

Supplementary material**Improved Protocol Toward 1,3,4-Oxadiazole-2(3H)-thiones and Scale-up Synthesis in the Presence of SDS as a Micelle Promoted Catalyst**

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*Uludağ University, Department of Chemistry, 16059 Bursa, Turkey**E-mail: yildirim@uludag.edu.tr**Tel: +90-2242941771; fax: +90-2242941899**Spectroscopic characterization of compounds:*

Compound 2a: IR (KBr): 3205, 1620, 1173, 1057 cm^{-1} ; ^1H NMR (400 MHz, CDCl_3): δ 10.97 (s, 1H, $-\text{NH}$), 2.69 (t, J 7.6 Hz, 2H, $-\text{CH}_2\text{-het}$), 1.75 (quin, J 7.6 Hz, 2H, $-\text{CH}_2\text{CH}_2\text{CH}_2\text{-het}$), 1.43-1.23 (m, 16H, $-\text{CH}_2-$), 0.87 (t, J 6.8 Hz, 3H, $-\text{CH}_3$); ^{13}C NMR (100 MHz, CDCl_3): δ 178.54, 164.90, 31.87, 29.54, 29.52, 29.32, 29.29, 28.99, 28.76, 25.67, 25.53, 22.66, 14.10. Anal. Calcd for $\text{C}_{13}\text{H}_{24}\text{N}_2\text{OS}$: C, 60.90; H, 9.43; N, 10.93; S, 12.50. Found: C, 60.85; H, 9.40; N, 10.56; S, 12.70.

Compound 2b: IR (KBr): 3205, 1620, 1176, 1065 cm^{-1} ; ^1H NMR (400 MHz, CDCl_3): δ 10.91 (s, 1H, $-\text{NH}$), 2.69 (t, J 7.5 Hz, 2H, $-\text{CH}_2\text{-het}$), 1.73 (quin, J 7.2 Hz, 2H, $-\text{CH}_2\text{CH}_2\text{CH}_2\text{-het}$), 1.43-1.21 (m, 20H, $-\text{CH}_2-$), 0.87 (t, J 6.8 Hz, 3H, $-\text{CH}_3$); ^{13}C NMR (100, MHz, CDCl_3): δ 178.54, 164.90, 31.90, 29.63, 29.62, 29.59, 29.52, 29.33, 29.00, 28.77, 25.67, 25.53, 22.67, 14.11. Anal. Calcd for $\text{C}_{15}\text{H}_{28}\text{N}_2\text{OS}$: C, 63.34; H, 9.92; N, 9.85; S, 11.27. Found: C, 63.20; H, 9.87; N, 9.63; S, 11.59.

Compound 2c: IR (KBr): 3205, 1620, 1176, 1068 cm^{-1} ; ^1H NMR (400 MHz, CDCl_3): δ 10.93 (s, 1H, $-\text{NH}$), 2.69 (t, J 7.6 Hz, 2H, $-\text{CH}_2\text{-het}$), 1.74 (*quin*, J 7.5 Hz, 2H, $-\text{CH}_2\text{CH}_2\text{CH}_2\text{-het}$), 1.43-1.22 (*m*, 24H, $-\text{CH}_2-$), 0.87 (t, J 6.4 Hz, 3H, $-\text{CH}_3$); ^{13}C NMR (100 MHz, CDCl_3): δ 178.54, 164.90, 31.87, 29.54, 29.52, 29.32, 29.29, 28.99, 28.76, 25.67, 25.53, 22.66, 14.10. Anal. Calcd for $\text{C}_{17}\text{H}_{32}\text{N}_2\text{OS}$: C, 65.34; H, 10.32; N, 8.96; S, 10.26. Found: C, 65.15; H, 10.09; N, 8.49; S, 10.28.

Compound 2d: IR (KBr): 3205, 1624, 1165, 1072 cm^{-1} ; ^1H NMR (400 MHz, CDCl_3): δ 10.96 (s, 1H, $-\text{NH}$), 2.69 (t, J 7.6 Hz, 2H, $-\text{CH}_2\text{-het}$), 1.74 (*quin*, J 7.4 Hz, 2H, $-\text{CH}_2\text{CH}_2\text{CH}_2\text{-het}$), 1.43-1.18 (*m*, 26H, $-\text{CH}_2-$), 0.87 (t, J 6.8 Hz, 3H, $-\text{CH}_3$); ^{13}C NMR (100 MHz, CDCl_3): δ 178.54, 164.89, 31.92, 29.69, 29.68, 29.65, 29.60, 29.54, 29.36, 29.34, 29.01, 28.78, 25.68, 25.53, 22.69, 14.13. Anal. Calcd for $\text{C}_{18}\text{H}_{34}\text{N}_2\text{OS}$: C, 66.21; H, 10.50; N, 8.58; S, 9.82. Found: C, 66.26; H, 10.65; N, 8.13; S, 9.52.

Compound 2e: IR (KBr): 3205, 1612, 1165, 1053 cm^{-1} ; ^1H NMR (400 MHz, CDCl_3): δ 10.93 (s, 1H, $-\text{NH}$), 2.69 (t, J 7.5 Hz, 2H, $-\text{CH}_2\text{-het}$), 1.75 (*quin*, J 7.4 Hz, 2H, $-\text{CH}_2\text{CH}_2\text{CH}_2\text{-het}$), 1.43-1.22 (*m*, 28H, $-\text{CH}_2-$), 0.87 (t, J 6.8 Hz, 3H, $-\text{CH}_3$); ^{13}C NMR (100 MHz, CDCl_3): δ 178.54, 164.89, 31.92, 29.68, 29.65, 29.60, 29.53, 29.35, 29.33, 29.01, 28.77, 25.68, 25.53, 22.68, 14.12. Anal. Calcd for $\text{C}_{19}\text{H}_{36}\text{N}_2\text{OS}$: C, 67.01; H, 10.66; N, 8.23; S, 9.41. Found: C, 66.90; H, 10.66; N, 8.04; S, 9.64.

Compound 2f: IR (KBr): 3205, 1620, 1165, 1060 cm^{-1} ; ^1H NMR (400 MHz, CDCl_3): δ 10.93 (s, 1H, $-\text{NH}$), 2.69 (t, J 7.6 Hz, 2H, $-\text{CH}_2\text{-het}$), 1.74 (*quin*, J 7.4 Hz, 2H, $-\text{CH}_2\text{CH}_2\text{CH}_2\text{-het}$), 1.43-1.22 (*m*, 36H, $-\text{CH}_2-$), 0.88 (t, J 6.8 Hz, 3H, $-\text{CH}_3$); ^{13}C NMR (100 MHz, CDCl_3): δ 178.54, 164.89, 31.92, 29.68, 29.65, 29.60, 29.53, 29.35,

29.33, 29.28, 29.17, 29.01, 28.77, 25.70, 25.68, 25.53, 22.68, 14.12. Anal. Calcd for $C_{23}H_{44}N_2OS$: C, 69.64; H, 11.18; N, 7.06; S, 8.08. Found: C, 69.80; H, 10.76; N, 7.34; S, 8.45.

