Supporting information

For

Revisiting the Armed-Disarmed Concept: The Importance of Anomeric Configuration in the Activation of S-Benzoxazolyl Glycosides

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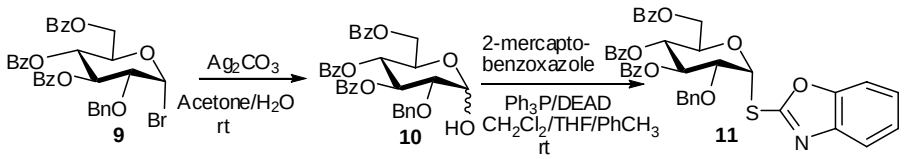
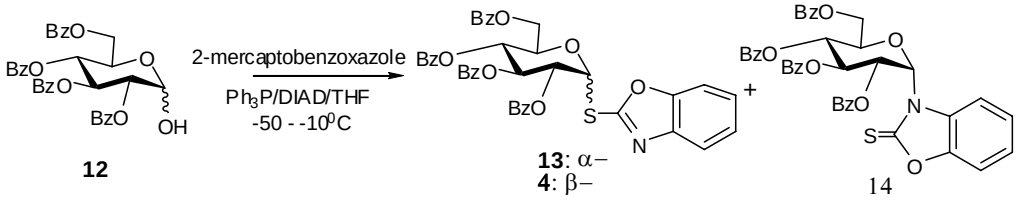
2-(2'-*O*-benzyl-3',4',6'-tri-*O*-benzoyl-1-thio-α-D-glucopyranosyl)-benzoxazole (11)



To a solution of glucosyl bromide **9**[1] (462 mg, 0.72 mmol) in a mixture of acetone (10 mL) and H_2O (1 mL) was added Ag_2CO_3 (400 mg, 1.45 mmol, 2.0 eq.). After the resulting mixture was stirred overnight with the exclusion of light, the reaction was diluted with CH_2Cl_2 and filtered off the solid through a pad of Celite. The filtrate was concentrated in vacuum. The residue was coevaporated with toluene three times (5 mL × 3) to afford hemiacetal **10** (360 mg, 0.62 mmol, 86%) as a white foam, which was directly taken into next step reaction.

To a solution of hemiacetal **10** (512.7 mg, 0.88 mmol) and 2-mercaptobenzoxazole (178.6 mg, 1.18 mmol, 1.3 eq.) in a mixture of 6 mL of CH_2Cl_2 and 2 mL of THF were sequentially added Ph_3P (346 mg, 1.32 mmol, 1.5 eq.) and a solution of 40% of DEAD in toluene (0.64 ml, 1.40 mmol, 1.6 eq.). The reaction was stirred for 12 hours at ambient temperature under argon atmosphere. The volatiles were removed under reduced pressure and the residue was purified three times by silica gel column (AcOEt/Hexane = 1/4, then AcOEt/CH_2Cl_2/Hexane = 1/12/12, finallyAcOEt/$PhCH_3$ = 1/15) to afford the desired compound (312 mg. 0.44 mmol, 50%). UV λ (nm) 232, 277, 284. $[\alpha]_D^{17}$ = 208.9 (*c* 1.0, $CHCl_3$), ^{1}H NMR δ 7.96 (d, 2H, *J* = 10), 7.94 (d, 2H, *J* = 8.5), 7.74 (d, 2H, *J* = 7.5), 7.64 (d, 1H, *J* = 7.0), 7.56 – 7.09 (m, 17H), 6.76 (d, 1H, *J* = 5.5), 5.85 (dd, 1H, $J_1 = J_2$ = 9.5), 5.55 (dd, 1H, $J_1 = J_2$ = 9.5), 4.78 (d, 2H, *J* = 12), 4.64 (d, 1H, *J* = 11), 4.48 – 4.42 (m, 2H), 4.25 (dd, 1H, *J* = 5.5, 9.5). ^{13}C NMR δ 166.0, 165.6, 165.3, 161.4, 151.9, 141.7, 136.4, 133.6, 133.4, 132.9, 130.0, 129.9, 129.5, 129.4, 129.2, 128.7, 128.6, 128.5, 128.4, 128.3, 128.2, 128.1, 124.6, 119.2, 110.2, 85.4, 75.3, 72.5, 72.1, 70.4, 69.1, 63.0. IR (film): ν 1727, 1452, 1267, 1094, 1069, 1027 cm^{-1}. HR-ESI *m/z* $[M+H]^+$ calcd for $C_{41}H_{34}NO_9S$ 716.1949, found 716.1946.

