

เลขที่..... ๘๗. ๒๕๖๖.....
เลขทะเบียน..... ๗๒๔๔.....
วันเดือนปี..... 16 มี.ค. ๒๕๖๐.....

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Assisted, Copper (II) Acetate-Accelerated Azide-Alkyne Cycloaddition. Journal of the American Chemical Society 133(35) (2011): 13984-14001.

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APPENDICES



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APPENDIX A

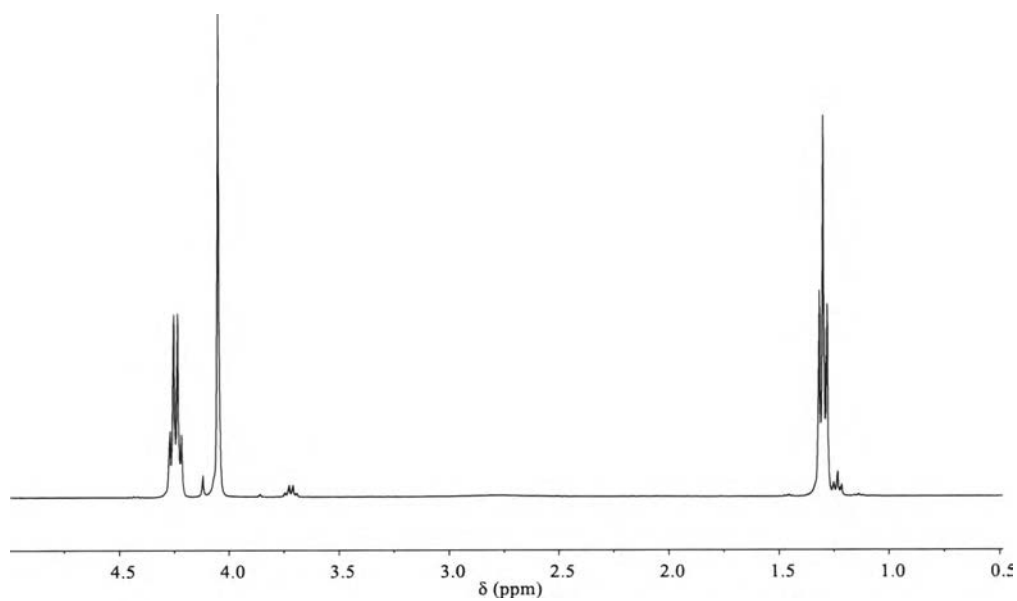


Figure A.1 ^1H NMR (CDCl_3) spectrum of ethyl chloroacetate (1)

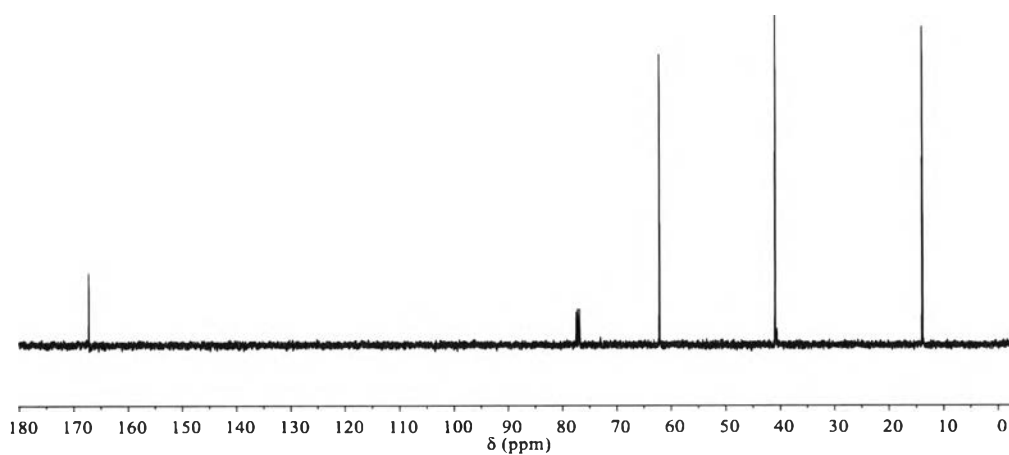


Figure A.2 ^{13}C NMR (CDCl_3) spectrum of ethyl chloroacetate (1)



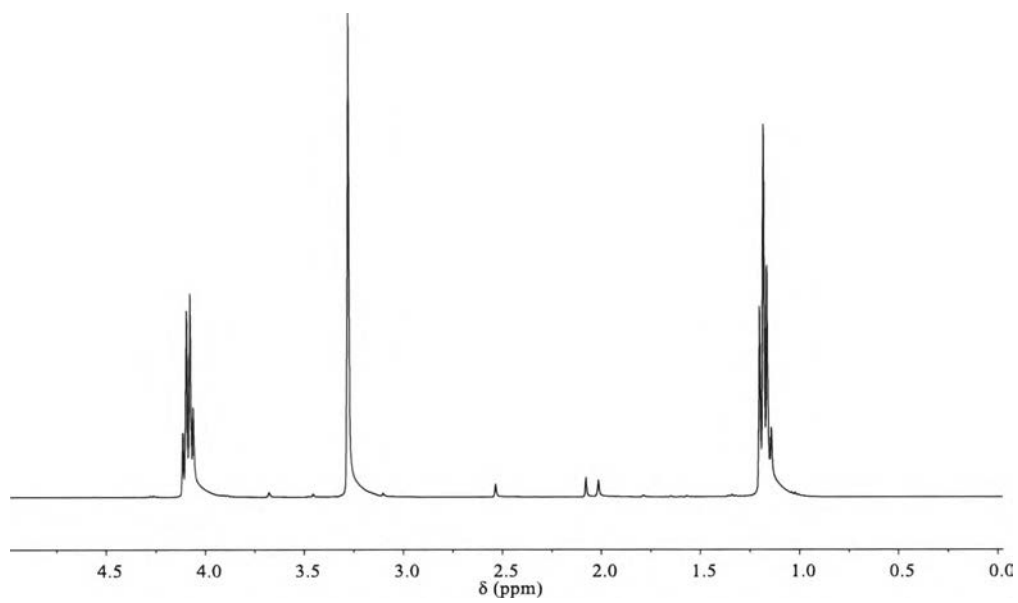


Figure A.3 ^1H NMR (CDCl_3) spectrum of diethyl thiodiglycolate (2)

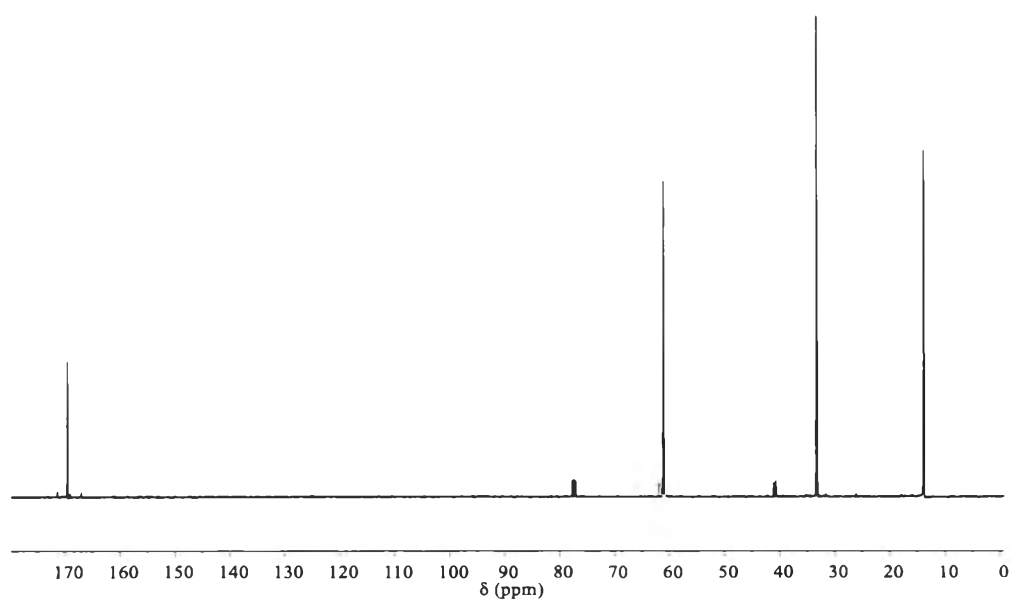


Figure A.4 ^{13}C NMR (CDCl_3) spectrum of diethyl thiodiglycolate (2)



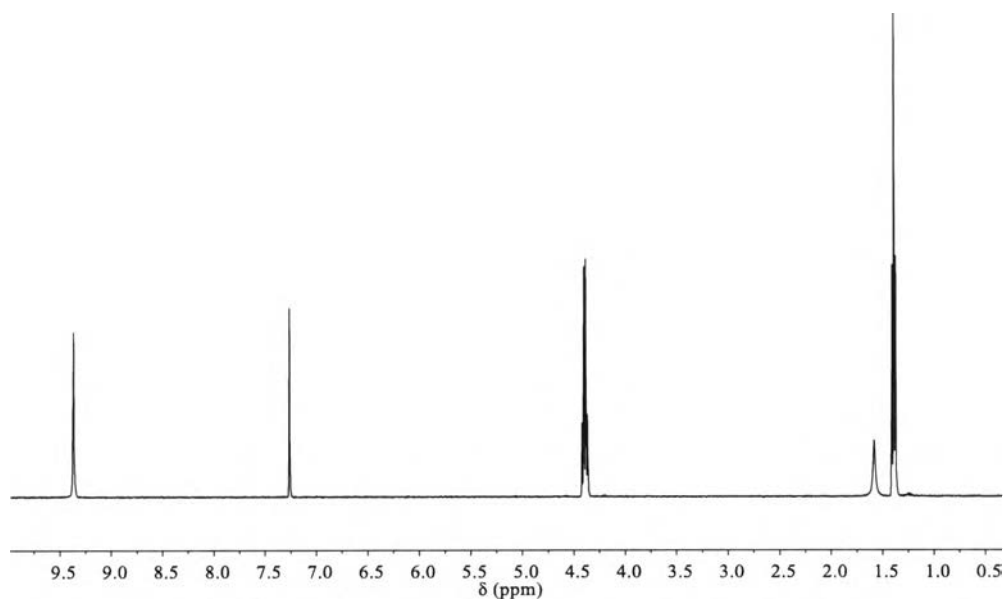


Figure A.5 ^1H NMR (CDCl_3) spectrum of diethyl 3,4-dihydroxythiophene-2,5-dicarboxylate (**3**)

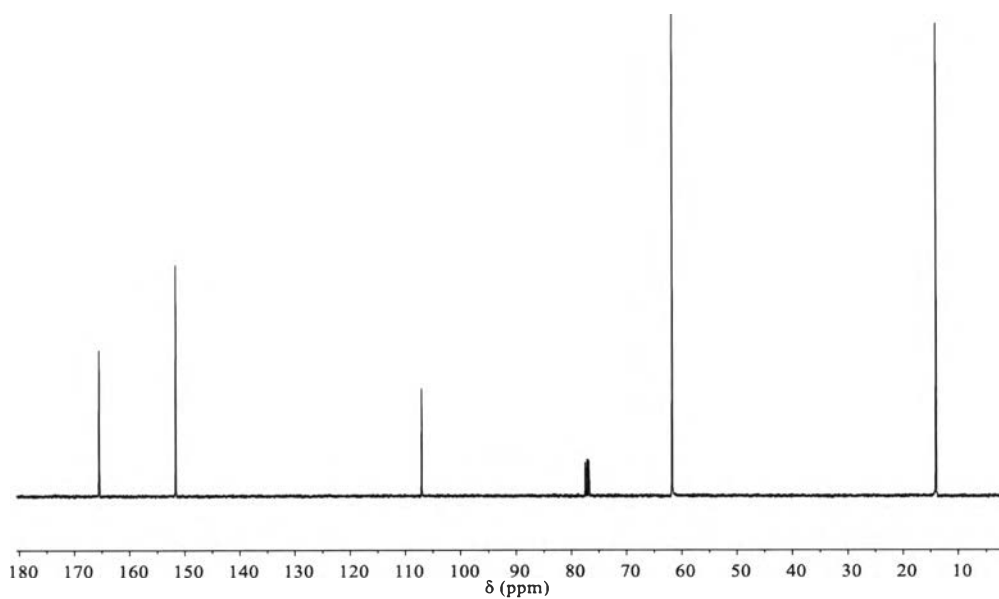


Figure A.6 ^{13}C NMR (CDCl_3) spectrum of diethyl 3,4-dihydroxythiophene-2,5-dicarboxylate (**3**)