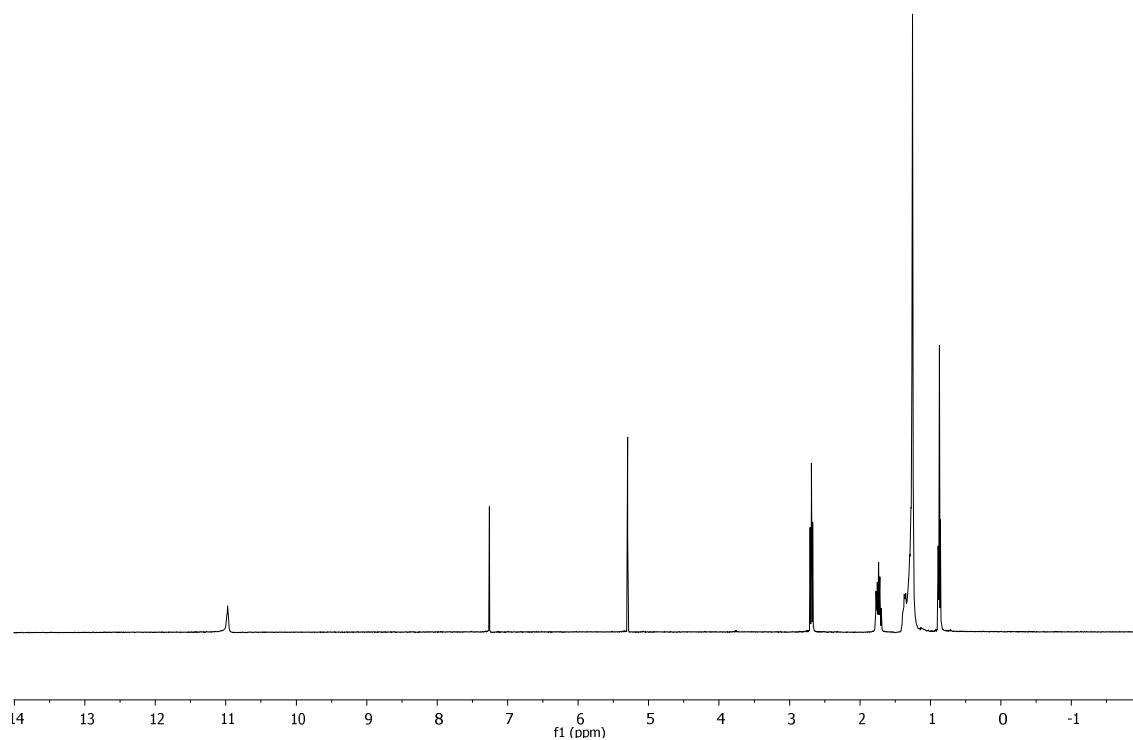
Compound 2g: IR (KBr): 3190, 1642, 1624, 1611, 1160, 1058 cm^{-1} ; 1H NMR (400 MHz, $CDCl_3$): δ 5.86-5.76 (*m*, 1H, $CH_2=CH-$), 5.02-4.97 (*m*, 1H, $CHH=CH-$), 4.95-4.92 (*m*, 1H, $CHH=CH$), 2.70 (*t*, *J* 7.6 Hz, 2H, $-CH_2-het$), 2.07-2.02 (*m*, 2H, $CH_2=CH-CH_2-$), 1.74 (*quin*, *J* 7.6 Hz, 2H, $-CH_2CH_2CH_2-het$), 1.39-1.25 (*m*, 10H, $-CH_2-$); ^{13}C NMR (100 MHz, $CDCl_3$): δ 178.56, 164.83, 139.10, 114.23, 33.75, 31.85, 29.78, 29.48, 29.16, 28.97, 28.82, 25.67. Anal. Calcd for $C_{12}H_{20}N_2OS$: C, 59.96; H, 8.39; N, 11.65; S, 13.34. Found: C, 60.15; H, 8.42; N, 11.36; S, 13.29.

Compound 2h: IR (KBr): 3181, 1626, 1609, 1160, 1065 cm^{-1} ; 1H NMR (400 MHz, $DMSO-d_6$): δ 2.64 (*t*, *J* 7.6 Hz, 4H, $2x-CH_2-het$), 1.57 (*t*, *J* 6.4 Hz, 4H, $2x-CH_2CH_2CH_2-het$), 1.23-1.18 (*m*, 8H, $-CH_2-$); ^{13}C NMR (100 MHz, $DMSO-d_6$): δ 178.09, 164.63, 28.68, 28.49, 25.34, 25.14. Anal. Calcd for $C_{12}H_{18}N_4O_2S_2$: C, 45.84; H, 5.77; N, 17.82; S, 20.39. Found: C, 45.57; H, 5.91; N, 17.86; S, 20.22.

Compound 2i: IR (KBr): 3180, 1626, 1608, 1160, 1064 cm^{-1} ; 1H NMR (400 MHz, $DMSO-d_6$): δ 2.64 (*t*, *J* 7.6 Hz, 4H, $2x-CH_2-het$), 1.57 (*t*, *J* 6.4 Hz, 4H, $2x-CH_2CH_2CH_2-het$), 1.23-1.18 (*m*, 12H, $-CH_2-$); ^{13}C NMR (100 MHz, $DMSO-d_6$): δ 178.09, 164.63, 28.64, 28.48, 25.36, 25.14. Anal. Calcd for $C_{14}H_{22}N_4O_2S_2$: C, 49.10; H, 6.48; N, 16.36; S, 18.72. Found: C, 49.35; H, 6.43; N, 16.37; S, 18.59.

