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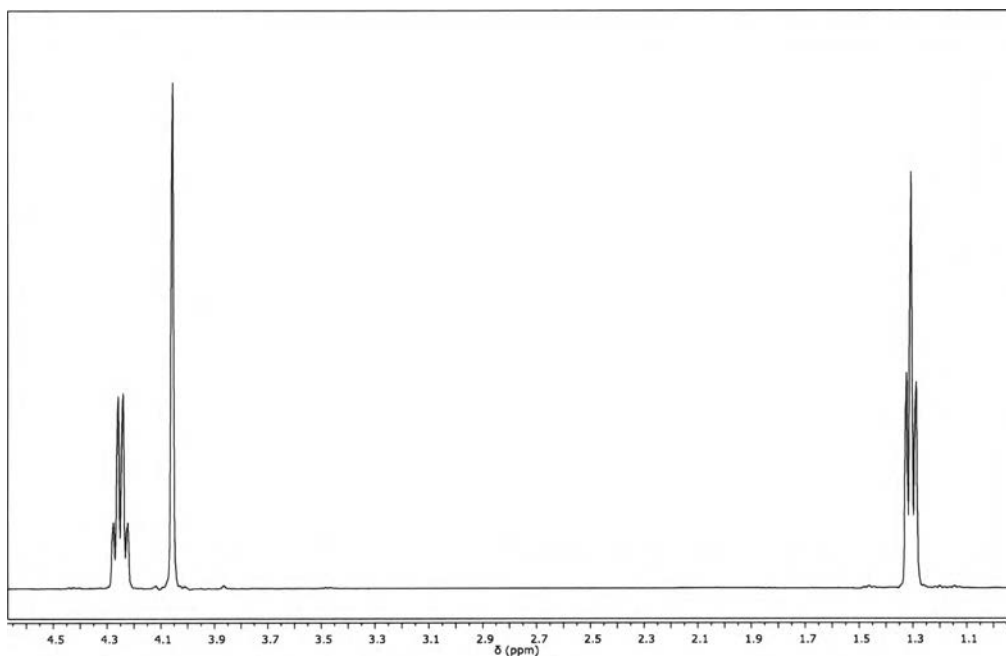
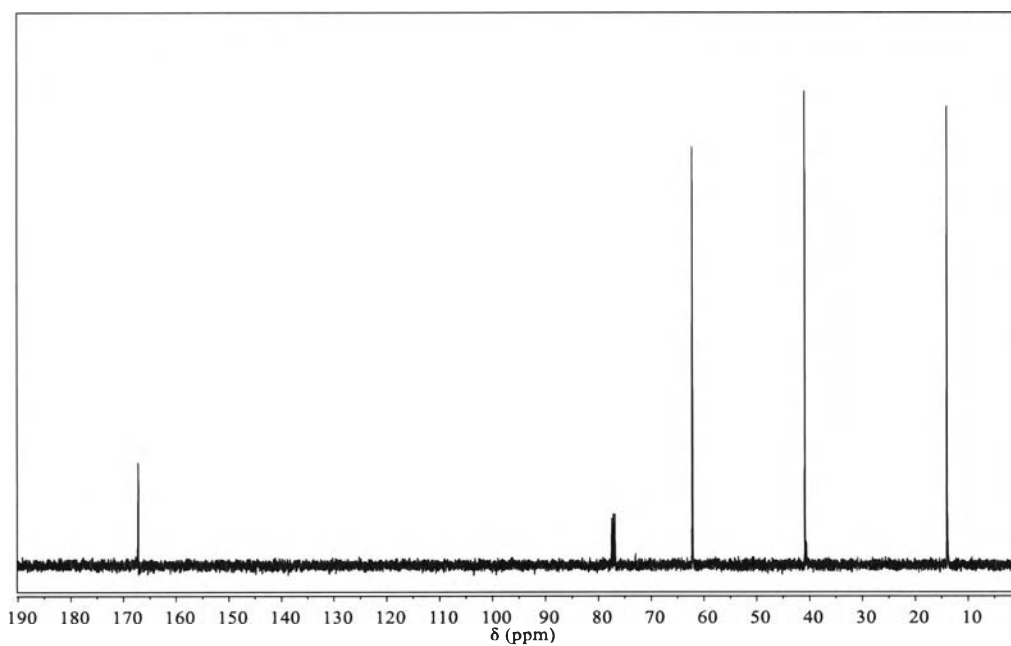
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APPENDIX