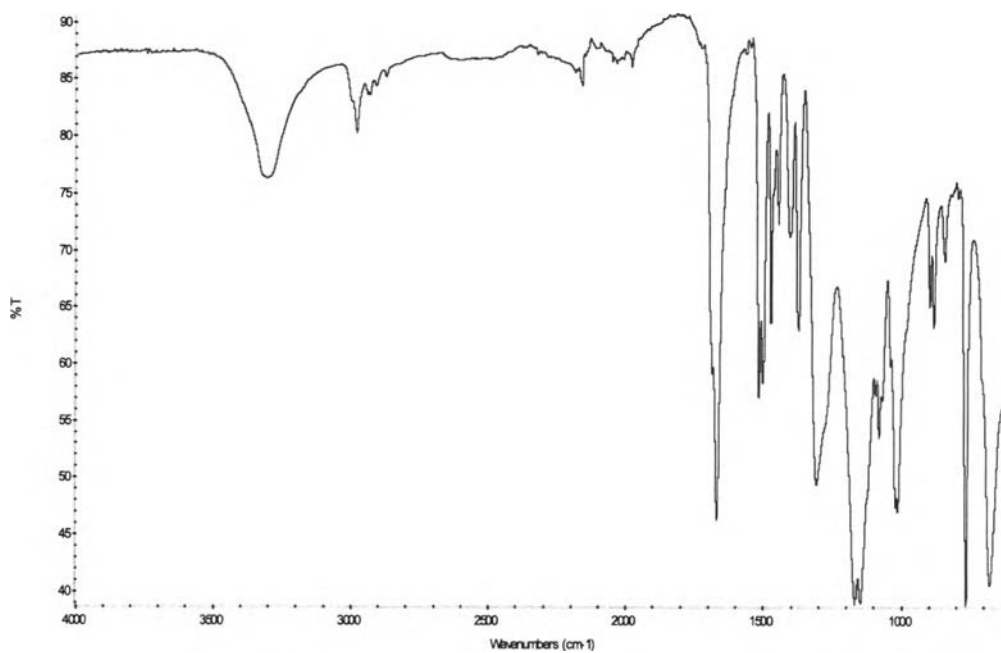


Figure A.7 IR spectrum of diethyl 3,4-dihydroxythiophene-2,5-dicarboxylate (**3**)

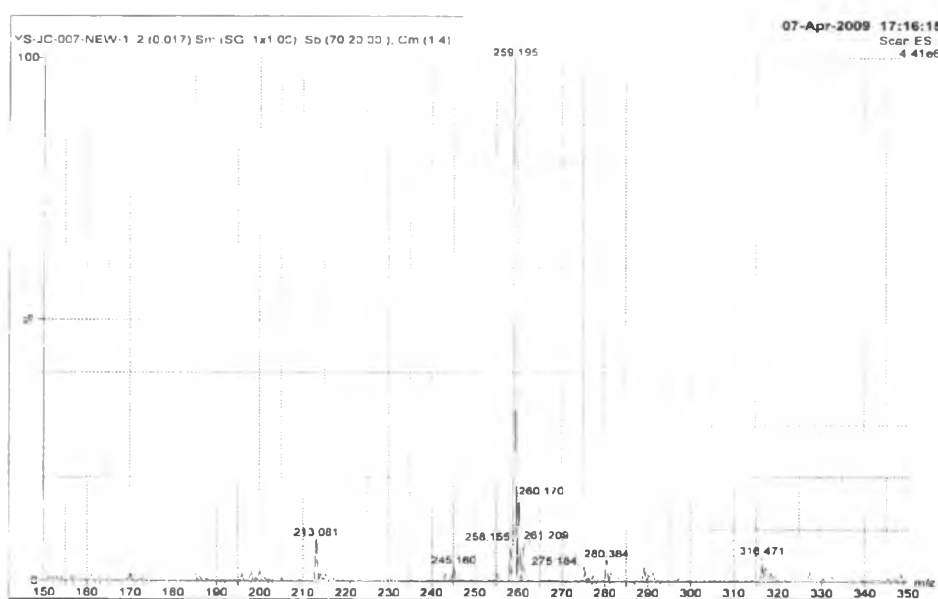


Figure A.8 Mass spectrum of diethyl 3,4-dihydroxythiophene-2,5-dicarboxylate (**3**)



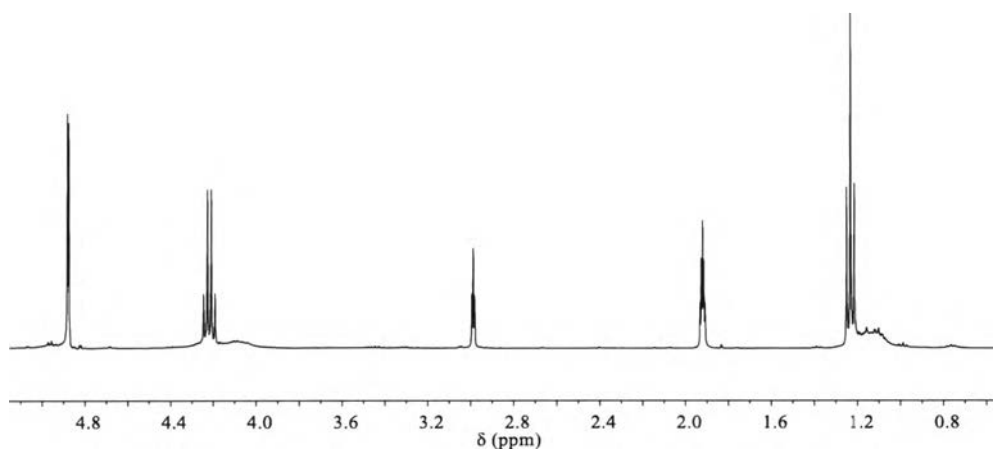


Figure A.9 ^1H NMR (Acetone- d_6) spectrum of diethyl 3,4-bis(2-propynyloxy)thiophene-2,5-dicarboxylate (**4**)

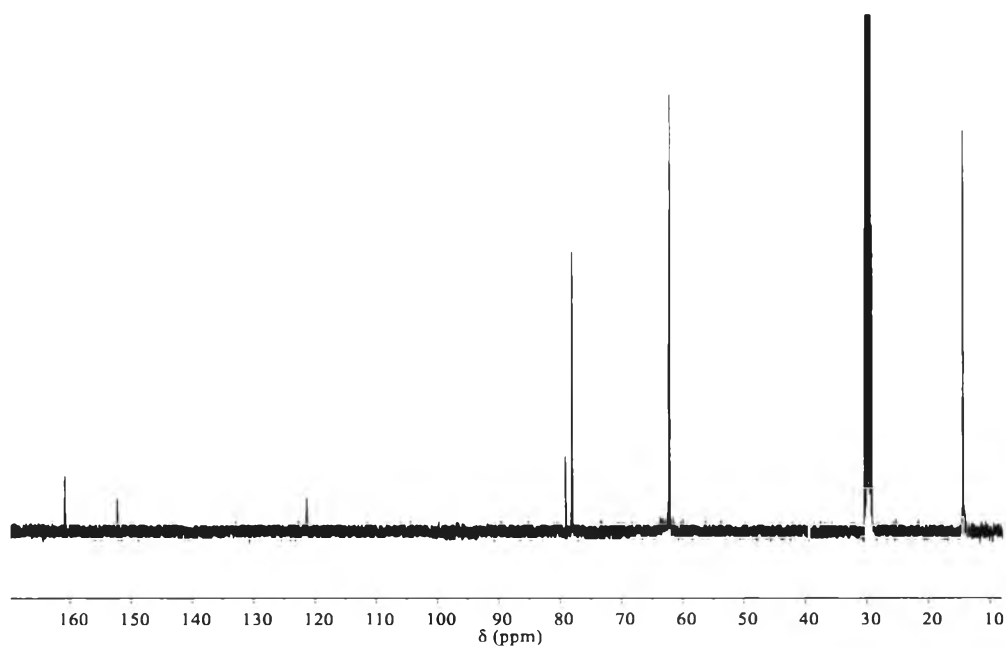


Figure A.10 ^{13}C NMR (Acetone- d_6) spectrum of diethyl 3,4-bis(2-propynyloxy)thiophene-2,5-dicarboxylate (**4**)

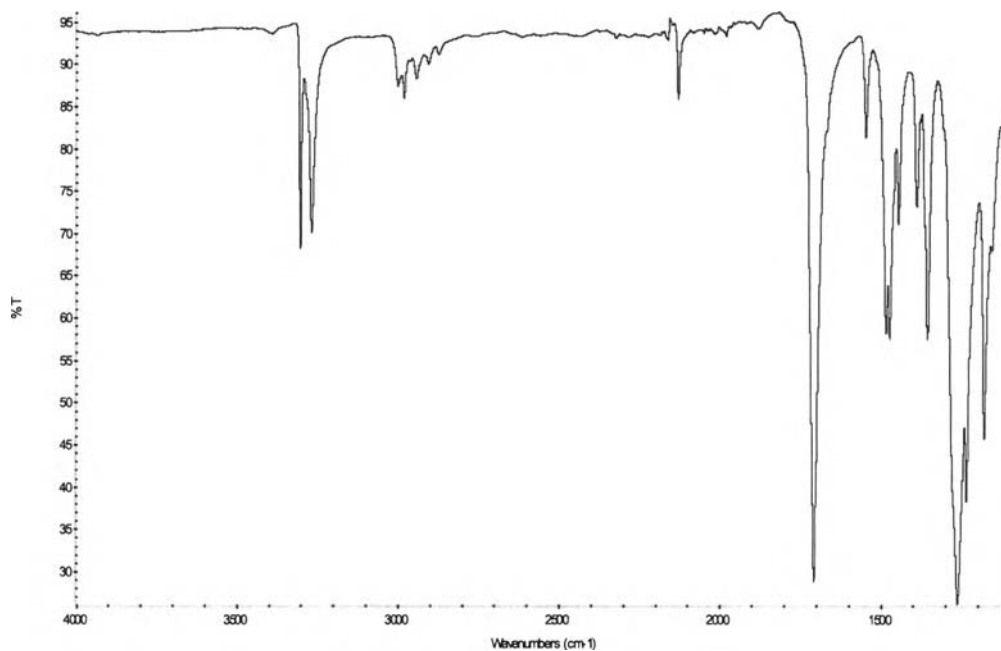


Figure A.11 IR spectrum of diethyl 3,4-bis(2-propynyloxy) thiophene-2,5-dicarboxylate (4)

