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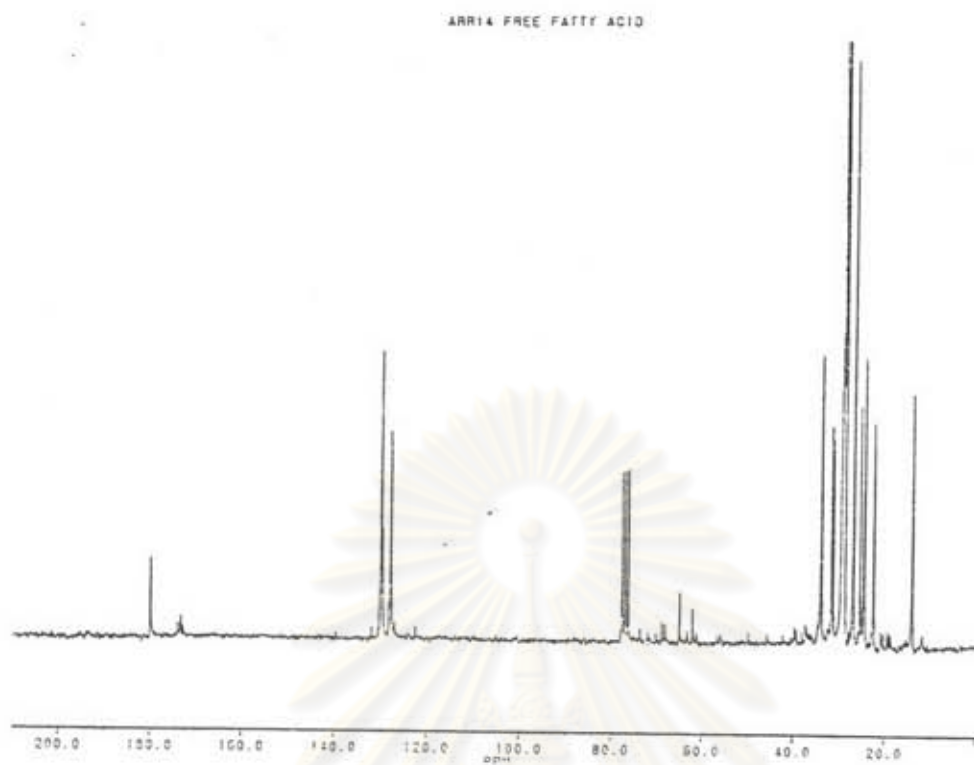


