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ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย



**APPENDIX A**

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย

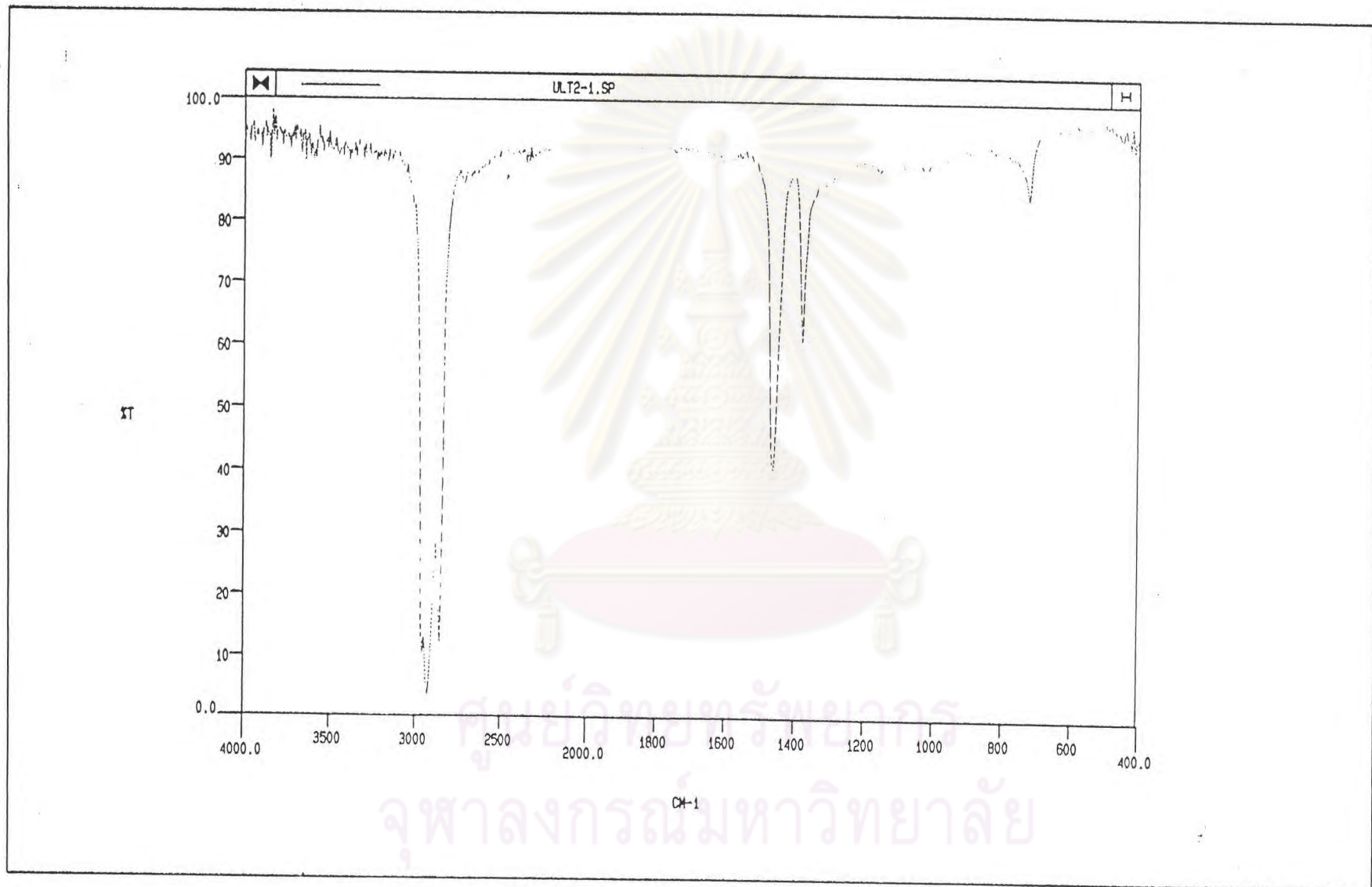


Figure A1 The IR spectrum of ULT1

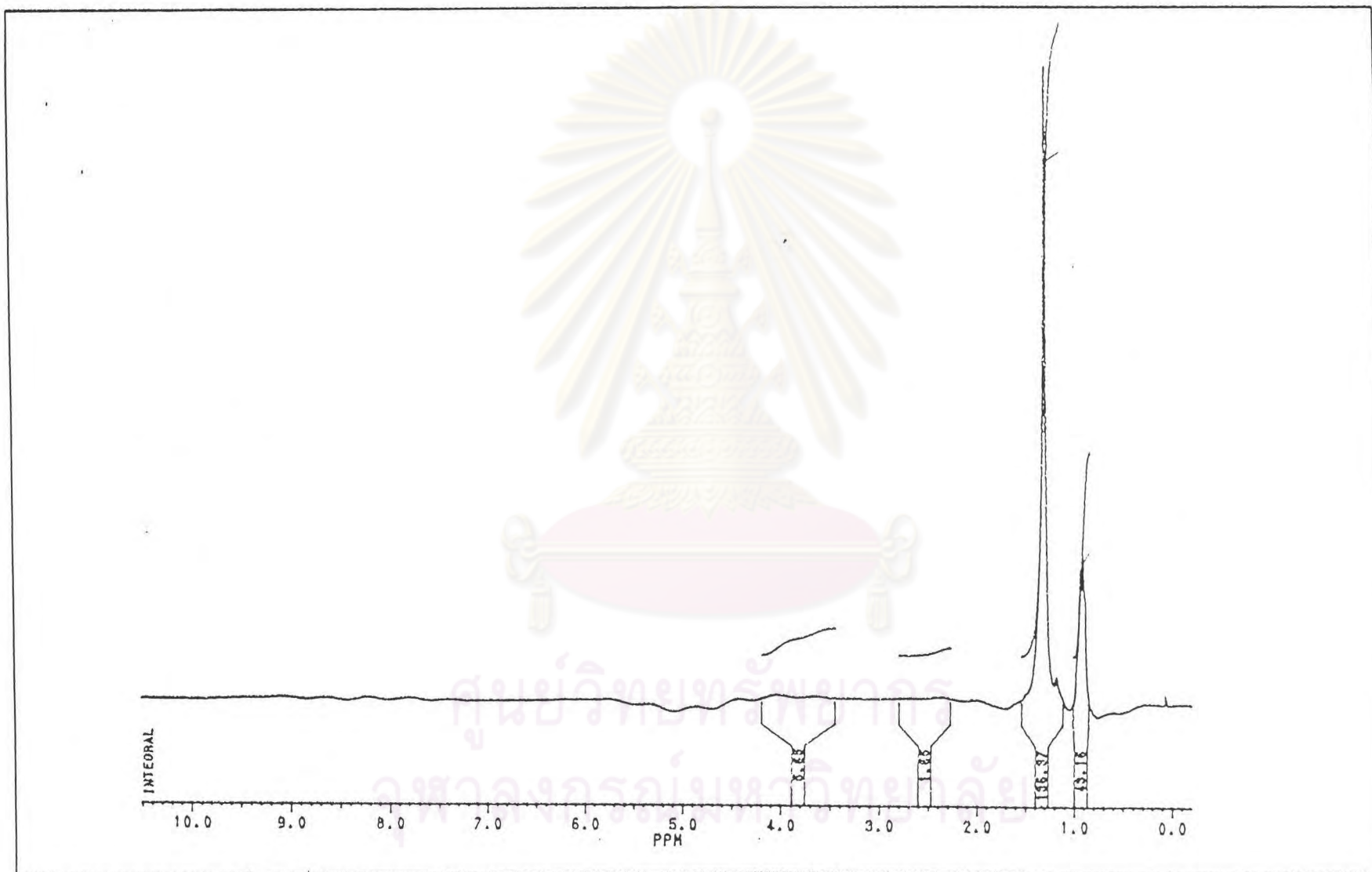