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**

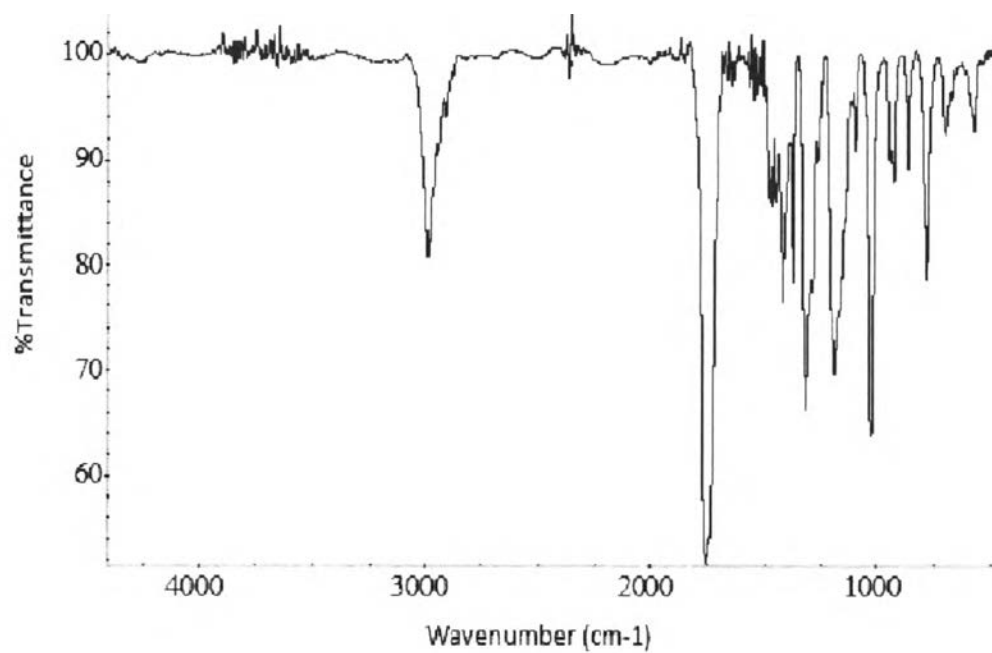


Figure A.3 IR spectrum of ethyl chloroacetate 1

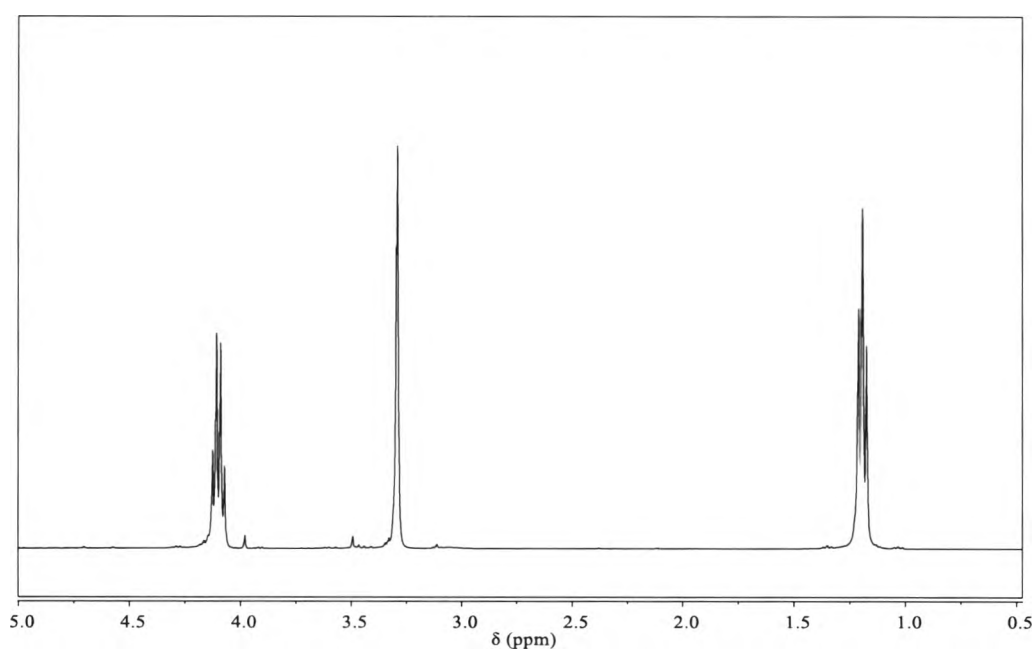


Figure A.4 ¹H NMR (CDCl₃) spectrum of diethyl thiodiglycolate, 2



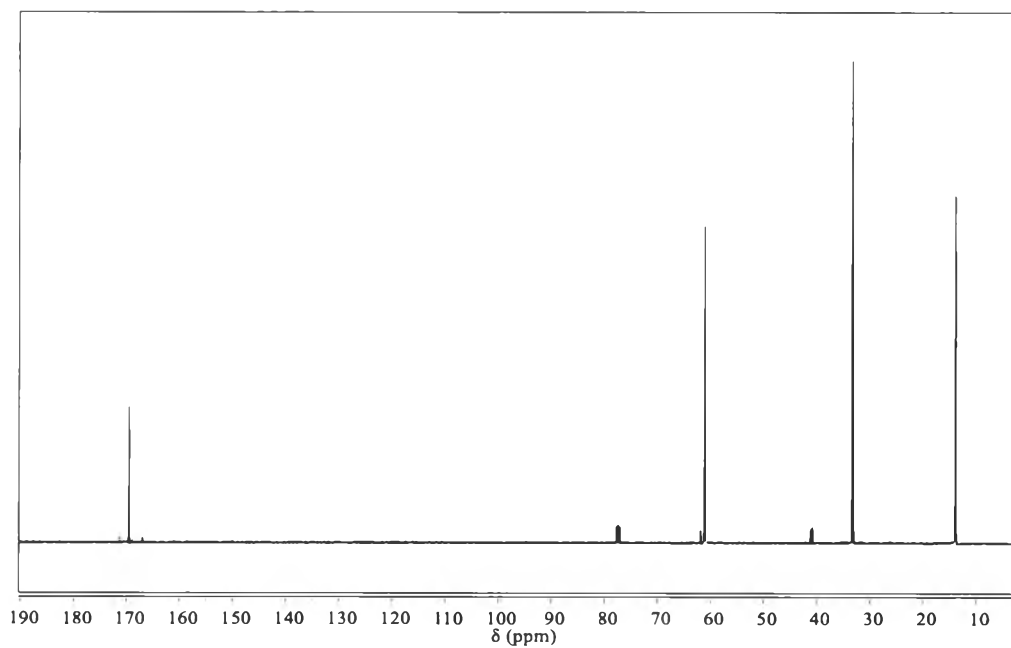


Figure A.5 ^{13}C NMR (CDCl_3) spectrum of diethyl thiodiglycolate 2

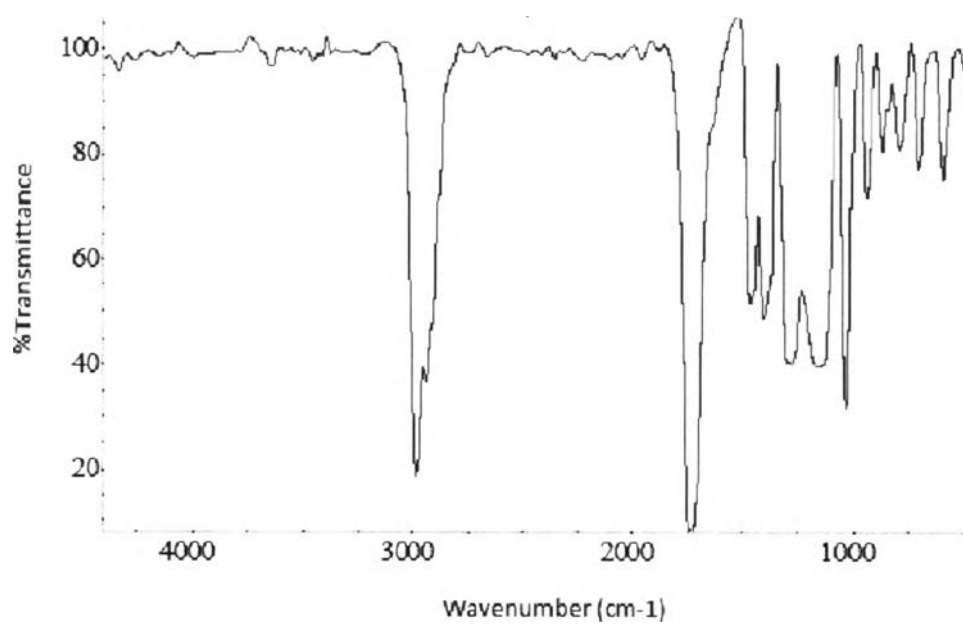


Figure A.6 IR spectrum of diethyl thiodiglycolate 2



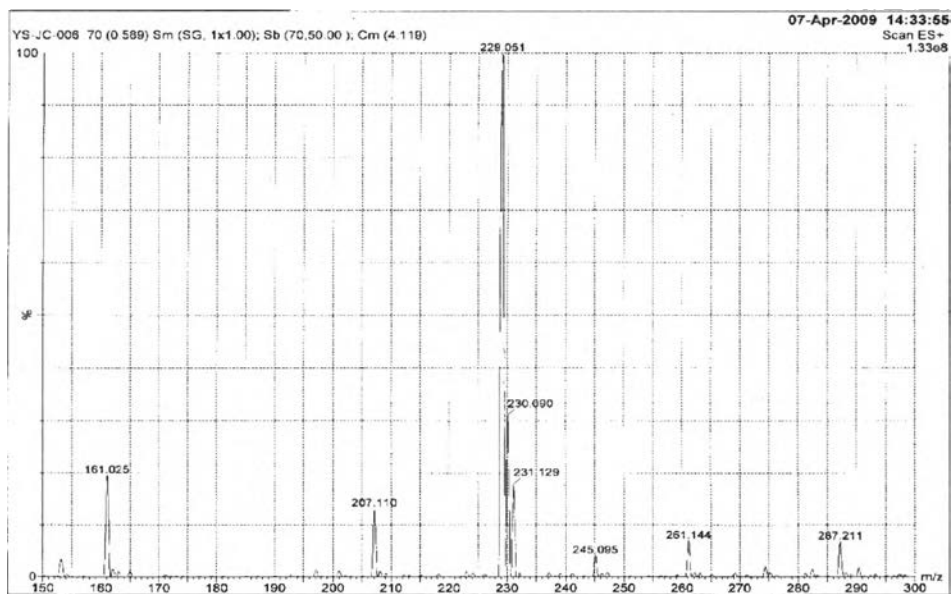


Figure A.7 Mass spectrum of diethyl thiodiglycolate, 2

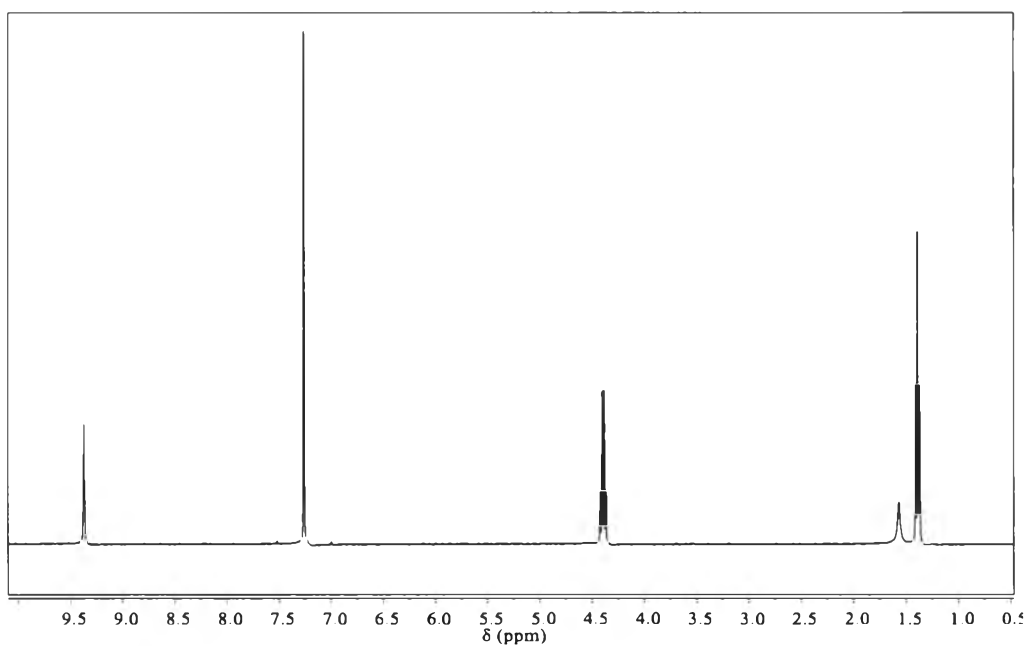


Figure A.8 ^1H NMR (CDCl_3) spectrum of diethyl 3,4-dihydroxythiophene-2,5-dicarboxylate 3



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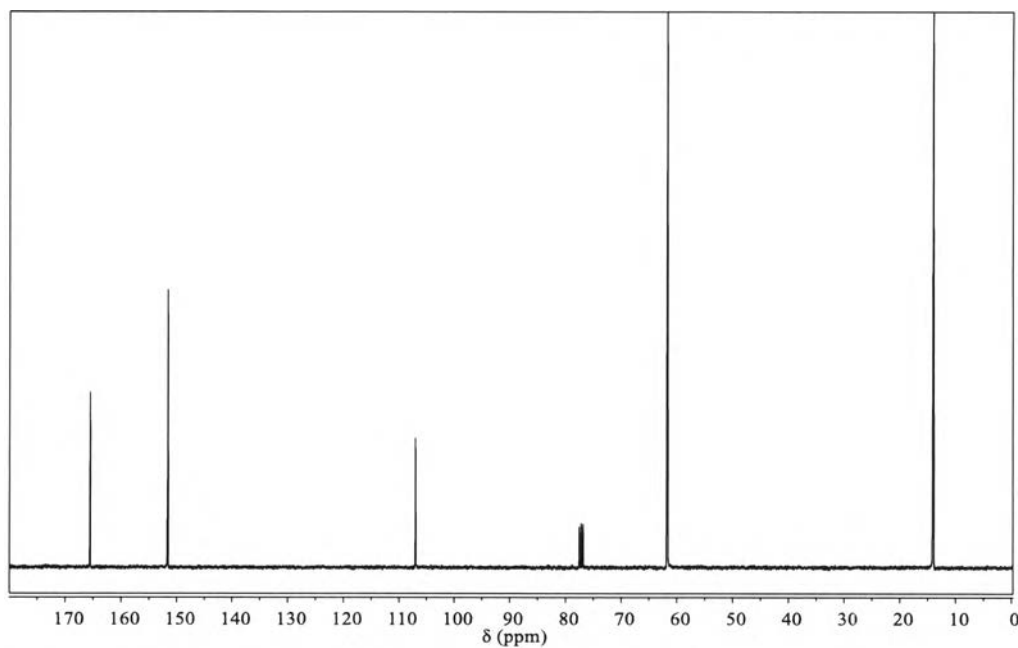


Figure A.9 ^{13}C NMR (CDCl_3) spectrum of diethyl 3,4-dihydroxythiophene-2,5-dicarboxylate **3**

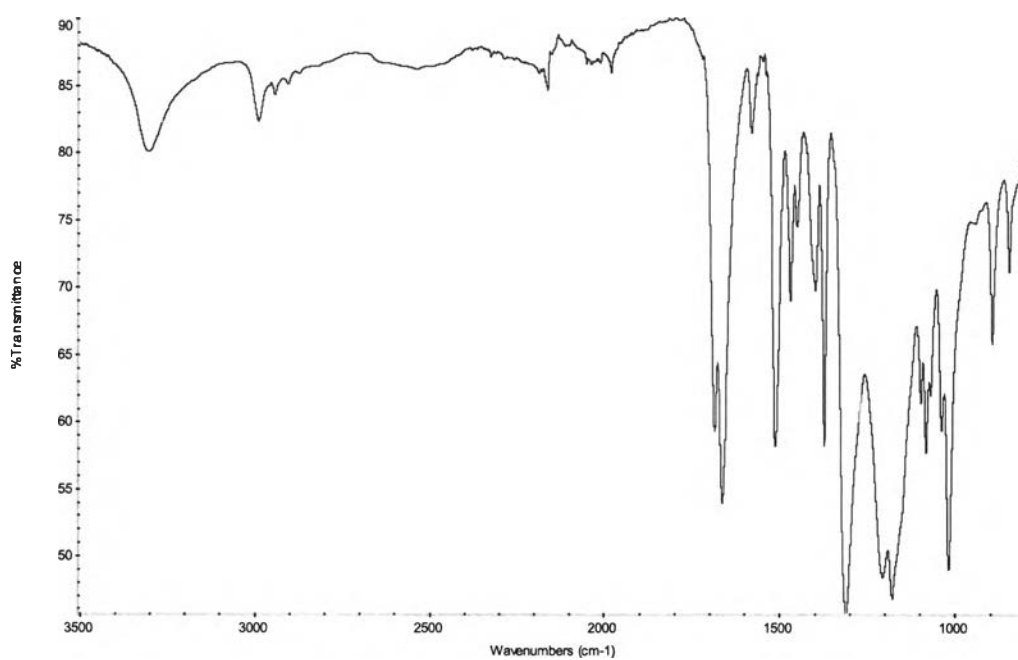


Figure A.10 IR spectrum of diethyl 3,4-dihydroxythiophene-2,5-dicarboxylate **3**



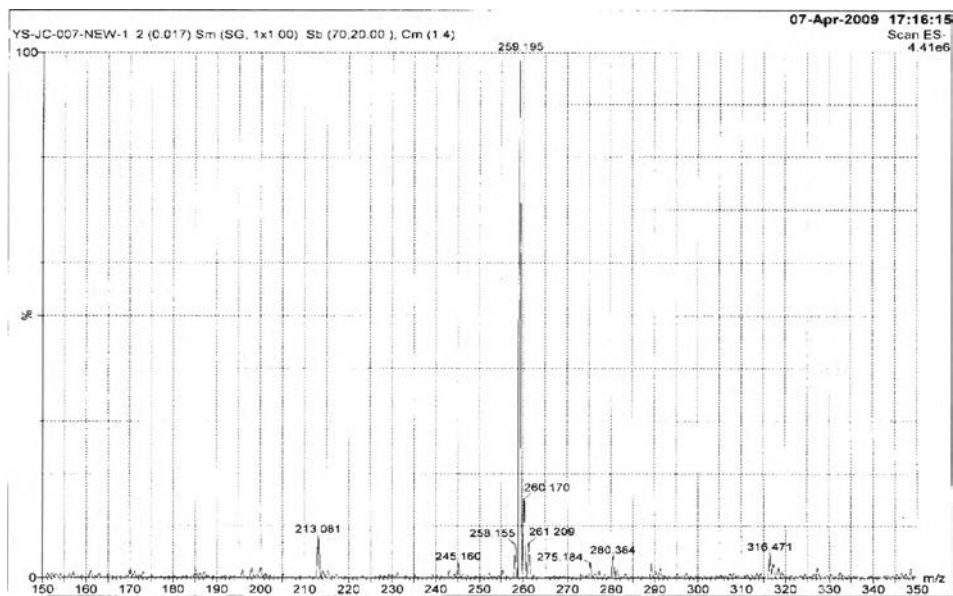


Figure A.11 Mass spectrum of diethyl 3,4-dihydroxythiophene-2,5-dicarboxylate **3**

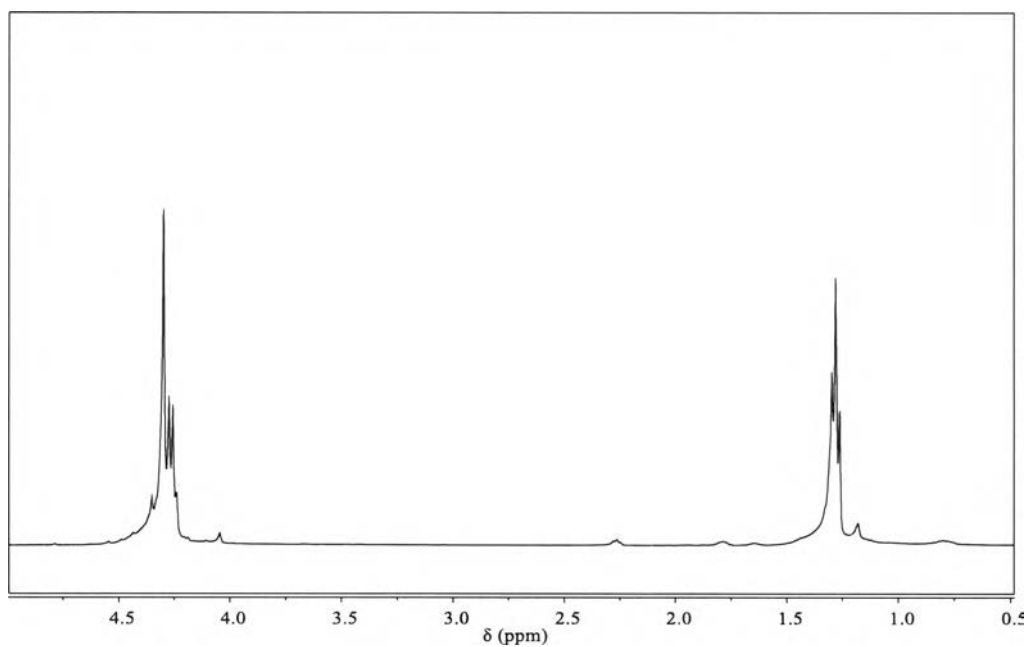


Figure A.12 ¹H NMR (CDCl₃) spectrum of diethyl 2-oxo-2,3-dihydrothieno[3,4-b][1,4]dioxine-5,7-dicarboxylate **4j**



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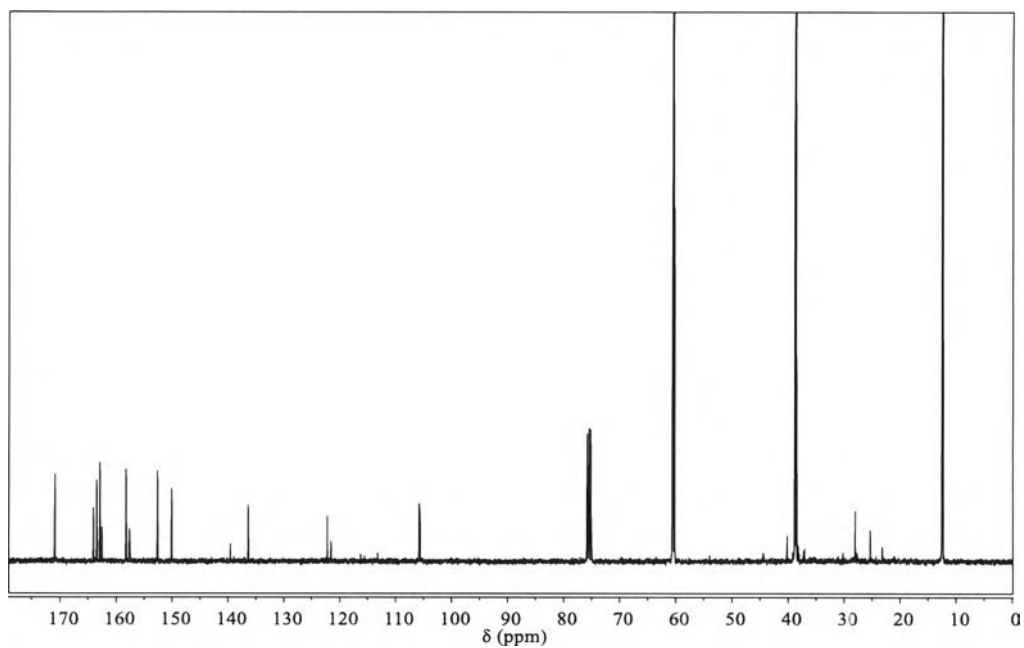


Figure A.13 ^{13}C NMR (CDCl_3) spectrum of diethyl 2-oxo-2,3-dihydrothieno[3,4-*b*][1,4]dioxine-5,7-dicarboxylate **4j**

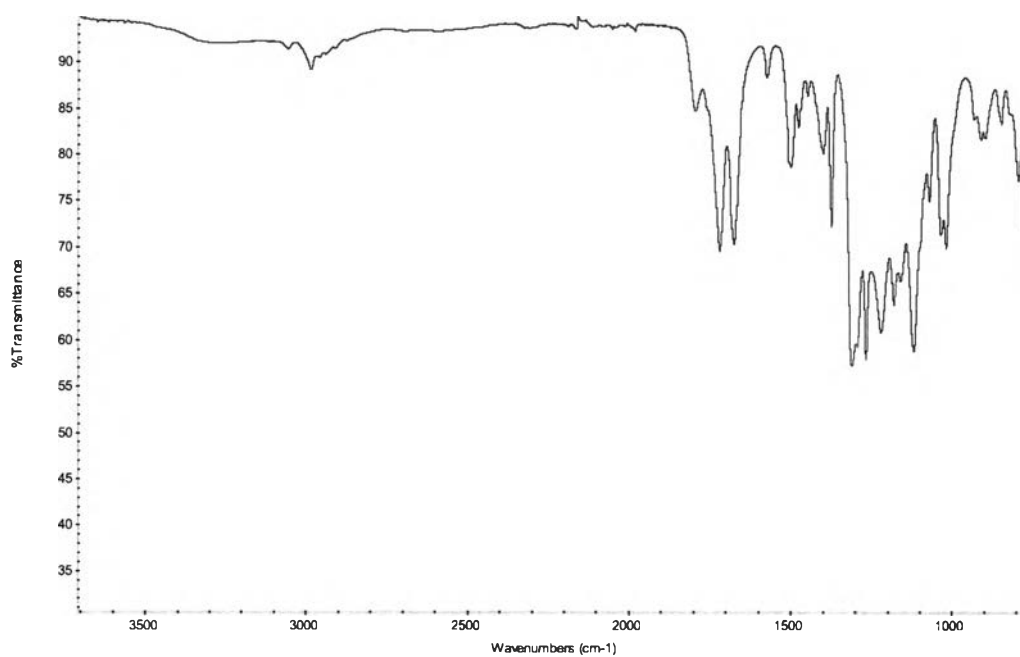


Figure A.14 IR spectrum of diethyl 2-oxo-2,3-dihydrothieno[3,4-*b*][1,4]dioxine-5,7-dicarboxylate **4j**