2-(2',3',4',6'-tetra-*O*-benzoyl-1-thio-D-glucopyranosyl)-benzoxazole (13 and **4) and 2-thioxo- 3-(2',3',4',6'-tetra-*O*-benzoyl-α-D-glucopyranosyl)-benzoxazole (14)**



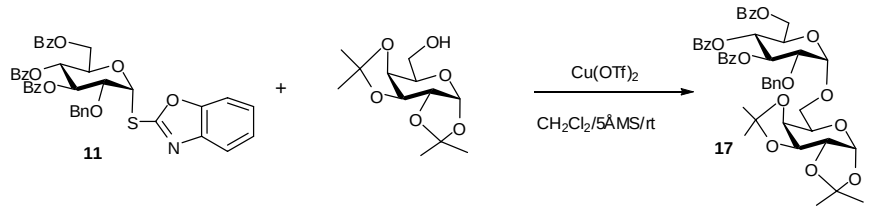
To a solution of Ph_3P (345 mg, 1.32 mmol, 1.3 eq.) in anhydrous THF (7.5 mL) at –50 ^{0}C under an argon atmosphere was added DIAD (0.27 mL, 1.39 mmol, 1.4 eq.). The mixture was stirred at this temperature for 10 minutes, whereon a thick yellow precipitate formed. 2,3,4,6-tetra-*O*-benzoyl-D-glucopyranose **12**[2] (597 mg, 1.0 mmol)

was added and the stirring continued at –50 ^{0}C for a further 10 minutes before a solution of 2-mercaptobenzoxazole (200 mg, 1.32 mmol, 1.3 eq.) in 3 mL of THF was slowly added over 15 minutes. Then the reaction was warmed slowly to –10 ^{0}C over 2 hours and continued to stir for another 12 hours. TLC showed that the reaction went to completion. The solvent was removed and the residue was sequentially subjected to silica gel column (AcOEt/Hexane/CH_2Cl_2 = 1/20/20) and normal phase HPLC (AcOEt/Hexane = 1/9 – 1/3) to furnish **13** (252 mg, 0.35 mmol, 35%) UV λ (nm) 232, 277, 284. $[\alpha]_D^{17}$ = 132.2 (*c* 0.9, $CHCl_3$), ^{1}H NMR δ 7.98 (d, 2H, *J* = 7.5), 7.95 (d, 2H, *J* = 7.5), 7.90 (d, 2H, *J* = 7.5), 7.82 (d, 2H, *J* = 7.5), 7.60 – 7.26 (m, 14H), 7.17 (t, 2H, *J* = 7.5), 7.02 (d, 1H, *J* = 5.5), 6.09 (dd, 1H, $J_1 = J_2$ = 10), 5.81 – 5.76 (m, 2H, 4.88 – 4.86 (m, 1H), 4.55 (d, 1H, *J* = 10), 4.50 (dd, 1H, *J* = 5.5, 12). ^{13}C NMR δ 166.0, 165.6, 165.2, 165.1, 160.0, 151.9, 141.6, 133.8, 133.7, 133.5, 133.0, 130.1, 130.0, 129.8, 129.6, 129.4, 128.7, 128.6, 128.5, 128.4, 128.3, 128.2, 124.7, 124.6, 119.3, 110.2, 84.1, 70.8, 70.7, 70.6, 68.9, 62.7. IR (film): ν 1728, 1452, 1267, 1092, 1069, 1026, 708 cm^{-1}. HR-ESI *m/z* $[M+H]^+$ calcd for $C_{41}H_{31}NO_{10}S$ 730.1741, found 730.1739. And **4** (210 mg, 0.29 mmol, 29%). And **14** (94 mg, 0.13 mmol, 13%) UV λ (nm) 232, 297. $[\alpha]_D^{19}$ = 96.0 (*c* 0.8, $CHCl_3$), ^{1}H NMR δ 8.19 (d, 2H, *J* = 7.0), 8.01 (d, 2H, *J* = 7.0), 7.97 (d, 2H, *J* = 7.5), 7.77 – 7.74 (m, 3H), 7.67 – 7.64 (m, 1H), 7.56 – 7.49 (m, 5H), 7.41 – 7.38 (m, 2H), 7.28 – 7.22 (m, 5H), 7.18 (d, 1H, *J* = 1.5), 7.10 (t, 1H, *J* = 7.5), 7.04 (t, 1H, *J* = 7.5), 5.94 – 5.92 (m, 2H), 5.57 (brs, 1H), 5.11 – 5.06 (m, 2H), 4.75 – 4.72 (m, 1H). ^{13}C NMR δ 178.5, 166.0, 165.2, 165.0, 164.3, 147.1, 134.1, 133.7, 133.6, 133.4, 130.6, 130.2, 130.0, 129.9, 129.2, 128.9, 128.5, 128.4, 128.3, 124.4, 124.2, 113.5, 110.3, 80.8, 76.0, 68.4, 67.0, 66.4, 61.1. IR (film): ν 1726, 1356, 1261, 1089, 1068, 1026 cm^{-1}. Anal. calcd for $C_{41}H_{31}NO_{10}S$ C, 67.48, H, 4.28, N, 1.92; Found C, 67.18, H, 4.38, N, 1.97.

General $Cu(OTf)_2$-promoted glycosylation procedure

1,2:3,4-di-*O*-isopropylidene-α-D-galactopyranoside (0.1 mmol) and thioglycoside (0.12 mmol) were coevaporated with toluene three times (3 mL ×3). The residue was dissolved in 2 mL of anhydrous CH_2Cl_2 and stirred for 1 hour at ambient temperature in the presence of 5Å molecular sieves (350 mg). At this point $Cu(OTf)_2$ (0.24 mmol) was added in one portion. The mixture continued to stir for 2-14 hours. The reaction was diluted with CH_2Cl_2, and the solid was filtered off. The filtrate was sequentially washed with sat. aqueous $NaHCO_3$ and brine. The collected organic layers were dried over Na_2SO_4, filtered, concentrated. The residue was subjected to silica gel column to afford the corresponding glycoside.

