Supporting Information

Hot Water Promoted Ring-opening of Epoxides and Aziridines by Water and Other Nucleopliles

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General: ^{1}H NMR and ^{13}C NMR spectra were recorded in $CDCl_3$, D_2O, and d_6-DMSO on 600 MHz, 400 MHz and 300 MHz. Chemical shift in ppm derived from TMS with the solvent as the internal indicator. GC analysis was recorded using Rtx-5 column. Flash column chromatography was performed using petroleum ether and ethyl acetate as solvent on silica gel (200-300 mesh). All of the organic solvents and reagents were purified according to the literature report; All of the reactions were carried out in the open air.

Analytical data for compounds in table 2

1-Phenyl-1, 2-ethanediol:[1]

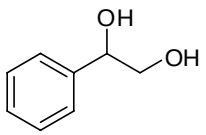


Table 2 - Entry 1

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.31–7.37 (m, 5H), 4.83 (dd, J = 3.2, 8.0 Hz, 1H), 3.76 (dd, J = 3.0, 11.4 Hz, 1H), 3.66 (dd, J = 8.2, 11.1 Hz, 1H), 2.69 (brs, 1H), 2.27 (brs, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 140.34, 128.36, 127.77, 126.00, 74.63, 67.88.

1-Phenyl-1,2-propanediol(60:40 mixture of diastereomers *threo:erythro*):[2]

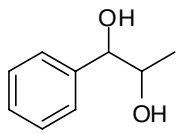


Table 2 - Entry 2

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.31–7.36 (m, 5 H)，4.67 (d, J =4.0 Hz. 0.4 H), 4.34 (d, J = 7.1 Hz, 0.6 H), .3.99 (brs, 0.4 H), 3.81–3.87 (m, 0.6 H), 2.93–3.00 (br, 0.6H), 2.70–2.81 (br, 1H), 2.15–2.20 (br, 0.4H), 1.06 (d, J= 6.4 Hz, 1.2H), 1.04 (d, J = 6.3 Hz, 1.8 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 141.36 (*threo*), 140.68 (*erythro*), 128.65 (*threo*), 128.43(*erythro*), 128.22 (*threo*), 127.77 (*erythro*), 127.21 (*threo*), 126.85

(*erythro*), 79.72 (*threo*), 77.41 (*erythro*), 72.40 (*threo*), 71.61 (*erythro*), 18.99 (*threo*), 16.85 (*erythro*).

2-Phenyl-1, 2-propanediol:[1]

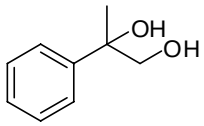


Table 2 - Entry 3

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.17–7.37 (m, 5H), 3.67 (d, J = 11.2 Hz, 1H), 3.52 (d, J = 11.2 Hz, 1H), 2.87 (br, 1H), 2.31 (br, 1H), 1.43 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.96, 128.05, 126.78, 124.95, 74.73, 70.46, 25.68.

Indane-1,2 -diol (*trans:cis* 25:75):[3]

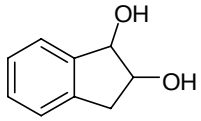


Table 2 - Entry 4

^{1}H NMR (400 MHz, d_6–DMSO) δ 7.14–7.31 (m, 4H), 5.37 (d, J = 6.1 Hz, 0.25H), 5.16 (d, J = 4.8 Hz, 0.25H), 4.98 (d, J = 6.6 Hz, 0.75H), 4.78 (t, J = 5.5 Hz, 0.75H), 4.69 (t, J = 5.6 Hz, 0.25H), 4.56 (d, J = 4.5, 0.75H), 4.23–4.28 (m, 0.75H), 4.05–4.11(m, 0.25H), 3.07(dd, J = 7.1, 15.5 Hz, 0.25H), 2.92 (dd, J = 5.5, 15.8 Hz, 0.75H), 2.76 (dd, J = 3.6, 15.8 Hz, 0.75H), 2.59 (dd, J = 7.0, 15.5 Hz, 0.25H); ^{13}C NMR (100 MHz, d_6–DMSO) δ 144.67, 144.47, 141.13, 140.00, 128.20, 128.10, 127.02, 126.86, 125.39, 125.35, 125.11, 124.81, 81.25, 80.64, 75.66, 73.48, 38.87, 38.64.

1-phenyl-cyclohexane-1, 2-diol (*trans:cis* 25:75):[4, 1]

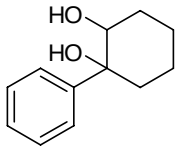


Table 2 - Entry 5

^{1}H NMR (400 MHz, d_6-DMSO,) δ 7.76 (t, J = 7.8 Hz, 2H), 7.14–7.30 (m, 3H), 4.73 (d, J = 3.1 Hz, 0.25H), 4.36 (d, J = 0.9 Hz, 0.75H), 4.22 (dd, J = 1.8, 4.6 Hz, 0.25H), 4.13 (dd, J = 3.3, 6.7 Hz, 0.75H), 3.71–3.77 (m, 0.75 H), 3.50 (brs, 0.25H), 2.20–2.26 (m, 0.25 H), 1.97–2.03 (m, 0.25 H), 1.59–1.66 (m, 5H), 1.24–1.50 (m, 2.5H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 146.37, 145.82, 128.10, 127.29, 126.66, 126.05, 125.01, 75.62, 74.31, 74.21, 73.09, 38.36, 31.26, 29.09, 28.33, 24.20, 20.92, 20.87, 19.14.

1-phenyl-propane-1, 2, 3-triol (*threo*:*erythro* 55:45):[5]

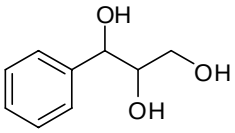


Table 2 - Entry 6

^{1}H NMR (400 MHz, D_2O) δ 7.30–7.34 (m, 5H), 4.58 (t, J = 7.0 Hz, 1H), 3.76–3.86 (m, 1H), 3.71 (dd, J = 1.8, 11.8 Hz, 0.45H), 3.54 (dd, J = 6.9, 11.8 Hz, 0.45H), 3.42 (dd, J = 2.3, 11.8 Hz, 0.55H), 3.31 (dd, J = 6.9, 11.7 Hz, 0.55H); ^{13}C NMR (100 MHz, D_2O) δ 140.44, 140.38, 128.63, 128.53, 128.12, 127.10, 126.71, 75.43, 74.65, 74.13, 73.95, 62.58, 62.46.

2-Chloro-propan-1, 2-diol:[6]

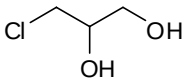


Table 2 - Entry 7

^{1}H NMR (400 MHz, $CDCl_3$) δ 3.94 (s, 1H), 3.77-3.80 (m, 1H), 3.59–3.70 (m, 3H), 2.63 (brs, 1H), 2.05 (brs, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 71.74, 63.57, 45.56.

1-*O*-Butylglycerol:[7]

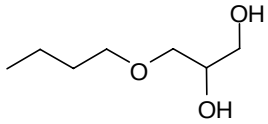


Table 2 - Entry 8

^{1}H NMR (400 MHz, $CDCl_3$) δ 3.83–3.87 (m, 1 H), 3.68–3.70 (m, 1 H), 3.61–3.68 (m, 1 H), 3.44-3.52 (m, 4 H), 2.86–2.88 (br, 1 H), 2.51–2.52 (br,1 H), 1.51–1.59 (m, 2 H), 1.31–1.40 (m, 2 H), 0.91 (t, J = 7.3 Hz, 3 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 71.83, 71.14, 70.61, 63.76, 31.32, 18.94, 13.62.

1, 2, 11-Undecanetriol:[8]

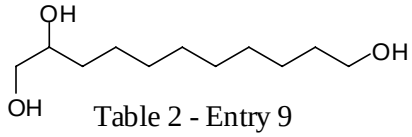


Table 2 - Entry 9

^{1}H NMR (400 MHz, d_6-DMSO) δ 4.43 (t, J = 5.5 Hz, 1H), 4.34–4.35 (m, 2H), 3.36–3.39 (m, 3H), 3.20–3.26 (m, 2H), 1.38–1.39 (m, 4H), 1.16–1.32 (brs, 12H); ^{13}C NMR (100 MHz, d_6-DMSO) δ 71.66, 66.56, 61.30, 33.95, 33.11, 29.88, 29.68, 29.56, 26.09, 25.75.

3, 7-dimethyl-1,6,7-otanetriol:[9]

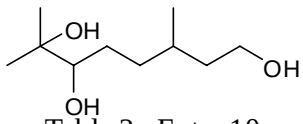


Table 2 - Entry 10

^{1}H NMR (400 MHz, $CDCl_3$) δ 3.62–3.79 (m, 2H), 3.34 (t, J = 10.6 Hz, 1H), 1.86–2.60 (brs, 2 H), 1.58–1.67 (m, 4H), 1.38–1.50(m, 4H), 1.21 (s, 3 H), 1.16 (s, 3H), 0.90–0.93 (m, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 78.72, 77.88, 73.04, 60.05, 60.02, 39.57, 39.24, 33.80, 33.19, 29.50, 28.92, 28.51, 28.15, 26.06, 25.98, 23.10, 23.08, 19.72, 19.31.

6, 7-Dihydroxy-3, 7-dimethyloctyl acetate:[10]

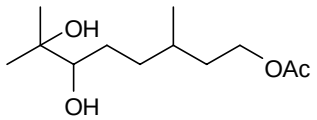


Table 2 - Entry 11

^{1}H NMR (400 MHz, $CDCl_3$) δ 4.04–4.15 (m, 2H), 3.31 (dd, J = 4.9, 9.8 Hz, 1H), 2.30 (br, 2H), 2.03 (s, 3H), 1.37–1.67 (m, 7H), 1.20 (s, 3H), 1.14 (s, 3H), 0.91 (dd, J = 4.4, 6.2 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 171.03, 78.42, 78.14, 72.76, 62.61, 35.22, 34.85, 33.80, 33.56, 29.59, 29.36, 28.60, 28.43, 25.98, 22.82, 20.63, 19.22, 18.92.

Butane-1, 2, 3, 4-tetraol:[11]

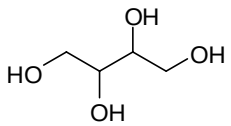


Table 2 - Entry 12

^{1}H NMR (400 MHz, D_2O) δ 3.64–3.66 (m, 4H), 3.55– 3.60 (m, 2H); ^{13}C NMR (100 MHz, D_2O) δ 71.74, 62.79.

Butane-1, 2, 3-triol:[12]

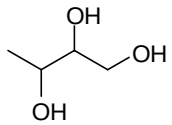


Table 2 - Entry 13

^{1}H NMR (400 MHz, D_2O) δ 3.69–3.75 (m, 1H), 3.63–3.66 (m, 1H), 3.45–3.53 (m, 2H), 1.10 (d, J = 6.4 Hz, 3H); ^{13}C NMR (100 MHz, D_2O) δ 75.59, 67.99, 62.70, 17.53.

Glycerin

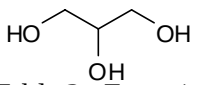


Table 2 - Entry 14

^{1}H NMR (400 MHz, D_2O) δ 3.64–3.68 (m, 1H), 3.54 (dd, J = 4.3, 11.7 Hz, 2H), 3.44

(dd, J = 6.5, 11.7 Hz, 2H); ^{13}C NMR (100 MHz, D_2O) δ 72.08, 62.51.

***trans*-1,2-Cyclopentanediol**:[13]

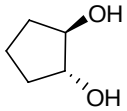


Table 2 - Entry 15

^{1}H NMR (400 MHz, $CDCl_3$) δ 4.01–4.03 (m, 2H), 1.99–2.06 (m, 2H), 1.71–1.78 (m, 4H), 1.53–1.64 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 78.81, 30.97, 19.49.

***trans*-1,2-Cyclohexanediol**:[4]

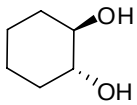


Table 2 - Entry 16

^{1}H NMR (400 MHz, $CDCl_3$) δ 3.36–3.37 (m, 2H), 2.31 (br, 2H), 1.97–1.99 (m, 2H), 1.67–1.71 (m, 2H), 1.27–1.28 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 75.47, 32.80, 24.27.

(1*S*,2*S*,4*R*)-1-methyl-4-(prop-1-en-2-yl)cyclohexane-1,2-diol[14]

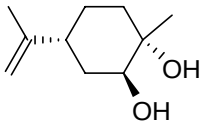


Table 2 - Entry 17

^{1}H NMR (600 MHz, $CDCl_3$) δ 4.73 (s, 2H), 3.63 (s, 1H), 2.23–2.27 (m, 2H), 1.93 (t, J = 12.5 Hz, 1H), 1.82 (brs, 1H), 1.73 (s, 3H), 1.64–1.68 (m, 1H), 1.52–1.56 (m, 3H), 1.26 (s, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 149.13, 108.97, 73.72, 71.43, 37.39, 33.84, 33.61, 26.35, 26.05, 21.06.

***trans*-2, 3-Dihydroxy-cyclohexanone**[15]

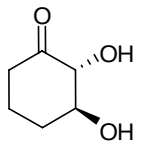


Table 2 - Entry 18

^{1}H NMR (400 MHz, D_2O) δ 4.14 (d, J = 9.6 Hz, 1H), 3.56–3.62 (m, 1H), 2.42–2.51 (m, 1H), 2.34–2.38 (m, 1H), 2.09–2.12 (m, 1H), 1.95–1.99 (m, 1H), 1.69–1.79 (m, 1H), 1.40–1.50 (m, 1H); ^{13}C NMR (100 MHz, D_2O) δ 212.36, 81.21, 75.43, 39.17, 31.70, 20.47.

Analytical data for compounds in table 3

2-(*N*-Tosylamino)-1-phenyl-1-ethanol[16]

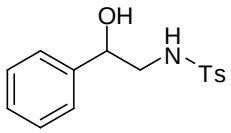


Table 3 - Entry 1

^{1}HNMR (400 MHz, $CDCl_3$) δ 7.69 (d, J = 8.0 Hz, 2H), 7.23–7.25 (m, 7H), 5.68 (s, 1H), 4.76 (dd, J =2.4, 8.4 Hz, 1H), 3.48 (brs, 1H), 3.14–3.17 (m, 1H), 2.94–3.00 (m, 1H), 2.37 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 143.40, 140.76, 136.48, 129.65, 128.39, 127.89, 126.94, 125.78, 72.58, 50.18, 21.39.

1-(Tosylamino)-2-hexanol (70%) and **2-(Tosylamino)-1- hexanol** (30%)[17]

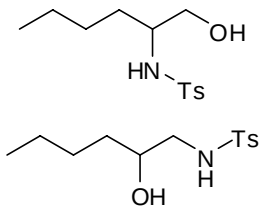


Table 3 - Entry 2

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.77 (d, J = 8.0 Hz, 2H), 7.30 (d, J = 8.0 Hz, 2H), 5.10 (t, J = 4.8 Hz, 0.3H), 4.90 (d, J = 7.6 Hz, 0.7H), 3.65–3.69 (m, 0.3H), 3.56 (dd, J = 4.0, 11.2 Hz, 0.7H), 3.47(dd, J = 5.6, 11.2 Hz, 0.7H), 3.18–3.23 (m, 0.7H), 3.04–3.10

(m, 0.3H), 2.74–2.80 (m, 0.3H), 2.42 (s, 3H), 2.21 (brs, 1H), 1.20-1.45 (m, 3H), 0.95-1.18 (m, 3H), 0.87 (t, J = 6.8 Hz, 0.9H), 0.74 (t, J = 6.8 Hz, 2.1H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 143.05, 142.99, 137.57, 136.47, 129.42, 129.32, 126.79, 70.14, 64.30, 55.32, 48.48, 33.84, 30.88, 27.39, 27.24, 22.26, 21.97, 21.16, 13.67, 13.50.

***trans*- 2-(*N*-Tosylamino)-1-cyclohexanol**[18]

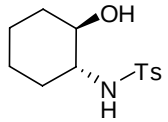


Table 3 - Entry 3

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.80 (d, J = 8.4 Hz, 2H), 7.30 (d, J = 8.0 Hz, 2H), 5.32 (d, J = 6.4 Hz, 1H), 3.28–3.33 (m, 1H), 2.81–2.92 (m, 2H), 2.42 (s, 3H), 1.98–2.00 (m, 1H), 1.50–1.73 (m, 3H), 1.05–1.30 (m, 4H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 143.19, 137.54, 129.52, 126.89, 126.79, 72.81, 59.46, 33.17, 31.35, 24.43, 23.65, 21.32.

***trans*- 2-(*N*-Tosylamino)-1-cyclopentanol**[19]

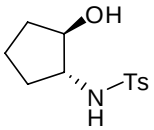


Table 3 - Entry 4

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.79 (d, J = 7.6 Hz, 2H), 7.28 (d, J = 8.0 Hz, 2H), 5.99 (d, J = 6.0 Hz, 1H), 4.02–4.04 (m, 1H), 3.60 (brs, 1H), 3.24–3.28 (m, 1H), 2.39 (s, 3H), 1.86–1.93 (m, 1H), 1.75–1.81 (m, 1H), 1.44–1.56 (m, 3H), 1.33–1.37 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 143.19, 136.77, 129.45, 126.86, 77.54, 61.37, 30.80, 29.43, 21.21, 19.54.

***trans*- 2-(*N*-Phenylcarbonylamino)-1-cyclohexanol**[20]

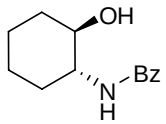


Table 3 - Entry 5

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.77 (d, J = 7.6 Hz, 2H) 7.39–7.51 (m, 3H), 6.33 (s, 1H), 3.81–3.83 (m, 1H), 3.68 (brs, 1H), 3.38–3.44 (m, 1H), 2.00–2.20 (m, 2H), 1.60–1.82 (m, 2H), 1.10–1.50 (m, 4H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 169.03, 134.17, 131.56, 128.45, 127.09, 74.84, 56.18, 34.49, 31.55, 24.53, 24.01.

Analytical data for compounds in table 4

2-Phenyl-2-(phenylamino)ethanol[21]

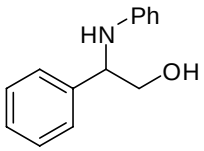


Table 4 - Entry 1

^{1}HNMR(600 MHz, $CDCl_3$) δ 7.22–7.33 (m, 5H), 7.08 (t, J = 7.9 Hz, 2H), 6.67 (t, J = 7.9 Hz, 1H), 6.54 (d, J = 8.0 Hz, 2H), 4.45 (dd, J = 4.2, 6.9 Hz, 1H), 3.86 (dd, J = 4.2, 11.1 Hz, 1H), 3.67 (dd, J = 7.1, 11.1 Hz, 1H); ^{13}C NMR (150MHz, $CDCl_3$) δ 147.18, 140.07, 129.08, 128.71, 127.49, 126.66, 117.80, 113.79, 67.20, 59.77.

2-Azido-2-phenylethanol[22]

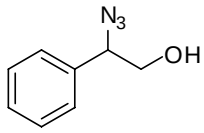


Table 4 - Entry 2

^{1}HNMR(600 MHz, $CDCl_3$) δ 7.30–7.42 (m, 5 H), 4.65 (t, J = 6.6 Hz, 1 H), 3.74 (d, J = 6.7 Hz , 2 H), 2.31 (brs, 1 H); ^{13}C NMR (150MHz, $CDCl_3$) δ 136.28, 128.88, 128.65, 127.12, 67.80, 66.39.

2-(Phenylamino)cyclohexanol[23]

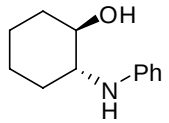


Table 4 - Entry 3

^{1}H-NMR (400 MHz, CDCl3) δ 7.20–7.16 (m, 2 H), 6.77–6.71 (m, 3H), 3.35 (td, J = 4.2, 9.7 Hz,1 H), 3.15 (ddd, J = 4.0, 9.2, 11.1 Hz, 1 H), 2.91–2.51 (m, 1 H), 2.14–2.10 (m, 2 H), 1.80–1.70 (m, 2 H), 1.42–1.25(m, 3H), 1.10–1.00(m, 1H).

2-Azidocyclohexanol[24]

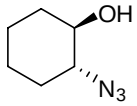


Table 4 - Entry 4

^{1}H-NMR (400 MHz, CDCl3) δ 3.42–3.35 (m, 1H), 3.22–3.15 (m, 1H), 2.52 (s, 1H), 2.07–2.00 (m, 2H), 1.78–1.72 (m, 2H), 1.36–1.19 (m, 4H).

4-Methyl-*N*-(2-(phenylamino)cyclohexyl)benzenesulfonamide[25]

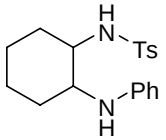


Table 4 - Entry 5

^{1}H NMR(600 MHz, $CDCl_3$) δ 7.74 (d, J = 8.1 Hz, 2H), 7.26 (d, J = 7.9 Hz, 2H), 7.12 (t, J = 7.9 Hz, 2H), 6.69 (t, J = 7.3 Hz, 1H), 6.47 (d, J = 7.8 Hz, 2H), 5.11 (brs, 1H), 3.48 (brs, 1H), 3.05 (m, 1H), 2.93 (m, 1H), 2.43 (s, 3H), 2.16 (m, 1H), 1.98 (m, IH), 1.63 (m. 2H), 1.25 (m, 3H), 1.02 (m, 1H); ^{13}C NMR (150MHz, $CDCl_3$) δ 147.00, 143.35, 137.46, 129.65, 129.29, 127.08, 117.67, 113.39, 56.96, 56.42, 32.86, 32.01, 24.33, 24.01, 21.49.

***N*-(2-Azidocyclohexyl)-4-methylbenzenesulfonamide**[26]

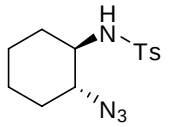


Table 4 - Entry 6

^{1}HNMR (600 MHz, $CDCl_3$) δ 7.79 (d, J = 8.4 Hz, 2 H), 7.31 (d, J = 8.4 Hz, 2 H) 5.33 (brs, 1 H), 3.09–3.11 (m, 1 H), 2.95–2.98 (m, 1 H), 2.43 (s, 3 H), 1.97–2.02 (m, 2 H), 1.60–1.69 (m, 2H), 1.18–1.40 (m, 4 H); ^{13}C NMR (150MHz, $CDCl_3$) δ 143.35, 137.59, 129.58, 127.03, 63.53, 56.67, 32.30, 30.17, 23.76, 23.49, 12.47.

***N*-(2-(Benzylamino)cyclohexyl)-4-methylbenzenesulfonamide**[27]

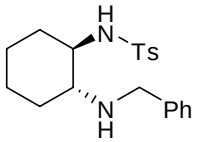


Table 4 - Entry 8

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.72 (d, J = 8.2 Hz, 2H) , 7.35–7.19 (m, 7H), 3.74 (d, J = 13.0 Hz, 1H), 3.56 (d, J = 13.0 Hz, 1H), 2.68 (td, J = 4.4, 9.9Hz, 1H), 2.37 (s, 3H), 2.24 (td, J = 3.7, 10.7Hz, 1H), 2.15–2.09 (m, 2H), 1.68–1.61 (m, 2H), 1.25–1.13 (m, 4H), 1.04–0.95 (m, 2H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 143.10, 140.16, 137.45, 129.51, 128.41, 127.94, 127.19, 127.01, 59.78, 57.56, 50.10, 32.82, 31.33, 24.67, 24.46, 21.44.

***N*-(2-Phenylthiocyclohexyl)-4-methylbenzenesulfonamide**[28]

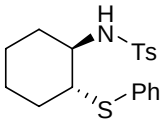
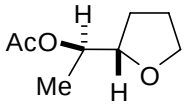


Table 4 - Entry 7

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.75 (d, J = 8.1Hz, 2H), 7.30 (d, J = 8.1 Hz, 2H), 7.28–7.23 (m, 5H), 5.19 (d, J = 3.0 Hz, 1H), 2.90–2.97 (m, 2H), 2.45 (s, 3H), 2.31–2.29 (m, 1H), 2.04–2.00 (m, 1H), 1.62–1.57 (m, 2H), 1.44–1.25 (m, 4H).

Analytical data for compounds in scheme 3

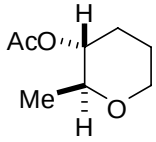
1-Tetrahydrofuran-2-yl)ethyl acetate(2a)[29]



2a

^{1}H NMR (300 MHz, $CDCl_3$) δ 4.88–4.96 (m, 1H), 3.74–3.93 (m, 3H), 2.05 (s, 3H), 1.84–1.97 (m, 3H), 1.66–1.72(m, 1H), 1.23 (d, J = 6.4 Hz, 3H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 170.36, 80.59, 72.01, 68.68, 27.35, 25.69, 21.19, 15.74.

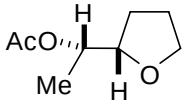
2-Methyltetrahydro-2H-pyran-3-yl acetate(2b)[29]



2b

^{1}H NMR (300 MHz, $CDCl_3$) δ 4.41–4.49 (m, 1H), 3.87–3.92 (m, 1H), 3.32–3.42 (m, 2H), 2.05 (s, 3H), 1.65–1.75 (m, 3H), 1.38–1.50 (m, 1H), 1.18 (d, J = 6.1 Hz, 3H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 170.18, 75.74, 73.66, 67.53, 29.28, 25.269, 21.11, 18.14.

1-Tetrahydrofuran-2-yl)ethyl acetate(4a)[29]

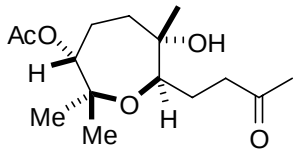


4a

^{1}H NMR (400 MHz, $CDCl_3$) δ 4.87 (p, J = 6.4 Hz, 1H), 3.77–3.88 (m, 3H), 2.09 (s, 3H), 1.88–1.97 (m, 3H), 1.53–1.62(m, 1H), 1.22 (d, J = 6.4 Hz, 3H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 170.65, 80.70, 72.32, 68.33, 27.99, 25.90, 21.29, 16.56.

Analytical data for compounds in scheme 4

6-Hydroxy-2,2,6-trimethyl-7-(3-oxobutyl)oxepan-3-yl acetate[30]

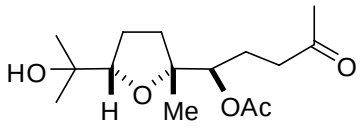


6a

^{1}H NMR (600 MHz, $CDCl_3$) δ 4.84 (dd, J = 1.7, 10.8 Hz, 1H), 3.77–3.81 (m, 1H), 2.39–2.52 (m, 2H), 2.14 (s, 3H), 2.08 (s, 3H), 1.79–1.97 (m, 4H), 1.58–1.64 (m, 2H), 1.26 (s, 3H), 1.22 (s, 3H), 1.10 (s, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 208.11, 171.04,

85.54, 83.70, 76.46, 70.56, 39.60, 34.66, 30.00, 27.70, 25.97, 24.54, 23.62, 22.30, 21.12..

1-(5-(2-Hydroxypropan-2-yl)-2-methyltetrahydrofuran-2-yl)-4-oxopentyl acetate



6b

^{1}H NMR (600 MHz, $CDCl_3$) δ 4.88 (dd, J = 2.7, 13.1 Hz, 1H), 3.71–3.74 (m, 1H), 2.42–2.53(m, 2H), 2.14 (s, 3H), 2.08 (s, 3H), 1.80–2.04 (m, 4H), 1.67–1.75 (m, 2H), 1.20 (s, 3H), 1.20 (s, 3H), 1.11 (s, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 207.84, 170.87, 87.13, 83.90, 77.37, 70.37, 40.12, 34.70, 29.97, 27.47, 26.05, 24.07, 23.86, 23.01, 21.08. MS (ES) calc. for $C_{15}H_{26}O_5Na$ $[MNa]^+$ 309.1672, found 309.1680.