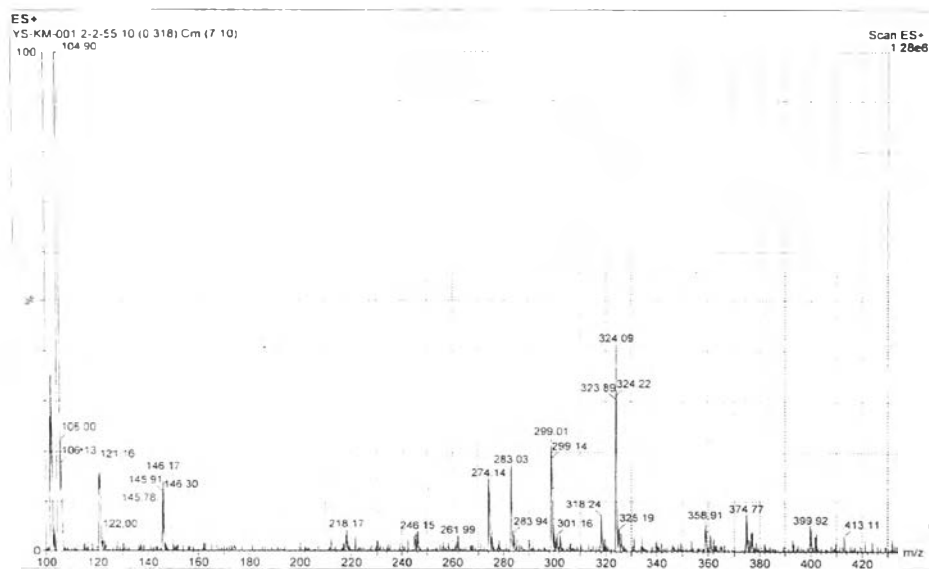


Figure A.15 Mass spectrum of diethyl 2-oxo-2,3-dihydrothieno[3,4-*b*][1,4]dioxine-5,7-dicarboxylate **4j**

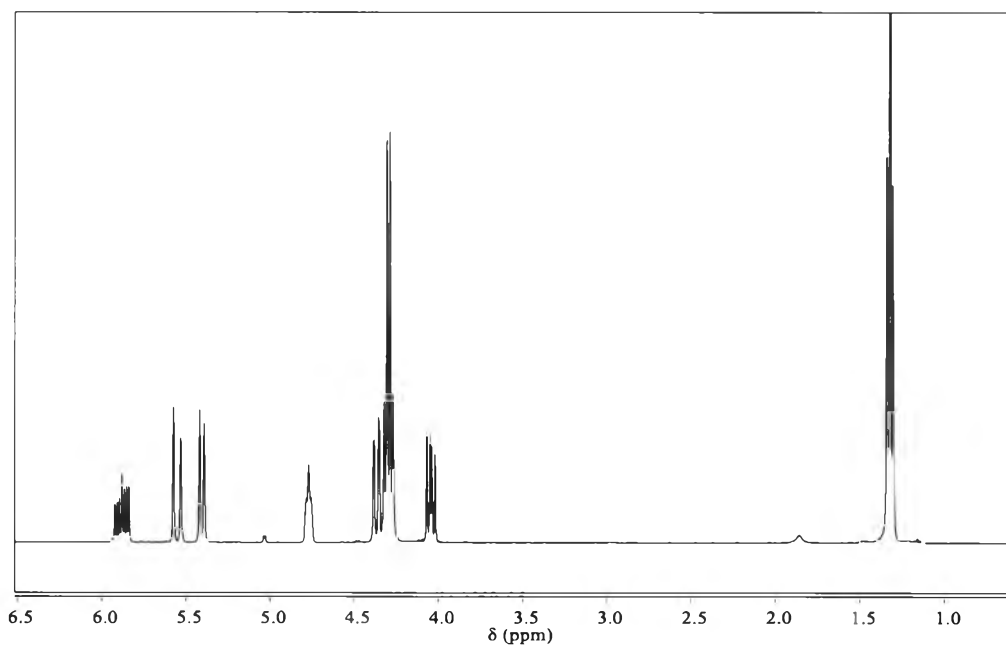


Figure A.16 ^1H NMR (CDCl_3) spectrum of diethyl 2-vinyl-2,3-dihydrothieno[3,4-*b*][1,4]dioxine-5,7-dicarboxylate **4k**

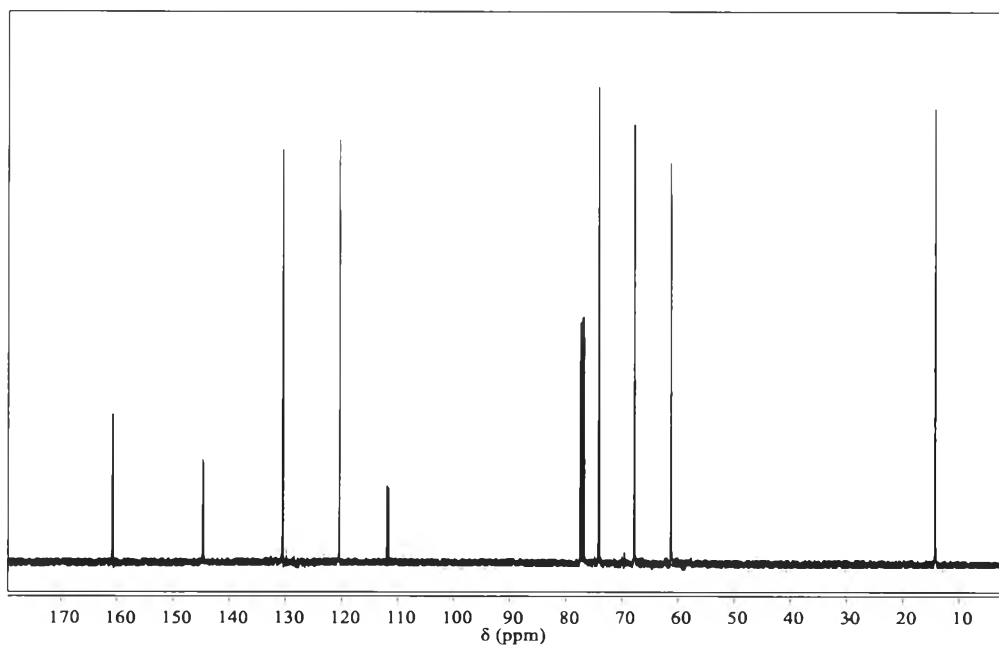


Figure A.17 ^{13}C NMR (CDCl_3) spectrum of diethyl 2-vinyl-2,3-dihydrothieno[3,4-*b*][1,4]dioxine-5,7-dicarboxylate, **4k**

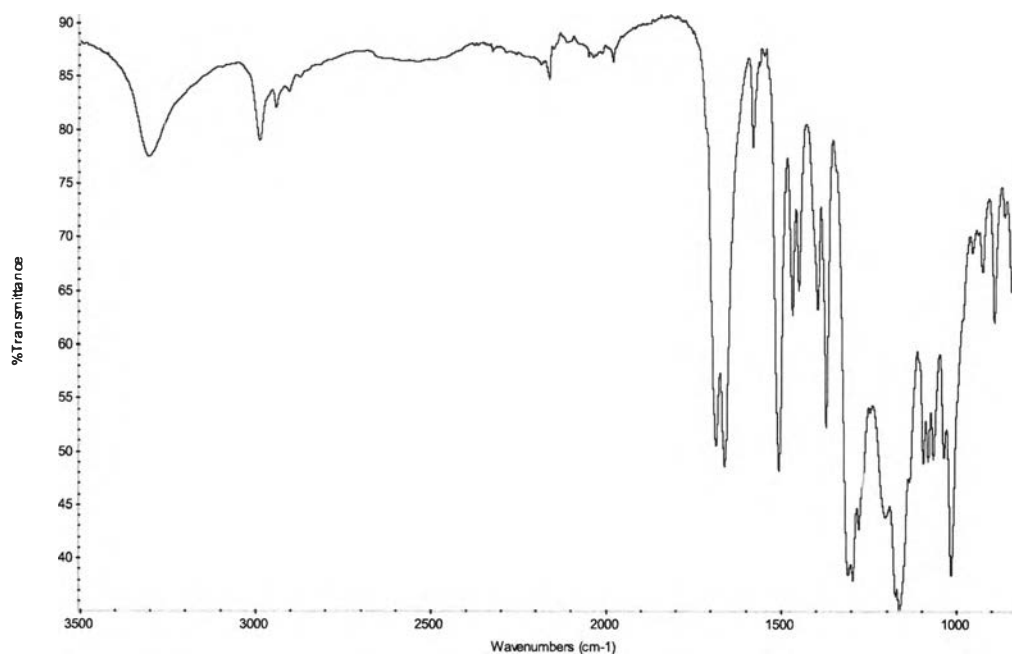


Figure A.18 IR spectrum of diethyl 2-vinyl-2,3-dihydrothieno[3,4-*b*][1,4]dioxine-5,7-dicarboxylate **4k**

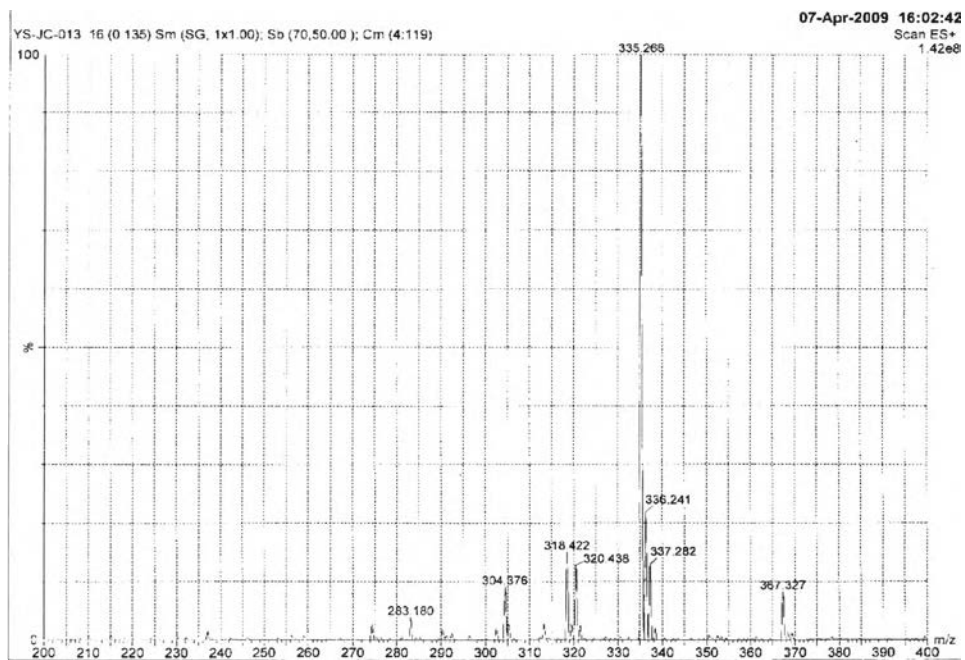


Figure A.19 Mass spectrum of diethyl 2-vinyl-2,3-dihydrothieno[3,4-*b*][1,4]dioxine-5,7-dicarboxylate **4k**

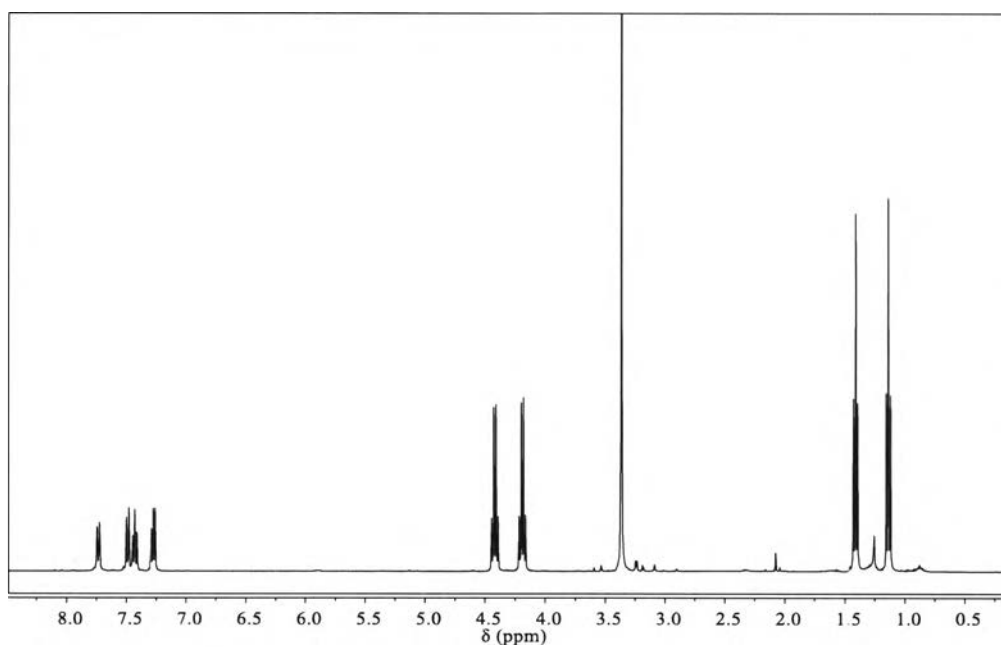


Figure A.20 ^1H NMR (CDCl_3) spectrum of diethyl 3-((3-(dimethylamino)quinoxalin-2-yl)oxy)-4-hydroxythiophene-2,5-dicarboxylate, **4l**