6-*O*-(2'-*O*-benzyl-3',4',6'-tri-*O*-Benzoyl-α-D-glucopyranosyl)-1,2:3,4-di-*O*-iso propylidene-α-D-galactopyranoside (17)

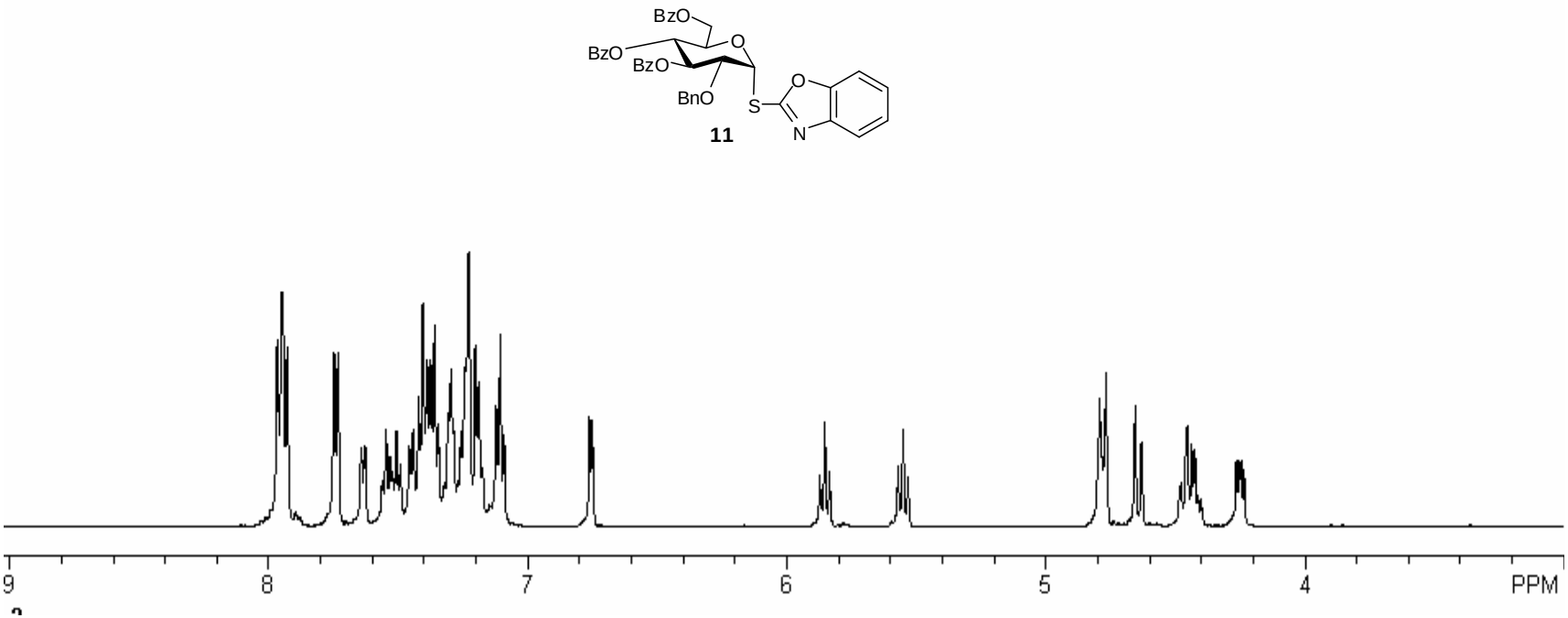


$[\alpha]_D^{22}$ = 13.0 (*c* 0.6, $CHCl_3$), ^{1}H NMR δ 8.02 – 7.90 (m, 6H), 7.53 – 7.47 (m, 3H), 7.41 – 7.32 (m, 6H), 7.22 – 7.18 (m, 5H), 5.97 (dd, 1H, $J_1 = J_2 = 10$), 5.53 (d, 1H, $J = 5.0$), 5.49 (t, 1H, $J = 10$), 5.10 (d, 1H, $J = 3.5$), 4.67 (d, 1H, $J = 12.5$), 4.62 – 4.58 (m, 2H), 452 – 4.48 (m, 2H), 4.42 (dd, 1H, $J = 5.0, 12.5$), 4.38 (dd, 1H, $J = 1.5, 7.5$), 4.33 (dd, 1H, $J = 2.5, 5.0$), 4.14 (t, 1H, $J = 7.0$), 3.91 (dd, 1H, $J = 6.5, 10.5$), 3.85 (dd, 1H, $J = 7.0, 10.5$), 3.76 (dd, 1H, $J = 3.5, 9.5$), 1.62 (s, 3H), 1.45 (s, 3H), 1.33 (s, 3H), 1.31 (s, 3H). ^{13}C NMR δ 166.3, 165.8, 165.4, 137.6, 133.3, 133.0, 129.9, 129.8, 129.1, 128.4, 128.3, 127.9, 127.7, 109.2, 108.8, 97.1, 96.4, 72.2, 72.0, 70.8, 70.6, 69.7, 67.7, 67.5, 66.4, 63.2, 26.2, 26.1, 25.0, 24.6. HR-ESI *m/z* $[M+H]^+$calcd for $C_{46}H_{38}O_{14}$ 847.2937, found 824.2926.

References

1. Lichtenthaler F. W.; Köhler B. *Carbohydr. Res*. **1994**, *258*, 77-85.
2. Sebesan S.; Neira S. *Carbohydr. Res*. **1992**, *223*, 169-185.