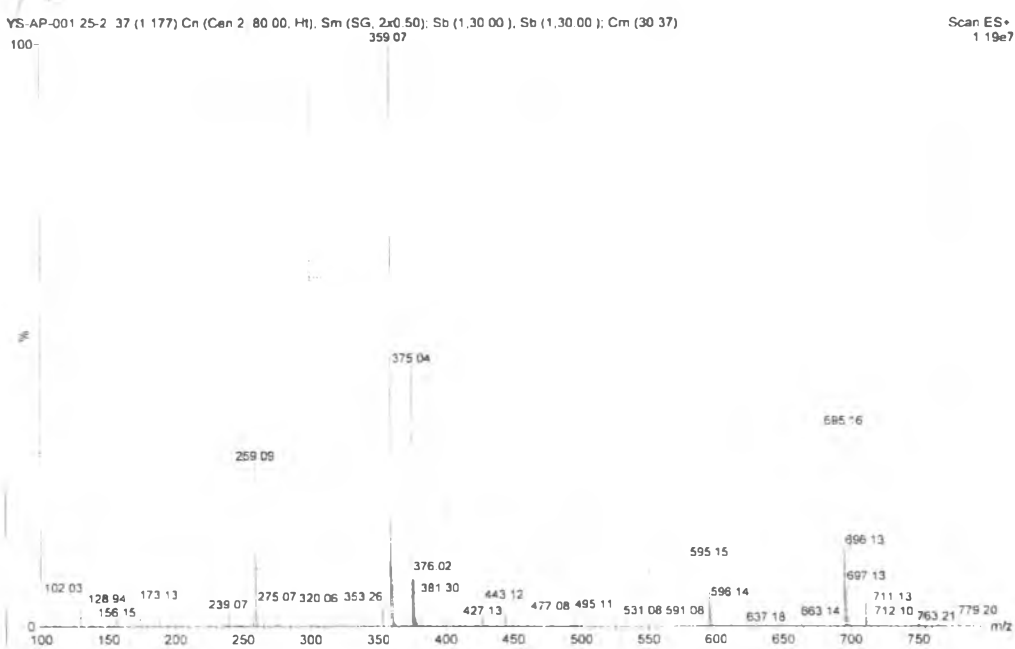


Figure A.12 Mass spectrum of diethyl 3,4-bis(2-propynyloxy) thiophene-2,5-dicarboxylate (4)

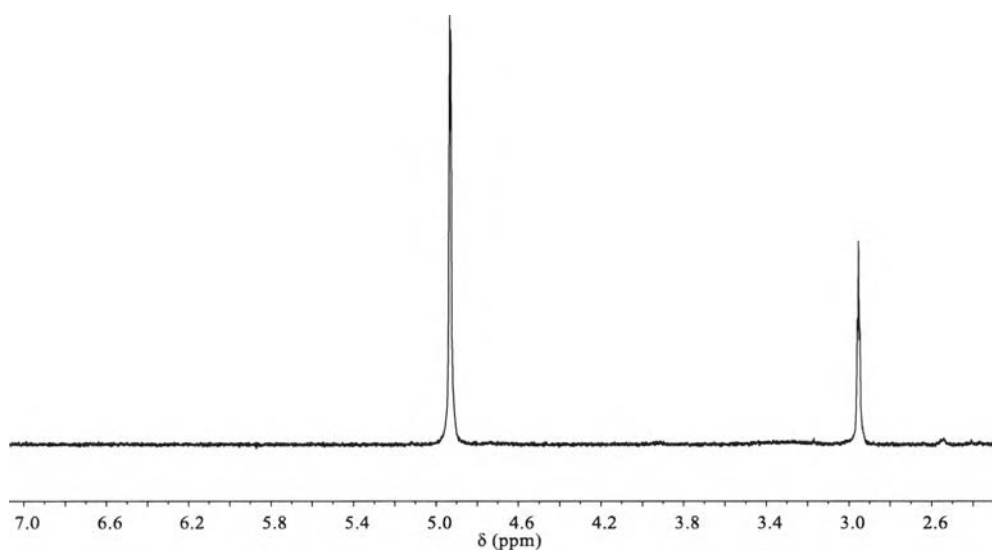


Figure A.13 ^1H NMR (Acetone- d_6) spectrum of diethyl-3,4-bis(2-propynyloxy)thiophene-2,5-dicarboxylic acid (**5**)

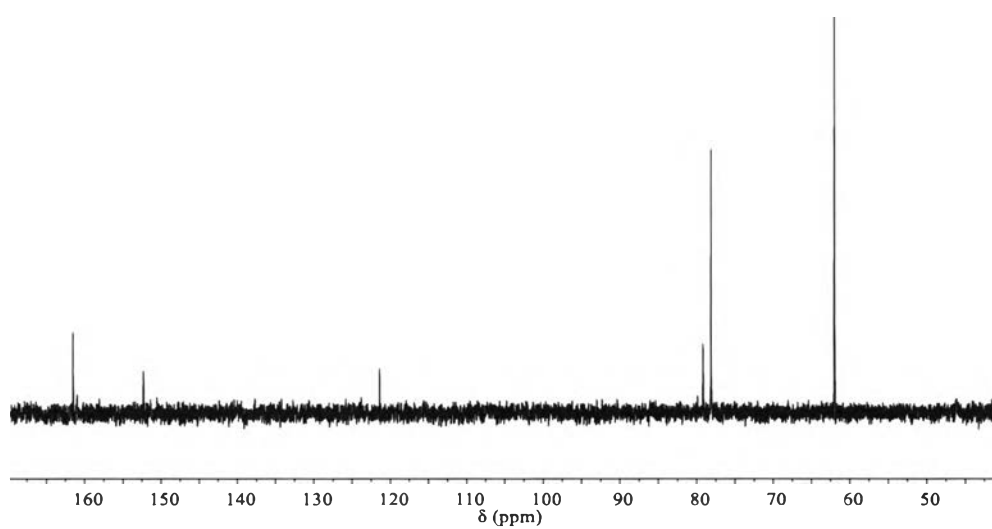


Figure A.14 ^{13}C NMR (Acetone- d_6) spectrum of diethyl-3,4-bis(2-propynyloxy)thiophene-2,5-dicarboxylic acid (**5**)

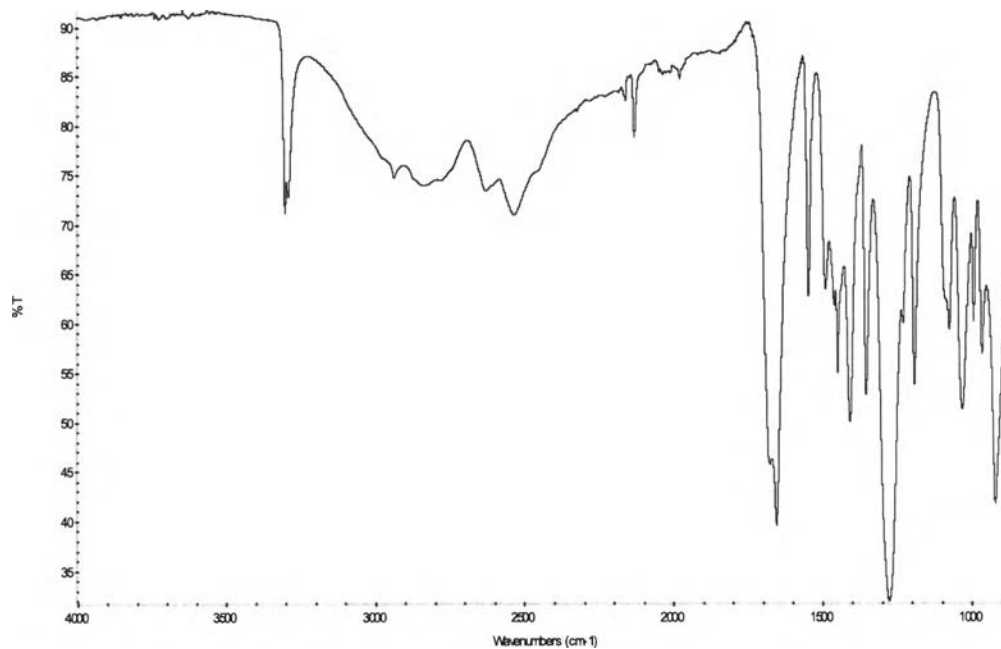


Figure A.15 IR spectrum of diethyl-3,4-bis(2-propynyloxy)thiophene-2,5-dicarboxylic acid (5)

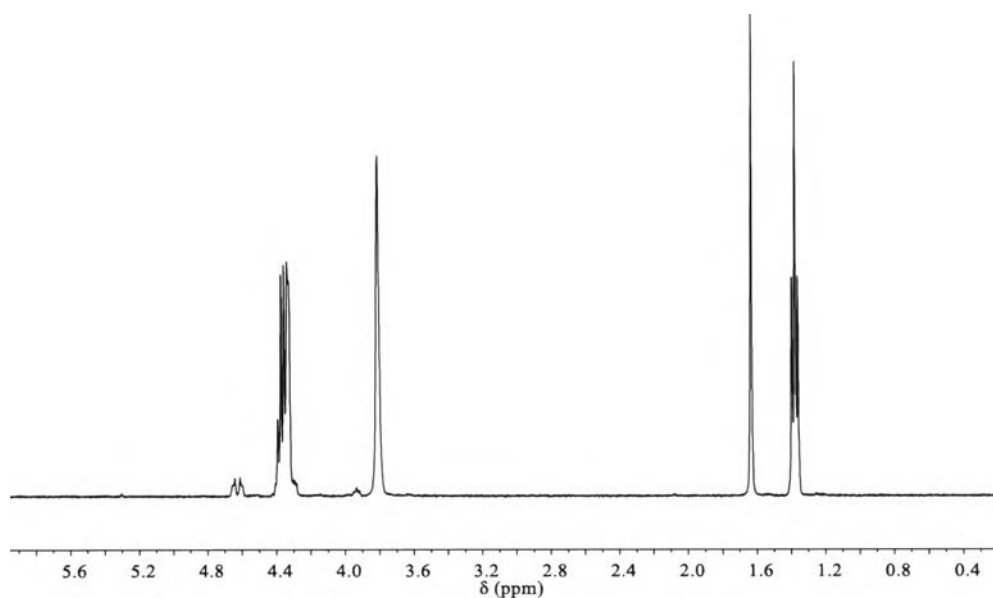


Figure A.16 ¹H NMR (CDCl₃) spectrum of diethyl 3,4-bis(2-hydroxyethoxy)thiophene-2,5-dicarboxylate (6)



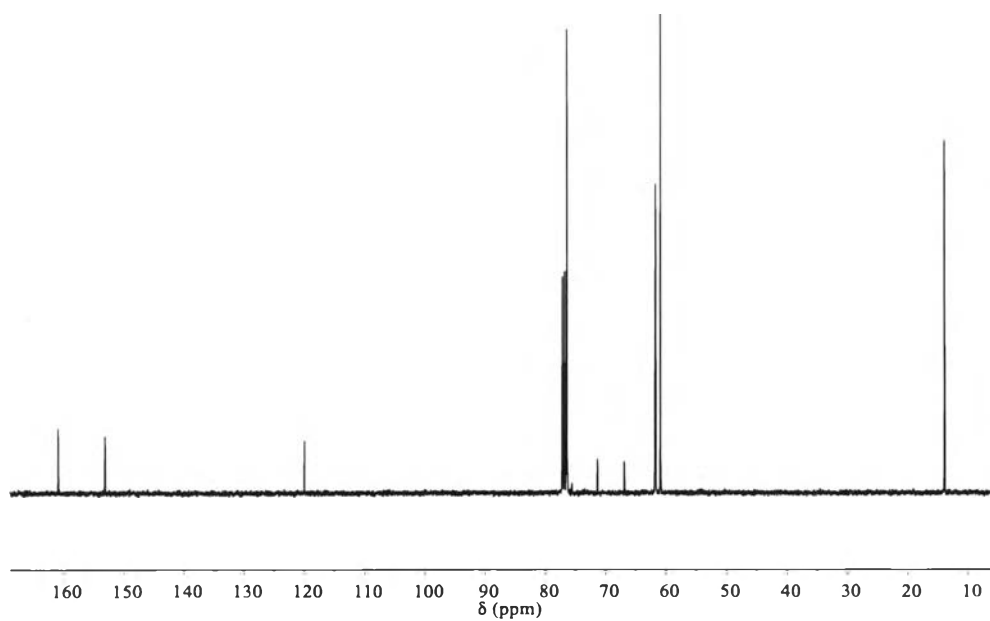


Figure A.17 ^{13}C NMR (CDCl_3) spectrum of diethyl 3,4-bis(2-hydroxyethoxy)thiophene-2,5-dicarboxylate (**6**)