Figure A1 The ^{13}C -NMR (CDCl_3) spectrum of soybean oil fatty acids

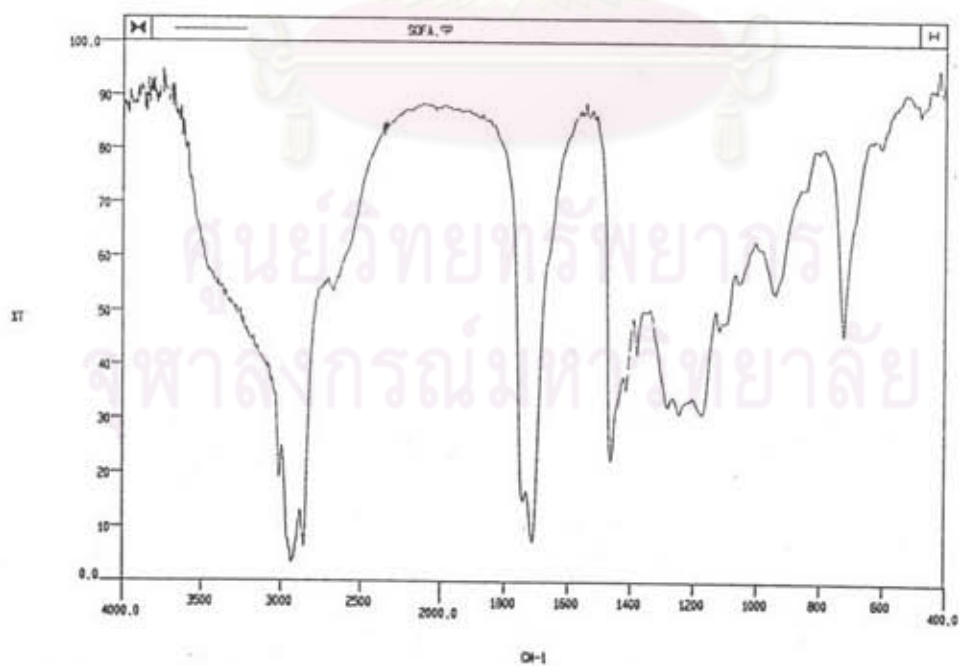


Figure A2 The infrared spectrum of soybean oil fatty acids

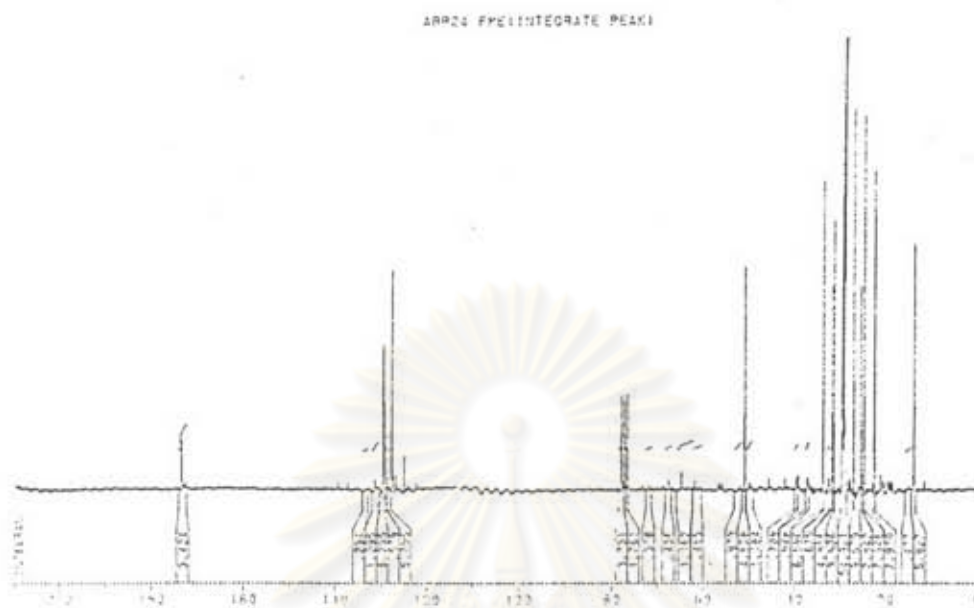


Figure A3 The ^{13}C -NMR (CDCl_3) spectrum of soybean oil methyl ester

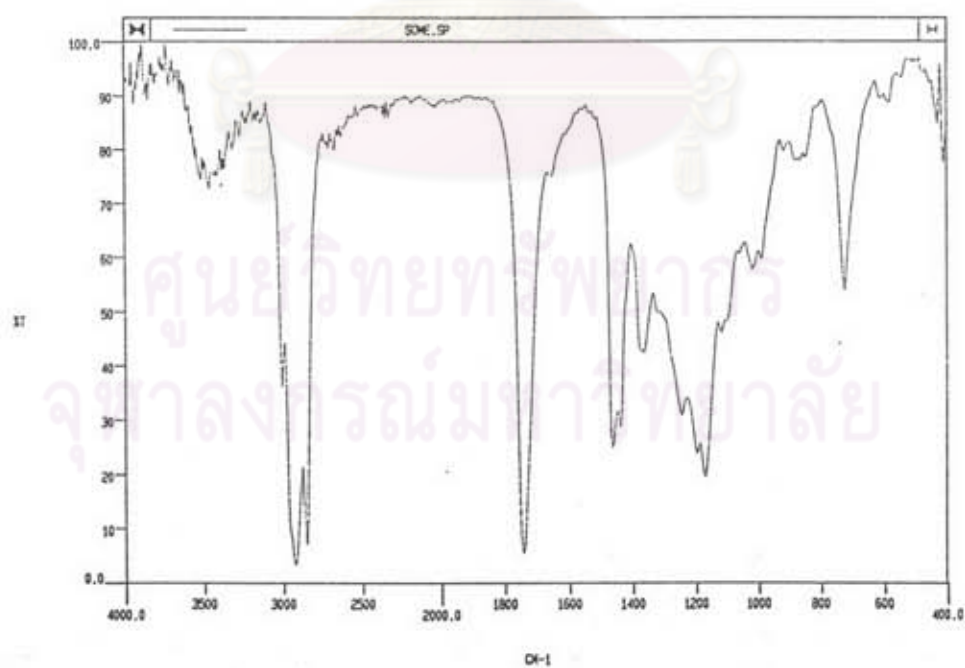


Figure A4 The infrared spectrum of soybean oil methyl ester

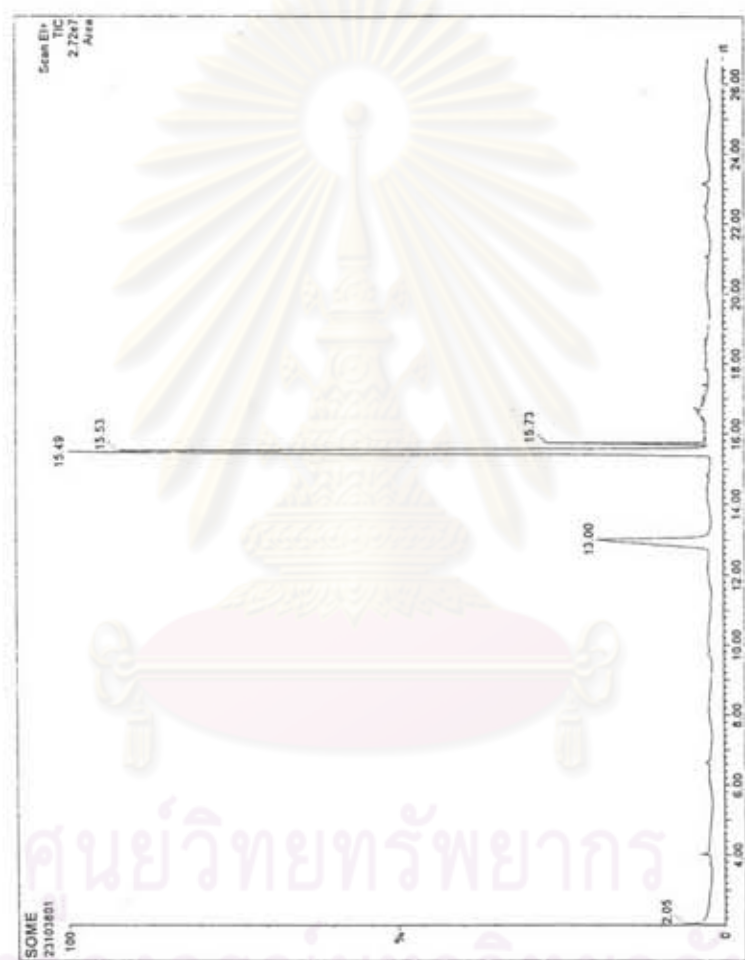


Figure A5 The gas chromatogram of soybean oil methyl ester

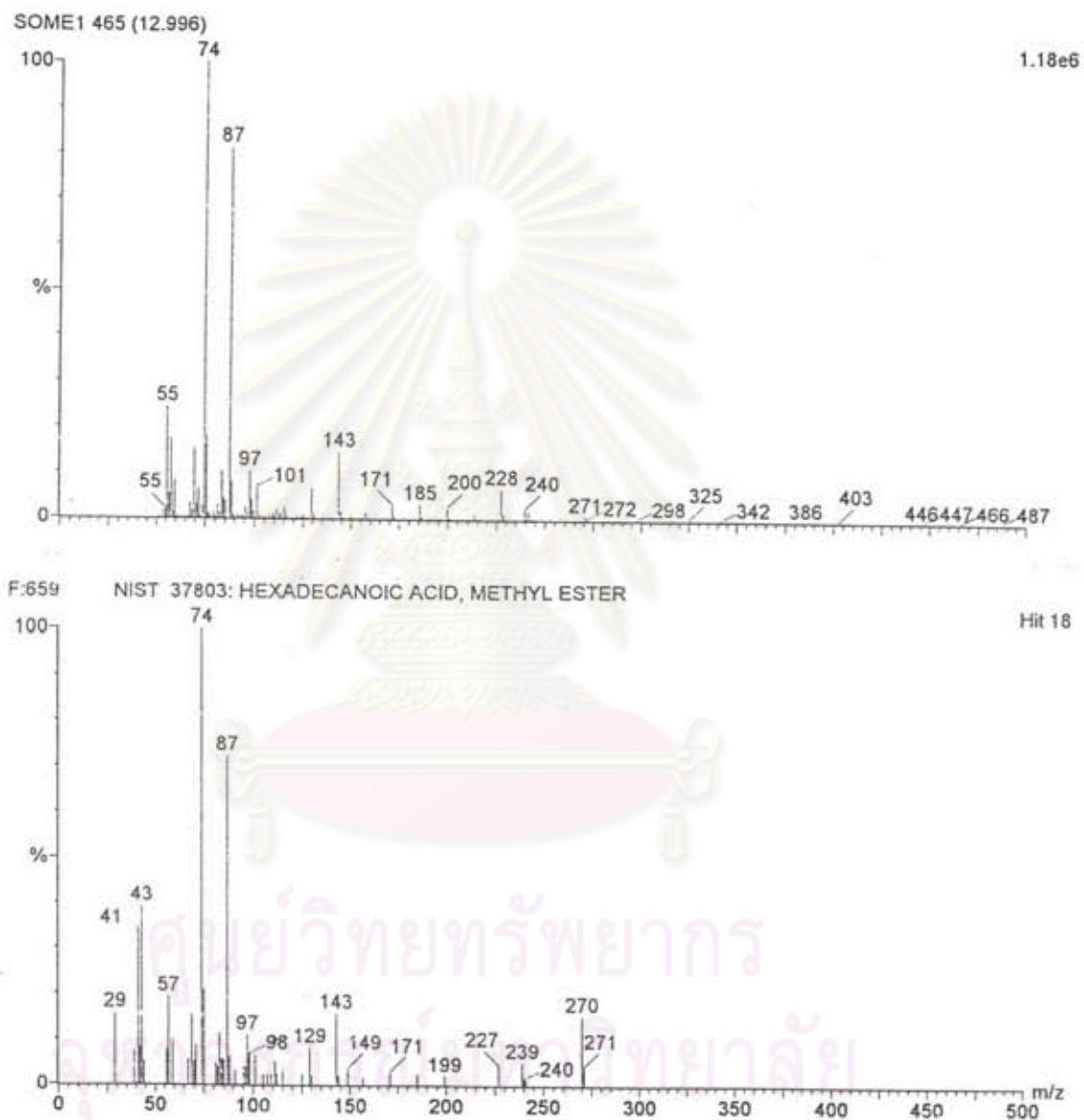


Figure A6 The mass spectrum of the soybean oil methyl ester at retention time=12.949 min. and methyl hexadecanoate

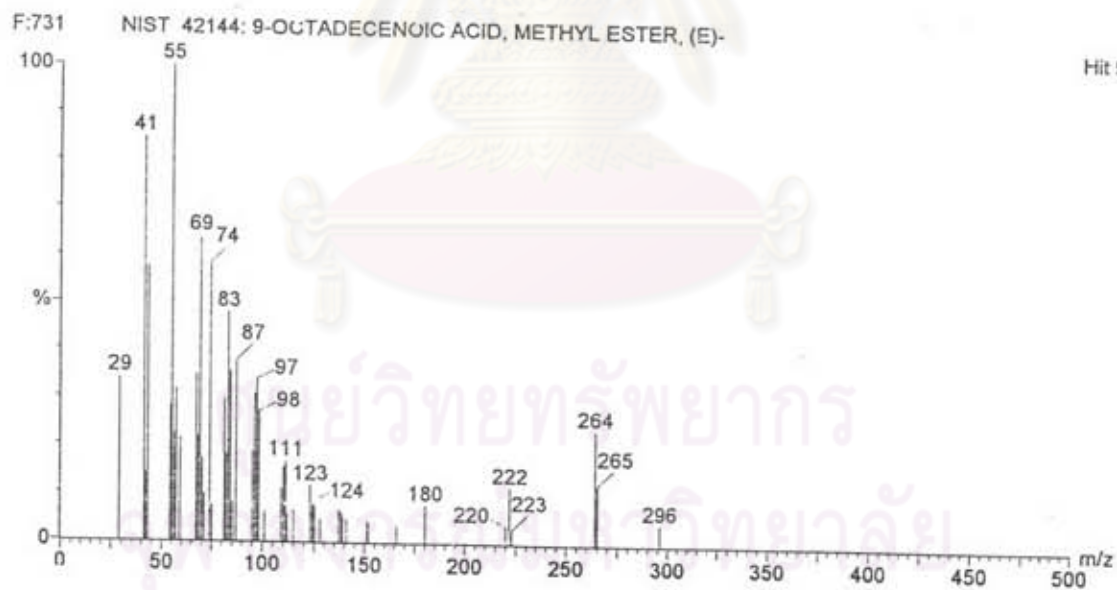
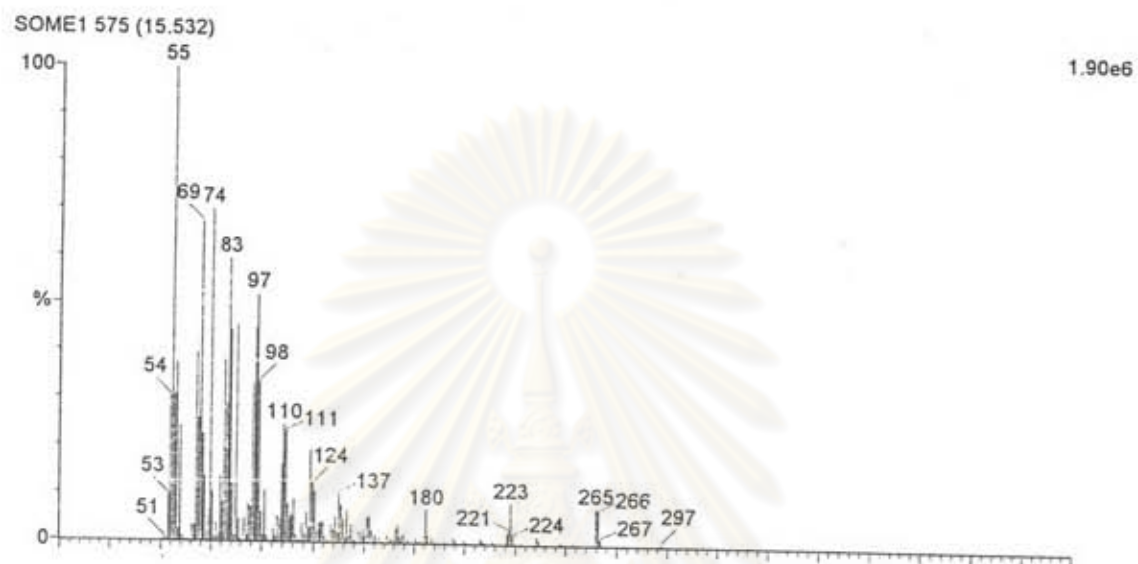


Figure A8 The mass spectrum of the soybean oil methyl ester at retention time=15.532 min. and methyl 9-octadecenoate

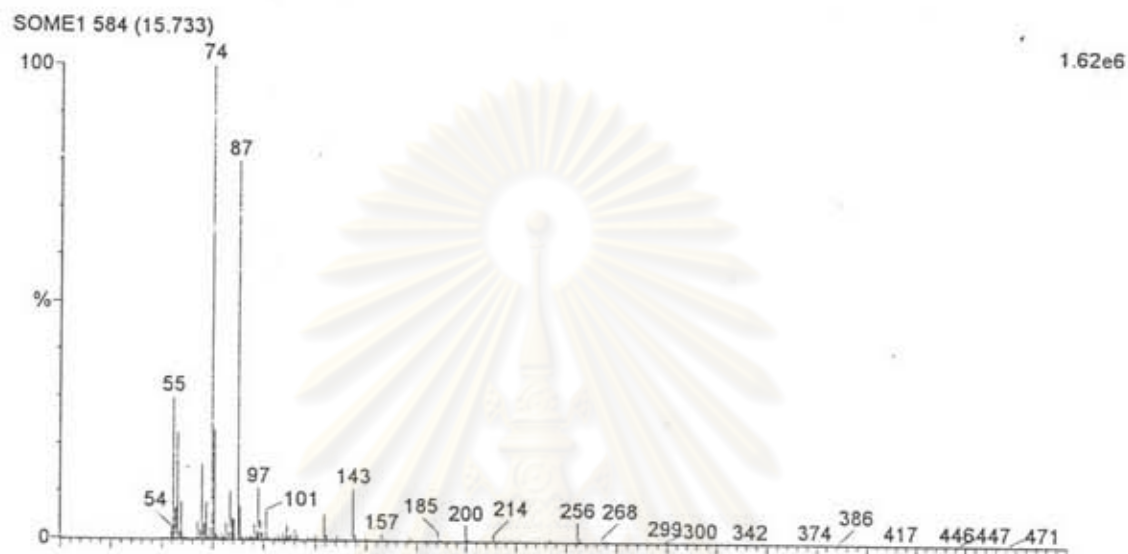


Figure A9 The mass spectrum of the soybean oil methyl ester at retention time=15.733 min. and methyl octadecanoate

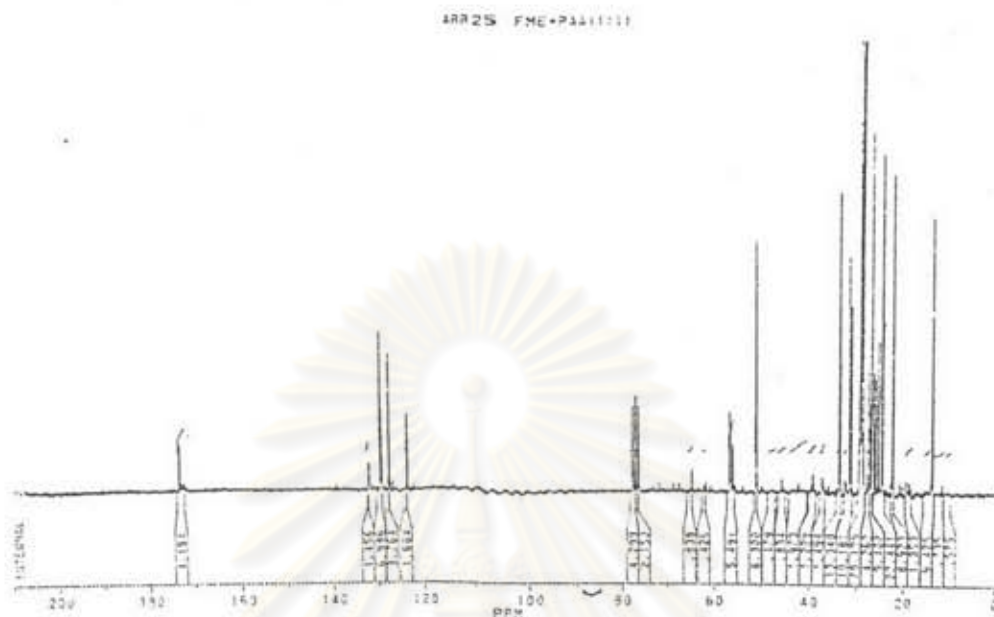


Figure A10 The ^{13}C -NMR (CDCl_3) spectrum of epoxidized soybean oil methyl ester obtained by peracetic acid (1:1) 100 ml at 60°C



Figure A11 The ^{13}C -NMR (CDCl_3) spectrum of epoxidized soybean oil methyl ester obtained by peracetic acid (2:1) 100 ml at 60°C

