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Microwave promoted C-O coupling for synthesizing *O*-aryloxytriazole nucleoside analogues

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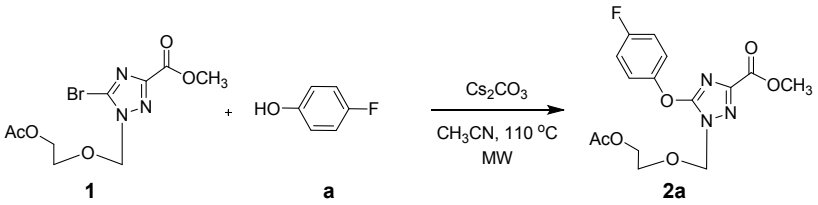
Table S1. Optimization of the reagent ratio.[a]



entry	phenol (**a**)	Cs_2CO_3	yield %
1	1.0 eq	1.0 eq	58
2	2.0 eq	1.0 eq	72
3	3.0 eq	1.0 eq	78
4	3.0 eq	1.5 eq	3
5	3.0 eq	2.0 eq	4
6	3.0 eq	0.5 eq	58

[a] compound **1** (0.10 mmol), solvent (0.75 mL), MW, 110 °C, calculated yield with ^{1}H NMR.

General: Chemicals were purchased from Sigma Aldrich or Alfa Aesar were used directly without purification. The adducts were purified by flash chromatography on silica gel (Merck 200-300 mesh). ^{1}H NMR spectra were recorded at 250 or 400 MHz and ^{13}C NMR spectra recorded at 62.5 or 100 MHz, on Bruker Avance II 250, Bruker Avance III 400 spectrometers, JEOL 400 spectrometers, respectively. The chemical shifts (δ) are expressed in parts per million (ppm) with the residual peak of $CHCl_3$ at 7.26 ppm. The high-resolution mass spectra (HRMS) were obtained with an MALDI/DHB or ESI-Positive mode on IonSpec 4.7 TESLA FTMS or Bruker Daltonics, Inc. APEXIII 7.0 TESLA FTMS. Thin Layer Chromatography (TLC) was performed on TLC plates silica gel 60 F_{254}, layer thickness 0.2 mm, Merck KGaA. The compound revelations were revealed by using UV light (254 nm).

General procedure A for synthesizing 2a-2n. Compound **1** (0.10 mmol), Cs_2CO_3 (0.10 mmol) were mixed in CH_3CN (0.75 mL) in an oven-dried 10 mL MW tube with a stirring bar under 110 ^{o}C for 30 min. Reactions were monitored by TLC. The reaction mixture was concentrated under reduced pressure and the crude residue purified by flash chromatography on silica gel using the mixture dichloromethane and menthol as eluent. The purified material was dried in vacuum to afford the corresponding product **2a-2n.**

General procedure B for synthesizing 4a-4n. Compound **3** (0.10 mmol), Cs_2CO_3 (0.10 mmol) were mixed in CH_3CN (0.75 mL) in an oven-dried 10 mL MW tube with a stirring bar under 110 ^{o}C for 30 min. Reactions were monitored by TLC. The reaction mixture was concentrated under reduced pressure and the crude residue purified by flash chromatography on silica gel using the mixture dichloromethane and menthol as eluent. The purified material was dried in vacuum to afford the corresponding product **4a-4n.**

2a: The desired product was obtained starting from compound **1** and 4-fluorophenol with a 78 % yield (27.6 mg) as white solid. ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.34-7.30 (m, 2H, phenyl-H), 7.09 (t, 2H, *J* = 8.6 Hz, phenyl-H), 5.57 (s, 2H, -O*CH*$_2$N-), 4.21 (t, 2H, *J* = 4.6 Hz, -OCH$_2$C*H*$_2$OAc), 3.94 (s, 3H, -C(O)O*CH*$_3$), 3.89 (t, 2H, *J* = 4.4 Hz, -O*CH*$_2$CH$_2$OAc), 2.03 (s, 3H, -C(O)*CH*$_3$); ^{13}C NMR (62.5 MHz, $CDCl_3$): δ 170.6, 160.2 (J_{CF} = 243.6 Hz), 159.7, 158.1, 150.8, 149.0 (J_{CF} = 2.8 Hz), 121.0 (J_{CF} = 8.5 Hz), 116.5 (J_{CF} = 23.6 Hz), 76.2, 68.0, 62.8, 52.8, 20.7. R_f = 0.34 (cyclohexane/ethyl acetate = 1:1). HRMS: calcd. for $C_{15}H_{17}FN_3O_6^+$, 354.1096, found 354.1093.

2b: The desired product was obtained starting from compound **1** and 3-fluorophenol with a 74 % yield (26.1 mg) as c white solid. ^{1}H NMR (250 MHz, $CDCl_3$): δ 7.41-7.32 (m, 1H, phenyl-H), 7.17-7.04 (m, 2H, phenyl-H), 7.00-6.93 (m, 1H, phenyl-H), 5.56 (s, 2H, -O*CH*$_2$N-), 4.20 (t, 2H, *J* = 4.6 Hz, -OCH$_2$C*H*$_2$OAc), 3.95 (s, 3H, -C(O)O*CH*$_3$), 3.87 (t, 2H, *J* = 4.6 Hz, -O*CH*$_2$CH$_2$OAc), 2.02 (s, 3H, -C(O)*CH*$_3$); ^{13}C NMR (62.5 MHz, $CDCl_3$): δ 170.6, 163.0 (J_{CF} = 247.1 Hz), 159.7, 157.4, 153.8 (J_{CF} = 10.9 Hz), 150.9, 130.7 (J_{CF} = 9.4 Hz), 115.0 (J_{CF} = 3.4 Hz), 113.1 (J_{CF} = 21.0 Hz), 107.5 (J_{CF} = 25.5 Hz), 76.3, 68.1, 62.7, 52.8, 20.7. R_f = 0.34 (cyclohexane/ethyl acetate = 1:1). HRMS: calcd. for $C_{15}H_{17}FN_3O_6^+$, 354.1096, found 354.1100.

2c: The desired product was obtained starting from compound **1** and 2-fluorophenol with a 50 % yield (17.6 mg) as white solid. ^{1}H NMR (250 MHz, $CDCl_3$): δ 7.50-7.43 (m, 1H, phenyl-H), 7.28-7.15 (m, 3H, phenyl-H), 5.61 (s, 2H, -O*CH*$_2$N-), 4.24 (t, 2H, *J* = 4.6 Hz, -OCH$_2$C*H*$_2$OAc), 3.95 (s, 3H, -C(O)O*CH*$_3$), 3.90 (t, 2H, *J* = 4.6 Hz, -O*CH*$_2$CH$_2$OAc), 2.06 (s, 3H, -C(O)*CH*$_3$); ^{13}C NMR (62.5 MHz, $CDCl_3$): δ 170.7, 159.7 , 158.0, 153.4 (J_{CF} = 248.6 Hz), 150.9, 140.5 (J_{CF} = 12.0 Hz), 127.6 (J_{CF} = 7.1 Hz), 124.9 (J_{CF} = 3.9 Hz), 122.4, 117.3 (J_{CF} = 17.8 Hz), 76.3, 68.0, 62.8, 52.8, 20.7. R_f = 0.31 (cyclohexane/ethyl acetate = 1:1). HRMS: calcd. for $C_{15}H_{17}FN_3O_6^+$, 354.1096, found 354.1096.

2d: The desired product was obtained starting from compound **1** and 4-(trifluoromethyl)phenol with a 62 % yield (24.9 mg) as white solid. ^{1}H NMR (250 MHz, $CDCl_3$): δ 7.69 (d, 2H, *J* = 9.0 Hz, phenyl-H), 7.51 (d, 2H, *J* = 9.0 Hz, phenyl-H), 5.59 (s, 2H, -O*CH*$_2$N-), 4.22 (t, 2H, *J* = 4.6 Hz, -OCH$_2$C*H*$_2$OAc), 3.97 (s, 3H, -

C(O)O*CH*$_3$), 3.90 (t, 2H, *J* = 4.6 Hz, -O*CH*$_2$CH$_2$OAc), 2.03 (s, 3H, -C(O)*CH*$_3$); ^{13}C NMR (62.5 MHz, $CDCl_3$): δ 170.7, 159.7, 157.2, 155.4, 150.9, 128.4 (J_{CF} = 32.8 Hz), 127.4 (J_{CF} = 3.8 Hz), 123.6 (J_{CF} = 270.1 Hz), 119.7, 76.4, 68.2, 62.7, 52.9, 20.7. R_f = 0.35 (cyclohexane/ethyl acetate = 1:1). HRMS: calcd. for $C_{16}H_{17}F_3N_3O_6^+$, 404.1064, found 404.1068.

2e: The desired product was obtained starting from compound **1** and 3-(trifluoromethyl)phenol with a 80 % yield (32.1 mg) as white solid. ^{1}H NMR (250 MHz, $CDCl_3$): δ 7.62-7.52 (m, 4H, phenyl-H), 5.57 (s, 2H, -O*CH*$_2$N-), 4.20 (t, 2H, *J* = 4.5 Hz, -OCH$_2$C*H*$_2$OAc), 3.94 (s, 3H, -C(O)O*CH*$_3$), 3.88 (t, 2H, *J* = 4.6 Hz, -O*CH*$_2$CH$_2$OAc), 2.01 (s, 3H, -C(O)*CH*$_3$); ^{13}C NMR (62.5 MHz, $CDCl_3$): δ 170.6, 159.6, 157.4, 153.1, 150.8, 132.4 (J_{CF} = 33.0 Hz), 130.6, 123.2 (J_{CF} = 270.8 Hz), 122.9 (J_{CF} = 3.9 Hz), 116.7 (J_{CF} = 3.9 Hz), 76.3, 68.1, 62.7, 52.8, 20.6. R_f = 0.38 (cyclohexane/ethyl acetate = 1:1). HRMS: calcd. for $C_{16}H_{17}F_3N_3O_6^+$, 404.1064, found 404.1064.

2f: The desired product was obtained starting from compound **1** and 2-(trifluoromethyl)phenol with a 35 % yield (14.1 mg) as white solid. ^{1}H NMR (400MHz, $CDCl_3$): δ 7.73-7.64 (m, 3H, phenyl-H), 7.39 (t, 1H, *J* = 7.6 Hz, phenyl-H), 5.60 (s, 2H, -O*CH*$_2$N-), 4.22 (t, 2H, *J* = 4.6 Hz, -OCH$_2$C*H*$_2$OAc), 3.96 (s, 3H, -C(O)O*CH*$_3$), 3.88 (t, 2H, *J* = 4.6 Hz, -O*CH*$_2$CH$_2$OAc), 2.05 (s, 3H, -C(O)*CH*$_3$); ^{13}C NMR (100 MHz, $CDCl_3$): δ 170.8, 159.7, 157.3, 150.8, 150.1, 133.9, 127.3 (J_{CF} = 7.3 Hz), 126.2, 122.8 (J_{CF} = 271.2 Hz), 121.7 (J_{CF} = 31.8 Hz), 76.3, 68.0, 62.8, 52.9, 20.7. R_f = 0.34 (cyclohexane/ethyl acetate = 1:1). HRMS: calcd. for $C_{16}H_{17}F_3N_3O_6^+$, 404.1064, found 404.1068.

2g: The desired product was obtained starting from compound **1** and 4-chlorophenol with a 61 % yield (22.5 mg) as white solid. ^{1}H NMR (250 MHz, $CDCl_3$): δ 7.40-7.29 (m, 4H, phenyl-H), 5.57 (s, 2H, -O*CH*$_2$N-), 4.22 (t, 2H, *J* = 4.6 Hz, -OCH$_2$C*H*$_2$OAc), 3.96 (s, 3H, -C(O)O*CH*$_3$), 3.89 (t, 2H, *J* = 4.6 Hz, -O*CH*$_2$CH$_2$OAc), 2.03 (s, 3H, -C(O)*CH*$_3$); ^{13}C NMR (62.5 MHz, $CDCl_3$): δ 170.7, 159.7, 157.7, 151.6, 150.9, 131.5, 130.0, 120.8, 76.3, 68.1, 62.8, 52.9, 20.8. R_f = 0.33 (cyclohexane/ethyl acetate = 1:1). HRMS: calcd. for $C_{15}H_{16}ClN_3NaO_6^+$, 392.0620, found 392.0620.

2h: The desired product was obtained starting from compound **1** and phenol with a 44 % yield (14.7 mg) as a white solid. ^{1}H NMR (250 MHz, $CDCl_3$): δ 7.43-7.20 (m, 5H, -phenyl-H), 5.56 (s, 2H, -O*CH*$_2$N-), 4.20 (t, 2H, *J* = 4.6 Hz, -OCH$_2$C*H*$_2$OAc), 3.93 (s, 3H, -C(O)O*CH*$_3$), 3.87 (t, 2H, *J* = 4.8 Hz, -O*CH*$_2$CH$_2$OAc), 2.02 (s, 3H, -C(O)*CH*$_3$); ^{13}C NMR (62.5 MHz, $CDCl_3$): δ 170.8, 159.9, 158.1, 153.3, 150.9, 130.0, 126.1, 119.3, 76.2, 68.0, 62.8, 52.8, 20.8. R_f = 0.33 (cyclohexane/ethyl acetate = 1:1). HRMS: calcd. for $C_{15}H_{18}N_3O_6^+$, 336.1190, found 336.1196.

2i: The desired product was obtained starting from compound **1** and 4-methylphenol with a 34 % yield (11.9 mg) as white solid. ^{1}H NMR (250 MHz, $CDCl_3$): δ 7.20 (s, 4H, phenyl-H), 5.56 (s, 2H, -O*CH*$_2$N-), 4.22 (t, 2H, *J* = 4.6 Hz, -OCH$_2$C*H*$_2$OAc), 3.94 (s, 3H, -C(O)O*CH*$_3$), 3.89 (t, 2H, *J* = 4.8 Hz, -O*CH*$_2$CH$_2$OAc), 2.35 (s, 3H, -Ph*CH*$_3$), 2.04 (s, 3H, -C(O)*CH*$_3$); ^{13}C NMR (62.5 MHz, $CDCl_3$): δ 170.7, 159.9, 158.4, 151.2, 135.8, 130.3, 119.2, 76.2, 68.0, 62.8, 52.8, 20.8. R_f = 0.38 (cyclohexane/ethyl acetate = 1:1). HRMS: calcd. for $C_{16}H_{20}N_3O_6^+$, 350.1347, found 350.1348.

2j: The desired product was obtained starting from compound **1** and 3-methylphenol with a 37 % yield (12.9 mg) as white solid. ^{1}H NMR (250 MHz, $CDCl_3$): δ 7.31-7.24 (m, 1H, phenyl-H), 7.13-7.04 (m, 3H, phenyl-H), 5.56 (s, 2H, -O*CH*$_2$N-), 4.22 (t, 2H, *J* = 4.6 Hz, -OCH$_2$C*H*$_2$OAc), 3.95 (s, 3H, -C(O)O*CH*$_3$), 3.88 (t, 2H, *J* = 4.8 Hz, -O*CH*$_2$CH$_2$OAc), 2.37 (s, 3H, -Ph*CH*$_3$), 2.04 (s, 3H, -C(O)*CH*$_3$); ^{13}C NMR (62.5 MHz, $CDCl_3$): δ 170.7, 159.9, 158.2, 153.3, 150.9, 140.3, 129.6, 126.9, 119.8, 116.3, 76.2, 68.0, 62.8, 52.8, 21.3, 20.8. R_f = 0.38 (cyclohexane/ethyl acetate = 1:1). HRMS: calcd. for $C_{16}H_{20}N_3O_6^+$, 350.1347, found 350.1349.

2k: The desired product was obtained starting from compound **1** and 2-methylphenol with a 32 % yield (11.2 mg) as white solid. ^{1}H NMR (250 MHz, $CDCl_3$): δ 7.30-7.13 (m, 4H, phenyl-H), 5.59 (s, 2H, -O*CH*$_2$N-), 4.23 (t, 2H, *J* = 4.6 Hz, -OCH$_2$C*H*$_2$OAc), 3.94 (s, 3H, -C(O)O*CH*$_3$), 3.90 (t, 2H, *J* = 4.6 Hz, -O*CH*$_2$CH$_2$OAc), 2.26 (s, 3H, -Ph*CH*$_3$), 2.04 (s, 3H, -C(O)*CH*$_3$); ^{13}C NMR (62.5 MHz, $CDCl_3$): δ 170.7, 159.9, 158.3, 151.7, 151.0, 131.7, 129.0, 127.5, 126.4, 119.9, 76.2, 67.9, 62.9, 52.8, 20.8, 16.0. R_f = 0.35 (cyclohexane/ethyl acetate = 1:1). HRMS: calcd. for $C_{16}H_{20}N_3O_6^+$, 350.1347, found 350.1346.

2l: The desired product was obtained starting from compound **1** and 4-*n*-pentylphenol with a 44 % yield (17.8 mg) as white solid. ^{1}H NMR (250 MHz, $CDCl_3$): δ 7.25-7.17 (m, 4H, phenyl-H), 5.56 (s, 2H, -O*CH*$_2$N-), 4.22 (t, 2H, *J* = 4.5 Hz, -OCH$_2$C*H*$_2$OAc), 3.95 (s, 3H, -C(O)O*CH*$_3$), 3.89 (t, 2H, *J* = 4.6 Hz, -O*CH*$_2$CH$_2$OAc), 2.60 (t, 2H, *J* = 7.6 Hz, -*CH*$_2$(CH$_2$)$_3$CH$_3$), 2.04 (s, 3H, -C(O)*CH*$_3$), 1.66-1.57 (m, 2H, -CH$_2$*CH*$_2$(CH$_2$)$_2$CH$_3$), 1.34-1.30 (m, 4H, -CH$_2$CH$_2$*(CH*$_2$*)*$_2$CH$_3$), 0.92-0.87 (m, 3H, -CH$_2$CH$_2$*(CH*$_2$*)*$_2$CH$_3$); ^{13}C NMR (62.5 MHz, $CDCl_3$): δ 170.7, 159.9, 158.3, 151.3, 150.9, 140.9, 129.7, 119.1, 76.2, 68.0, 62.8, 52.8, 35.2, 31.2, 31.1, 26.9, 22.5, 20.8, 14.0. R_f = 0.44 (cyclohexane/ethyl acetate = 1:1). HRMS: calcd. for $C_{20}H_{28}N_3O_6^+$, 406.1973, found 406.1975.

2m: The desired product was obtained starting from compound **1** and 4-*n*-heptylphenol with a 47 % yield (20.3 mg) as white solid. ^{1}H NMR (250 MHz, $CDCl_3$): δ 7.25-7.17 (m, 4H, phenyl-H), 5.56 (s, 2H, -O*CH*$_2$N-), 4.22 (t, 2H, *J* = 4.6 Hz, -OCH$_2$C*H*$_2$OAc), 3.95 (s, 3H, -C(O)O*CH*$_3$), 3.89 (t, 2H, *J* = 4.6 Hz, -O*CH*$_2$CH$_2$OAc), 2.59 (t, 2H, *J* = 7.6 Hz, -*CH*$_2$(CH$_2$)$_5$CH$_3$), 2.04 (s, 3H, -C(O)*CH*$_3$), 1.31-1.25 (m, 10H, -CH$_2$(*CH*$_2$)$_5$CH$_3$), 0.91-0.85 (m, 3H, -CH$_2$(CH$_2$)$_5$*CH*$_3$); ^{13}C NMR (62.5 MHz, $CDCl_3$): δ 170.8, 159.9, 158.3, 151.3, 150.9, 140.9, 129.8, 129.7, 119.1, 76.2, 68.0, 62.9, 52.8, 35.3, 31.8, 31.4, 29.2, 29.1, 22.6, 20.8, 14.1. R_f = 0.50 (cyclohexane/ethyl acetate = 1:1). HRMS: calcd. for $C_{22}H_{32}N_3O_6^+$, 434.2286, found 434.2291.

2n: The desired product was obtained starting from compound **1** and 4-methoxyphenol with a 40 % yield (14.6 mg) as white solid. ^{1}H NMR (250 MHz, $CDCl_3$): δ 7.27-7.22 (m, 2H, phenyl-H), 6.92-6.89 (m, 2H, phenyl-H), 5.56 (s, 2H, -O*CH*$_2$N-), 4.22 (t, 2H, *J* = 4.6 Hz, -OCH$_2$C*H*$_2$OAc), 3.94 (s, 3H, -C(O)O*CH*$_3$), 3.89 (t, 2H, *J* = 4.6 Hz, -O*CH*$_2$CH$_2$OAc), 3.81 (s, 3H, -O*CH*$_3$); 2.04 (s, 3H, -C(O)*CH*$_3$); ^{13}C NMR (62.5 MHz, $CDCl_3$): δ 170.8, 159.9, 158.7, 157.5, 150.9, 146.9, 120.6, 114.9, 76.2, 68.0, 62.9, 55.7, 52.8, 20.8. R_f = 0.26 (cyclohexane/ethyl acetate = 1:1). HRMS: calcd. for $C_{16}H_{20}FN_3O_7^+$, 366.1296, found 366.1298.

4a: The desired product was obtained starting from compound **3** and 4-fluorophenol with a 86 % yield (29.0 mg) as white solid. ^{1}H NMR (250 MHz, $CDCl_3$): δ 7.35-7.29 (m, 2H, phenyl-H), 7.14-7.07 (m, 2H, phenyl-H), 6.78 (s, 1H, -C(O)NH$_2$), 5.86 (s, 1H,

-C(O)NH_2), 5.56 (s, 2H, -OCH_2N-), 4.23 (t, 2H, J = 4.6 Hz, -OCH$_2$CH_2OAc), 3.91 (t, 2H, J = 4.8 Hz, -OCH_2CH$_2$OAc), 2.05 (s, 3H, -C(O)CH_3); ^{13}C NMR (100 MHz, $CDCl_3$): δ 170.8, 160.5, 160.2 (J_{CF} = 244.3 Hz), 157.8, 152.4, 149.0, 121.2 (J_{CF} = 8.5 Hz), 116.5 (J_{CF} = 23.6 Hz), 76.1, 68.1, 62.8, 20.8. R_f = 0.49 (dichloromethane/methanol = 10:1). HRMS: calcd. for $C_{14}H_{15}FN_4NaO_5^+$, 361.0919, found 361.0909.

4b: The desired product was obtained starting from compound **3** and 3-fluorophenol with a 88 % yield (29.7 mg) as white solid. ^{1}H NMR (250 MHz, $CDCl_3$): δ 7.44-7.35 (m, 1H, phenyl-H), 7.17-7.11 (m, 2H, phenyl-H), 7.04-6.96 (m, 1H, phenyl-H), 6.81 (s, 1H, -C(O)NH_2), 6.07 (s, 1H, -C(O)NH_2), 5.56 (s, 2H, -OCH_2N-), 4.22 (t, 2H, J = 4.6 Hz, -OCH$_2$CH_2OAc), 3.91 (t, 2H, J = 4.6 Hz, -OCH_2CH$_2$OAc), 2.04 (s, 3H, -C(O)CH_3); ^{13}C NMR (62.5 MHz, $CDCl_3$): δ 170.8, 163.0 (J_{CF} = 247.1 Hz), 160.4, 157.2, 153.8 (J_{CF} = 10.8 Hz), 152.5, 130.8 (J_{CF} = 9.4 Hz), 115.1 (J_{CF} = 3.4 Hz), 113.2 (J_{CF} = 20.9 Hz), 107.7 (J_{CF} = 25.4 Hz), 76.2, 68.1, 62.8, 20.8. R_f = 0.51 (dichloromethane/methanol = 10:1). HRMS: calcd. for $C_{14}H_{15}FN_4NaO_5^+$, 361.0919, found 361.0904.

4c: The desired product was obtained starting from compound **3** and 2-fluorophenol with a 84 % yield (28.4 mg) as white solid. ^{1}H NMR (250 MHz, $CDCl_3$): δ 7.46-7.42 (m, 1H, J = 7.8 Hz, phenyl-H), 7.31-7.19 (m, 3H, phenyl-H), 6.75 (s, 1H, -C(O)NH_2), 5.69 (s, 1H, -C(O)NH_2), 5.59 (s, 2H, -OCH_2N-), 4.24 (t, 2H, J = 4.6 Hz, -OCH$_2$CH_2OAc), 3.92 (t, 2H, J = 4.8 Hz, -OCH_2CH$_2$OAc), 2.05 (s, 3H, -C(O)CH_3); ^{13}C NMR (62.5 MHz, d_6-DMSO and $CDCl_3$): δ 171.1, 160.8, 157.5, 153.2 (J_{CF} = 248.6 Hz), 152.2, 140.2 (J_{CF} = 12.1 Hz), 127.5 (J_{CF} = 7.1 Hz), 124.6 (J_{CF} = 4.0 Hz), 122.3, 117.0 (J_{CF} = 17.8 Hz), 76.0, 67.6, 62.8, 20.3. R_f = 0.53 (dichloromethane/methanol = 10:1). HRMS: calcd. for $C_{14}H_{15}FN_4NaO_5^+$, 361.0919, found 361.0915.

4d: The desired product was obtained starting from compound **3** and 4-(trifluoromethyl)phenol with a 55 % yield (21.4 mg) as white solid. ^{1}H NMR (250 MHz, $CDCl_3$): δ 7.70 (d, 2H, J = 8.5 Hz, phenyl-H), 7.50 (d, 2H, J = 8.5 Hz, phenyl-H), 6.80 (s, 1H, -C(O)NH_2), 6.12 (s, 1H, -C(O)NH_2), 5.57 (s, 2H, -OCH_2N-), 4.22 (t,

2H, *J* = 4.6 Hz, -OCH$_2$C*H*$_2$OAc), 3.91 (t, 2H, *J* = 4.6 Hz, -O*CH*$_2$CH$_2$OAc), 2.04 (s, 3H, -C(O)*CH*$_3$); ^{13}C NMR (100 MHz, $CDCl_3$): δ 170.8, 160.4, 157.0, 155.3, 152.5, 128.4 (J_{CF} = 32.8 Hz), 127.3 (J_{CF} = 3.6 Hz), 123.6 (J_{CF} = 270.4 Hz), 119.8, 76.2, 68.2, 62.8, 20.8. R_f = 0.53 (dichloromethane/methanol = 10:1). HRMS: calcd. for $C_{15}H_{15}F_3N_4NaO_5^+$, 411.0887, found 411.0879.