2-(2'-*O*-benzyl-3',4',6'-tri-*O*-benzoyl-1-thio-α-D-glucopyranosyl)-benzoxazole (11)



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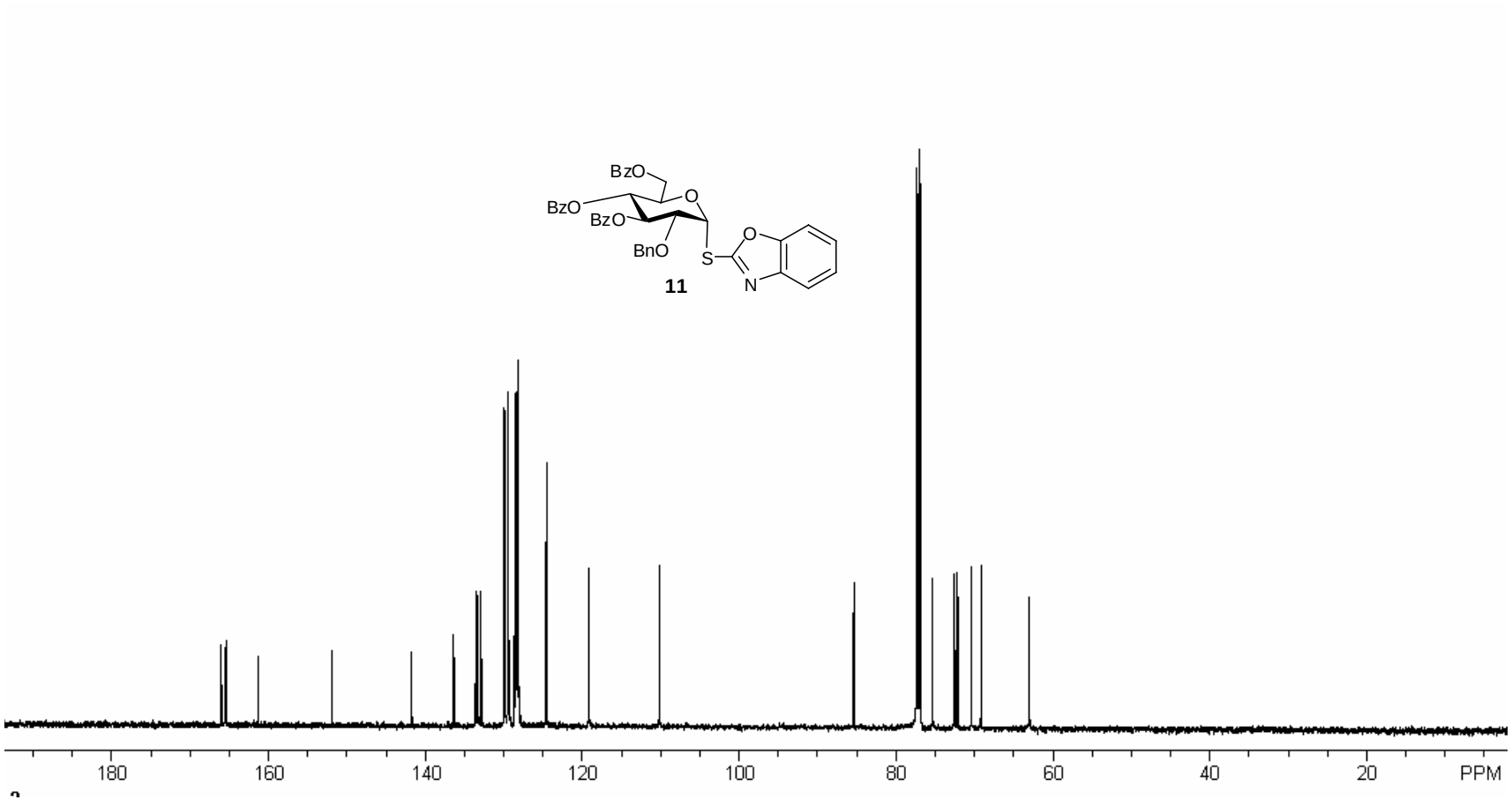