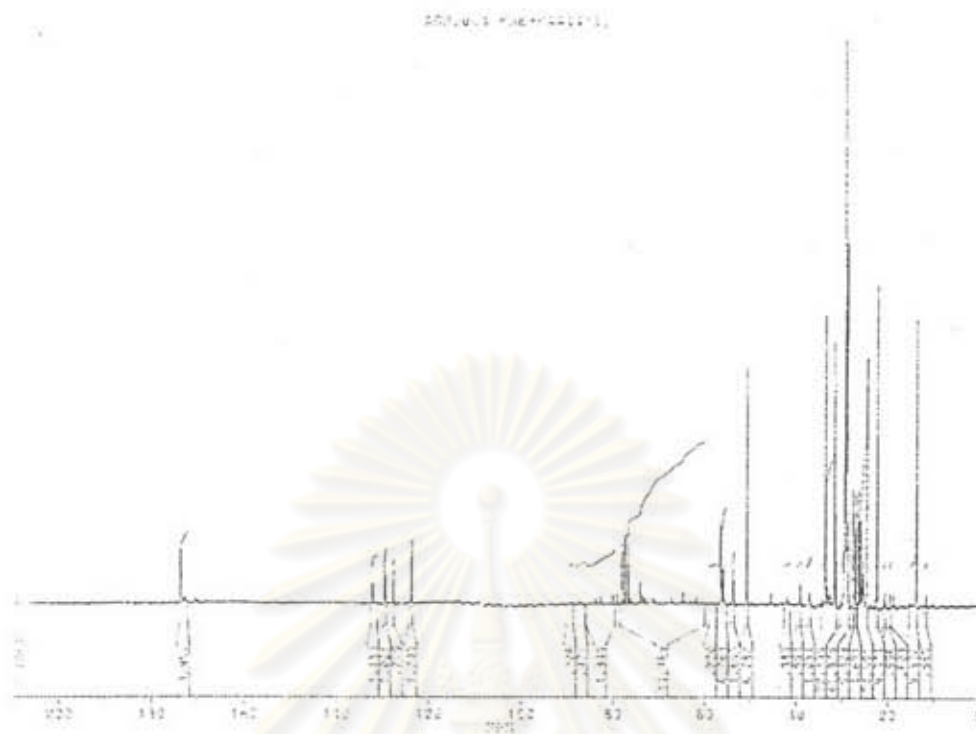


Figure A12 The ^{13}C -NMR (CDCl_3) spectrum of epoxidized soybean oil methyl ester obtained by peracetic acid (4:1) 100 ml at 60°C

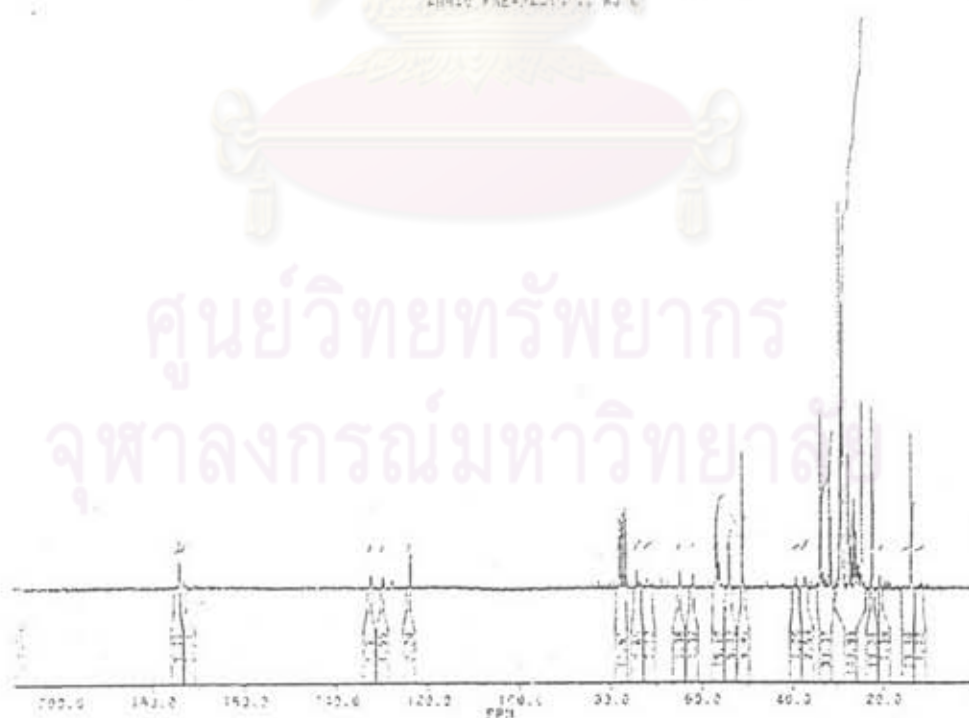


Figure A13 The ^{13}C -NMR (CDCl_3) spectrum of epoxidized soybean oil methyl ester obtained by peracetic acid (5:1) 100 ml at 60°C

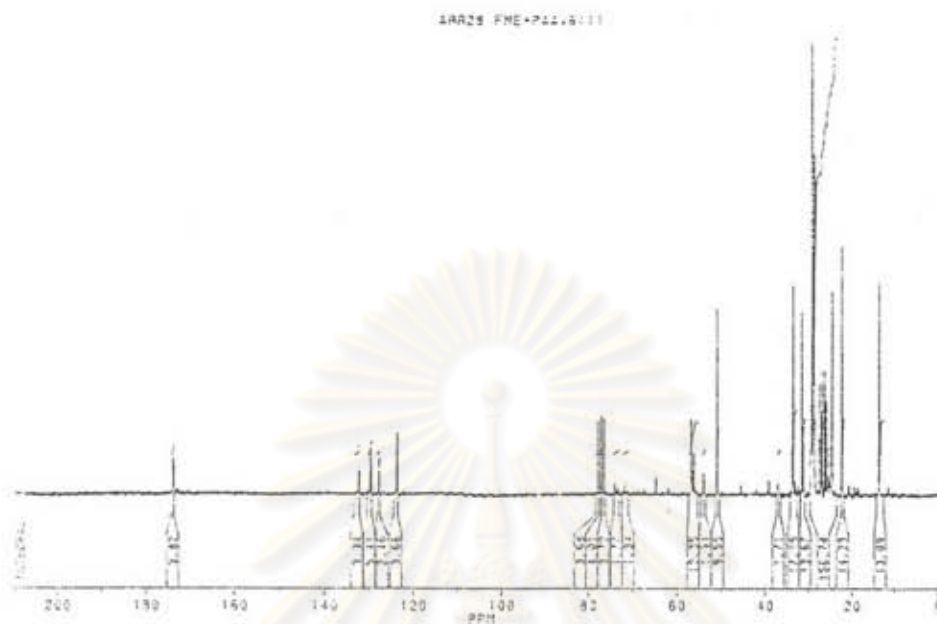


Figure A14 The ^{13}C -NMR (CDCl_3) spectrum of epoxidized soybean oil methyl ester obtained by peracetic acid (6:1) 100 ml at 60°C

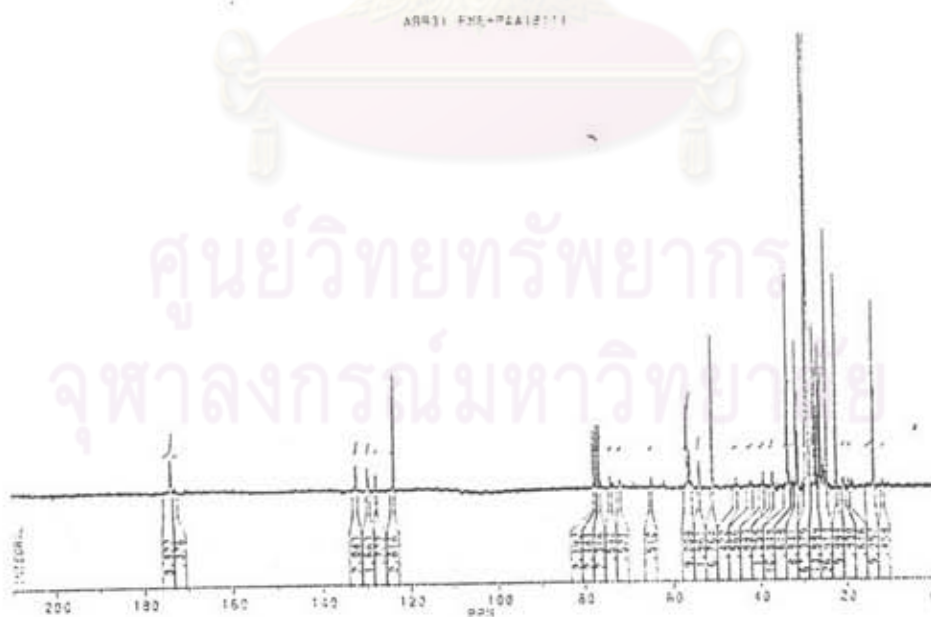


Figure A15 The ^{13}C -NMR (CDCl_3) spectrum of epoxidized soybean oil methyl ester obtained by peracetic acid (8:1) 100 ml at 60°C

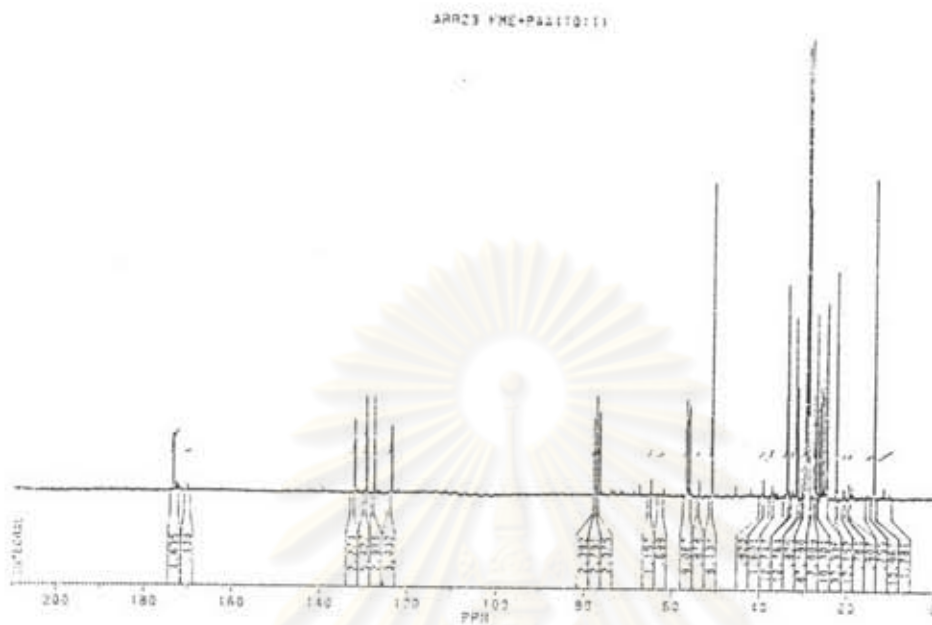


Figure A16 The ^{13}C -NMR (CDCl_3) spectrum of epoxidized soybean oil methyl ester obtained by peracetic acid (10:1) 100 ml at 60°C

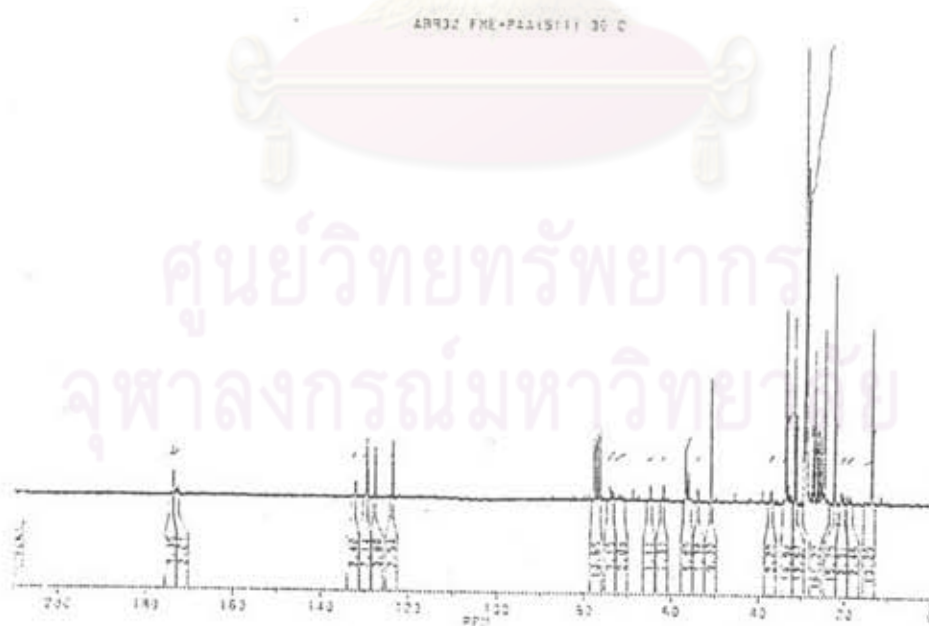


Figure A17 The ^{13}C -NMR (CDCl_3) spectrum of epoxidized soybean oil methyl ester obtained by peracetic acid (5:1) 100 ml at 30°C