4e: The desired product was obtained starting from compound **3** and 3-(trifluoromethyl)phenol with a 81 % yield (31.4 mg) as white solid. ^{1}H NMR (250 MHz, $CDCl_3$): δ 7.61-7.54 (m, 4H, phenyl-H), 6.79 (s, 1H, -C(O)*NH*$_2$), 6.20 (s, 1H, -C(O)*NH*$_2$), 5.57 (s, 2H, -O*CH*$_2$N-), 4.22 (t, 2H, *J* = 4.8 Hz, -OCH$_2$C*H*$_2$OAc), 3.91 (t, 2H, *J* = 4.6 Hz, -O*CH*$_2$CH$_2$OAc), 2.03 (s, 3H, -C(O)*CH*$_3$); ^{13}C NMR (62.5 MHz, $CDCl_3$): δ 170.7, 160.4, 157.2, 153.1, 152.5, 132.5 (J_{CF} = 33.1 Hz), 130.6, 123.3 (J_{CF} = 270.8 Hz), 123.0 (J_{CF} = 10.2 Hz), 121.1, 116.9 (J_{CF} = 3.8 Hz), 76.2, 68.2, 62.8, 20.7. R_f = 0.53 (dichloromethane/methanol = 10:1). HRMS: calcd. for $C_{15}H_{15}F_3N_4NaO_5^+$, 411.0887, found 411.0877.

4f: The desired product was obtained starting from compound **3** and 2-(trifluoromethyl)phenol with a 48 % yield (18.6 mg) as colorless oil. ^{1}H NMR (400MHz, $CDCl_3$): δ 7.73-7.65 (m, 3H, phenyl-H), 7.40 (t, 2H, *J* = 7.2 Hz, phenyl-H), 6.79 (s, 1H, -C(O)*NH*$_2$), 6.10 (s, 1H, -C(O)*NH*$_2$), 5.57 (s, 2H, -O*CH*$_2$N-), 4.22 (t, 2H, *J* = 4.6 Hz, -OCH$_2$C*H*$_2$OAc), 3.89 (t, 2H, *J* = 4.8 Hz, -O*CH*$_2$CH$_2$OAc), 2.05 (s, 3H, -C(O)*CH*$_3$); ^{13}C NMR (100 MHz, $CDCl_3$): δ 170.8, 160.5, 157.2, 152.5, 150.1, 133.7, 127.2 (J_{CF} = 4.7 Hz), 126.2, 122.7 (J_{CF} = 271.4 Hz), 121.8 (J_{CF} = 31.8 Hz), 76.2, 68.0, 62.8, 20.8. R_f = 0.58 (dichloromethane/methanol = 10:1). HRMS: calcd. for $C_{15}H_{15}F_3N_4NaO_5^+$, 411.0887, found 411.0884.

4g: The desired product was obtained starting from compound **3** and 4-chlorophenol with a 84 % yield (29.7 mg) as white solid. ^{1}H NMR (250 MHz, $CDCl_3$): δ 7.41-7.28 (m, 4H, phenyl-H), 6.79 (s, 1H, -C(O)*NH*$_2$), 6.10 (s, 1H, -C(O)*NH*$_2$), 5.55 (s, 2H, -O*CH*$_2$N-), 4.21 (t, 2H, *J* = 4.8 Hz, -OCH$_2$C*H*$_2$OAc), 3.90 (t, 2H, *J* = 4.8 Hz, -O*CH*$_2$CH$_2$OAc), 2.04 (s, 3H, -C(O)*CH*$_3$); ^{13}C NMR (62.5 MHz, $CDCl_3$): δ 170.7, 160.4, 157.5, 152.5, 151.6, 131.5, 129.9, 120.9, 76.2, 68.1, 62.8, 20.8. R_f = 0.56 (dichloromethane/methanol = 10:1). HRMS: calcd. for $C_{14}H_{15}ClN_4NaO_5^+$, 377.0623,

found 377.0621.

4h: The desired product was obtained starting from compound **3** and phenol with a 85 % yield (27.2 mg) as a white solid. ^{1}H NMR (250 MHz, $CDCl_3$): δ 7.47-7.28 (m, 5H, -phenyl-H), 6.80 (s, 1H, -C(O)*NH*$_2$), 5.64 (s, 1H, -C(O)*NH*$_2$), 5.57 (s, 2H, -O*CH*$_2$N-), 4.23 (t, 2H, *J* = 4.8 Hz, -OCH$_2$C*H*$_2$OAc), 3.92 (t, 2H, *J* = 4.6 Hz, -O*CH*$_2$CH$_2$OAc), 2.05 (s, 3H, -C(O)*CH*$_3$); ^{13}C NMR (62.5 MHz, $CDCl_3$): δ 170.7, 160.7, 157.7, 153.3, 152.5, 129.8, 126.1, 119.5, 76.1, 68.0, 62.8, 20.7. R_f = 0.50 (dichloromethane/methanol = 10:1). HRMS: calcd. for $C_{14}H_{16}N_4NaO_5^+$, 343.1013, found 343.1008.

4i: The desired product was obtained starting from compound **3** and 4-methylphenol with a 88 % yield (29.4 mg) as white solid. ^{1}H NMR (250 MHz, $CDCl_3$): δ 7.18 (s, 4H, phenyl-H), 6.83 (s, 1H, -C(O)*NH*$_2$), 6.41 (s, 1H, -C(O)*NH*$_2$), 5.53 (s, 2H, -O*CH*$_2$N-), 4.20 (t, 2H, *J* = 4.6 Hz, -OCH$_2$C*H*$_2$OAc), 3.89 (t, 2H, *J* = 4.6 Hz, -O*CH*$_2$CH$_2$OAc), 2.34 (s, 3H, -Ph*CH*$_3$), 2.02 (s, 3H, -C(O)*CH*$_3$); ^{13}C NMR (62.5 MHz, $CDCl_3$): δ 170.7, 160.8, 158.0, 152.5, 151.1, 135.9, 130.2, 119.3, 76.0, 68.0, 62.8, 20.8. R_f = 0.56 (dichloromethane/methanol = 10:1). HRMS: calcd. for $C_{15}H_{18}N_4NaO_5^+$, 357.1169, found 357.1176.

4j: The desired product was obtained starting from compound **3** and 3-methylphenol with a 80 % yield (26.7 mg) as white solid. ^{1}H NMR (250 MHz, $CDCl_3$): δ 7.33-7.27 (m, 1H, phenyl-H), 7.10 (t, 3H, *J* = 7.3 Hz, phenyl-H), 6.81 (s, 1H, -C(O)*NH*$_2$), 5.87 (s, 1H, -C(O)*NH*$_2$), 5.55 (s, 2H, -O*CH*$_2$N-), 4.22 (t, 2H, *J* = 4.6 Hz, -OCH$_2$C*H*$_2$OAc), 3.91 (t, 2H, *J* = 4.8 Hz, -O*CH*$_2$CH$_2$OAc), 2.39 (s, 3H, -Ph*CH*$_3$), 2.05 (s, 3H, -C(O)*CH*$_3$); ^{13}C NMR (62.5 MHz, $CDCl_3$): δ 170.8, 160.6, 157.9, 153.3, 152.6, 151.2, 140.3, 129.6, 126.9, 120.0, 116.4, 76.1, 68.0, 62.9, 21.3, 20.8. R_f = 0.47 (dichloromethane/methanol = 10:1). HRMS: calcd. for $C_{15}H_{18}N_4NaO_5^+$, 357.1169, found 357.1175.

4k: The desired product was obtained starting from compound **3** and 2-methylphenol with a 74 % yield (24.7 mg) as white solid. ^{1}H NMR (250 MHz, $CDCl_3$): δ 7.29-7.16 (m, 4H, phenyl-H), 6.77 (s, 1H, -C(O)*NH*$_2$), 5.74 (s, 1H, -C(O)*NH*$_2$), 5.58 (s, 2H, -O*CH*$_2$N-), 4.22 (t, 2H, *J* = 5.0 Hz, -OCH$_2$C*H*$_2$OAc), 3.92 (t, 2H, *J* = 4.6 Hz, -

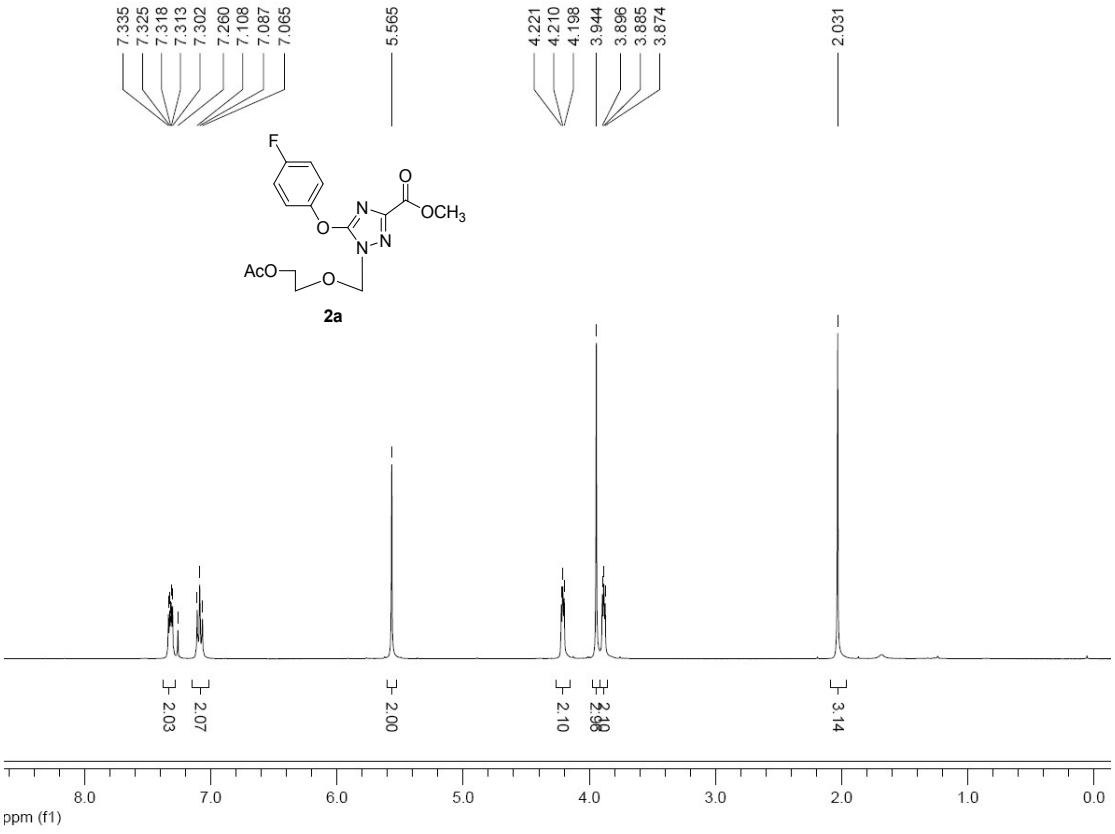
O*CH*$_2$CH$_2$OAc), 2.26 (s, 3H, -Ph*CH*$_3$), 2.05 (s, 3H, -C(O)*CH*$_3$); ^{13}C NMR (62.5 MHz, $CDCl_3$): δ 170.7, 160.6, 157.9, 152.5, 151.7, 131.7, 129.3, 127.3, 126.4, 120.1, 76.1, 68.0, 62.9, 20.8, 16.0. R_f = 0.51 (dichloromethane/methanol = 10:1). HRMS: calcd. for $C_{15}H_{18}N_4NaO_5^+$, 357.1169, found 357.1183.

4l: The desired product was obtained starting from compound **3** and 4-*n*-pentylphenol with a 81 % yield (31.6 mg) as white solid. ^{1}H NMR (250 MHz, $CDCl_3$): δ 7.20 (s, 4H, phenyl-H), 6.83 (s, 1H, -C(O)*NH*$_2$), 6.24 (s, 1H, -C(O)*NH*$_2$), 5.54 (s, 2H, -O*CH*$_2$N-), 4.21 (t, 2H, *J* = 4.6 Hz, -OCH$_2$C*H*$_2$OAc), 3.90 (t, 2H, *J* = 4.6 Hz, -O*CH*$_2$CH$_2$OAc), 2.60 (t, 2H, *J* = 7.8 Hz, -*CH*$_2$(CH$_2$)$_3$CH$_3$), 2.03 (s, 3H, -C(O)*CH*$_3$), 1.64-1.55 (m, 2H, -CH$_2$*CH*$_2$(CH$_2$)$_2$CH$_3$), 1.34-1.25 (m, 4H, -CH$_2$CH$_2$*(CH*$_2$*)*$_2$CH$_3$), 0.91-0.86 (m, 3H, -CH$_2$CH$_2$*(CH*$_2$*)*$_2$CH$_3$); ^{13}C NMR (62.5 MHz, $CDCl_3$): δ 170.7, 160.7, 158.0, 152.5, 151.3, 140.9, 129.6, 119.2, 76.0, 68.0, 62.8, 35.2, 31.4, 31.1, 22.4, 20.7, 13.9. R_f = 0.53 (dichloromethane/methanol = 10:1). HRMS: calcd. for $C_{19}H_{26}N_4NaO_5^+$, 413.1795, found 413.1779.

4m: The desired product was obtained starting from compound **3** and 4-*n*-heptylphenol with a 84 % yield (35.1 mg) as white solid. ^{1}H NMR (250 MHz, $CDCl_3$): δ 7.21 (s, 4H, phenyl-H), 6.81 (s, 1H, -C(O)*NH*$_2$), 5.84 (s, 1H, -C(O)*NH*$_2$), 5.55 (s, 2H, -O*CH*$_2$N-), 4.22 (t, 2H, *J* = 4.6 Hz, -OCH$_2$C*H*$_2$OAc), 3.91 (t, 2H, *J* = 4.8 Hz, -O*CH*$_2$CH$_2$OAc), 2.61 (t, 2H, *J* = 7.6 Hz, -*CH*$_2$(CH$_2$)$_5$CH$_3$), 2.05 (s, 3H, -C(O)*CH*$_3$), 1.63-1.58 (m, 2H, -CH$_2$*CH*$_2$(CH$_2$)$_4$CH$_3$), 1.32-1.28 (m, 8H, -CH$_2$CH$_2$*(CH*$_2$*)*$_4$CH$_3$), 0.91-0.86 (m, 3H, -CH$_2$CH$_2$(CH$_2$)$_4$*CH*$_3$); ^{13}C NMR (62.5 MHz, $CDCl_3$): δ 170.7, 160.7, 158.0, 152.5, 151.3, 140.9, 129.6, 119.2, 76.0, 68.0, 62.9, 35.2, 31.7, 31.4, 29.2, 29.1, 22.6, 20.8, 14.0. R_f = 0.49 (dichloromethane/methanol = 10:1). HRMS: calcd. for $C_{21}H_{30}N_4NaO_5^+$, 441.2108, found 441.2114.

4n: The desired product was obtained starting from compound **3** and 4-methoxyphenol with a 80 % yield (28.0 mg) as white solid. ^{1}H NMR (250 MHz, $CDCl_3$): δ 7.24-7.21 (m, 2H, phenyl-H), 6.94-6.91 (m, 2H, phenyl-H), 6.79 (s, 1H, -C(O)*NH*$_2$), 5.63 (s, 1H, -C(O)*NH*$_2$), 5.55 (s, 2H, -O*CH*$_2$N-), 4.23 (t, 2H, *J* = 4.8 Hz, -OCH$_2$C*H*$_2$OAc), 3.92 (t, 2H, *J* = 4.6 Hz, -O*CH*$_2$CH$_2$OAc), 3.82 (s, 3H, -O*CH*$_3$); 2.05 (s, 3H, -C(O)*CH*$_3$); ^{13}C NMR (62.5 MHz, $CDCl_3$): δ 170.8, 160.7, 158.3, 157.5, 152.5,