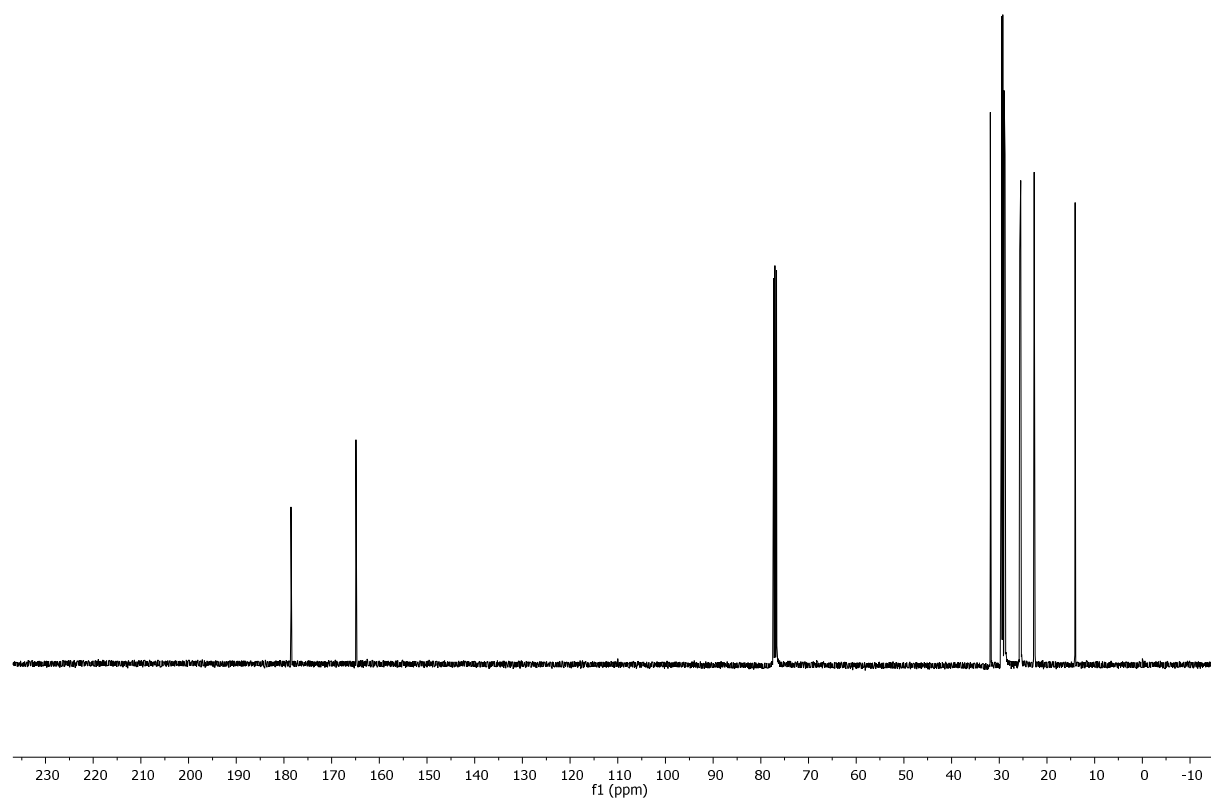
H-NMR Spectrum: **2a**

idy-9
DOHDE



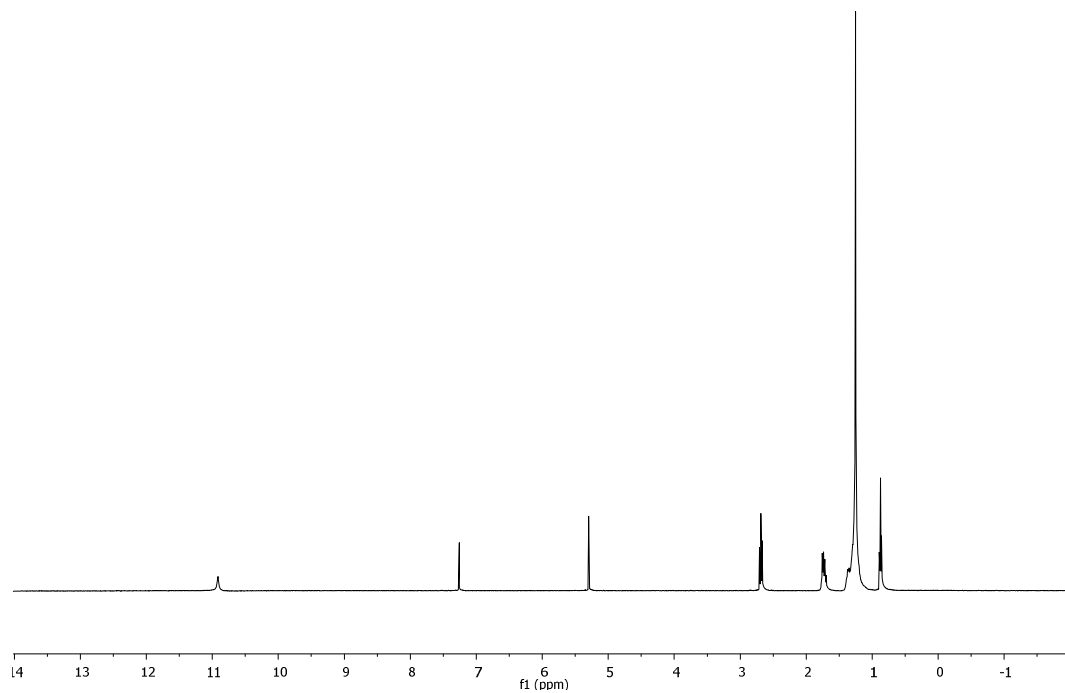
C-NMR Spectrum: **2a**

idy-9
STANDARD CARBON PARAMETERS



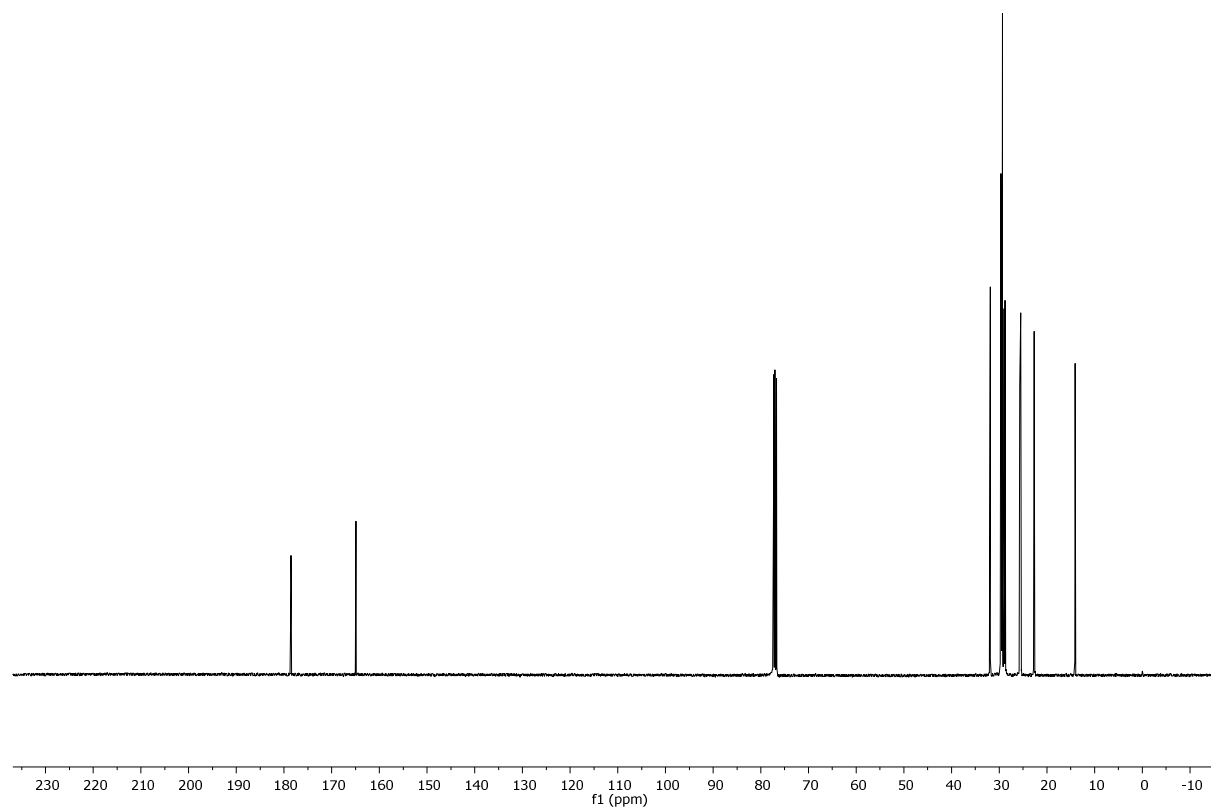
H-NMR Spectrum: **2b**

idy-22
DOHDE