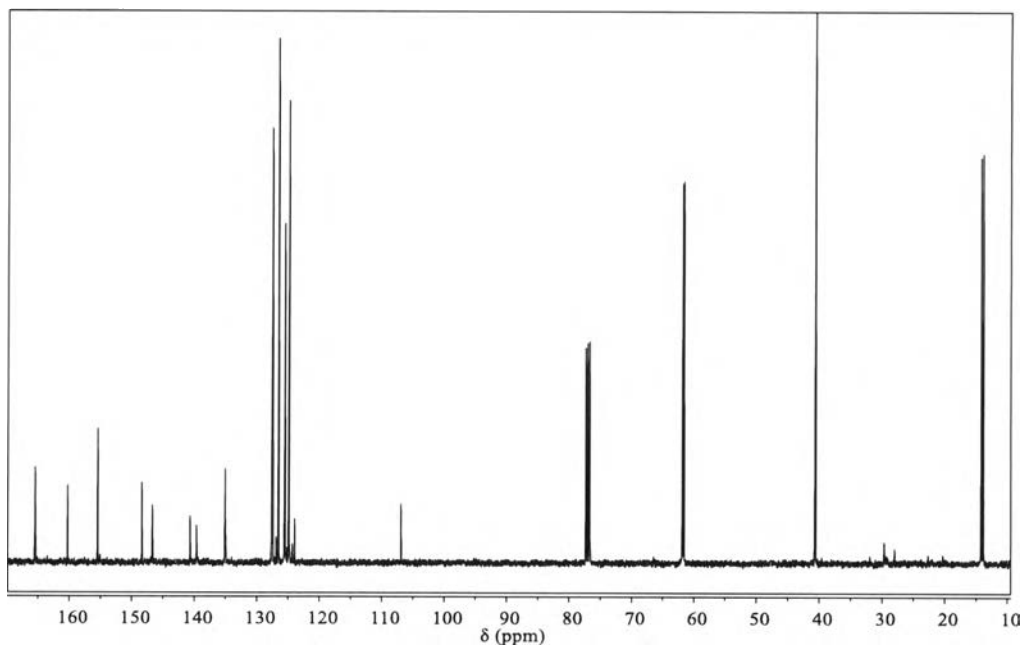


Figure A.21 ^{13}C NMR (CDCl_3) spectrum of diethyl 3-((3-(dimethylamino)quinoxalin-2-yl)oxy)-4-hydroxythiophene-2,5-dicarboxylate **4l**

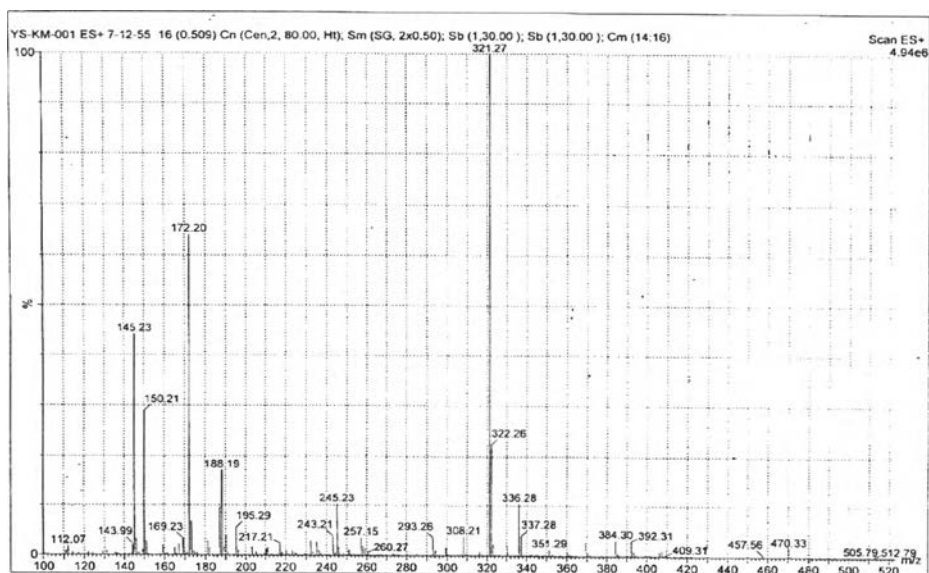


Figure A.22 Mass spectrum of diethyl 3-((3-(dimethylamino)quinoxalin-2-yl)oxy)-4-hydroxythiophene-2,5-dicarboxylate, **4l**

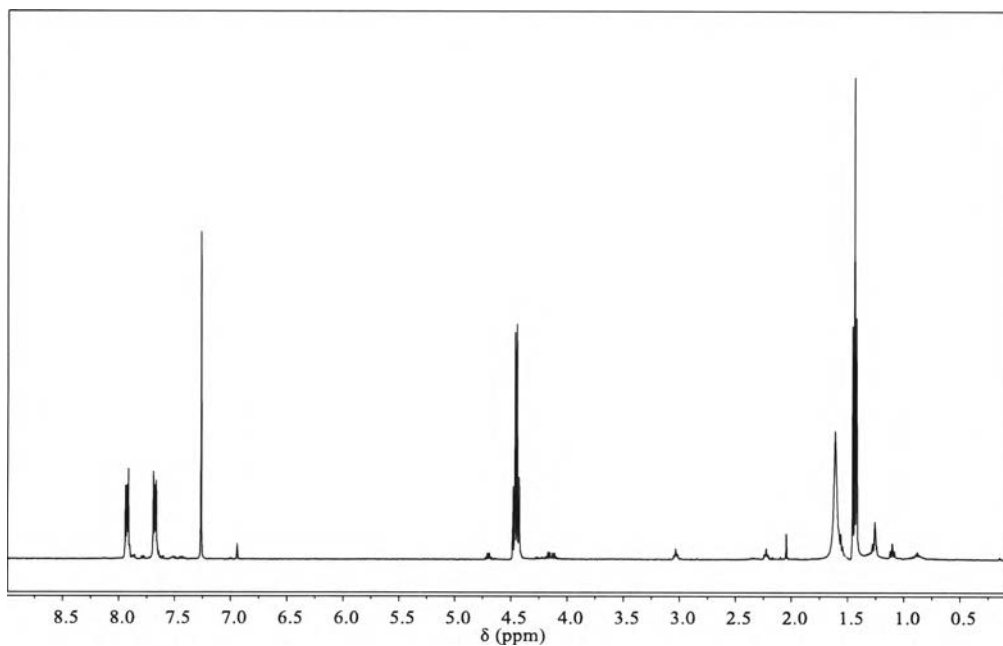


Figure A.23 ^1H NMR (CDCl_3) spectrum of diethyl thieno[3',4':5,6][1,4]dioxino[2,3-*b*]quinoxaline-1,3-dicarboxylate **4m**

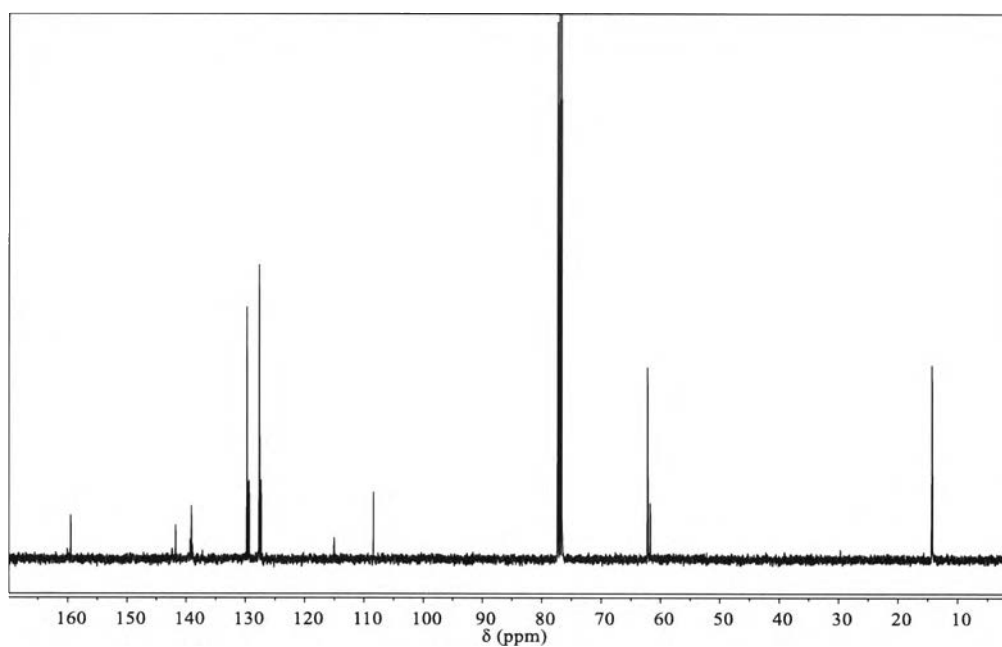


Figure A.24 ^{13}C NMR (CDCl_3) spectrum of diethyl thieno[3',4':5,6][1,4]dioxino[2,3-*b*]quinoxaline-1,3-dicarboxylate **4m**



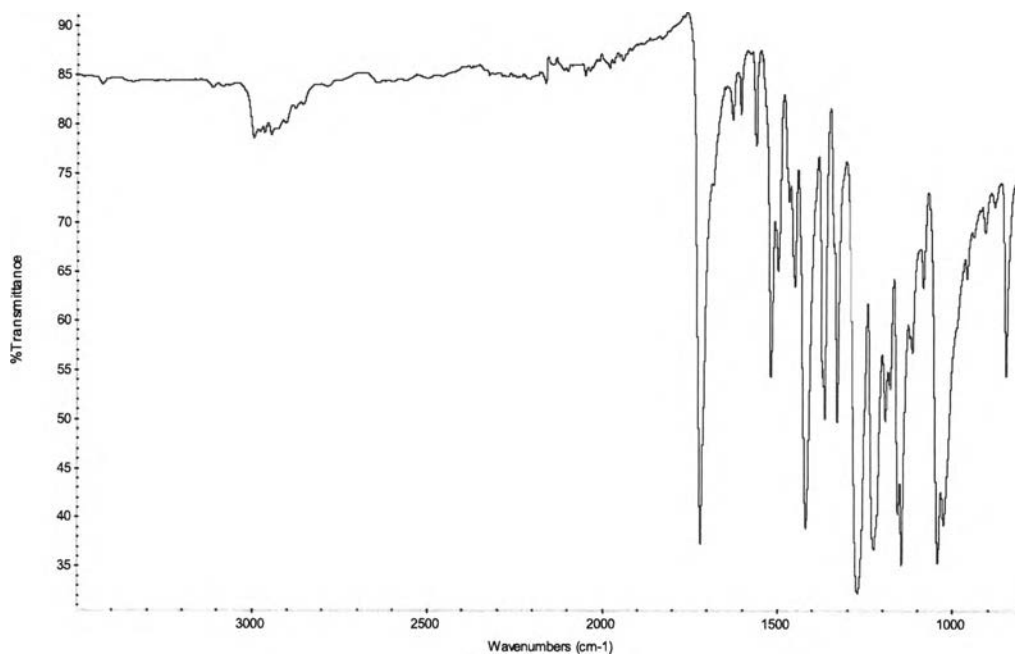


Figure A.25 IR spectrum of diethyl thieno[3',4':5,6][1,4]dioxino[2,3-*b*]quinoxaline-1,3-dicarboxylate **4m**

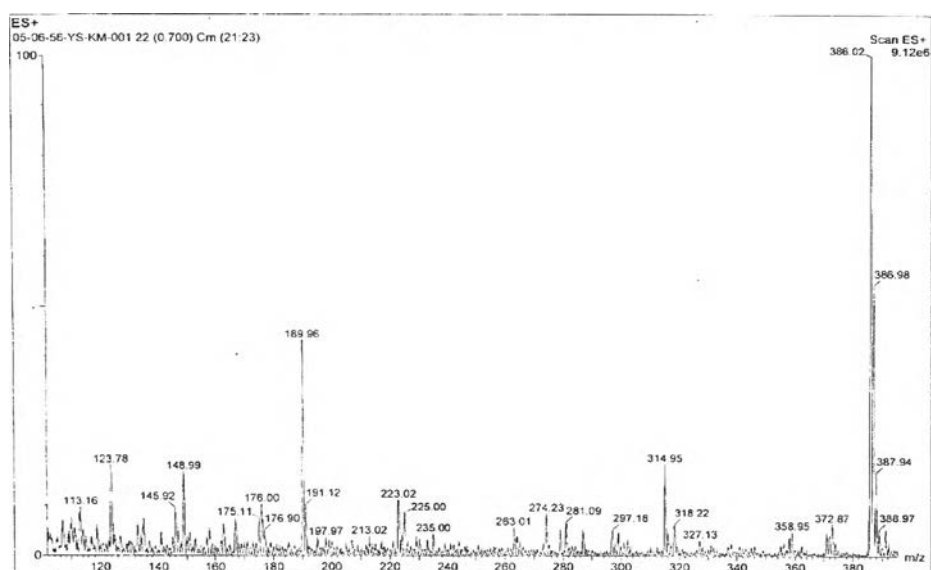


Figure A.26 Mass spectrum of diethyl thieno[3',4':5,6][1,4]dioxino[2,3-*b*]quinoxaline-1,3-dicarboxylate **4m**



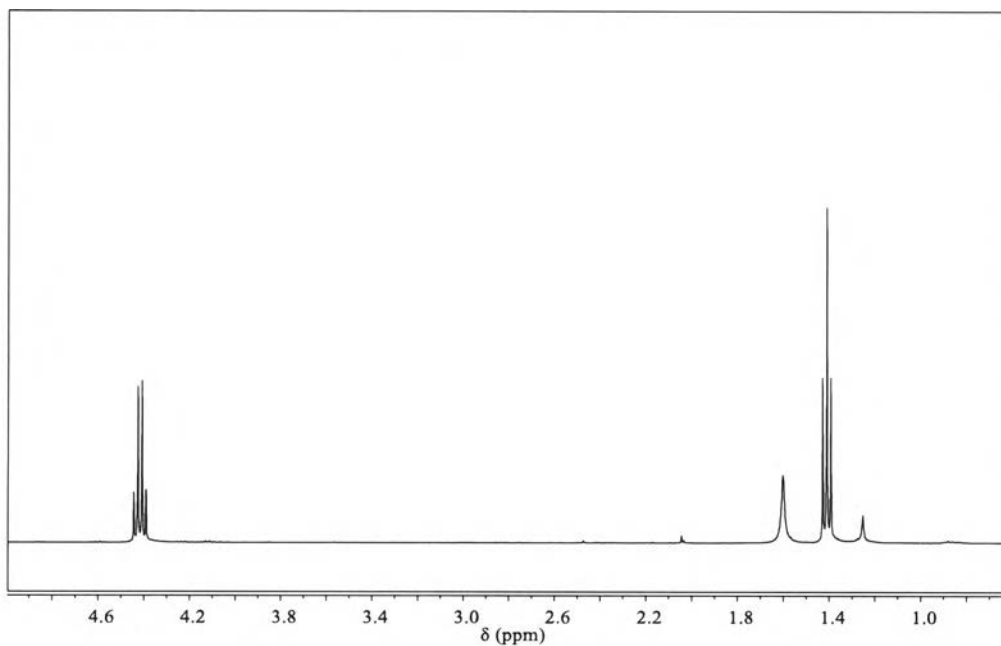


Figure A.27 ^1H NMR (CDCl_3) spectrum of diethyl thieno[3',4':5,6][1,4]dioxino[2,3-c][1,2,5]thiadiazole-5,7-dicarboxylate **4n**