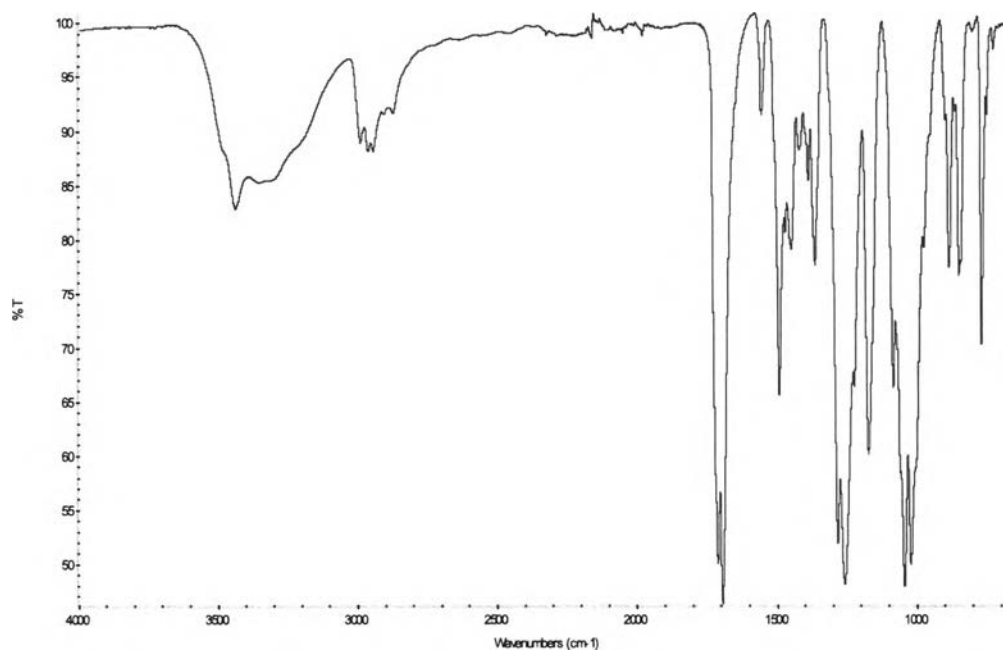


Figure A.18 IR spectrum of diethyl 3,4-bis(2-hydroxyethoxy)thiophene-2,5-dicarboxylate (**6**)



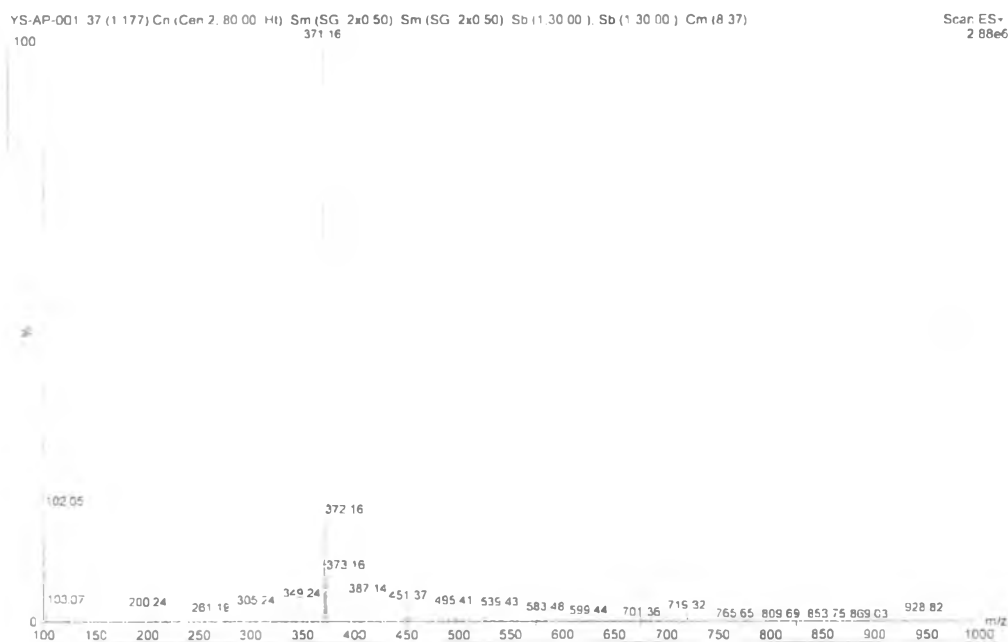


Figure A.19 Mass spectrum of diethyl 3,4-bis(2-hydroxyethoxy)thiophene-2,5-dicarboxylate (**6**)

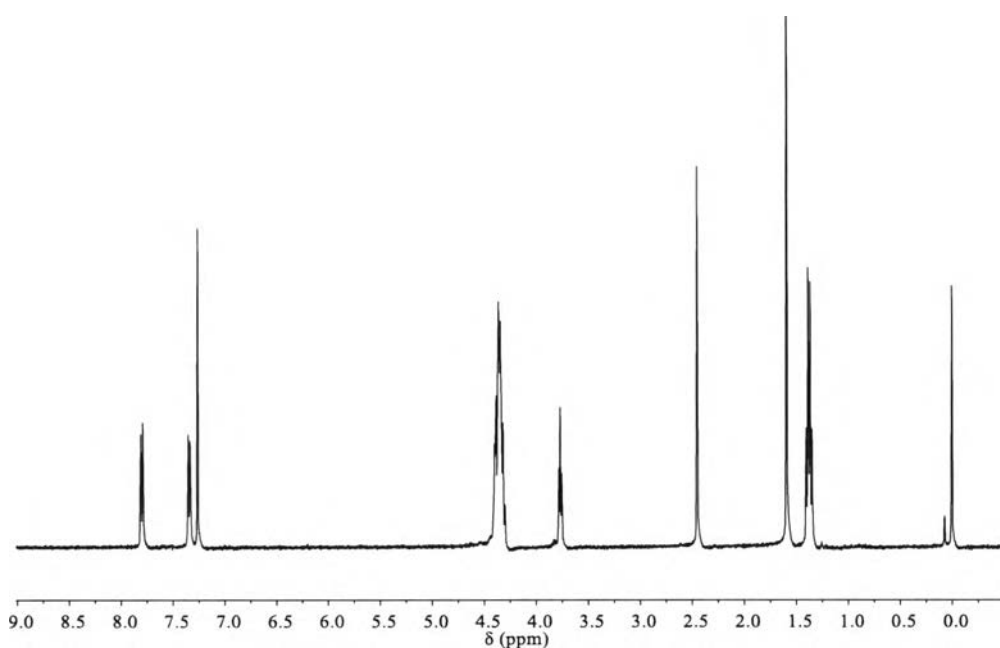


Figure A.20 ^1H NMR (CDCl_3) spectrum of Diethyl 3,4-bis(2-tosyloxy)ethoxythiophene-2,5-dicarboxylate (**6a**)

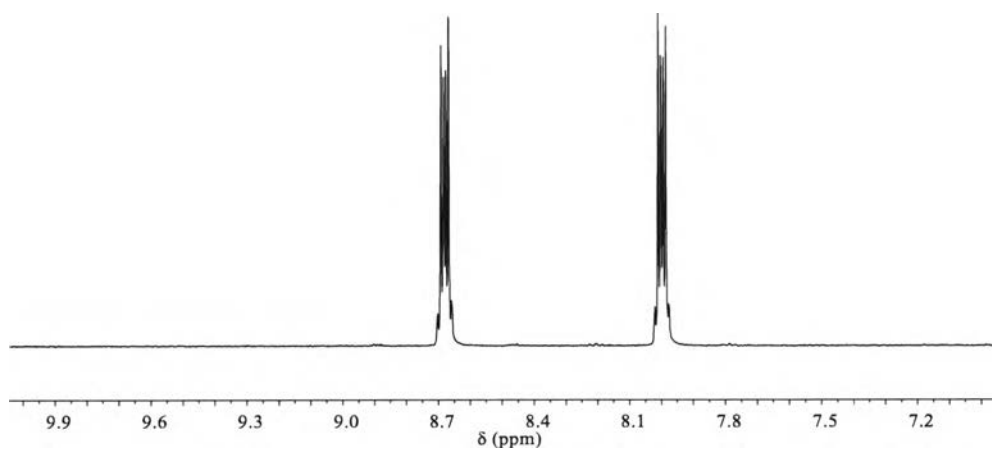


Figure A.21 ^1H NMR (CDCl_3) spectrum of 2,3-diazidoquinoxaline (7)

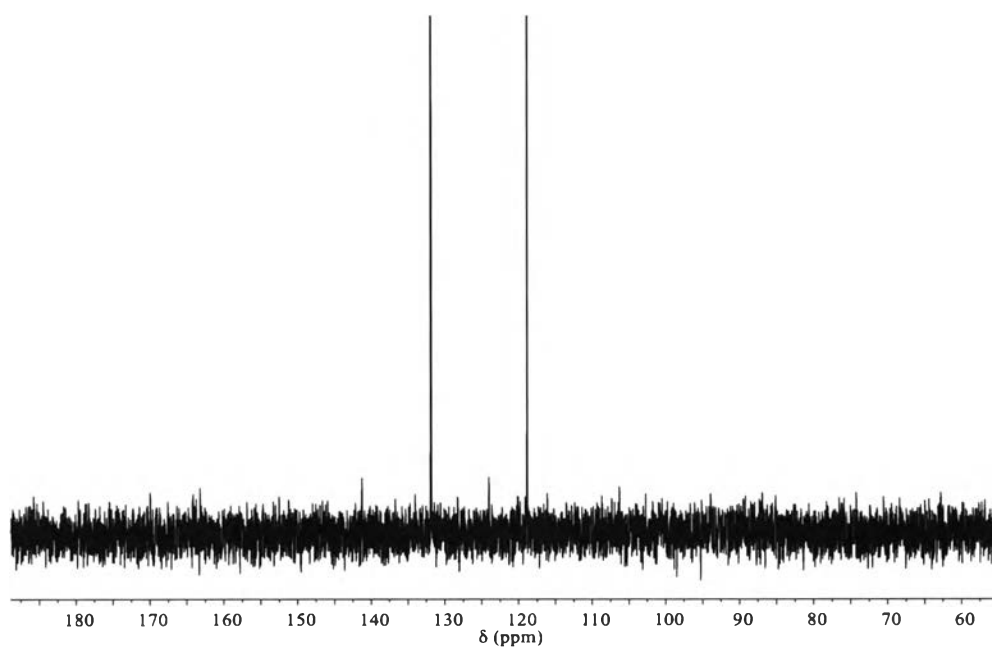


Figure A.22 ^{13}C NMR (CDCl_3) spectrum of 2,3-diazidoquinoxaline (7)