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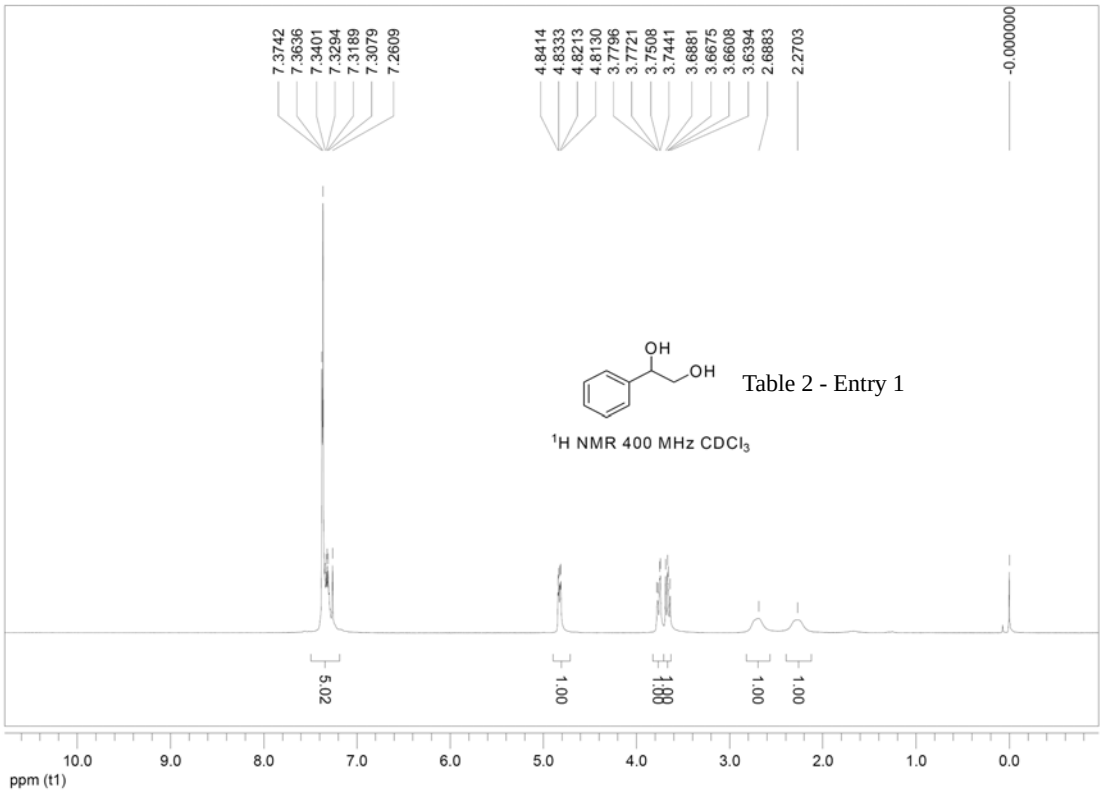
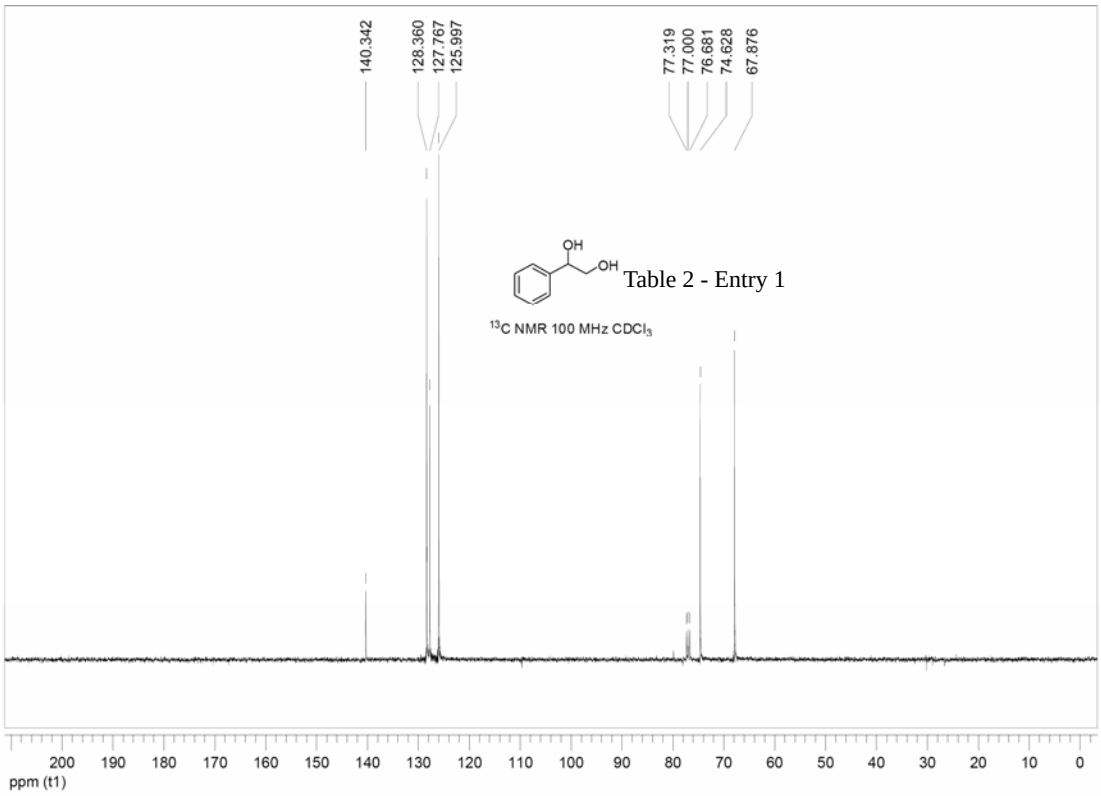
^{1}H NMR and ^{13}C NMR spectra of compounds in table 2

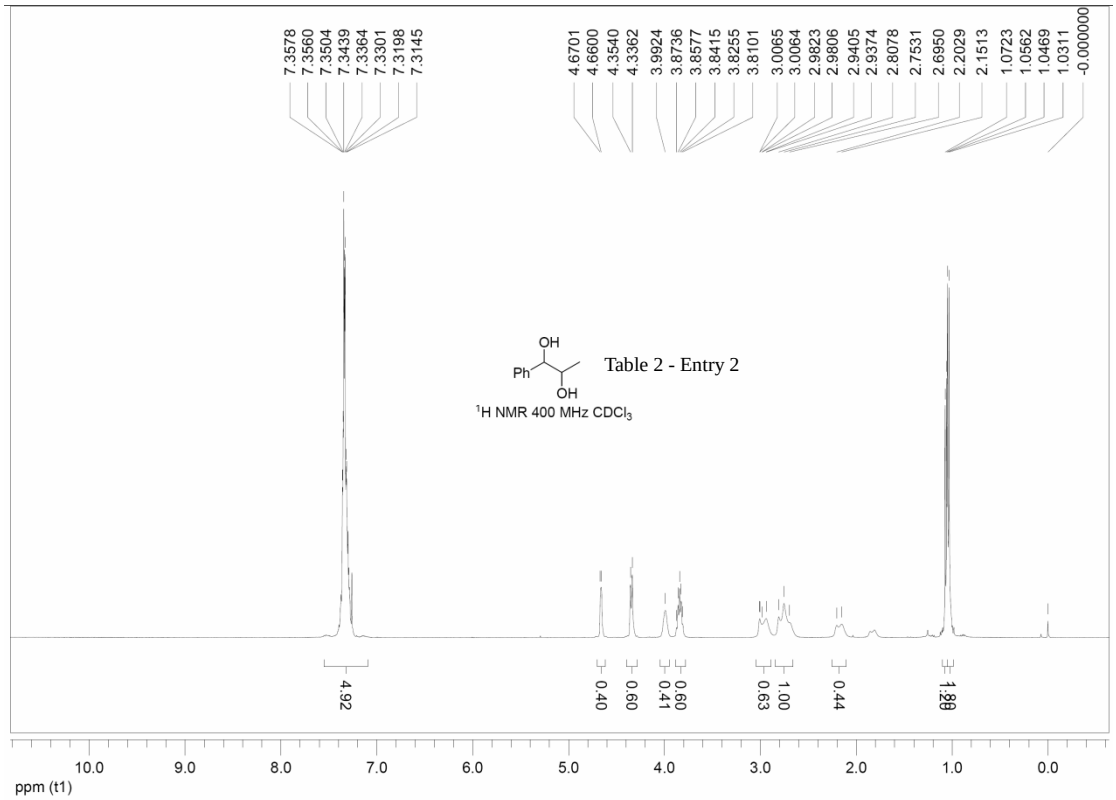
1-Phenyl-1, 2-ethanediol ^{1}H NMR



1-Phenyl-1, 2-ethanediol ^{13}C NMR

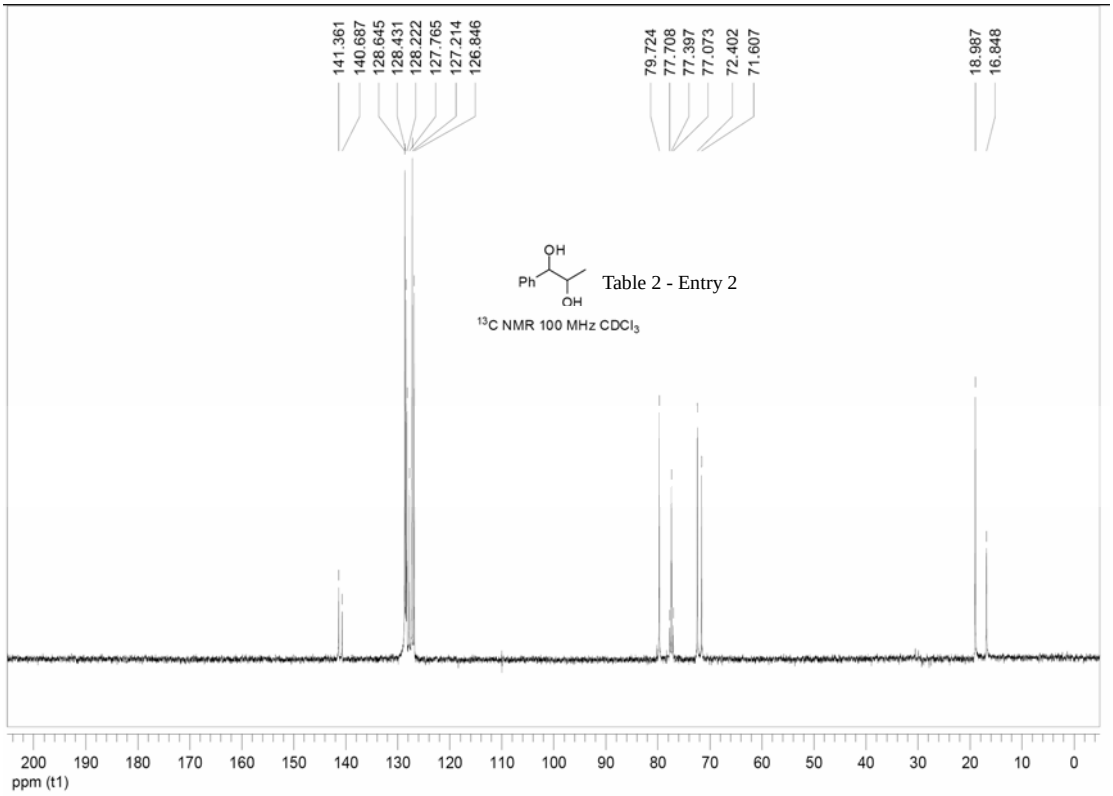


1-Phenyl-1,2-propanediol(60:40 mixture of diastereomers *threo* ： *erythro*) ^{1}H NMR

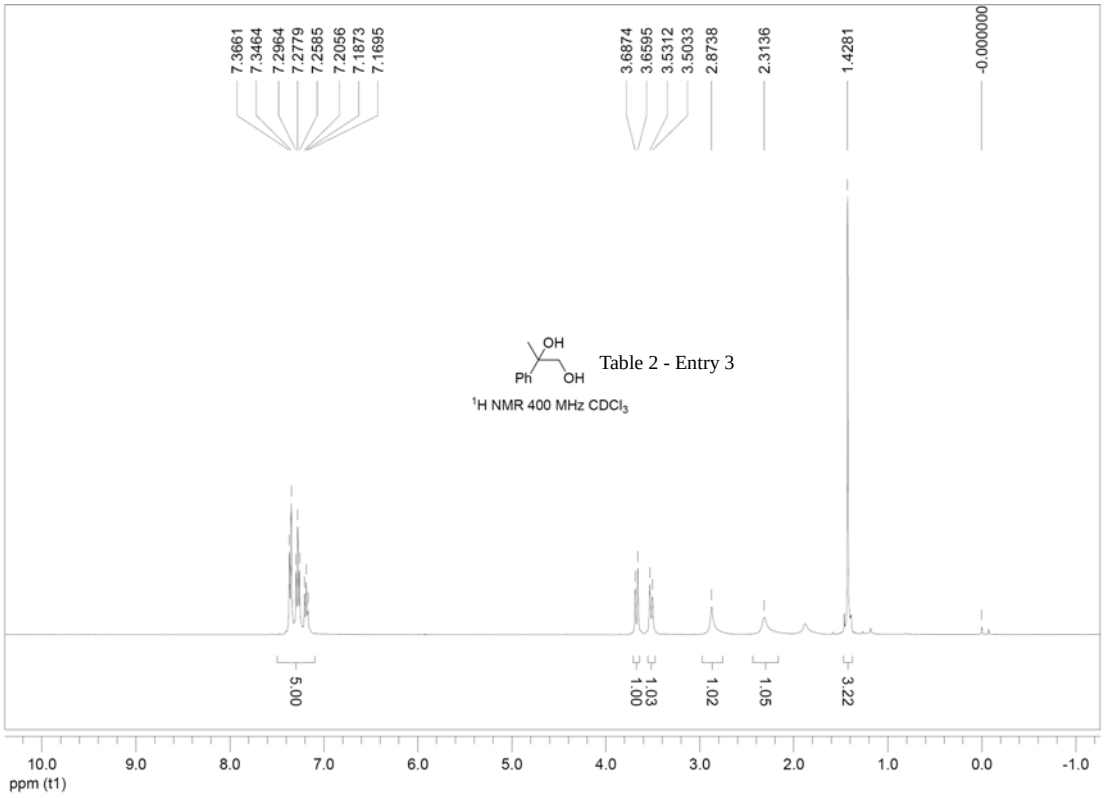


1-Phenyl-1,2-propanediol(60:40 mixture of diastereomers *threo* ： *erythro*)

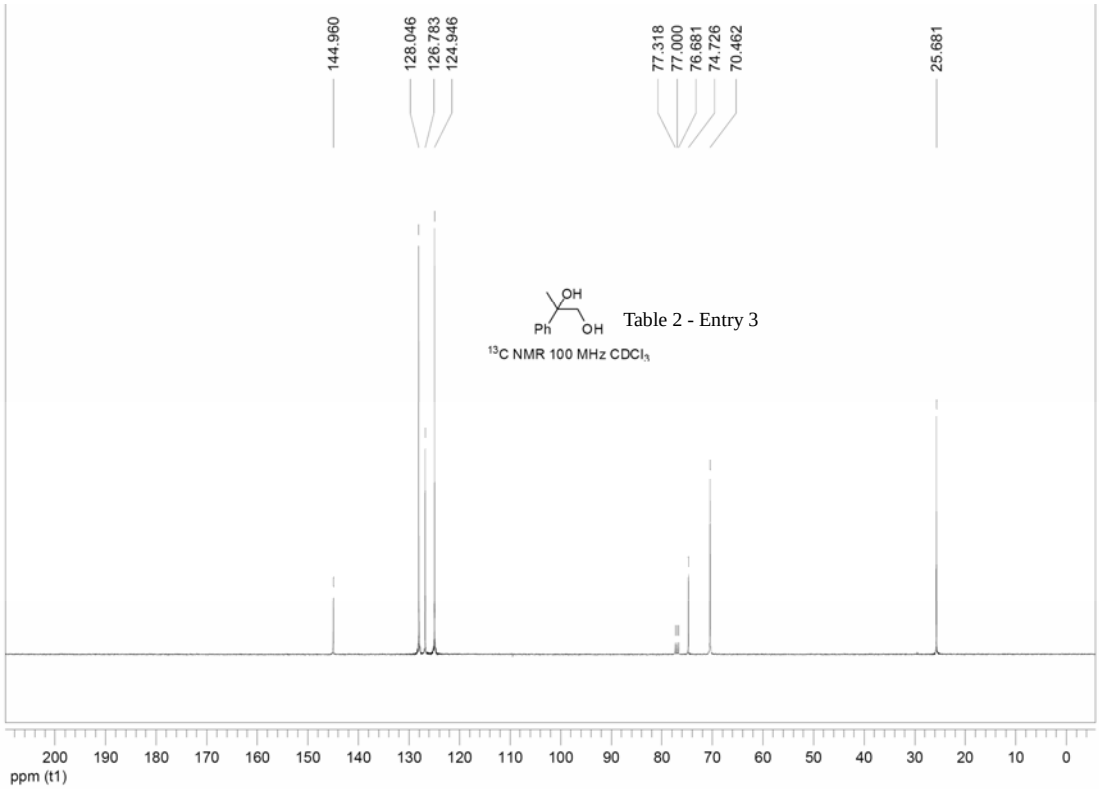
^{13}C NMR



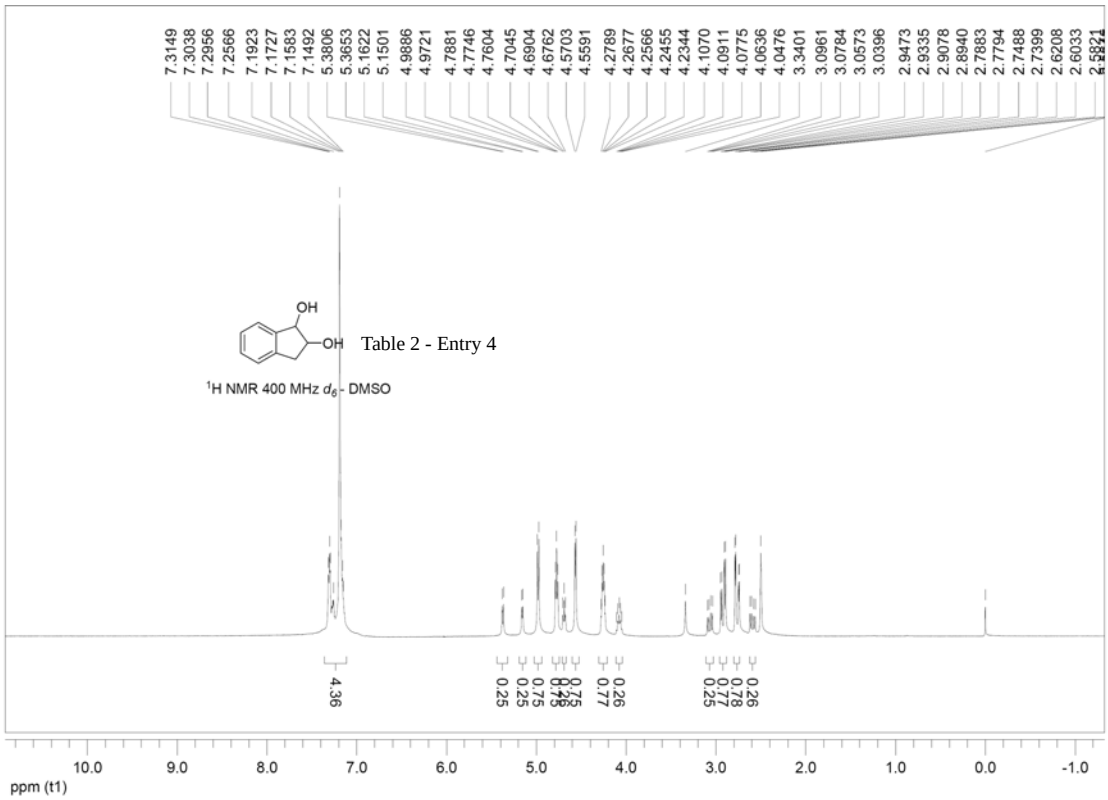
2-Phenyl-1, 2-propanediol ^{1}H NMR



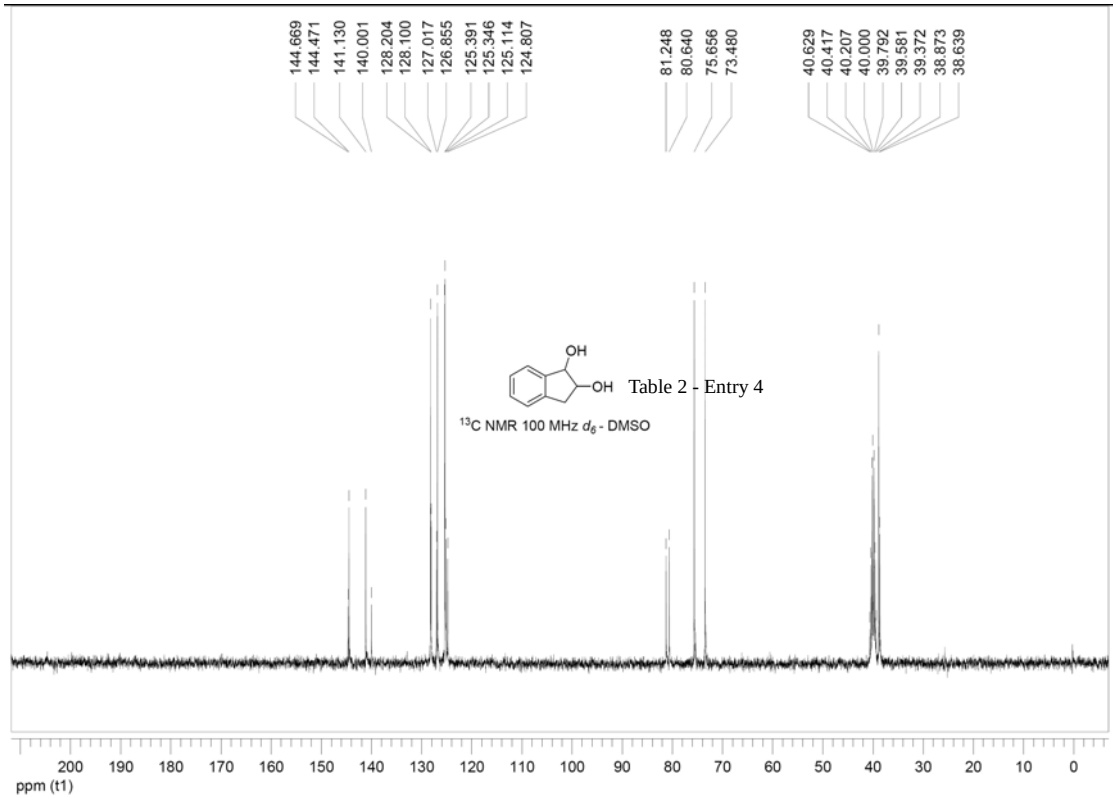
2-Phenyl-1, 2-propanediol ^{13}C NMR



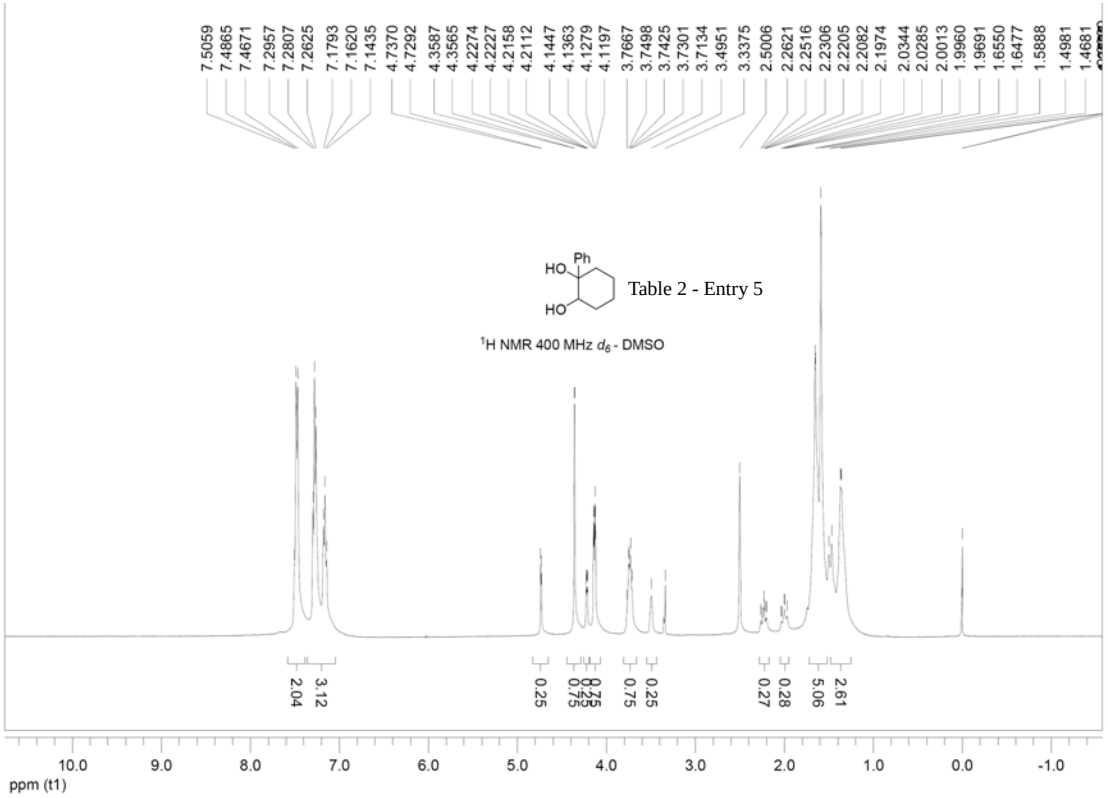
Indane-1, 2 -diol (*trans:cis* 25:75): ^{1}H NMR



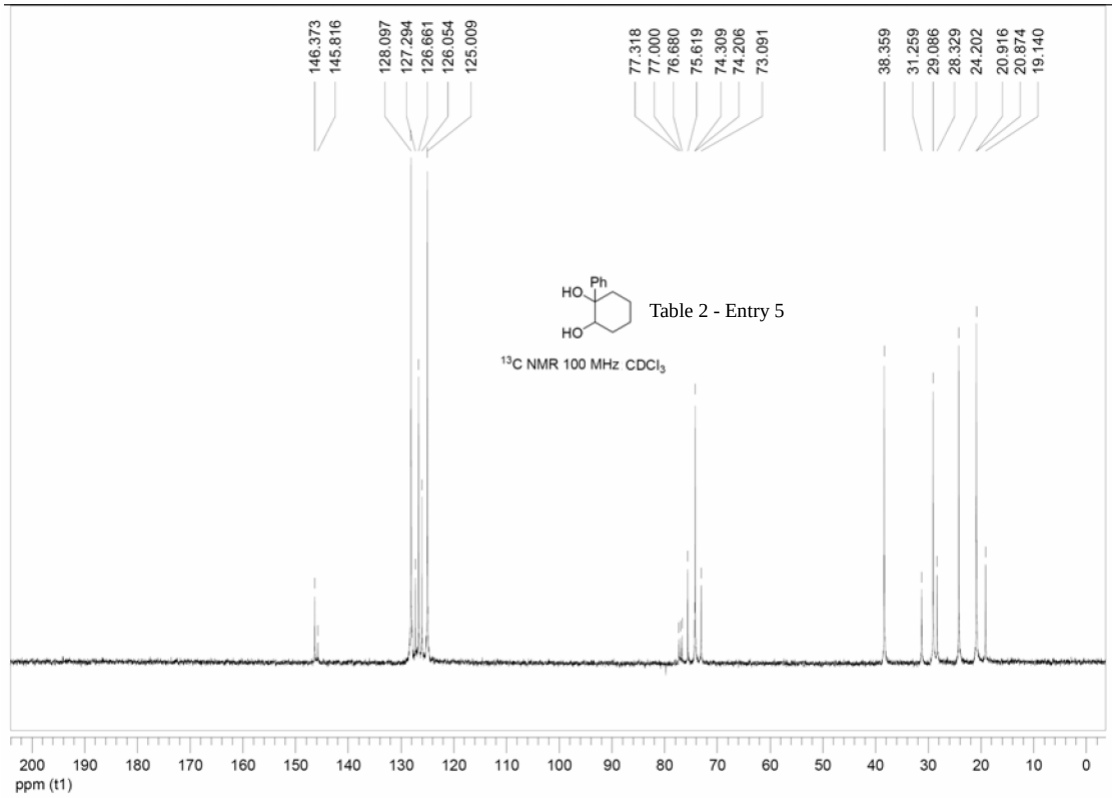
Indane-1, 2 -diol (*trans:cis* 25:75) ^{13}C NMR