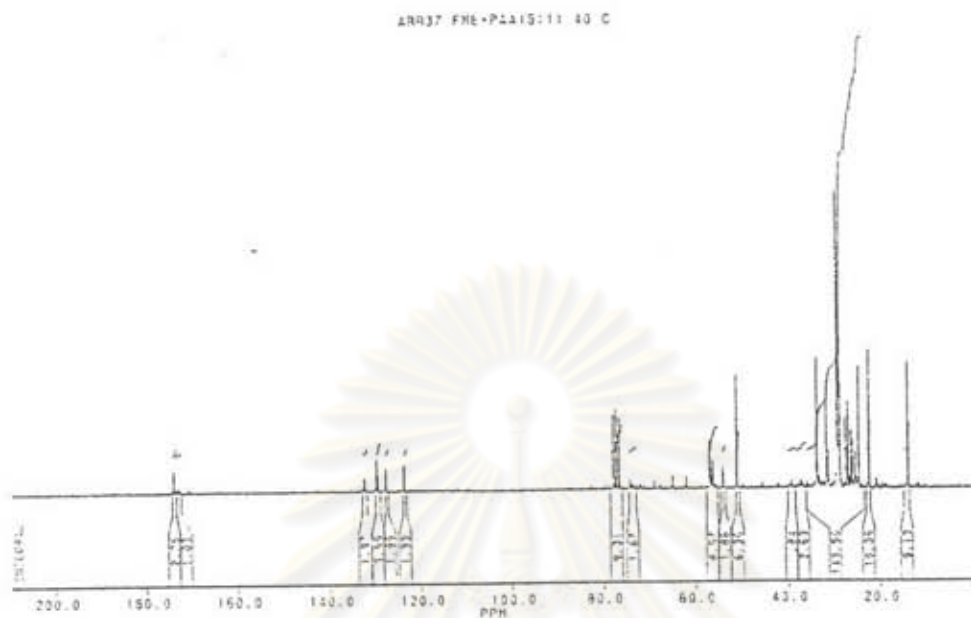


Figure A18 The ^{13}C -NMR (CDCl_3) spectrum of epoxidized soybean oil methyl ester obtained by peracetic acid (5:1) 100 ml at 40°C

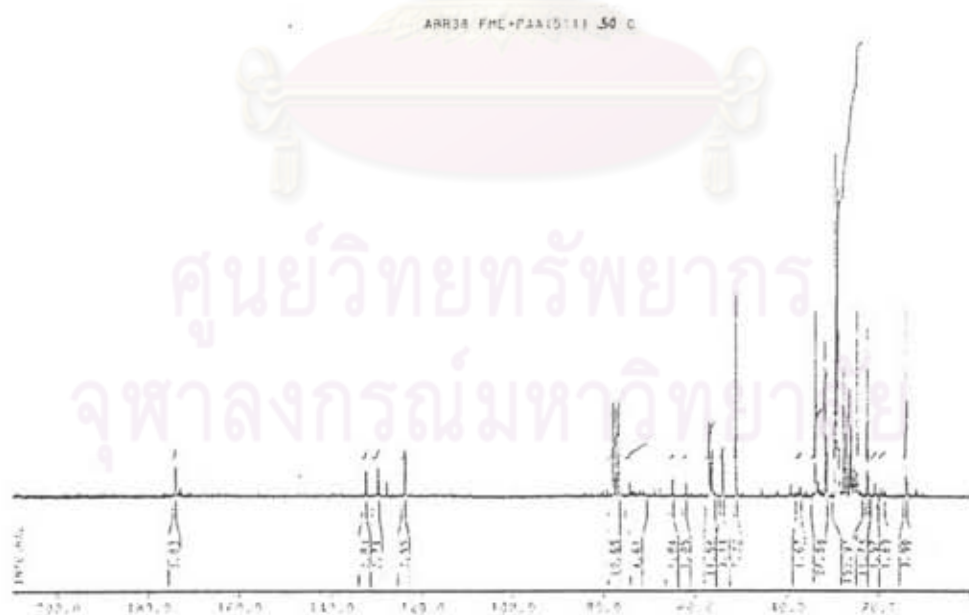


Figure A19 The ^{13}C -NMR (CDCl_3) spectrum of epoxidized soybean oil methyl ester obtained by peracetic acid (5:1) 100 ml at 50°C

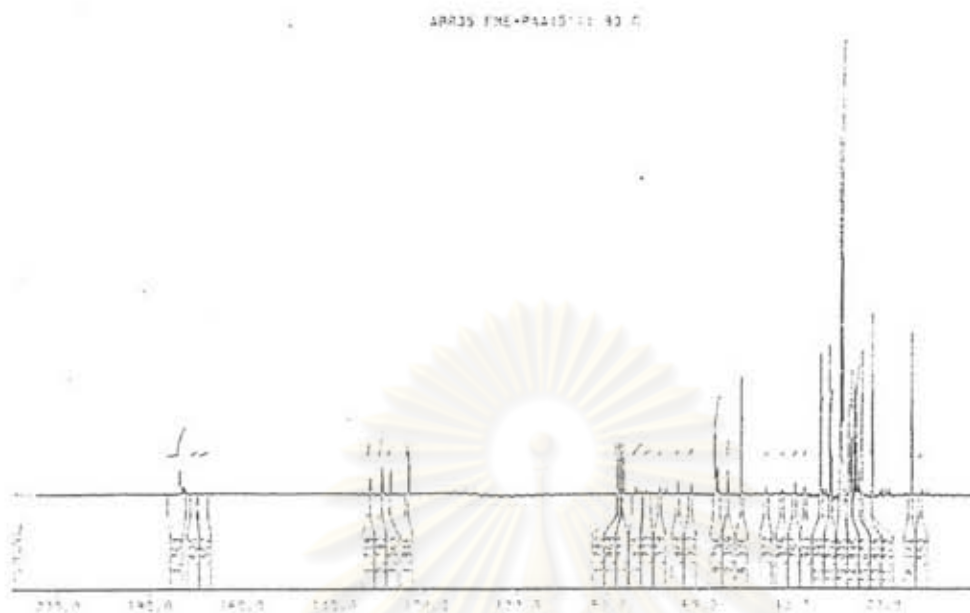


Figure A20 The ^{13}C -NMR (CDCl_3) spectrum of epoxidized soybean oil methyl ester obtained by peracetic acid (5:1) 100 ml at 80°C

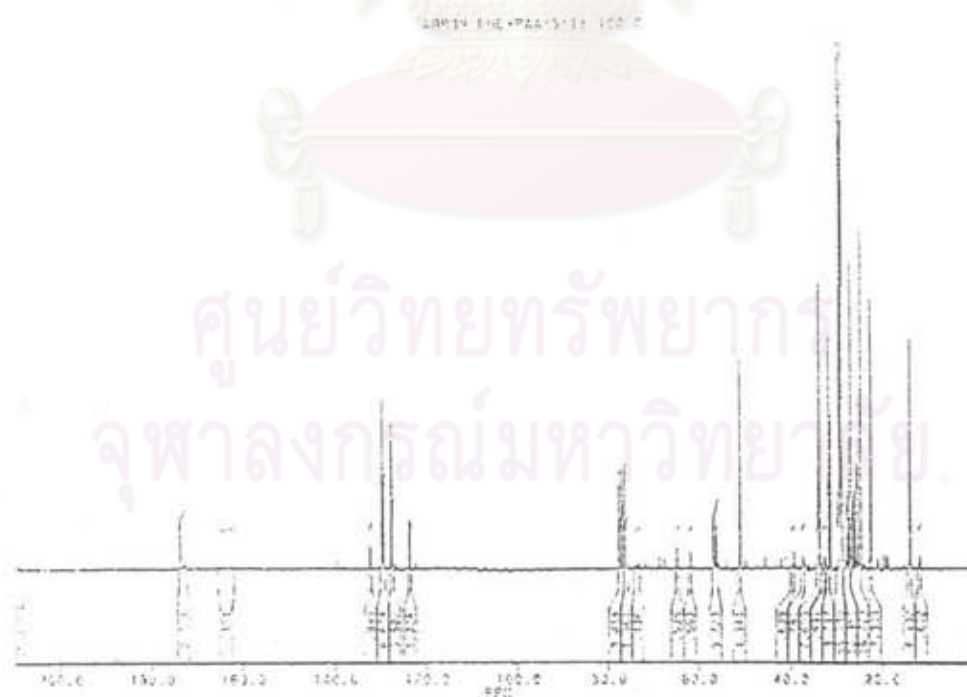


Figure A21 The ^{13}C -NMR (CDCl_3) spectrum of epoxidized soybean oil methyl ester obtained by peracetic acid (5:1) 100 ml at 100°C

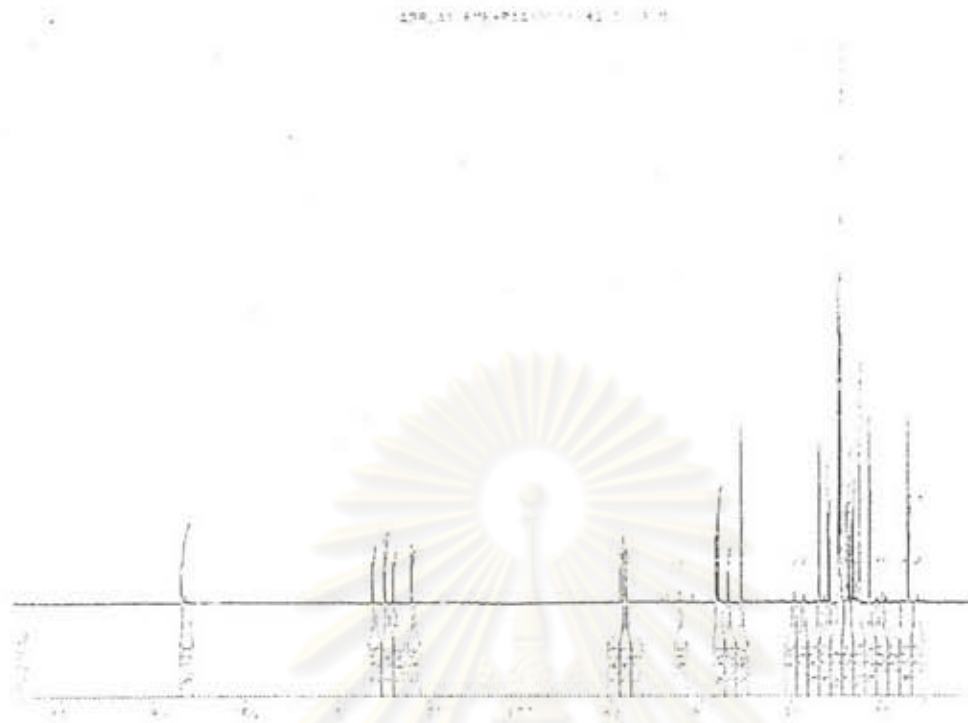


Figure A22 The ^{13}C -NMR (CDCl_3) spectrum of epoxidized soybean oil methyl ester obtained by peracetic acid (5:1) 50 ml at 60°C

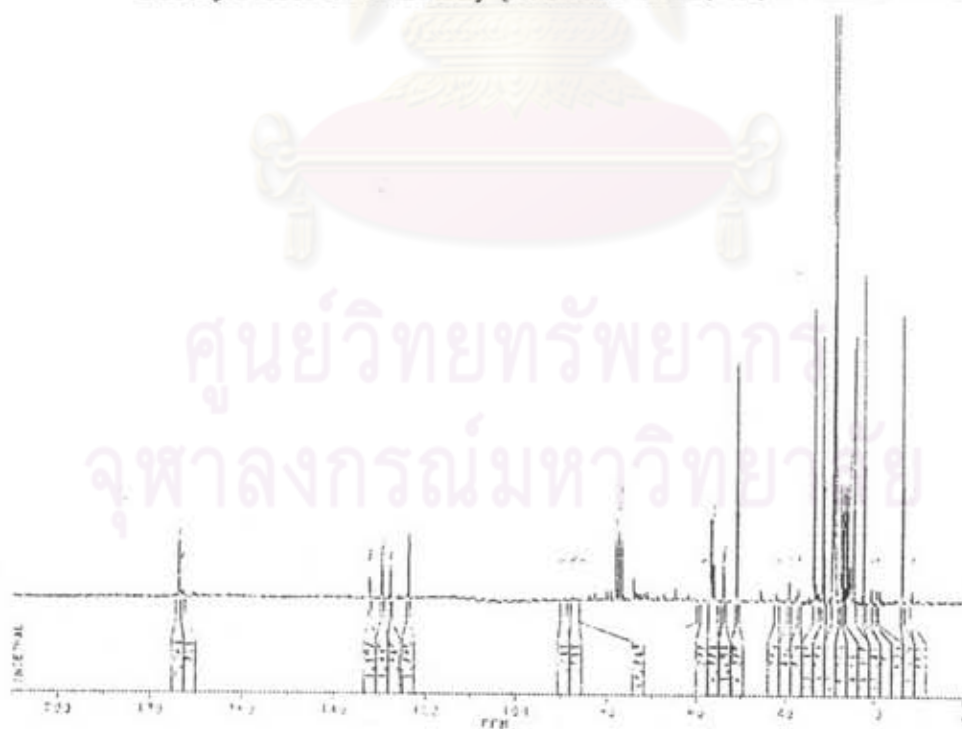


Figure A23 The ^{13}C -NMR (CDCl_3) spectrum of epoxidized soybean oil methyl ester obtained by peracetic acid (5:1) 75 ml at 60°C

