.37 (m, 4 H), 0.91 (s, 9 H, *1 isomer*), 0.88 (s, 9 H, *1 isomer*), 0.08 (s, 3 H), 0.06 (s, 3 H)

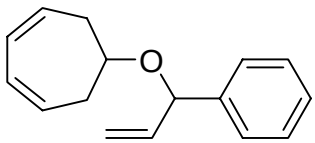
^{13}C – NMR (125.8 MHz): 139.5 (CH), 139.2 (CH), 131.1(CH), 129.9 (CH), 129.8 (CH), 128.6 (CH), 114.2 (CH_2), 114.1 (CH_2), 72.0 (CH), 66.8 (CH), 41.2 (CH), 39.1 (CH), 31.4 (CH_2), 31.1 (CH_2), 31.0 (CH_2), 29.9 (CH_2), 26.0 (CH_3), 25.4 (CH_2), 24.9 (CH_2), 24.6 (CH_2), 23.0 (CH_2), 18.3 (C), 18.2 (C), -3.7 (CH_3), -4.0 (CH_3) -4.5 (CH_3), -4.7 (CH_3)

IR : 3077(*w*), 2925 (*m*), 1651 (*w*), 1521 (*m*), 1082 (*s*), 834 (*vs*), 813 (*m*), 773 (*vs*), 677 (*m*)

EI – MS: 266 (<1, $[M]^+$), 251 (1, $[M\text{-}CH_3]^+$), 211 (2, $[M\text{-}C_4H_7]^+$), 209 (62, $[M\text{-}C_4H_9]^+$), 75 (100)

HR – MS: calculated for $[M]^+$: 266.2066, found: 266.2073

17a: 6-(1-Phenyl-allyloxy)-cyclohepta-1,3-diene



^{1}H-NMR (500 MHz, $CDCl_3$, 25°C): δ = 7.31-7.37 (m, 5 H), 5.94 (ddd, J = 15.9 Hz, 10.3 Hz, 6.6 Hz, 1 H), 5.77-5.83 (m, 2 H), 5.63-5.73 (m, 2 H), 5.25 (d, J = 15.9 Hz, 1 H), 5.17 (d, J = 10.3 Hz, 1 H), 4.88 (d, J = 6.6 Hz, 1 H), 3.74-3.83 (m, 1 H), 2.41-2.69 (m, 4 H)

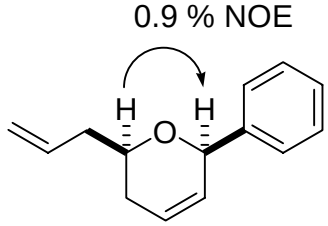
^{13}C – NMR (125.8 MHz): 140.6 (C), 139.4 (CH), 129.3 (CH), 128.6 (CH), 128.5 (CH), 128.1 (CH), 128.0 (CH), 127.6 (CH), 127.1 (CH), 126.9 (CH), 126.3 (CH), 126.2 (CH), 126.1 (CH8 116.1 (CH_2), 80.7 (CH), 75.8 (CH), 37.5 (CH_2), 37.2 (CH_2)

IR : 3082 (*m*), 3025 (*s*), 2903 (*m*), 1613 (*w*), 1453 (*m*), 1080 (*s*), 1064 (*vs*), 1029 (*vs*), 926 (*m*), 747 (*m*), 700 (*vs*)

EI – MS: 226 (8, $[M]^+$), 117 (100, $[M\text{-}C_7H_9O]^+$), 91 (16)

HR –MS: calculated for $[M]^+$: 226.1358, found: 226.1368

17b: 2-Allyl-6-phenyl-3,6-dihydro-2H-pyran



Method c, Column chromatography (SiO_2, ether/pentane 1/200) yielded 57 % of a single isomer.

^{1}H-NMR (500 MHz, $CDCl_3$, 25°C): δ = 7.31-7.35 (m, 5 H), 5.86-5.95 (m, 1 H), 5.75 (ddd, *J* = 10.1 Hz, 1.1 Hz, 1 H), 5.18 (bs, 1 H), 5.12 (dd, *J* = 17.2 Hz, 1.5 Hz, 1 H), 5.06 (d, *J* = 9.6 Hz, 1 H), 3.78-3.84 (m, 1 H), 2.42-2.49 (m, 1 H), 2.27-2.34 (m, 1 H), 2.10-2.19 (m, 1H), 2.02-2.07 (m, 1 H)