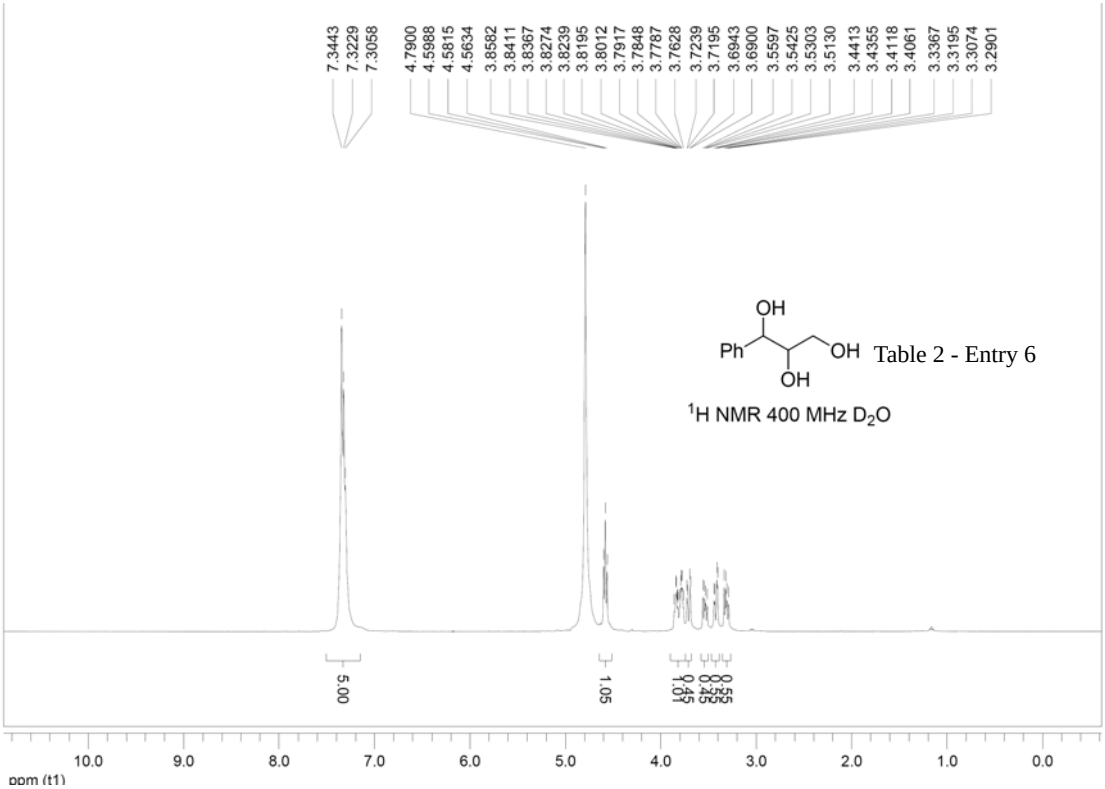
1-phenyl-cyclohexane-1, 2-diol (*trans:cis* 25:75) ^{1}H NMR



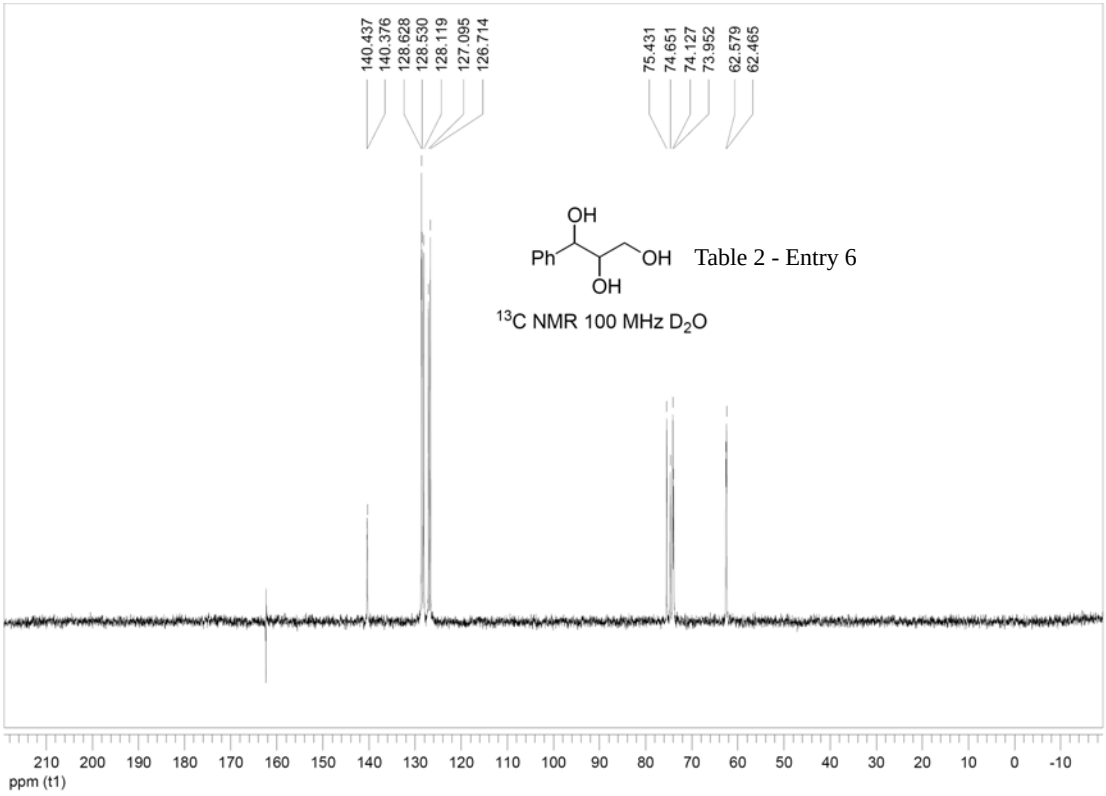
1-phenyl-cyclohexane-1, 2-diol (*trans:cis* 25:75) ^{13}C NMR



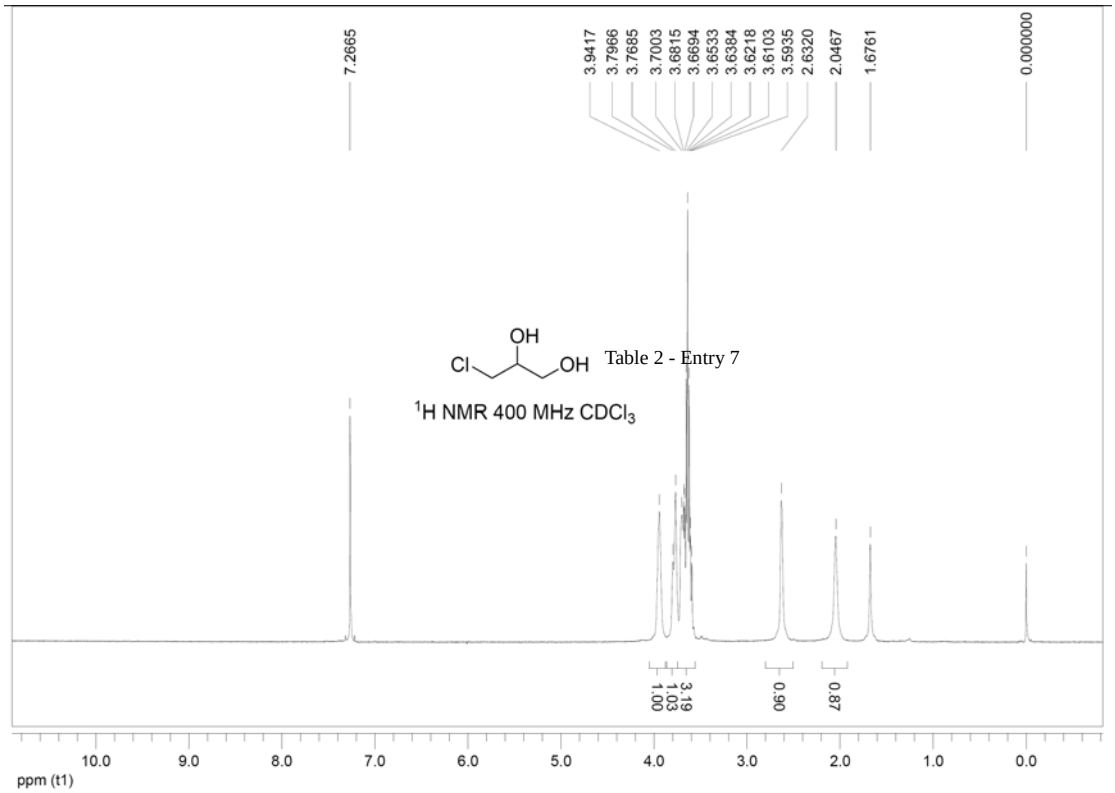
1-phenyl-propane-1, 2, 3-triol (*threo*：*erythro* 55：45) ^{1}H NMR



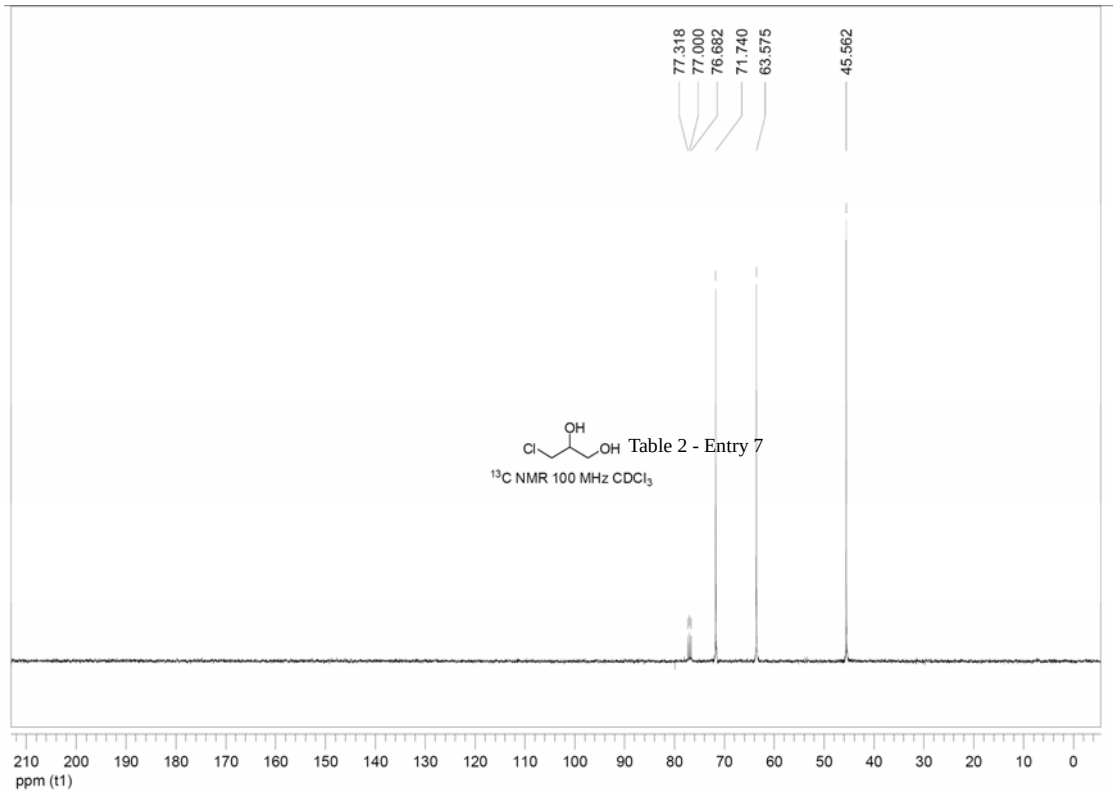
1-phenyl-propane-1, 2, 3-triol (*threo*：*erythro* 55：45) ^{13}C NMR



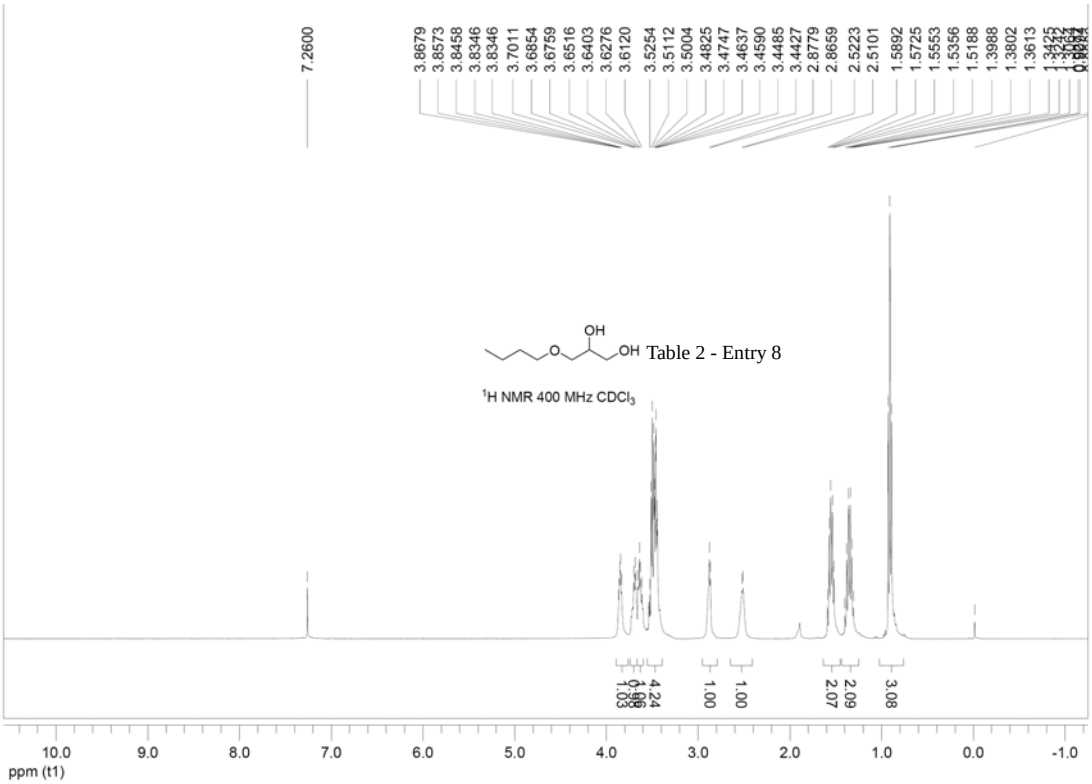
2-Chloro-propan-1, 2-diol: ^{1}H NMR



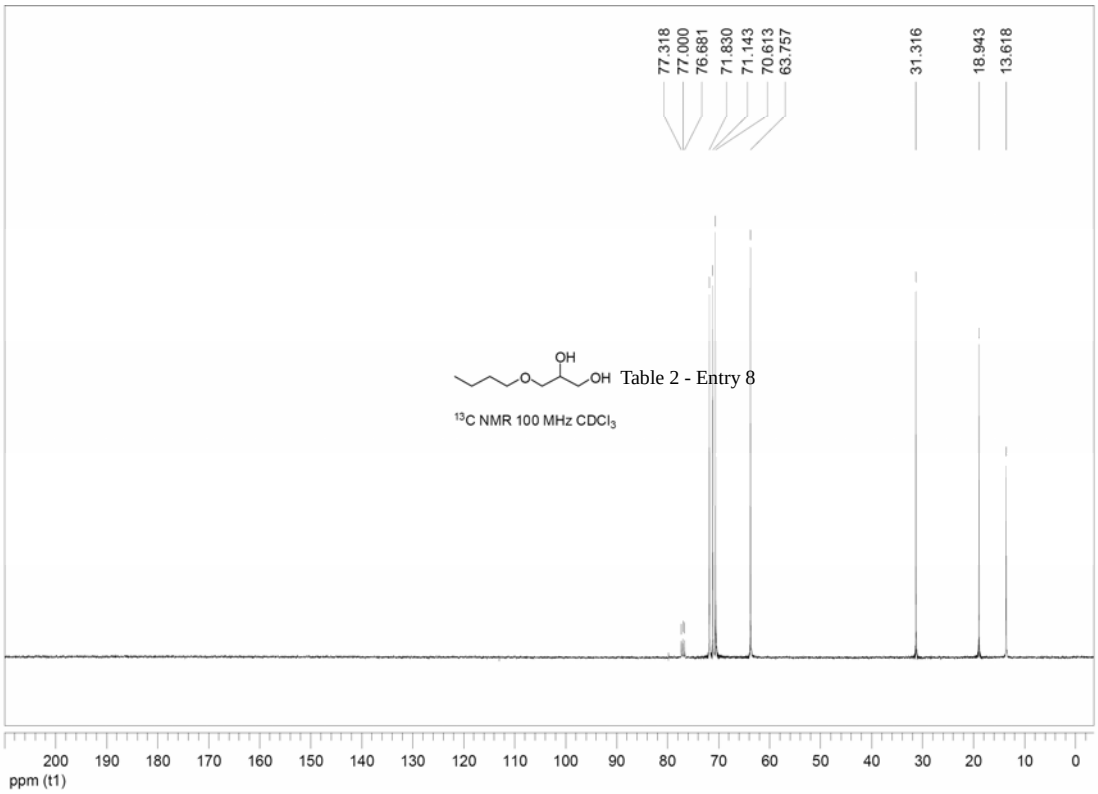
2-Chloro-propan-1, 2-diol: ^{13}C NMR



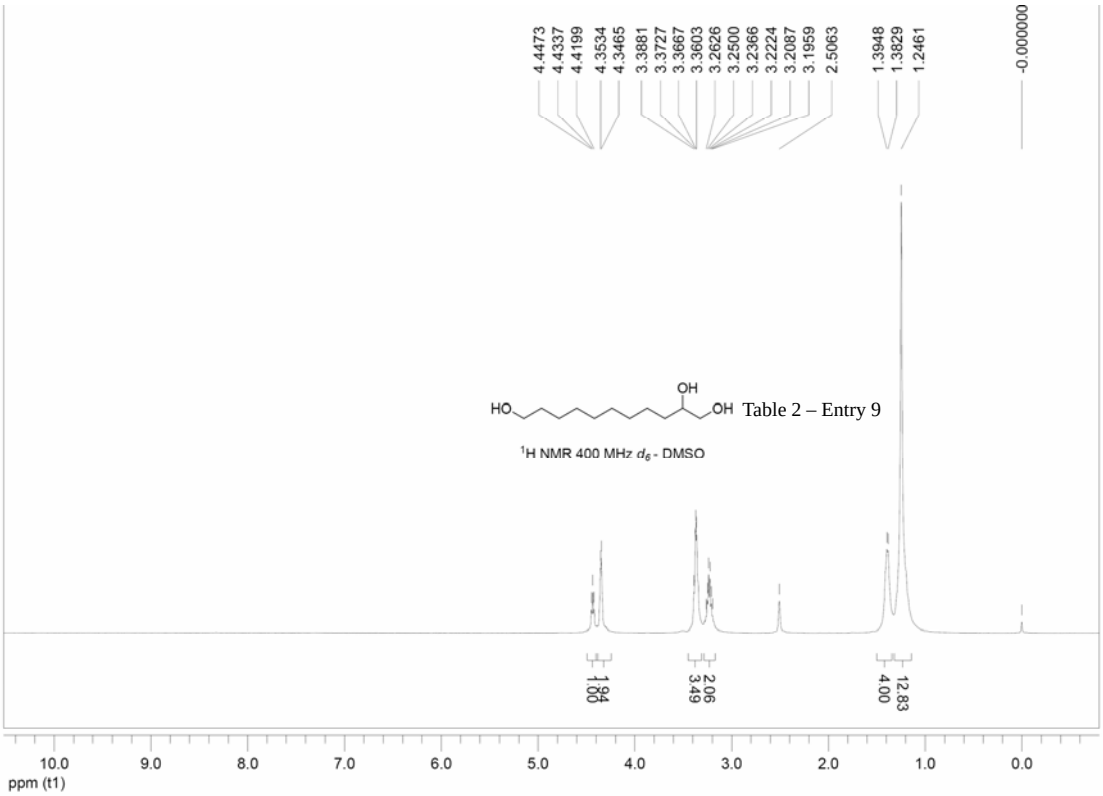
1-O-Butylglycerol: ^{1}H NMR



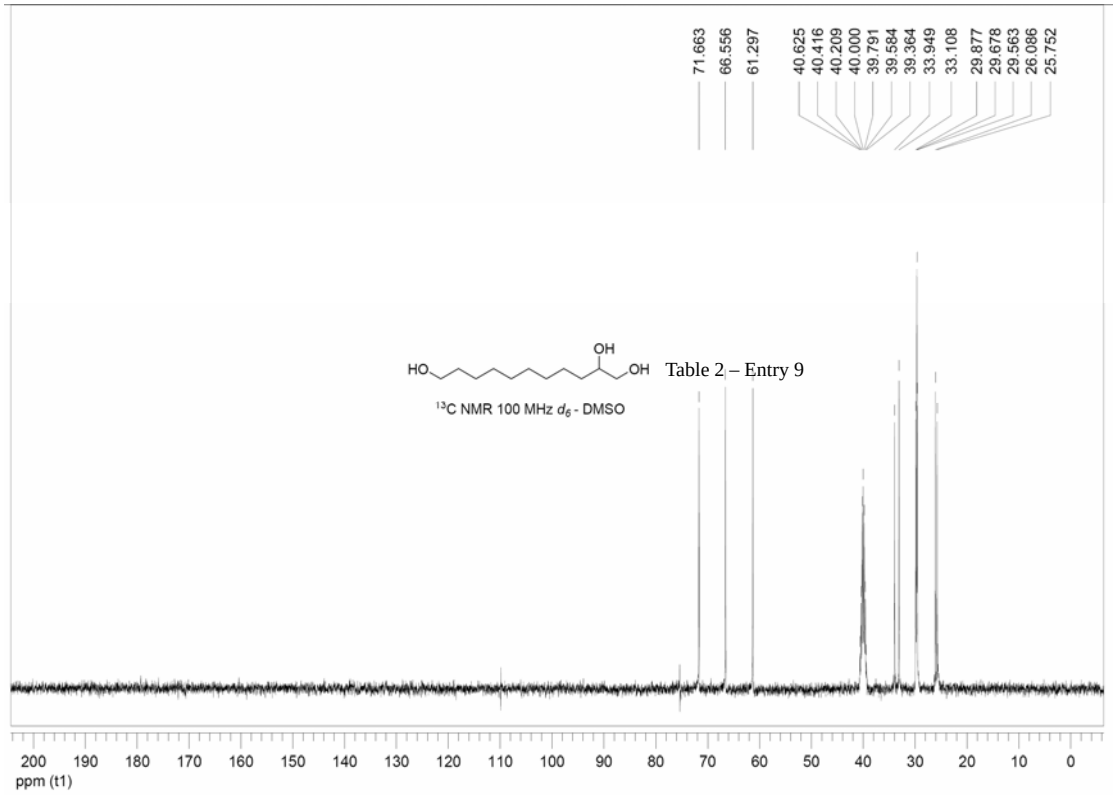
1-O-Butylglycerol: ^{13}C NMR



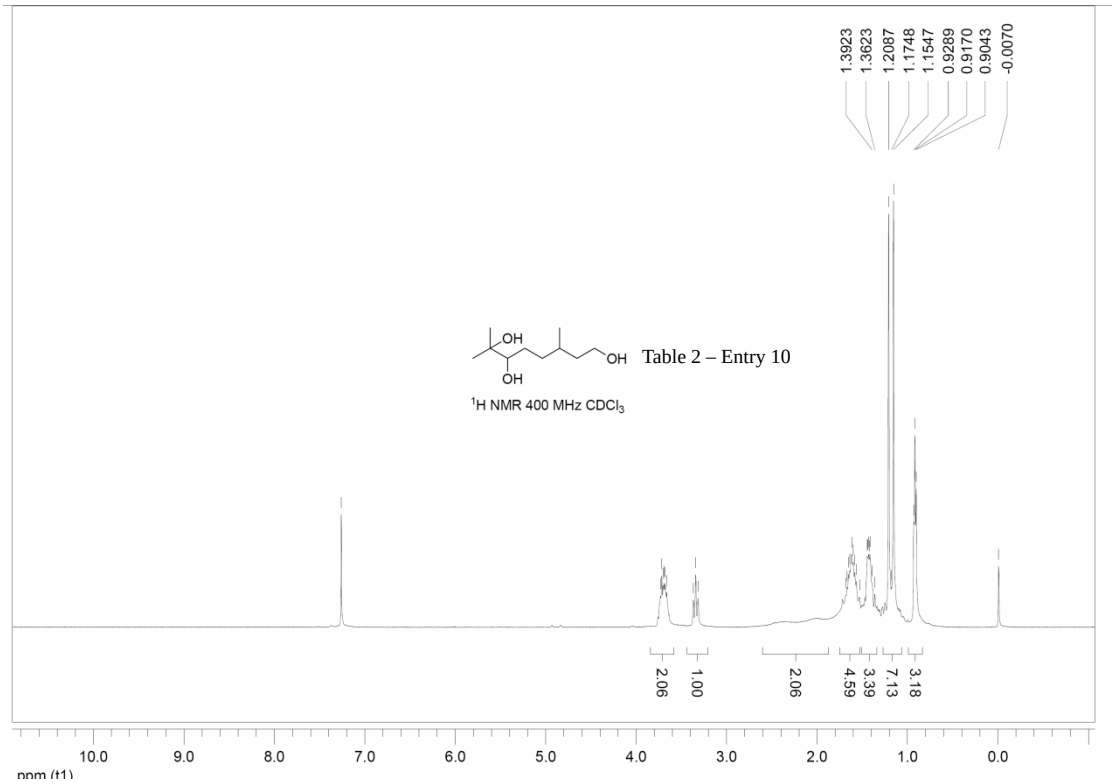
1, 2, 11-Undecanetriol: ^{1}H NMR



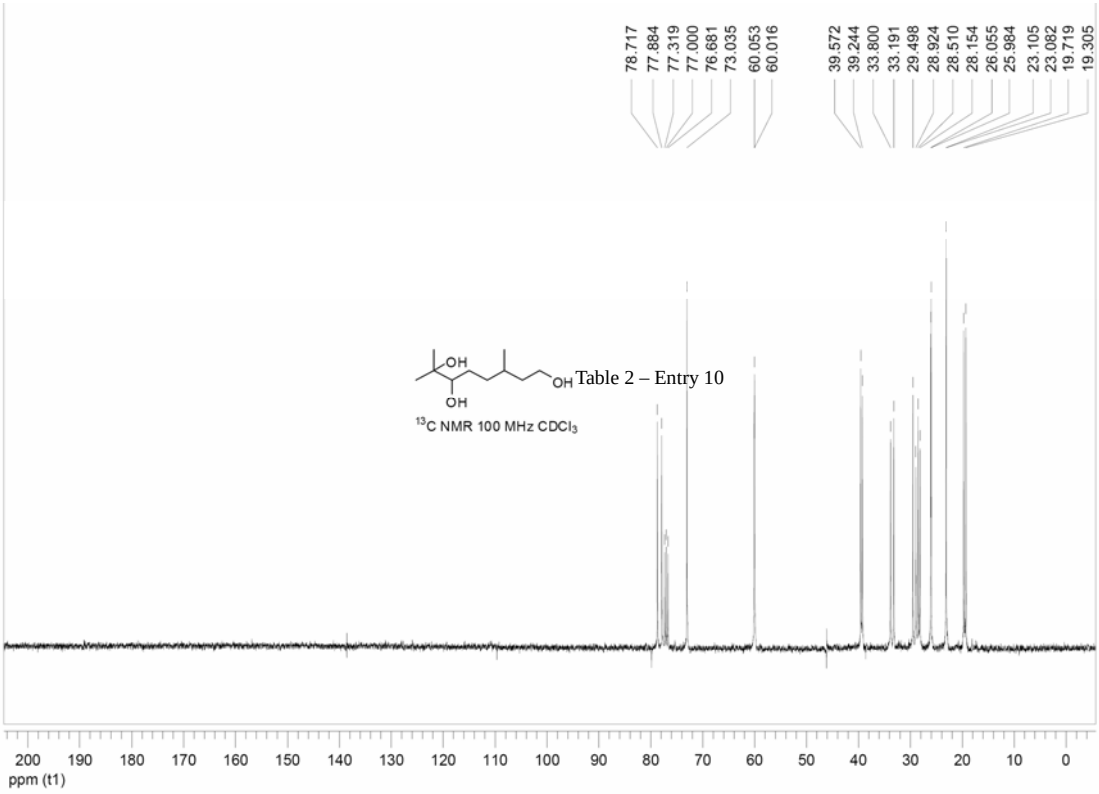
1, 2, 11-Undecanetriol: ^{13}C NMR



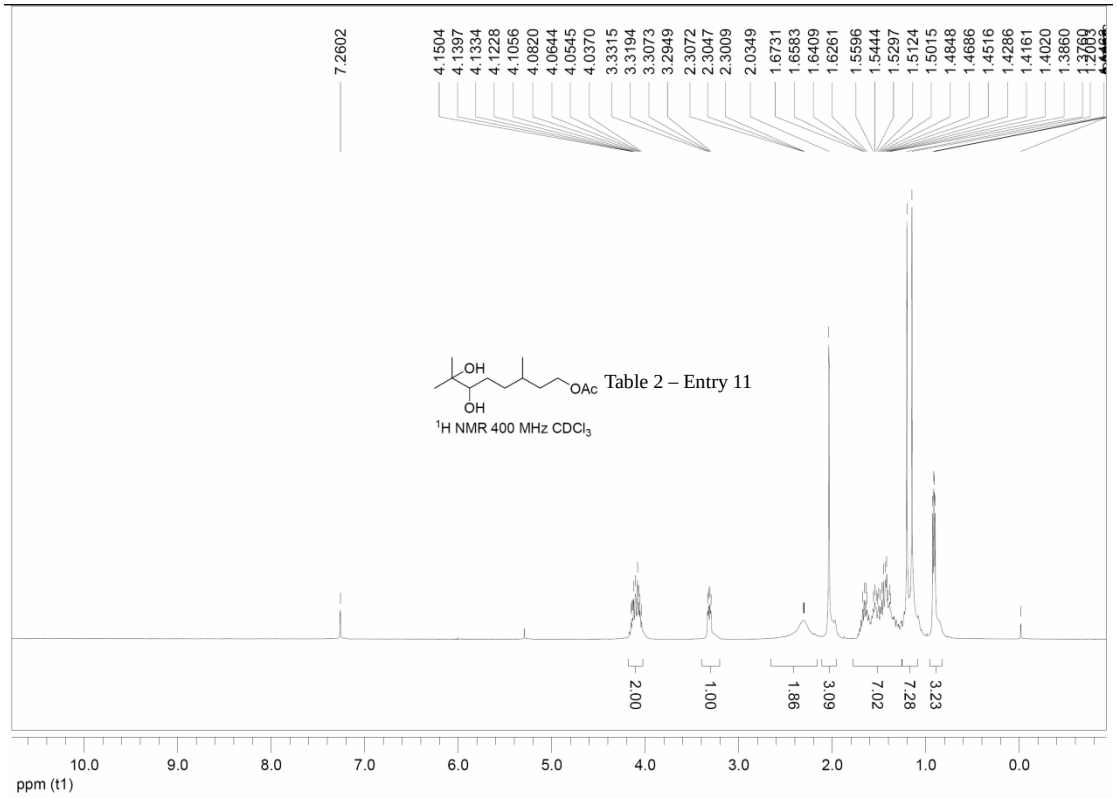
3, 7-dimethyl-1,6,7-otanetriol: ^{1}H NMR