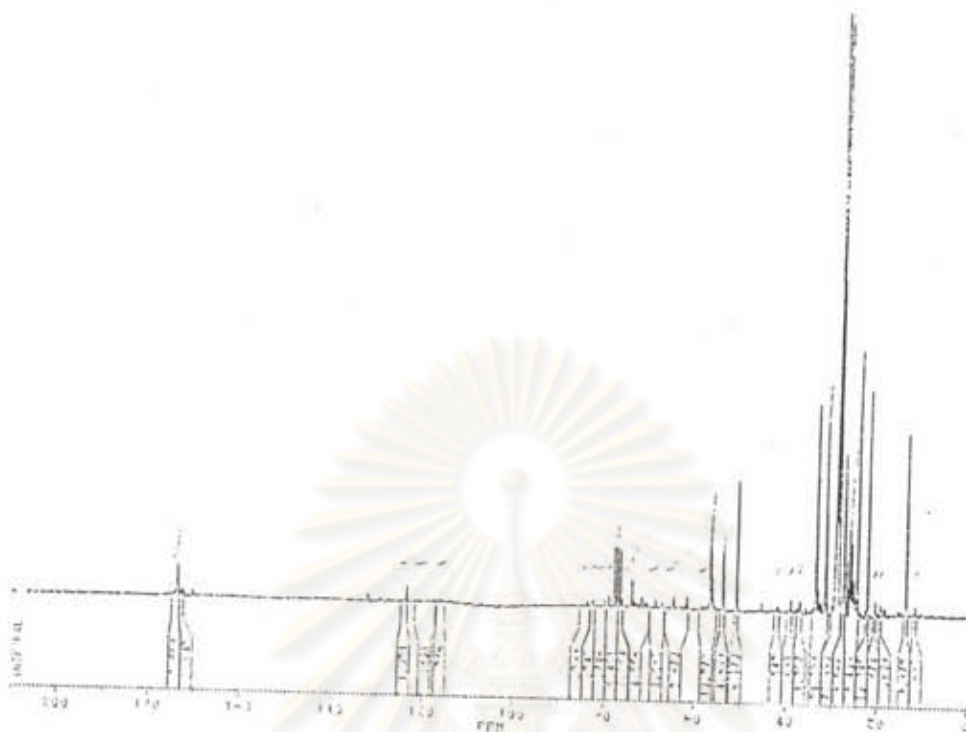


Figure A24 The ^{13}C -NMR (CDCl_3) spectrum of epoxidized soybean oil methyl ester obtained by peracetic acid (5:1) 125 ml at 60°C

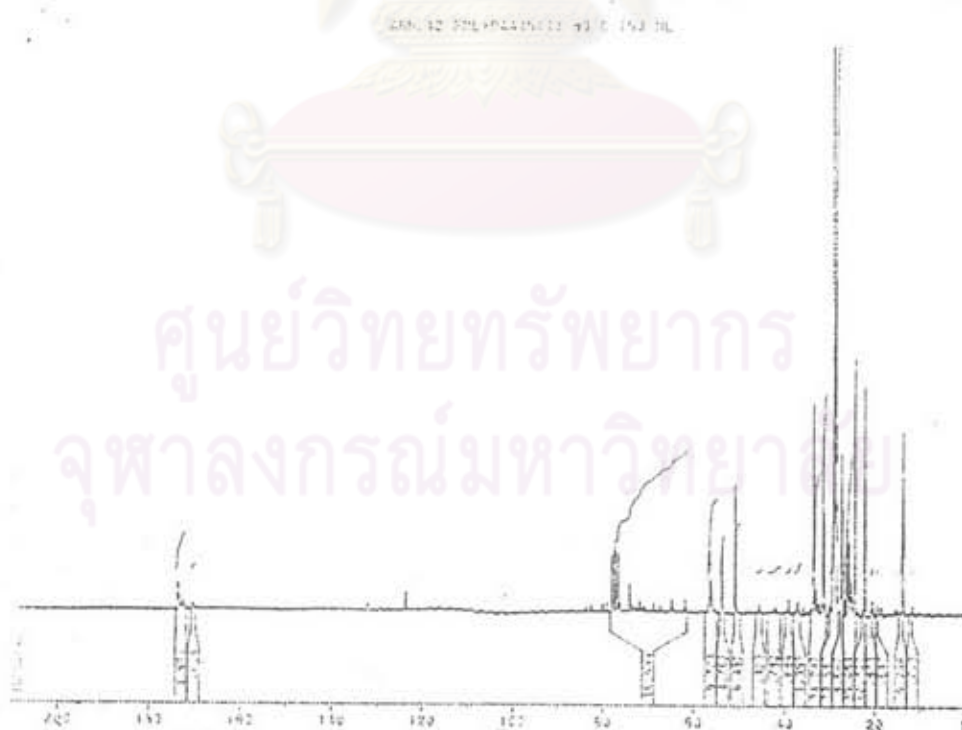


Figure A25 The ^{13}C -NMR (CDCl_3) spectrum of epoxidized soybean oil methyl ester obtained by peracetic acid (5:1) 150 ml at 60°C

APP. 14 EPOX SOYBEAN

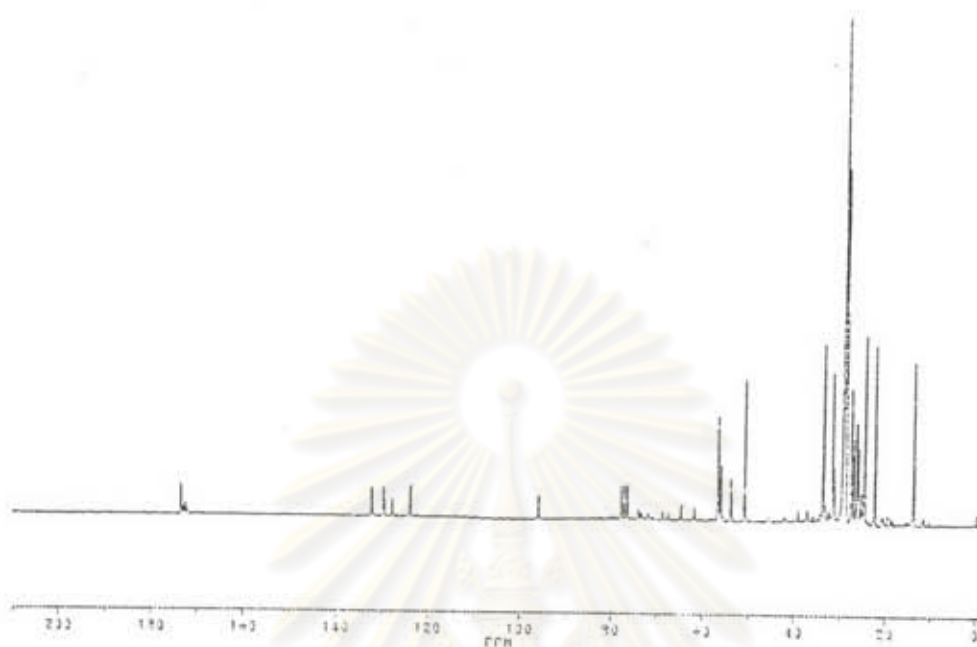


Figure A26 The ^{13}C -NMR (CDCl_3) spectrum of epoxidized soybean oil methyl ester which was prepared at appropriate condition

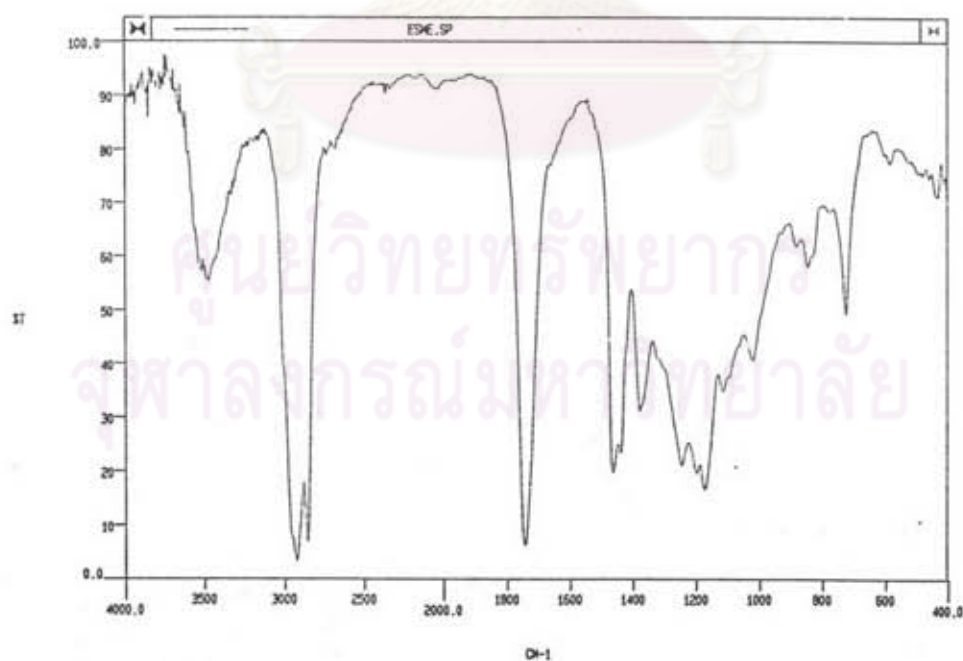


Figure A27 The infrared spectrum of epoxidized soybean oil methyl ester



Figure A28 The gas chromatogram of epoxidized soybean oil methyl ester

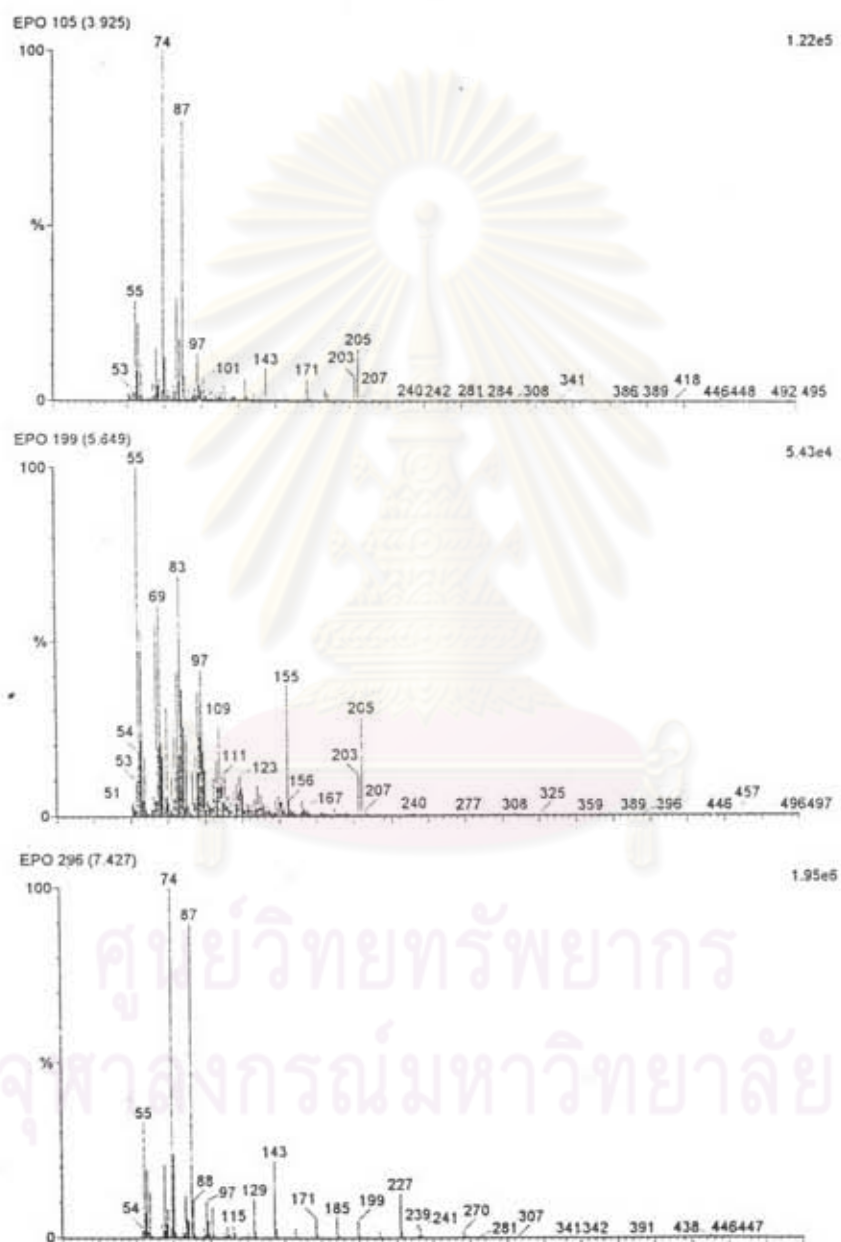


Figure A29 The mass spectrum of the epoxidized soybean oil methyl ester at retention time=3.925, 5.649, and 7.427 min.