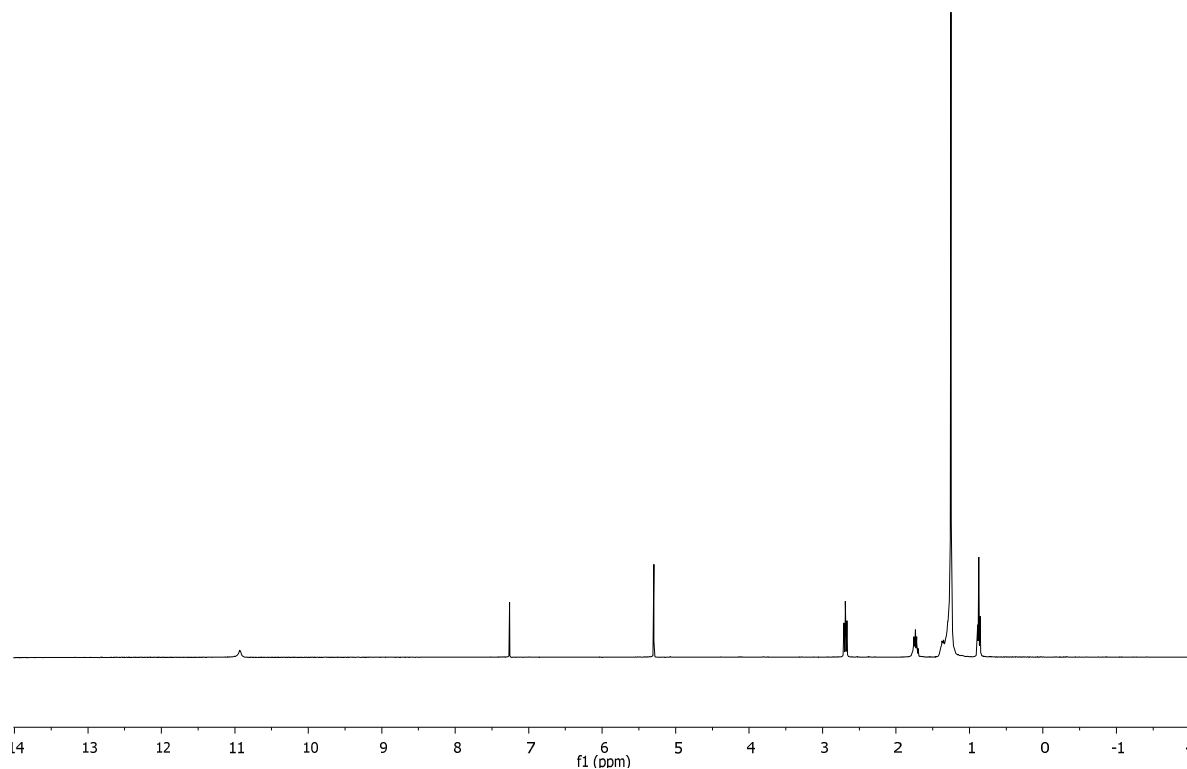
C-NMR Spectrum: **2b**

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STANDARD CARBON PARAMETERS



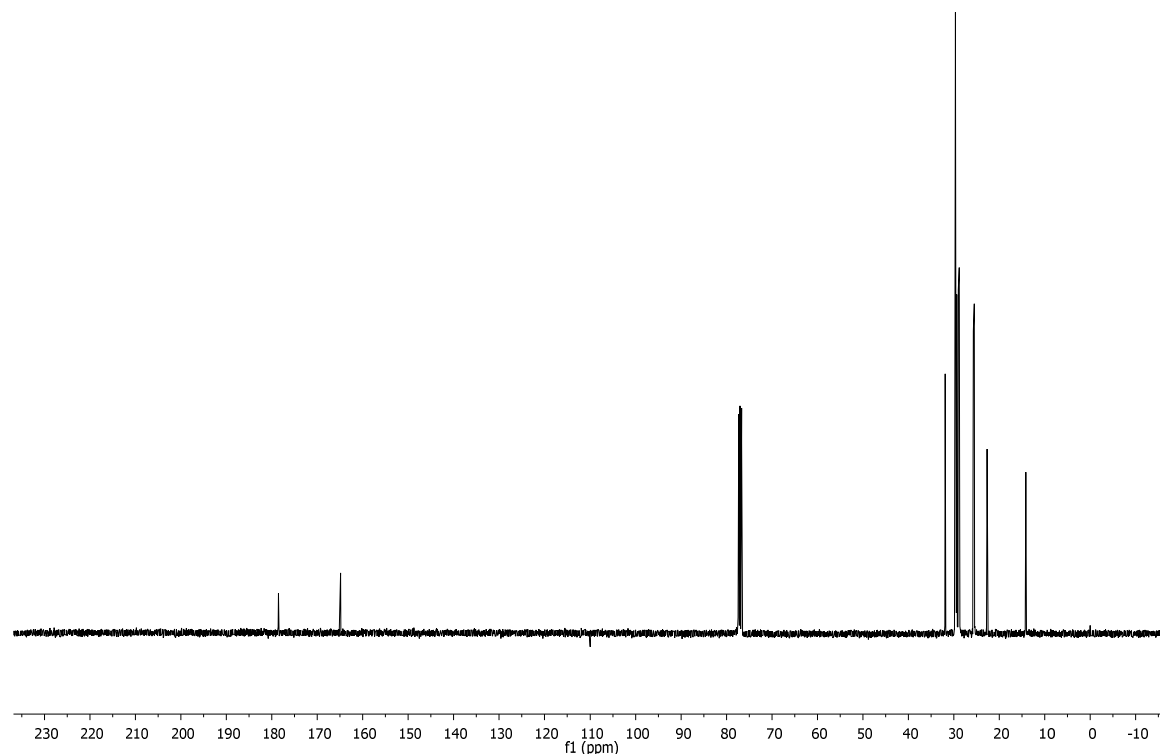
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idy-25
DOHDE