Figure A2 The  $^1\text{H}$  NMR spectrum of ULT1

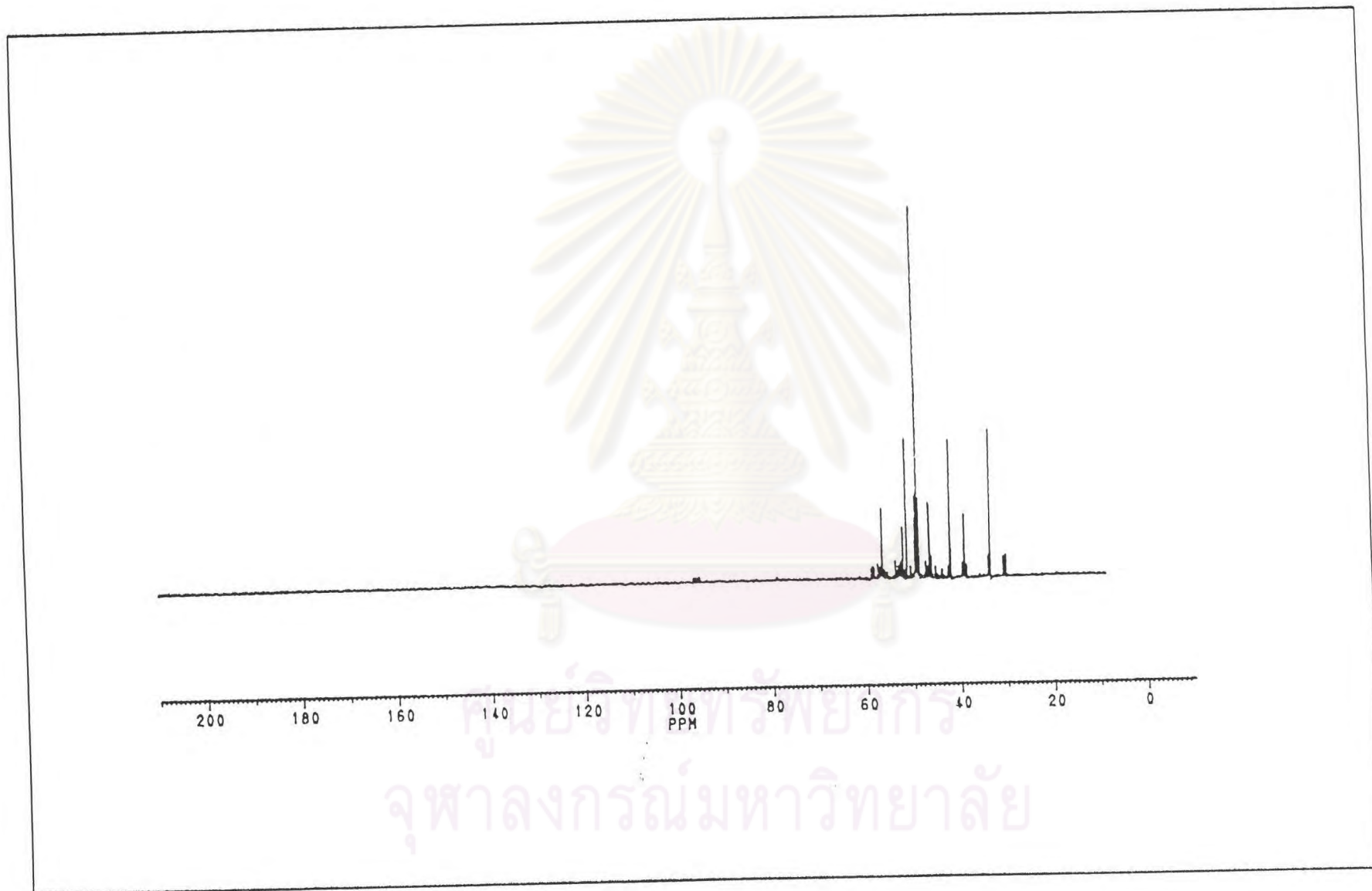


Figure A3 The  $^{13}\text{C}$  NMR spectrum of ULT1



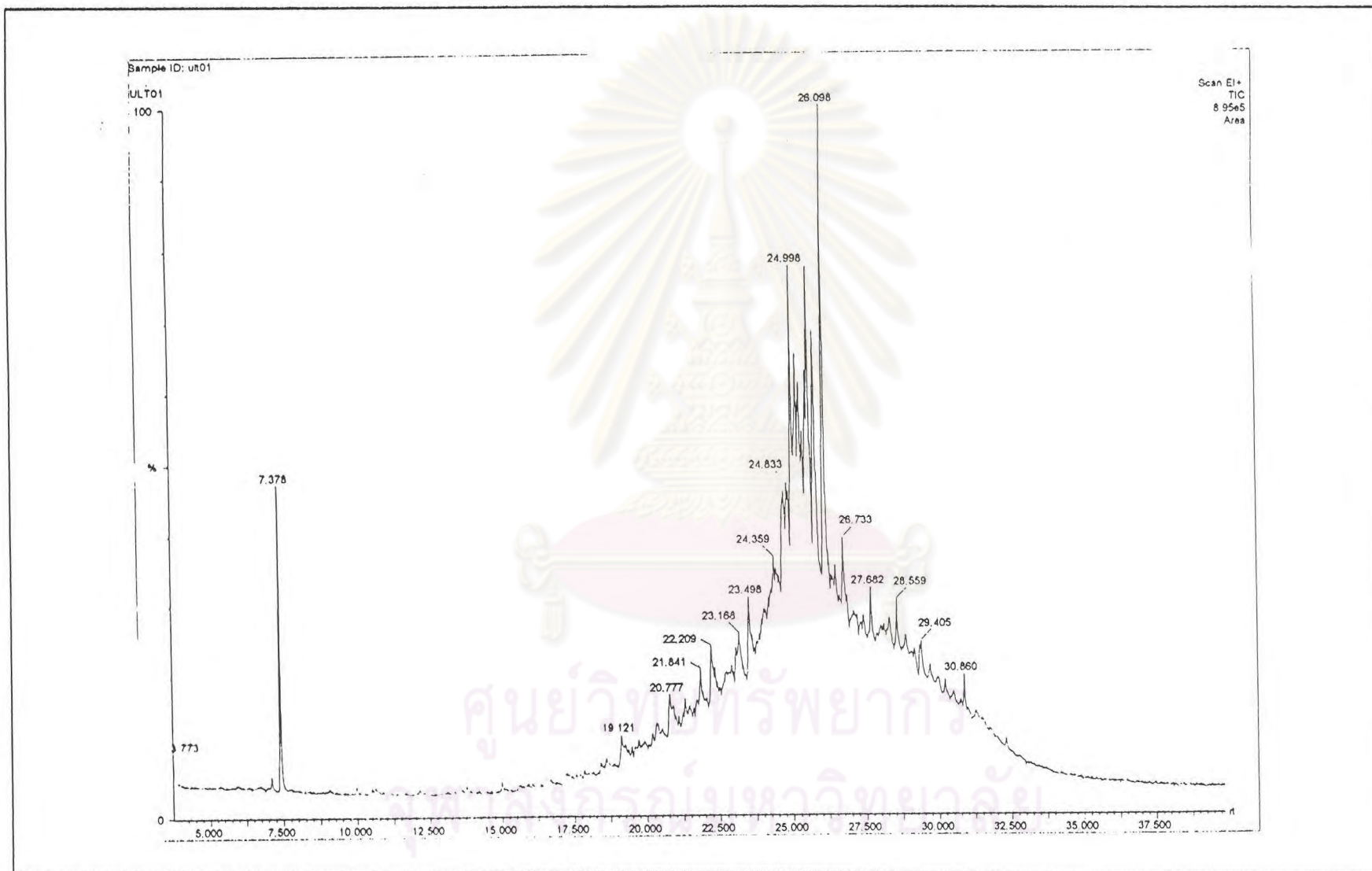