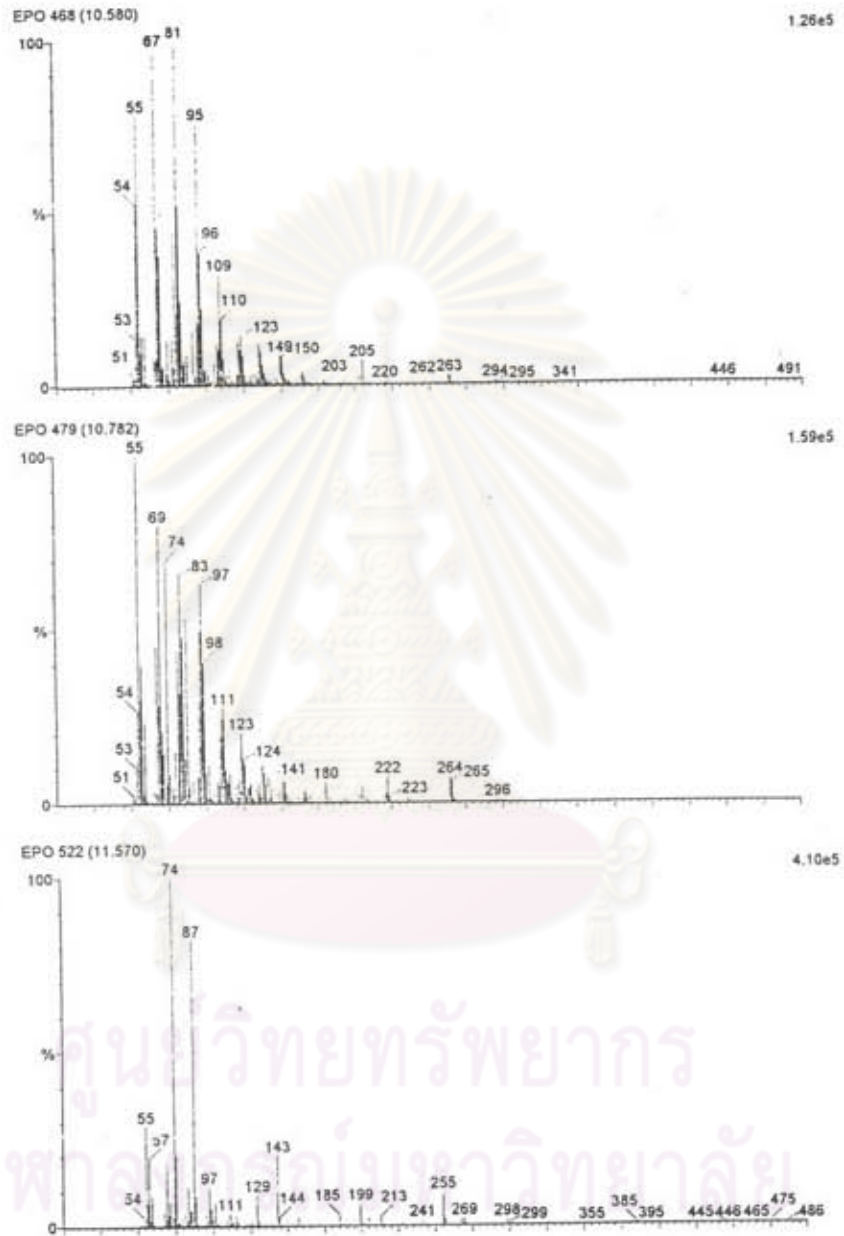


Figure A30 The mass spectrum of the epoxidized soybean oil methyl ester at retention time=10.580, 10.782, and 11.570 min.

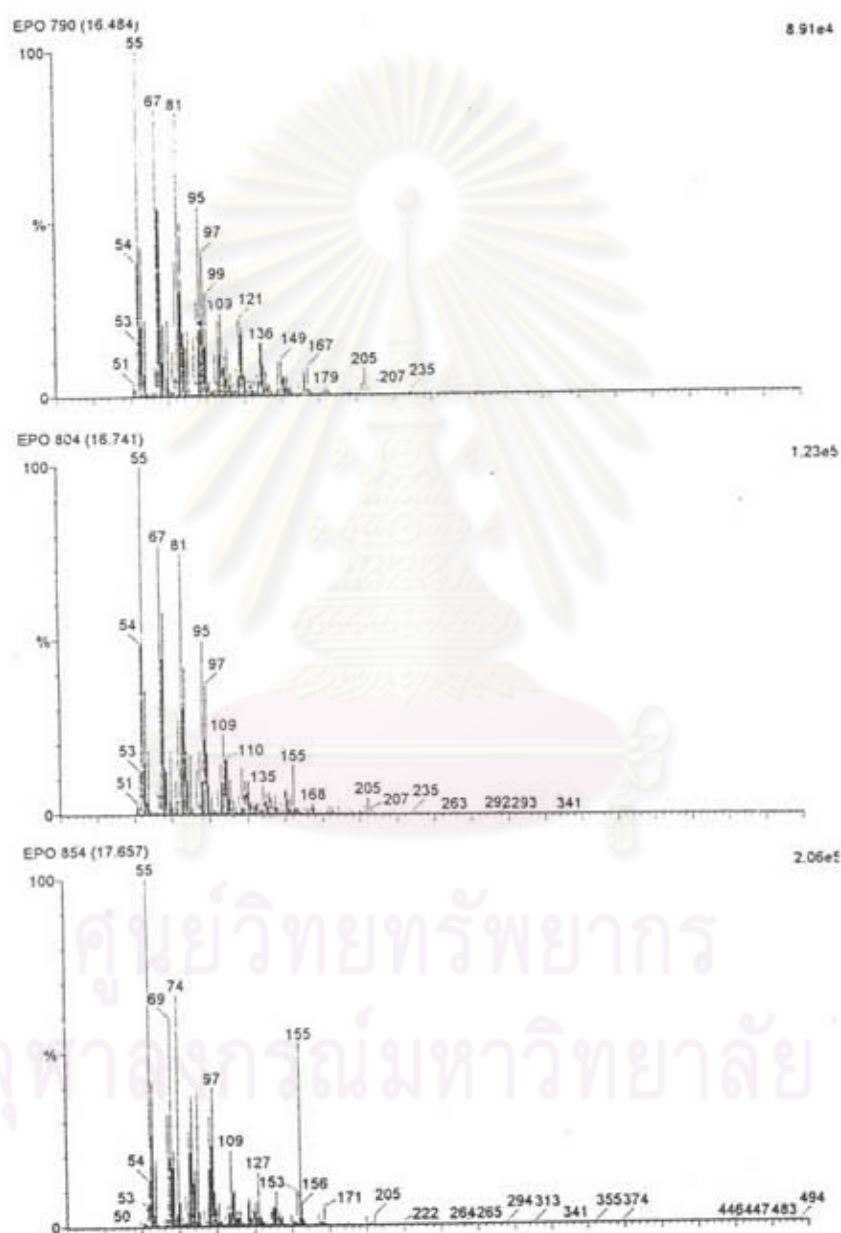


Figure A31 The mass spectrum of the epoxidized soybean oil methyl ester at retention time=16.484, 16.741, and 17.657 min.

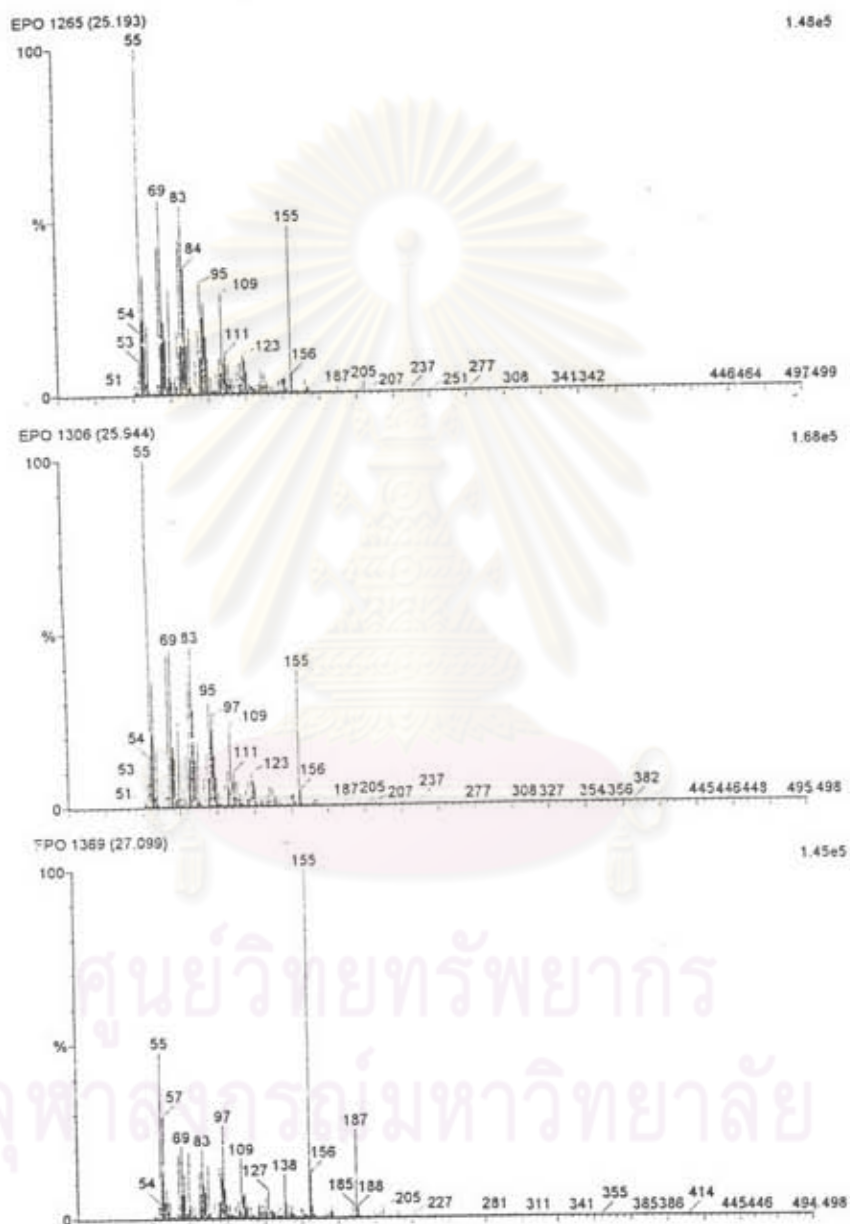


Figure A32 The mass spectrum of the epoxidized soybean oil methyl ester at retention time=25.193, 25.944, and 27.099 min.