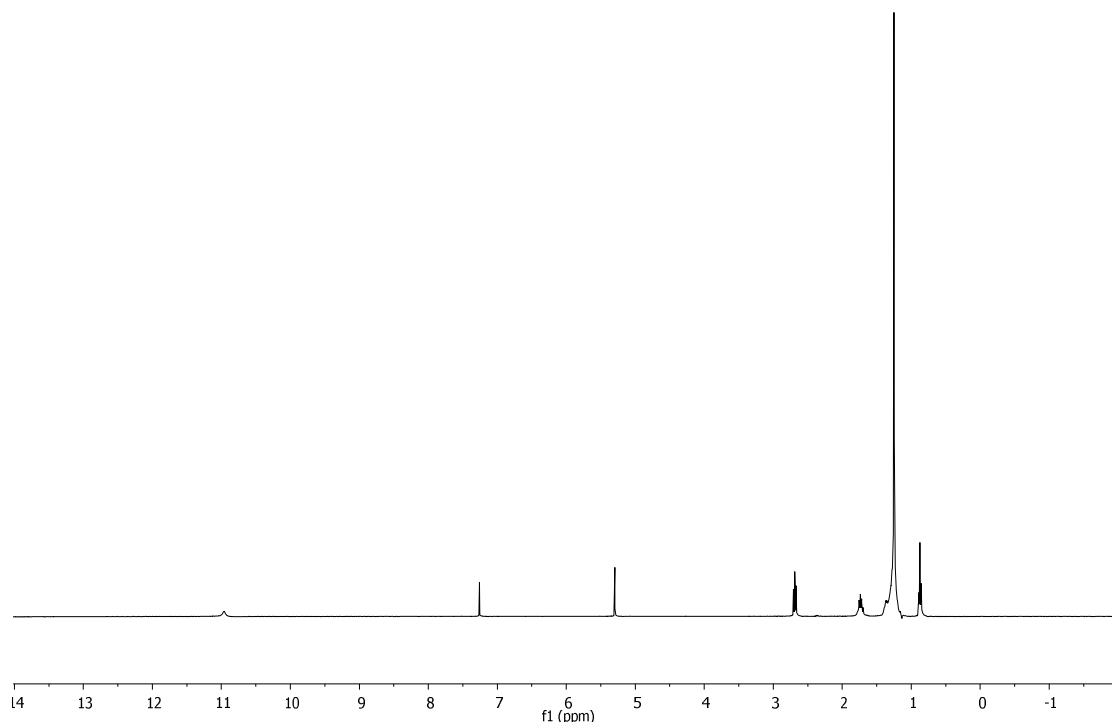
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idy-25
STANDARD CARBON PARAMETERS