146.9, 120.7, 114.7, 76.0, 68.0, 62.9, 55.6, 20.8. R_f = 0.50 (dichloromethane/methanol = 10:1). HRMS: calcd. for $C_{15}H_{18}N_4NaO_6^+$, 373.1119, found 373.1119.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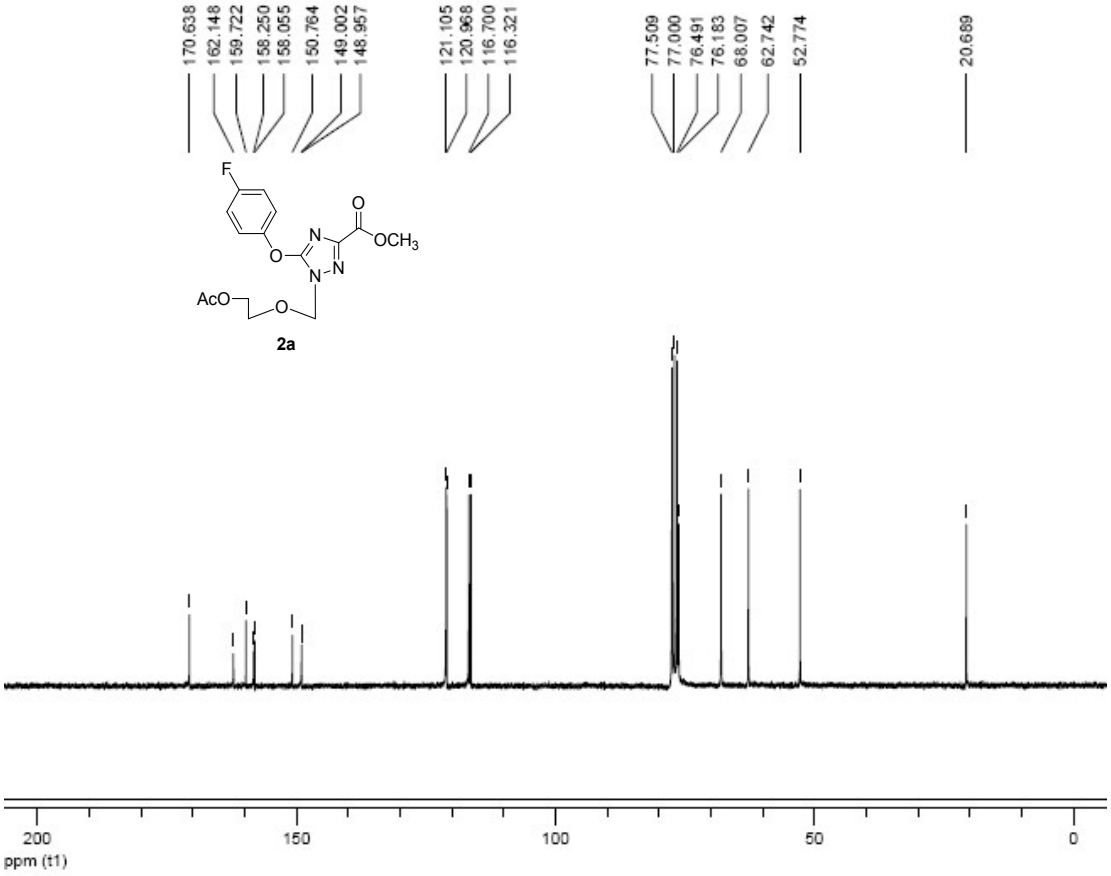
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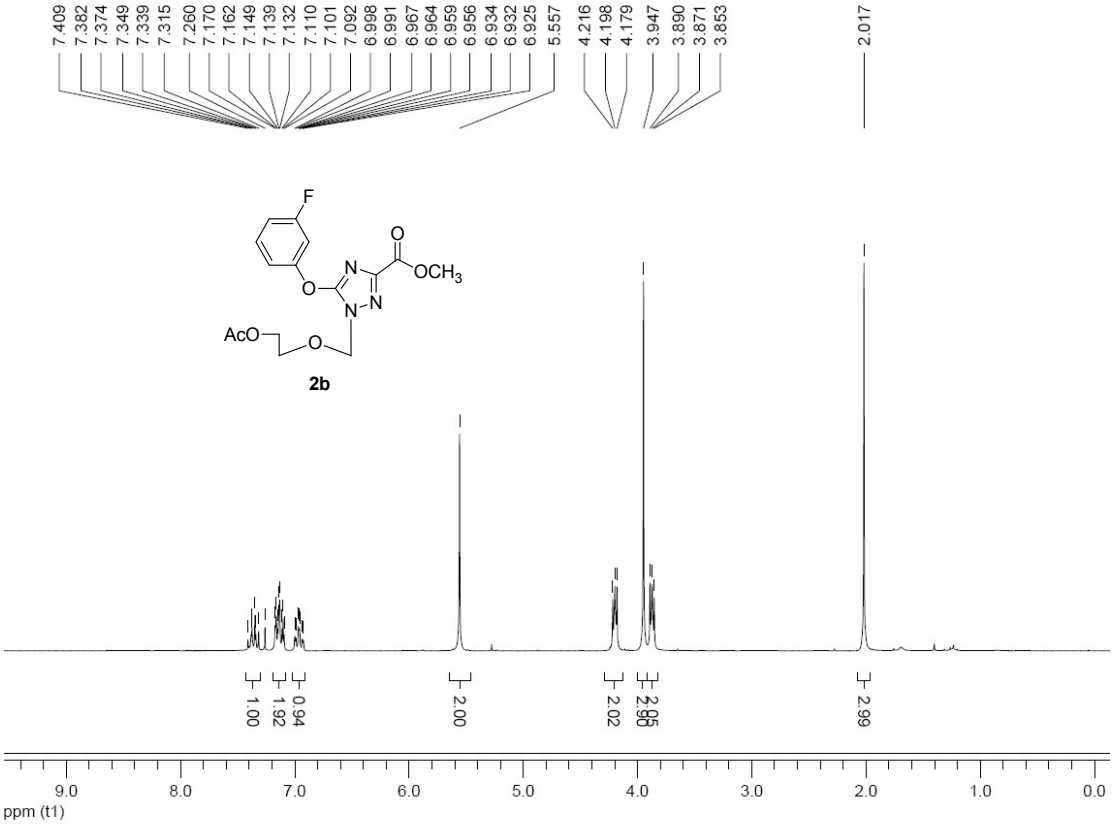
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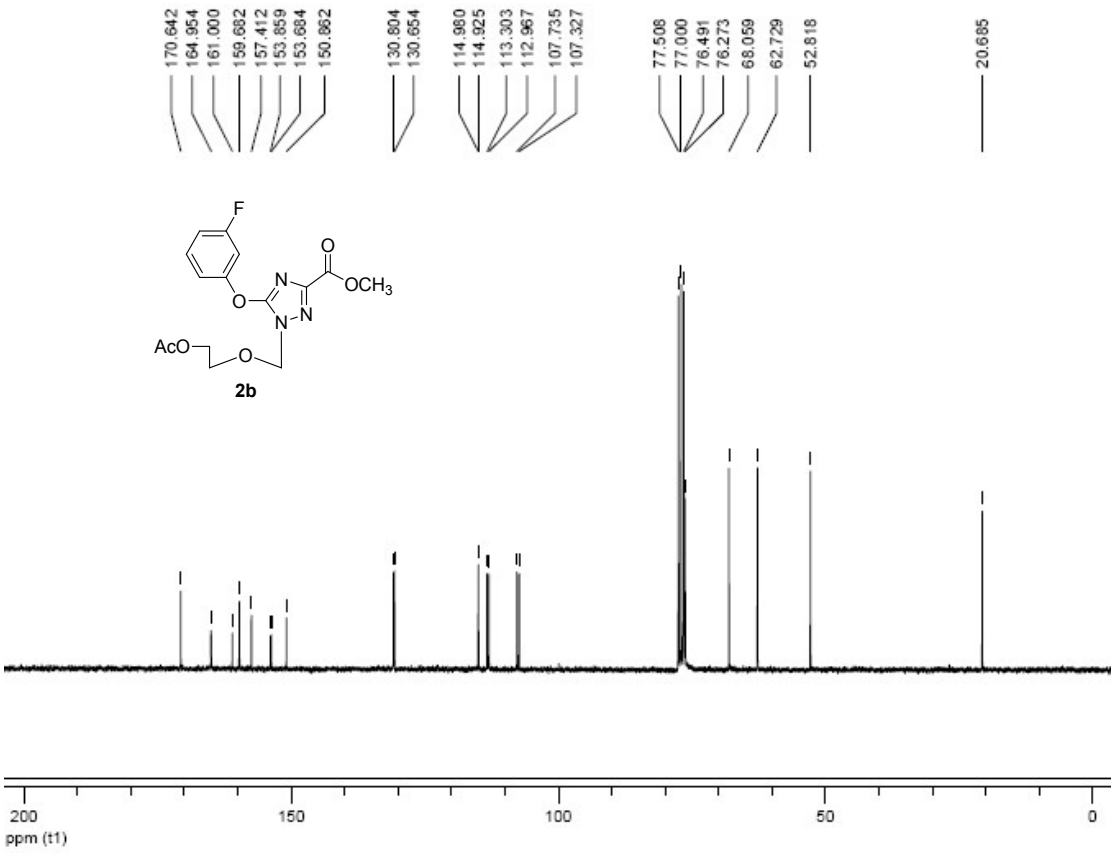
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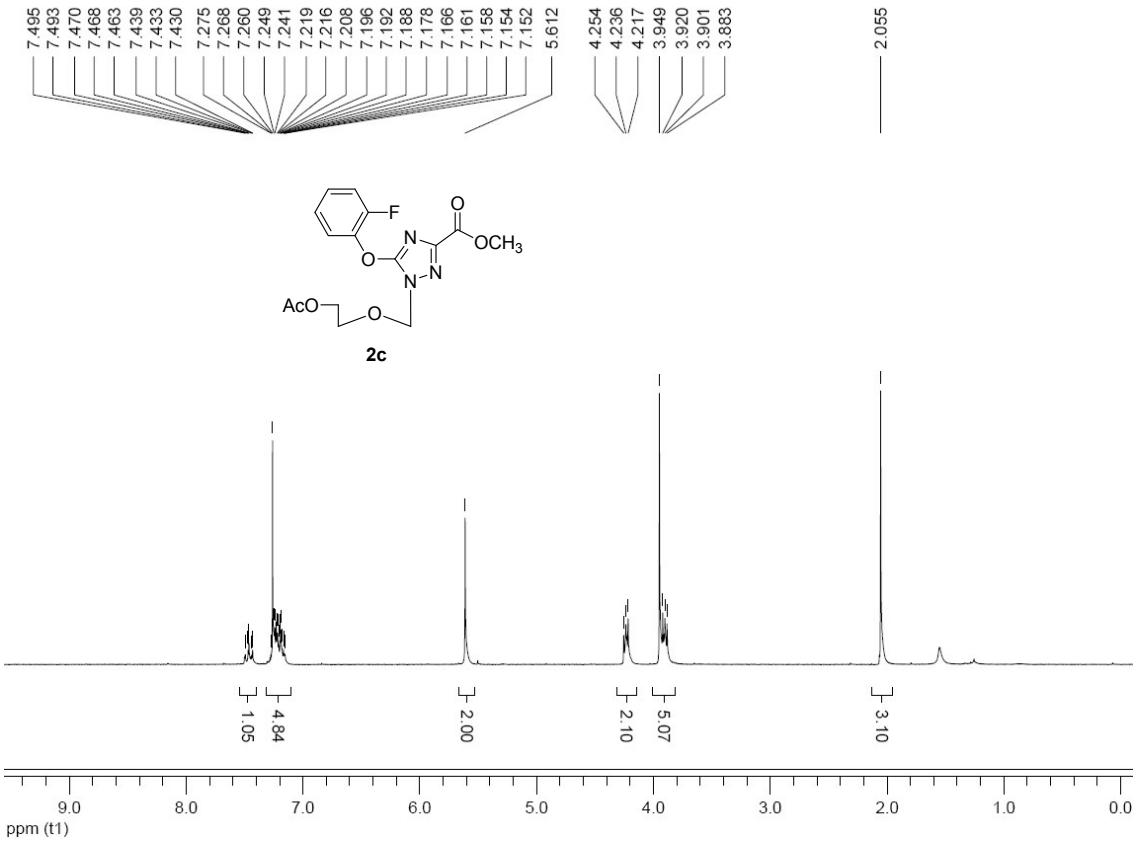
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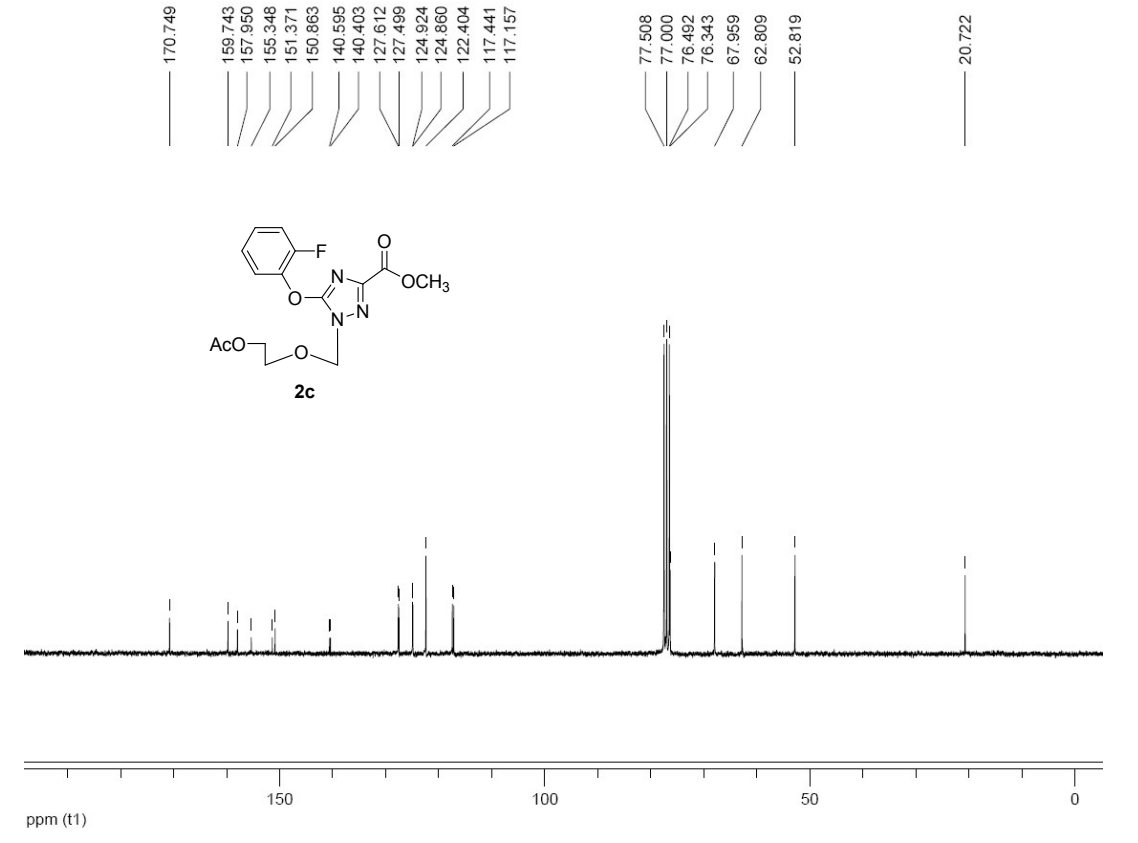
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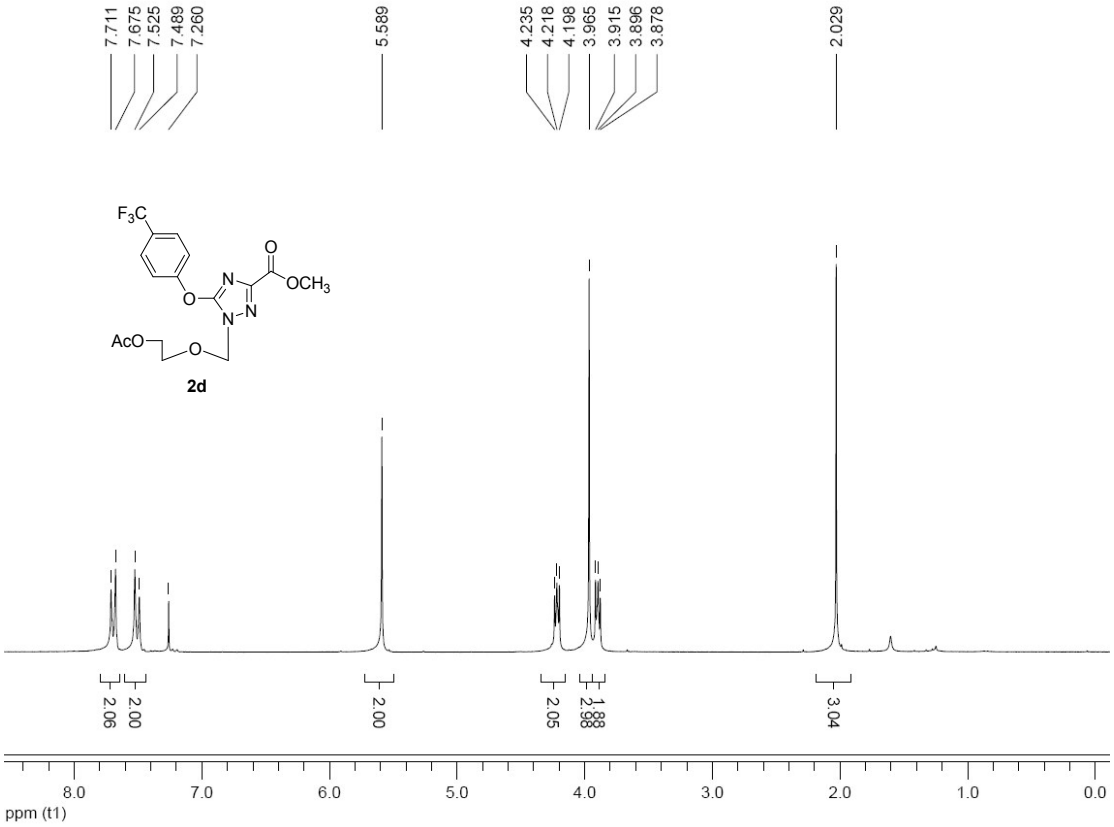
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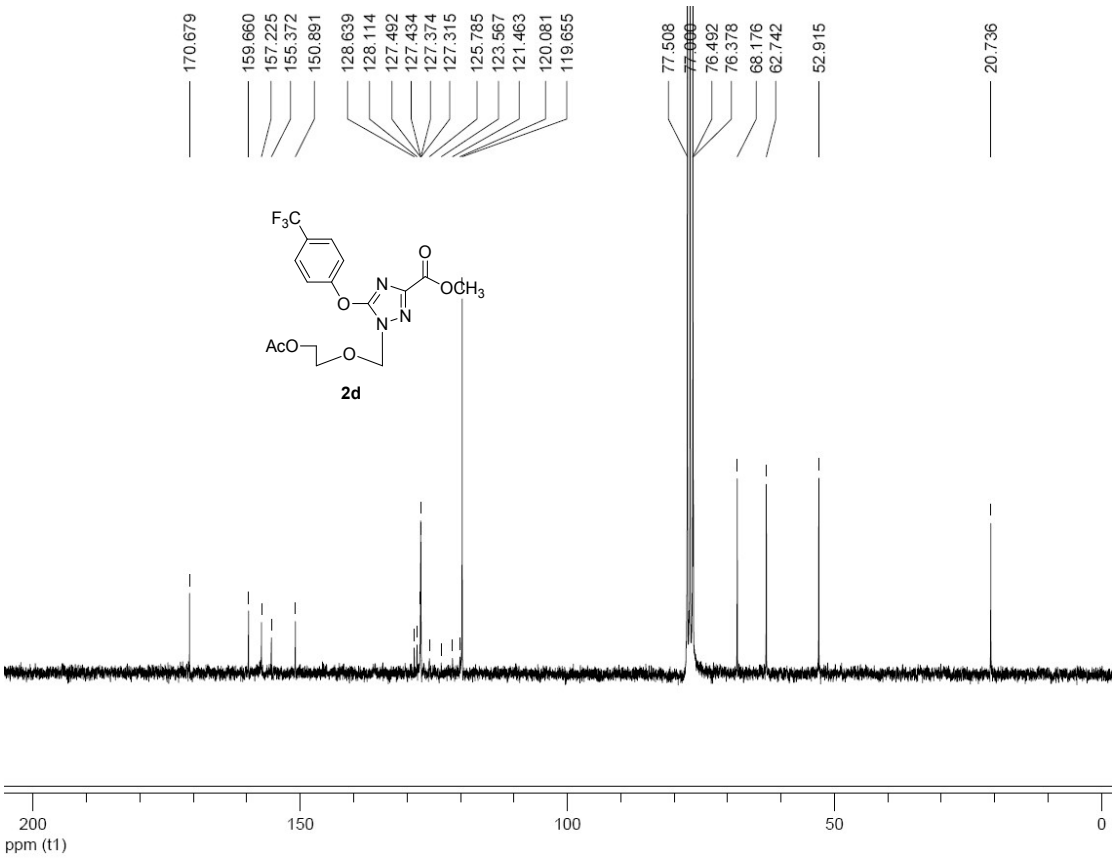
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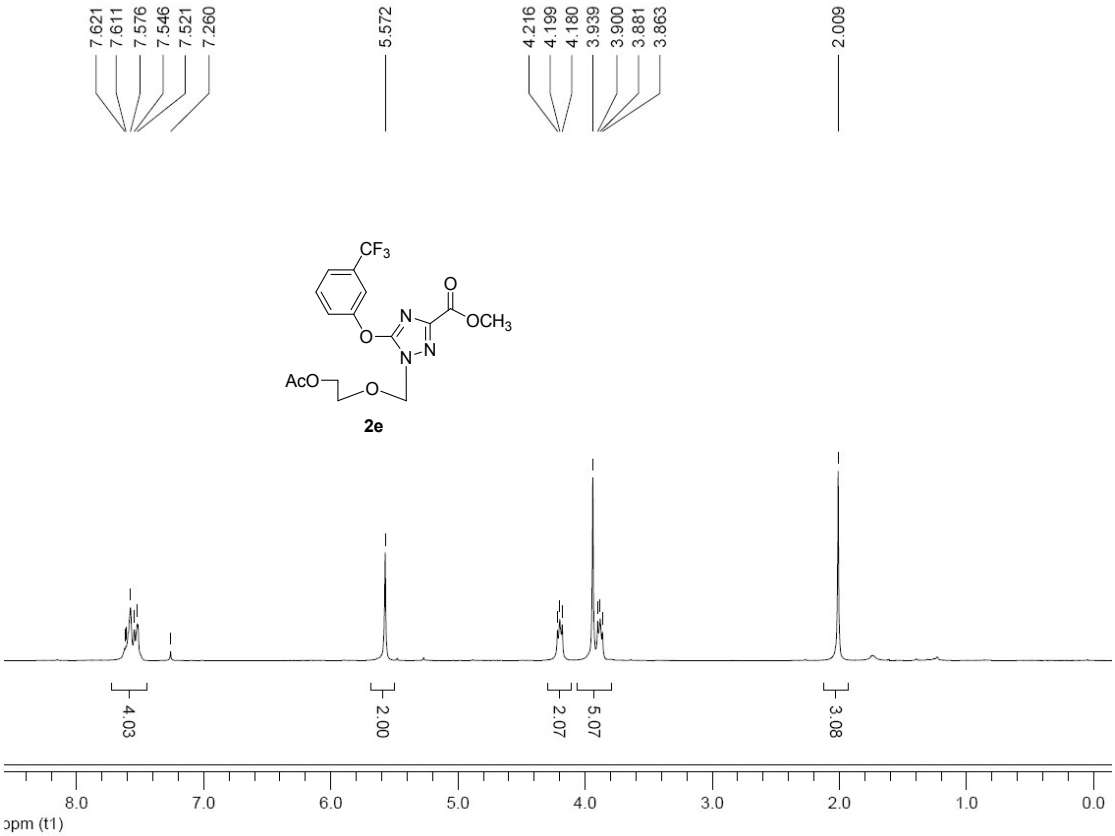
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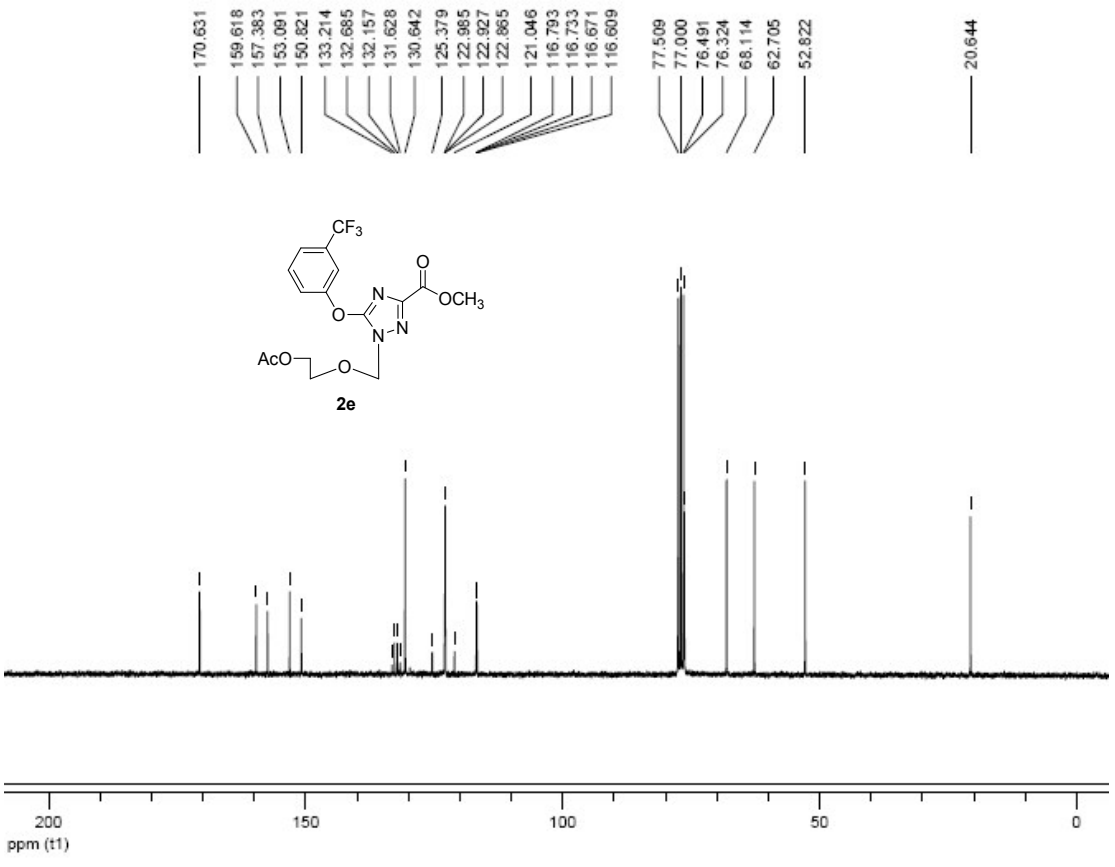
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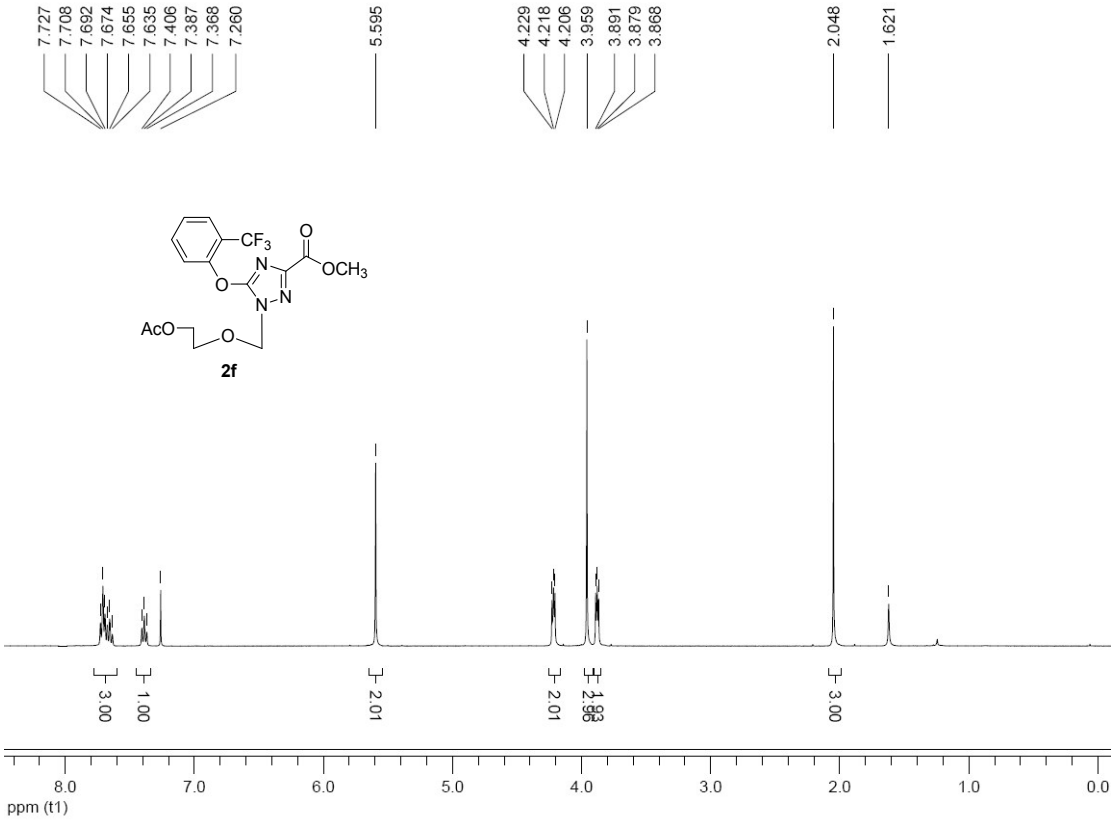
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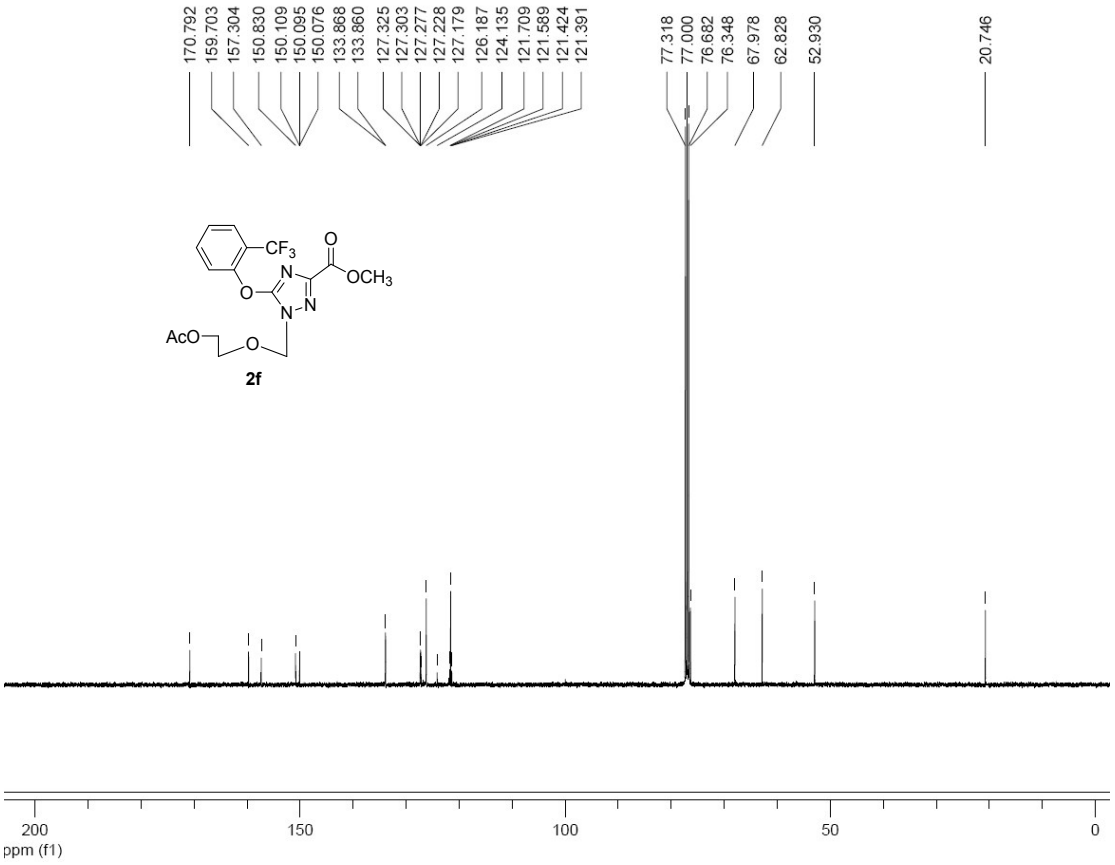
ppm (t1)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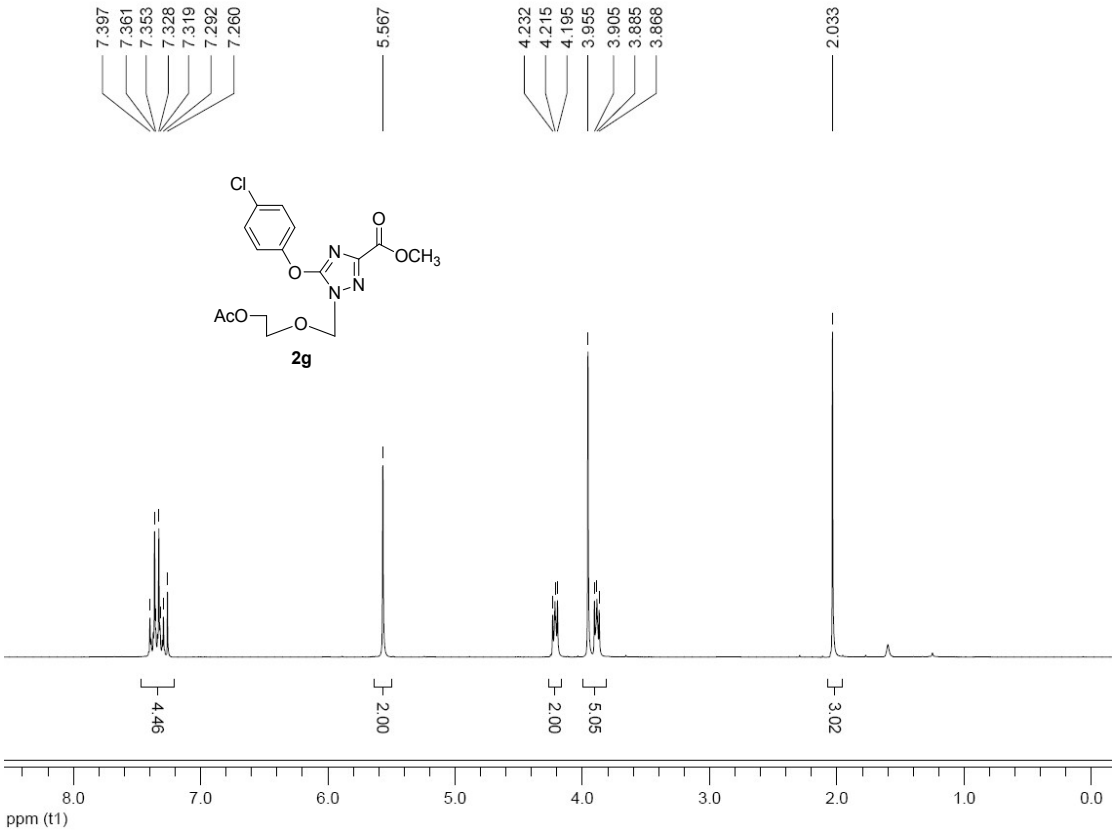
150.095
150.076
133.868
133.860
127.325
127.303
127.277
127.228
127.179
126.187
124.135
121.709
121.589
121.424
121.391
77.318
77.000
76.682
76.348
67.978
62.828
52.930
20.746
CF3
O
OCH3
N
O
N
N
AcO
O
2f
200
150
100
50
0
ppm (f1)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7.361
7.353
7.328
7.319
7.292
7.260
5.567
4.232
4.215
4.195
3.955
3.905
3.885
3.868
2.033
Cl
O
N
OCH3
O
N
N
AcO
O
2g
4.46
2.00
2.00
5.05
3.02
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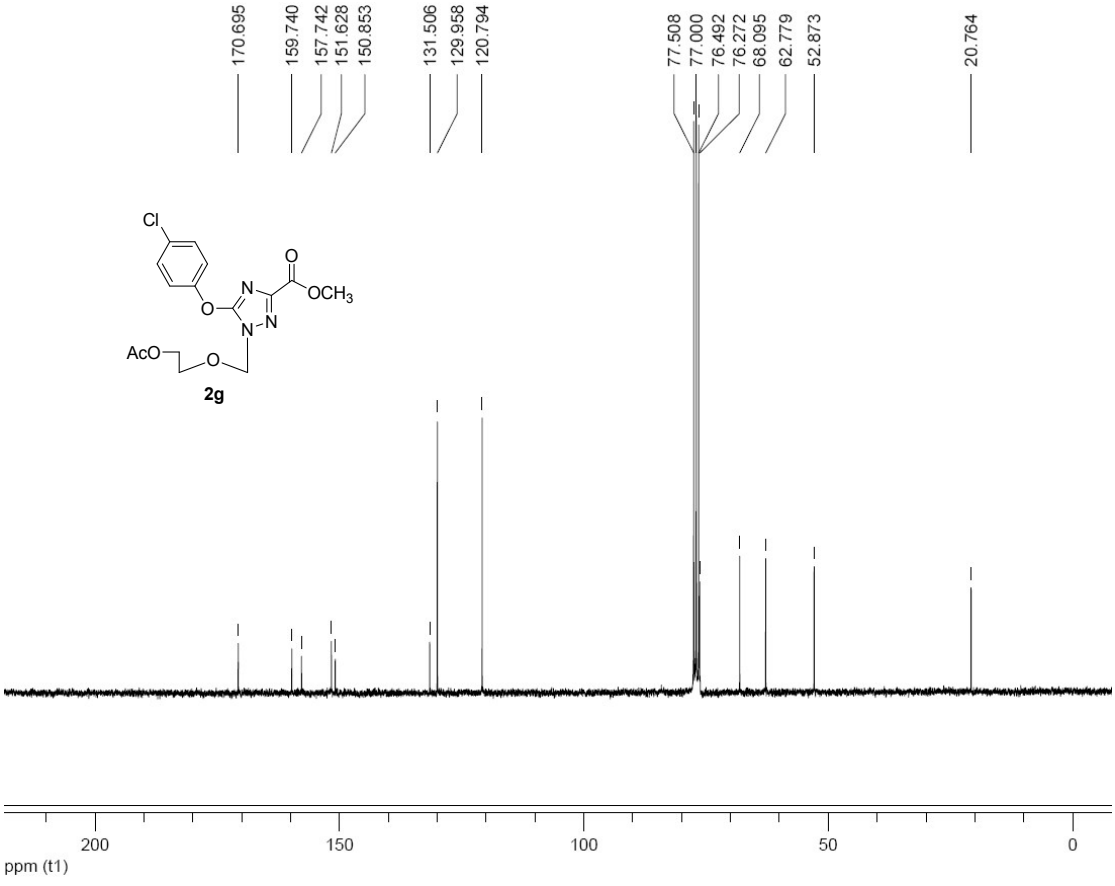
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
ppm (t1)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131.506
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120.794
77.508
77.000
76.492
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68.095
62.779
52.873
20.764
Cl
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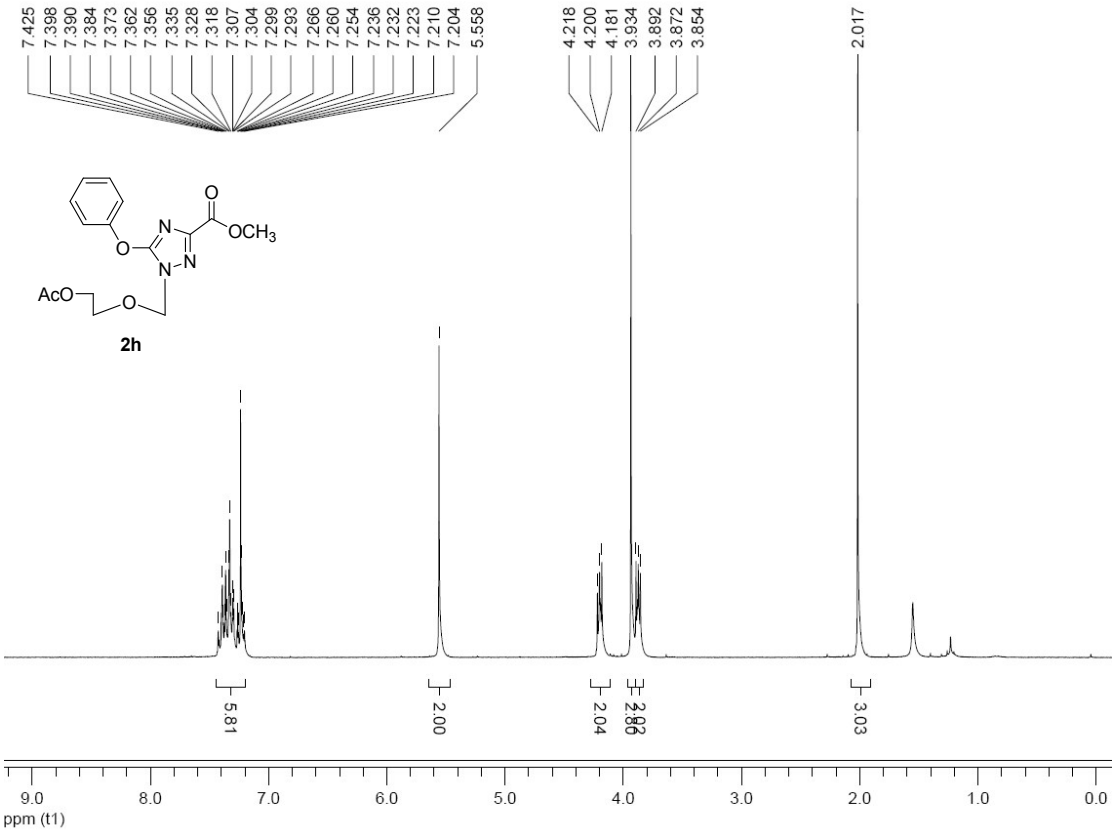
N
OCH3
O
N
N
AcO
O
2g
200
150
100
50
0