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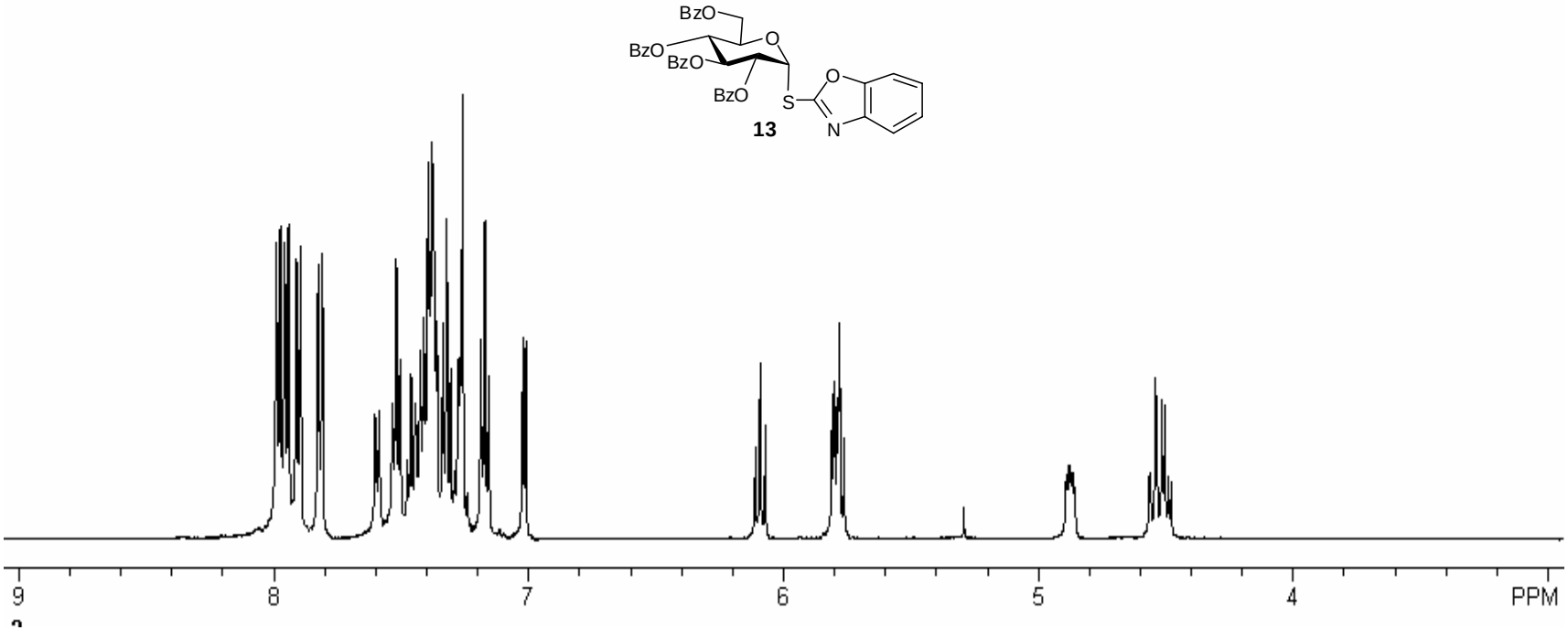
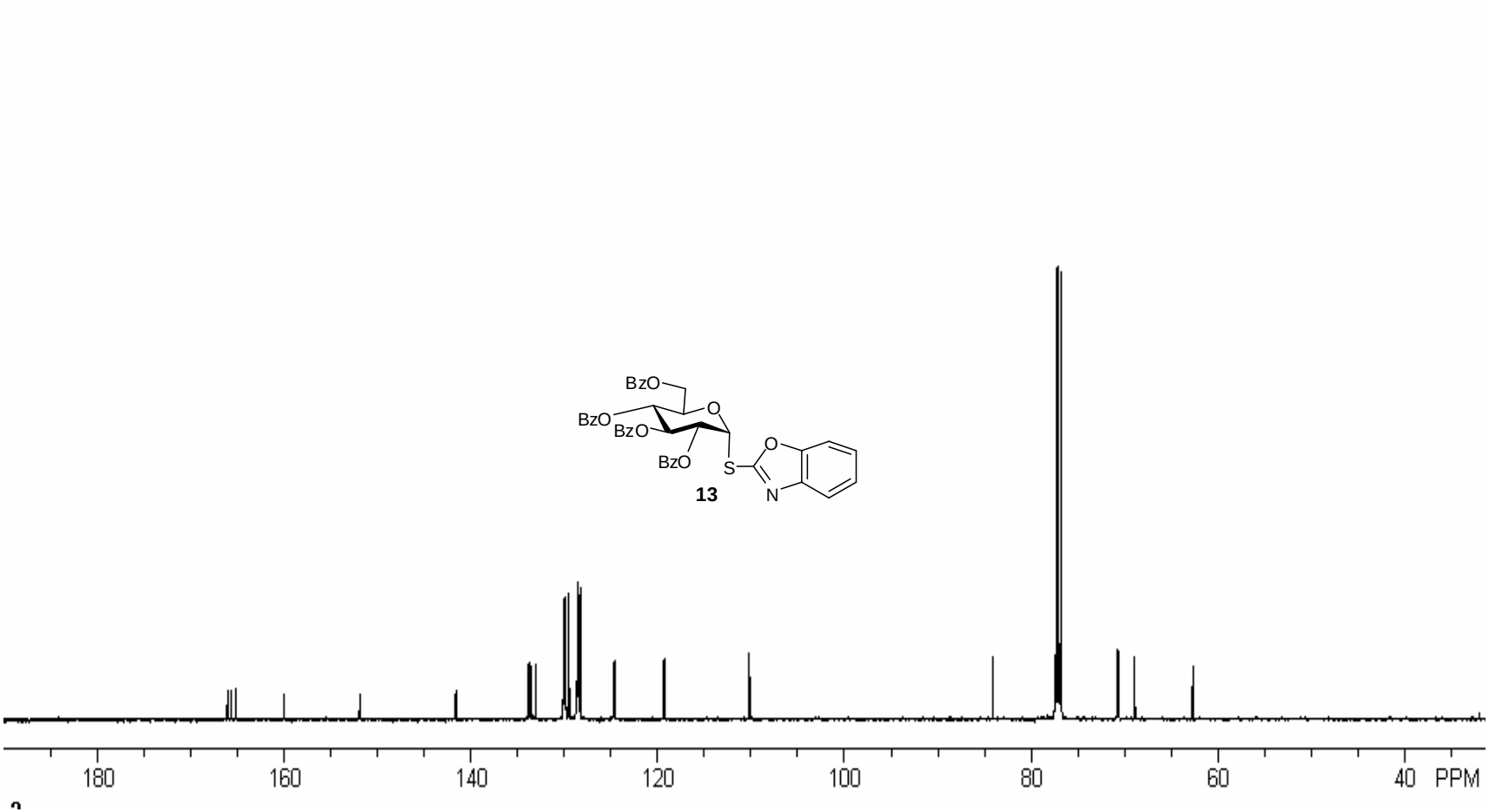
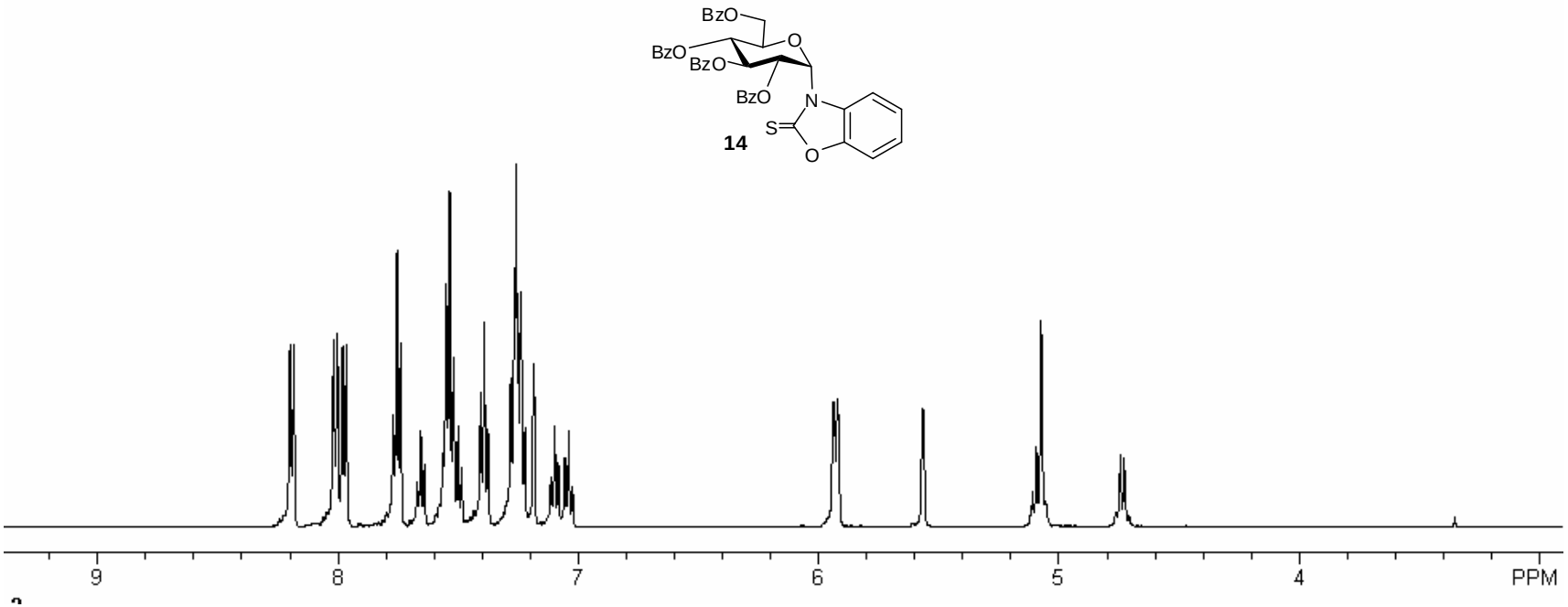