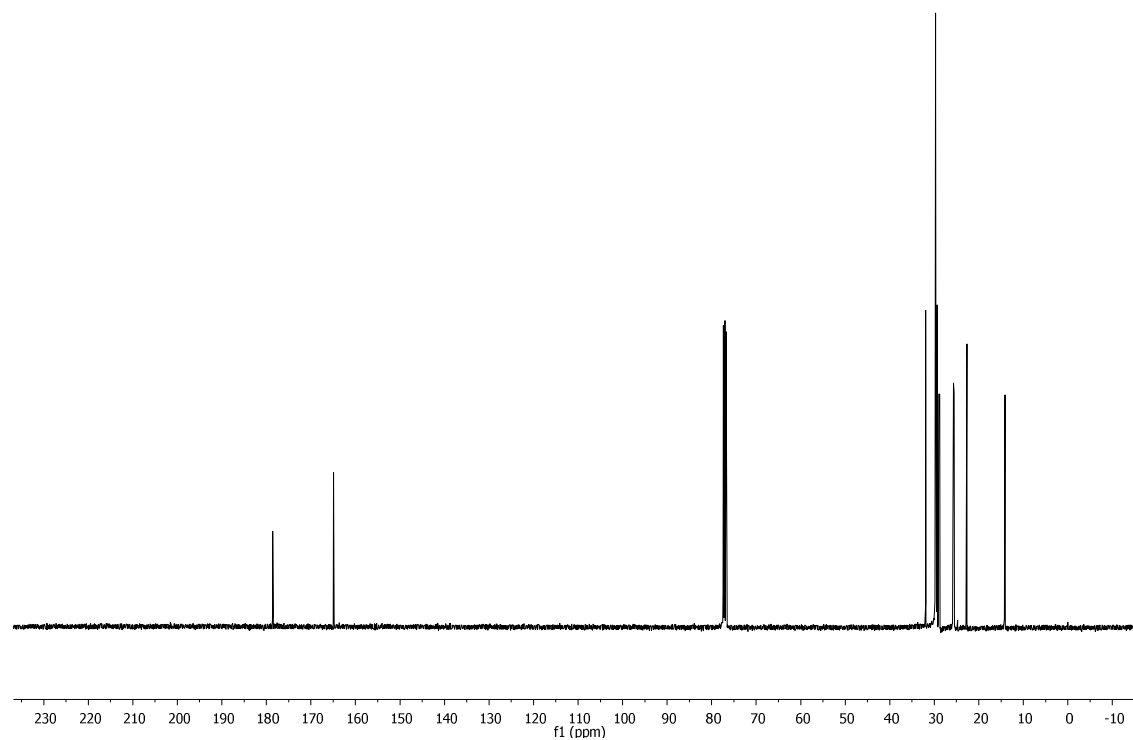
H-NMR Spectrum: **2d**

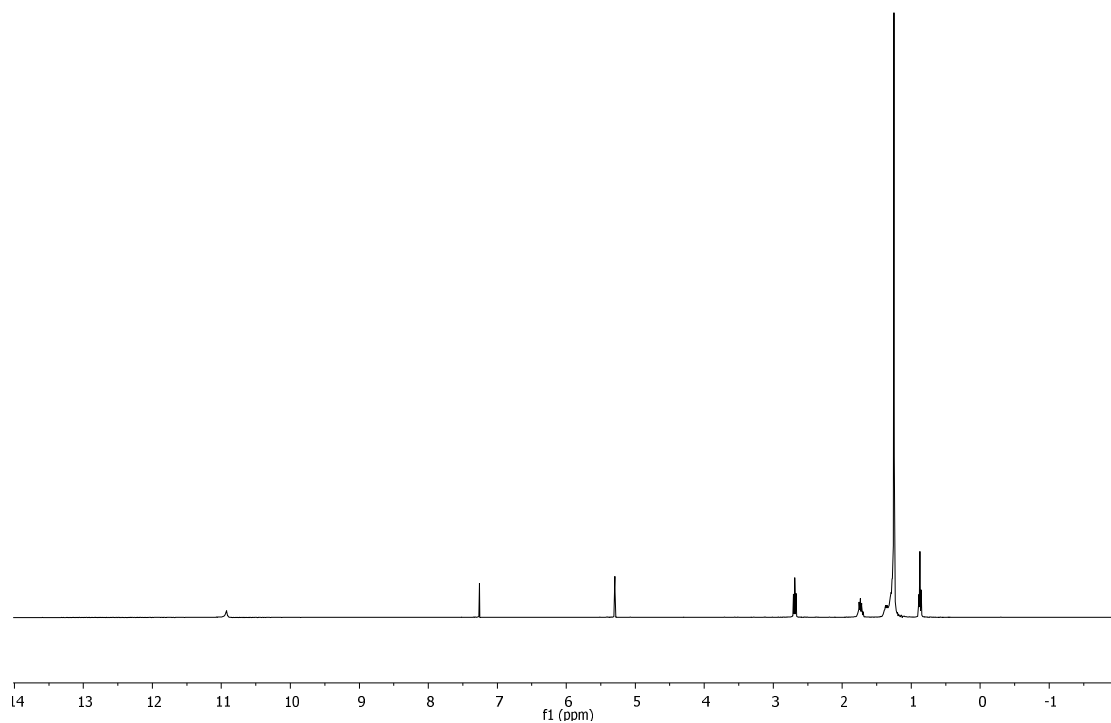
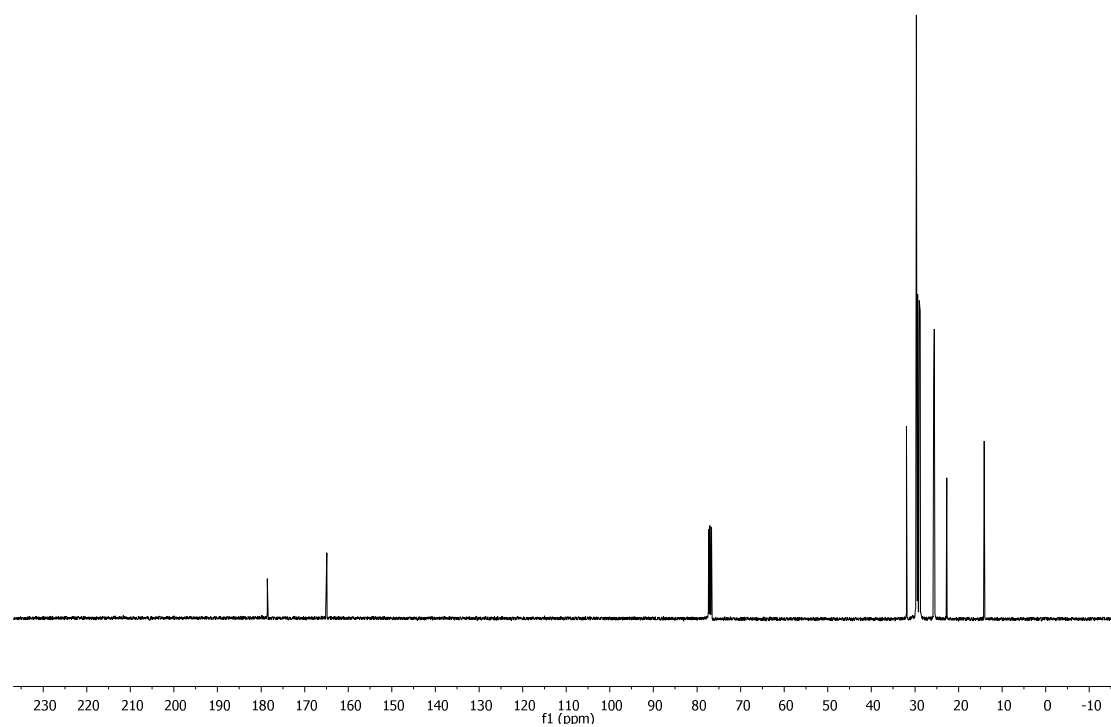
idy-16
DOHDE

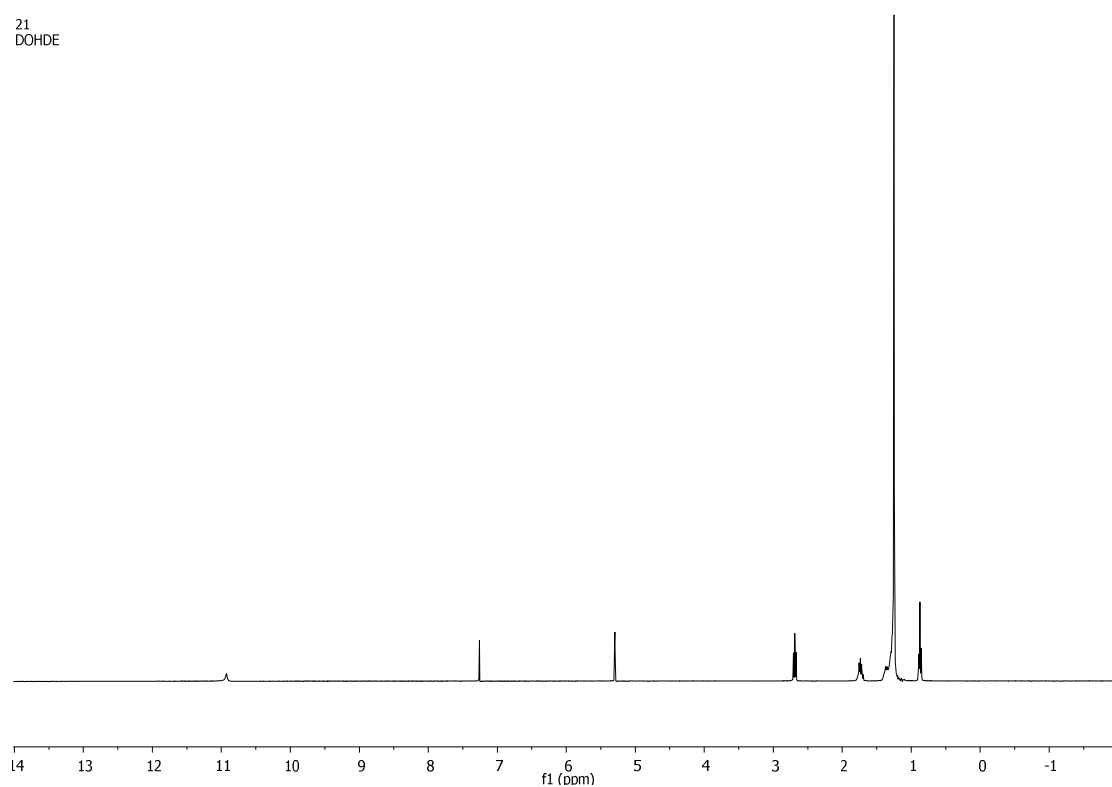
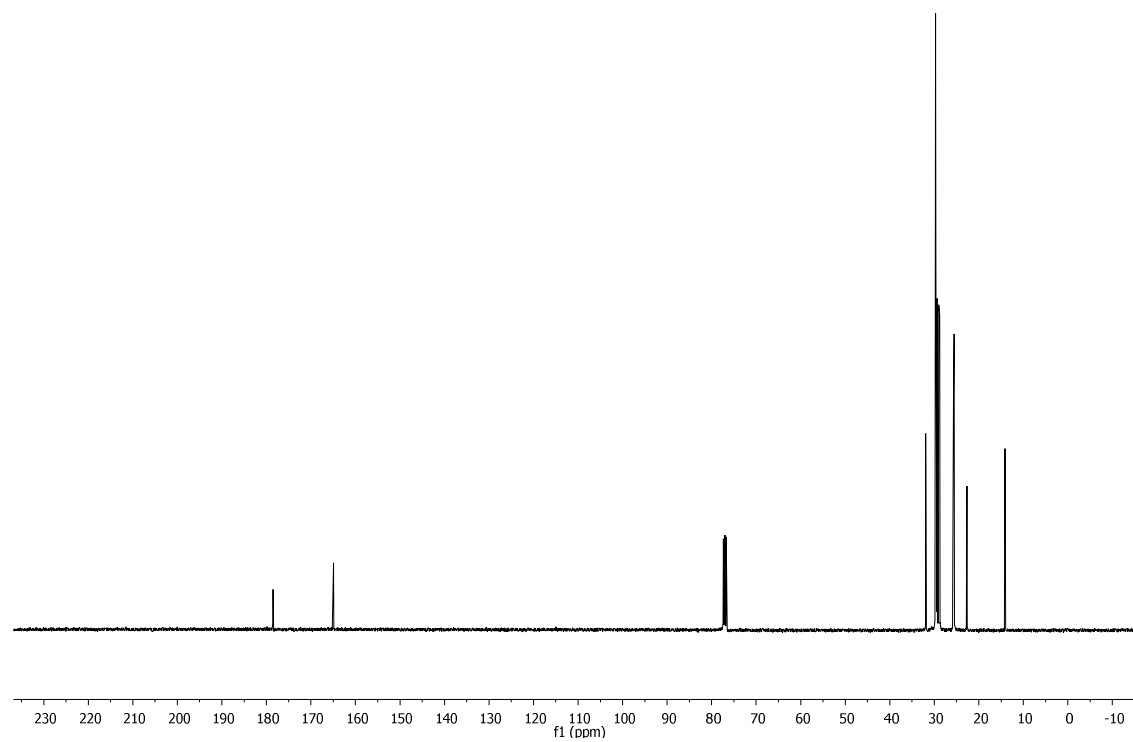