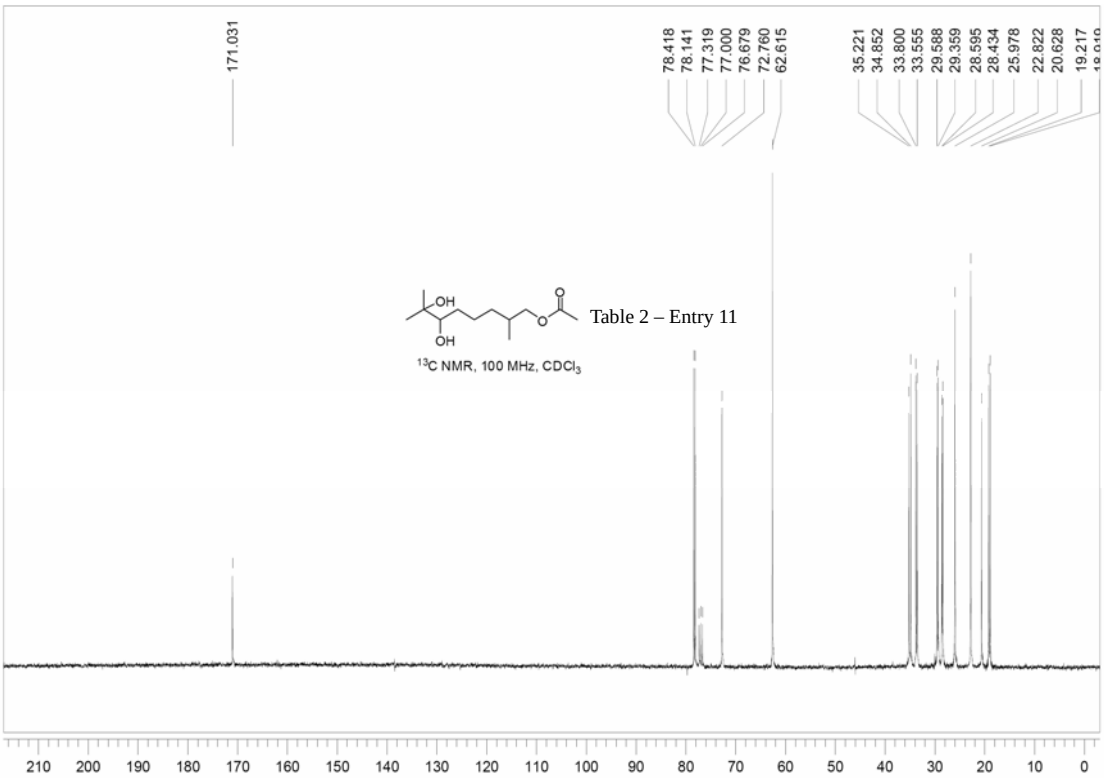
3, 7-dimethyl-1,6,7-otanetriol: ^{13}C NMR



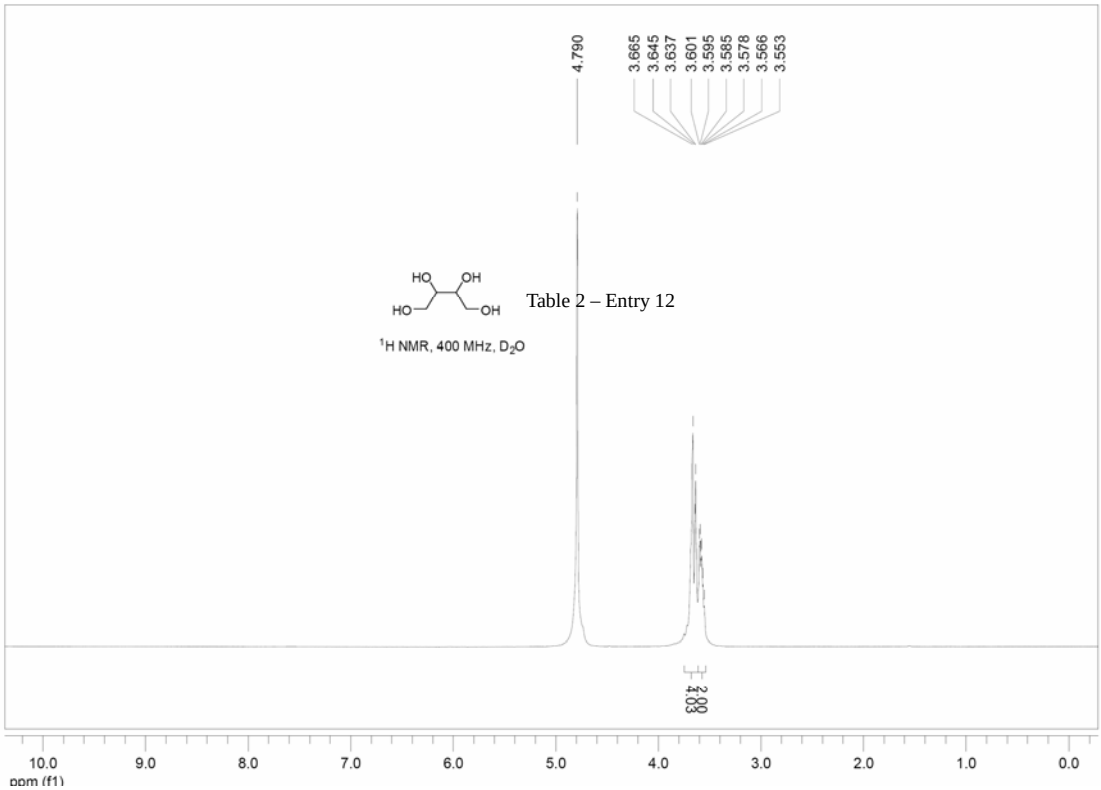
6, 7-dihydroxy-3, 7-dimethyloctyl acetate: ^{1}H NMR



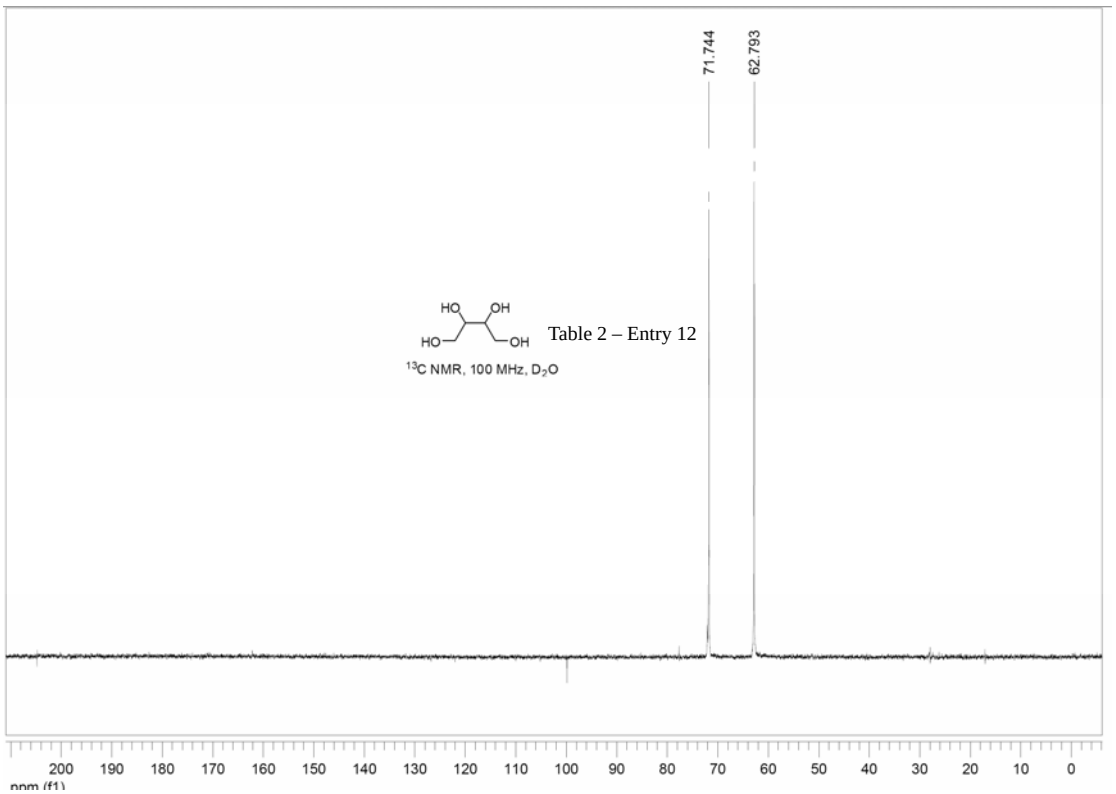
6, 7-dihydroxy-3, 7-dimethyloctyl acetate: ^{13}C NMR