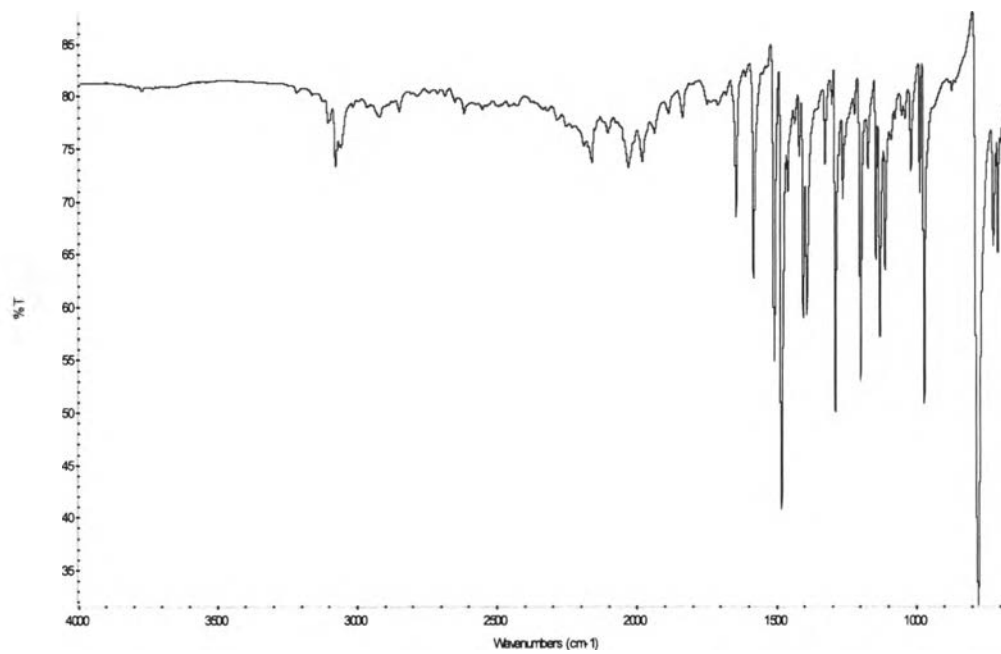


Figure A.23 IR spectrum of 2,3-diazidoquinoxaline (7)

mass 212.1 NA
 YS-AP-001 6-2-56 7 (0.223) Cn (Cen.2. 80.00 HI) Sm (SG. 2x0.50) Sm (SC. 2x0.50) Sb (1.30.00) Sb (1.30.00) Cm (5.33)
 100 235 Scan ES- 2.01e5

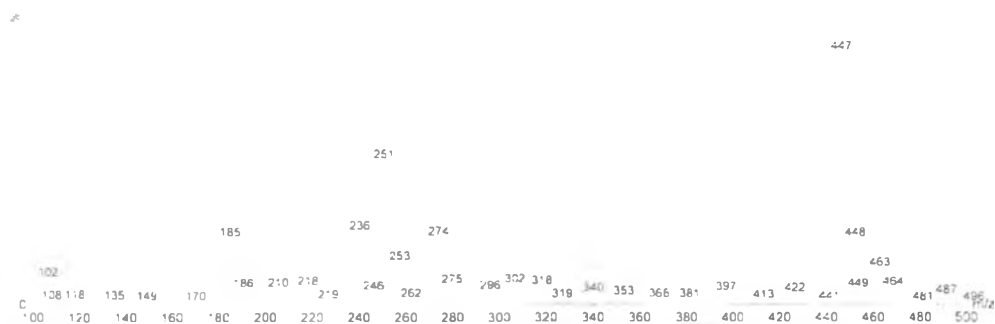


Figure A.24 Mass spectrum of 2,3-diazidoquinoxaline (7)



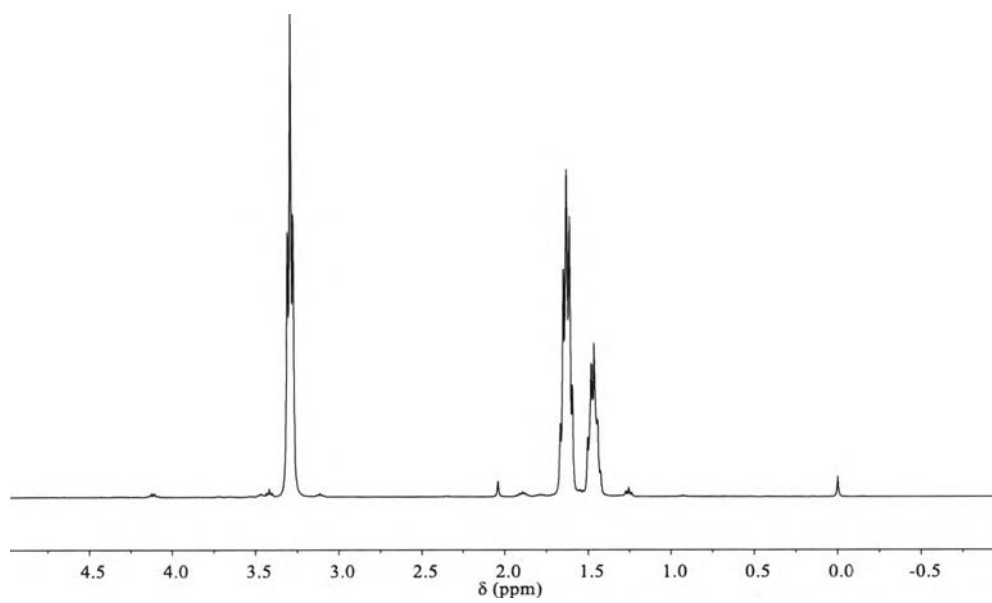


Figure A.25 ^1H NMR (CDCl_3) spectrum of 1,5-diazidopentane (8)

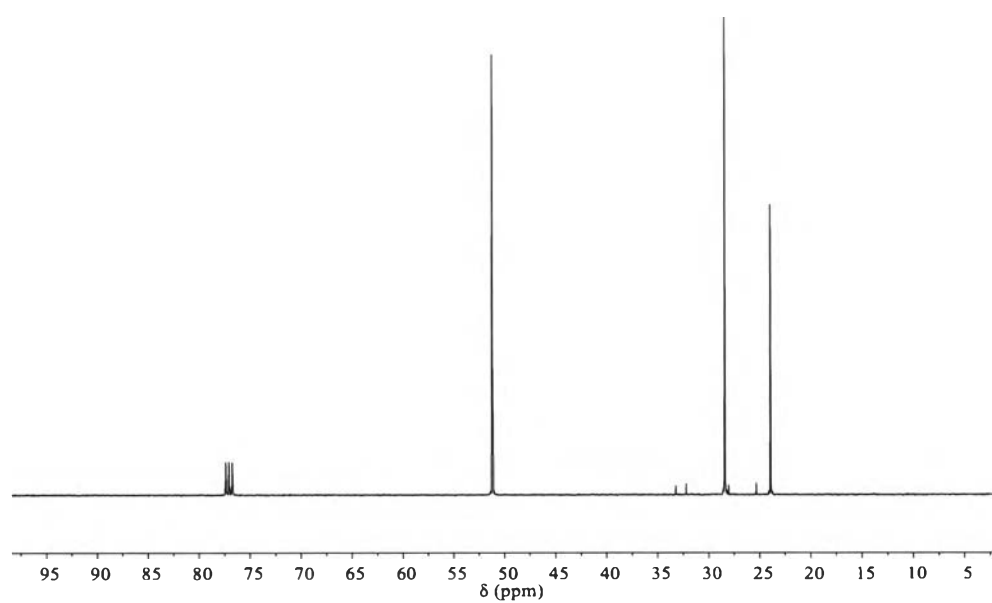


Figure A.26 ^{13}C NMR (CDCl_3) spectrum of 1,5-diazidopentane (8)



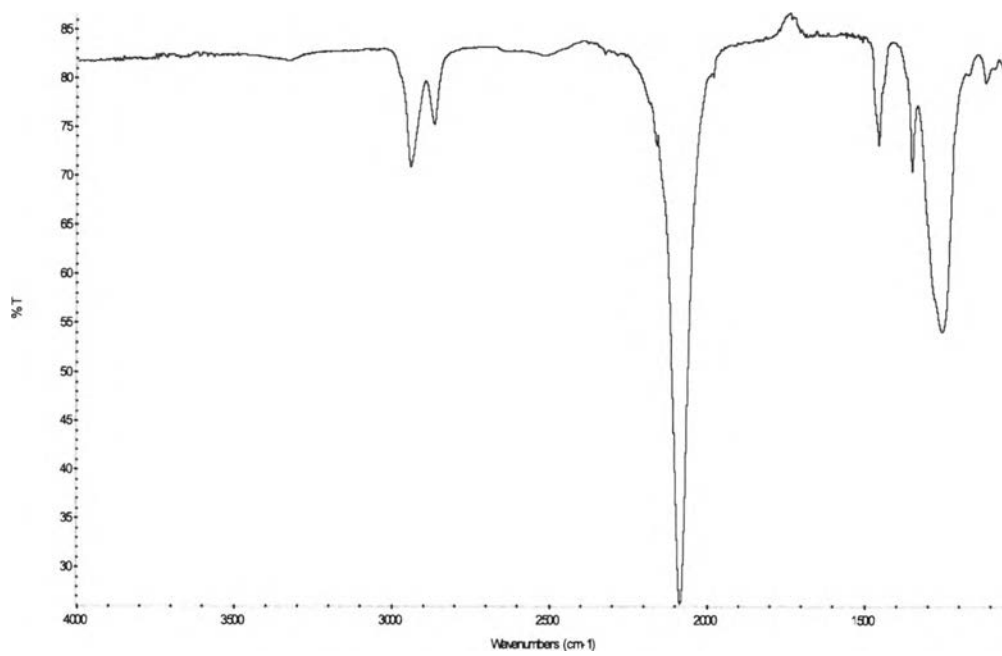


Figure A.27 IR spectrum of 1,5-diazidopentane (**8**)

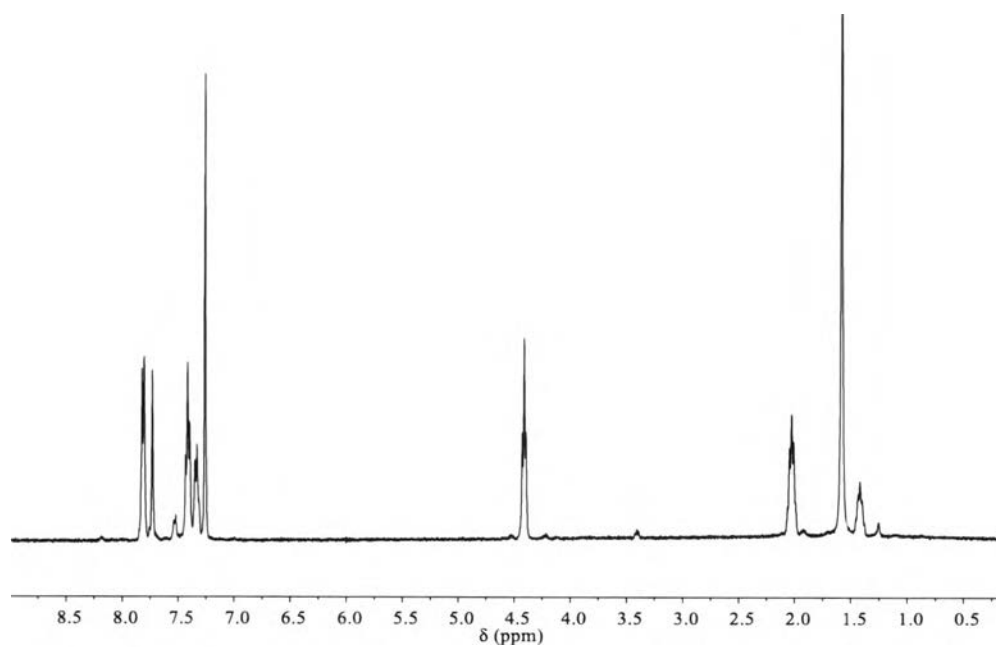


Figure A.28 ¹H NMR (CDCl₃) spectrum of 1,5-bis(4-phenyl-1,2,3-triazolyl)pentane (**9**)