ppm (t1)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7.356
7.335
7.328
7.318
7.307
7.304
7.299
7.293
7.266
7.260
7.254
7.236
7.232
7.223
7.210
7.204
5.558
4.218
4.200
4.181
3.934
3.892
3.872
3.854
2.017
O
OCH3
N
N
N
O
AcO
O
2h
5.81
2.00
2.04
2.02
2.00
3.03
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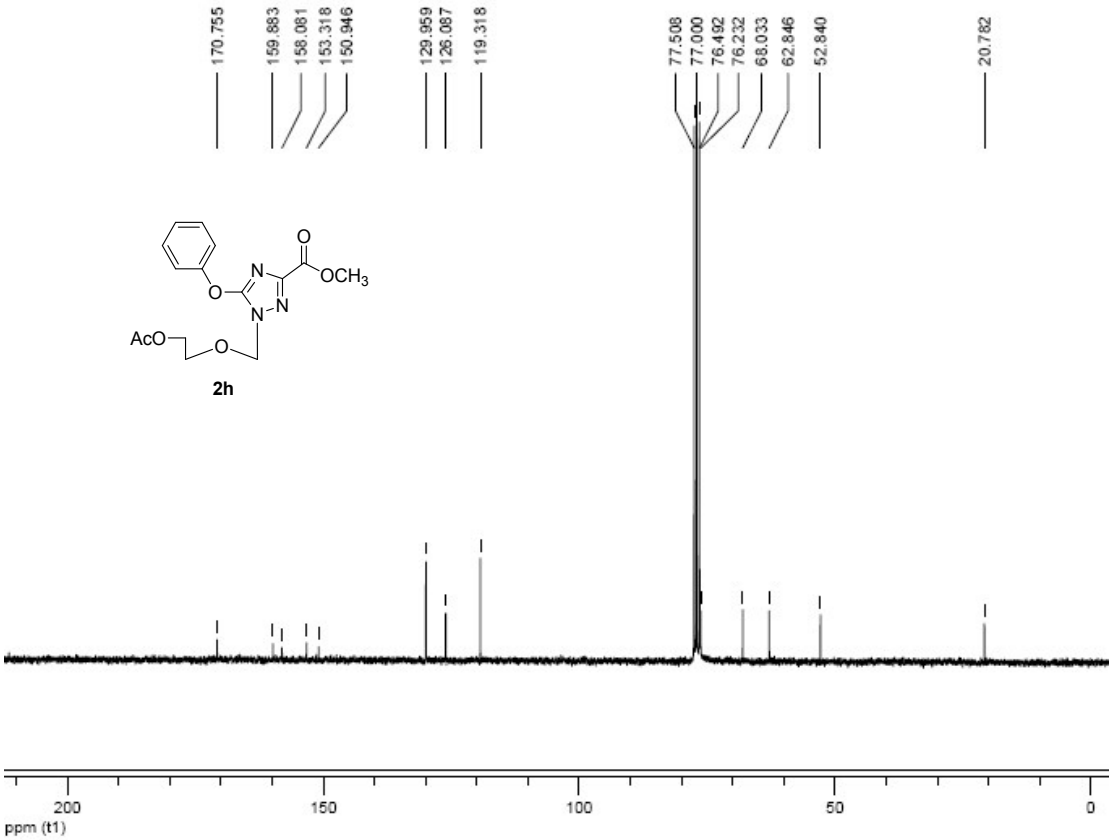
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
ppm (t1)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159.883
158.061
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150.946
129.959
126.087
119.318
77.508
77.000
76.492
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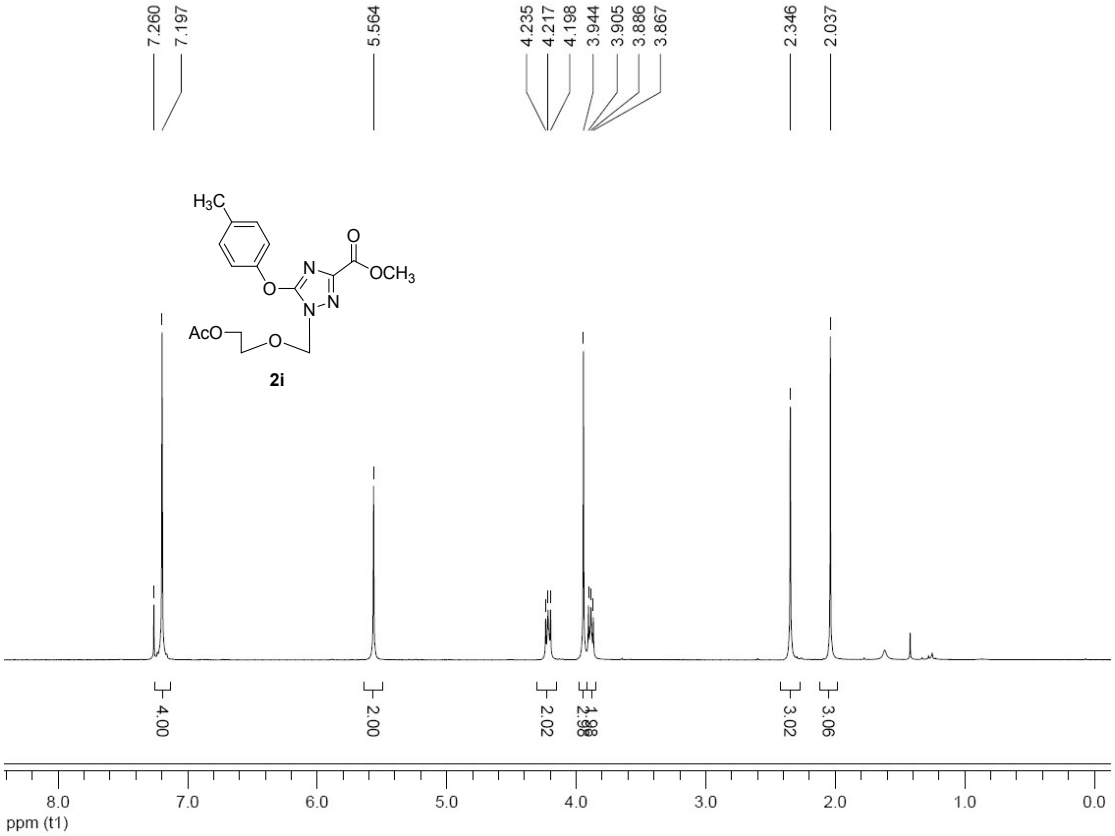
68.033
62.846
52.840
20.782
O
OCH3
N
N
N
O
AcO
O
2h
200
150
100
50
0
ppm (t1)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7.197
5.564
4.235
4.217
4.198
3.944
3.905
3.886
3.867
2.346
2.037
H3C
O
N
OCH3
O
N
N
AcO
O
2i
4.00
2.00
2.02
1.98
3.02
3.06
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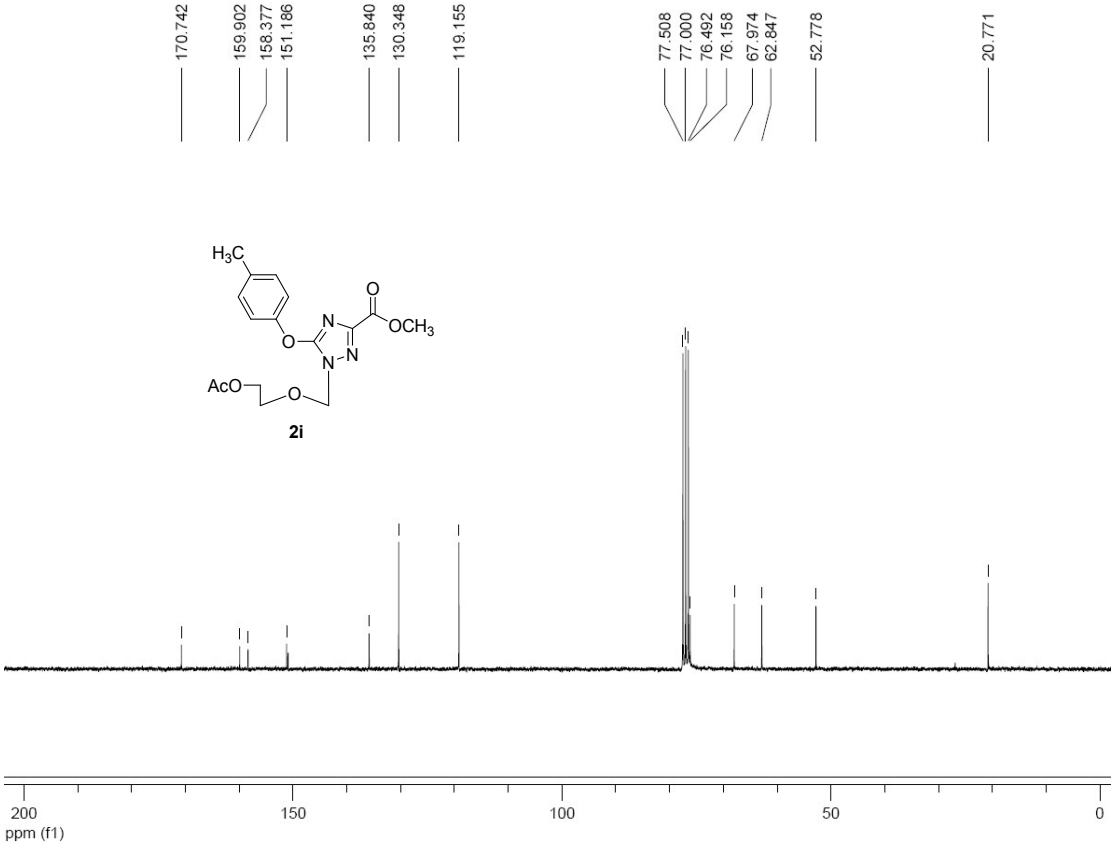
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
ppm (t1)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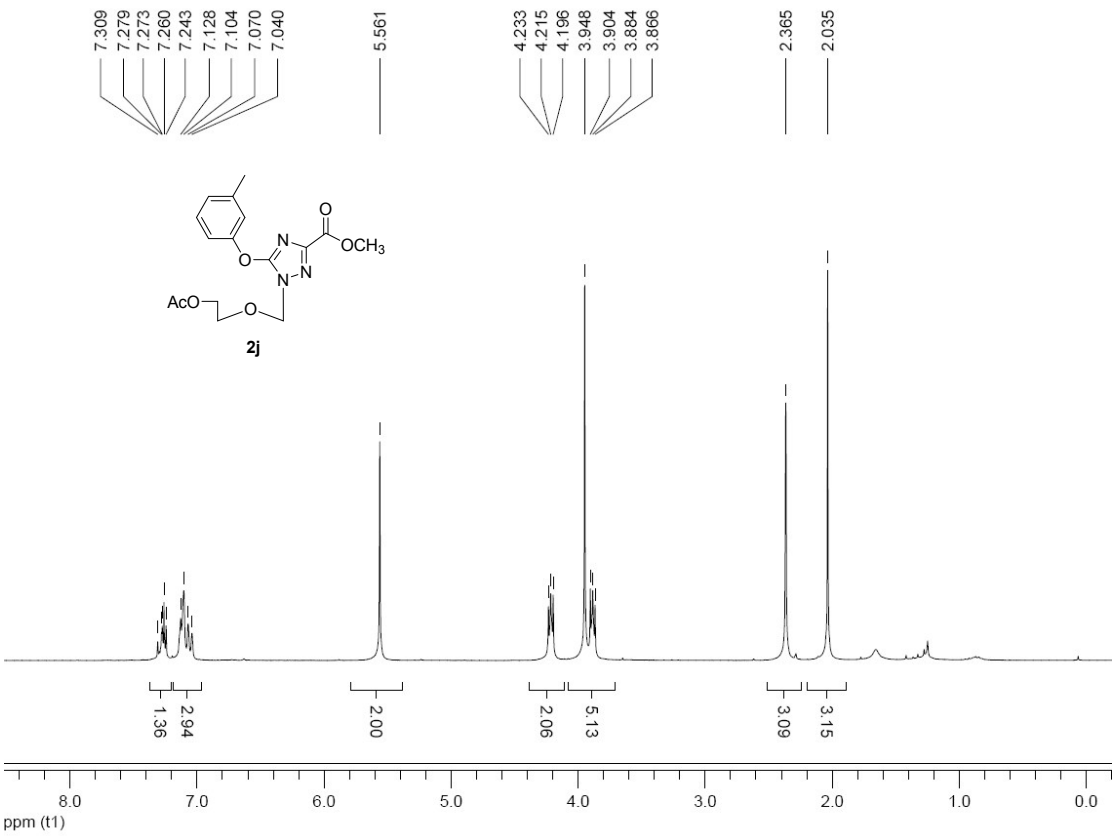
130.348
119.155
77.508
77.000
76.492
76.158
67.974
62.847
52.778
20.771
H3C
O
N
OCH3
O
N
N
AcO
O
2i
200
150
100
50
0
ppm (f1)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7.279
7.273
7.260
7.243
7.128
7.104
7.070
7.040
5.561
4.233
4.215
4.196
3.948
3.904
3.884
3.866
2.365
2.035
AcO
O
N
N
N
O
OCH3
2j
1.36
2.94
2.00
2.06
5.13
3.09
3.15
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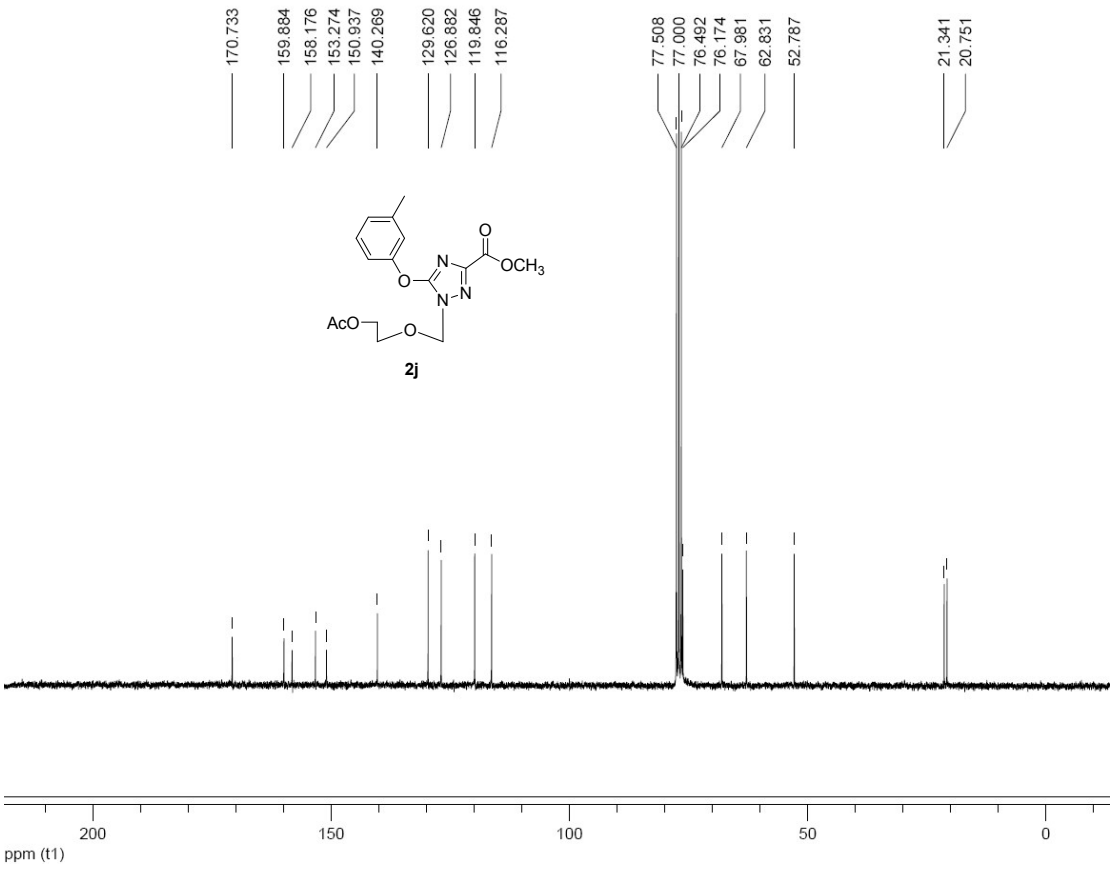
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
ppm (t1)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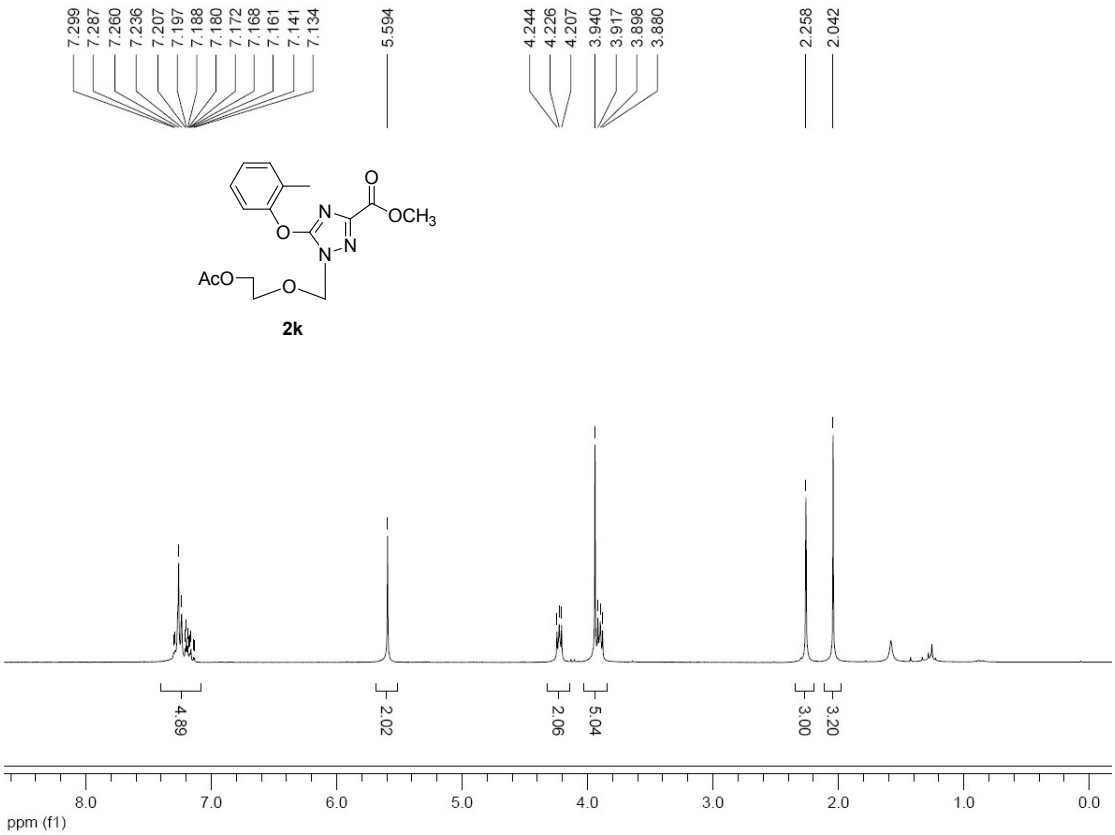
158.176
153.274
150.937
140.269
129.620
126.882
119.846
116.287
77.508
77.000
76.492
76.174
67.981
62.831
52.787
21.341
20.751
AcO
O
N
N
N
O
OCH3
2j
200
150
100
50
0
ppm (t1)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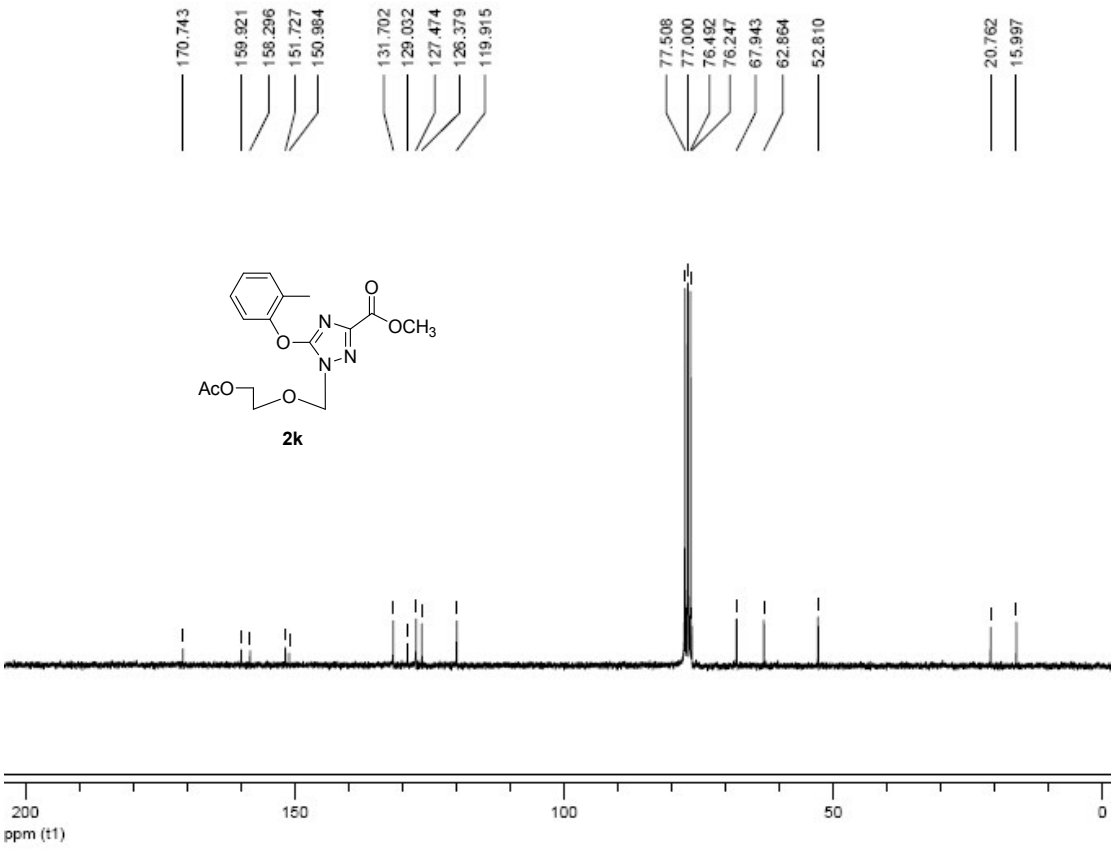
7.287
7.260
7.236
7.207
7.197
7.188
7.180
7.172
7.168
7.161
7.141
7.134
5.594
4.244
4.226
4.207
3.940
3.917
3.898
3.880
2.258
2.042
O
OCH3
N
O
N
N
AcO
O
4.89
2.02
2.06
5.04
3.00
3.20
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
ppm (f1)