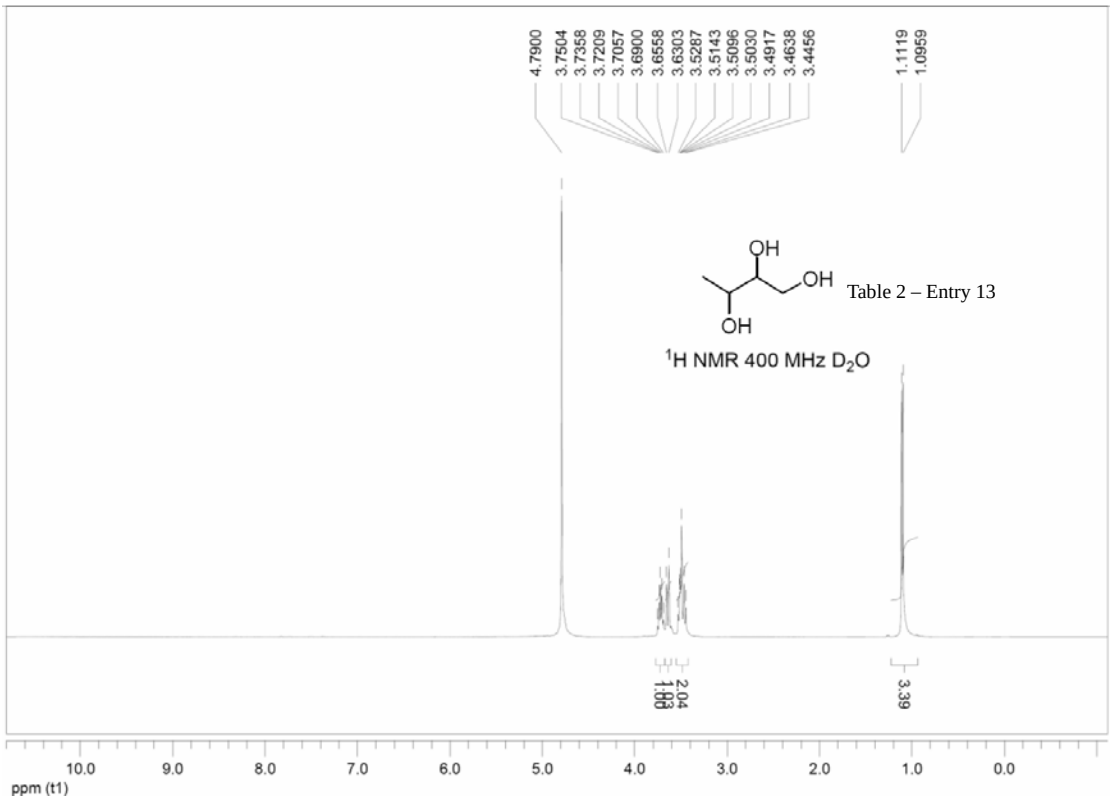
Butane-1, 2, 3, 4-tetraol: ^{1}H NMR



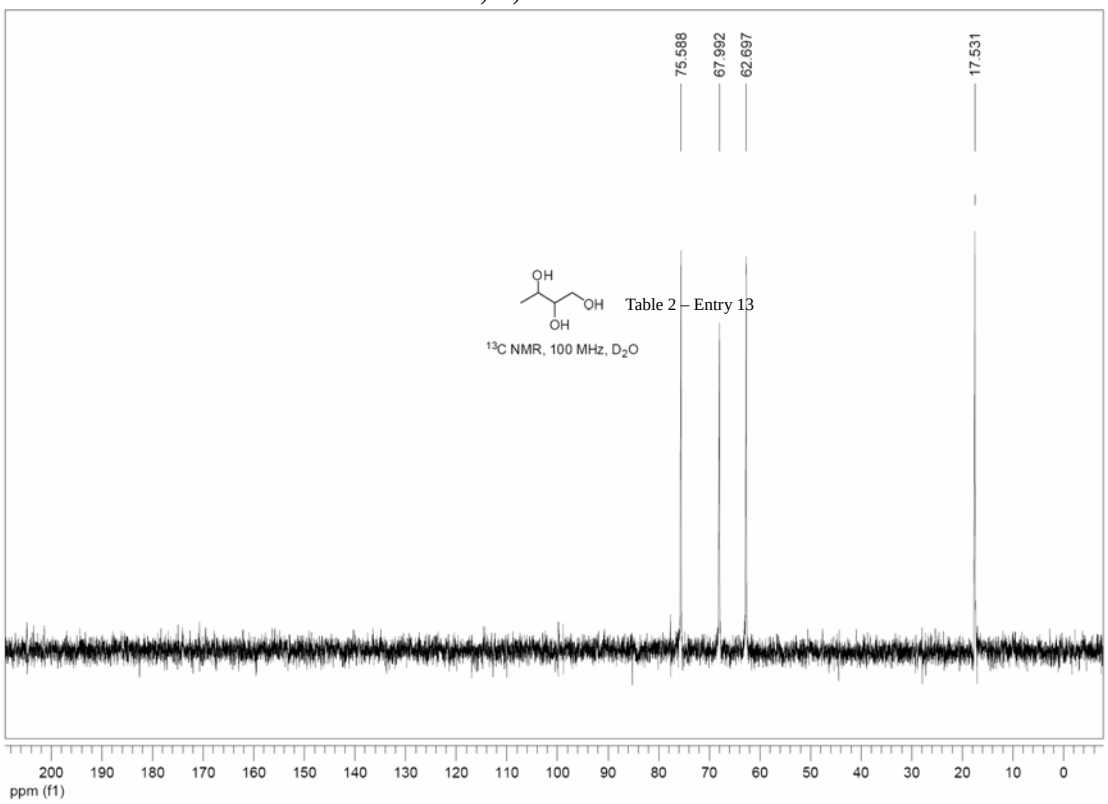
Butane-1, 2, 3, 4-tetraol: ^{13}C NMR



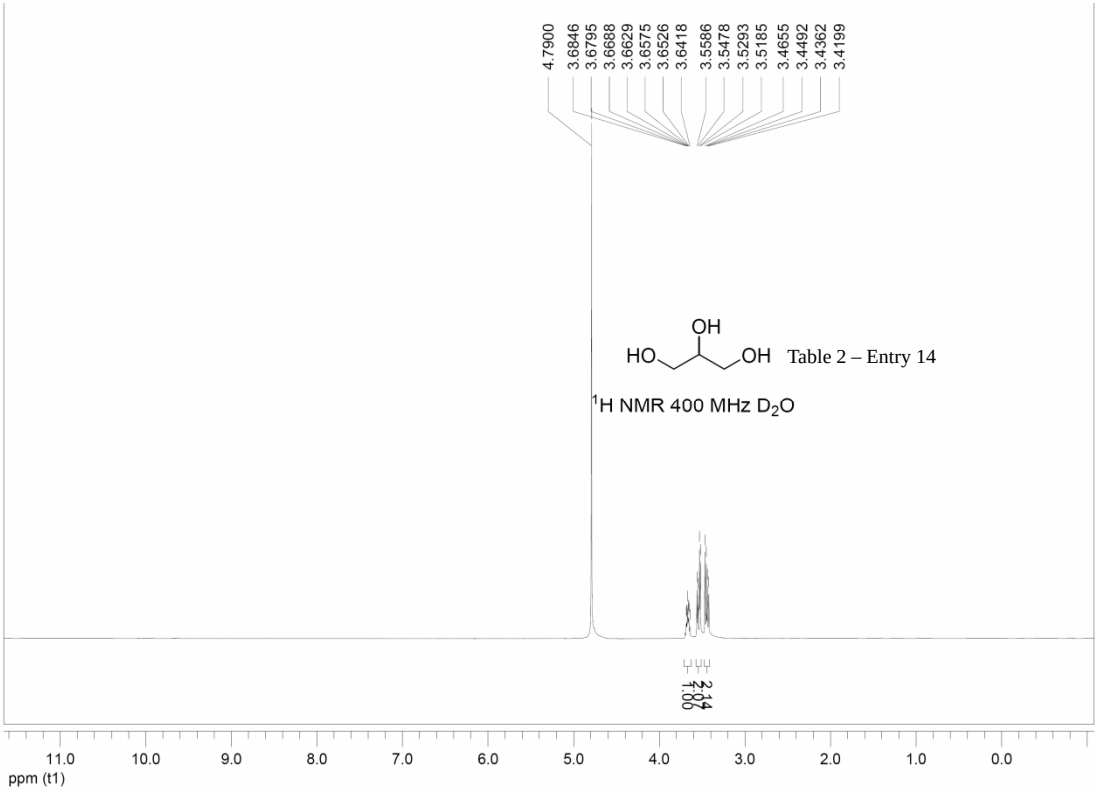
Butane-1, 2, 3-triol: ^{1}H NMR



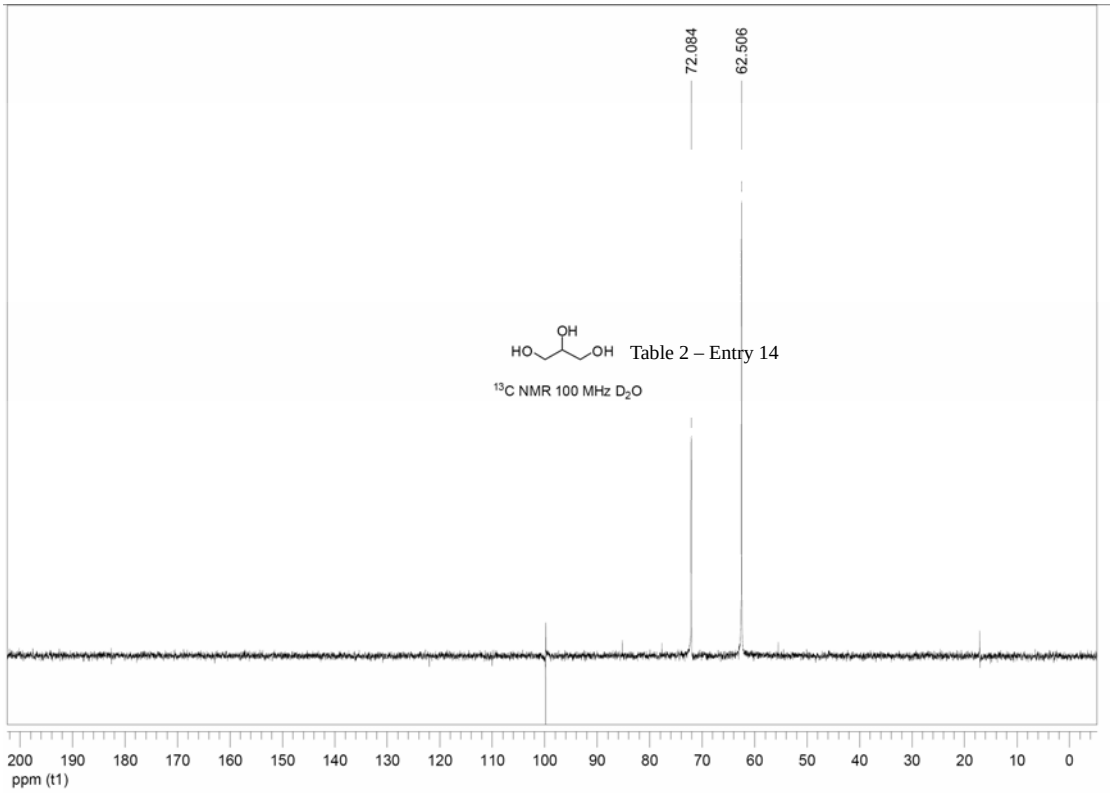
Butane-1, 2, 3-triol: ^{13}C NMR



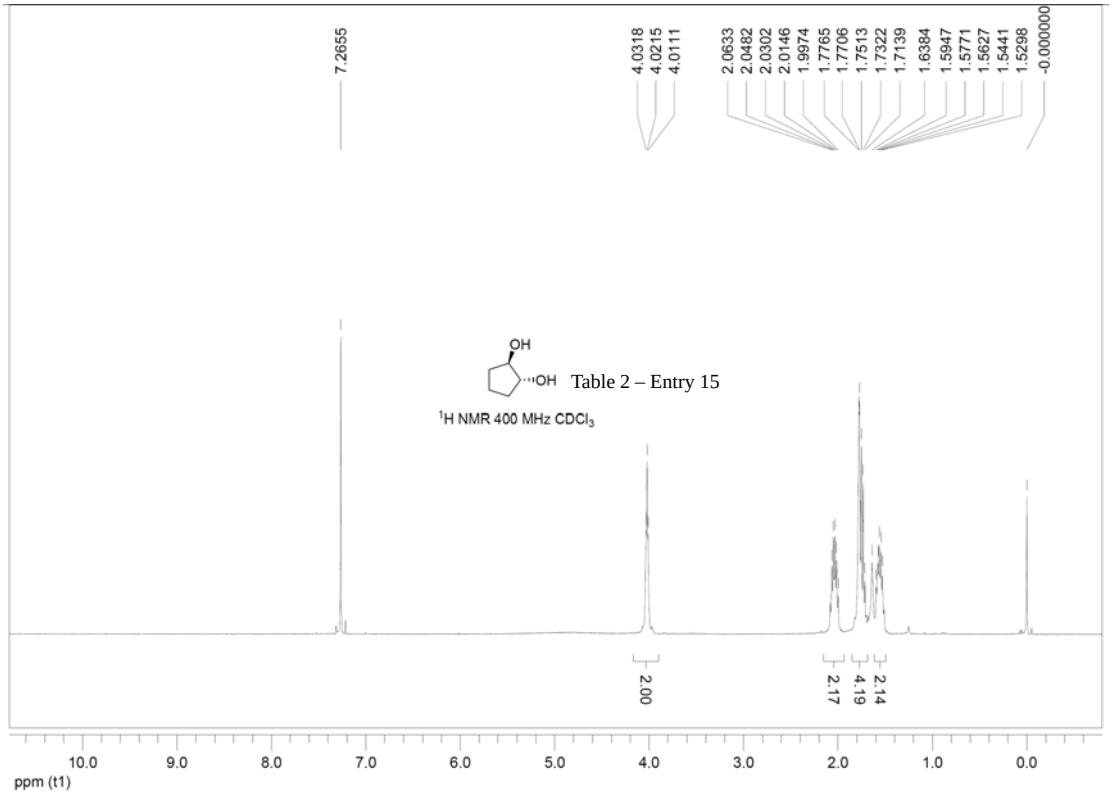
Glycerin: ^{1}H NMR



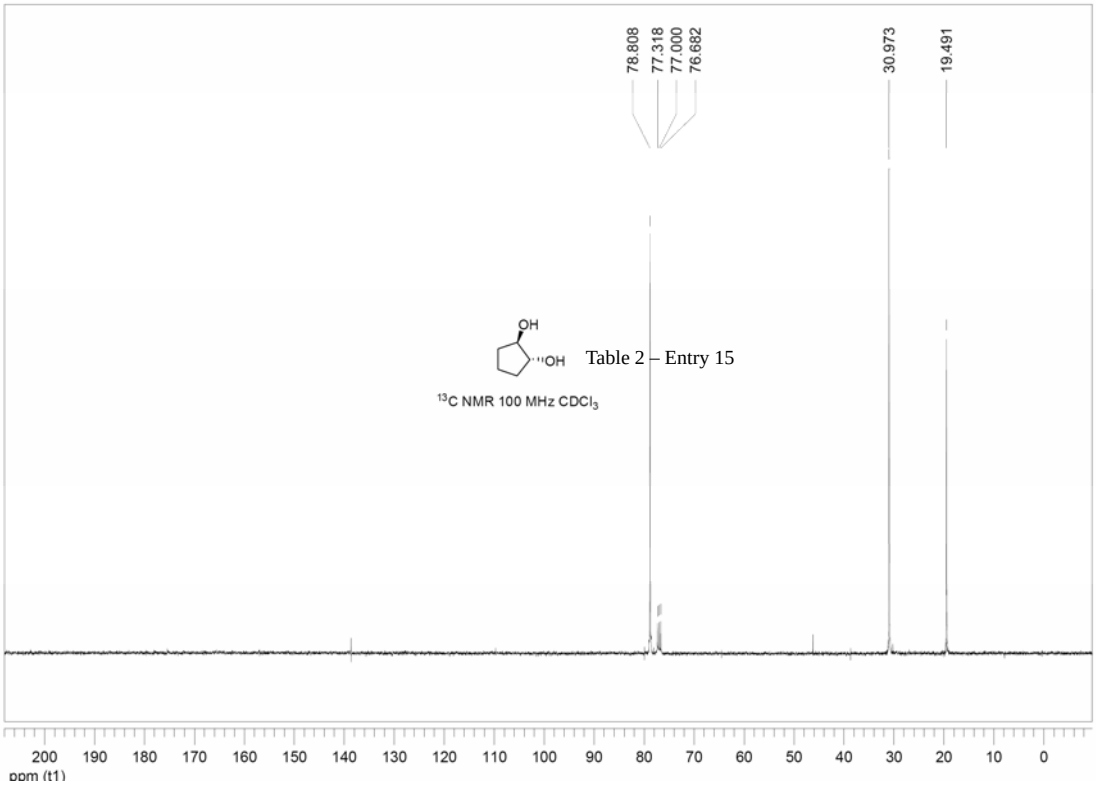
Glycerin: ^{13}C NMR



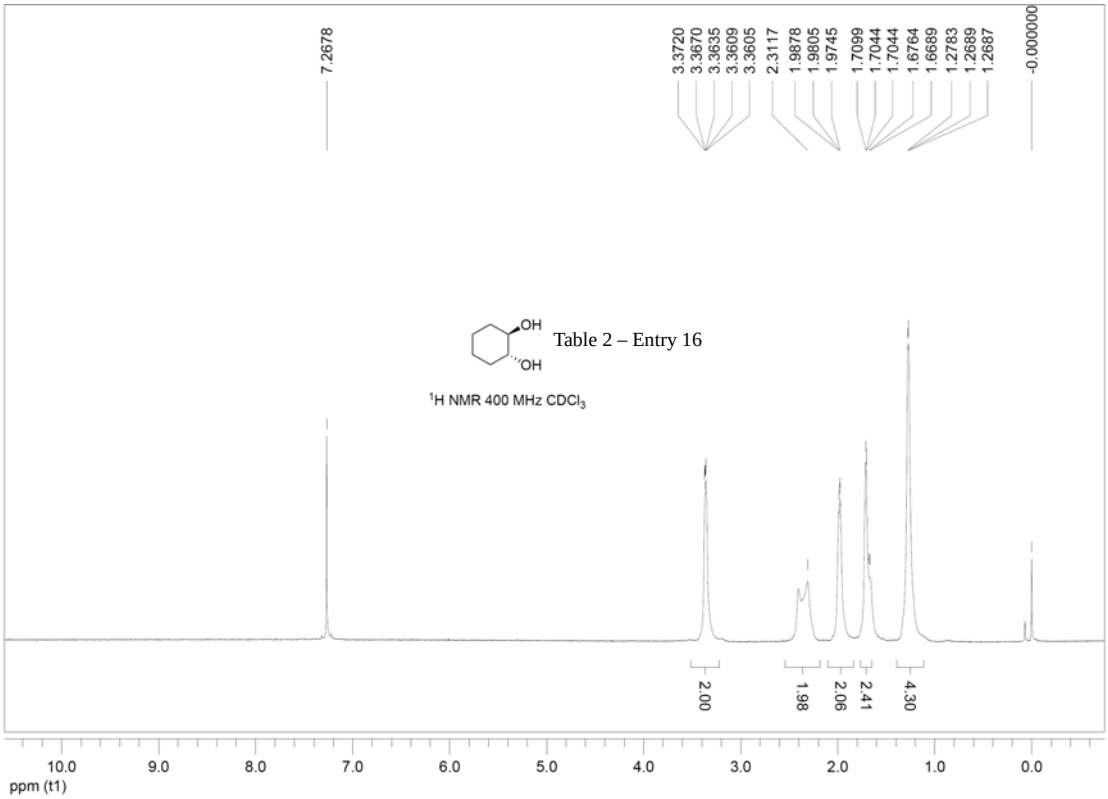
trans-1,2-Cyclopentanediol ^{1}H NMR



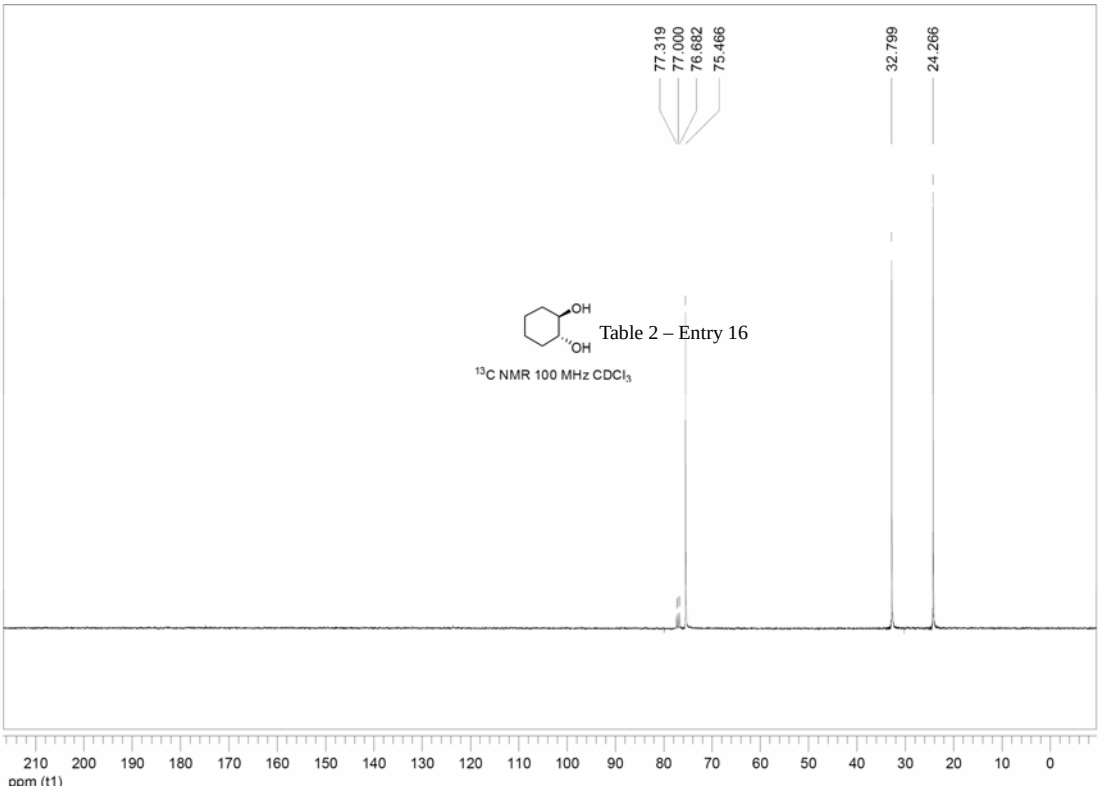
trans-1,2-Cyclopentanediol ^{13}C NMR



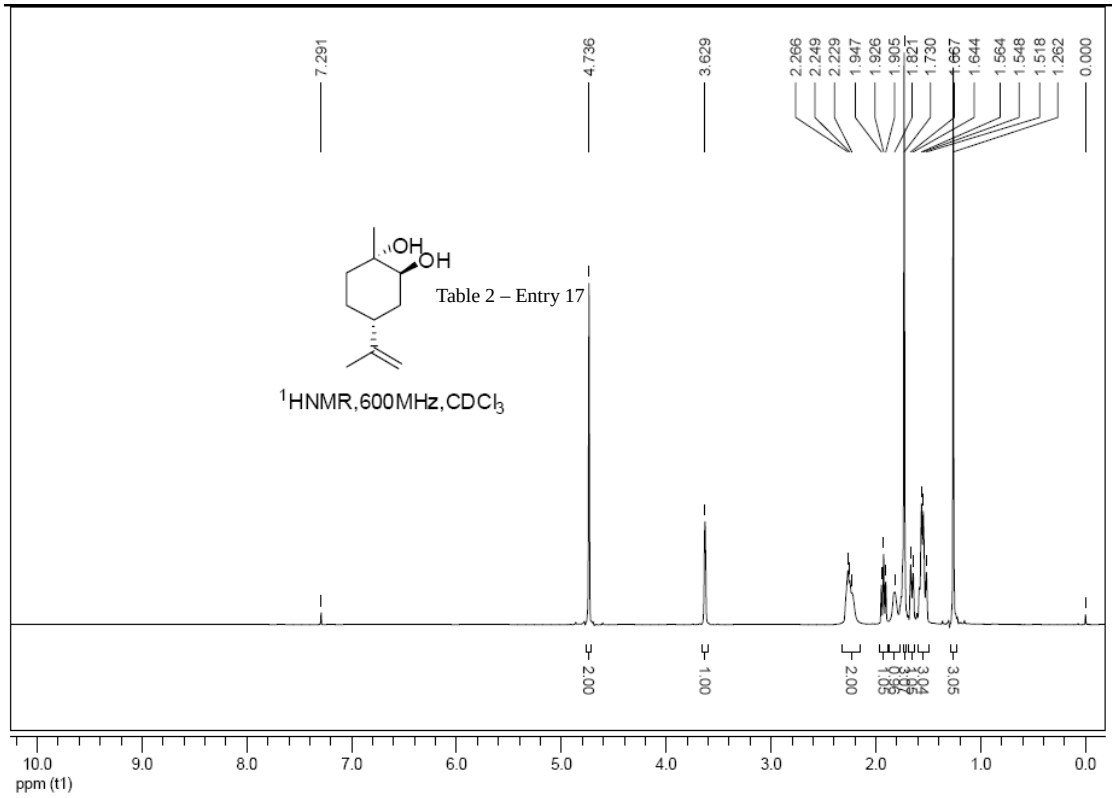
***trans*-1, 2-Cyclohexanediol**: ^{1}H NMR



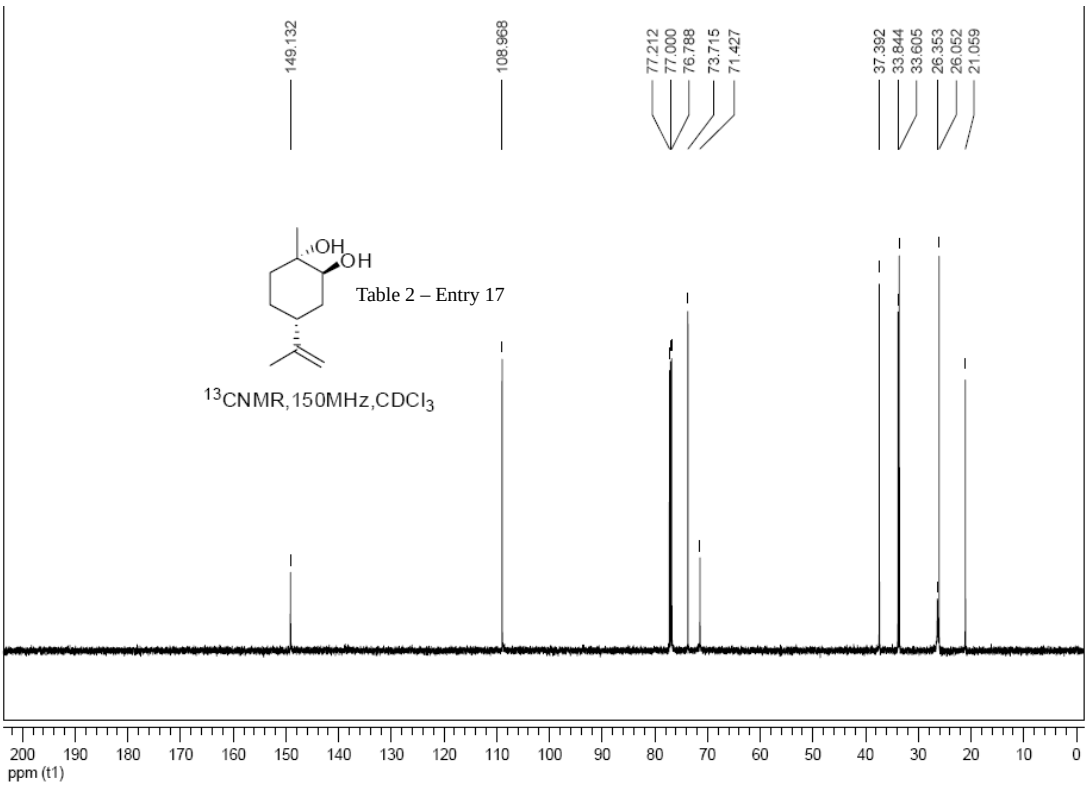
***trans*-1, 2-Cyclohexanediol**: ^{13}C NMR



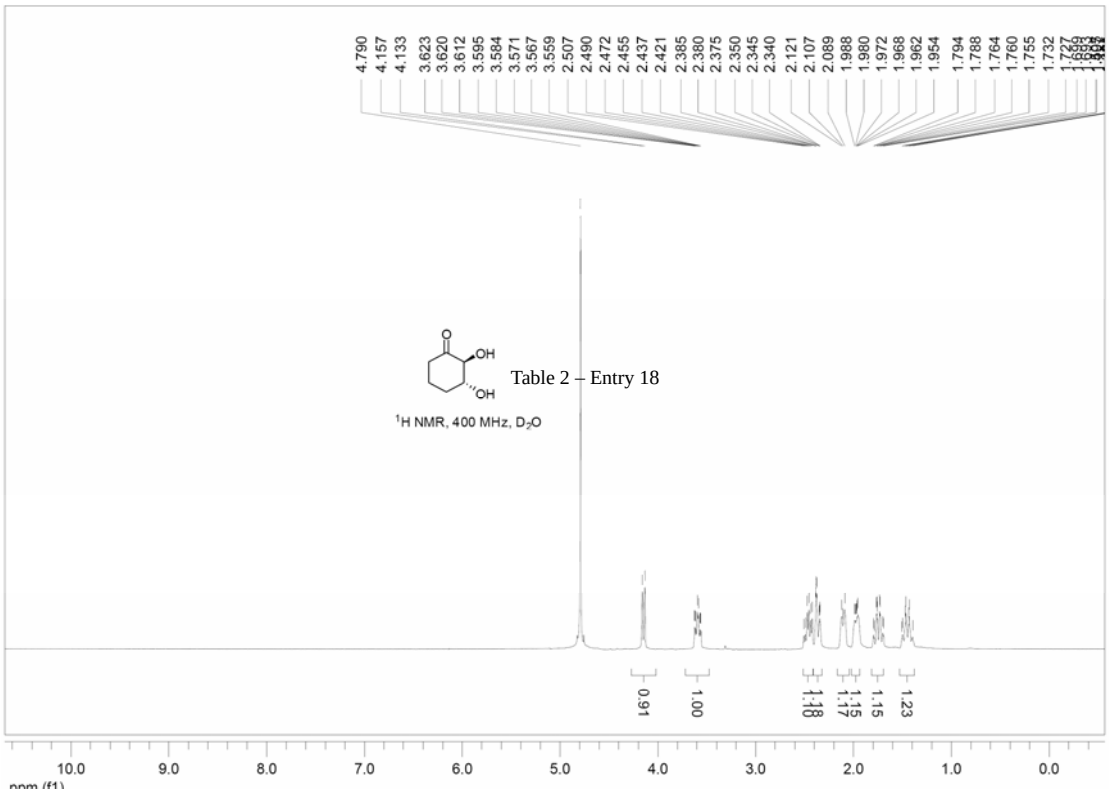
(1*S*,2*S*,4*R*)-1-methyl-4-(prop-1-en-2-yl)cyclohexane-1,2-diol: ^{1}H NMR



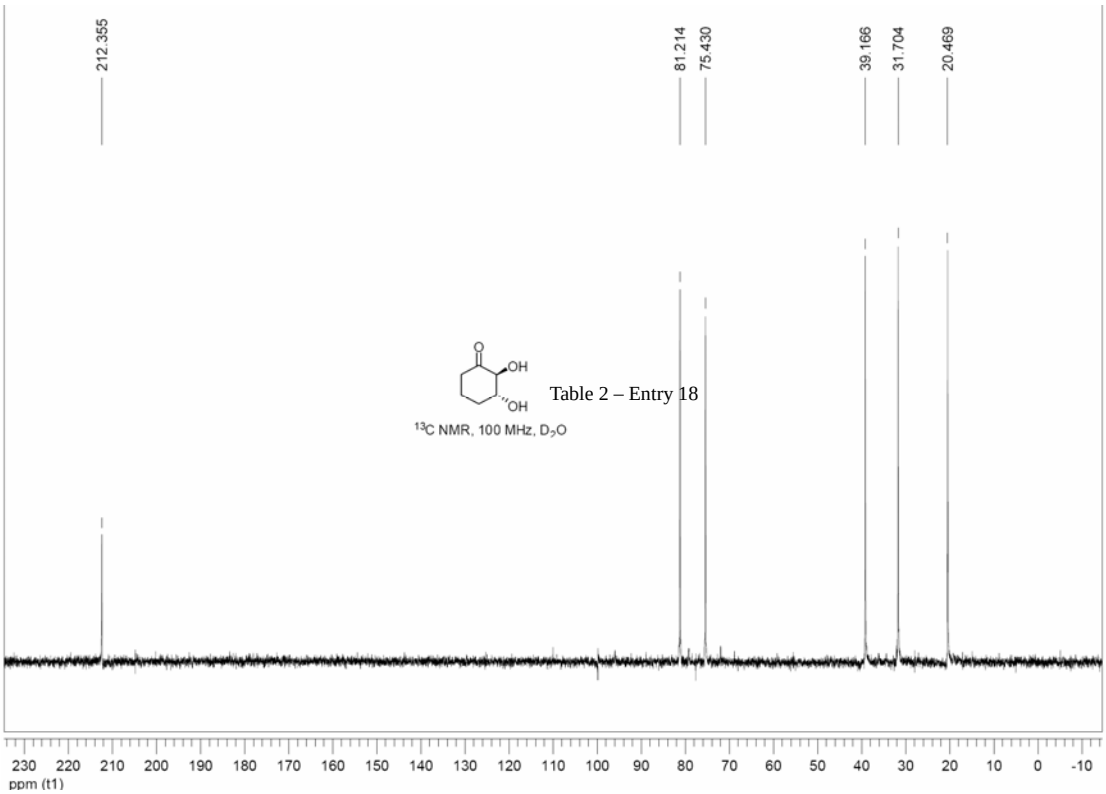
(1*S*,2*S*,4*R*)-1-methyl-4-(prop-1-en-2-yl)cyclohexane-1,2-diol: ^{13}C NMR



trans-2, 3-Dihydroxy-cyclohexanone: ^{1}H NMR

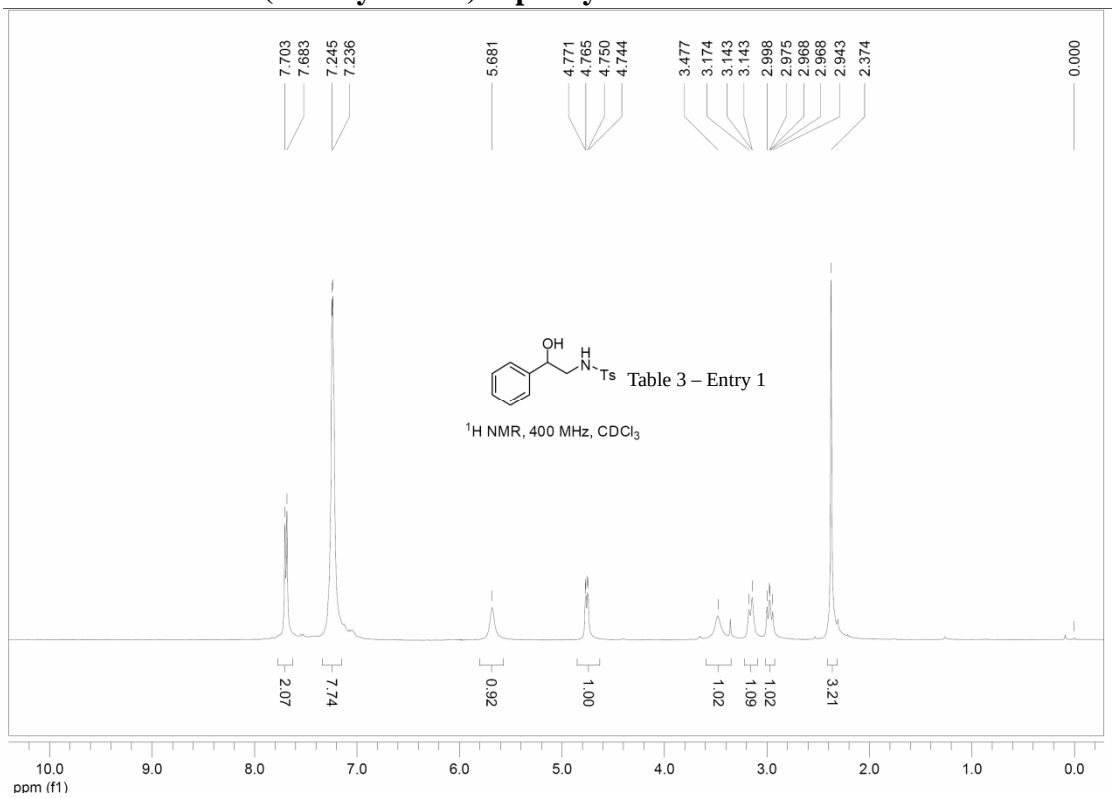


trans-2, 3-Dihydroxy-cyclohexanone: ^{13}C NMR

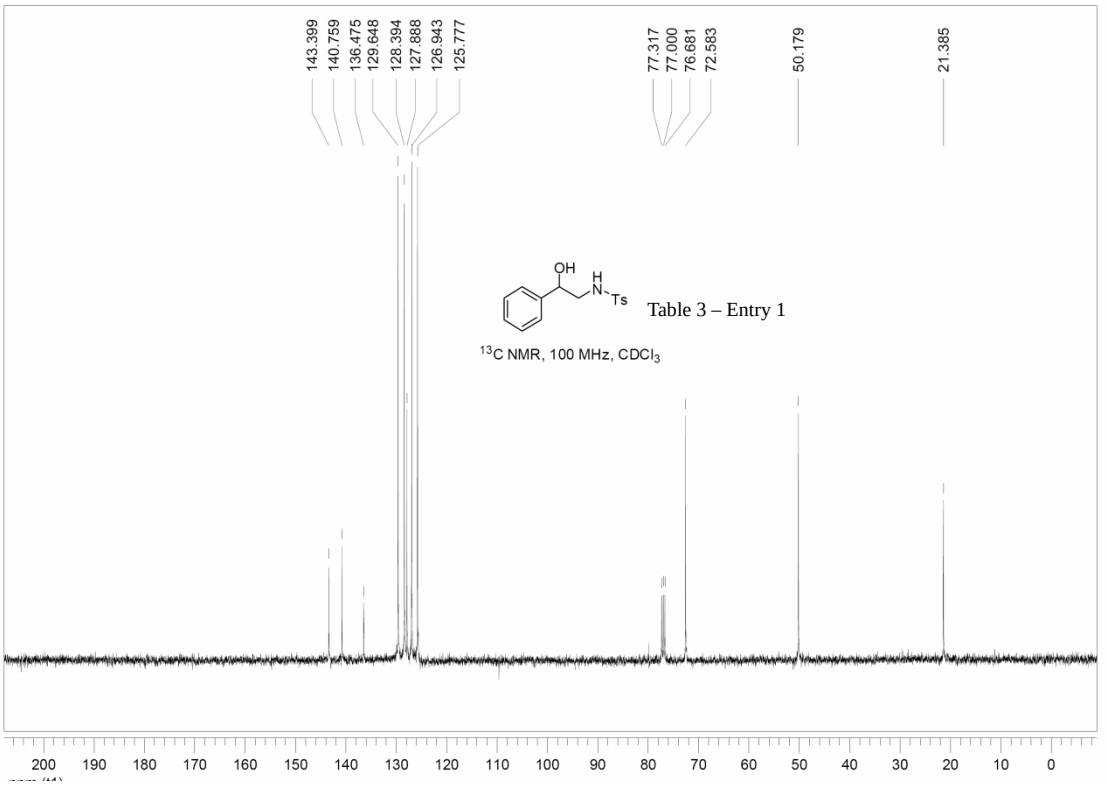


^{1}H NMR and ^{13}C NMR spectra of compounds in table 3

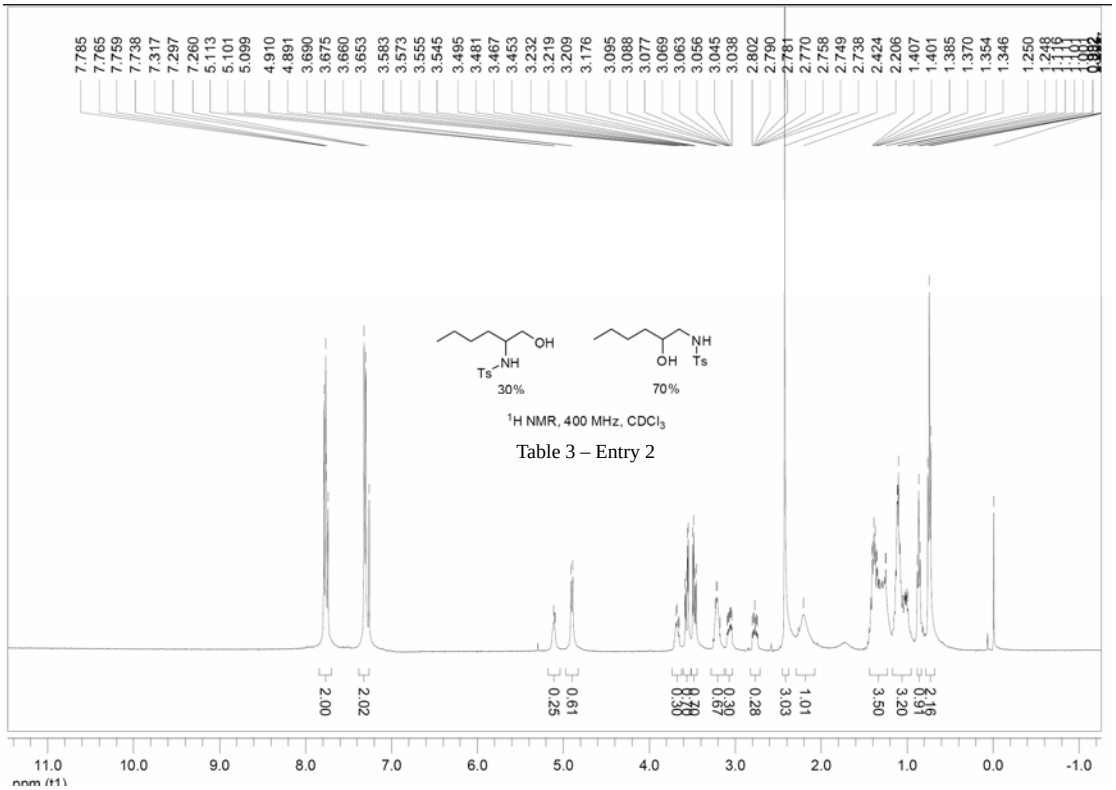
2-(*N*-Tosylamino)-1-phenyl-1-ethanol: ^{1}H NMR