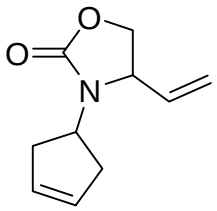
^{13}C – NMR (125.8 MHz): 141.7 (C), 134.7 (CH), 130.2 (CH), 128.9 (CH), 128.5 (CH), 127.8 (CH), 127.2 (CH), 126.1 (CH), 125.4 (CH), 124.6 (CH), 116.9 (CH_2), 77.7 (CH), 73.9 (CH), 40.5 (CH_2), 32.0 (CH_2)

IR : 3369 (*m*), 3062 (*w*), 3029 (*w*), 2924 (*vs*), 2853 (*s*), 1733 (*m*), 1450 (*m*), 1078 (*s*), 1028 (*s*), 914 (*m*), 758 (*m*), 700 (*s*)

EI – MS: 200 (10, $[M]^+$), 159 (64, $[M\text{-}C_3H_5]^+$), 157 (84), 131 (100), 105 (78), 91 (34)

HR –MS: calculated for $[M]^+$: 200.1201, found: 200.1200

18a: 3-Cyclopent-3-enyl-4-vinyl-oxazolidin-2-one



^{1}H-NMR (500 MHz, $CDCl_3$, 25°C): δ = 5.81 (m, 1 H), 5.71 (m, 1 H), 5.64 (m, 1 H), 5.29 (d, *J* = 17 Hz, 1 H), 5.25 (d, *J* = 11 Hz, 1 H), 4.39 (m, 2 H), 4.20 (q, *J* = 8 Hz, 1 H), 3.92 (dd, *J* = 9 Hz, 6 Hz, 1 H), 2.65-2.45 (m, 4 H)

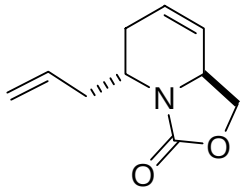
^{13}C-NMR (125 MHz): δ = 157.7 (C), 136.4 (CH), 129.3 (CH), 128.7 (CH), 119.6 (CH_2), 67.3 (CH_2), 58.9 (CH), 53.3 (CH), 36.9 (CH_2), 36.0 (CH_2).

IR: 3057 (*w*), 2983 (*w*), 2944 (*w*), 2912 (*w*), 2854 (*w*), 1740 (*s*), 1406 (*m*), 1344 (*w*), 1222 (*m*), 1083 (*w*), 1060 (*w*), 930 (*m*), 763 (*m*), 687 (*w*).

EI - MS: = 179 ($[M]^+$, 12), 114 (100), 80 (20), 70 (12), 67 (24), 66 (44), 54 (32).

HR - MS: calculated for $[M]^+$ 179.0946, found: 179.0942.

18b: 5-Allyl-1,5,6,8a-tetrahydro-oxazolo[3,4-a]pyridin-3-one



Method c, Column chromatography (SiO_2, ether/hexane 1/2) yielded 84 % (combined yield, 60% of the *trans*-product) of a colourless oil.

^{1}H-NMR (500 MHz, $CDCl_3$, 25°C): *trans:* δ = 5.83 (m, 1 H), 5.76 (m, 1 H), 5.62 (d, *J* = 10 Hz, 1 H), 5.09 (d, *J* = 16 Hz, 1 H), 5.06 (d, *J* = 10 Hz, 1 H), 4.45 (d, *J* = 8 Hz, 1 H), 4.28 (bs, 1 H), 4.10 (q, *J* = 7 Hz, 1 H), 3.93 (t, *J* = 7 Hz, 1 H), 2.48 (m, 1 H), 2.37 (m, 1 H), 2.25 (m, 1 H), 1.95 (dd, *J* = 18 Hz, 2 Hz, 1 H); *cis:* δ = 5.95 (m, 1 H), 5.84 (m, 1 H) 5.63 (m, 1 H), 5.16 (d, *J* = 17 Hz, 1 H), 5.08 (d, *J* = 10 Hz, 1 H), 4.36 (m, 2 H), 3.93 (dd, *J* = 7 Hz, 2 Hz, 1 H), 3.33 (m, 1 H), 3.12 (m, 1 H), 2.59 (m, 1 H), 2.35 (m, 1 H), 2.12 (m, 1 H).

^{13}C-NMR (125 MHz): *trans:* δ = 157.7 (C_q), 134.5 (CH), 126.2 (CH), 124.7 (CH), 117.7 (CH_2), 67.9 (CH_2), 49.4 (CH), 47.4 (CH), 36.15 (CH_2), 27.2 (CH_2); *cis:* δ = 157.7 (C), 135.3 (CH), 129.4 (CH), 127.0 (CH), 117.2 (CH_2), 67.0 (CH_2), 57.1 (CH), 54.3 (CH), 35.9 (CH_2), 29.4 (CH_2).