2k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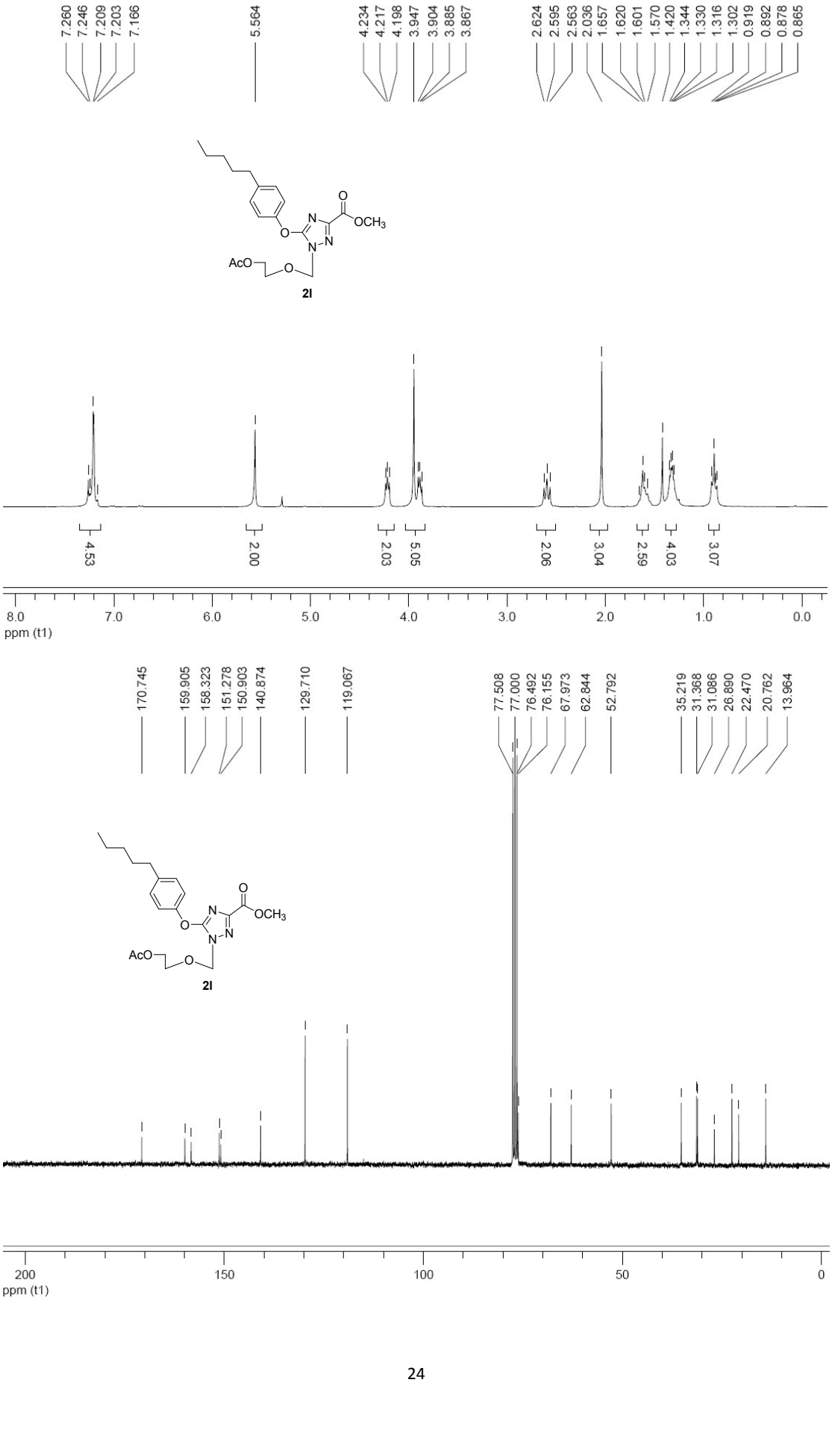
127.474
126.379
119.915
77.508
77.000
76.492
76.247
67.943
62.864
52.810
20.762
15.997
O
OCH3
N
O
N
N
AcO
O
200
150
100
50
0
ppm (t1)