Figure A4 The GC-MS chromatogram of ULT1

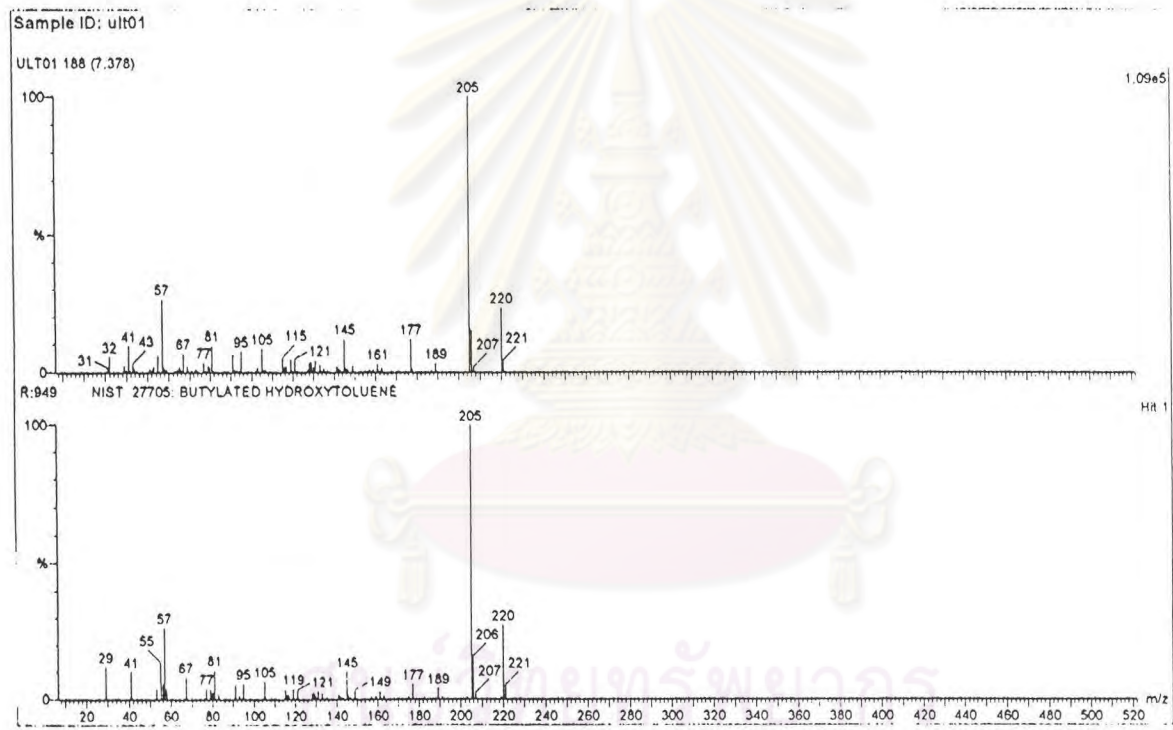


Figure A5 The mass spectrum of ULT1 at retention time 7.378 min.