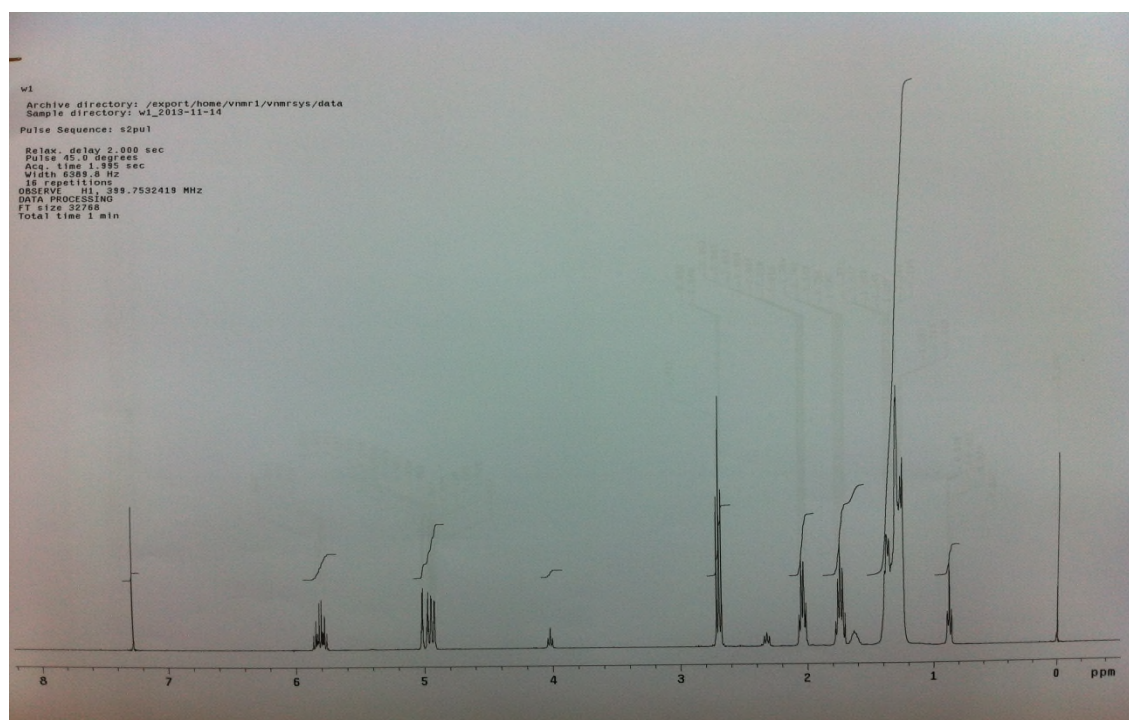
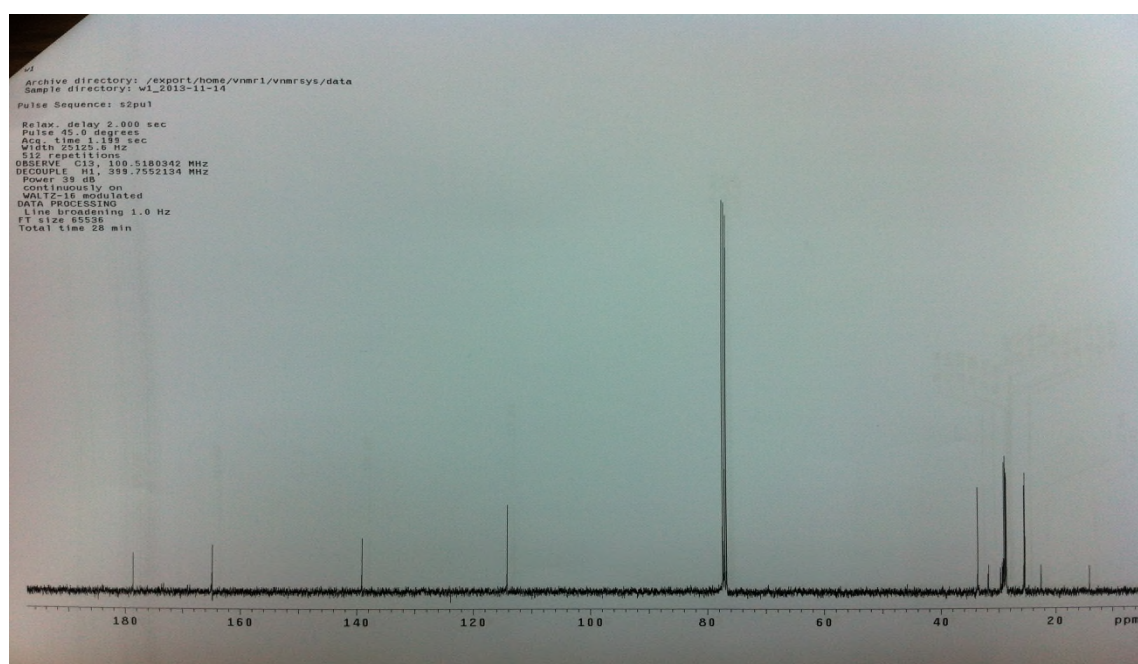
C-NMR Spectrum: **2d**