2k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7.209
7.203
7.166
5.564
4.234
4.217
4.198
3.947
3.904
3.885
3.867
2.624
2.595
2.563
2.036
1.657
1.620
1.601
1.570
1.420
1.344
1.330
1.316
1.302
0.919
0.892
0.878
0.865
OCH3
AcO
2l
4.53
2.00
2.03
5.05
2.06
3.04
2.59
4.03
3.07
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
ppm (t1)
170.745
159.905
158.323
151.278
150.903
140.874
129.710
119.067
77.508
77.000
76.492
76.155
67.973
62.844
52.792
35.219
31.368
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26.890
22.470
20.762
13.964
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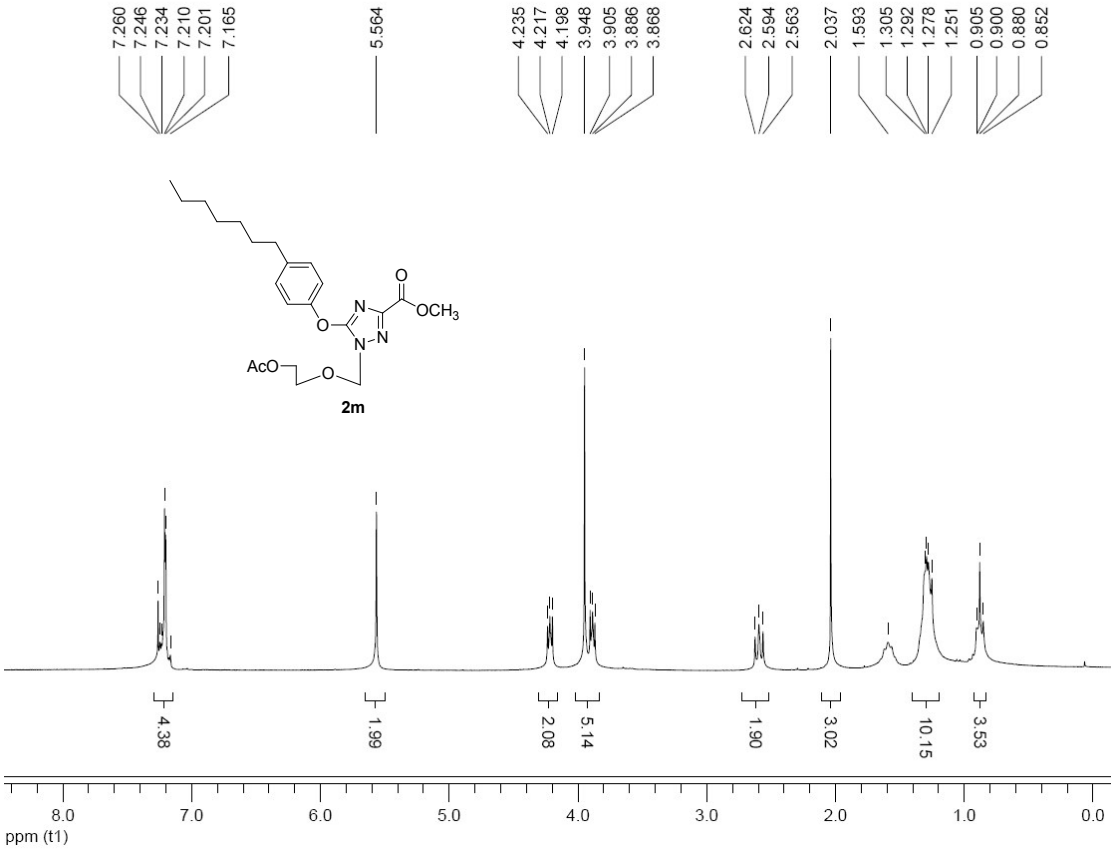
AcO
2l
200
150
100
50
0
ppm (t1)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7.246
7.234
7.210
7.201
7.165
5.564
4.235
4.217
4.198
3.948
3.905
3.886
3.868
2.624
2.594
2.563
2.037
1.593
1.305
1.292
1.278
1.251
0.905
0.900
0.880
0.852
OCH3
AcO
2m
4.38
1.99
2.08
5.14
1.90
3.02
10.15
3.53
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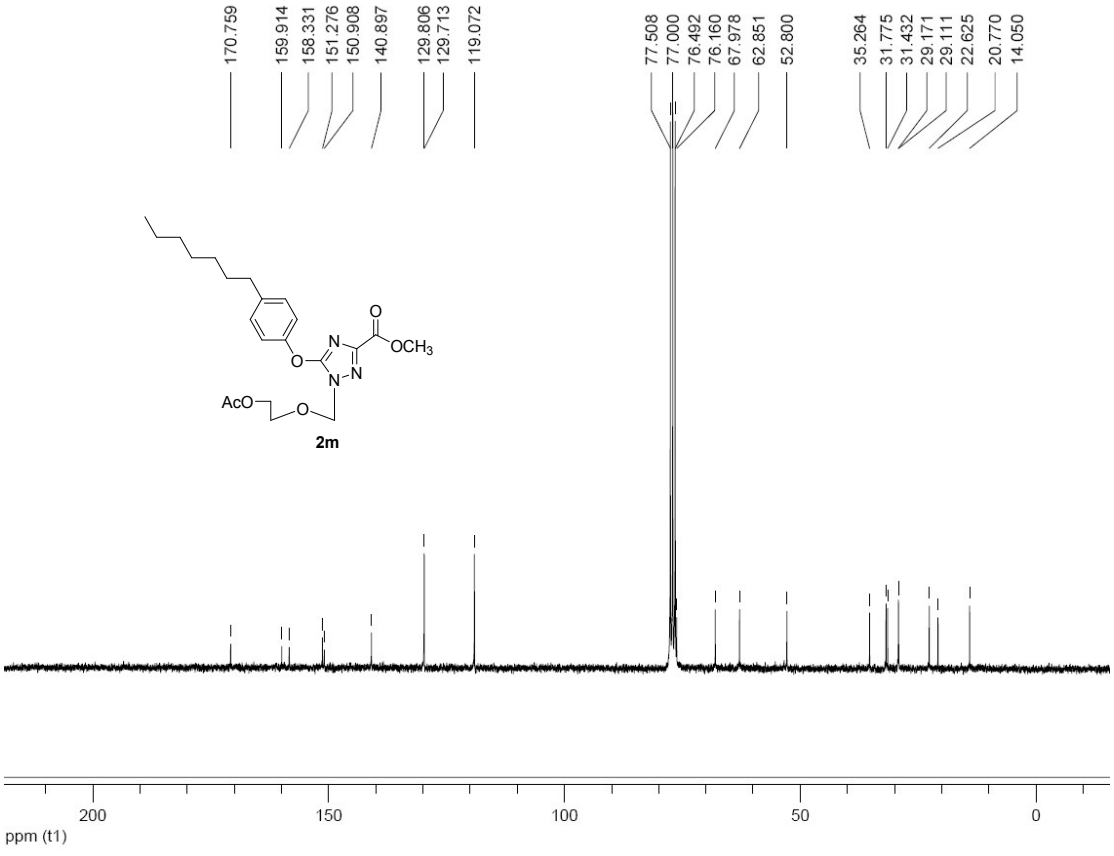
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
ppm (t1)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129.713
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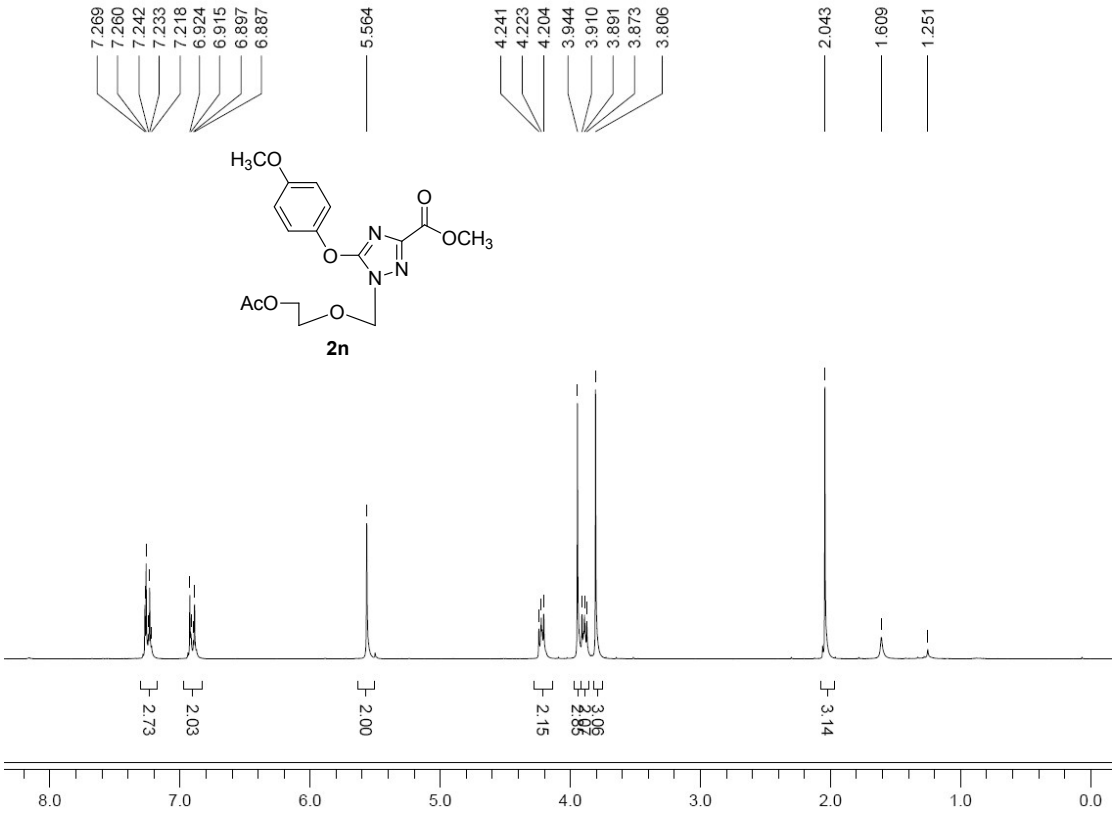
77.000
76.492
76.160
67.978
62.851
52.800
35.264
31.775
31.432
29.171
29.111
22.625
20.770
14.050
OCH3
AcO
2m
200
150
100
50
0
ppm (t1)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7.233
7.218
6.924
6.915
6.897
6.887
5.564
4.241
4.223
4.204
3.944
3.910
3.891
3.873
3.806
2.043
1.609
1.251
H3CO
O
N
OCH3
O
N
N
AcO
O
2n
2.73
2.03
2.00
2.15
3.06
3.14
8.0
7.0
6.0
5.0
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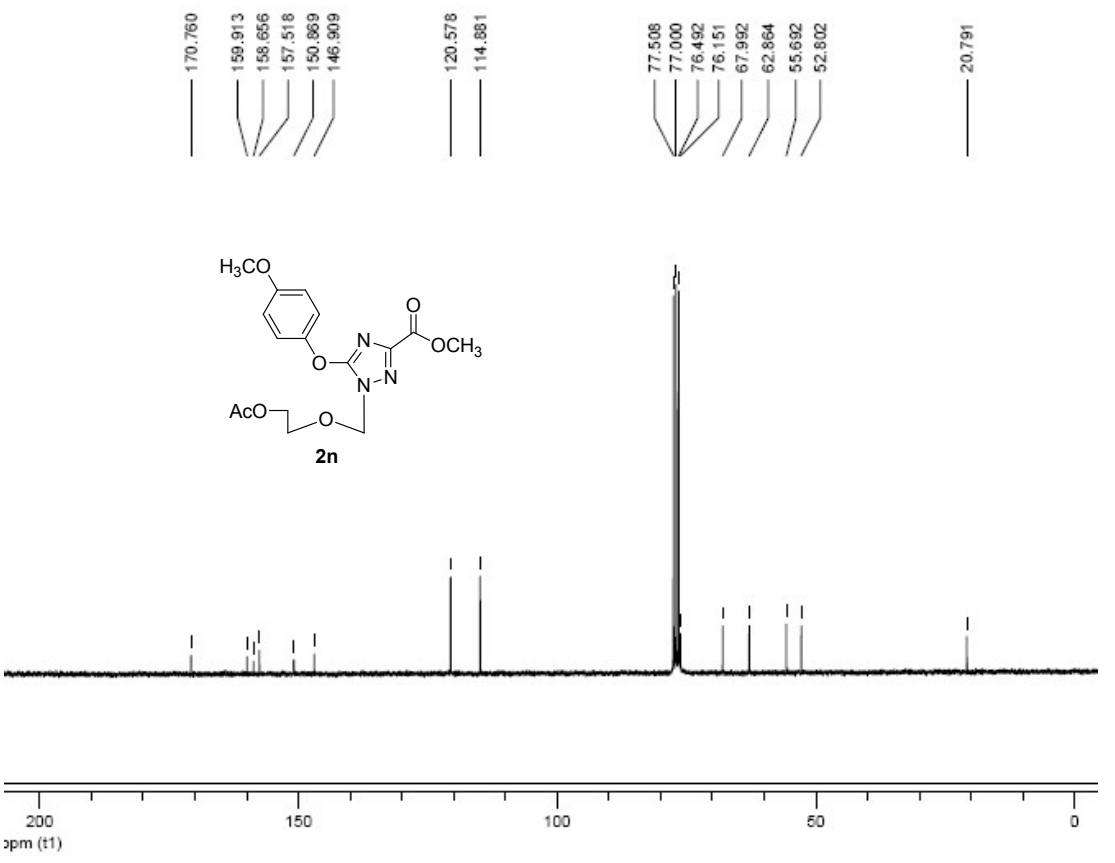
2.0
1.0
0.0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114.881
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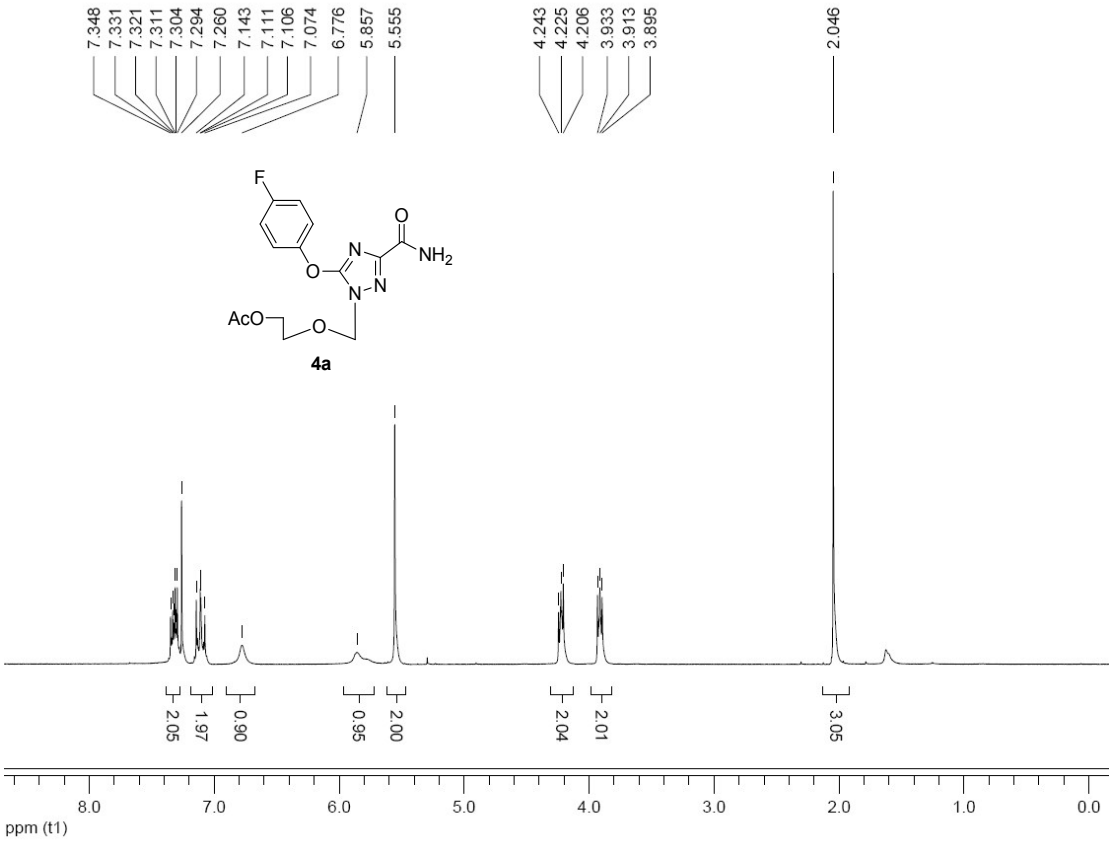
77.000
76.492
76.151
67.992
62.864
55.692
52.802
20.791
H3CO
O
N
OCH3
O
N
N
AcO
O
2n
200
150
100
50
0
ppm (t1)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7.304
7.294
7.260
7.143
7.111
7.106
7.074
6.776
5.857
5.555
4.243
4.225
4.206
3.933
3.913
3.895
2.046
F
O
NH2
N
O
N
N
AcO
O
4a
2.05
1.97
0.90
0.95
2.00
2.04
2.01
3.05
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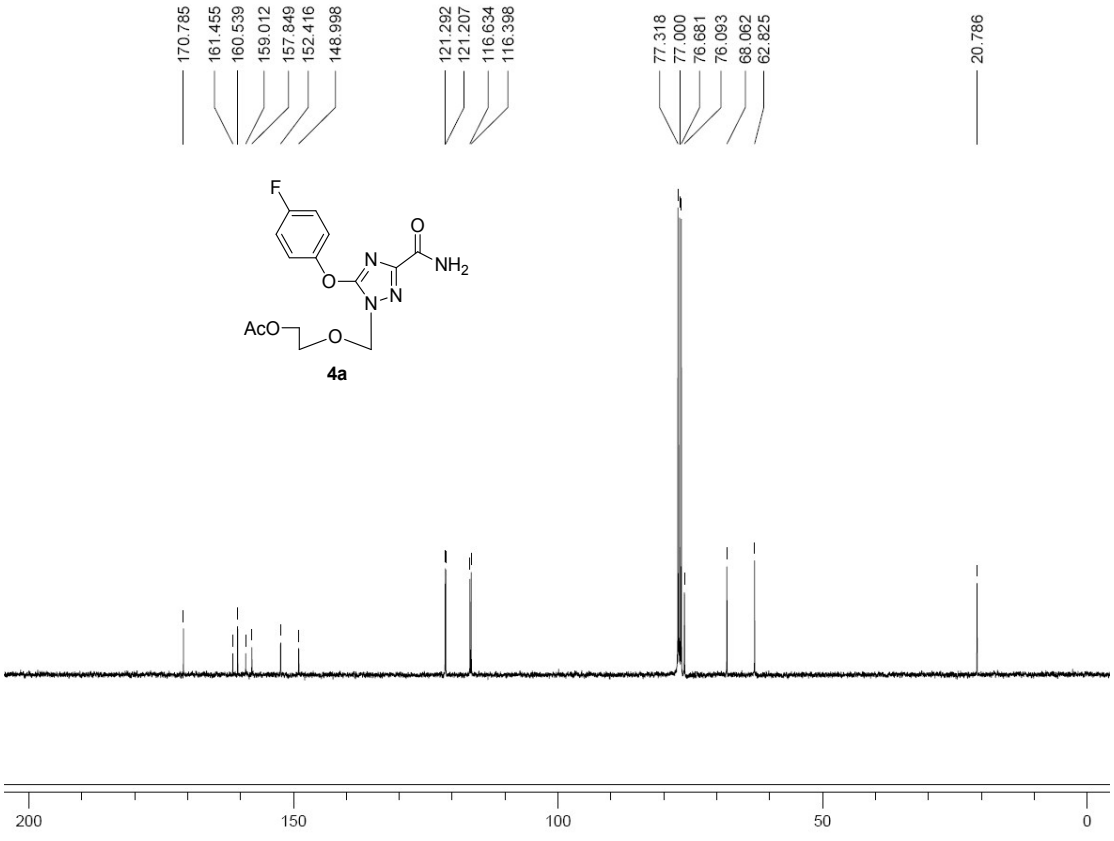
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
ppm (t1)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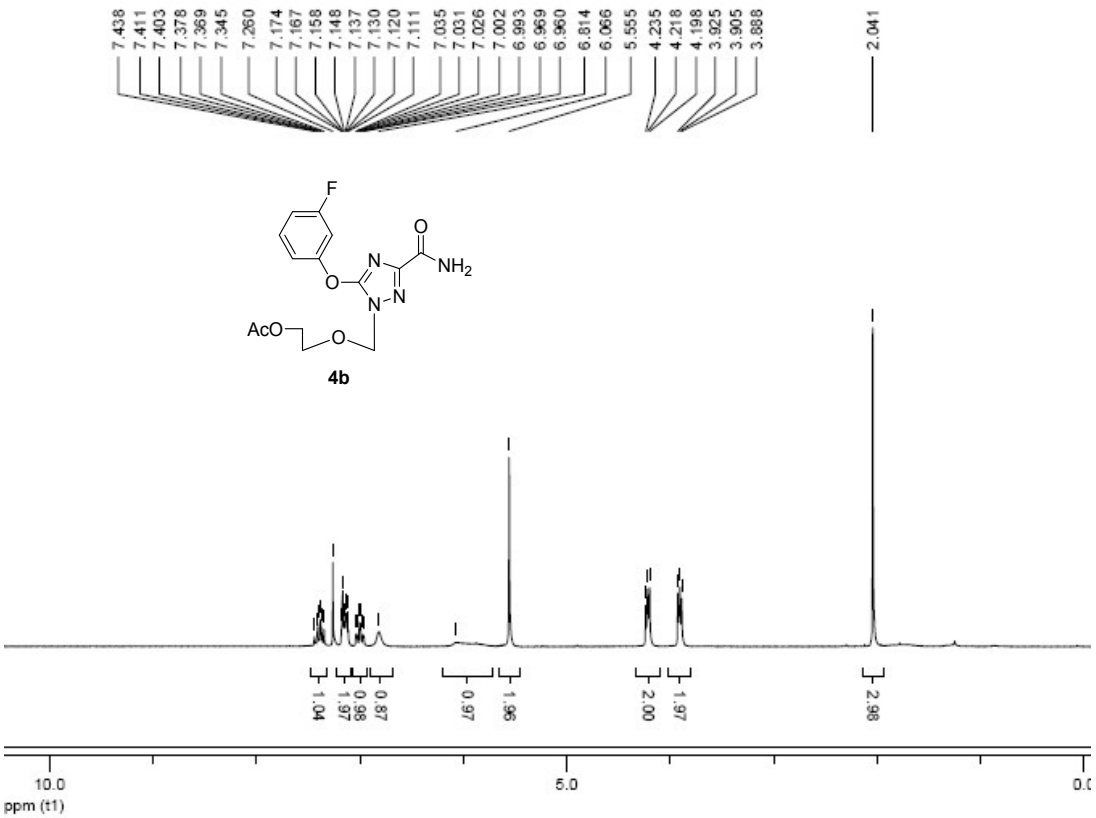
116.398
77.318
77.000
76.681
76.093
68.062
62.825
20.786
F
O
NH2
N
O
N
N
AcO
O
4a
200
150
100
50
0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7.167
7.158
7.148
7.137
7.130
7.120
7.111
7.035
7.031
7.026
7.002
6.993
6.969
6.960
6.814
6.066
5.555
4.235
4.218
4.198
3.925
3.905
3.888
2.041
F
O
NH2
N
O
N
N
AcO
O
4b
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2.00
1.97
2.98
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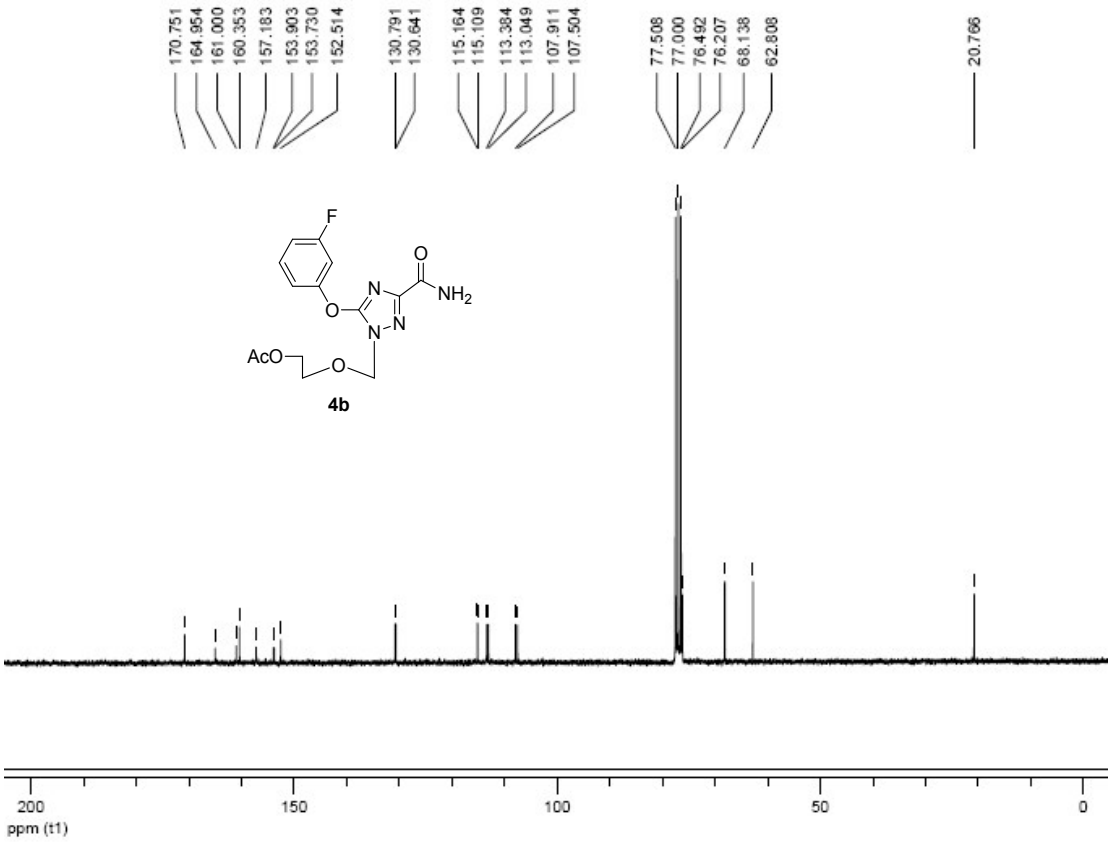
ppm (t1)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152.514
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113.384
113.049
107.911
107.504
77.508
77.000
76.492
76.207
68.138
62.808
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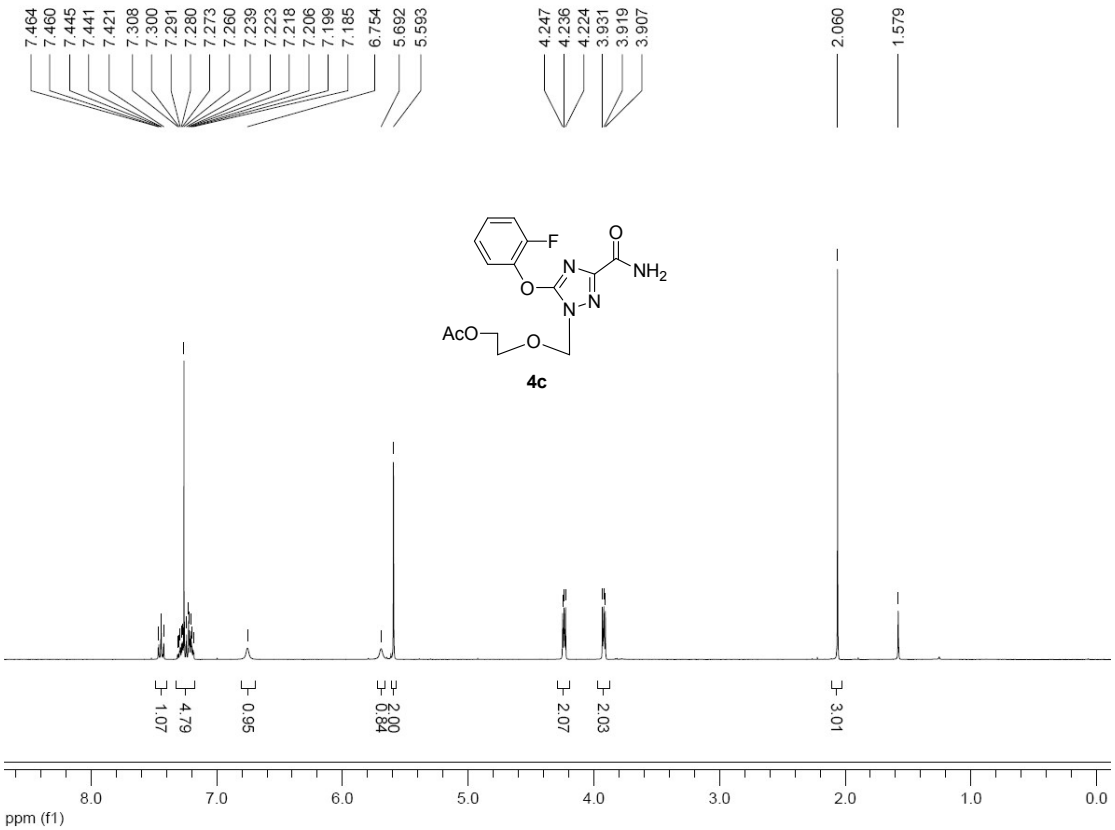
F
O
NH2
N
O
N
N
AcO
O
4b
200
150
100
50
0
ppm (t1)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7.421
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7.291
7.280
7.273
7.260
7.239
7.223
7.218
7.206
7.199
7.185
6.754
5.692
5.593
4.247
4.236
4.224
3.931
3.919
3.907
2.060
1.579
F
O
NH2
N
O
N
N
AcO
O
4c
1.07
4.79
0.95
2.00
0.80
2.07
2.03
3.01
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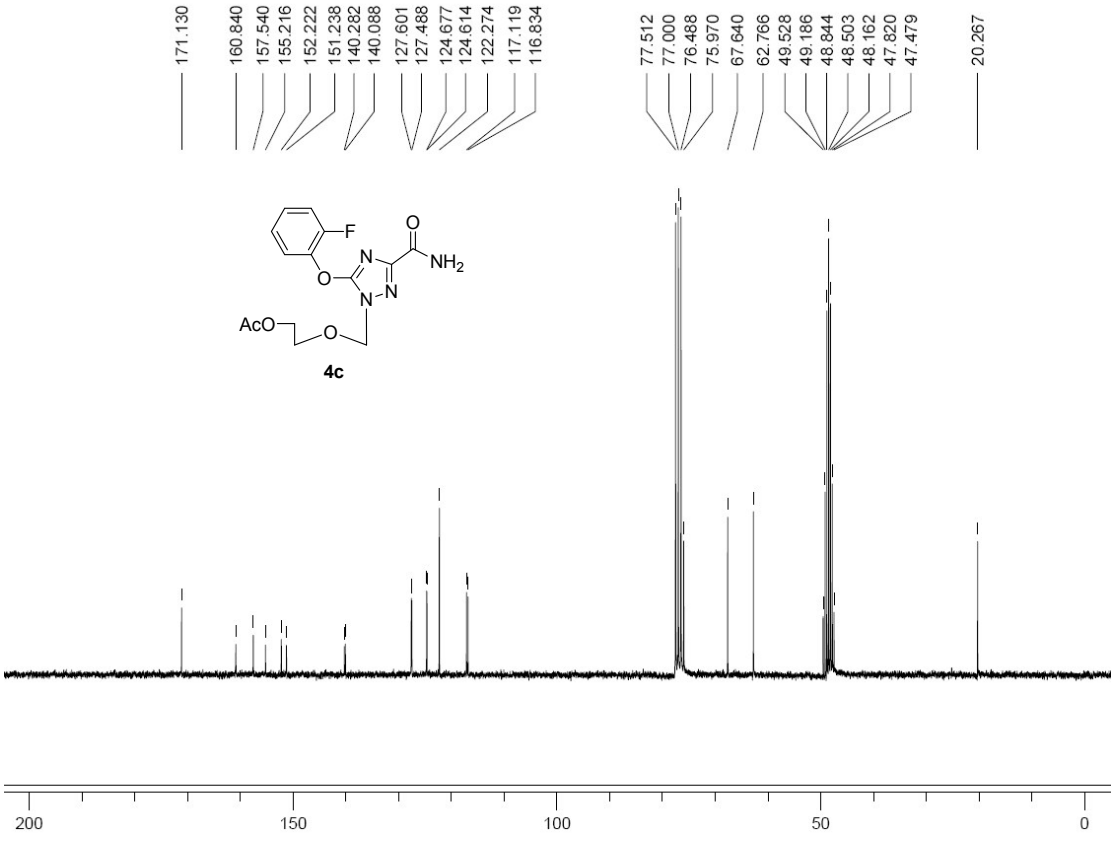
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
ppm (f1)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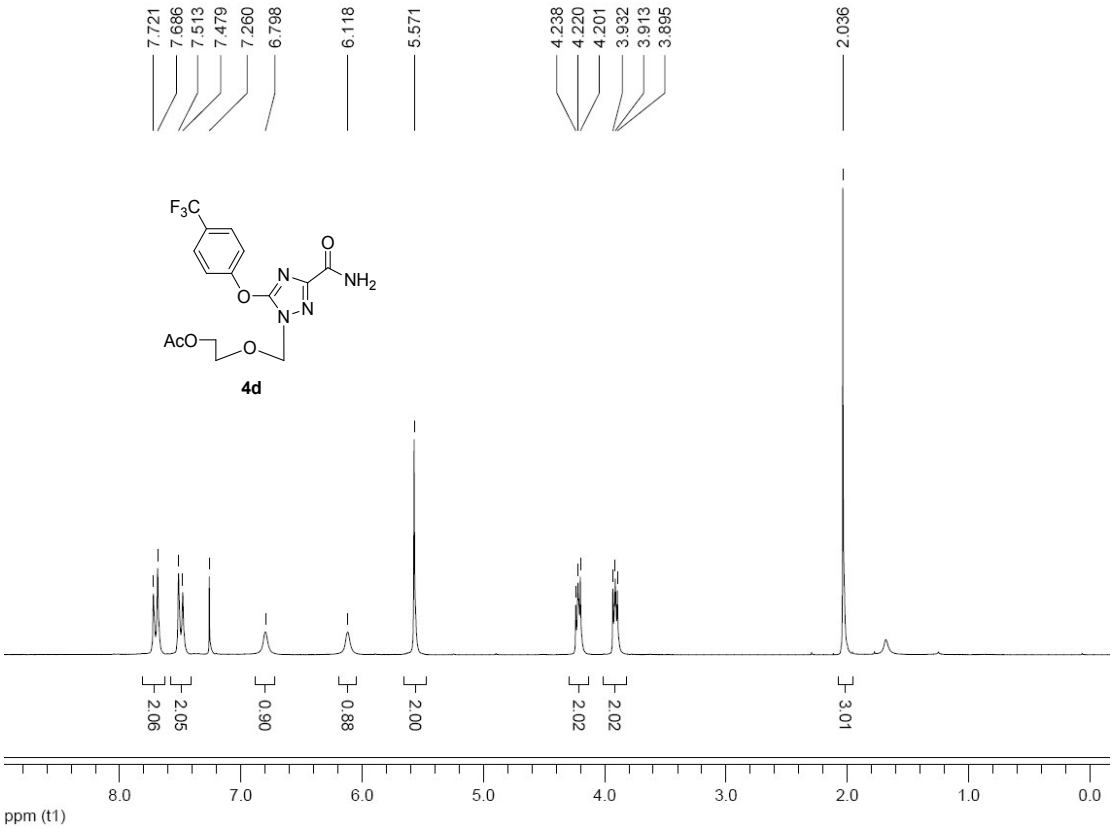
155.216
152.222
151.238
140.282
140.088
127.601
127.488
124.677
124.614
122.274
117.119
116.834
77.512
77.000
76.488
75.970
67.640
62.766
49.528
49.186
48.844
48.503
48.162
47.820
47.479
20.267
F
O
NH2
N
O
N
N
AcO
O
4c
200
150
100
50
0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7.479
7.260
6.798
6.118
5.571
4.238
4.220
4.201
3.932
3.913
3.895
2.036
F3C
O
NH2
N
O
N
N
AcO
O
4d
2.06
2.05
0.90
0.88
2.00
2.02
2.02
3.01
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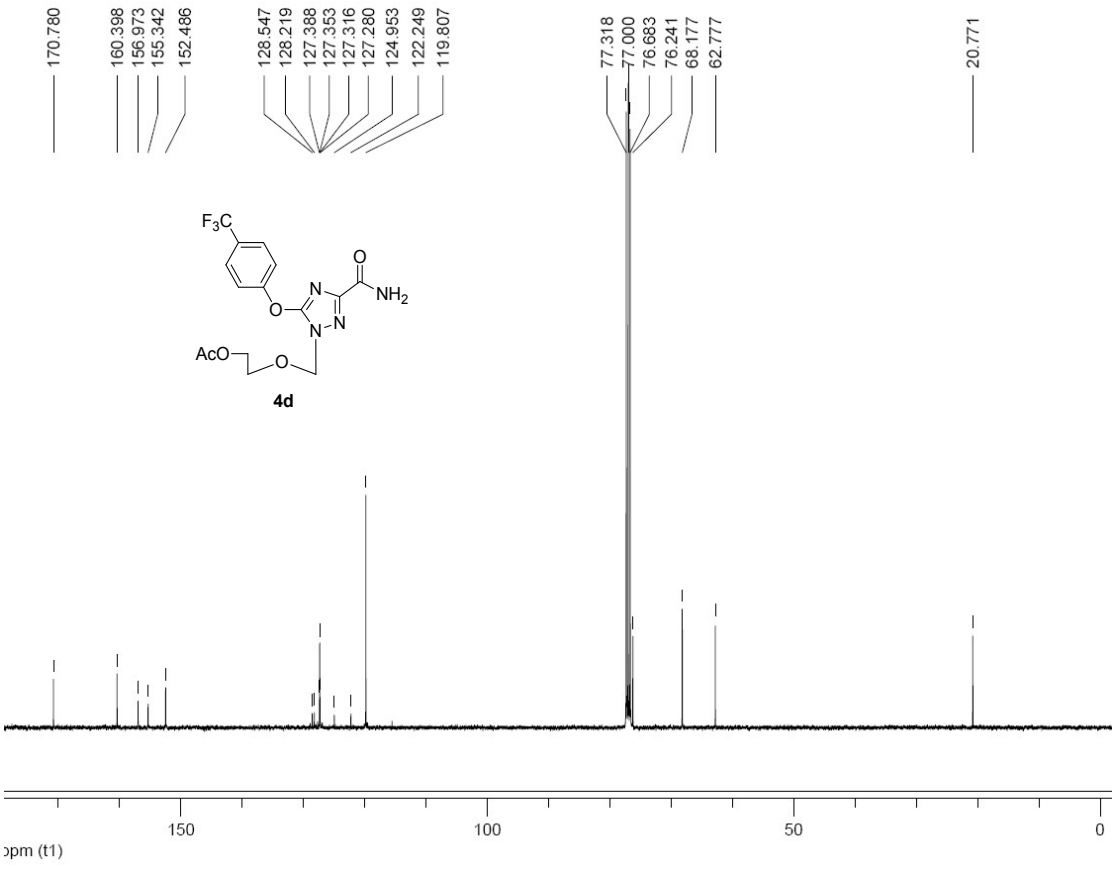
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
ppm (t1)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127.388
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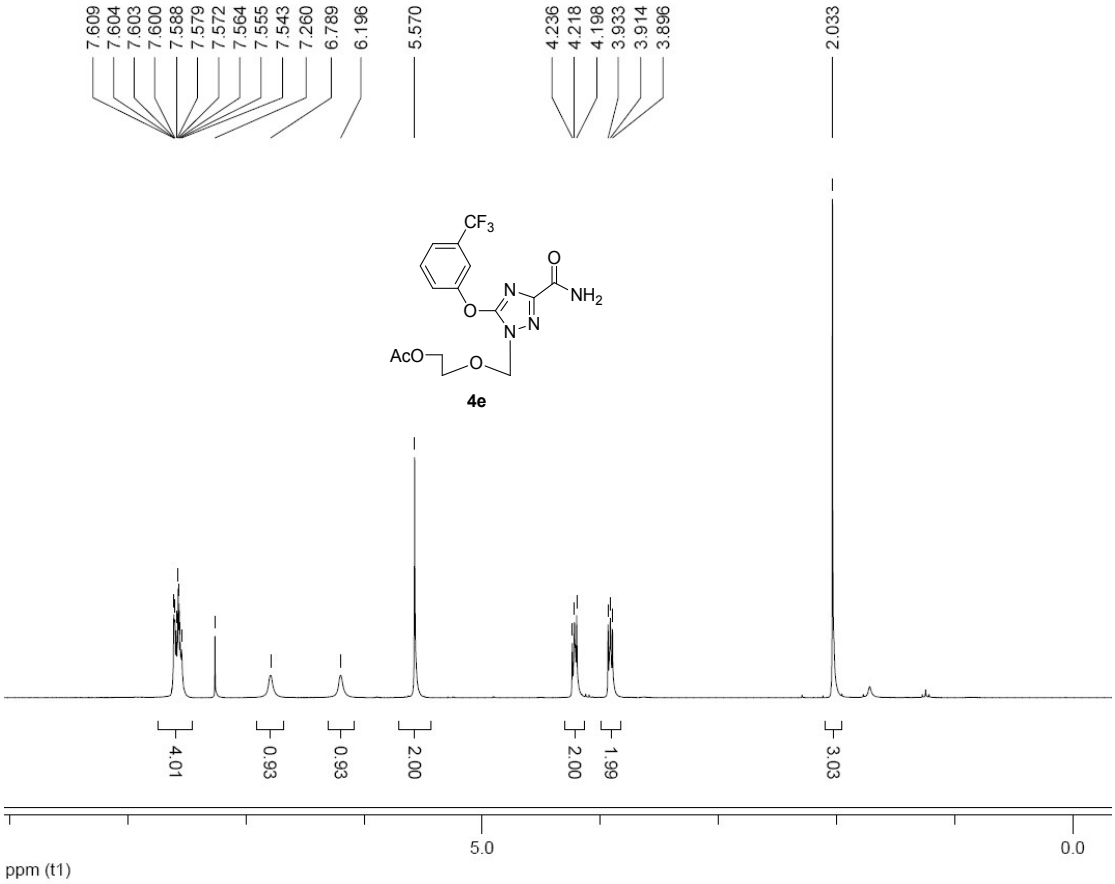
127.316
127.280
124.953
122.249
119.807
77.318
77.000
76.683
76.241
68.177
62.777
20.771
F3C
O
NH2
N
O
N
N
AcO
O
4d
150
100
50
0
ppm (t1)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7.604
7.603
7.600
7.588
7.579
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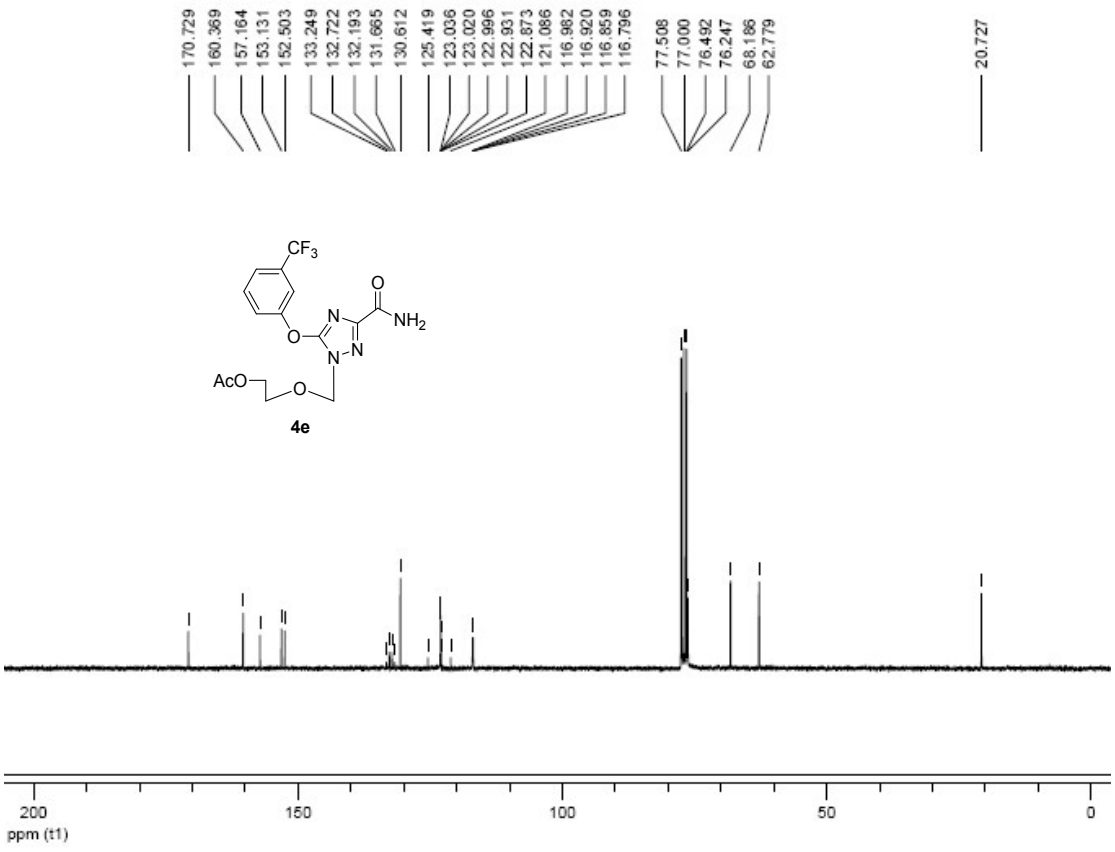
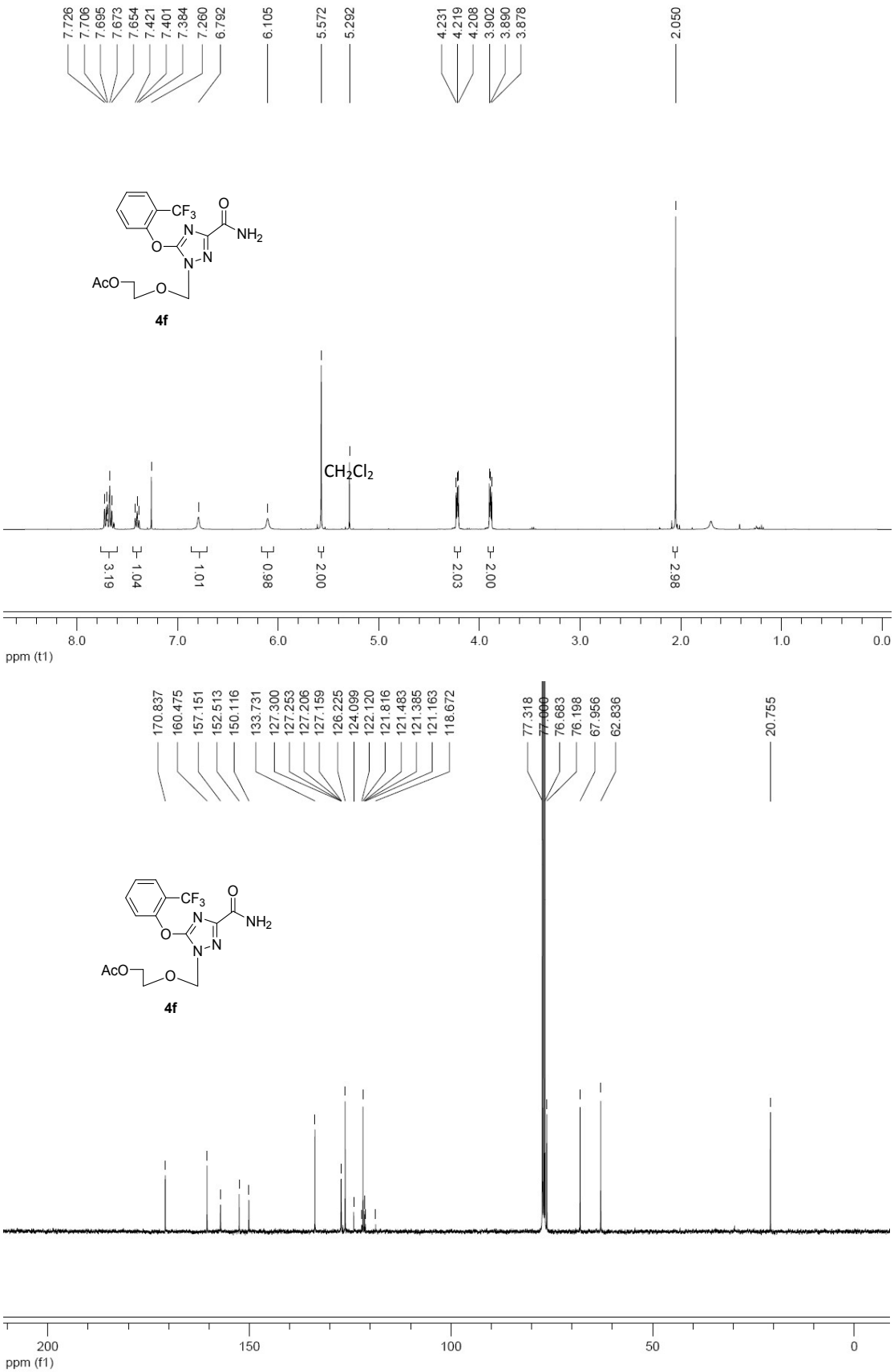
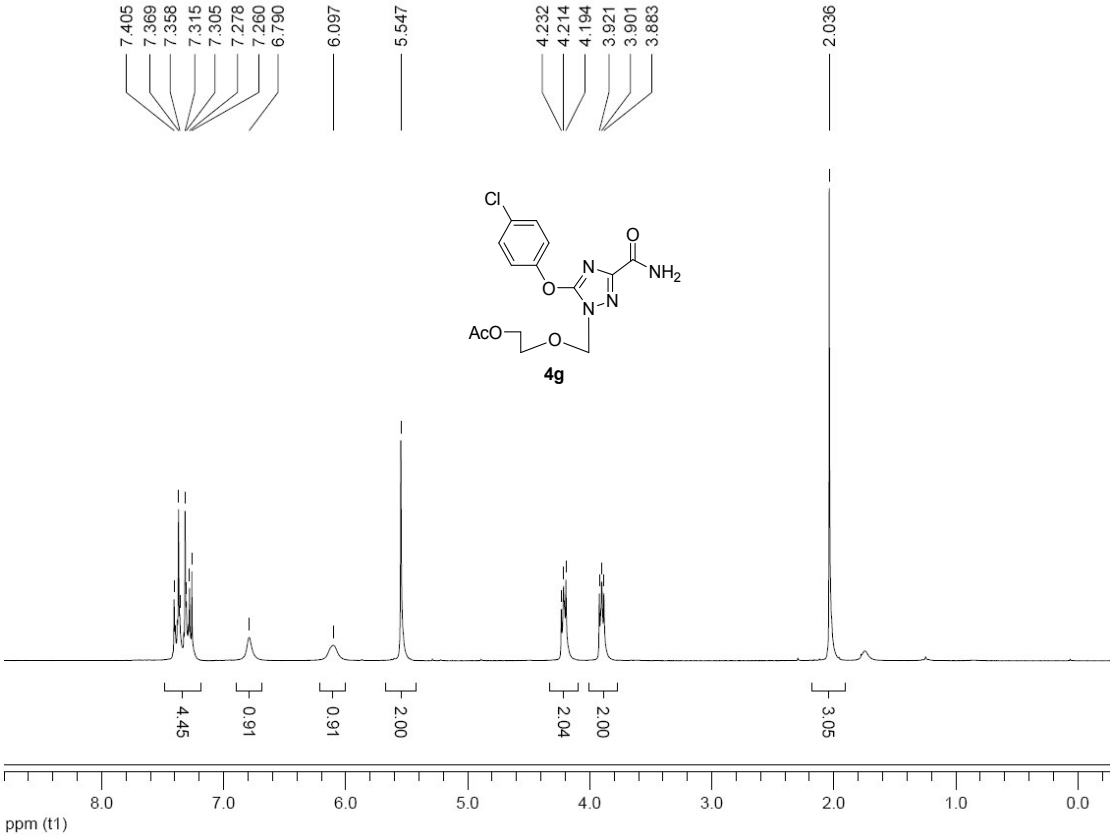
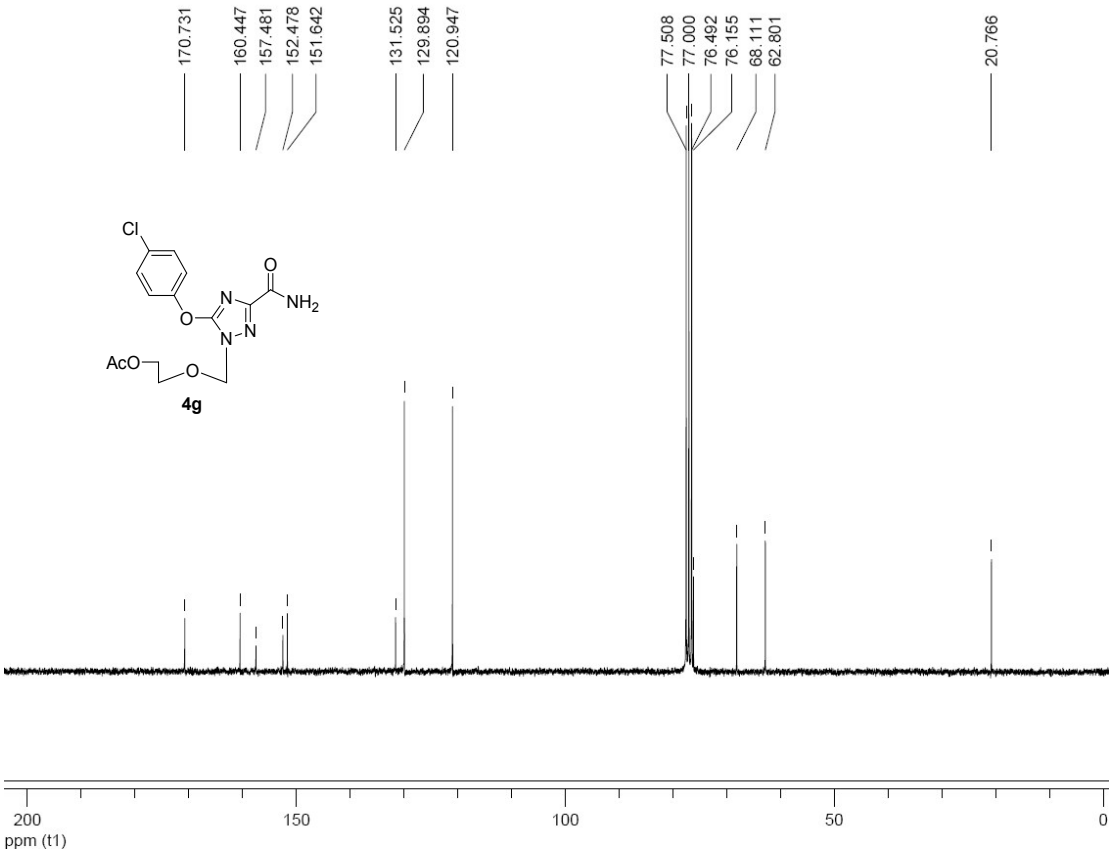
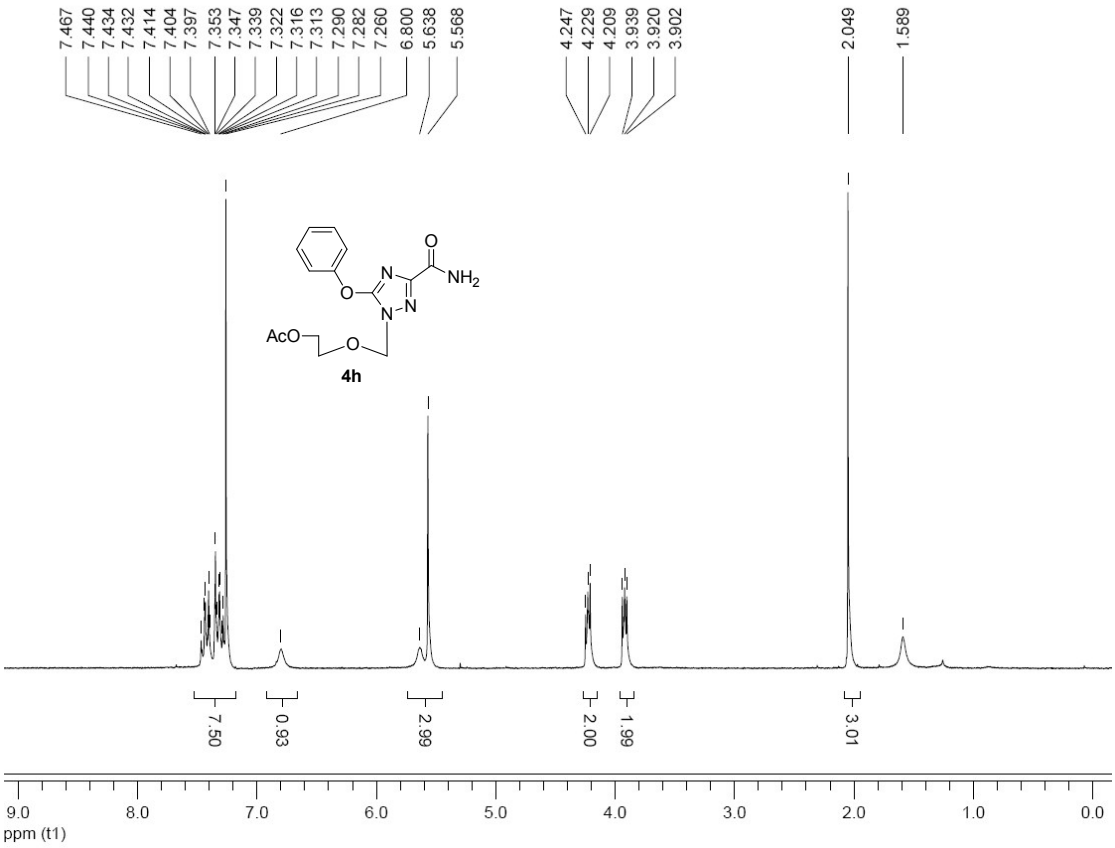
7.564
7.555
7.543
7.260
6.789
6.196
5.570
4.236
4.218
4.198
3.933
3.914
3.896
2.033
CF3
O
NH2
N
N
N
O
AcO
O
4e
4.01
0.93
0.93
2.00
2.00
1.99
3.03
5.0
0.0
ppm (t1)