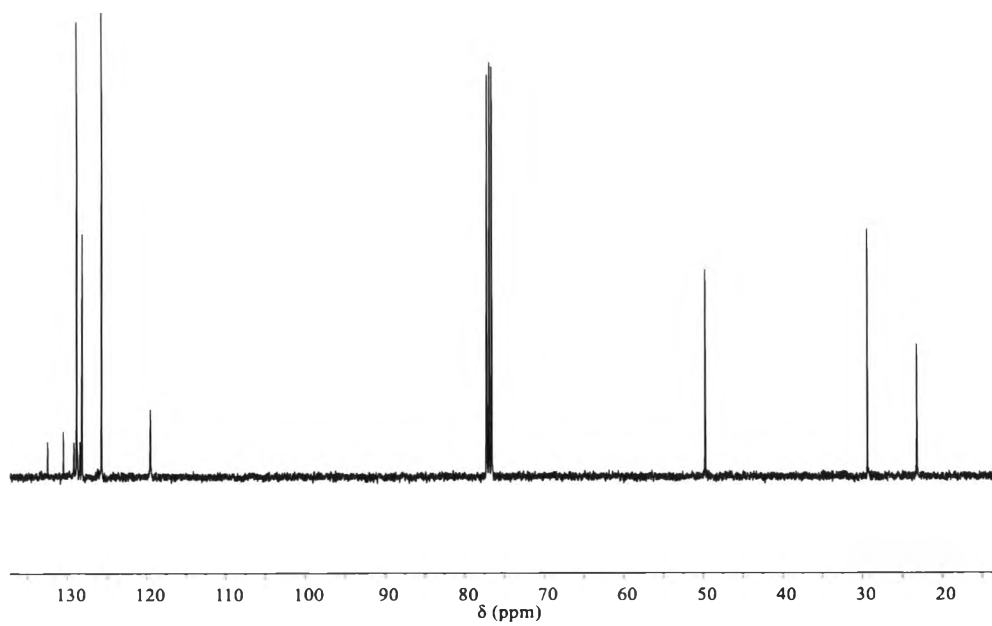


Figure A.29 ^{13}C NMR (CDCl_3) spectrum of 1,5-bis(4-phenyl-1,2,3-triazolyl)pentane (9)

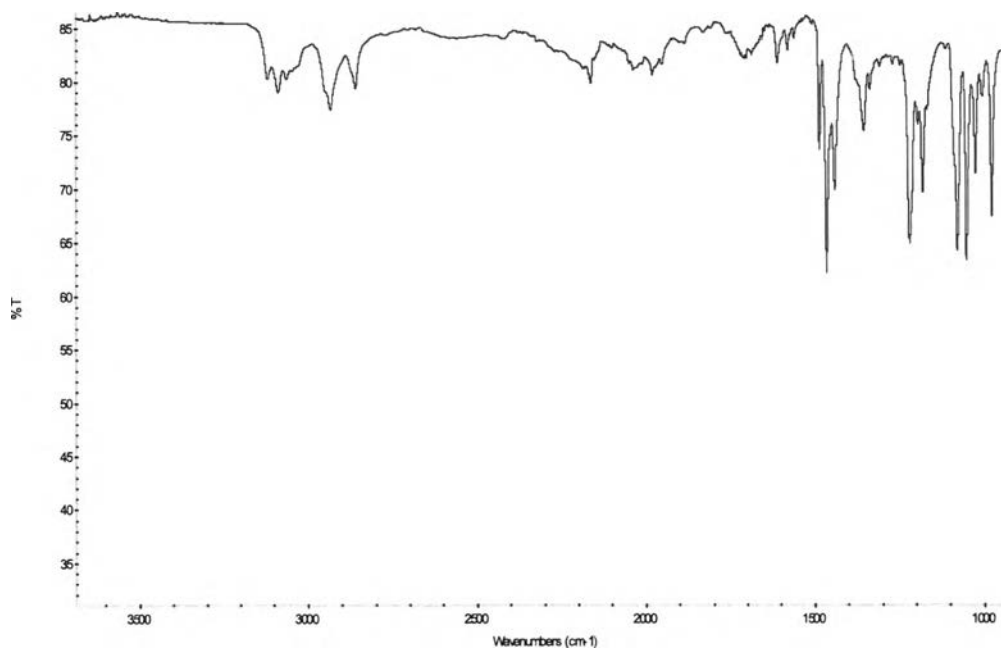


Figure A.30 IR spectrum of 1,5-bis(4-phenyl-1,2,3-triazolyl)pentane (9)