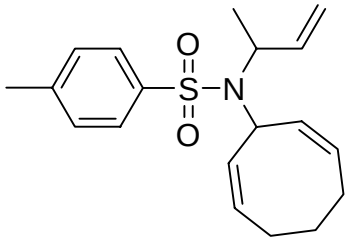
IR: *trans:* 3076 (*w*), 3030 (*w*), 2957 (*w*), 2965 (*w*), 2909 (*w*), 2851 (*w*), 1743 (*s*), 1641 (*w*), 1413 (*m*), 1373 (*m*), 1322 (*m*), 1212 (*m*), 1068 (*m*), 998 (*m*), 914 (*w*).

IR: *cis:* 3076 (*w*), 3034 (*w*), 2976 (*w*), 2952 (*w*), 2910 (*w*), 2843 (*w*), 1742 (*s*), 1641 (*w*), 1478 (*w*), 1405 (*m*), 1383 (*m*), 1229 (*m*), 1067 (*m*), 1039 (*m*), 993 (*m*), 918 (*m*), 159 (*m*).

EI - MS : 179 ($[M]^+$, 2), 139 (8), 138 (100), 94 (16), 67 (80), 53 (8).

HR - MS: calculated for: $[M]^+$: 179.0946, found: 179.0947

19a: N-Cycloocta-2,7-dienyl-4-methyl-N-(1-methyl-allyl)-benzenesulfonamide



^{1}H-NMR (500 MHz, $CDCl_3$, 25°C): δ = 7.74 (d, *J* = 8.2 Hz, 2 H), 7.25 (d, *J* = 8.2 Hz, 2 H), 6.09 (ddd, *J* = 16.9 Hz, 10.4 Hz, 5.8 Hz, 1 H), 5.67 (ddd, *J* = 11.3 Hz, 11.3 Hz, 4.2 Hz, 1 H), 5.42-5.45 (m, 2 H), 5.13 (d, *J* = 16.9 Hz, 1 H), 5.10 (d, *J* = 10.4 Hz, 1 H), 4.88 (bs, 1H), 4.18 (dq, *J* = 7.0 Hz, 5.8 Hz, 1 H), 2.37 – 2.41 (m, 2 H), 2.40 (s, 3 H), 2.10-2.13 (m, 2 H), 2.24 (q, *J* = 7.0 Hz, 3 H), 1.25 – 1.39 (m, 2 H).

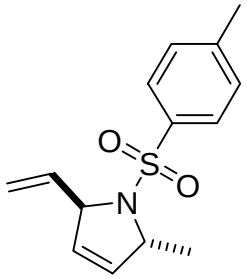
^{13}C – NMR (125.8 MHz): 142.7 (C), 139.4 (C), 139.4 (CH),133.4 (CH), 132.8 (CH), 129.4 (CH), 128.8 (CH), 128.6 (CH), 127.5 (CH), 116.1 (CH_2), 57.2 (CH), 56.3 (CH), 24.3 (CH_2), 24.2 (CH_2), 22.1 (CH_2), 21.5 (CH_3), 19.3 (CH_3)

IR (film): 3085 (*w*), 3064 (*w*), 2935 (*m*), 1337 (s), 1156 (*vs*), 1090 (*s*), 814 (*m*), 667 (*s*)

EI – MS : 331 (2, $[M]^+$), 276 (8, $[M - C_4H_7]^+$), 176 (42, $[M - C_7H_7SO_2]^+$), 155 (18, $[C_7H_7SO_2]^+$), 105 (24, $[C_8H_{10}]^+$), 91 (65, $[C_7H_7]^+$)

HR –MS: calculated for $[M]^+$: 331.1606, found: 331.1610

19b: 2-Methyl-1-(toluene-4-sulfonyl)-5-vinyl-2,5-dihydro-1H-pyrrole



Method c, column chromatography (SiO_2, ethylacetate / hexane 1/10) yielded 50 %.

^{1}H-NMR (500 MHz, $CDCl_3$, 25°C): *trans*: δ = 7.73 (d, *J* = 3.2 Hz, 2 H), 7.26 (d, *J* = 3.2 Hz, 2 H), 5.65 (d, *J* = 6.2 Hz, 1 H),, 5.53 (ddd, *J* = 16.9 Hz, 9.8 Hz, 6.2 Hz, 1 H), 5.45 (d, *J* = 6.2 Hz, 1 H), 5.23 (d, *J* = 16.9 Hz, 1 H), 5.07 (d, *J* = 9.8 Hz, 1 H), 4.93 (dd, *J* = 6.2 Hz, 2.0 Hz), 4.92 (dq, *J* = 6.3 Hz, 1 Hz), 2.41 (s, 3 H), 1.42 (d, *J* = 6.3 Hz).