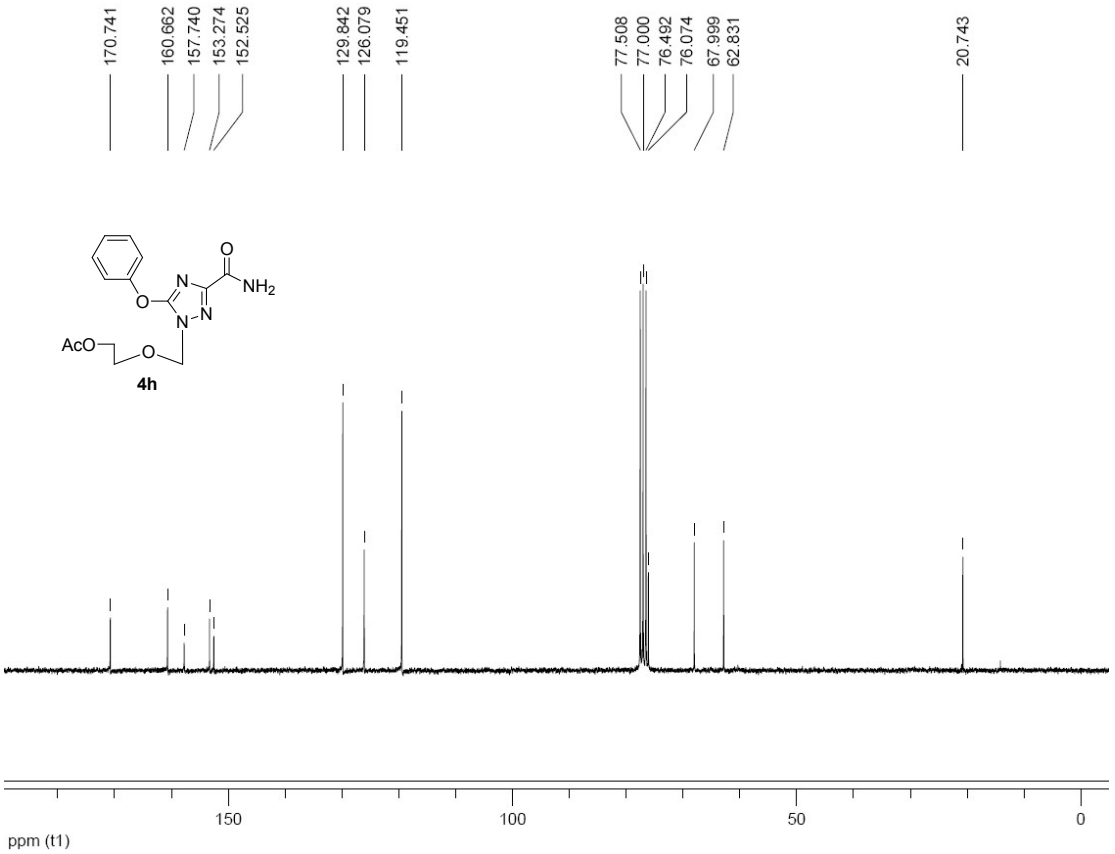

170.729
160.369
157.164
153.131
152.503
133.249
132.722
132.193
131.665
130.612
125.419
123.036
123.020
122.996
122.931
122.873
121.086
116.982
116.920
116.859
116.796
77.508
77.000
76.492
76.247
68.186
62.779
20.727
CF3
O
NH2
N
N
N
O
AcO
O
4e
200
150
100
50
0
ppm (t1)

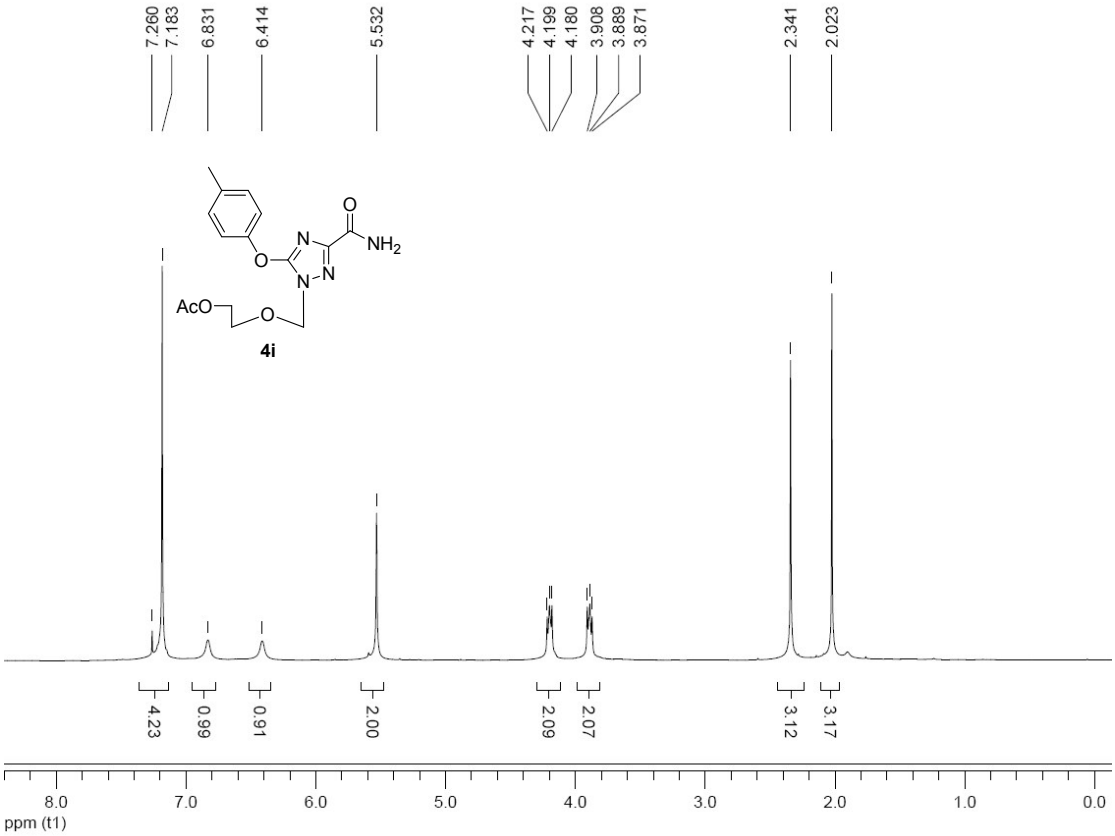

7.726
7.706
7.695
7.673
7.654
7.421
7.401
7.384
7.260
6.792
6.105
5.572
5.292
4.231
4.219
4.208
3.902
3.890
3.878
2.050
CF3
O
NH2
N
O
N
N
AcO
O
4f
CH2Cl2
3.19
1.04
1.01
0.98
2.00
2.03
2.00
2.98
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
ppm (t1)
170.837
160.475
157.151
152.513
150.116
133.731
127.300
127.253
127.206
127.159
126.225
124.099
122.120
121.816
121.483
121.385
121.163
118.672
77.318
77.000
76.683
76.198
67.956
62.836
20.755
CF3
O
NH2
N
O
N
N
AcO
O
4f
200
150
100
50
0
ppm (f1)

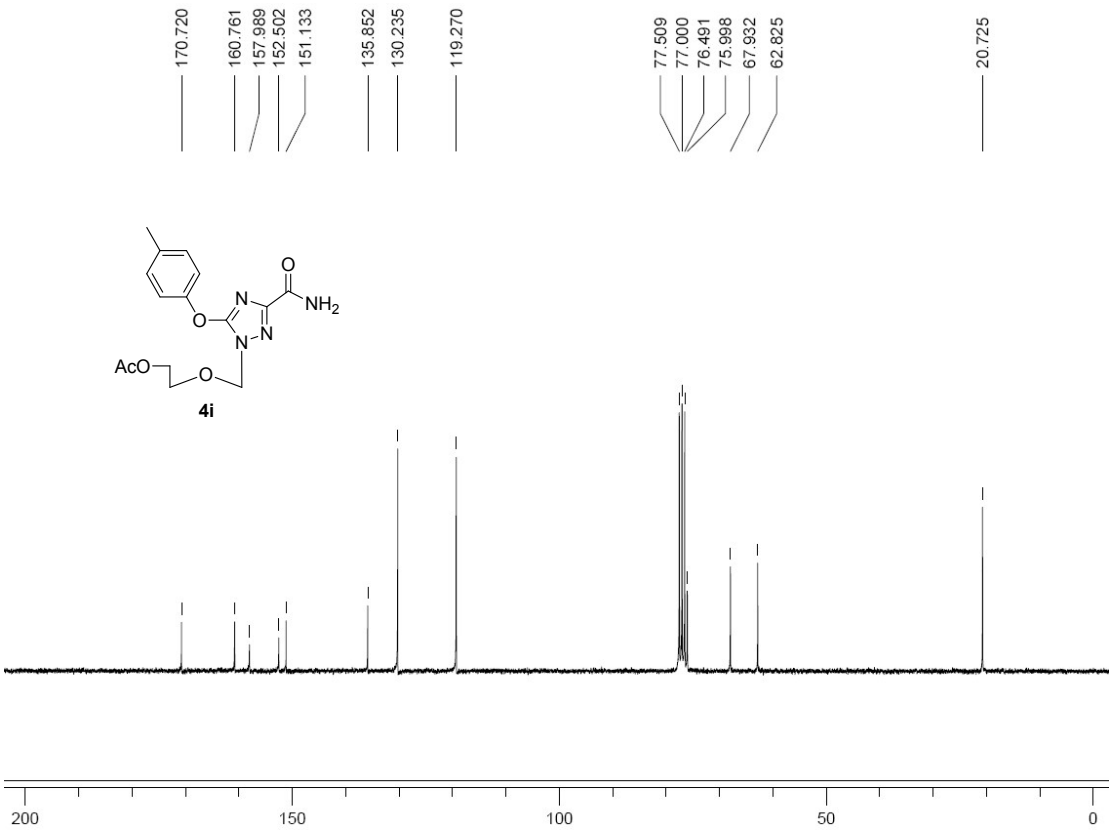

7.405
7.369
7.358
7.315
7.305
7.278
7.260
6.790
6.097
5.547
4.232
4.214
4.194
3.921
3.901
3.883
2.036
Cl
O
NH2
N
O
N
N
AcO
O
4g
4.45
0.91
0.91
2.00
2.04
2.00
3.05
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
ppm (t1)

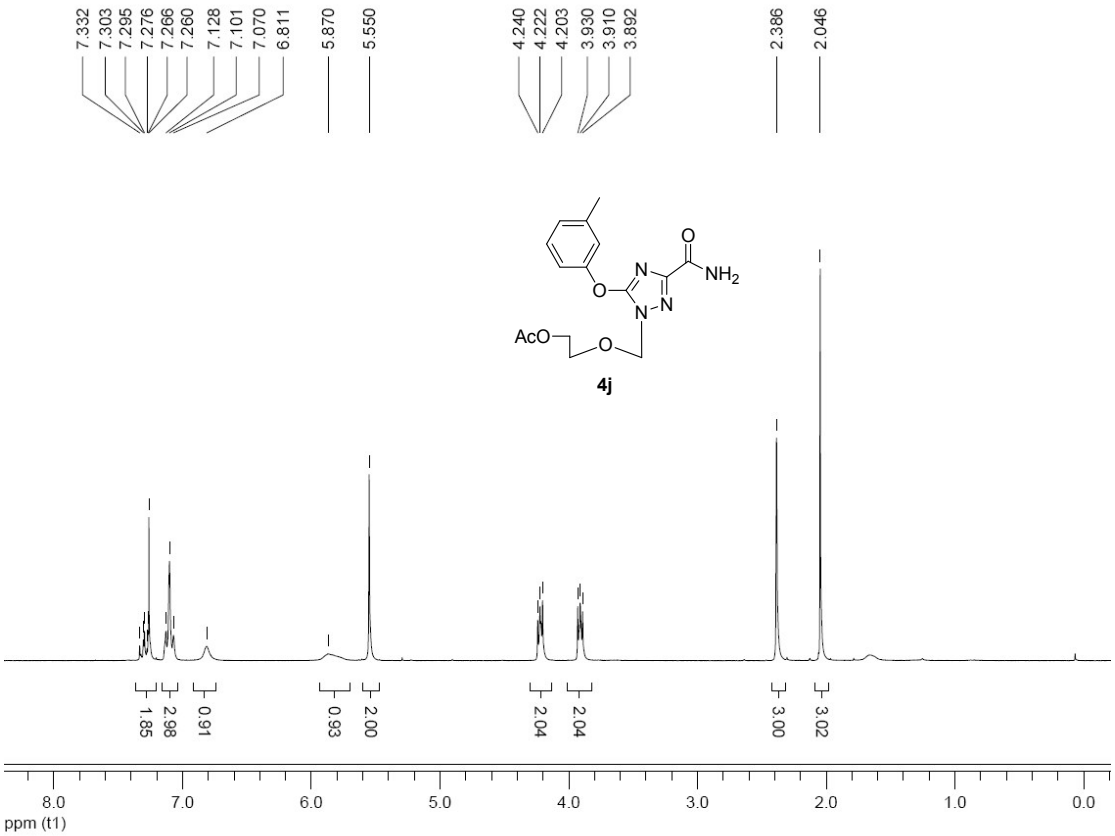

170.731
160.447
157.481
152.478
151.642
131.525
129.894
120.947
77.508
77.000
76.492
76.155
68.111
62.801
20.766
Cl
O
NH2
N
O
N
N
AcO
O
4g
200
150
100
50
0
ppm (t1)

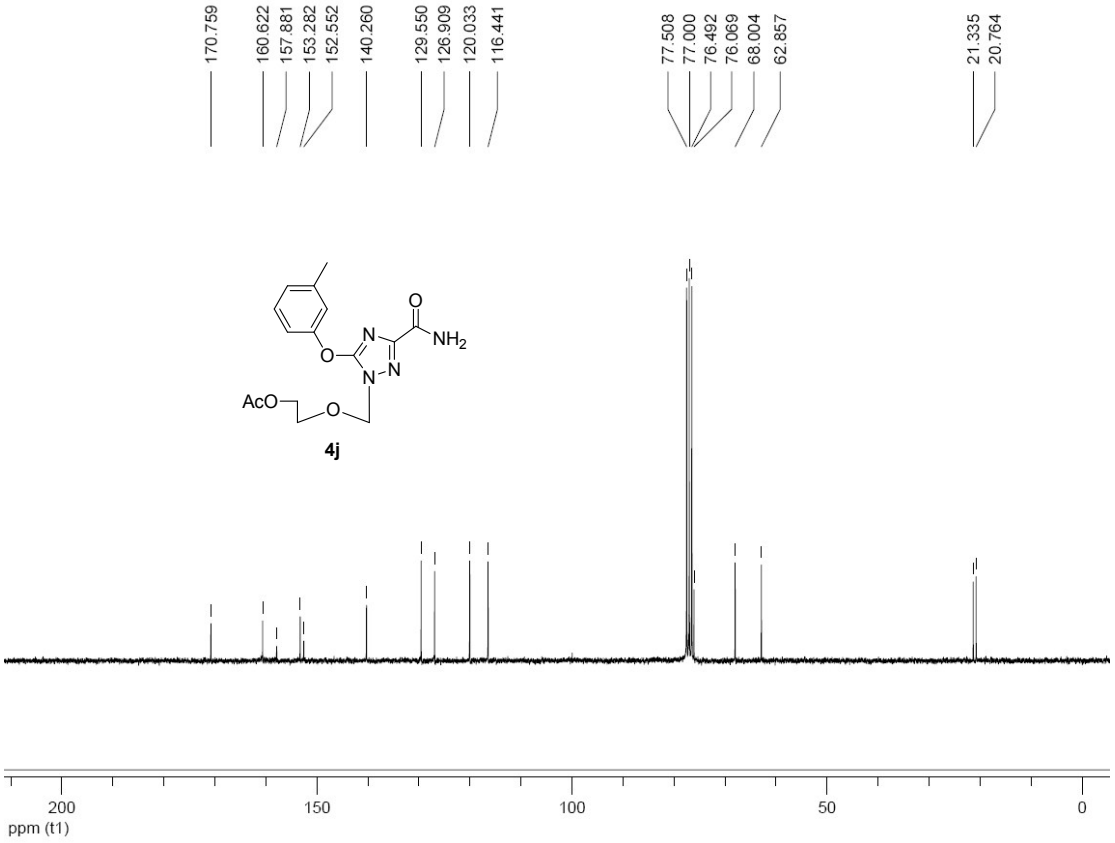

7.467
7.440
7.434
7.432
7.414
7.404
7.397
7.353
7.347
7.339
7.322
7.316
7.313
7.290
7.282
7.260
6.800
5.638
5.568
4.247
4.229
4.209
3.939
3.920
3.902
2.049
1.589
4h
7.50
0.93
2.99
2.00
1.99
3.01
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
ppm (t1)