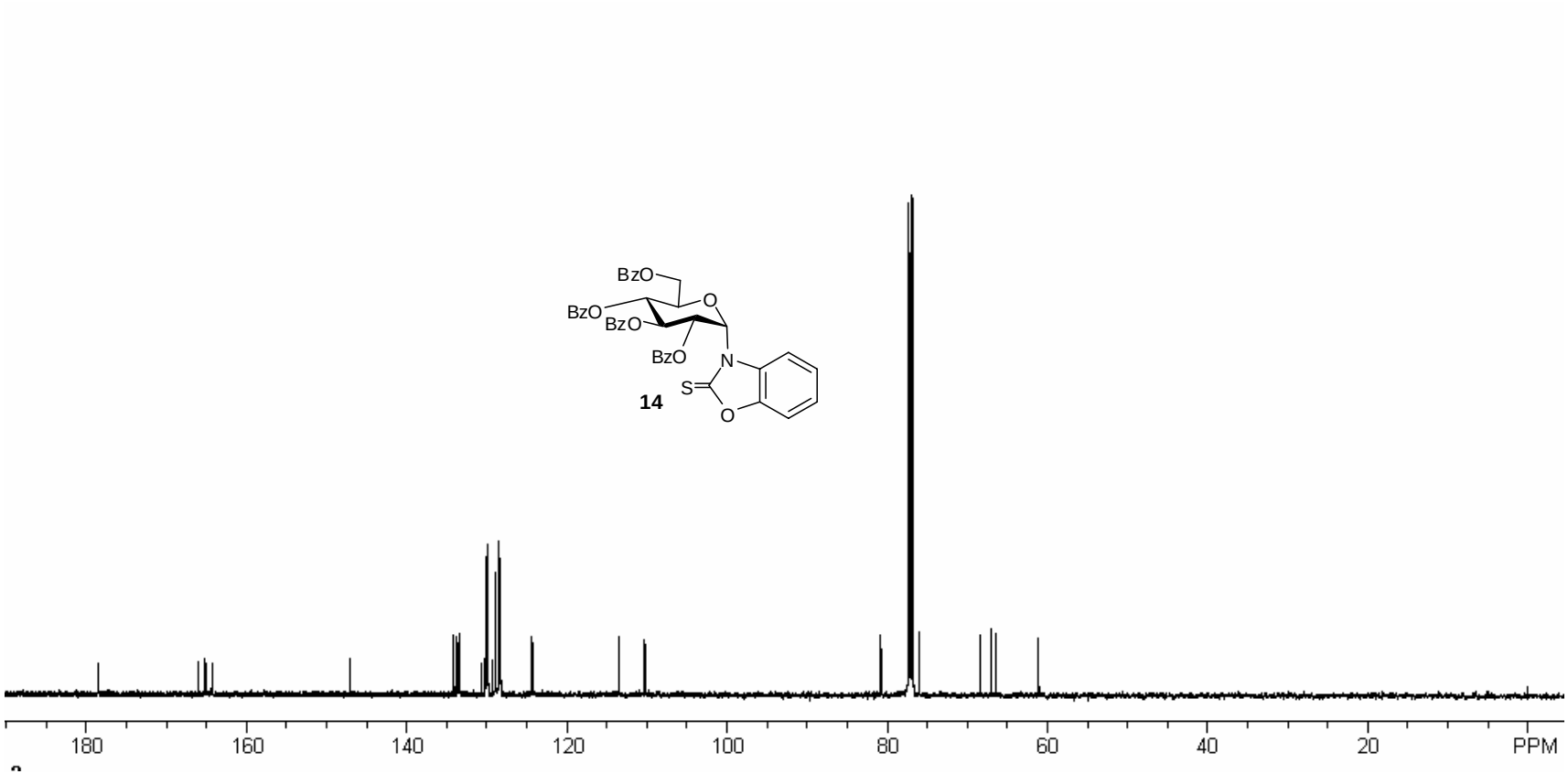
2-(2',3',4',6'-tetra-*O*-benzoyl-1-thio-α-D-glucopyranosyl)-benzoxazole (13)