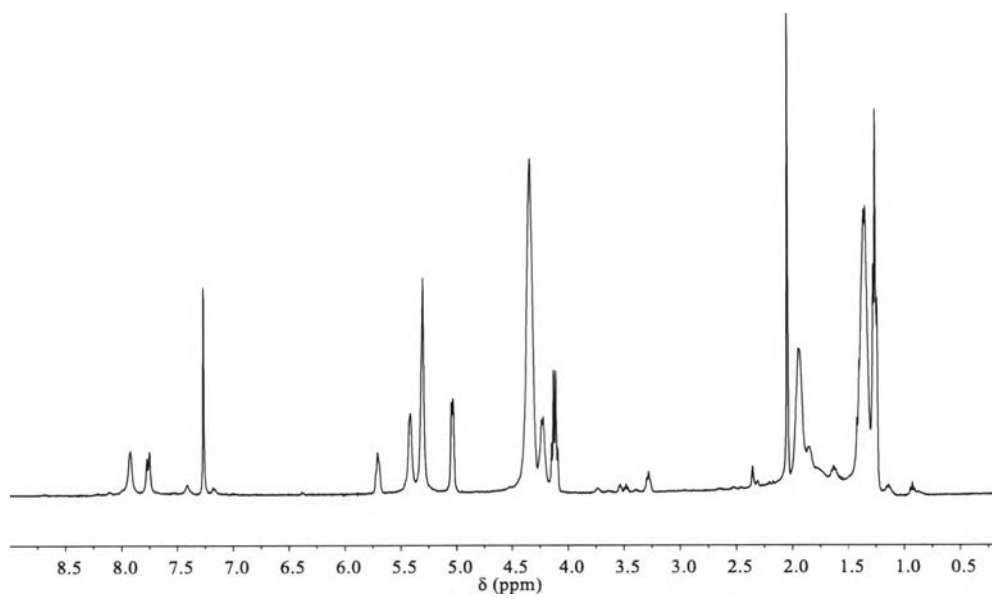


Figure A.31 ^1H NMR (CDCl_3) spectrum of polymer P1

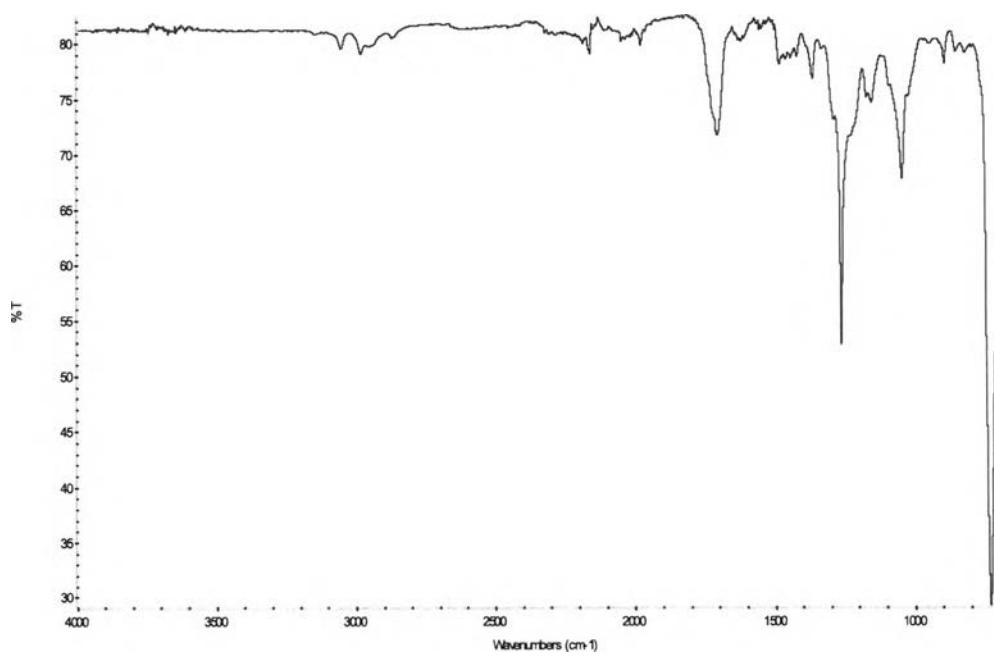


Figure A.32 IR spectrum of polymer P1



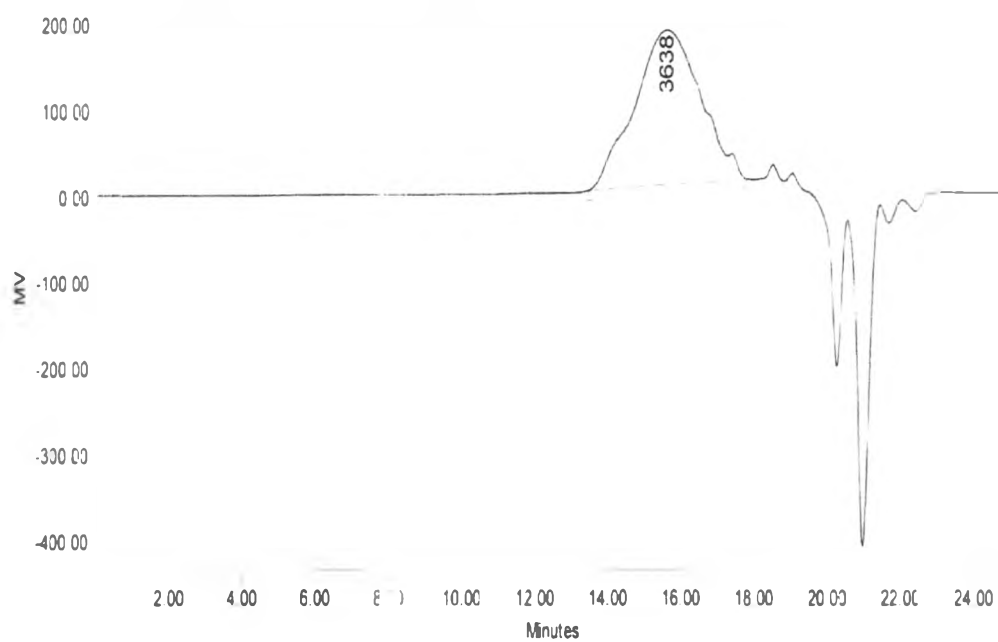


Figure A.33 M_n , M_w (GPC) of polymer P1

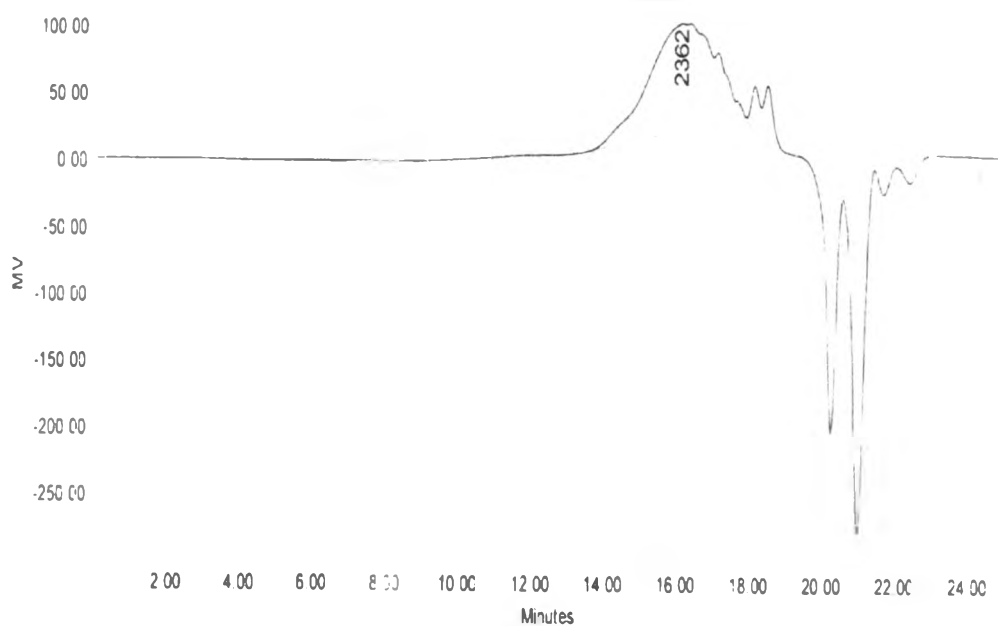


Figure A.34 M_n , M_w (GPC) of polymer P1



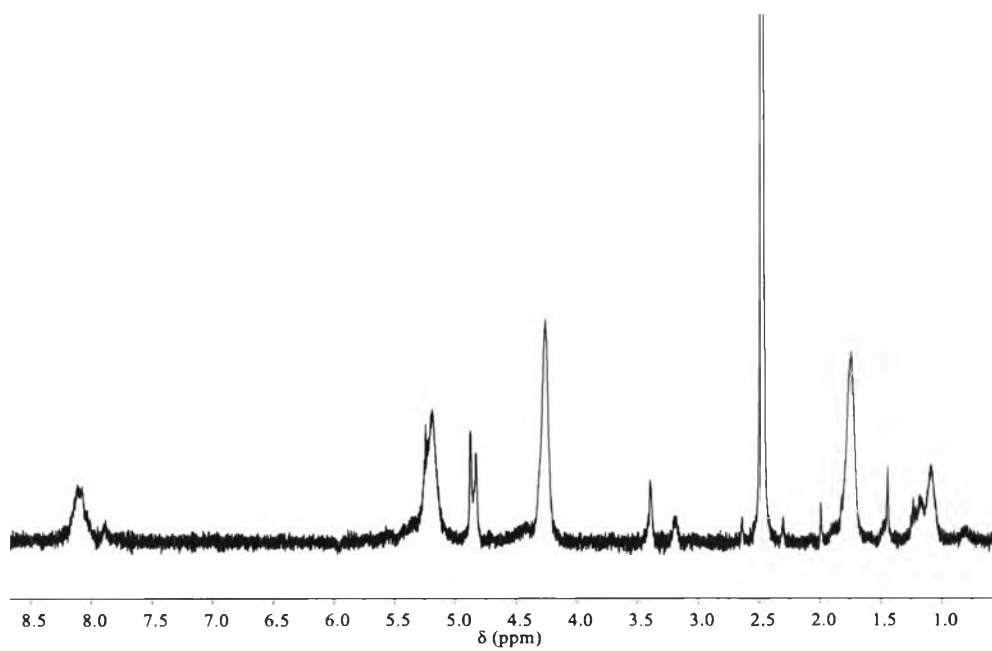


Figure A.35 ^1H NMR ($\text{DMSO-}d_6$) spectrum of polymer P2

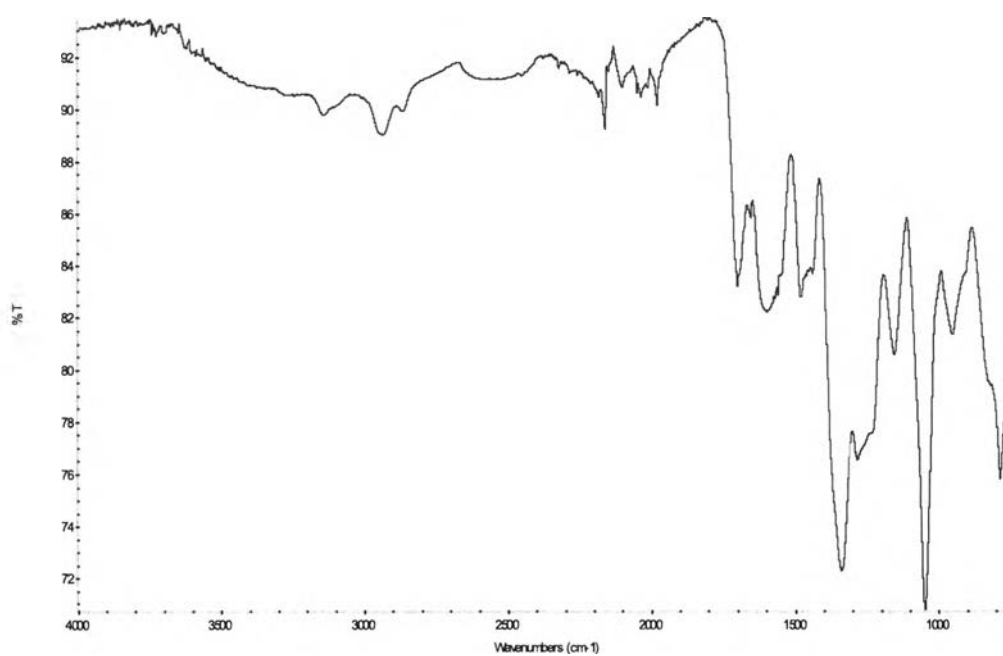


Figure A.36 IR spectrum of polymer P2

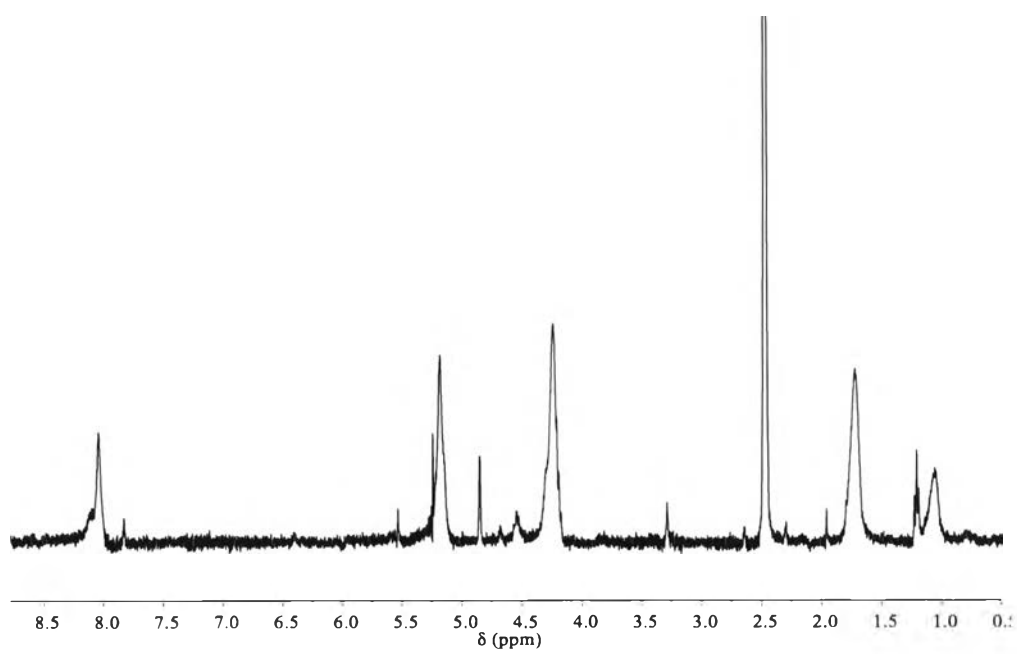


Figure A.37 ^1H NMR ($\text{DMSO-}d_6$) spectrum of polymer P2

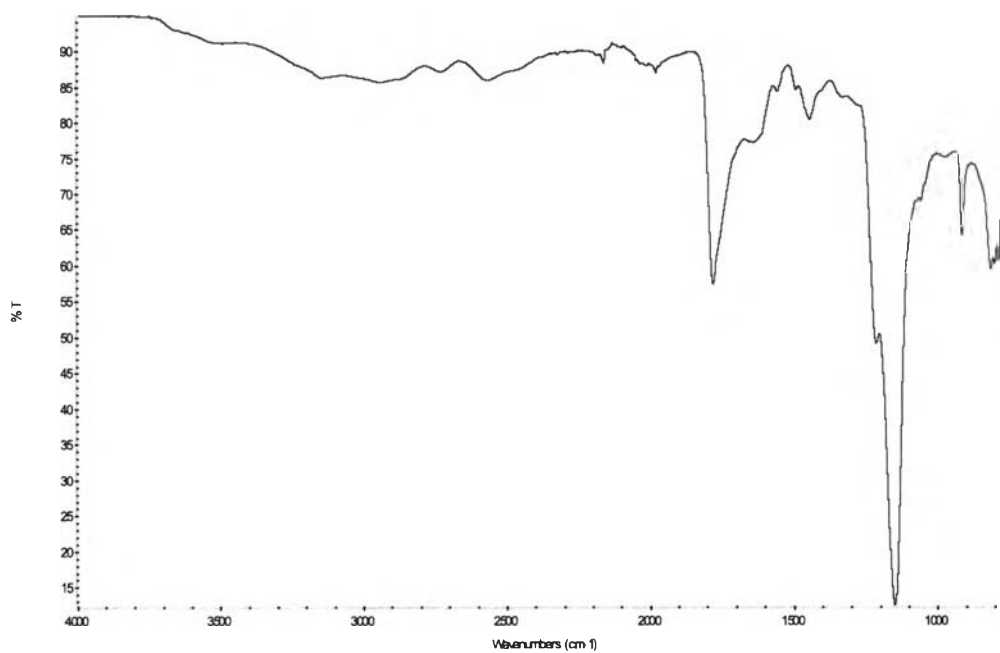


Figure A.38 IR spectrum of polymer P2



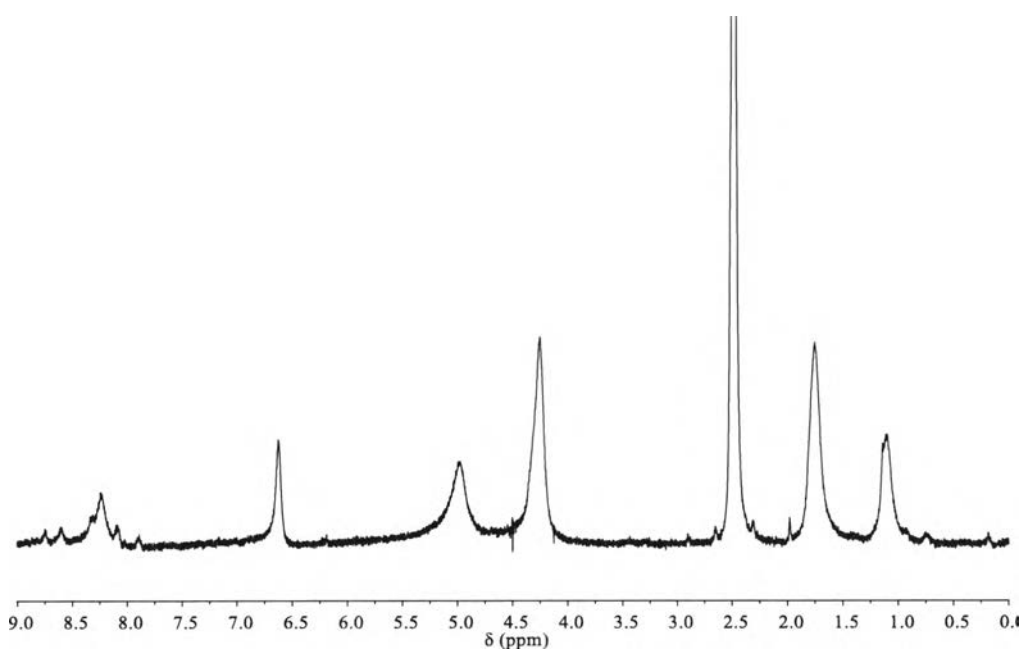


Figure A.39 ^1H NMR ($\text{DMSO-}d_6$) spectrum of polymer P3

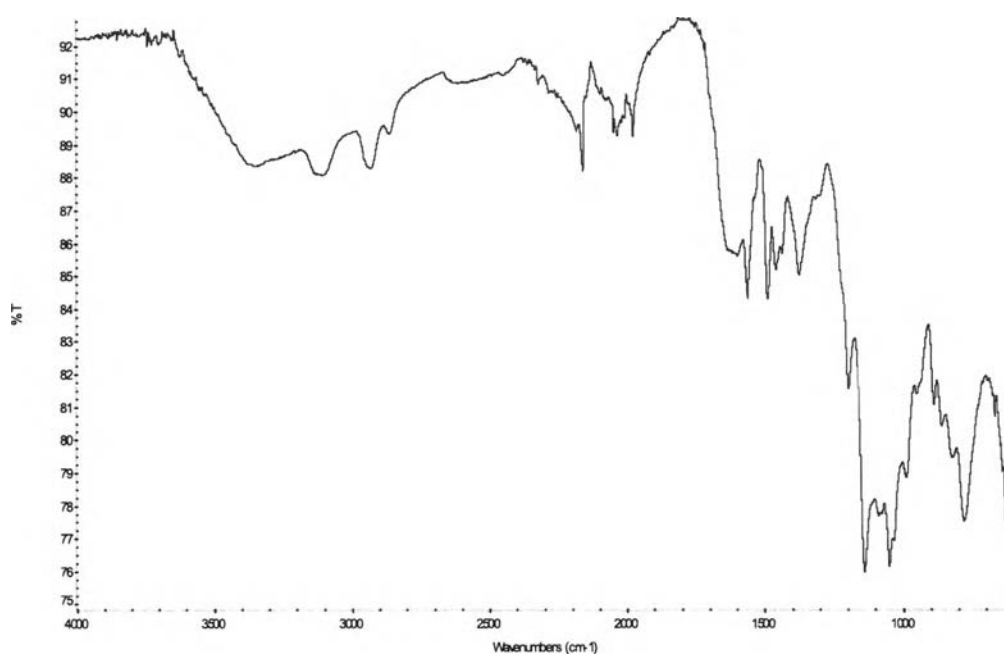


Figure A.40 IR spectrum of polymer P3