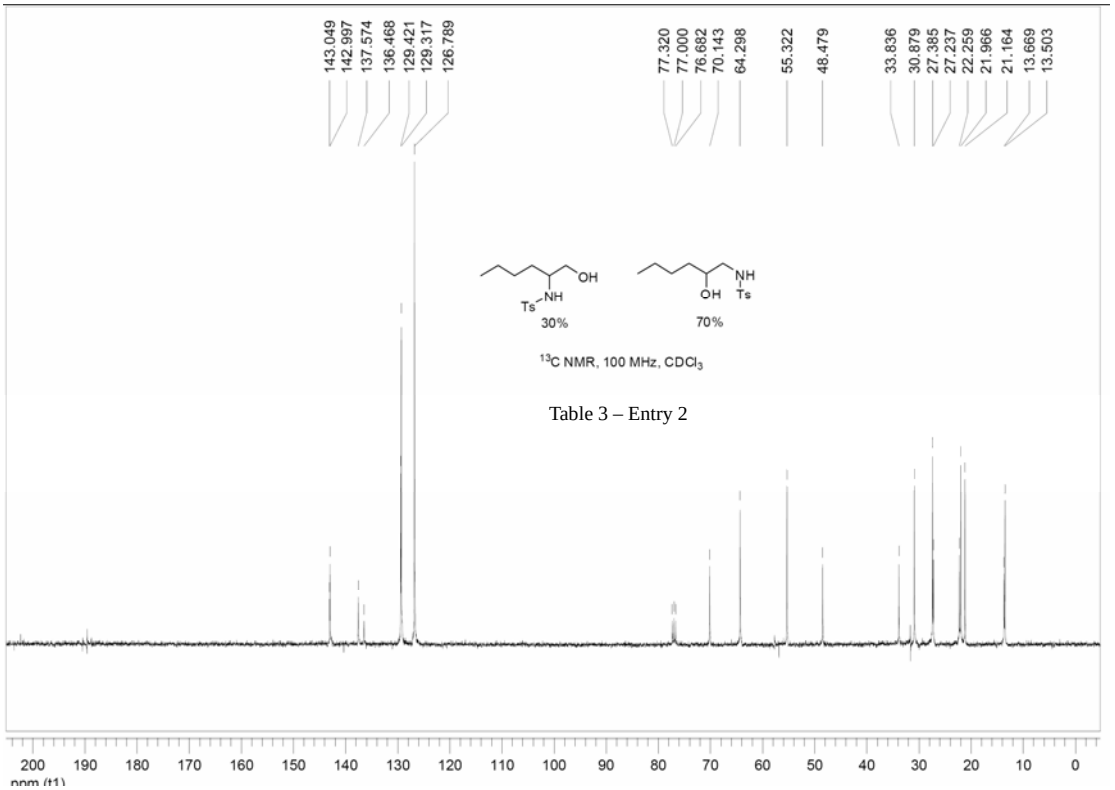
2-(*N*-Tosylamino)-1-phenyl-1-ethanol: ^{13}C NMR



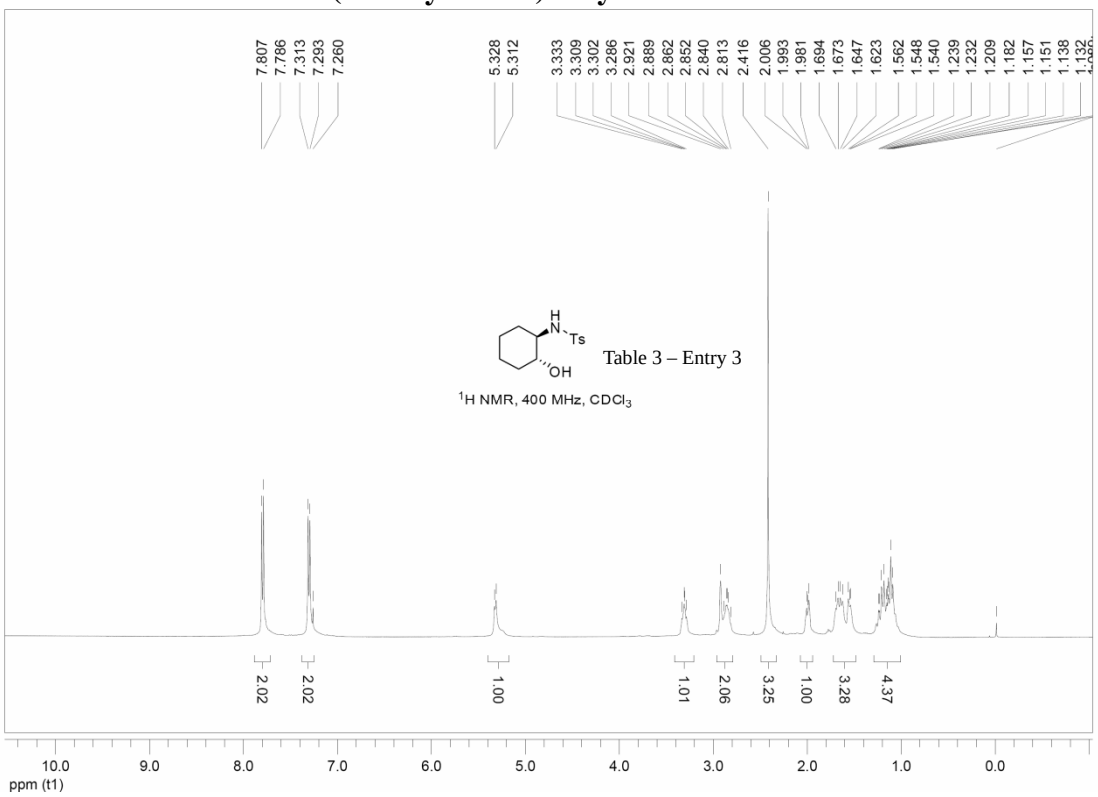
1-(Tosylamino)-2-hexanol (70%) and **2-(Tosylamino)-1-hexanol** (30%): ^{1}H NMR



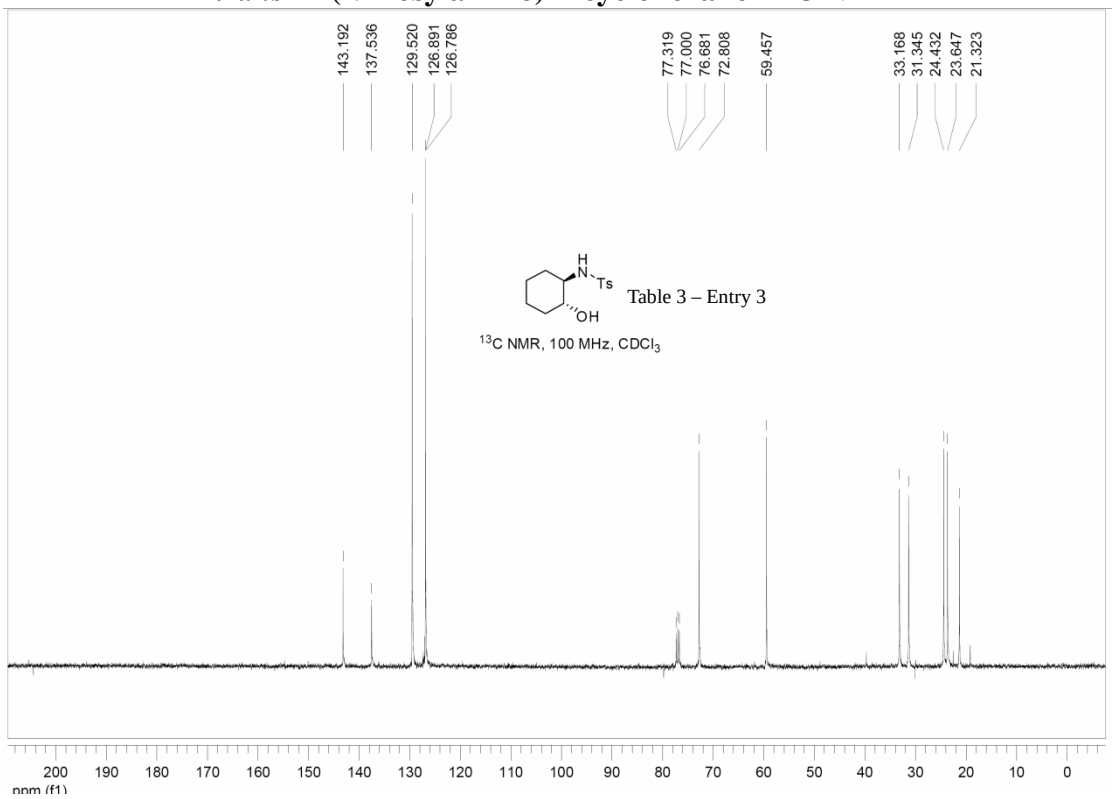
1-(Tosylamino)-2-hexanol (70%) and **2-(Tosylamino)-1-hexanol** (30%): ^{13}C NMR



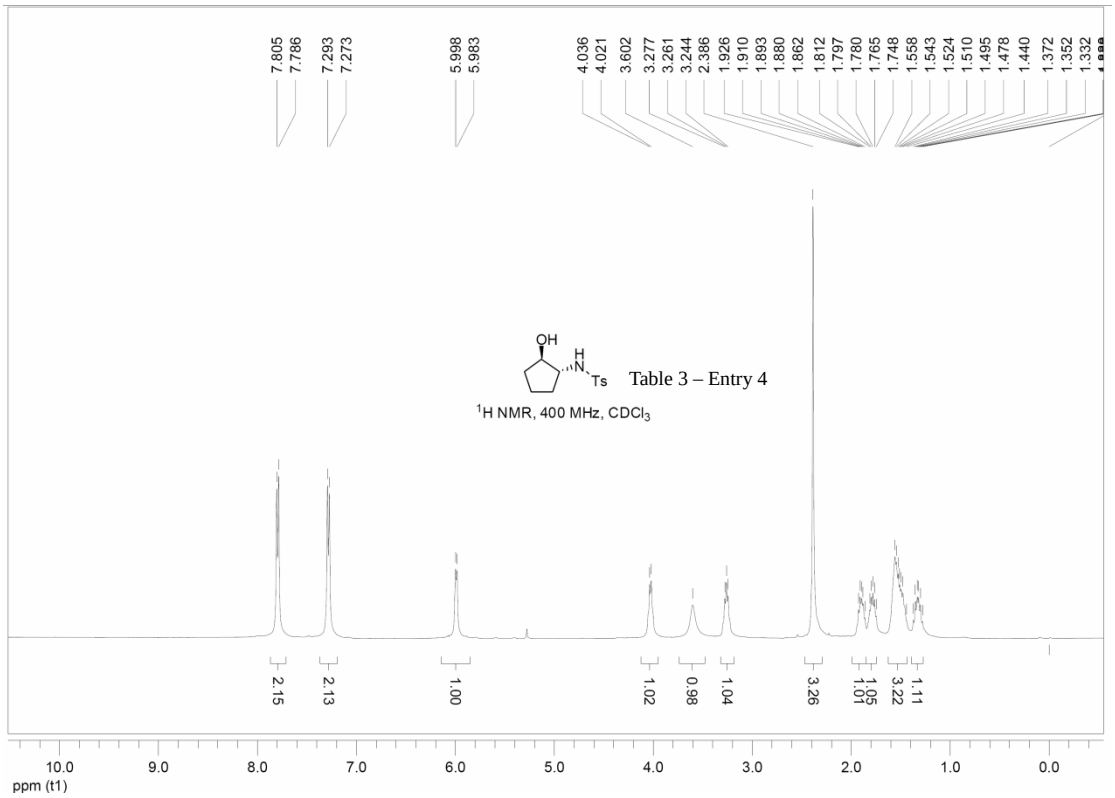
trans- 2-(*N*-Tosylamino)-1-cyclohexanol: ^{1}H NMR



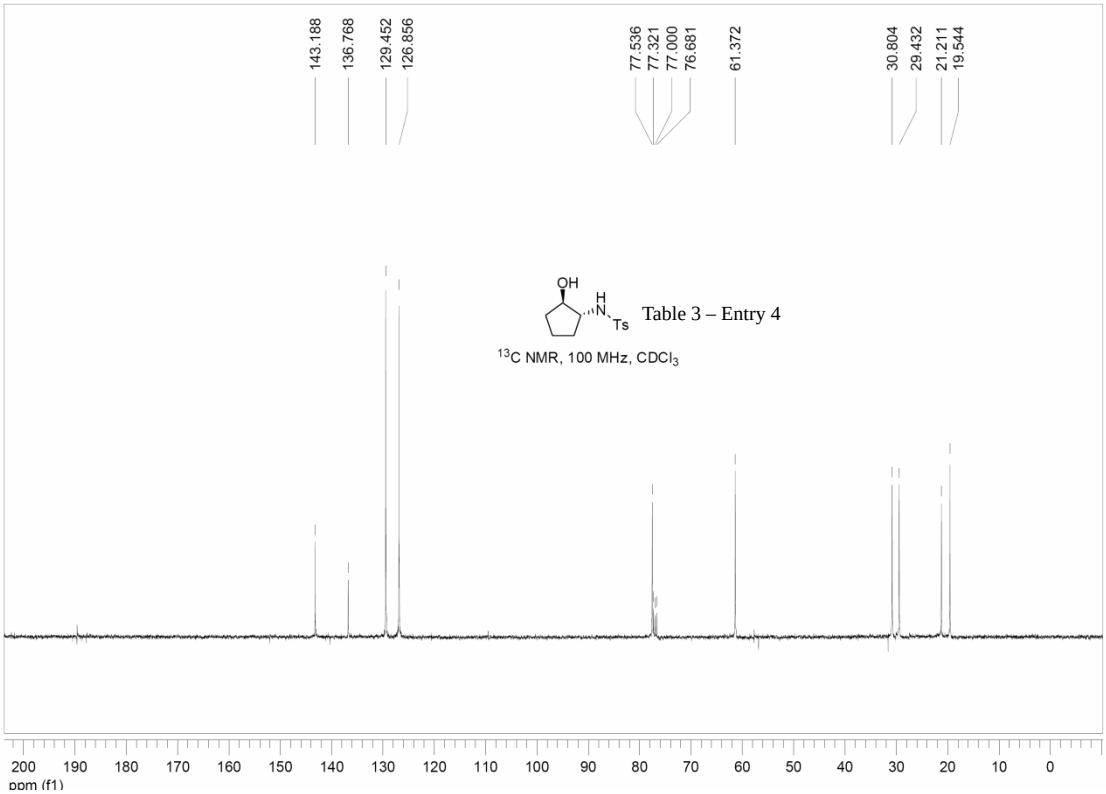
trans- 2-(*N*-Tosylamino)-1-cyclohexanol: ^{13}C NMR



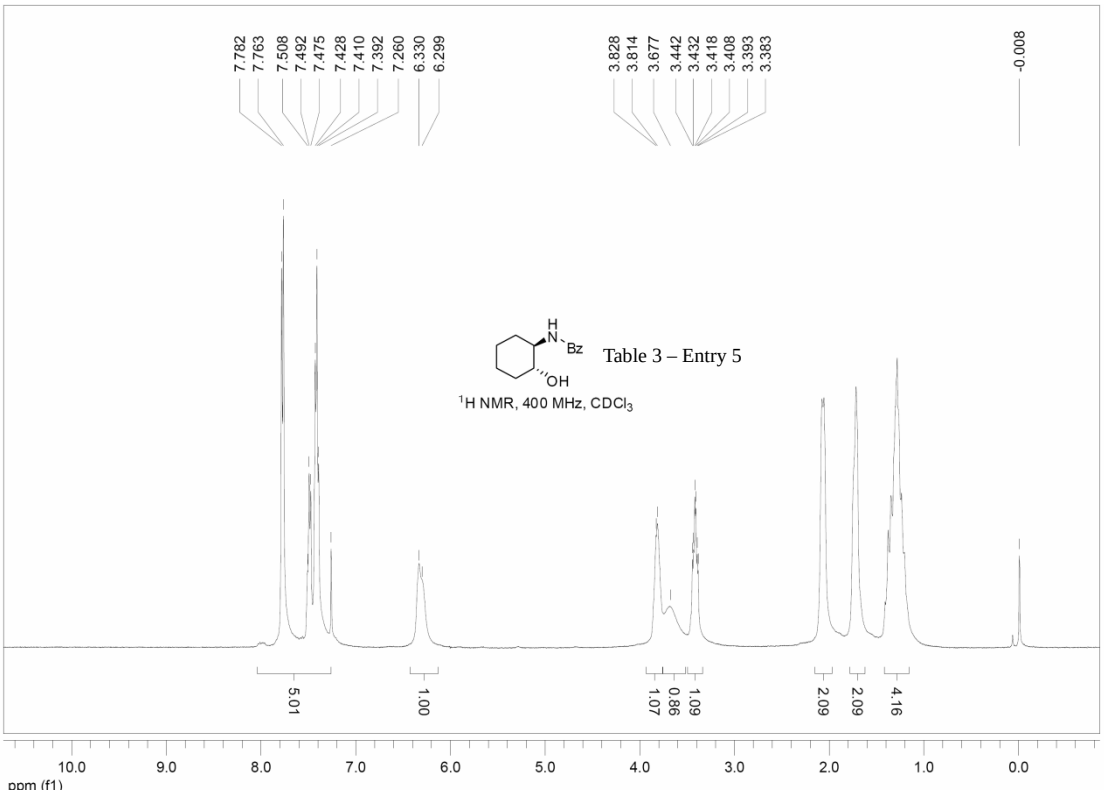
trans- 2-(N-Tosylamino)-1-cyclopentanol: ^{1}H NMR



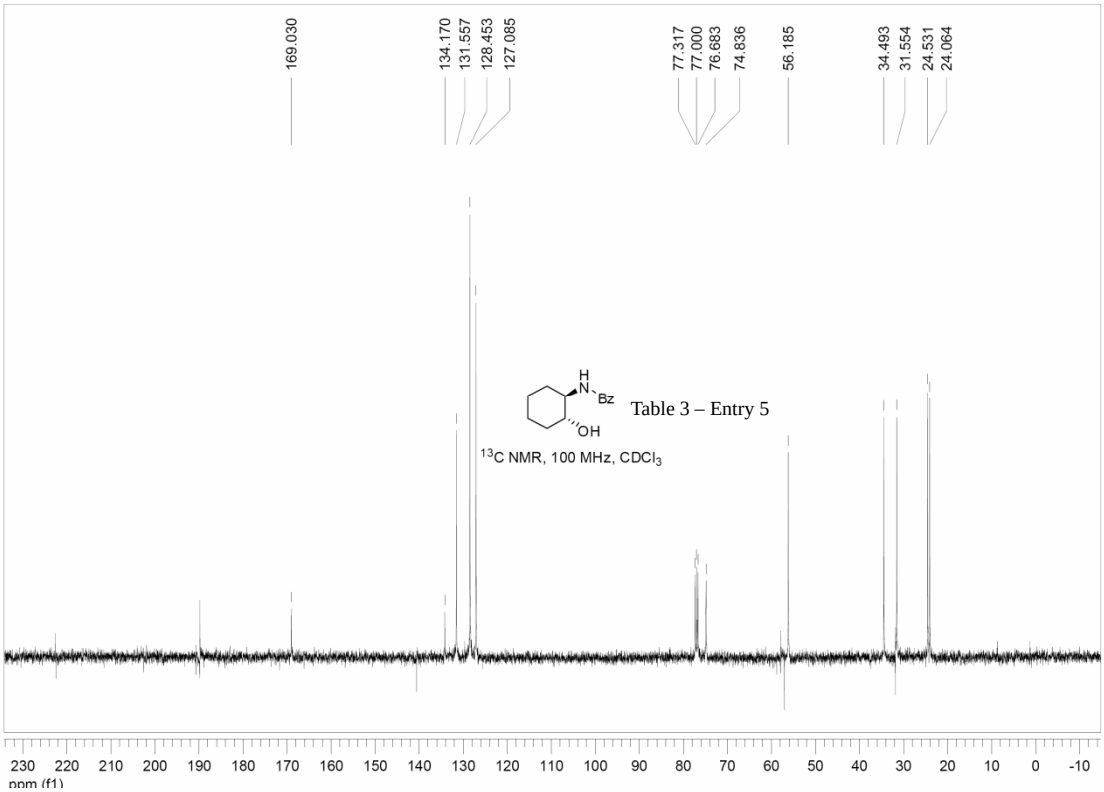
trans- 2-(N-Tosylamino)-1-cyclopentanol: ^{13}C NMR



trans- 2-(*N*-Phenylcarbonylamino)-1-cyclohexanol: ^{1}H NMR

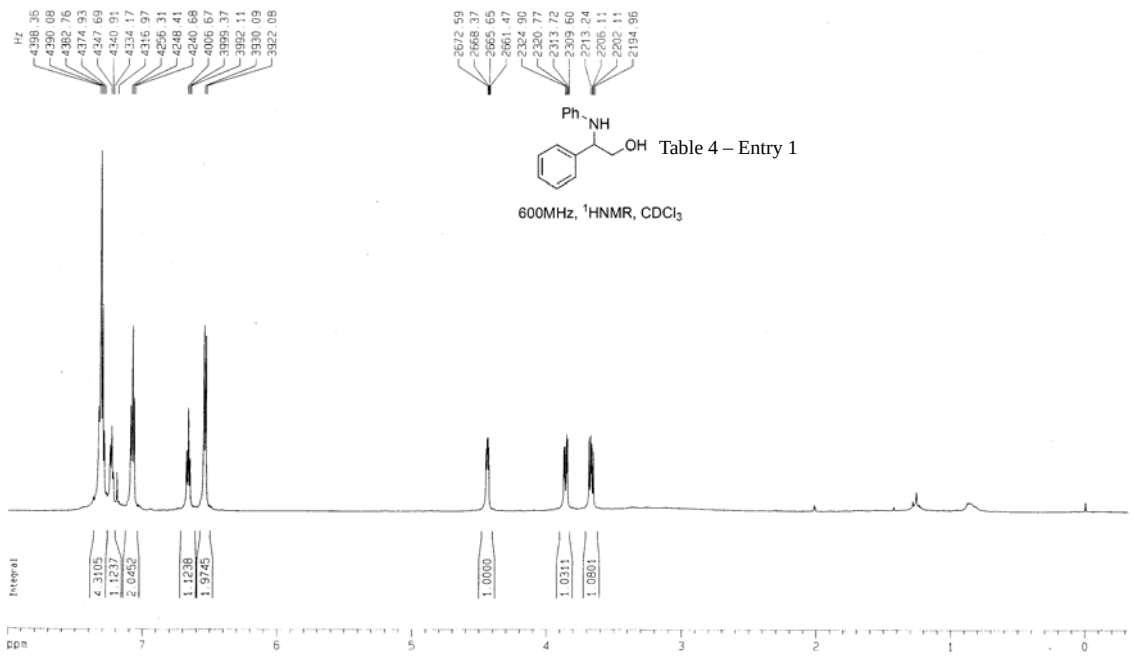


trans- 2-(*N*-Phenylcarbonylamino)-1-cyclohexanol: ^{13}C NMR

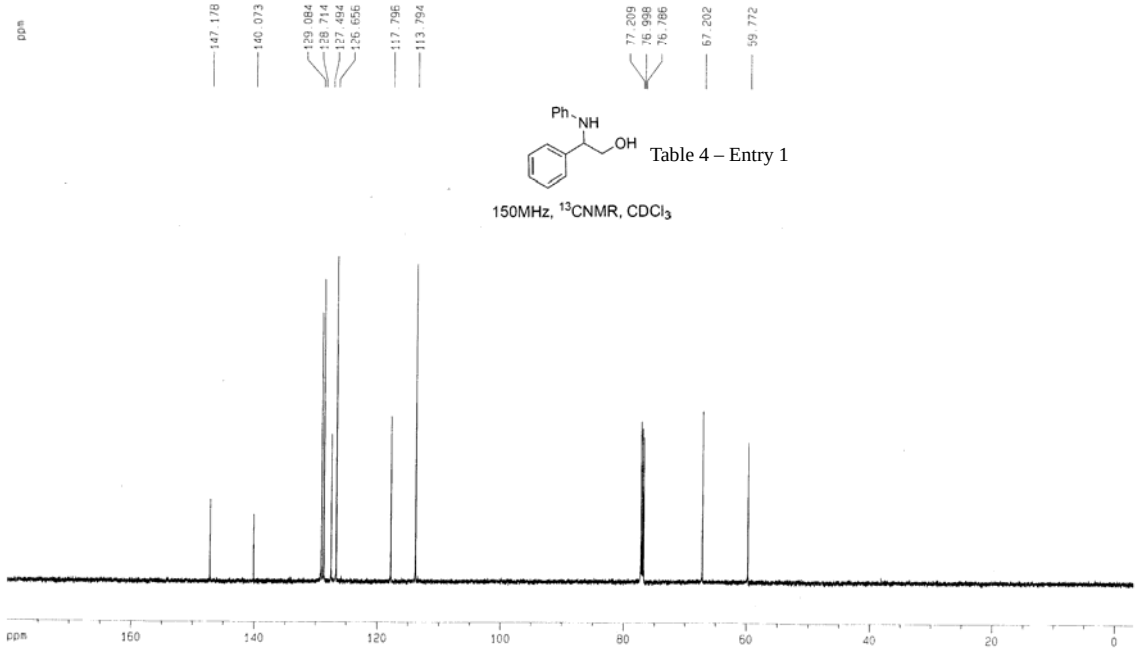


^{1}H NMR and ^{13}C NMR spectra of compounds in table 4

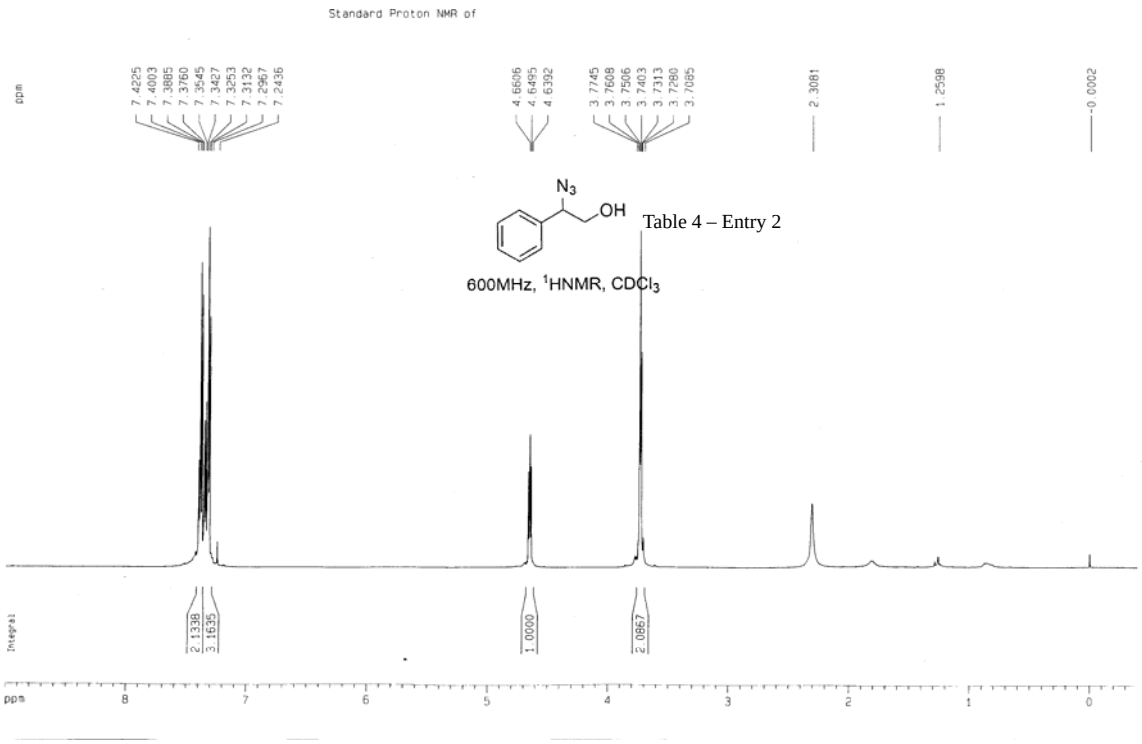
2-phenyl-2-(phenylamino)ethanol ^{1}HNMR