^{13}C – NMR (125.8 MHz): 142.8 (C), 139.0 (C, mp), 138.9 (C, sp) 137.2 (CH, mp),131.7 (CH, mp), 131.1 (CH, sp), 129.9 (CH, sp), 129.3 (CH, mp), 127.6 (CH, sp), 127.5 (CH, mp), 116.8

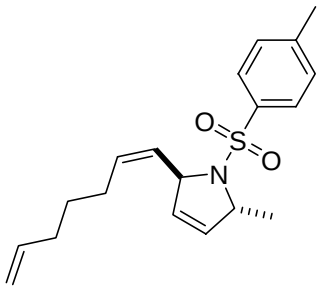
(CH_2, mp), 115.9 (CH_2, sp), 69.9 (CH, mp), 69.3 (CH, sp), 63.7 (CH, sp), 63.1 (CH, mp), 21.8 (CH_3), 21.5 (CH_3)

IR : 3802 (*w*), 2964 (*w*), 2927 (*m*), 1713 (*m*), 1598 (*m*), 1345 (*s*), 1164 (*vs*), 1103 (*s*), 815 (*m*), 668 (*s*)

EI – MS: 264 (4, $[MH]^+$) 248 (8), 155 (19, $[C_7H_7SO_2]^+$), 148 (100), 121 (96), 91 (65, $[C_7H_7]^+$)

HR –MS: calculated for $[MH]^+$: 264.1058, found: 264.1055

19c: 2-Hepta-1,6-dienyl-5-methyl-1-(toluene-4-sulfonyl)-2,5-dihydro-1H-pyrrole



Method c, with catalyst **2**, after column chromatography (SiO_2, ethylacetat/hexane 1/20) 15 % of a colourless oil were isolated.

^{1}H-NMR (500 MHz, $CDCl_3$, 25°C): δ = 7.70 (d, J = 8.3 Hz, 2 H), 7.26 (d, J = 8.3 Hz, 2 H), 5.73 – 5.77 (m, 1 H), 5.40 – 5.49 (m, 2 H), 5.22 (d, J = 17.1 Hz, 1 H), 5.09 (d, J = 10.0 Hz, 1 H), 4.74 (bs, 1H), 4.68 (t, J = 5.3 Hz, 1 H), 3.70 (s, 3 H), 2.62 – 2.67 (m, 1 H), 2.48-2.53 (m, 1 H), 2.41 (s, 3 H)

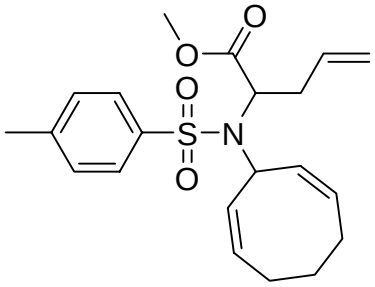
^{13}C – NMR (125.8 MHz): 142.7 (C), 139.1 (C), 138.6 (CH), 132.8 (CH), 132.0 (CH), 131.3 (CH), 129.2 (CH), 128.8 (CH), 128.5 (CH), 127.8 (CH), 127.5 (CH), 114.8 (CH_2), 64.1 (CH), 62.7 (CH), 33.5 (CH_2), 28.8 (CH_2), 26.9 (CH_2) 22.1 (CH_3), 21.5 (CH_3)

IR : 3074 (*w*), 2971 (*w*), 2927 (*m*), 2857 (*w*), 1649 (*w*), 1599 (*m*), 1345 (*s*), 1163 (*vs*), 1105 (*s*), 814 (*m*), 669 (*s*)

EI – MS: 331 (2, $[M]^+$), 316 (16, $[M\text{-}CH_3]$), 236 (37), 155 (40, $[C_7H_7SO_2]^+$), 91 (100, $[C_7H_7]^+$)

HR –MS: calculated for $[M]^+$: 331.1606, found: 331.1619

20a: 2-[Cycloocta-2,7-dienyl-(toluene-4-sulfonyl)-amino]-pent-4-enoic acid methyl ester