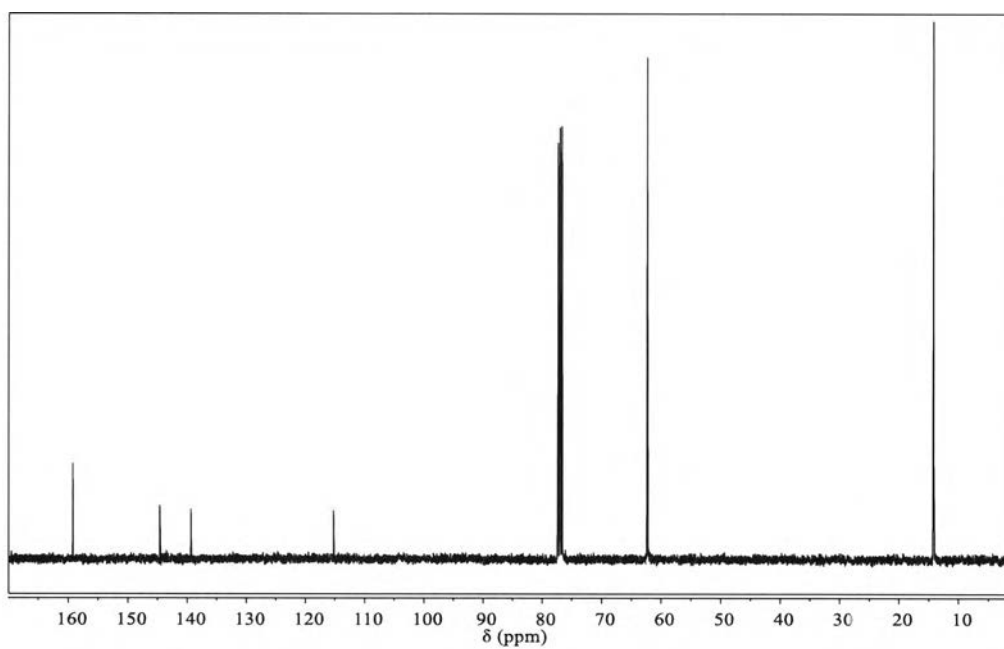


Figure A.28 ^{13}C NMR (CDCl_3) spectrum of diethyl thieno[3',4':5,6][1,4]dioxino[2,3-c][1,2,5]thiadiazole-5,7-dicarboxylate **4n**



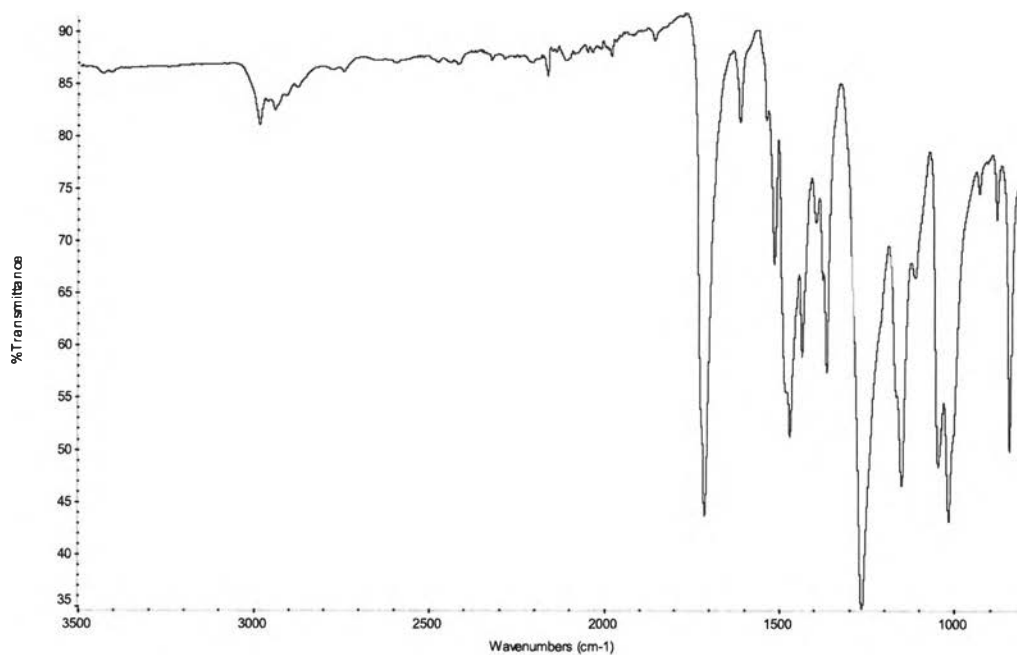


Figure A.29 IR spectrum of diethyl thieno[3',4':5,6][1,4]dioxino[2,3-c][1,2,5]thiadiazole-5,7-dicarboxylate **4n**

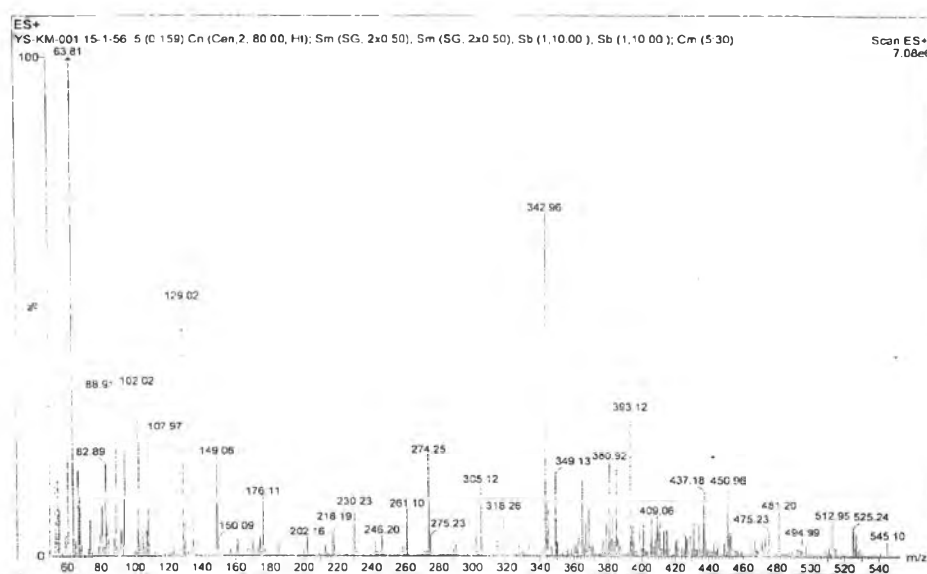


Figure A.30 Mass spectrum of diethyl thieno[3',4':5,6][1,4]dioxino[2,3-c][1,2,5]thiadiazole-5,7-dicarboxylate **4n**

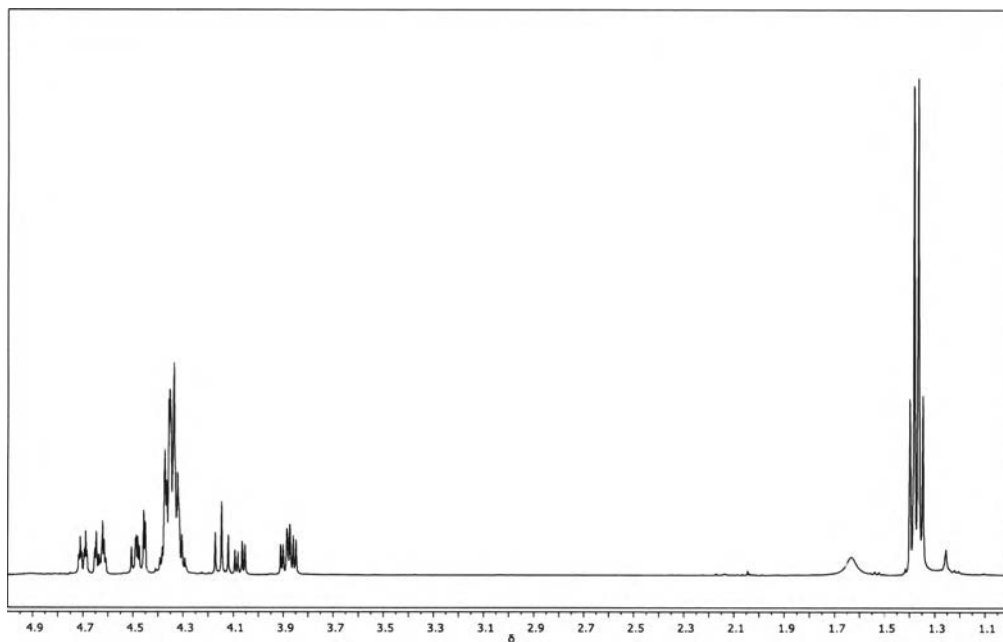


Figure A.31 ^1H NMR (CDCl_3) spectrum of diethyl 2-(1,2-dibromoethyl)-2,3-dihydrothieno[3,4-b][1,4]dioxine-5,7-dicarboxylate **4p**

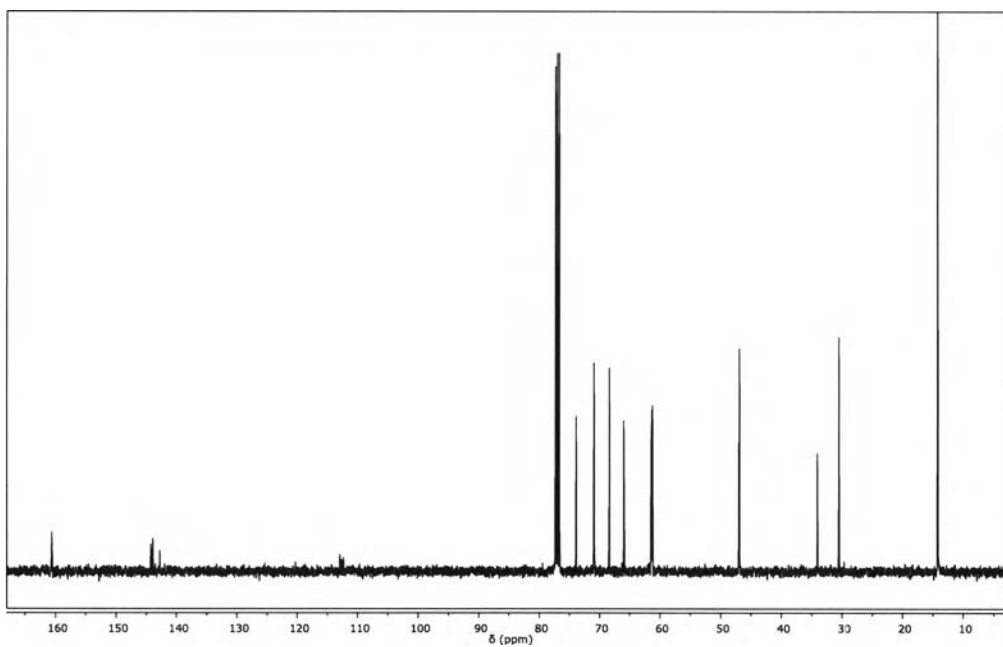


Figure A.32 ^{13}C NMR (CDCl_3) spectrum of diethyl 2-(1,2-dibromoethyl)-2,3-dihydrothieno[3,4-b][1,4]dioxine-5,7-dicarboxylate **4p**



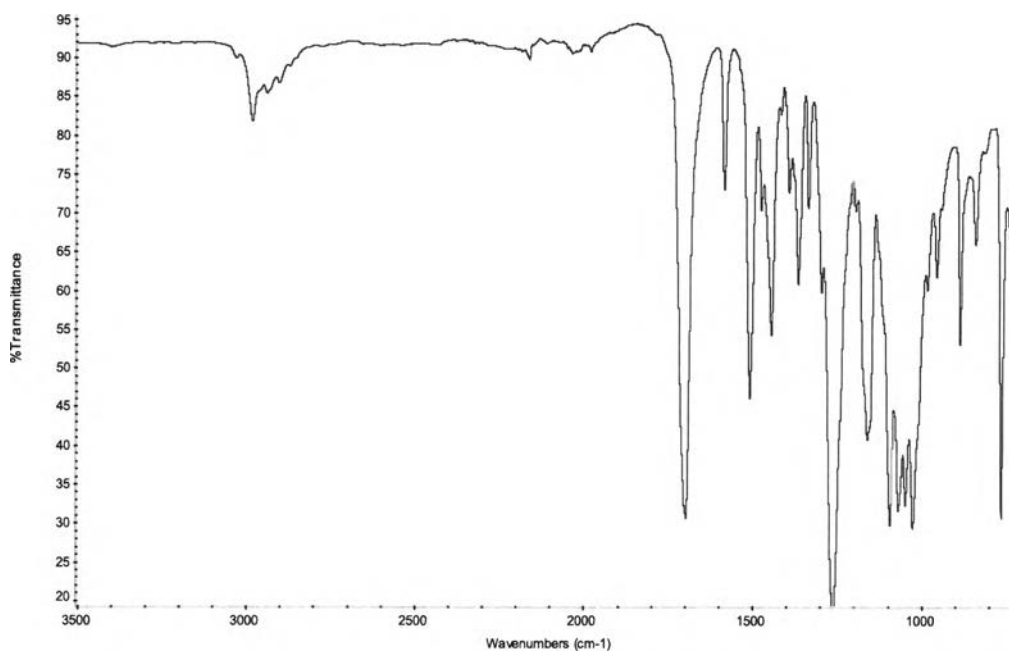


Figure A.33 IR spectrum of diethyl 2-(1,2-dibromoethyl)-2,3-dihydrothieno[3,4-b][1,4]dioxine-5,7-dicarboxylate **4p**

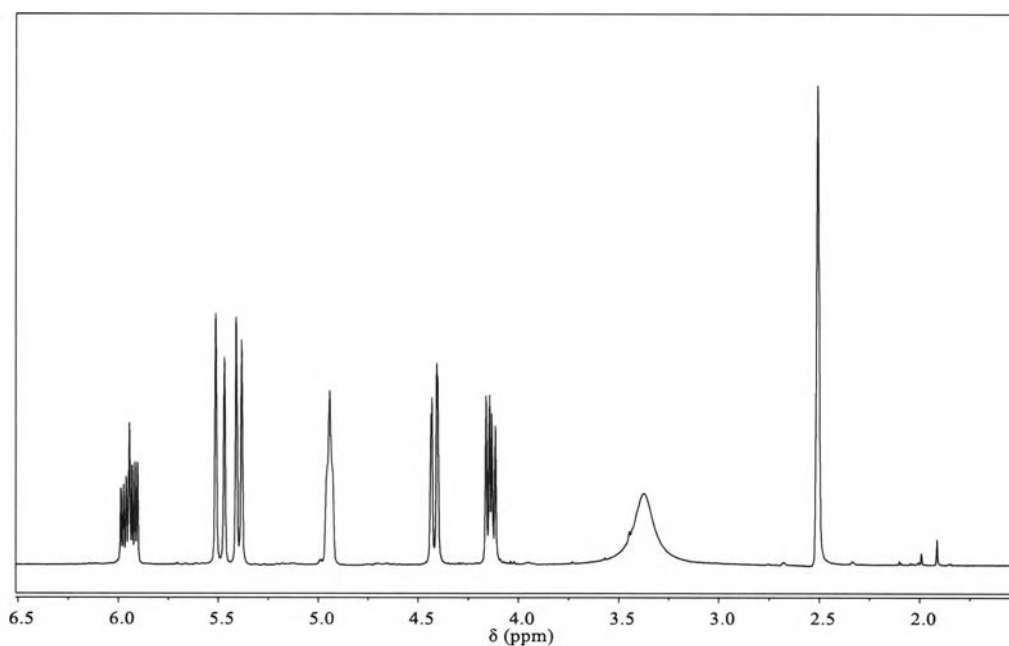


Figure A.34 ^1H NMR (DMSO-d_6) spectrum of 2-vinyl-2,3-dihydrothieno[3,4-b][1,4]dioxine-5,7-dicarboxylic acid **5k**