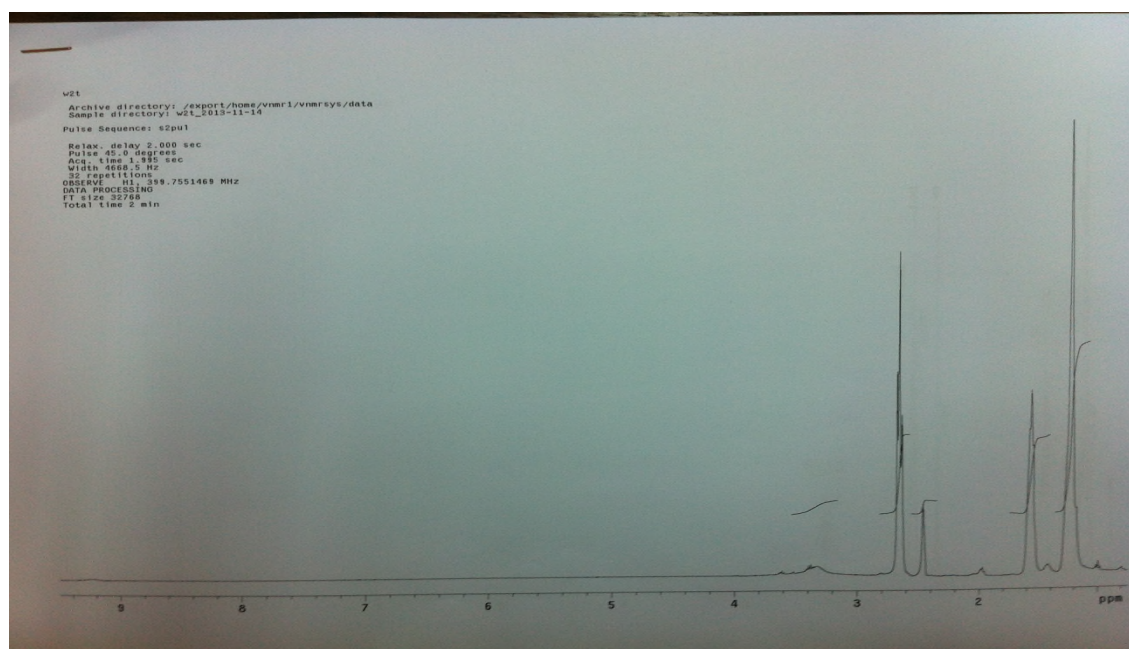
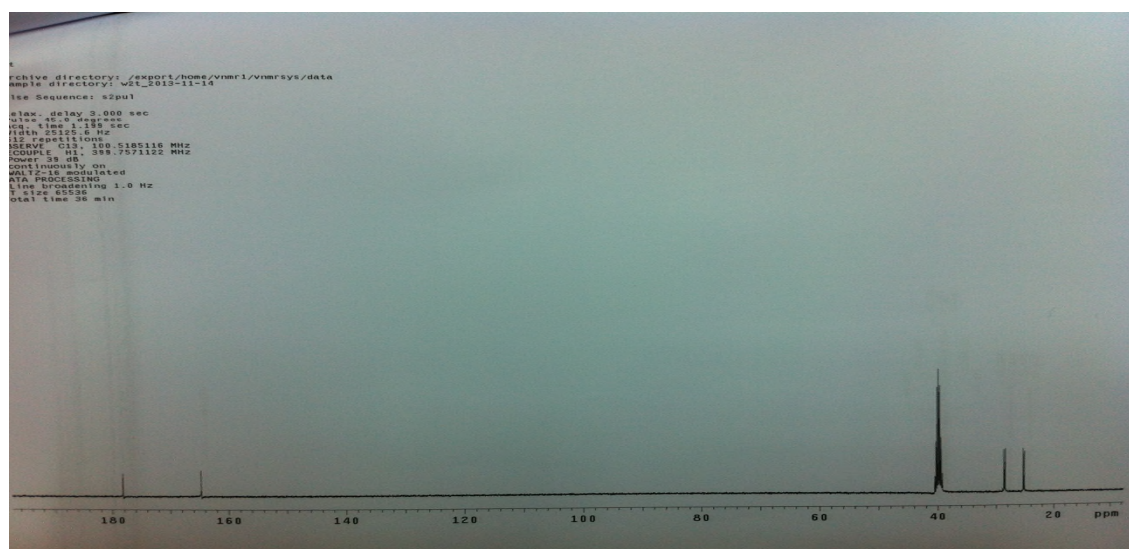
idy-16
STANDARD CARBON PARAMETERS



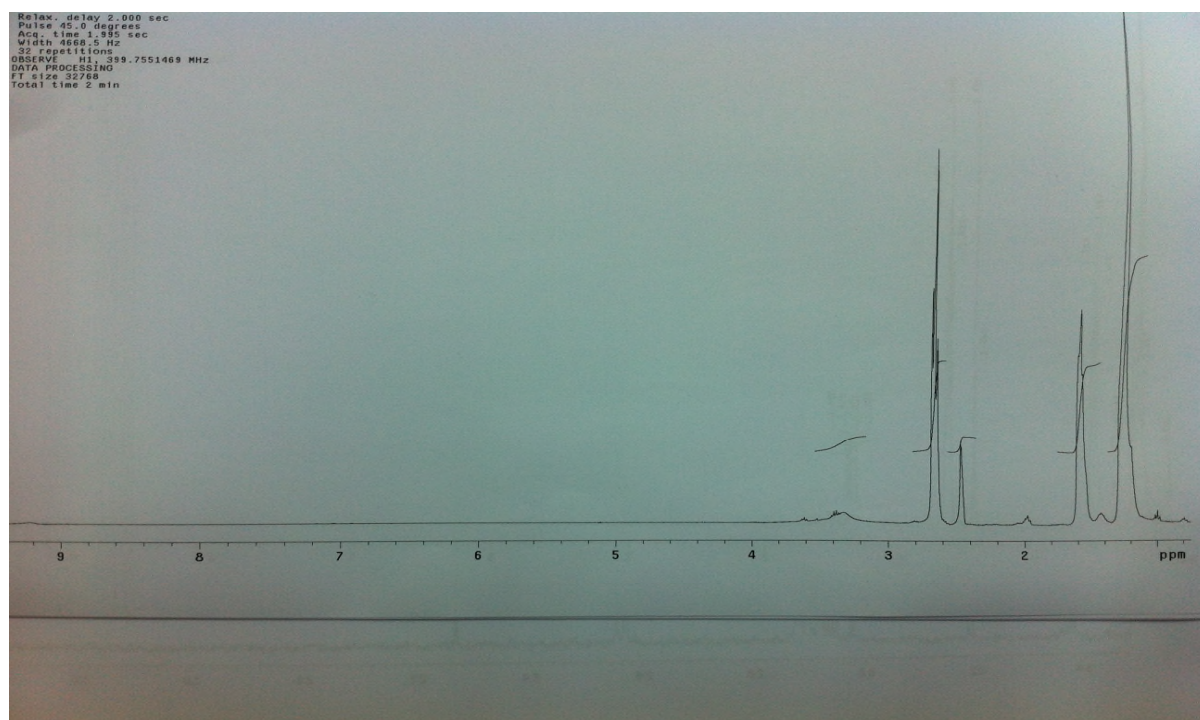
H-NMR Spectrum: **2**idy-28
DOHDEC-NMR Spectrum: **2e**idy-28
STANDARD CARBON PARAMETERS

H-NMR Spectrum: **2f**²¹
DOHDEC-NMR Spectrum: **2f**²¹
STANDARD CARBON PARAMETERS

H-NMR Spectrum: **2g**C-NMR Spectrum: **2g**

H-NMR Spectrum: **2h**C-NMR Spectrum: **2h**

H-NMR Spectrum: 2i



C-NMR Spectrum: 2i