^{1}H-NMR (500 MHz, $CDCl_3$, 25°C): δ = 7.80 (d, J = 8.2 Hz, 2 H), 7.27 (d, J = 8.2 Hz, 2 H), 5.78 – 5.86 (m, 1 H), 5.63 (dd, J = 11.5 Hz, 4.5 Hz, 2 H), 5.45 – 5.39 (m, 1 H), 5.07 (d, J = 17.1 Hz, 1 H), 5.05 (d, J = 10.1 Hz, 1 H), 4.99 (bs, 1H), 4.08 (dd, J = 8.5 Hz, 5.3 Hz, 1 H), 3.71 (s, 1 H), 3.00 – 3.07 (m, 1 H), 2.53 – 2.59 (m, 1 H), 2.39 (s, 3 H), 2.36-2.44 (m, 1 H), 2.24 – 2.31 (m, 1 H), 2.11 – 2.18 (m, 1 H), 2.03 – 2.09 (m, 1 H), 1.39 – 1.47 (m, 1 H), 1.28 – 1.36 (m, 1 H)

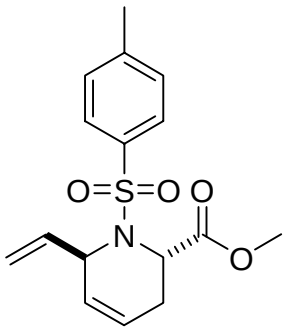
^{13}C – NMR (125.8 MHz): 151.5 (C=O), 143.3 (C), 138.2 (C), 135.1 (CH),132.1 (CH), 131.8 (CH), 129.7 (CH), 129.6 (CH), 129.4 (CH), 127.9 (CH), 117.8 (CH_2), 60.1 (CH), 58.2 (CH), 52.3 (CH_3), 36.6 (CH_2), 24.0 (CH_2), 23.9 (CH_2), 21.6 (CH_2), 21.6 (CH_3)

IR : 3073 (*w*), 3014 (*w*), 2936 (*m*), 1744 (*s*), 1342 (*s*), 1156 (*vs*), 1089 (*s*), 815 (*m*), 664 (*s*)

EI – MS : 389 (<1, $[M]^+$), 348 (6, $[M - C_3H_5]^+$), 330 (7, $[M - CO_2Me]^+$), 234 (100, $[M - C_7H_7SO_2]^+$, 155 (12, $[C_7H_7SO_2]^+$), 91 (61, $[C_7H_7]^+$)

HR –MS: calculated for $[M]^+$: 389.1661, found: 389.1669

20b: 1-(Toluene-4-sulfonyl)-6-vinyl-1,2,3,6-tetrahydro-pyridine-2-carboxylic acid methyl ester



Method c, Column chromatography (SiO_2, ethylacetate/hexane 1/6) yielded 70 % of a colourless oil.

^{1}H-NMR (500 MHz, $CDCl_3$, 25°C): δ = 7.70 (d, J = 8.3 Hz, 2 H), 7.26 (d, J = 8.3 Hz, 2 H), 5.73 – 5.77 (m, 1 H), 5.40 – 5.49 (m, 2 H), 5.22 (d, J = 17.1 Hz, 1 H), 5.09 (d, J = 10.0 Hz, 1

H), 4.74 (bs, 1H), 4.68 (t, J = 5.3 Hz, 1 H), 3.70 (s, 3 H), 2.62 – 2.67 (m, 1 H), 2.48-2.53 (m, 1 H), 2.41 (s, 3 H)

^{13}C – NMR (125.8 MHz): 171.4 (C), 143.3 (C), 138.2 (C), 137.0 (CH),129.2 (CH), 128.3 (CH), 1297.8 (CH), 123.3 (CH), 117.4 (CH_2), 58.1 (CH), 55.0 (CH), 52.4 (CH_3), 28.0 (CH_2), 21.6 (CH_3)

IR (film): 3064 (*w*), 3039 (*w*), 2952 (*m*), 2849 (*w*), 1747 (*s*), 1343 (s), 1160 (*vs*), 1093 (*m*), 816 (*m*), 661 (*s*)

EI – MS : 304 (2, $[M\text{-}CH_3]^+$), 294 (10, $[M - C_2H_3]^+$), 262 (64, $[M\text{-}CO_2CH_3]^+$), 166 (84, M-$C_7H_7SO_2$]), 155 (35, $[C_7H_7SO_2]^+$), 107 (64, $[C_7H_9N]^+$), 91 (100, $[C_7H_7]^+$)

HR –MS: calculated for $[M\text{-}C_2H_3]^+$: 294.0800, found: 294.0830