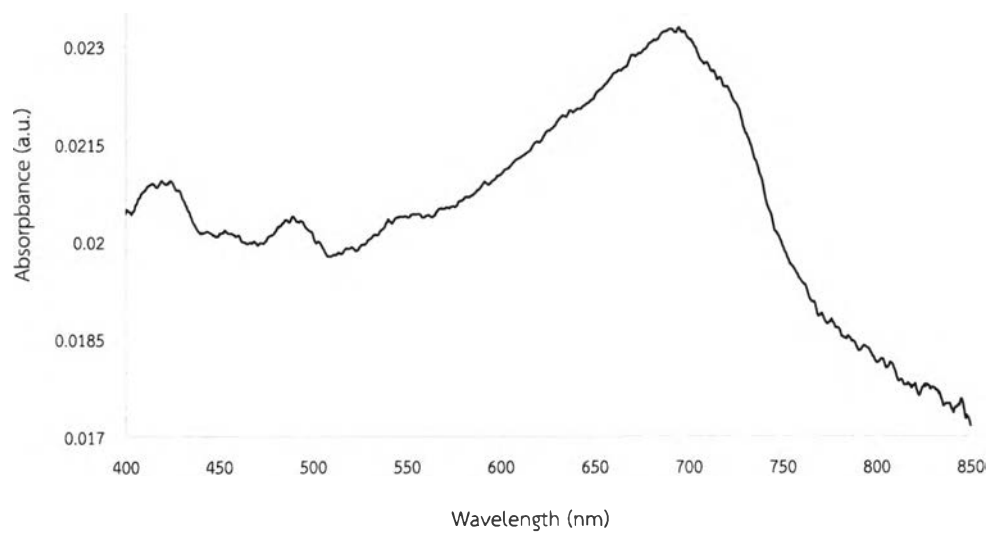


Figure A.41 Solid UV-visible spectra of polymer P3

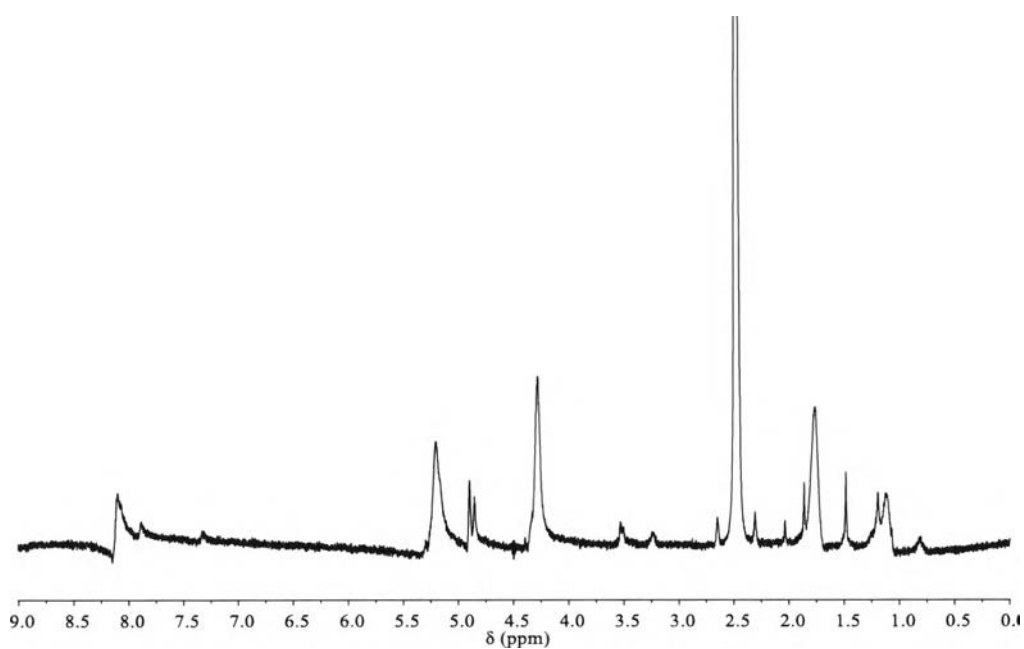


Figure A.42 ¹H NMR (DMSO-*d*₆) spectrum of double strand polymer P4



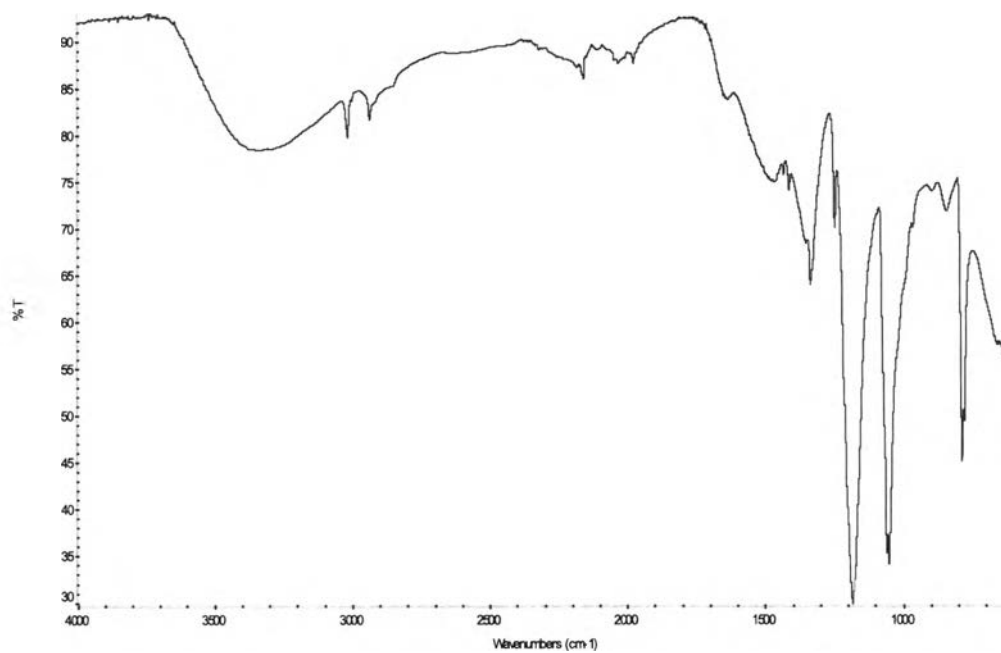


Figure A.43 IR spectrum of polymer P4

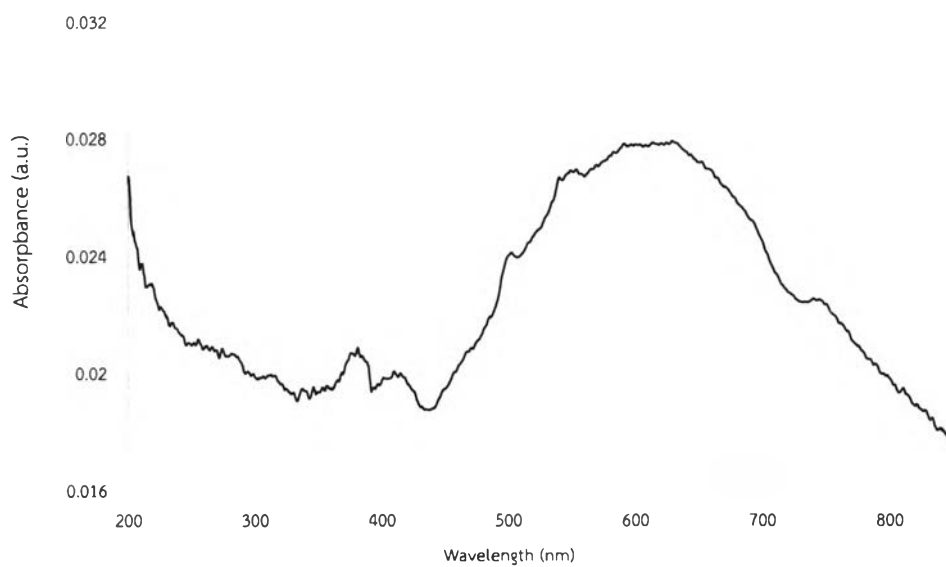


Figure A.44 Solid UV-visible spectra of polymer P4



VITA

Miss Apirujee Pullpraporn was born on April 16, 1987 in Phetchabun, Thailand. She received a Bachelor's degree of science from Department of Chemistry, Faculty of Science, Mahidol University, Thailand in 2010. She was admitted to a Master's Degree Program in Petrochemical and Polymer science, Faculty of Science, Chulalongkorn University and completed the program in 2014. Her address is house no. 6/1, village no. 3, Wang Yai sub-district, Wichian Buri district , Phetchabun province, 67180, Thailand.