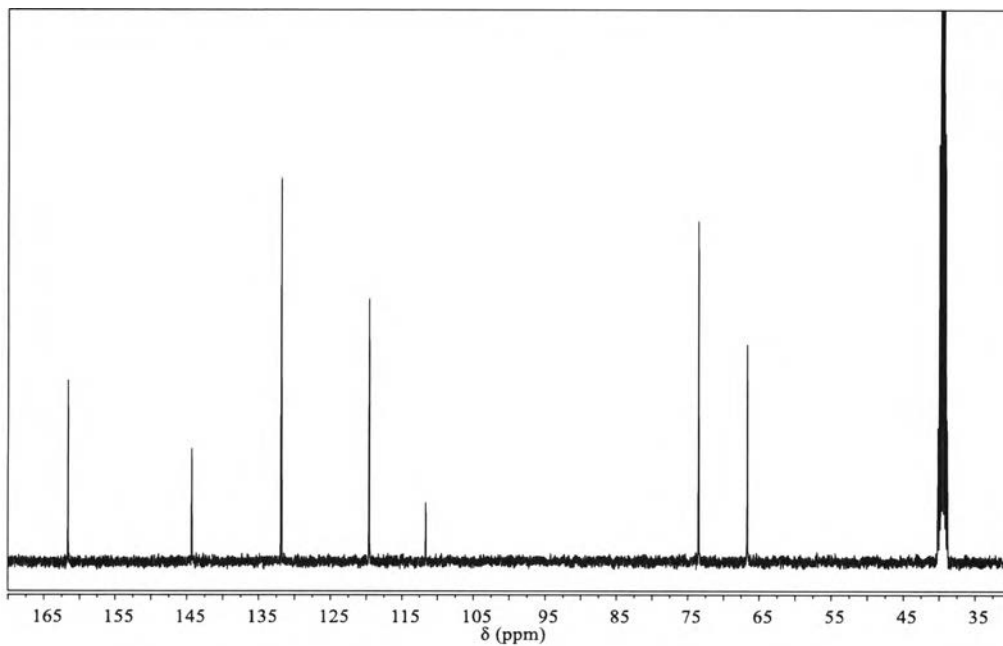


Figure A.35 ^{13}C NMR (DMSO-d_6) spectrum of 2-vinyl-2,3-dihydrothieno[3,4-*b*][1,4]dioxine-5,7-dicarboxylic acid **5k**

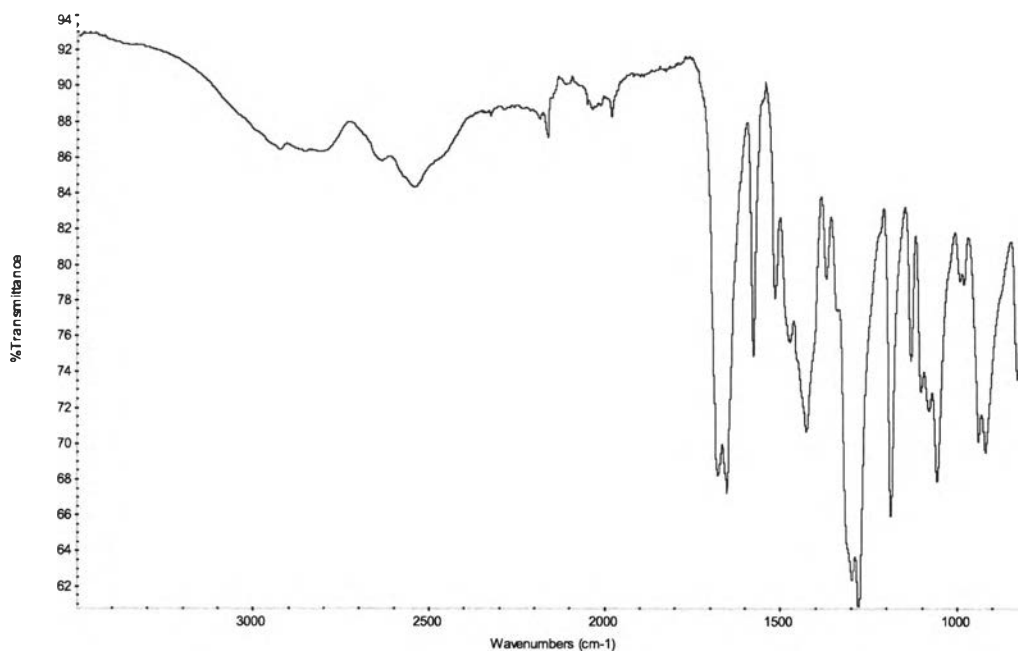


Figure A.36 IR spectrum of 2-vinyl-2,3-dihydrothieno[3,4-*b*][1,4]dioxine-5,7-dicarboxylic acid **5k**



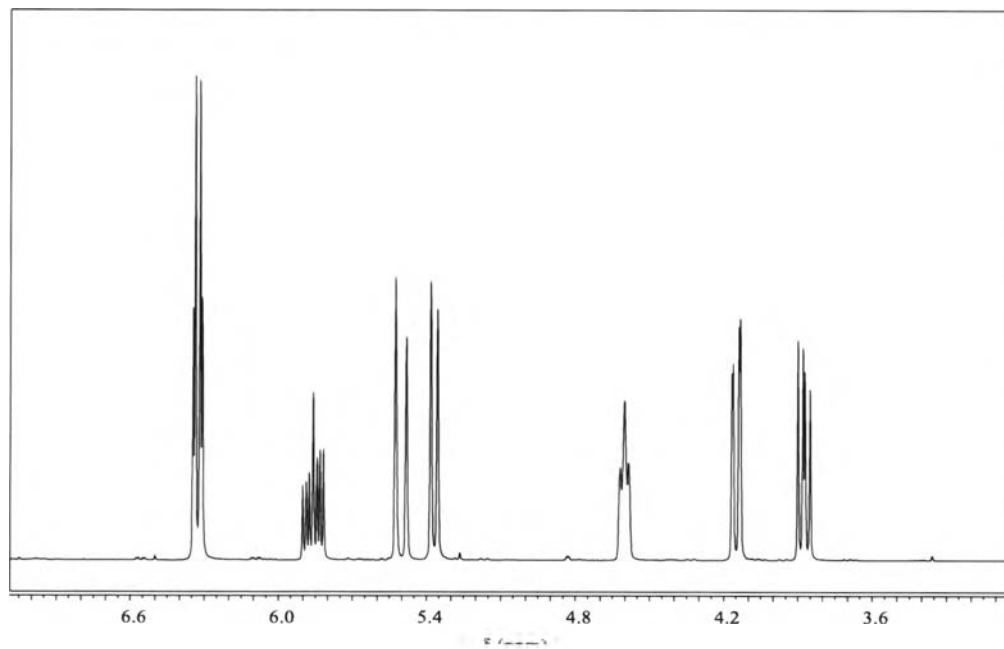


Figure A.37 ^1H NMR (CDCl_3) spectrum of 2-vinyl-2,3-dihydrothieno[3,4-*b*][1,4]dioxine **6**

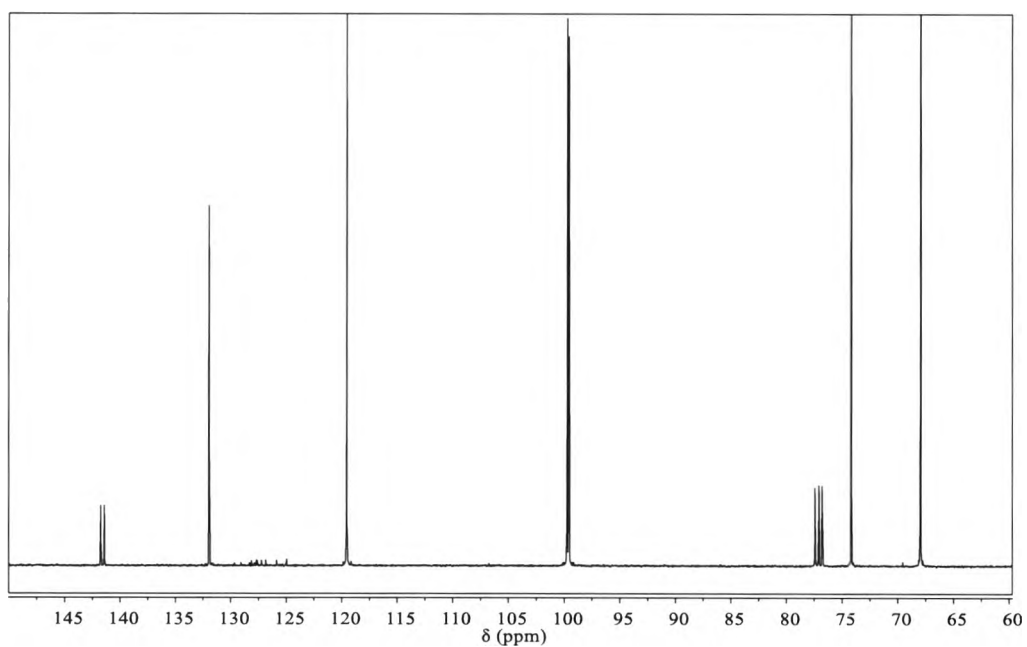


Figure A.38 ^{13}C NMR (CDCl_3) spectrum of 2-vinyl-2,3-dihydrothieno[3,4-*b*][1,4]dioxine **6**



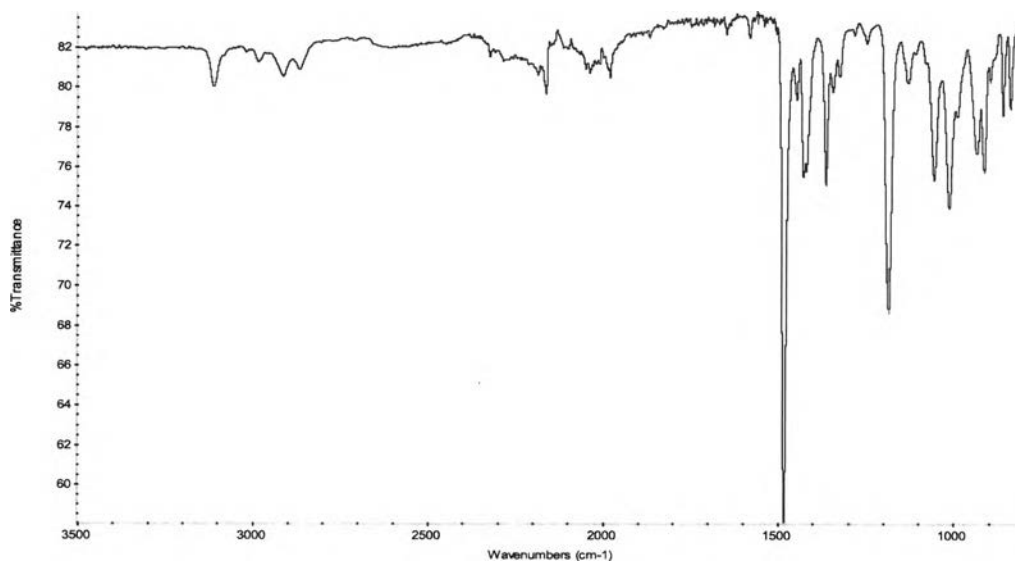


Figure A.39 IR spectrum of 2-vinyl-2,3-dihydrothieno[3,4-*b*][1,4]dioxine **6**

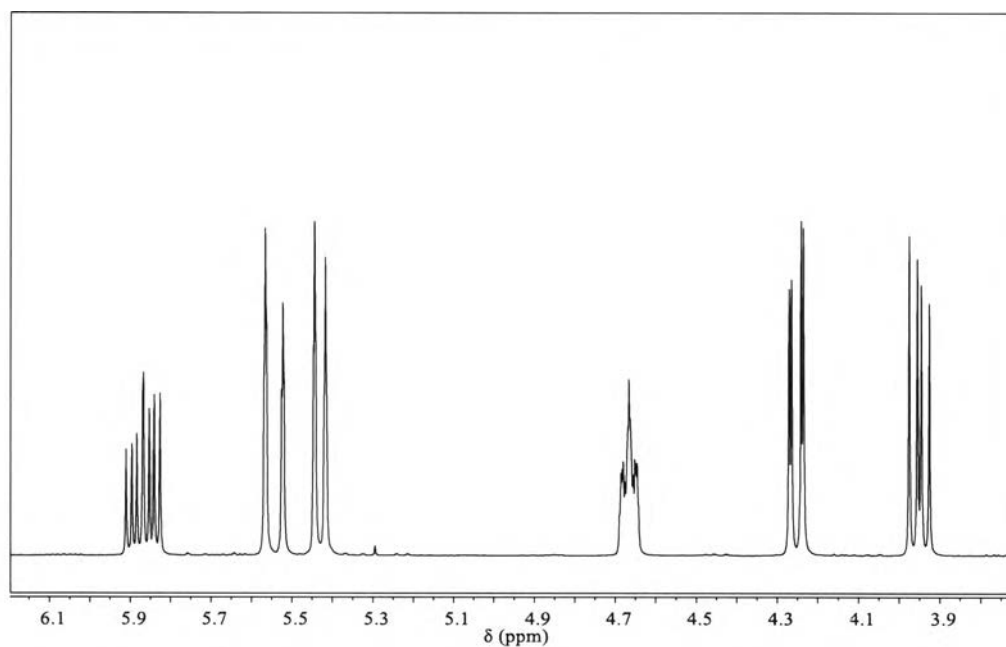


Figure A.40 ¹H NMR (CDCl₃) spectrum of 5,7-dibromo-2-vinyl-2,3-dihydrothieno[3,4-*b*][1,4]dioxine **7**