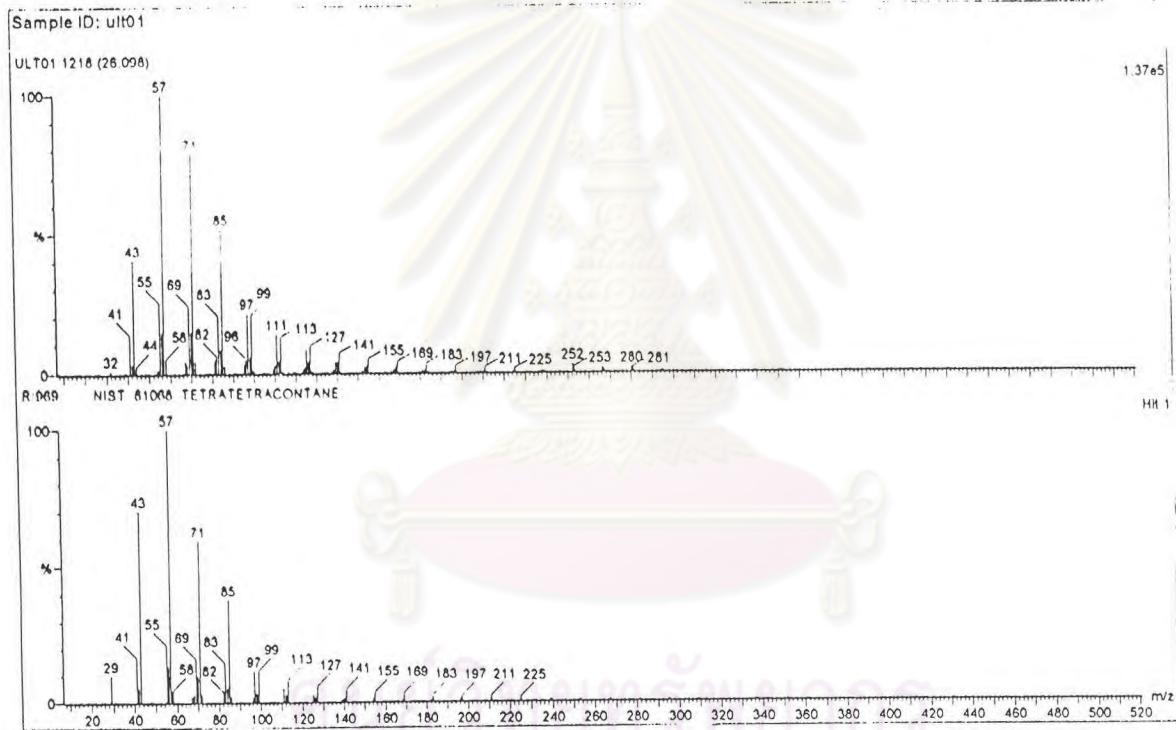


Figure A6 The mass spectrum of ULT1 at retention time 19.121 to 30.860 min.