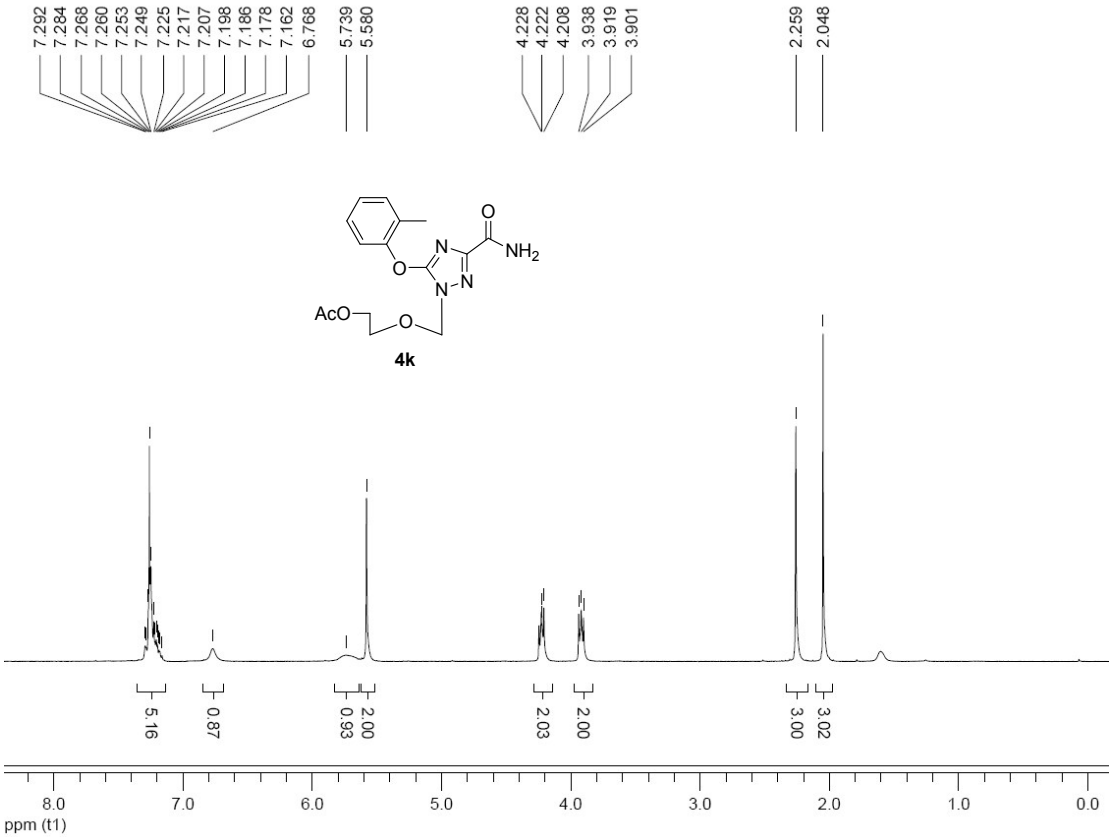

170.741
160.662
157.740
153.274
152.525
129.842
126.079
119.451
77.508
77.000
76.492
76.074
67.999
62.831
20.743
4h
150
100
50
0
ppm (t1)

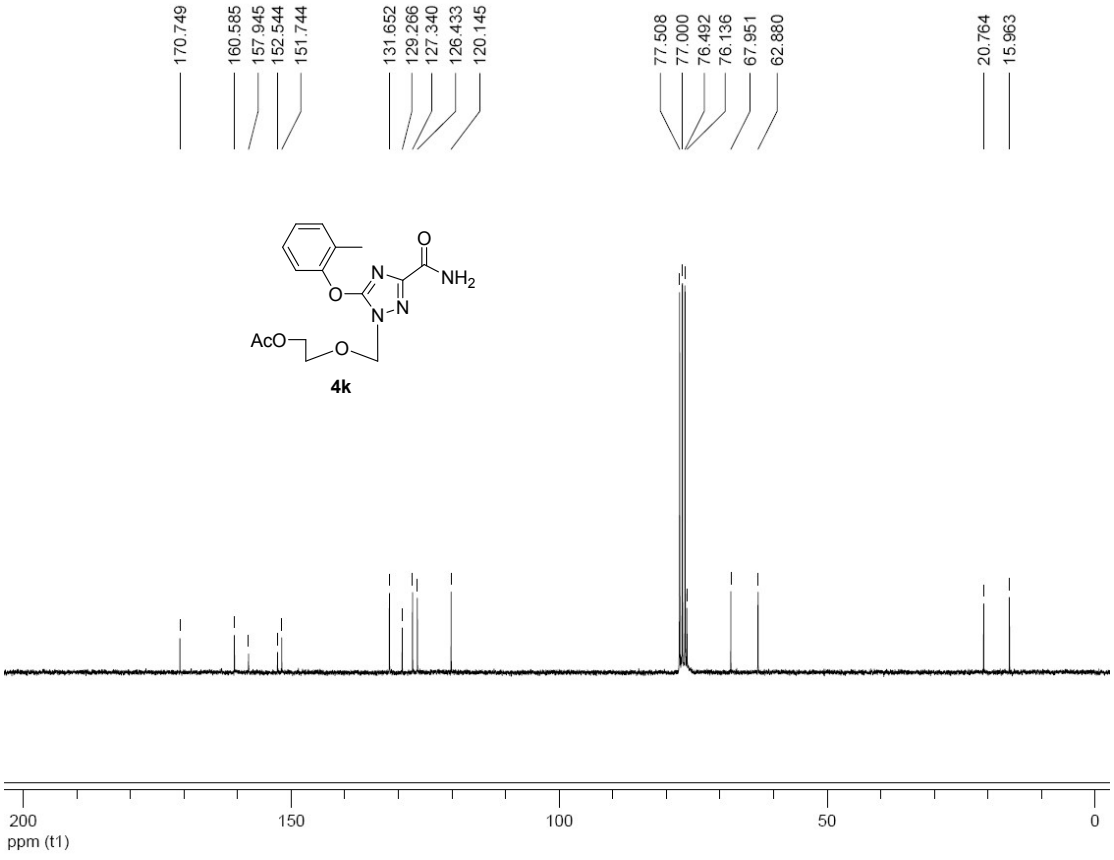

7.260
7.183
6.831
6.414
5.532
4.217
4.199
4.180
3.908
3.889
3.871
2.341
2.023
O
NH2
N
O
N
N
AcO
O
4i
4.23
0.99
1.01
2.00
2.09
2.07
3.12
3.17
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
ppm (t1)

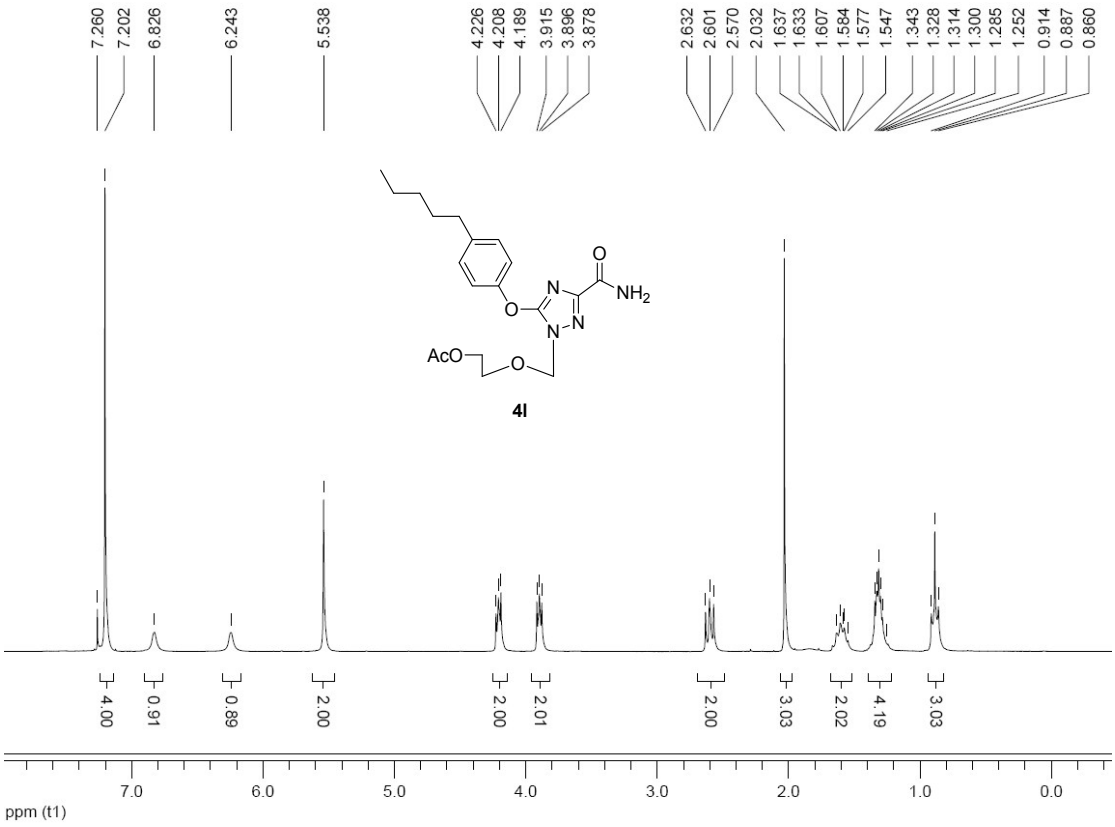

170.720
160.761
157.989
152.502
151.133
135.852
130.235
119.270
77.509
77.000
76.491
75.998
67.932
62.825
20.725
O
NH2
N
O
N
N
AcO
O
4i
200
150
100
50
0


7.332
7.303
7.295
7.276
7.266
7.260
7.128
7.101
7.070
6.811
5.870
5.550
4.240
4.222
4.203
3.930
3.910
3.892
2.386
2.046
4j
1.95
2.98
1.01
0.93
2.00
2.04
2.04
3.00
3.02
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
ppm (t1)

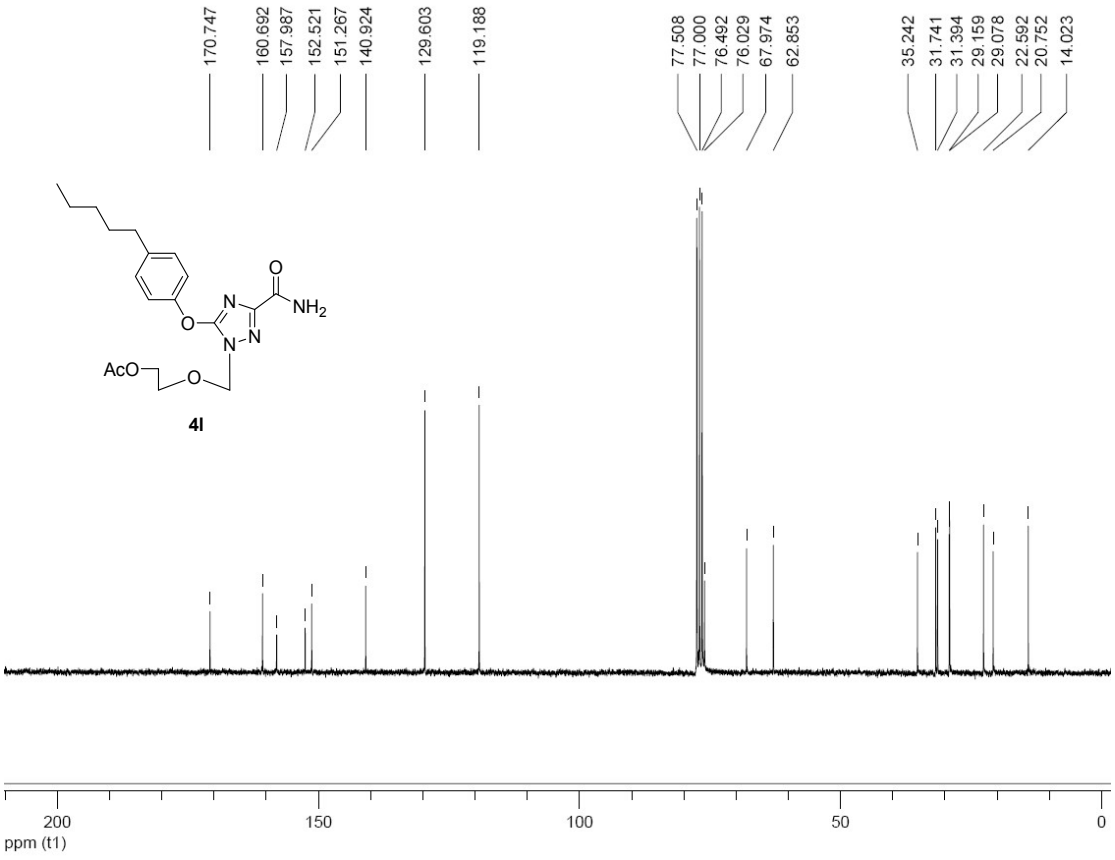

170.759
160.622
157.881
153.282
152.552
140.260
129.550
126.909
120.033
116.441
77.508
77.000
76.492
76.069
68.004
62.857
21.335
20.764
4j
200
150
100
50
0
ppm (t1)


7.292
7.284
7.268
7.260
7.253
7.249
7.225
7.217
7.207
7.198
7.186
7.178
7.162
6.768
5.739
5.580
4.228
4.222
4.208
3.938
3.919
3.901
2.259
2.048
O
NH2
N
O
N
N
AcO
O
4k
5.16
0.87
0.93
2.00
2.03
2.00
3.00
3.02
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
ppm (t1)

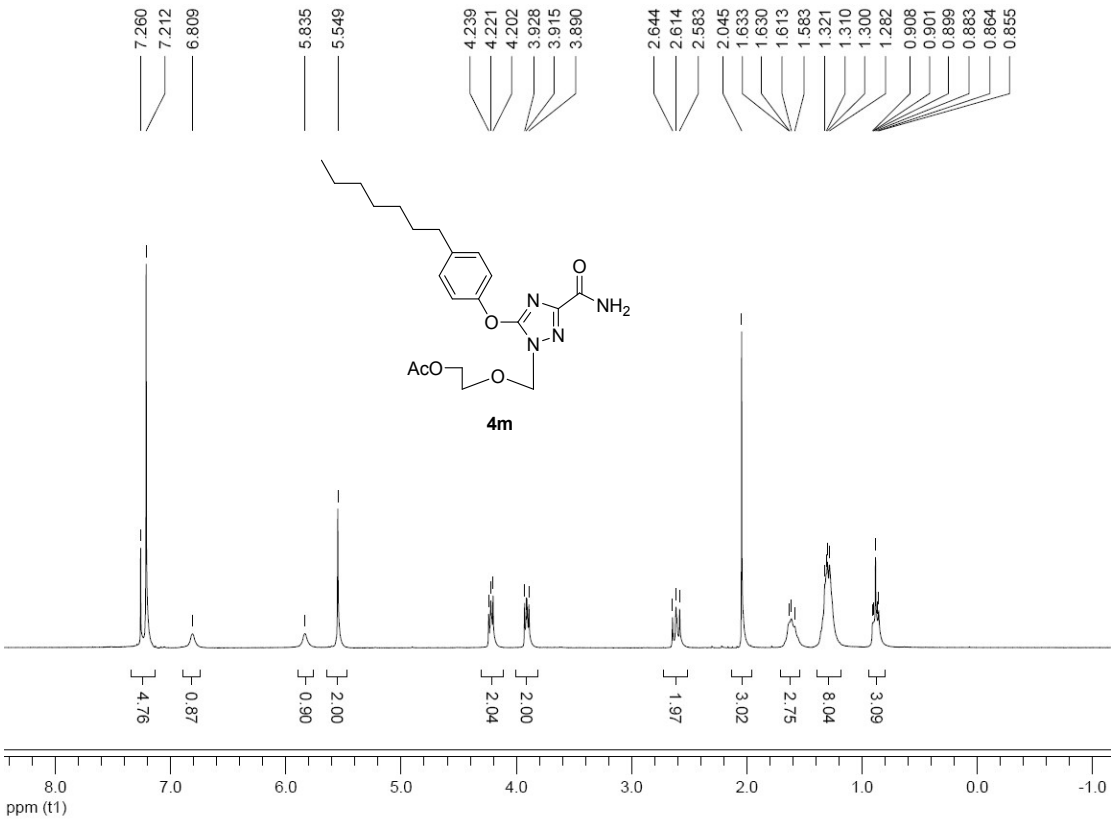

170.749
160.585
157.945
152.544
151.744
131.652
129.266
127.340
126.433
120.145
77.508
77.000
76.492
76.136
67.951
62.880
20.764
15.963
O
NH2
N
O
N
N
AcO
O
4k
200
150
100
50
0
ppm (t1)

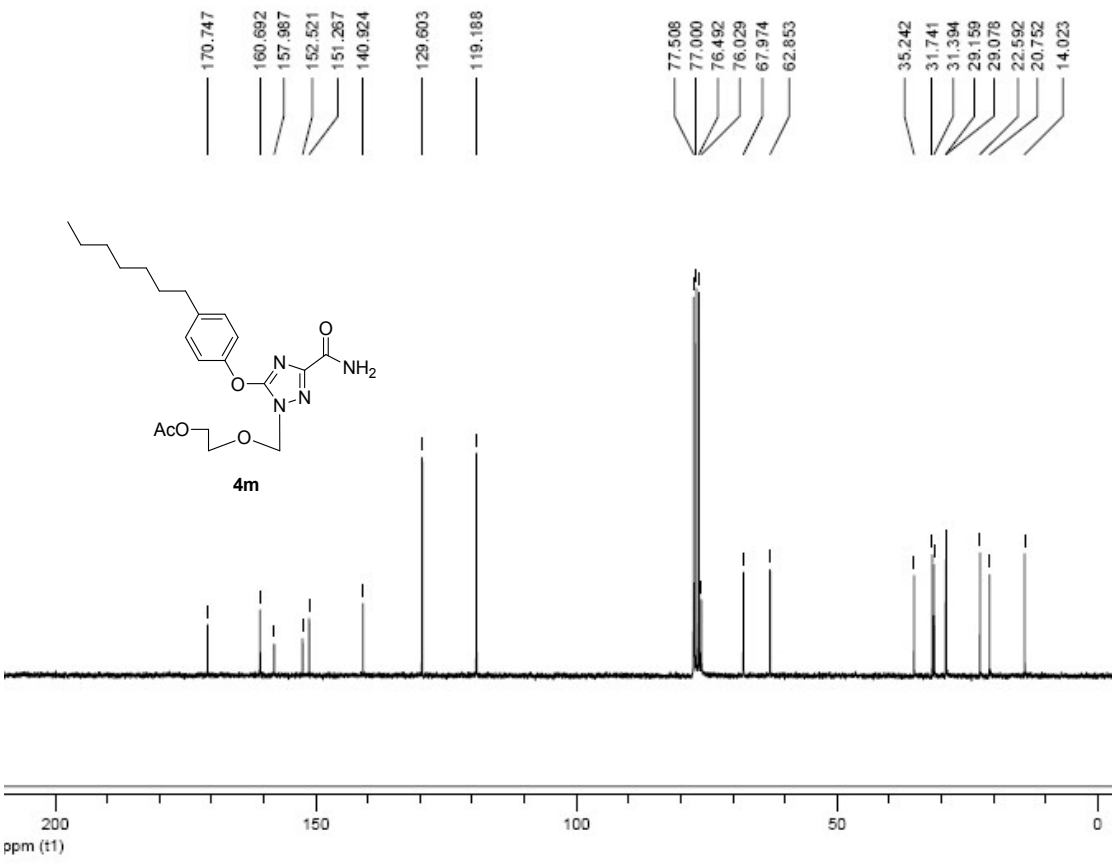

7.260
7.202
6.826
6.243
5.538
4.226
4.208
4.189
3.915
3.896
3.878
2.632
2.601
2.570
2.032
1.637
1.633
1.607
1.584
1.577
1.547
1.343
1.328
1.314
1.300
1.285
1.252
0.914
0.887
0.860
4.00
0.91
0.89
2.00
2.00
2.01
2.00
3.03
2.02
4.19
3.03
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
ppm (t1)

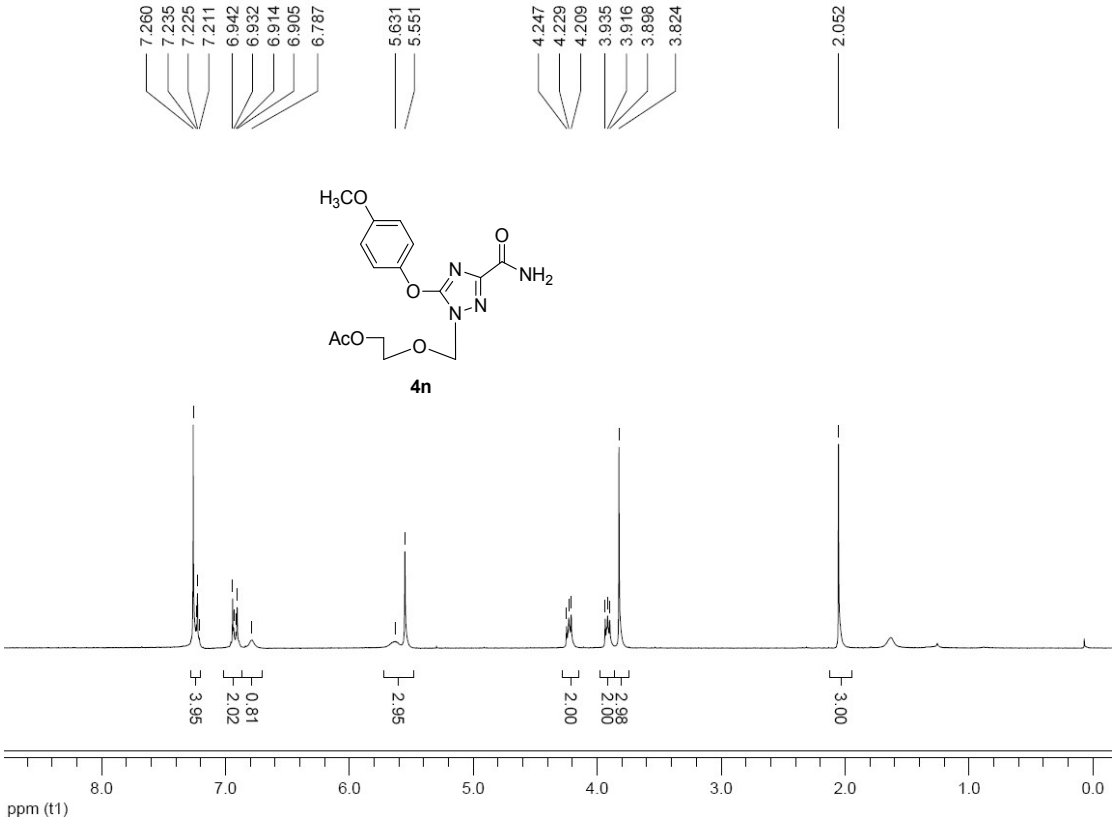
4l

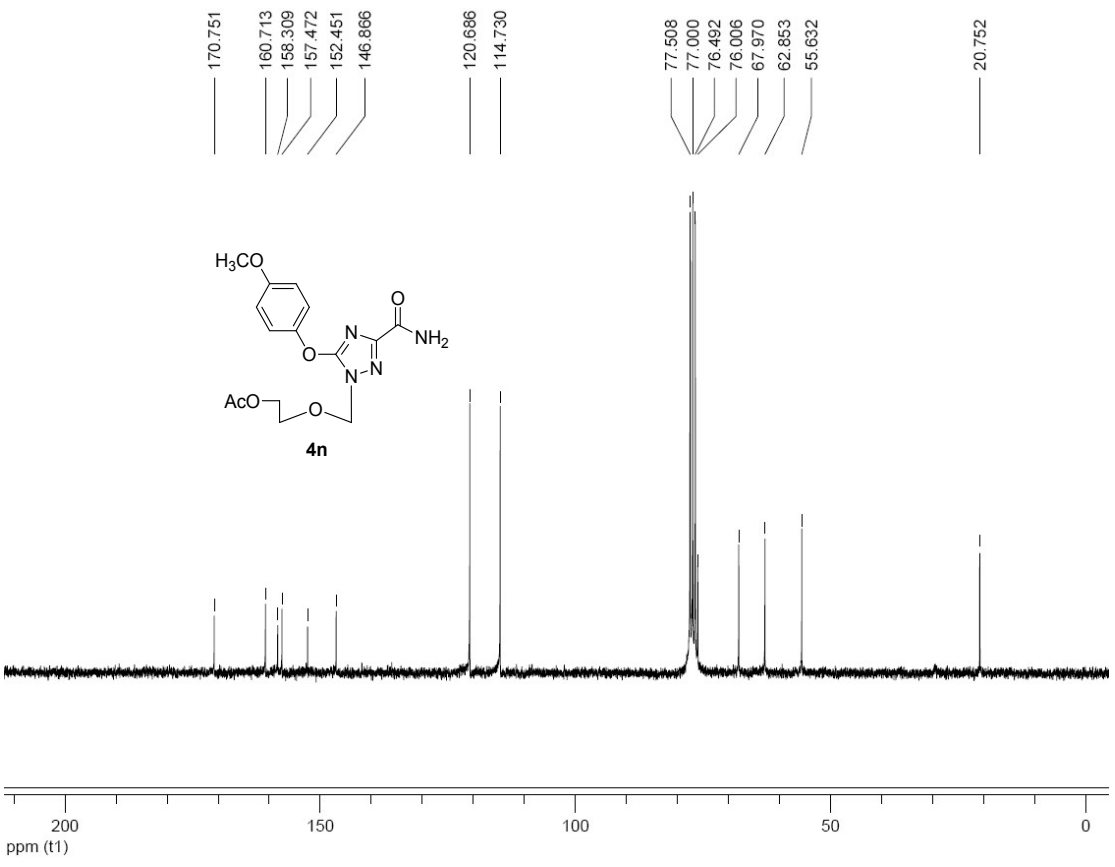

170.747
160.692
157.987
152.521
151.267
140.924
129.603
119.188
77.508
77.000
76.492
76.029
67.974
62.853
35.242
31.741
31.394
29.159
29.078
22.592
20.752
14.023
200
150
100
50
0
ppm (t1)

4l


7.260
7.212
6.809
5.835
5.549
4.239
4.221
4.202
3.928
3.915
3.890
2.644
2.614
2.583
2.045
1.633
1.630
1.613
1.583
1.321
1.310
1.300
1.282
0.908
0.901
0.899
0.883
0.864
0.855
O
NH2
N
O
N
N
AcO
O
4m
4.76
0.87
0.90
2.00
2.04
2.00
1.97
3.02
2.75
8.04
3.09
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
ppm (t1)


170.747
160.692
157.987
152.521
151.267
140.924
129.603
119.188
77.508
77.000
76.492
76.029
67.974
62.853
35.242
31.741
31.394
29.159
29.078
22.592
20.752
14.023
O
NH2
N
O
N
N
AcO
O
4m
200
150
100
50
0
ppm (t1)


7.260
7.235
7.225
7.211
6.942
6.932
6.914
6.905
6.787
5.631
5.551
4.247
4.229
4.209
3.935
3.916
3.898
3.824
2.052
H3CO
O
NH2
N
O
N
N
AcO
O
4n
3.95
2.02
0.81
2.95
2.00
2.00
3.00
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
ppm (t1)


170.751
160.713
158.309
157.472
152.451
146.866
120.686
114.730
77.508
77.000
76.492
76.006
67.970
62.853
55.632
20.752
H3CO
O
NH2
N
O
N
N
AcO
O
4n
200
150
100
50
0
ppm (t1)