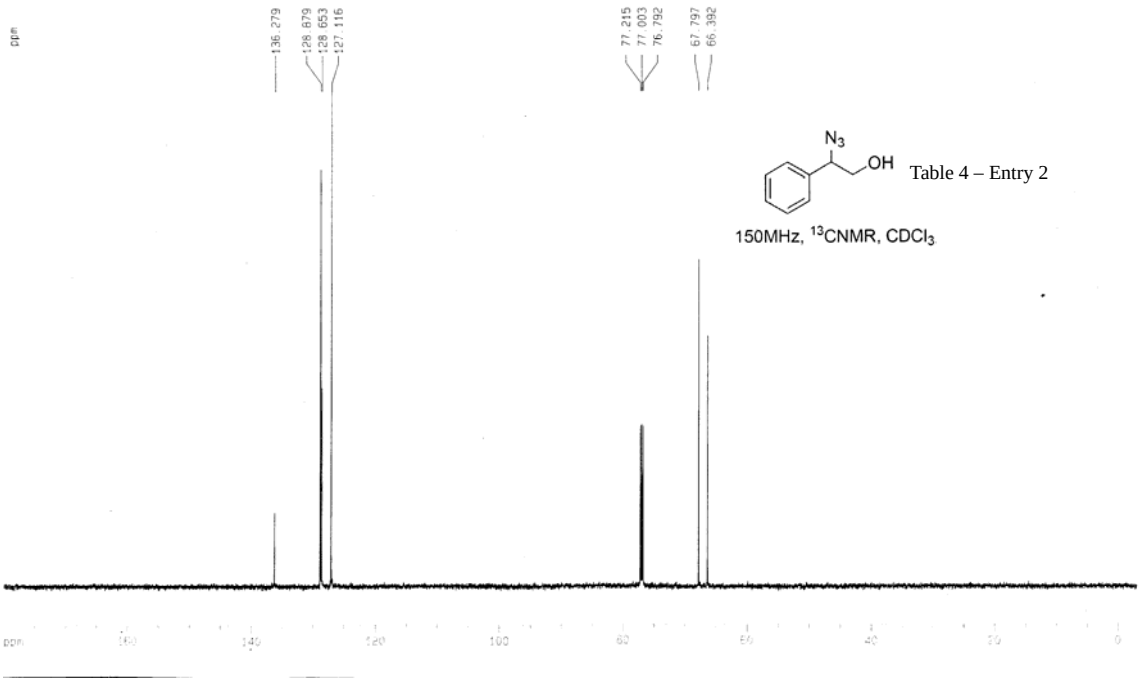
2-phenyl-2-(phenylamino)ethanol ^{13}CNMR



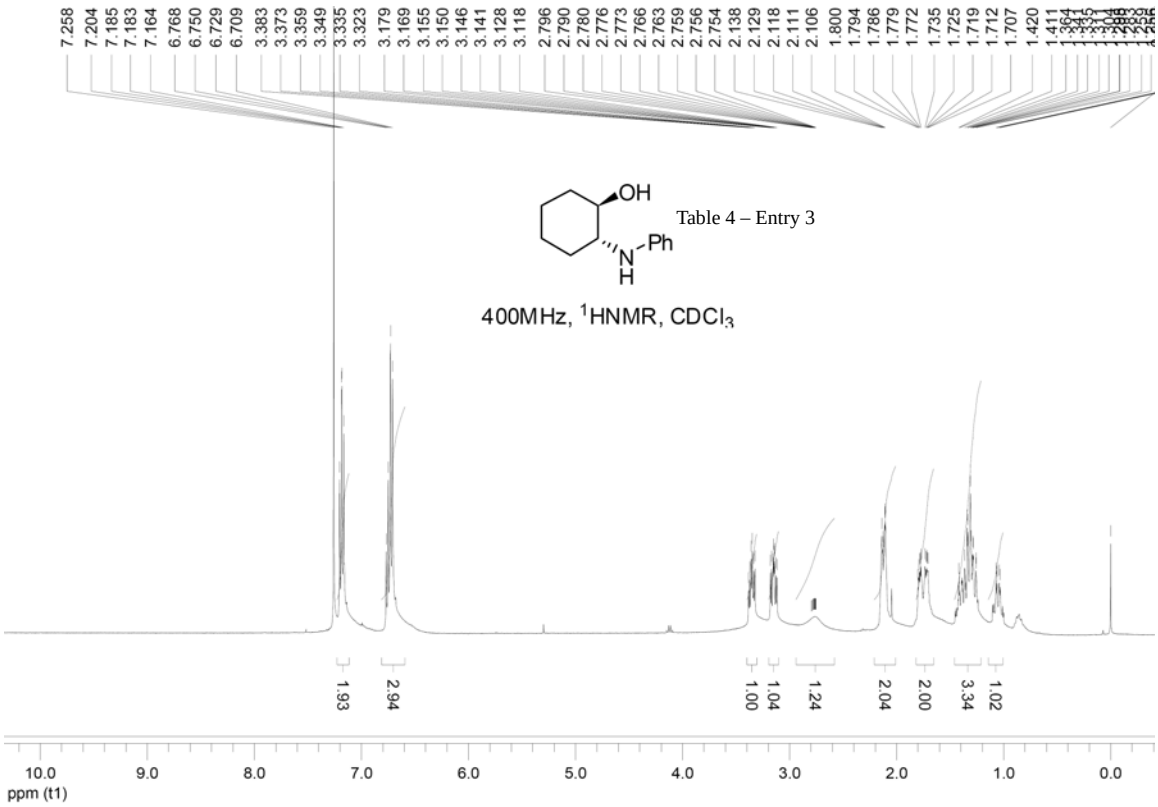
2-azido-2-phenylethanol ^{1}HNMR



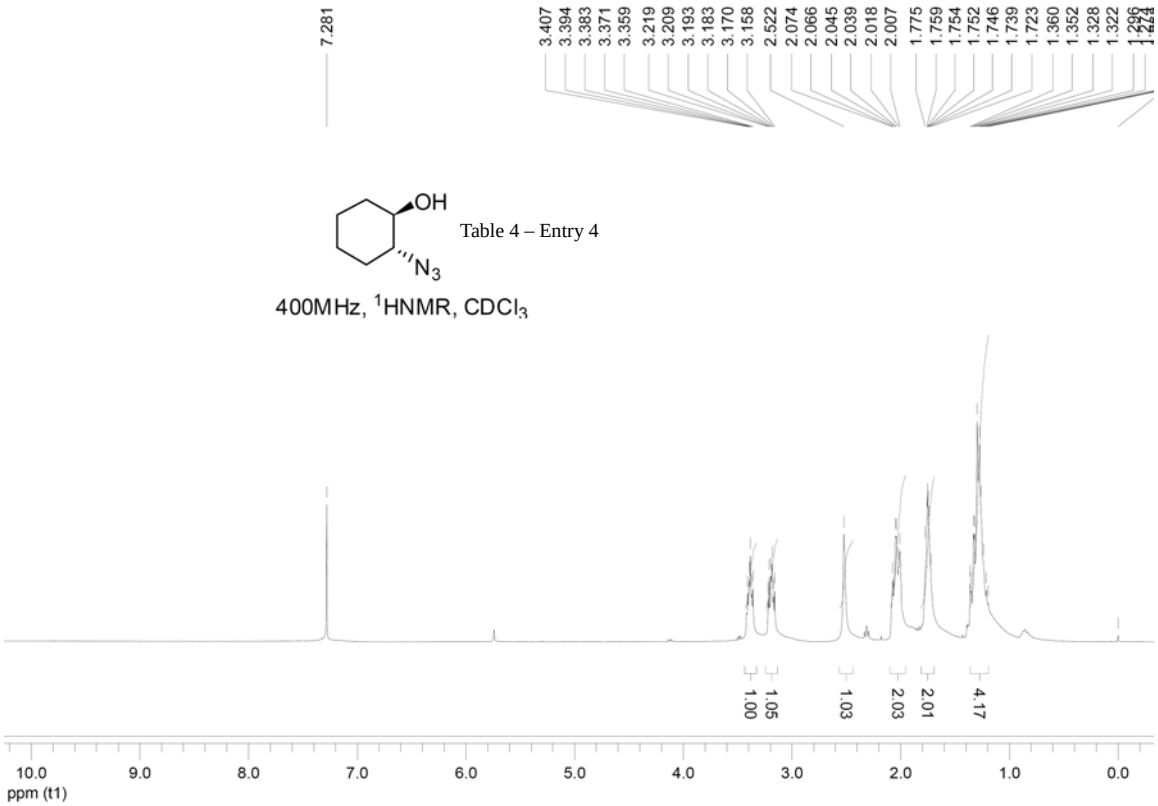
2-azido-2-phenylethanol ^{13}CNMR



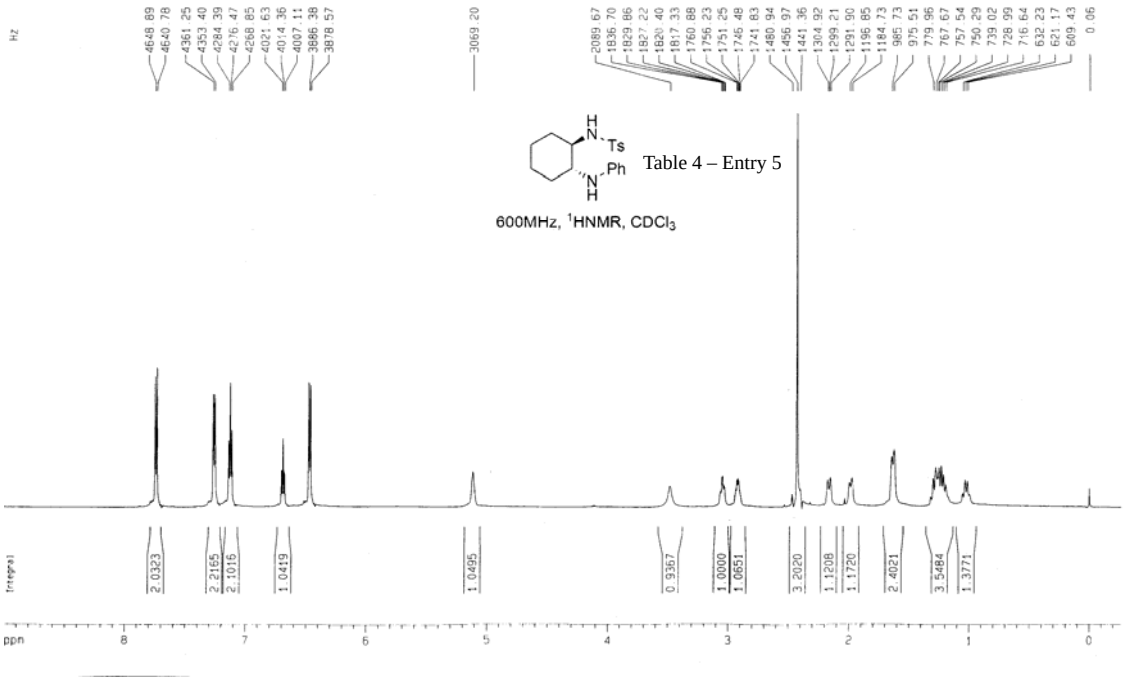
2-(phenylamino)cyclohexanol ^{1}H-NMR



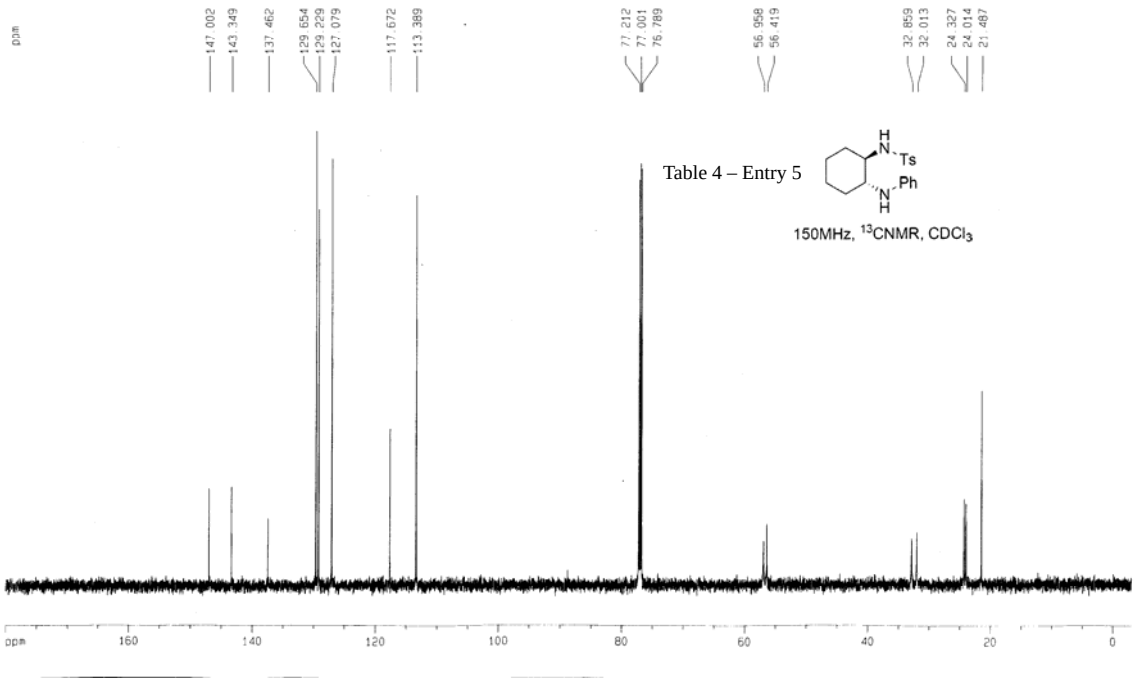
2-azidocyclohexanol ^{1}H-NMR



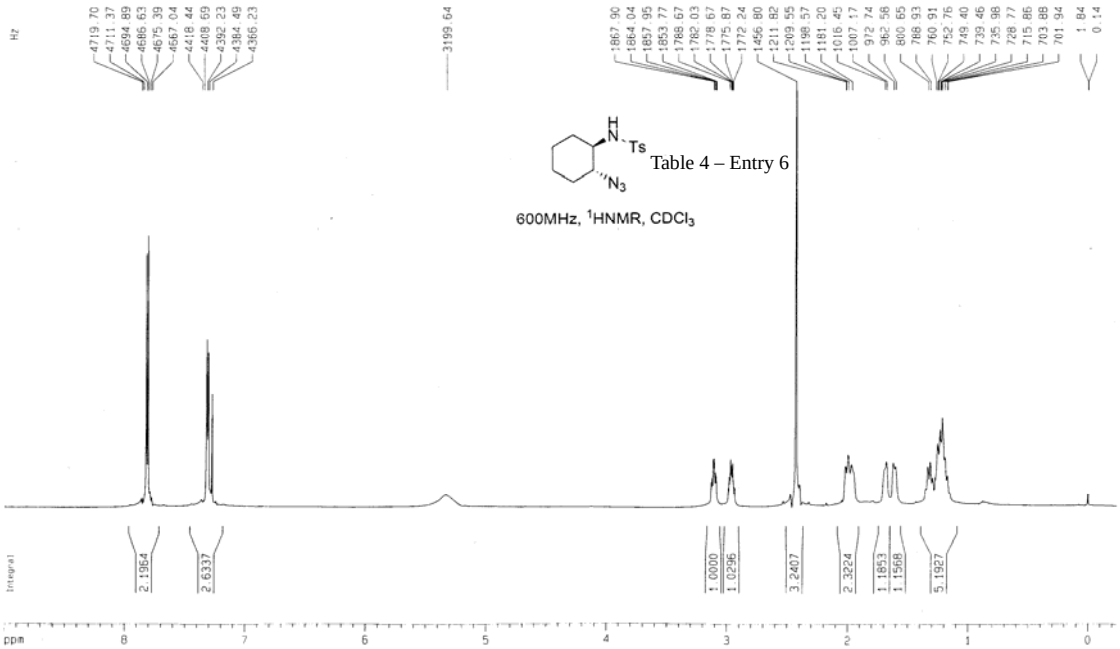
4-methyl-N-(2-(phenylamino)cyclohexyl)benzenesulfonamide ^{1}HNMR



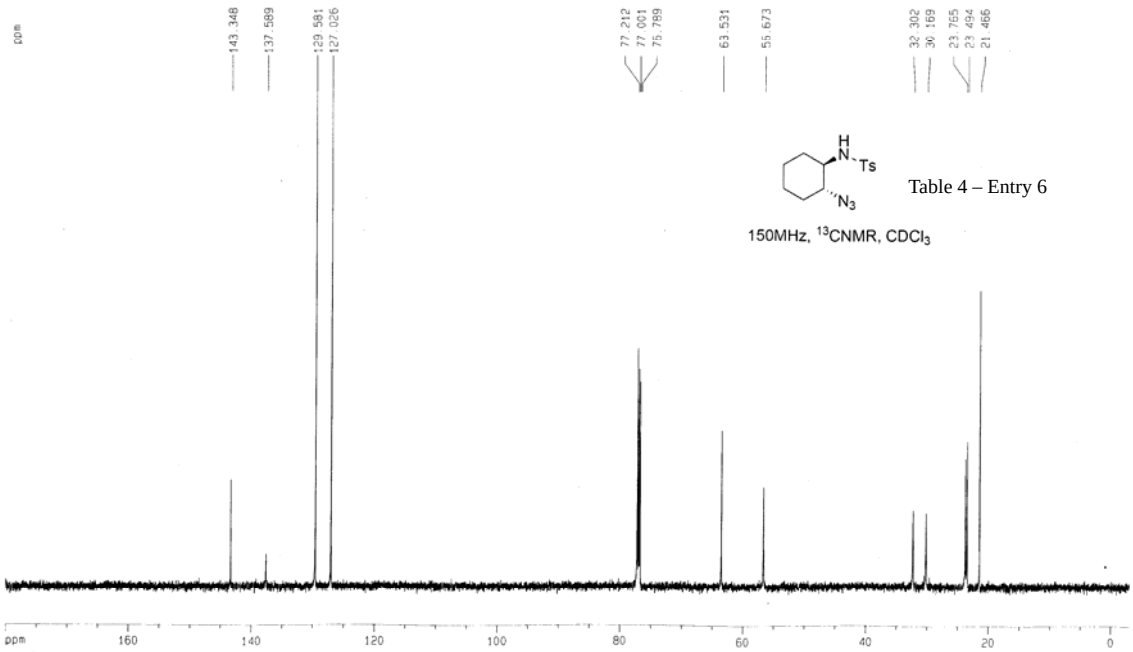
4-methyl-N-(2-(phenylamino)cyclohexyl)benzenesulfonamide ^{13}CNMR



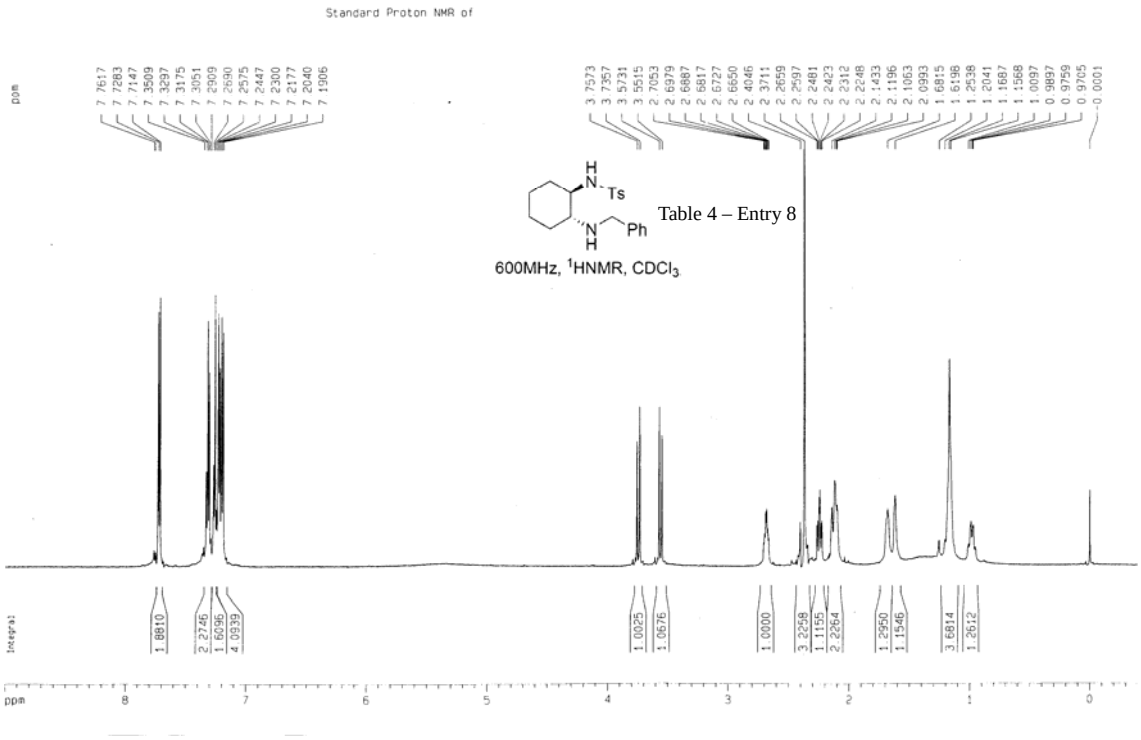
N-(2-azidocyclohexyl)-4-methylbenzenesulfonamide ^{1}HNMR



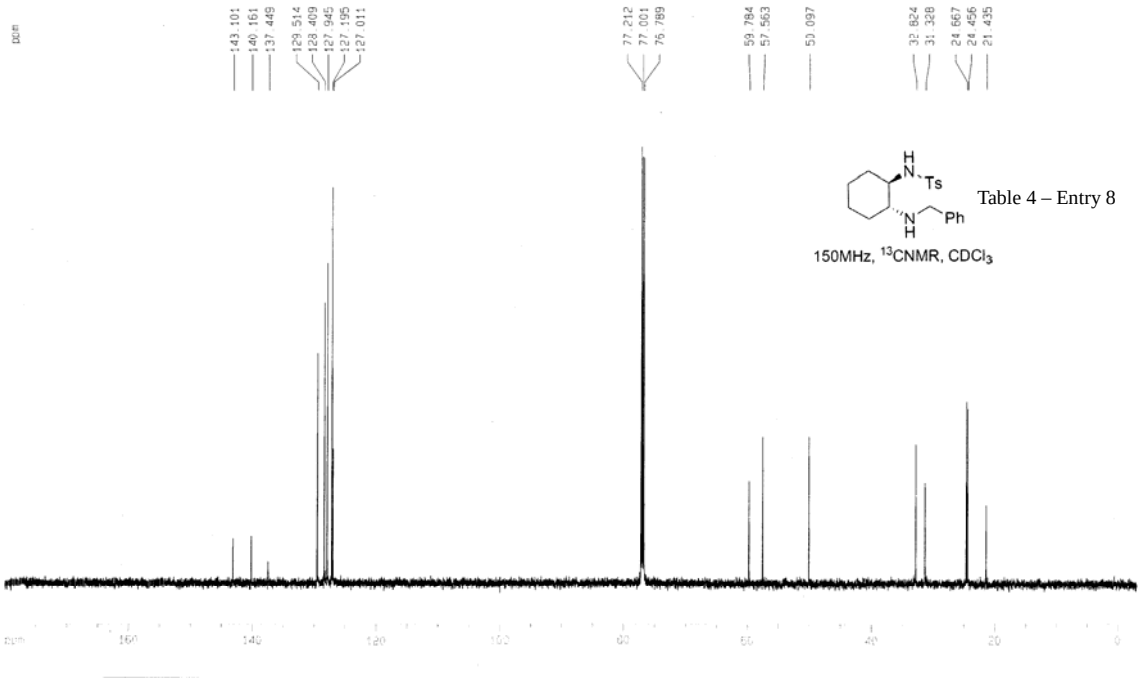
N-(2-azidocyclohexyl)-4-methylbenzenesulfonamide ^{13}CNMR



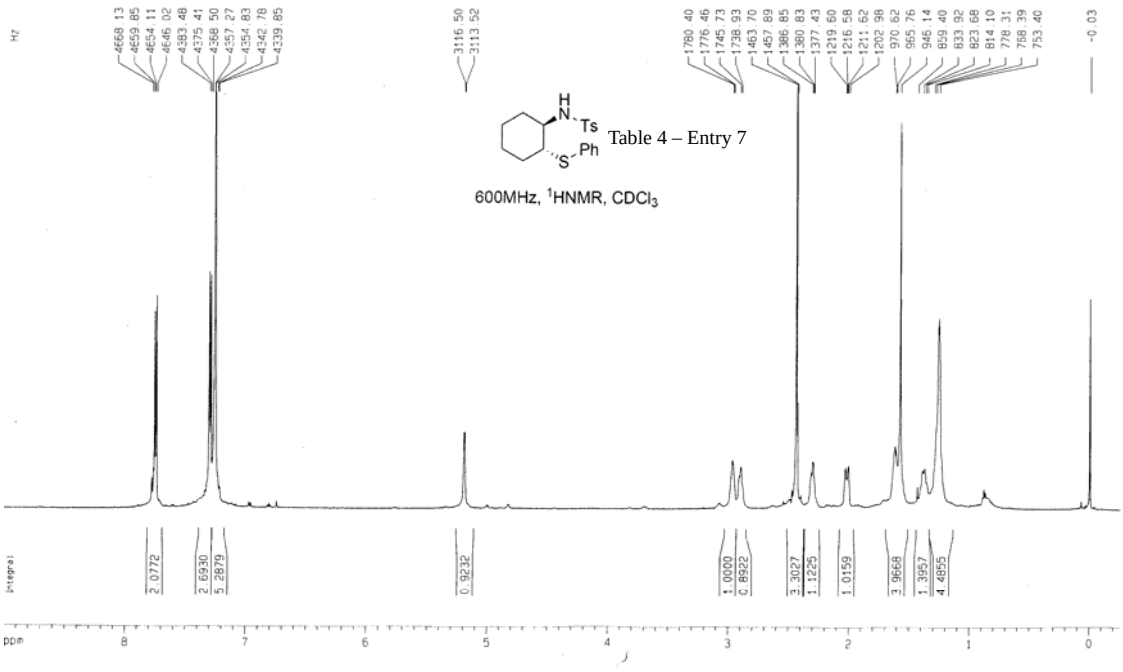
N-(2-(benzylamino)cyclohexyl)-4-methylbenzenesulfonamide ^{1}HNMR