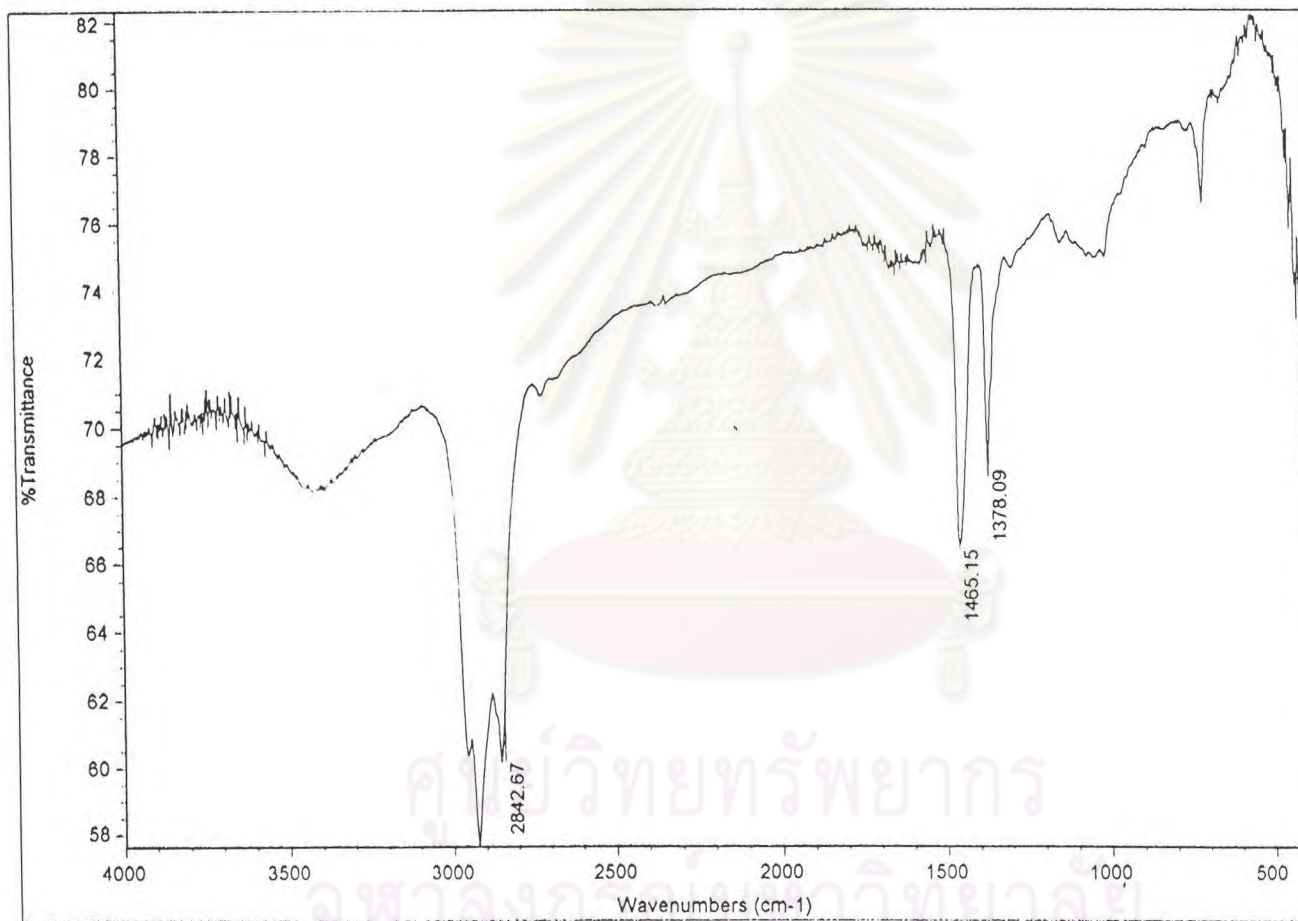


Figure A7 The IR spectrum of TMO1

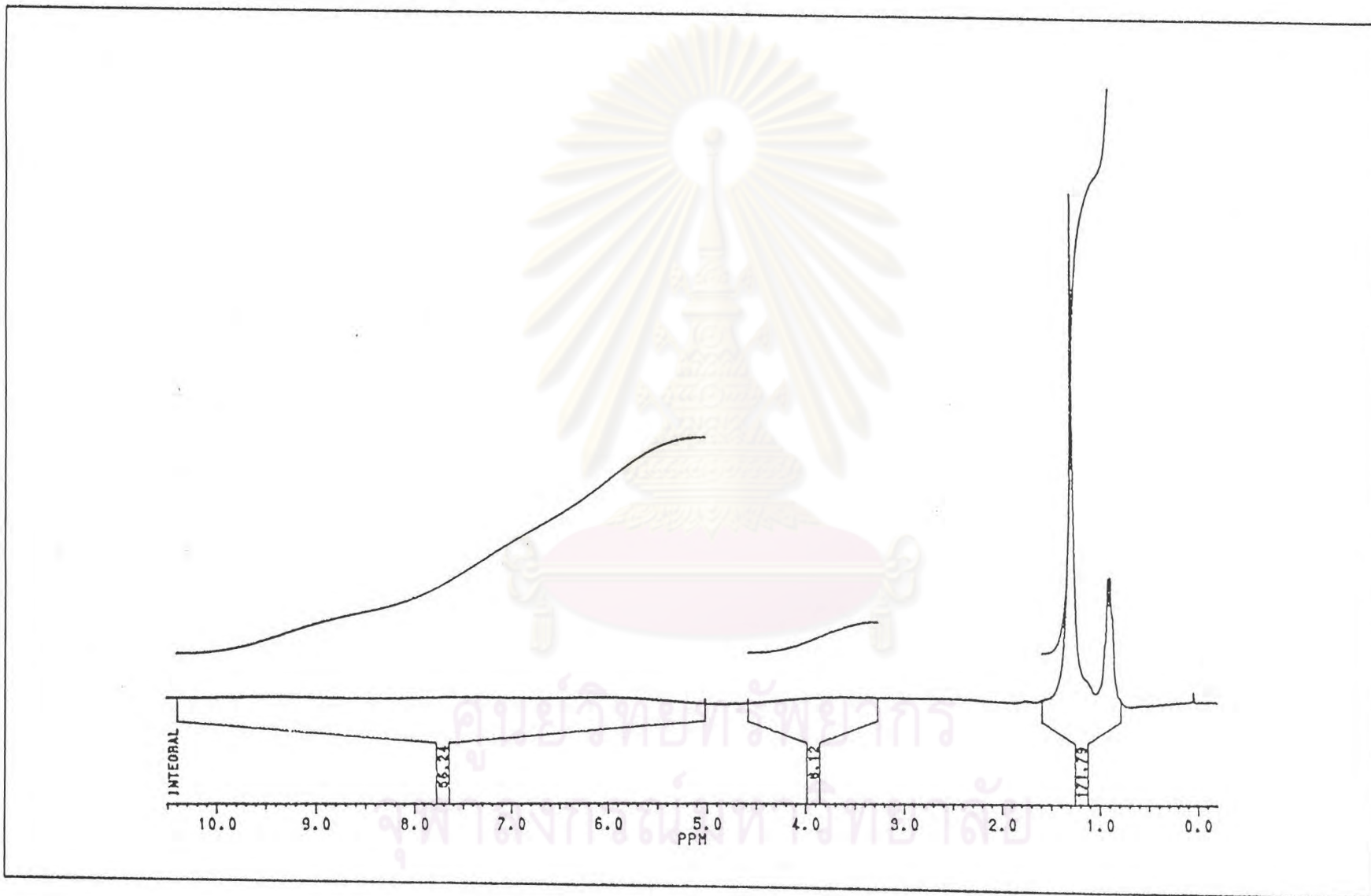