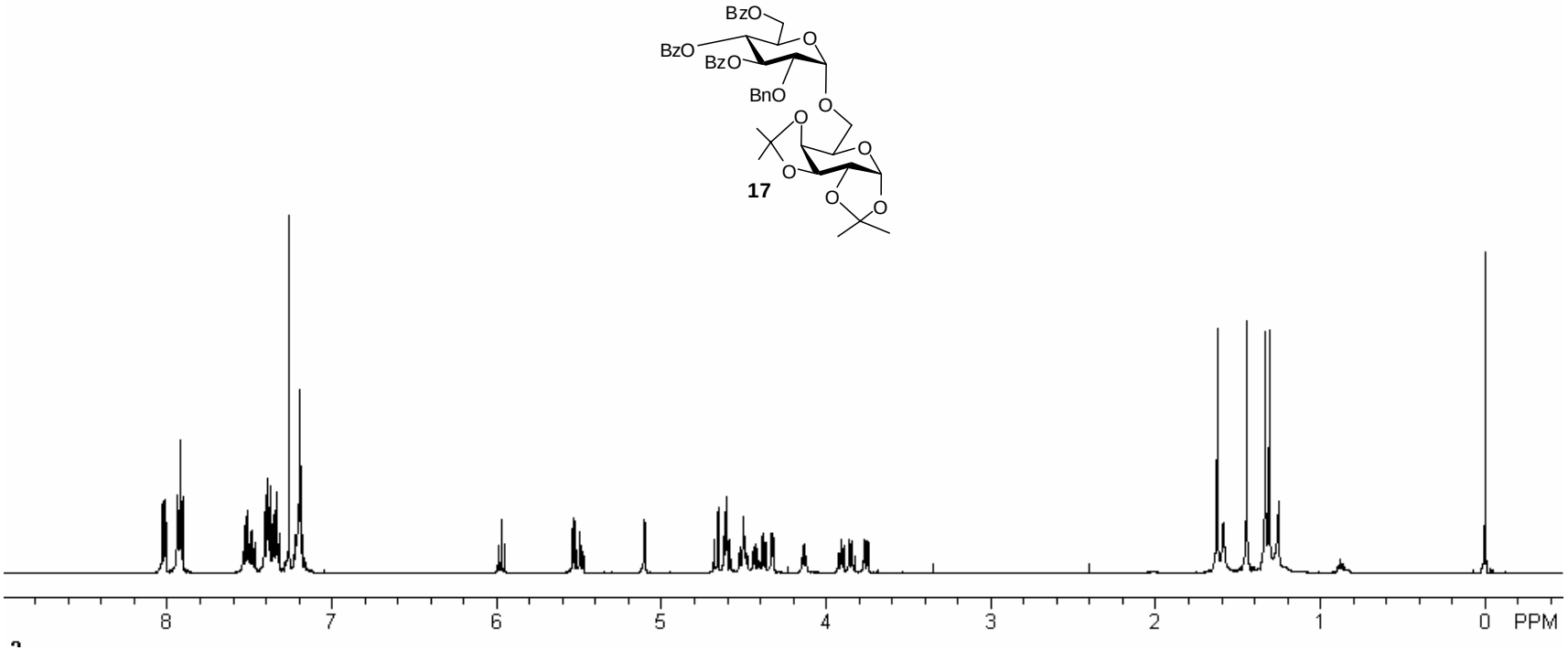
2-thioxo- 3-(2',3',4',6'-tetra-*O*-benzoyl-α-D-glucopyranosyl)-benzoxazole (14)