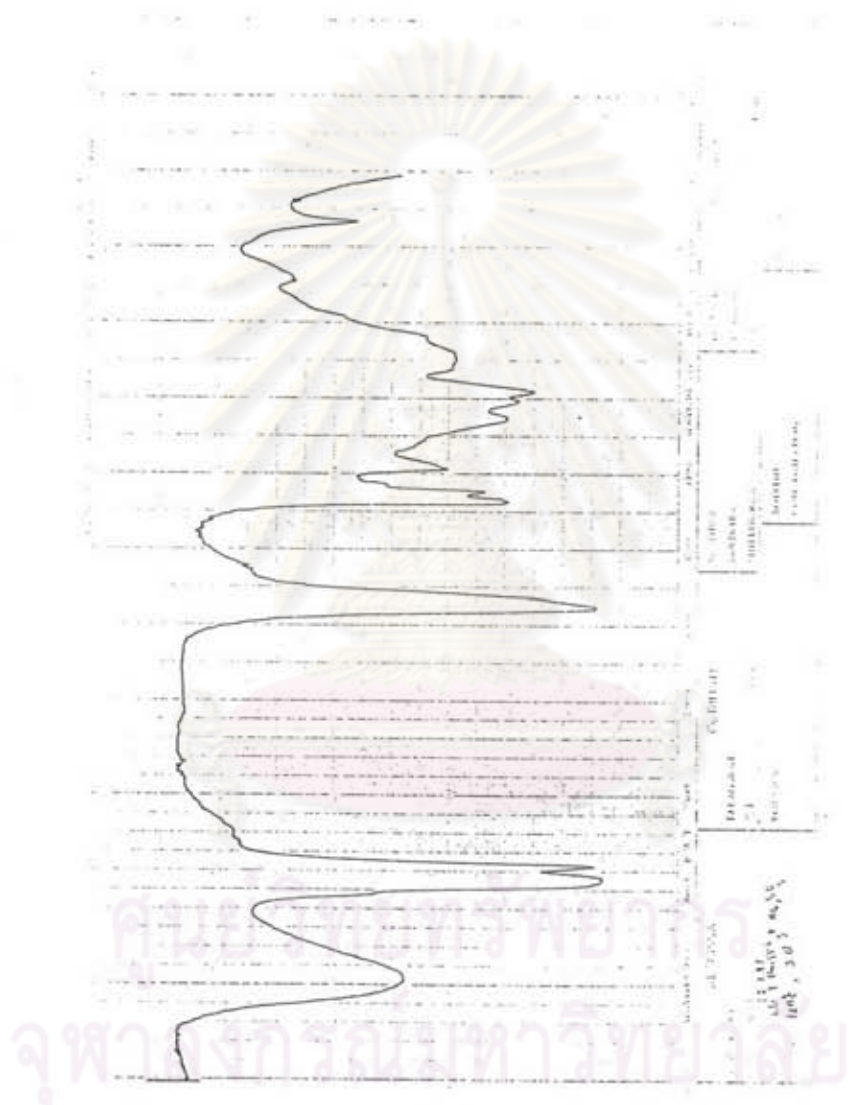


Figure A.3.3 The infrared spectrum of sulfonated soybean oil methyl ester

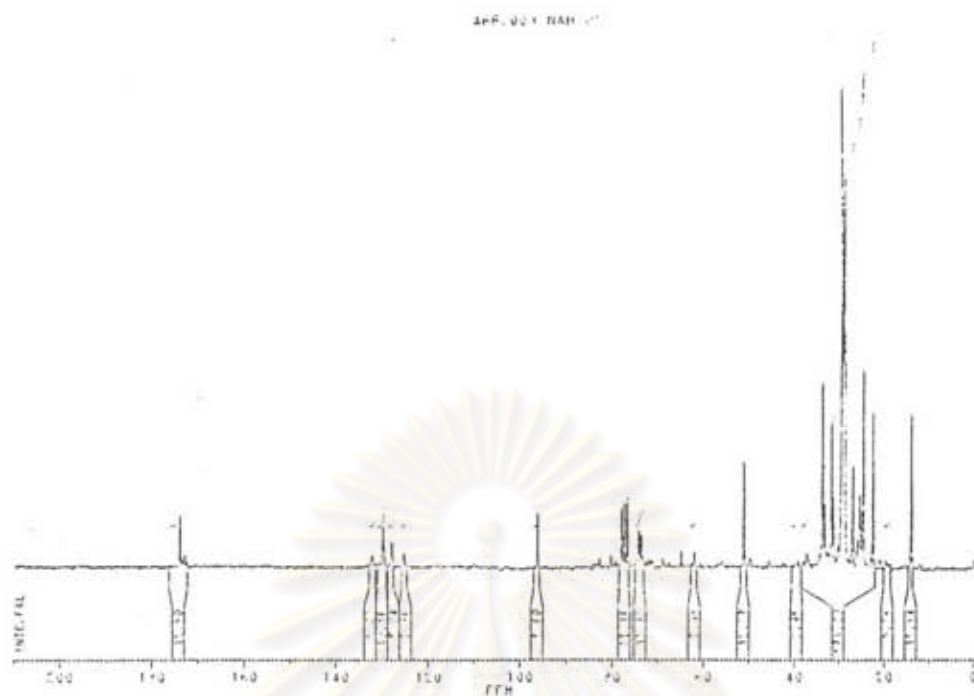


Figure A34 The ^{13}C -NMR (CDCl_3) spectrum of sulfonated soybean oil methyl ester

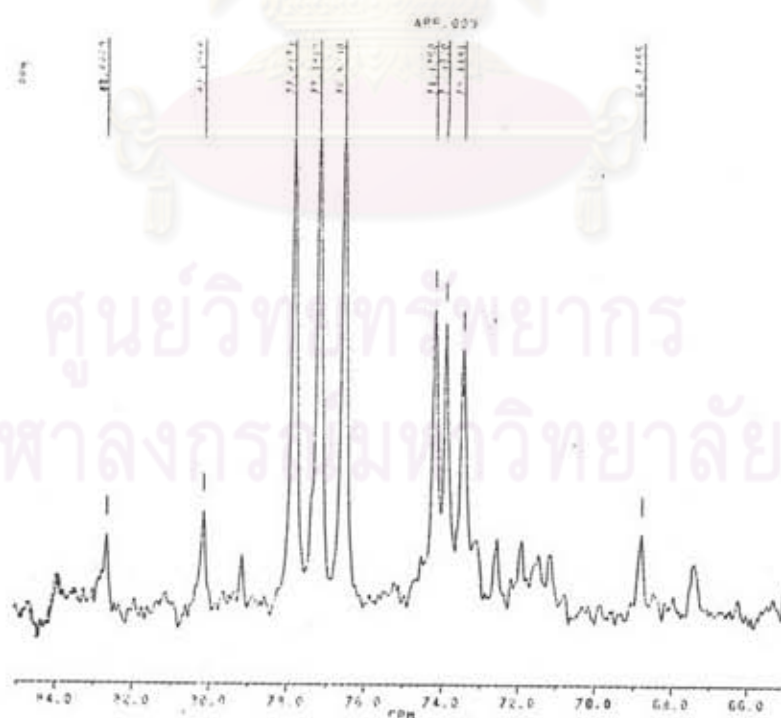


Figure A35 The expanded portion of ^{13}C -NMR spectrum in Figure A34

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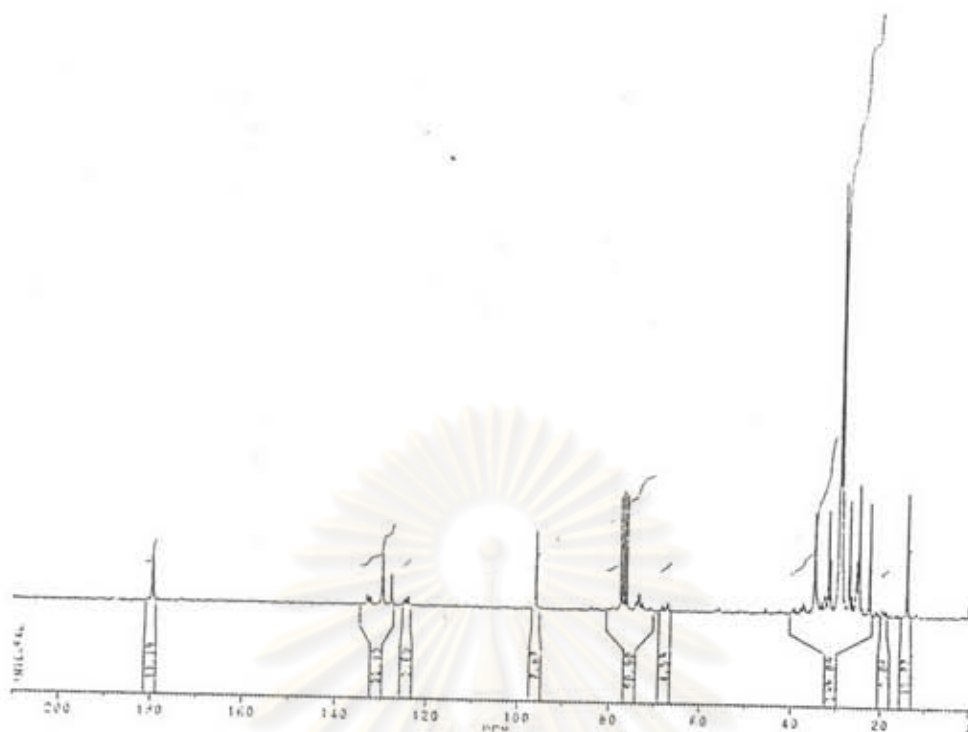