N-(2-(benzylamino)cyclohexyl)-4-methylbenzenesulfonamide ^{13}CNMR

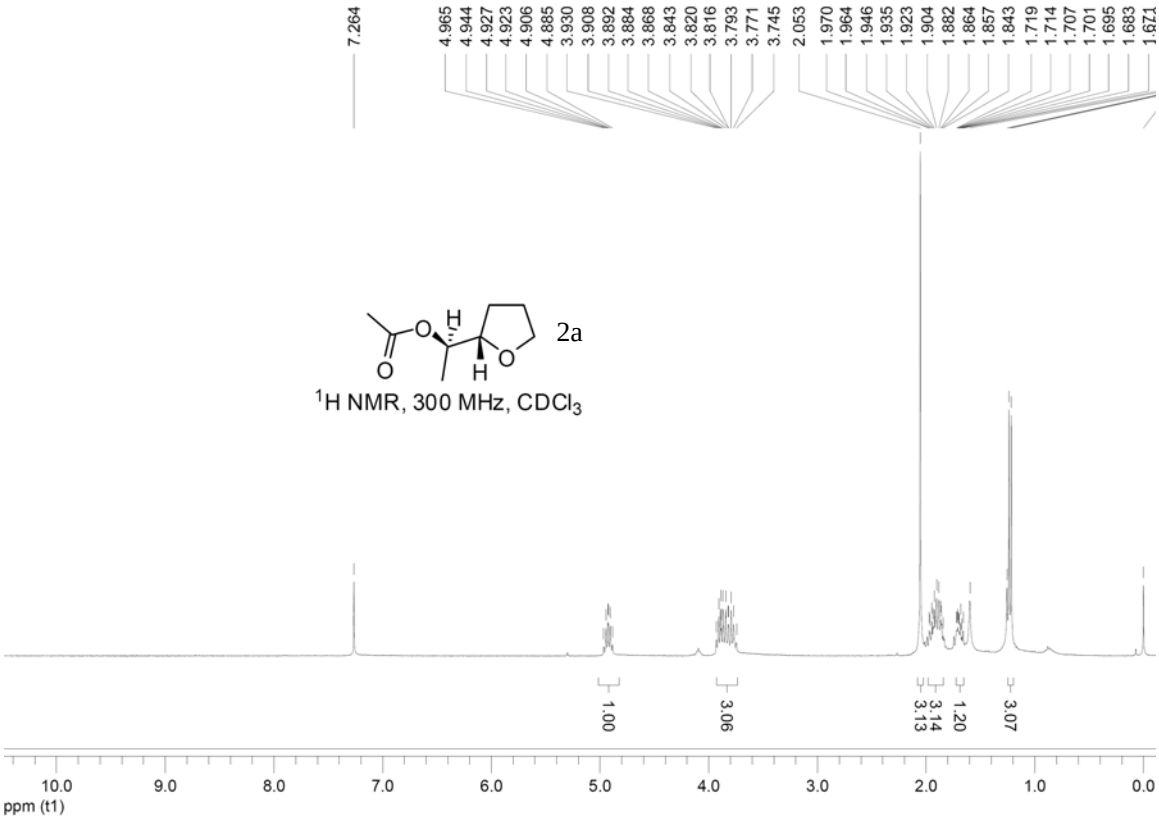


N-(2-Phenylthiocyclohexyl)-4-methylbenzenesulfonamide ^{1}H NMR

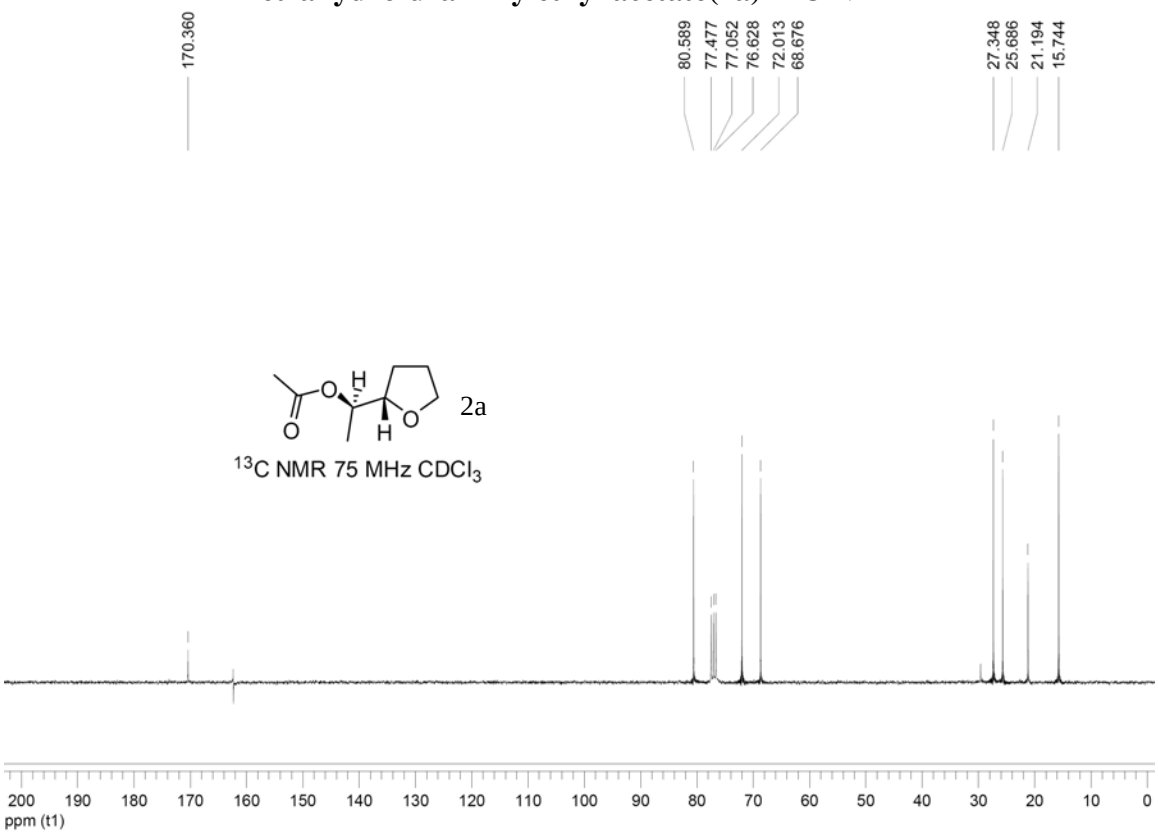


^{1}H NMR and ^{13}C NMR spectra of compounds in scheme 3

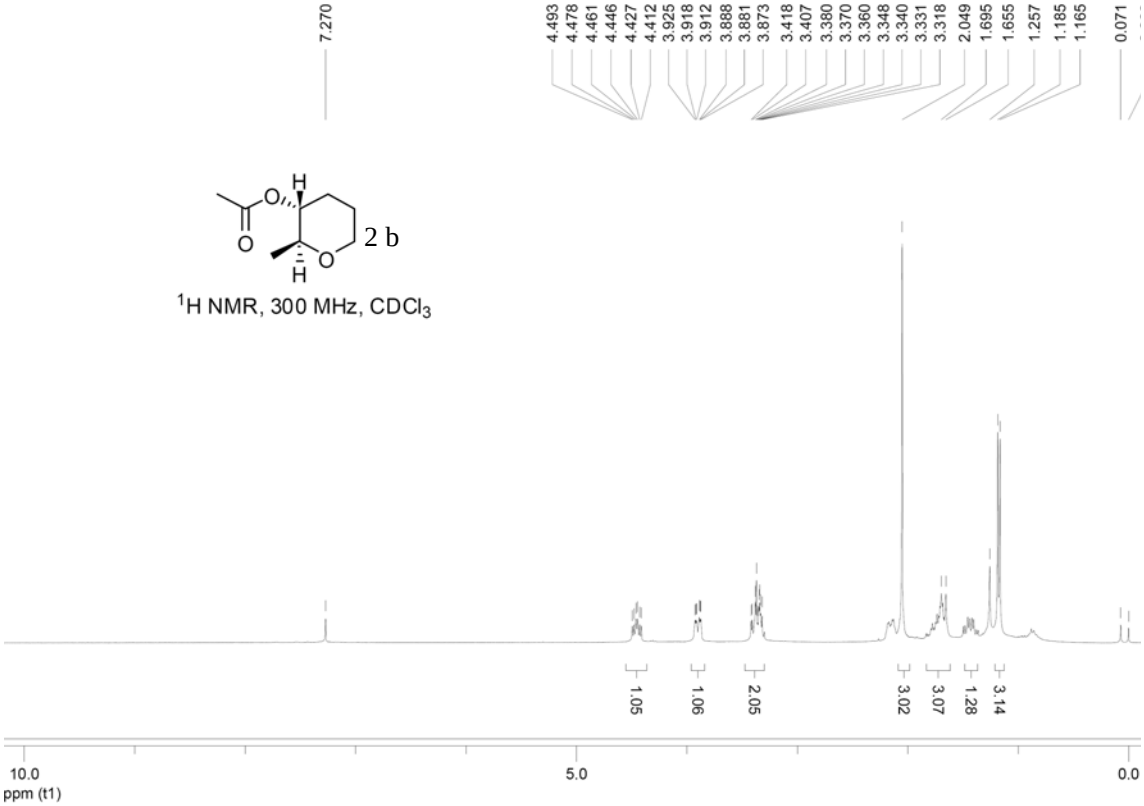
1-Tetrahydrofuran-2-ylethyl acetate(2a): ^{1}H NMR



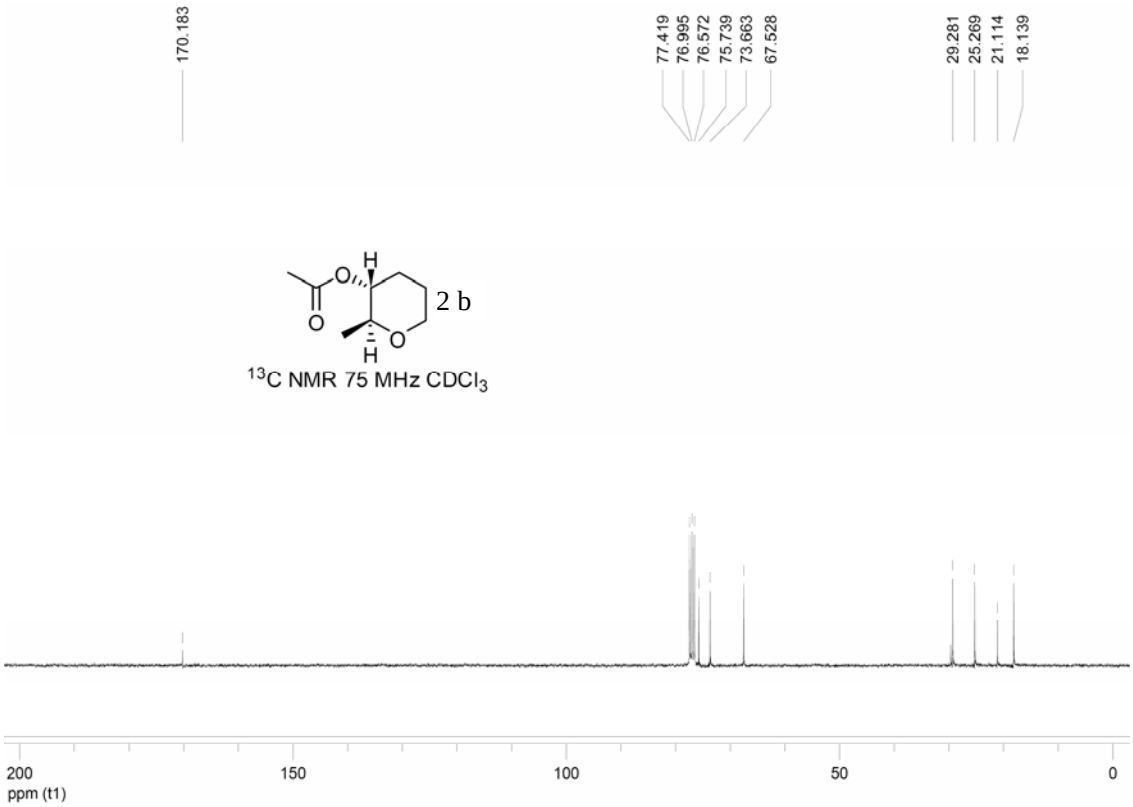
1-Tetrahydrofuran-2-ylethyl acetate(2a): ^{13}C NMR



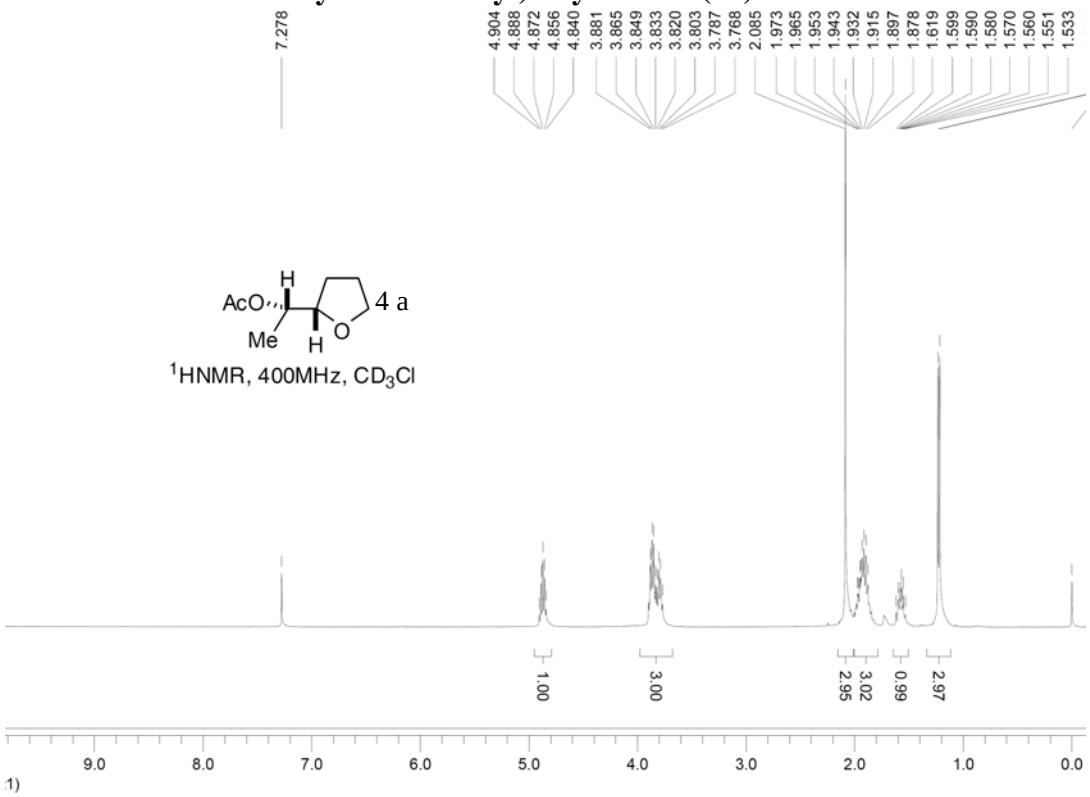
2-Methyltetrahydro-2H-pyran-3-yl acetate(2b): ^{1}H NMR



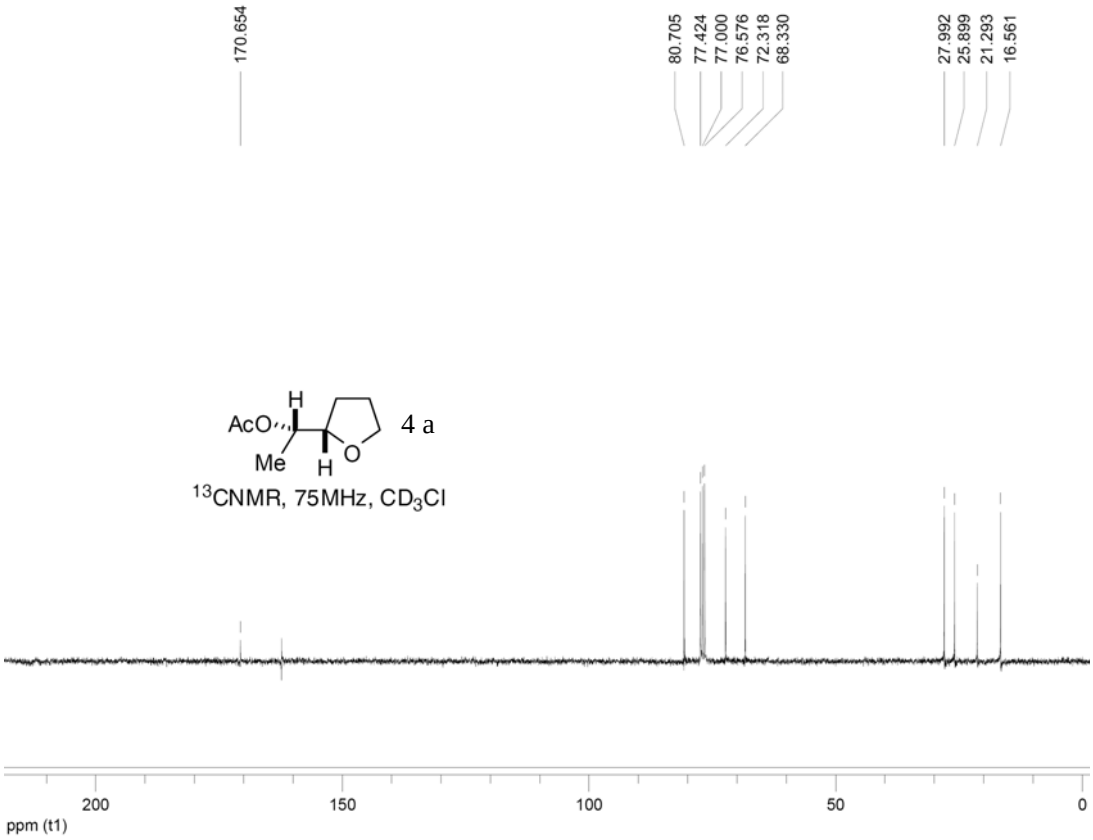
2-Methyltetrahydro-2H-pyran-3-yl acetate(2 b): ^{13}C NMR



1-Tetrahydrofuran-2-yl)ethyl acetate(4a) : ^{1}H NMR

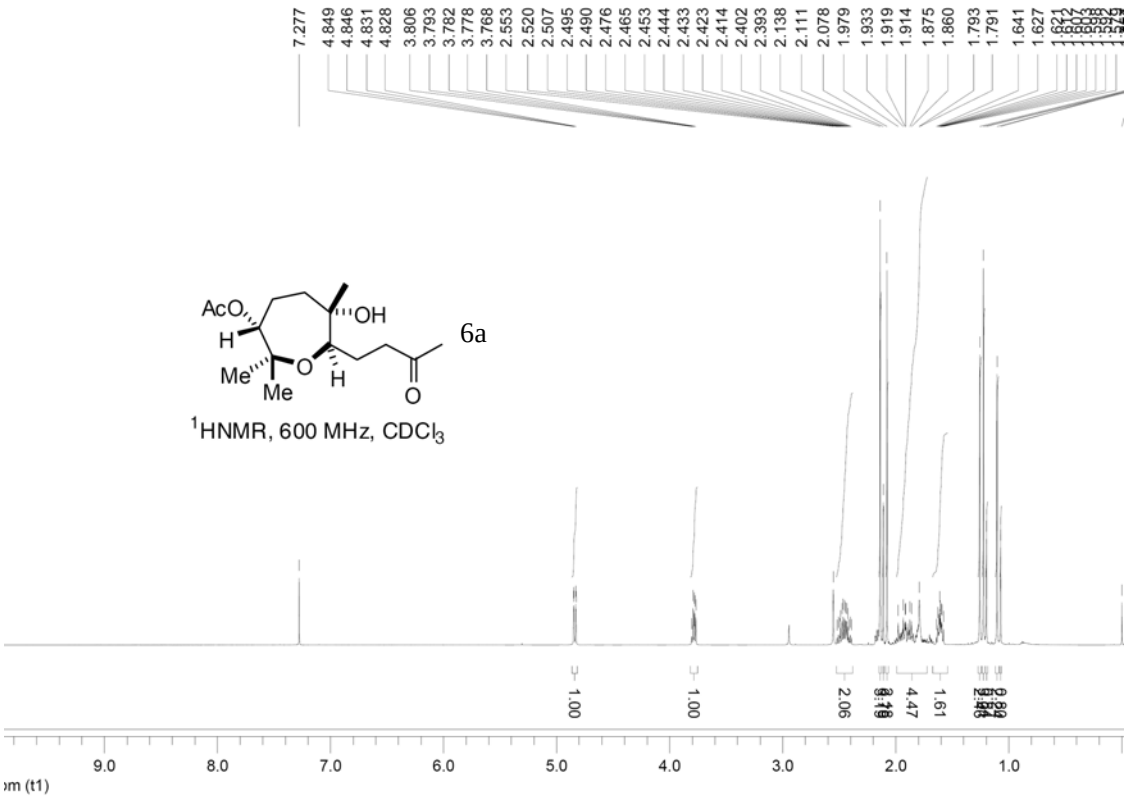


1-Tetrahydrofuran-2-yl)ethyl acetate(4a) : ^{13}C NMR

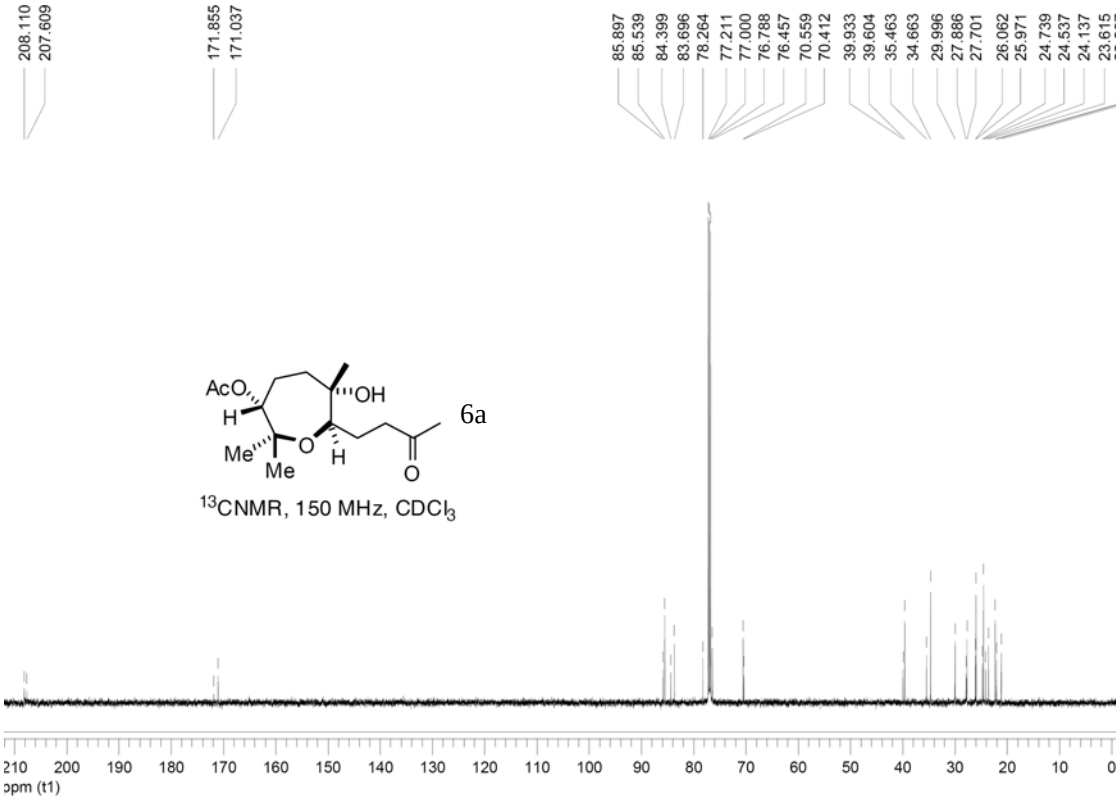


^{1}H NMR and ^{13}C NMR spectra of compounds in scheme 4

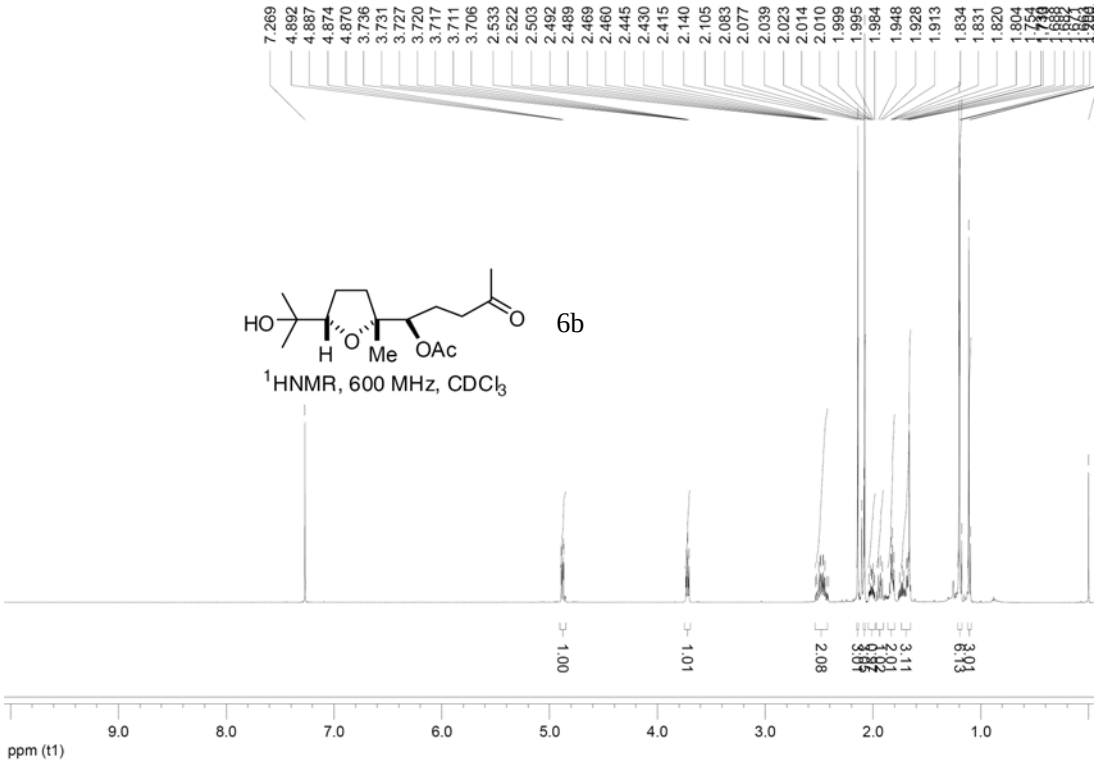
6-Hydroxy-2,2,6-trimethyl-7-(3-oxobutyl)oxepan-3-yl acetate; ^{1}H NMR

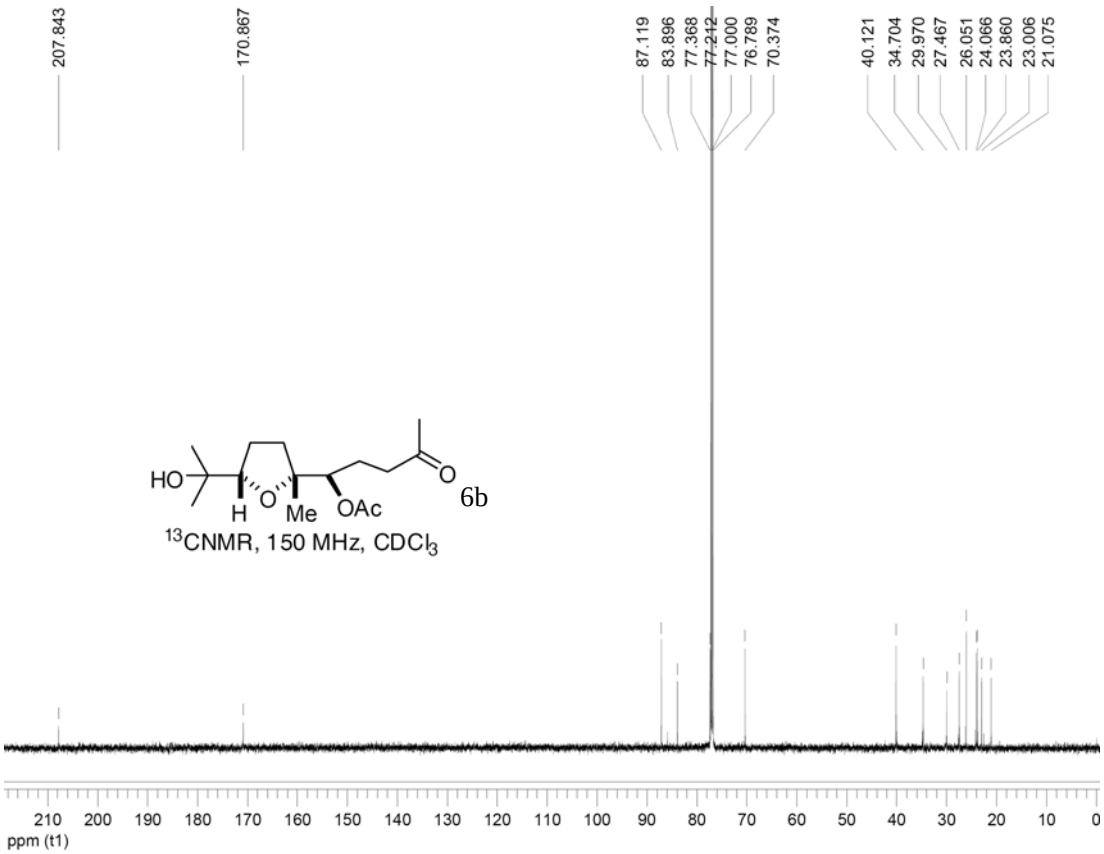


6-Hydroxy-2,2,6-trimethyl-7-(3-oxobutyl)oxepan-3-yl acetate; ^{13}C NMR



1-(5-(2-Hydroxypropan-2-yl)-2-methyltetrahydrofuran-2-yl)-4-oxopentyl acetate



1-(5-(2-Hydroxypropan-2-yl)-2-methyltetrahydrofuran-2-yl)-4-oxopentyl acetate

^{13}C NMR