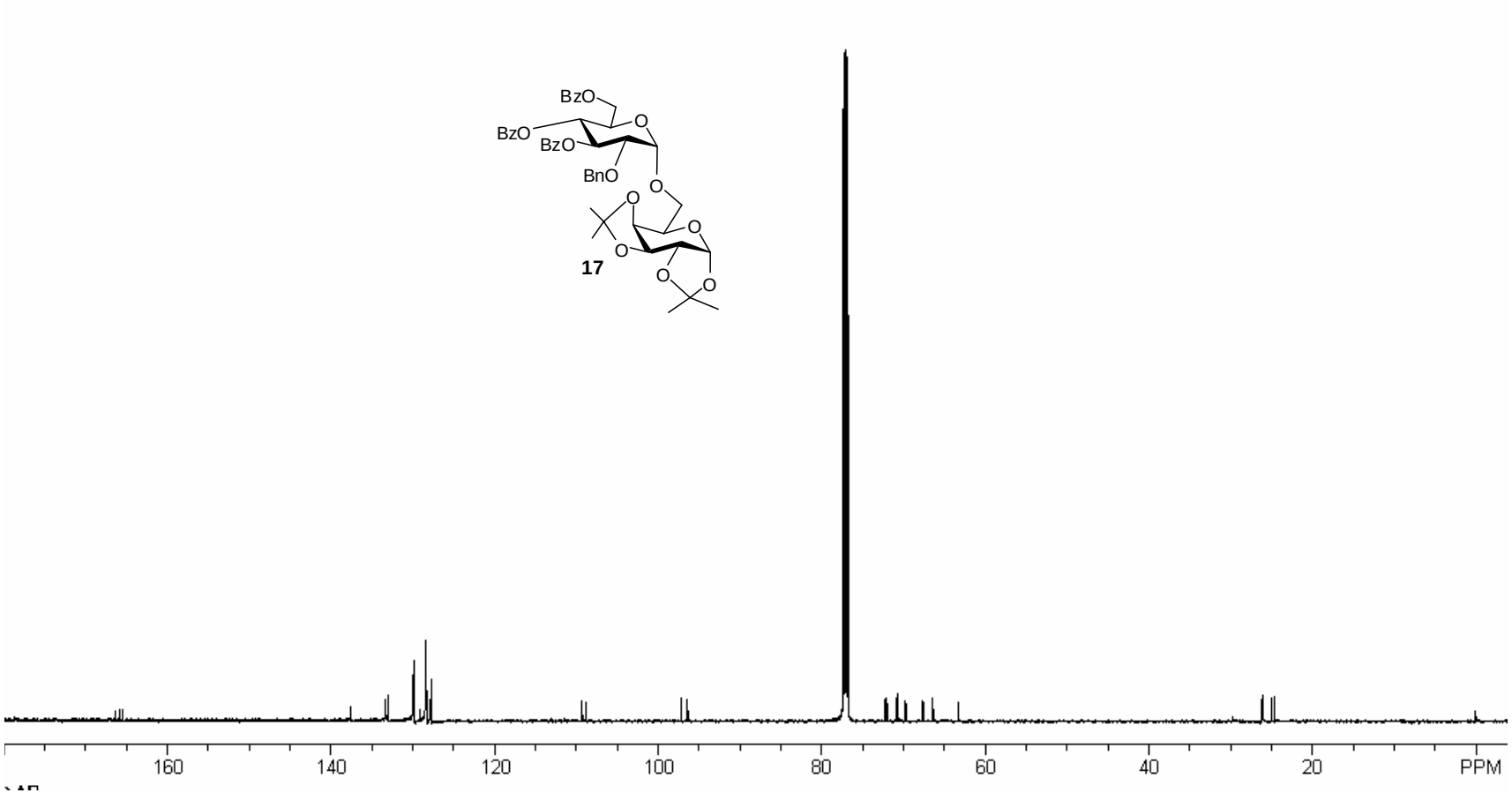
2-thioxo- 3-(2',3',4',6'-tetra-*O*-benzoyl-α-D-glucopyranosyl)-benzoxazole (14)



6-*O*-(2'-*O*-benzyl-3',4',6'-tri-*O*-Benzoyl-α-D-glucopyranosyl)-1,2:3,4-di-*O*-isopropylidene-α-D-galactopyranoside (17)



6-*O*-(2'-*O*-benzyl-3',4',6'-tri-*O*-Benzoyl-α-D-glucopyranosyl)-1,2:3,4-di-*O*-isopropylidene-α-D-galactopyranoside (17)



UV Spectra of Compound **11**, **13** and **14** in Ethanol