Figure A36 The ^{13}C -NMR (CDCl_3) spectrum of hydrolyzed ESME

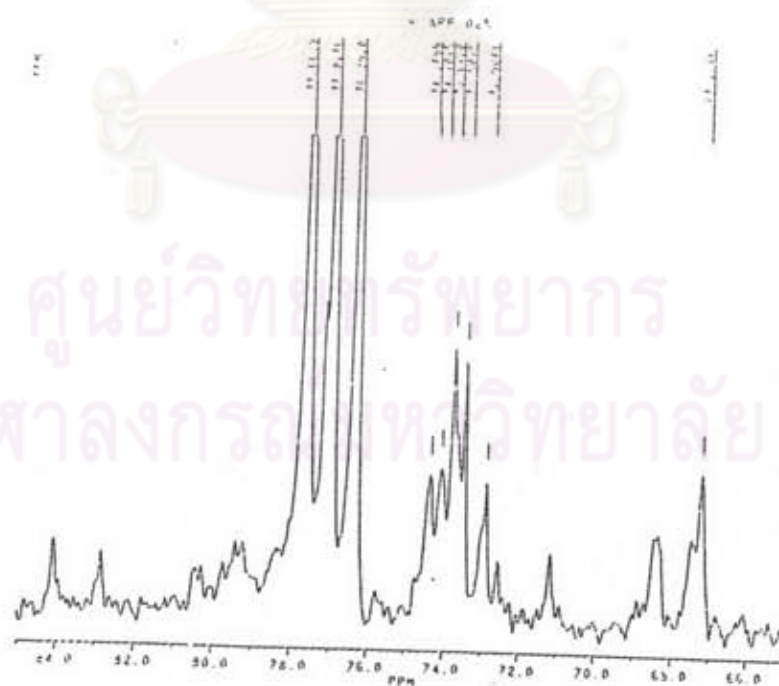


Figure A37 The expanded portion of ^{13}C -NMR spectrum in Figure A36

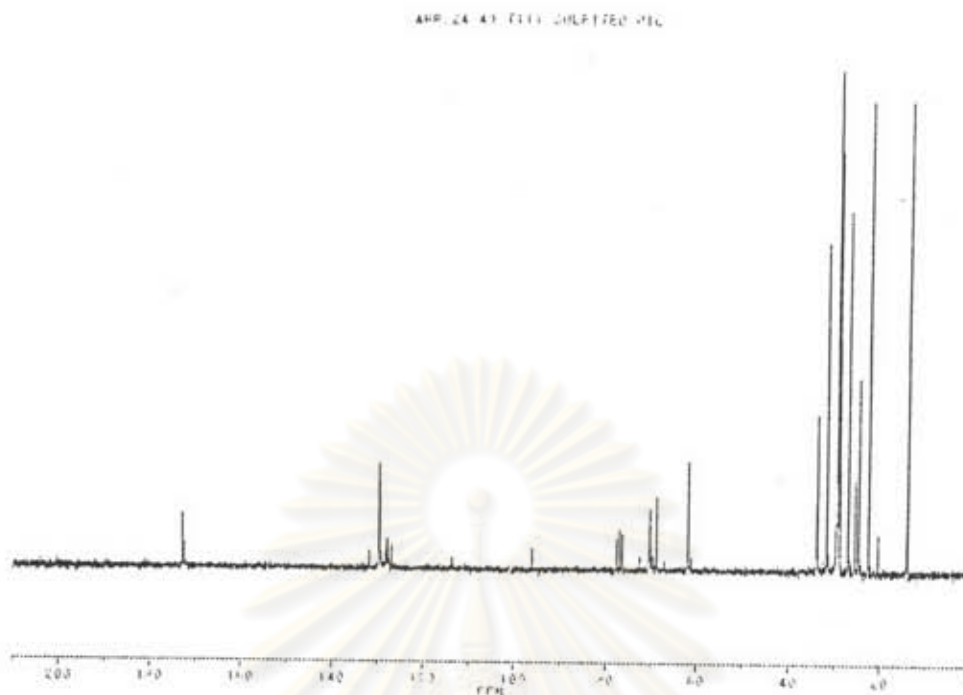


Figure A38 The ^{13}C -NMR (CDCl_3) spectrum of commercial sulfonated oil

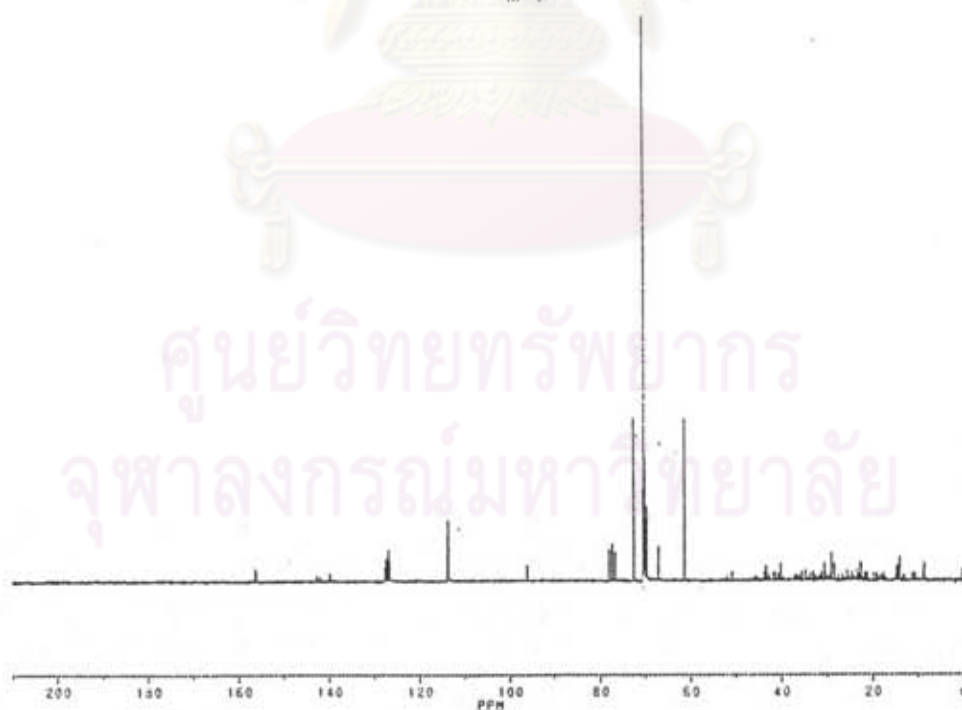


Figure A39 The ^{13}C -NMR (CDCl_3) spectrum of sulfonated soybean oil methyl ester which was prepared by commercial procedure

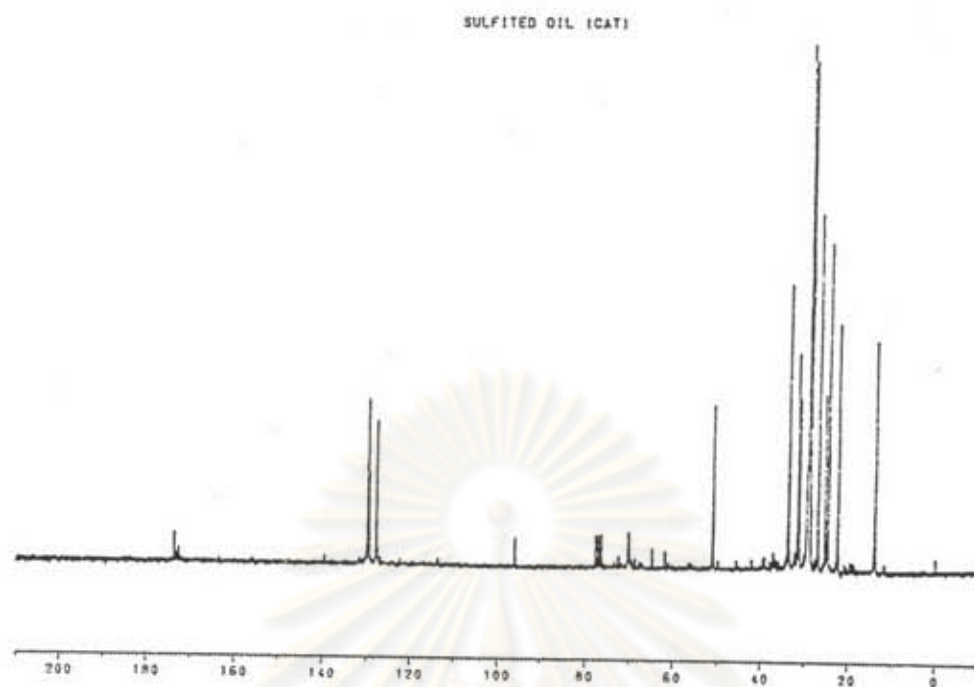


Figure A40 The ^{13}C -NMR (CDCl_3) spectrum of tergitol NP-9 nonionic surfactant

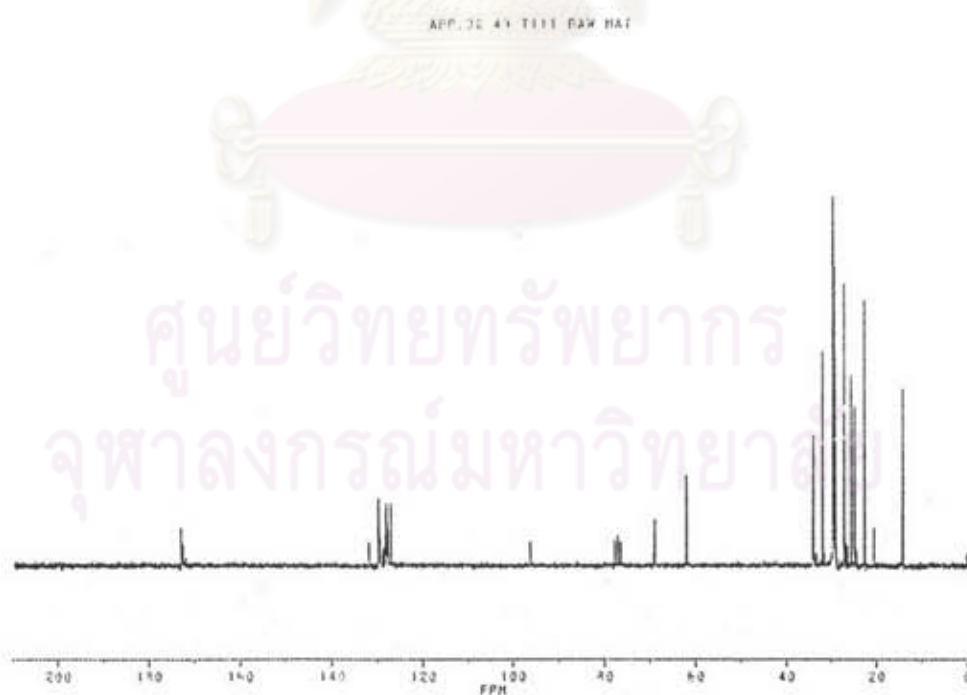


Figure A41 The ^{13}C -NMR (CDCl_3) spectrum of fish oil

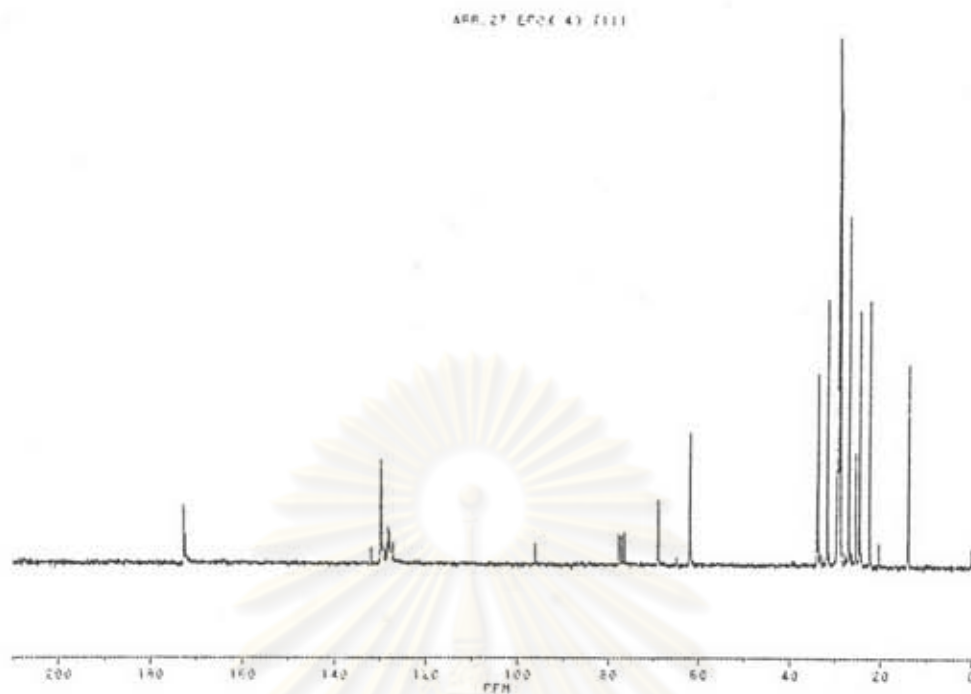


Figure A42 The ^{13}C -NMR (CDCl_3) spectrum of oxidized fish oil

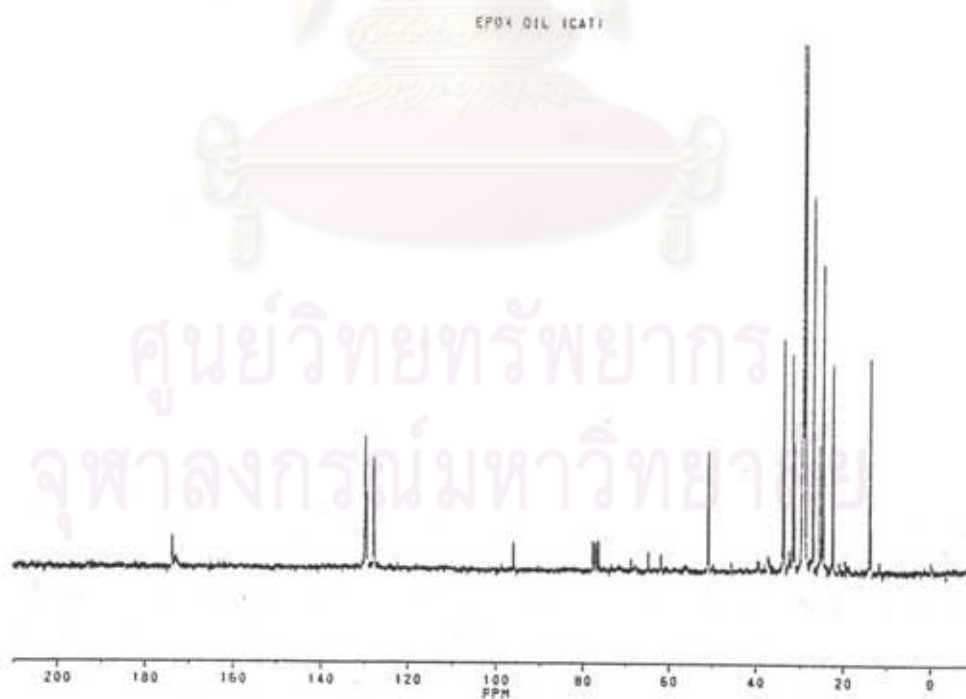


Figure A43 The ^{13}C -NMR (CDCl_3) spectrum of oxidized soybean oil methyl ester which was prepared by commercial procedure

VITA

Mr. Chainoi Charnchaisompob was born on November 23, 1970 in Samutprakarn. He received his Bachelor's Degree of Science in Chemistry from the Department of Chemistry, Faculty of Science, Chulalongkorn University in 1993. He began his master study at the multidisciplinary of Petrochemistry and Polymer, Graduate School, Chulalongkorn University, in 1993 and completed the program in 1996.



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