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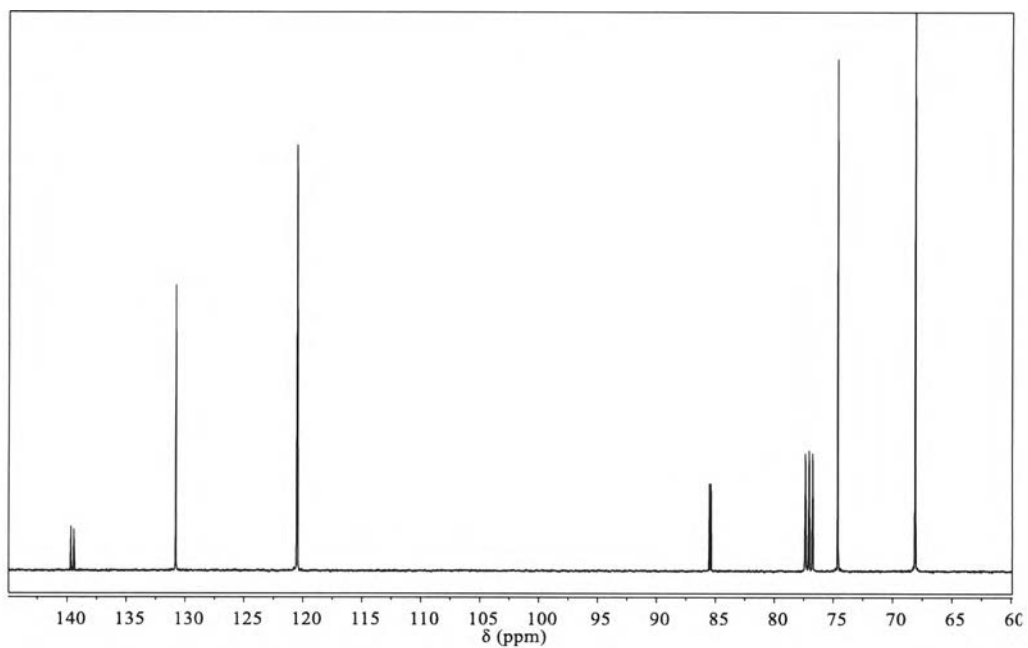


Figure A.41 ^{13}C NMR (CDCl_3) spectrum of 5,7-dibromo-2-vinyl-2,3-dihydrothieno[3,4-*b*][1,4]dioxine 7

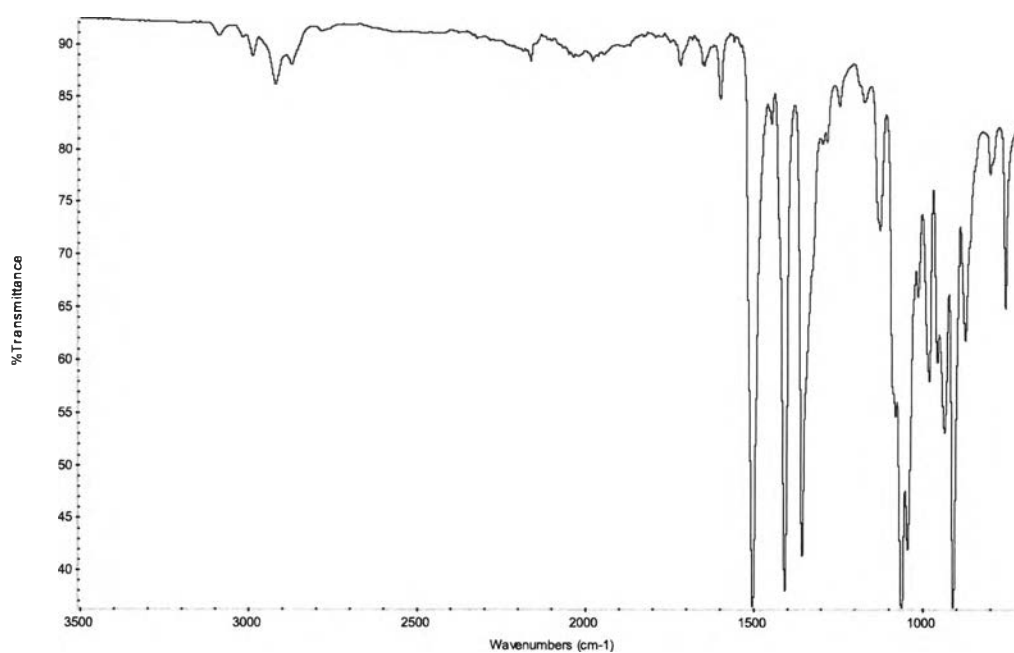


Figure A.42 IR spectrum of 5,7-dibromo-2-vinyl-2,3-dihydrothieno[3,4-*b*][1,4]dioxine 7



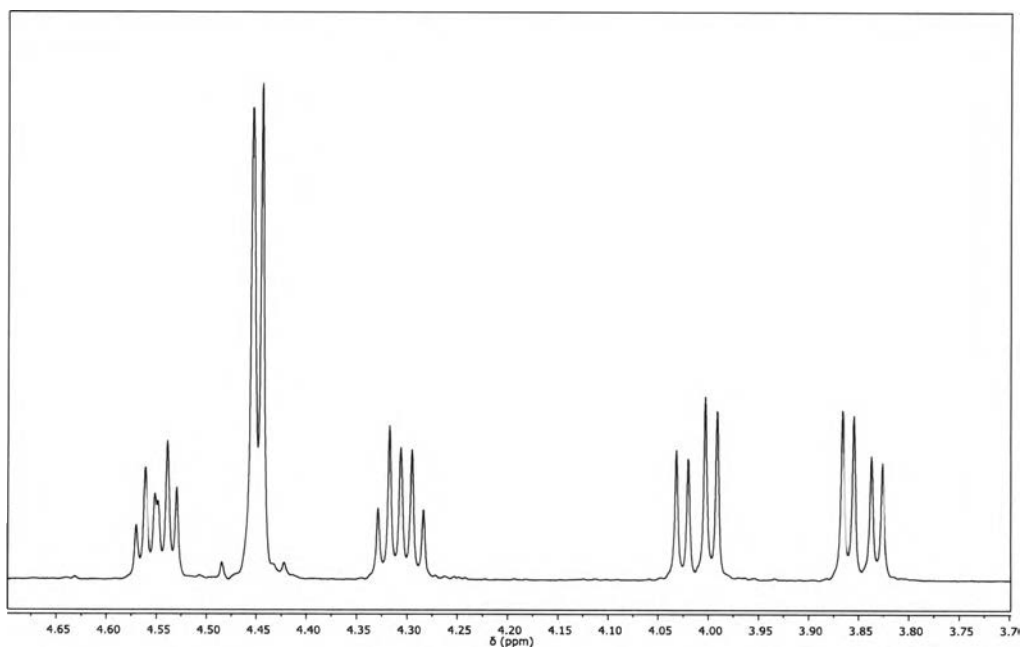


Figure A.43 ¹H NMR (CDCl₃) spectrum of 5,7-dibromo-2-(1,2-dibromoethyl)-2,3-dihydrothieno[3,4-*b*][1,4]dioxine (colorless oil) **8**

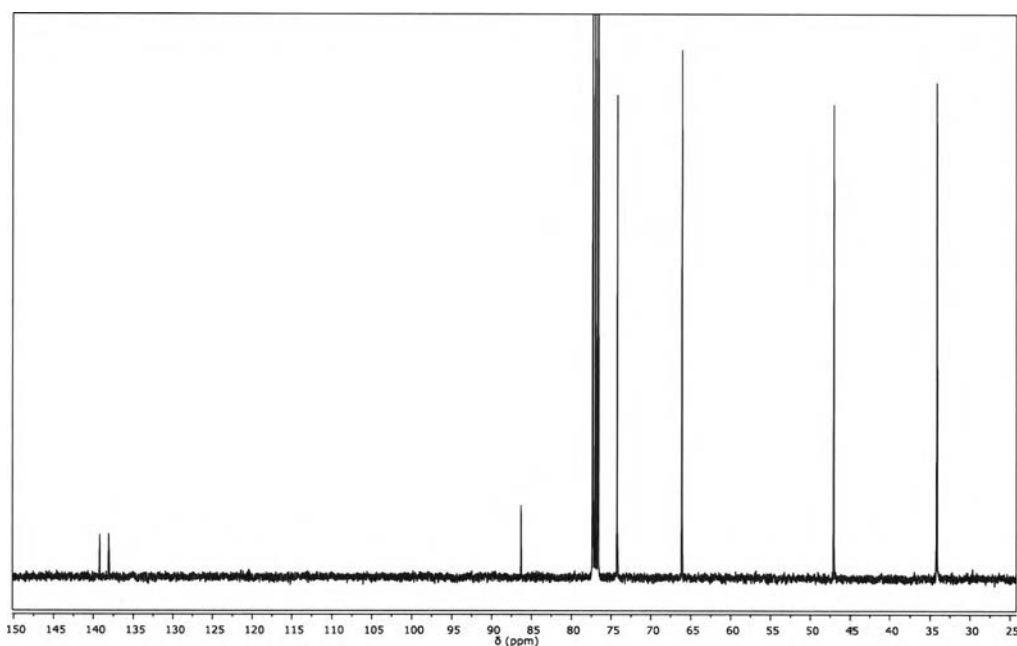


Figure A.44 ¹³C NMR (CDCl₃) spectrum of 5,7-dibromo-2-(1,2-dibromoethyl)-2,3-dihydrothieno[3,4-*b*][1,4]dioxine (colorless oil) **8**



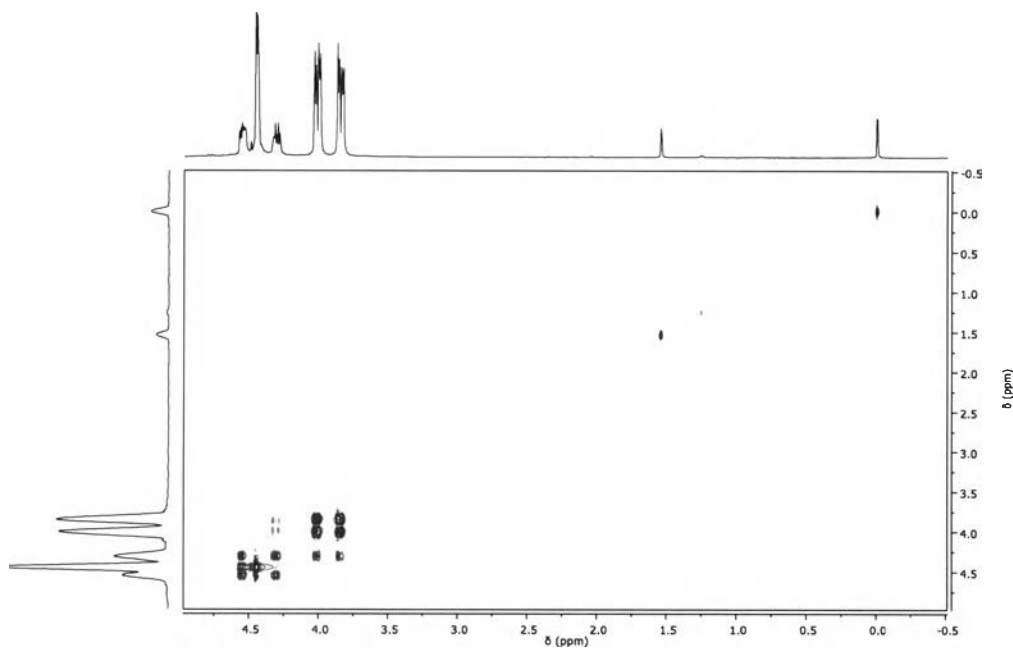


Figure A.45 ^1H cosy NMR (CDCl_3) spectrum of 5,7-dibromo-2-(1,2-dibromoethyl)-2,3-dihydrothieno[3,4-*b*][1,4]dioxine (colorless oil) **8**

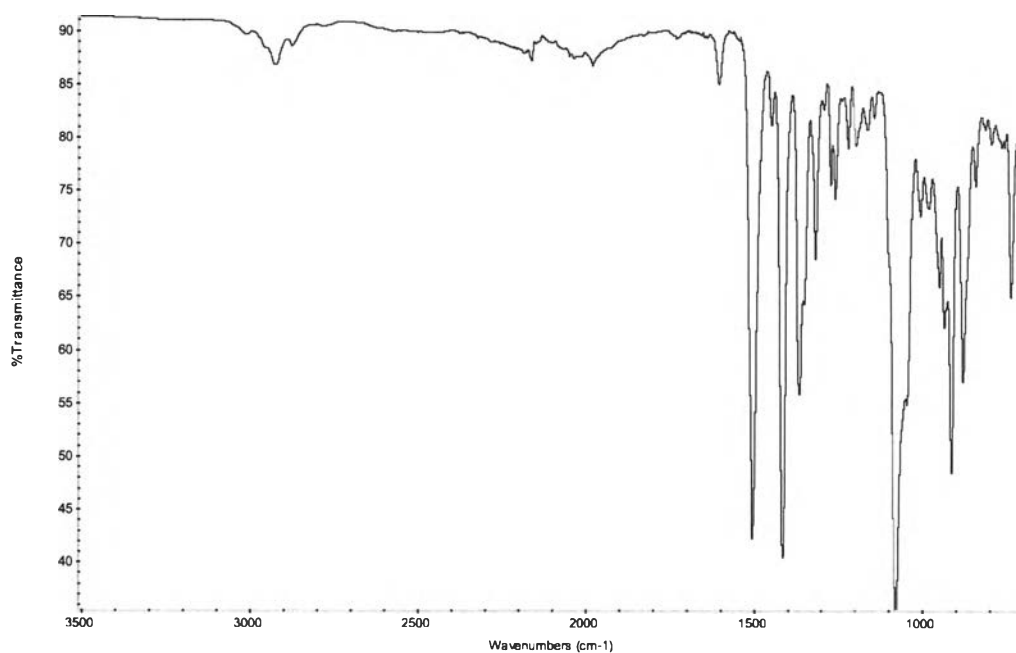


Figure A.46 IR spectrum of 5,7-dibromo-2-(1,2-dibromoethyl)-2,3-dihydrothieno[3,4-*b*][1,4]dioxine (colorless oil) **8**



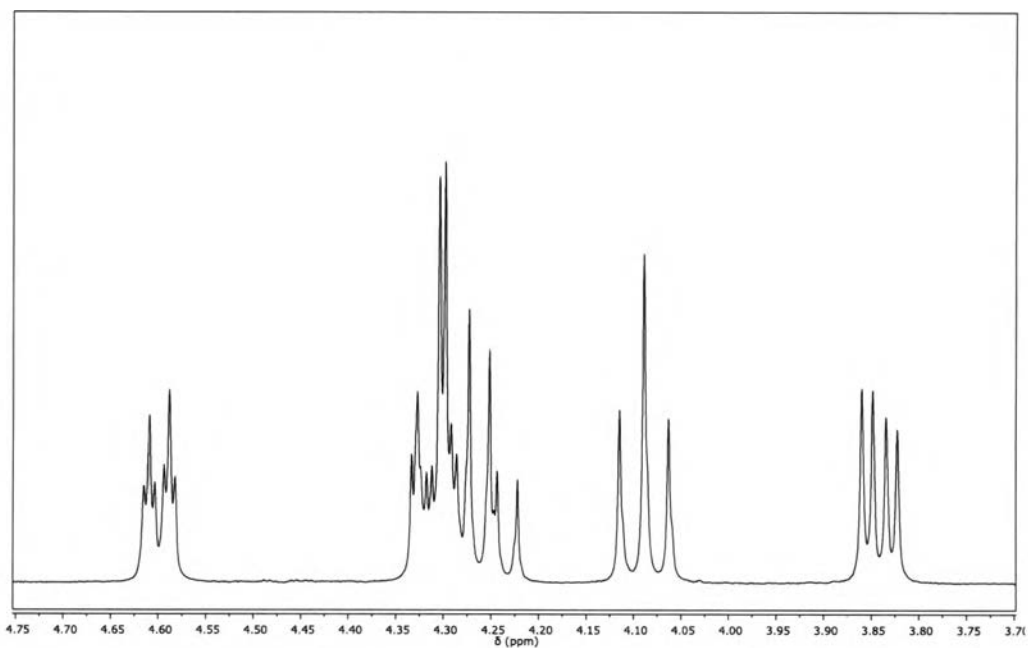


Figure A.47 ^1H NMR (CDCl_3) spectrum of 5,7-dibromo-2-(1,2-dibromoethyl)-2,3-dihydrothieno[3,4-*b*][1,4]dioxine (white powder) **8**

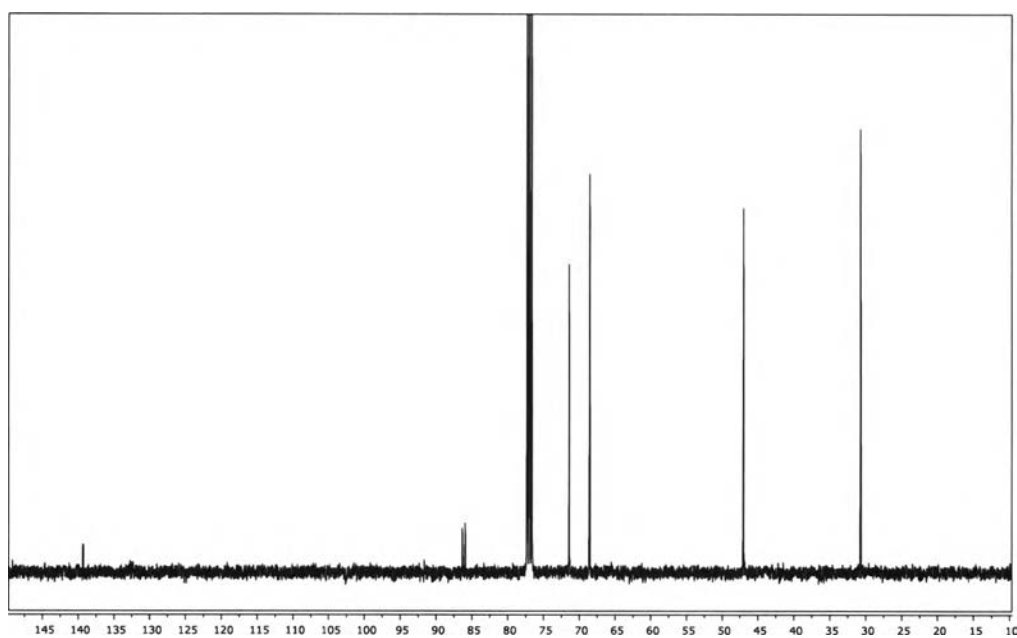


Figure A.48 ^{13}C NMR (CDCl_3) spectrum of 5,7-dibromo-2-(1,2-dibromoethyl)-2,3-dihydrothieno[3,4-*b*][1,4]dioxine (white powder) **8**



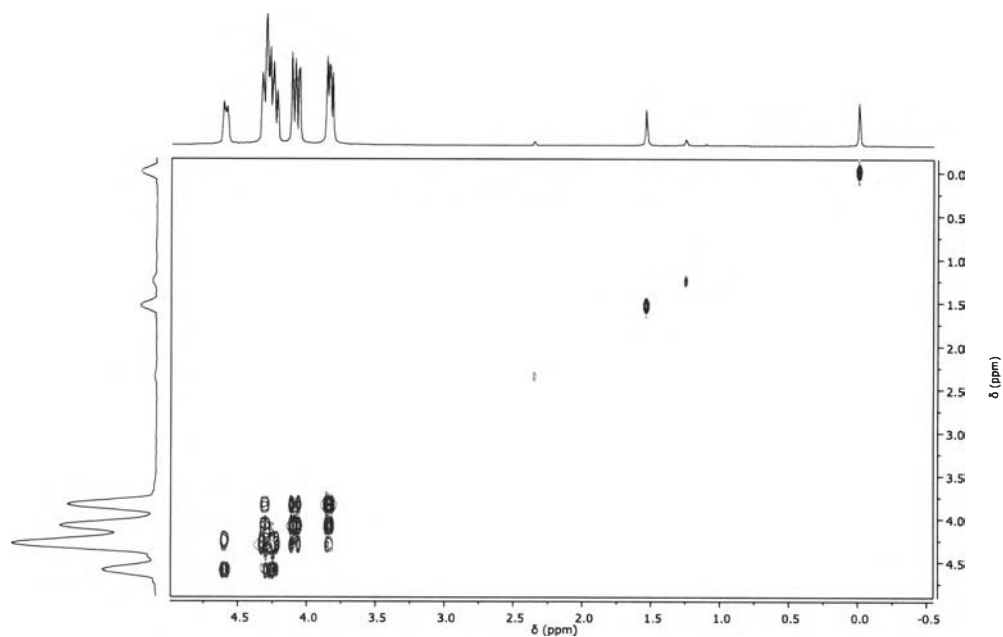


Figure A.49 ^1H cosy NMR (CDCl_3) spectrum of 5,7-dibromo-2-(1,2-dibromoethyl)-2,3-dihydrothieno[3,4-*b*][1,4]dioxine (white powder) **8**

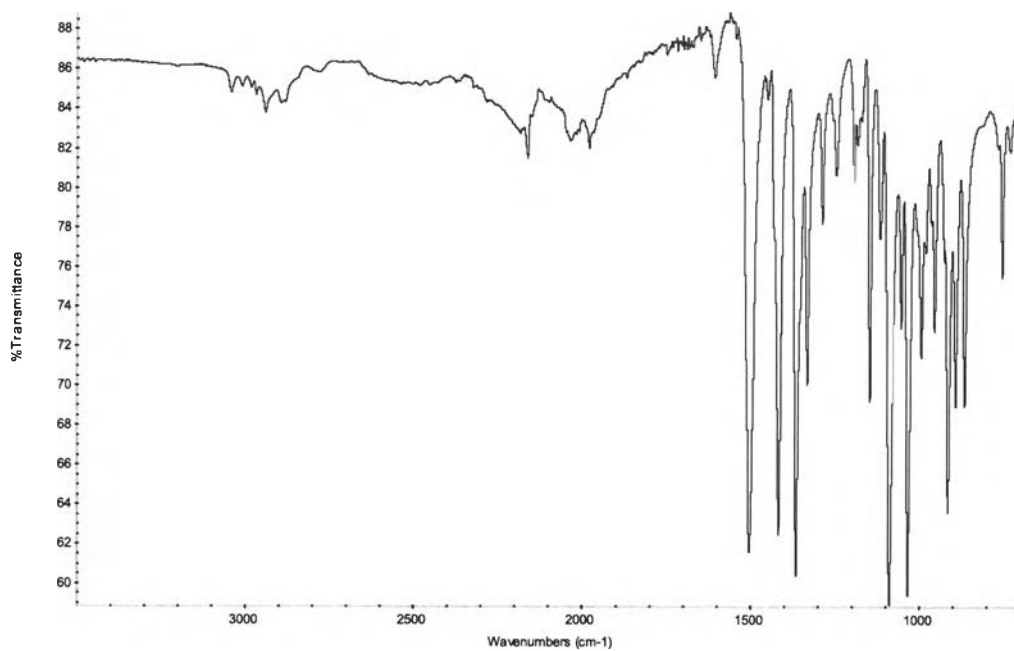


Figure A.50 IR spectrum of 5,7-dibromo-2-(1,2-dibromoethyl)-2,3-dihydrothieno[3,4-*b*][1,4]dioxine (white powder) **8**

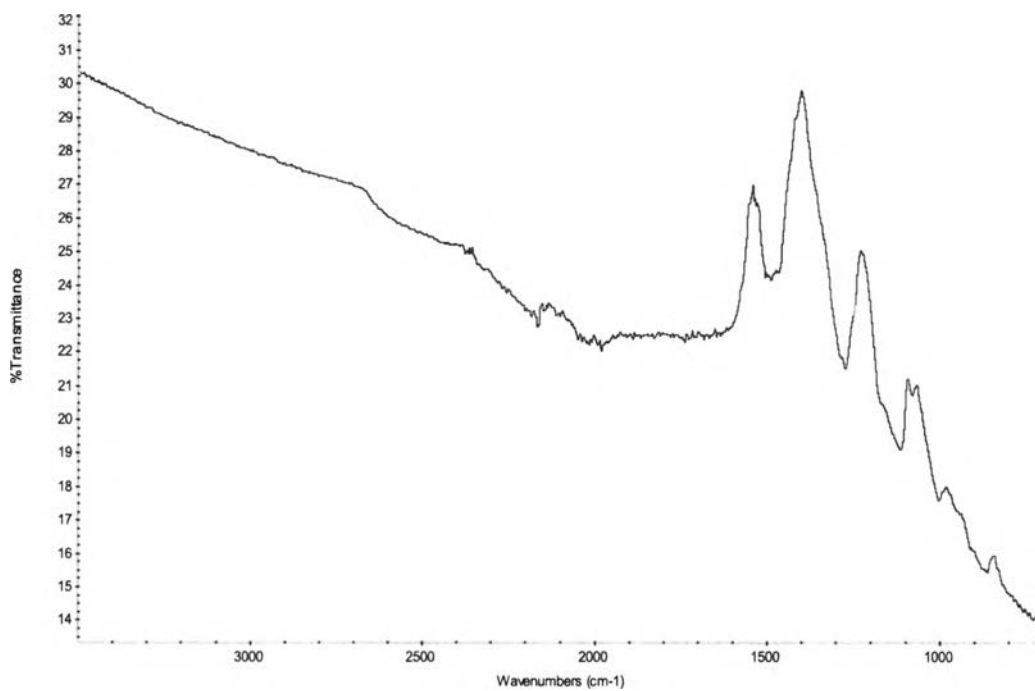


Figure A.51 IR spectrum of poly(2-vinyl-2,3-dihydrothieno[3,4-b][1,4]dioxine) 9

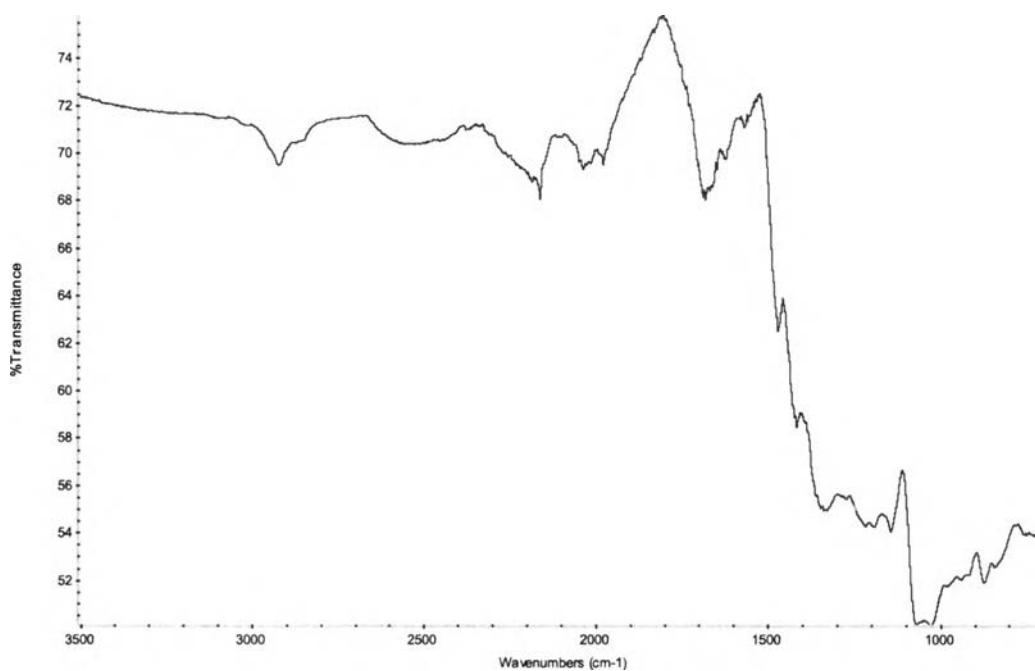


Figure A.52 IR spectrum of poly(2-vinyl-2,3-dihydrothieno[3,4-b][1,4]dioxine) 9



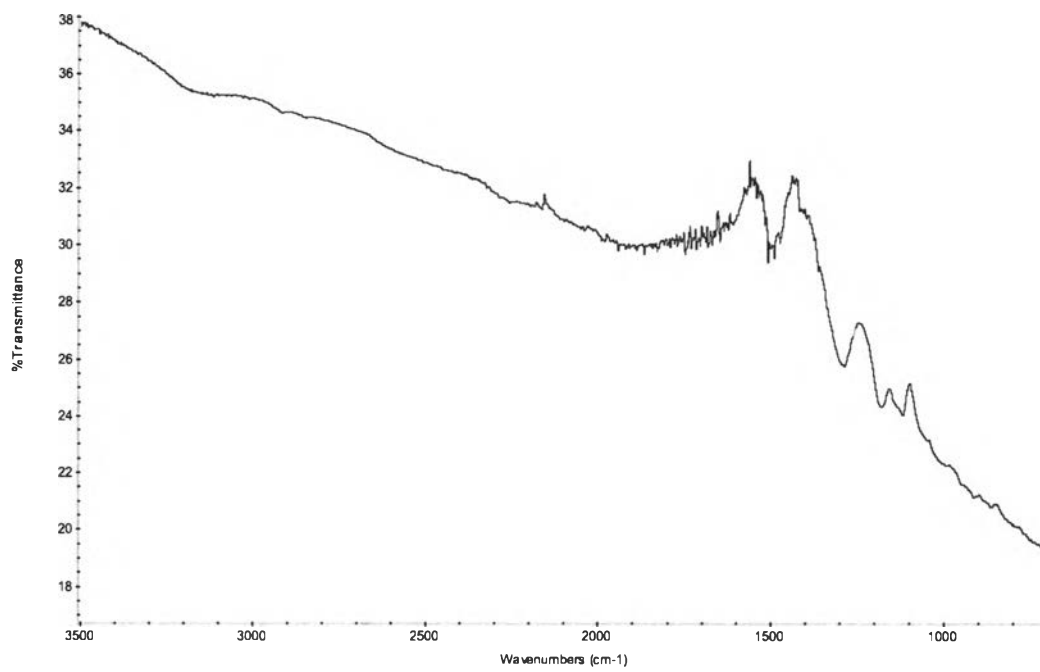


Figure A.53 IR spectrum of Poly(2-(1,2-dibromoethyl)-2,3-dihydrothieno[3,4-*b*][1,4]dioxine) 10



VITA

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