Figure A8 The  $^1\text{H}$  NMR spectrum of TMO1

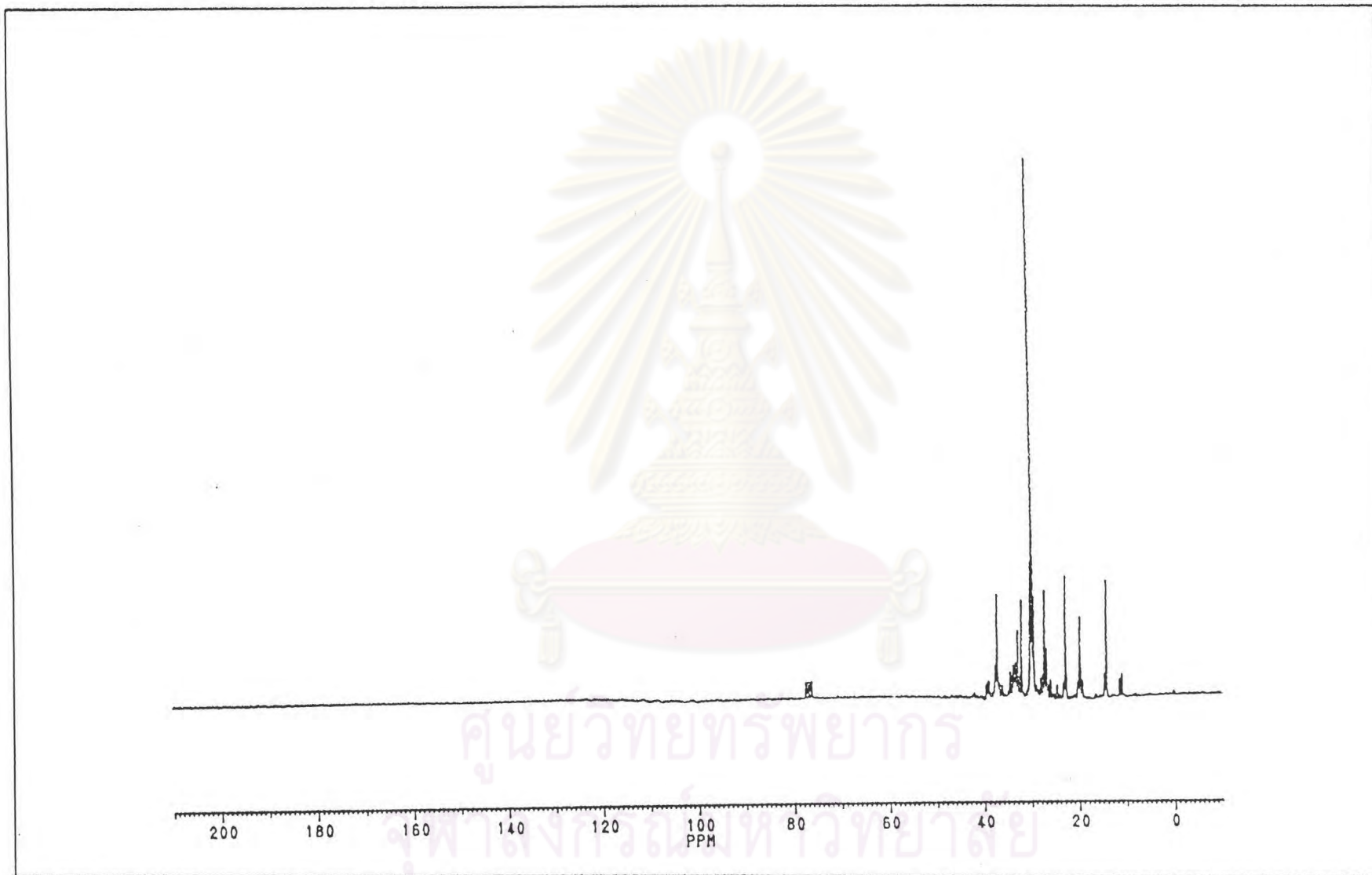


Figure A9 The  $^{13}\text{C}$  NMR spectrum of TMO1

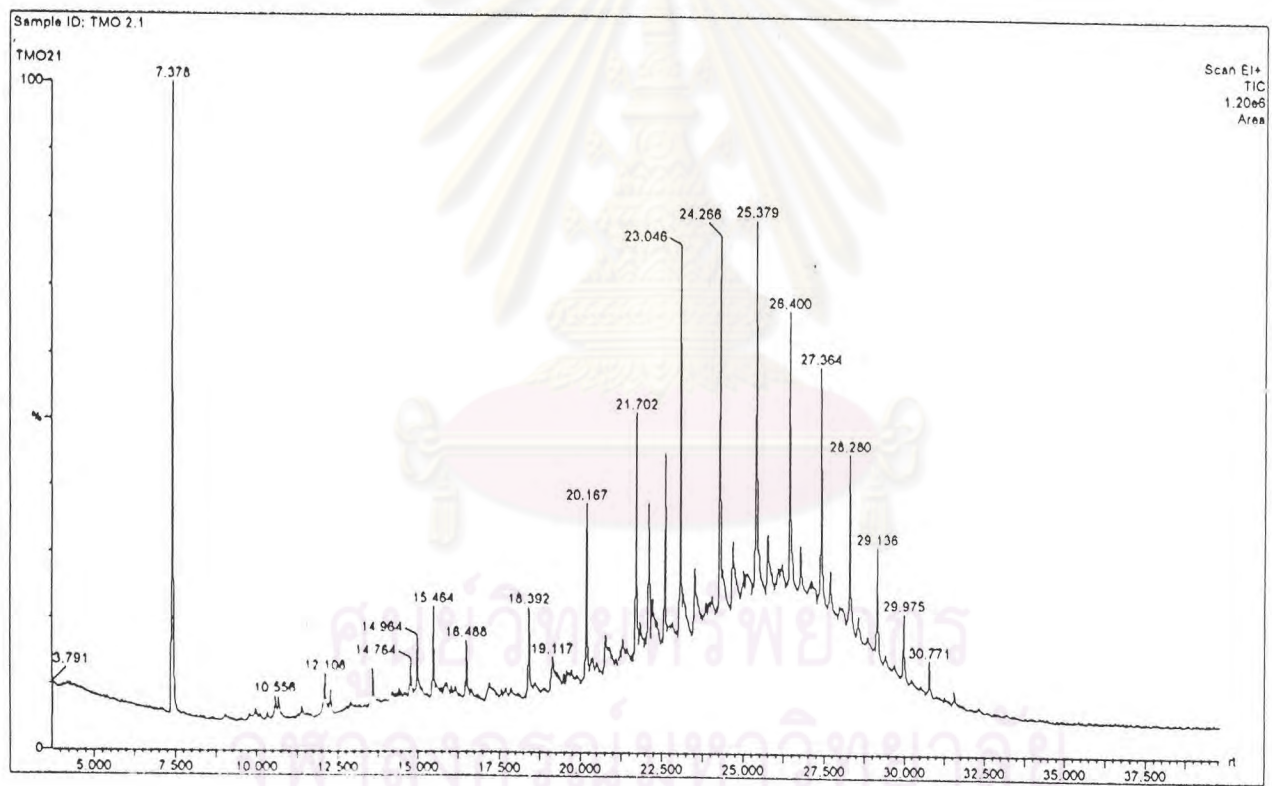


Figure A10 The GC-MS chromatogram of TMO1

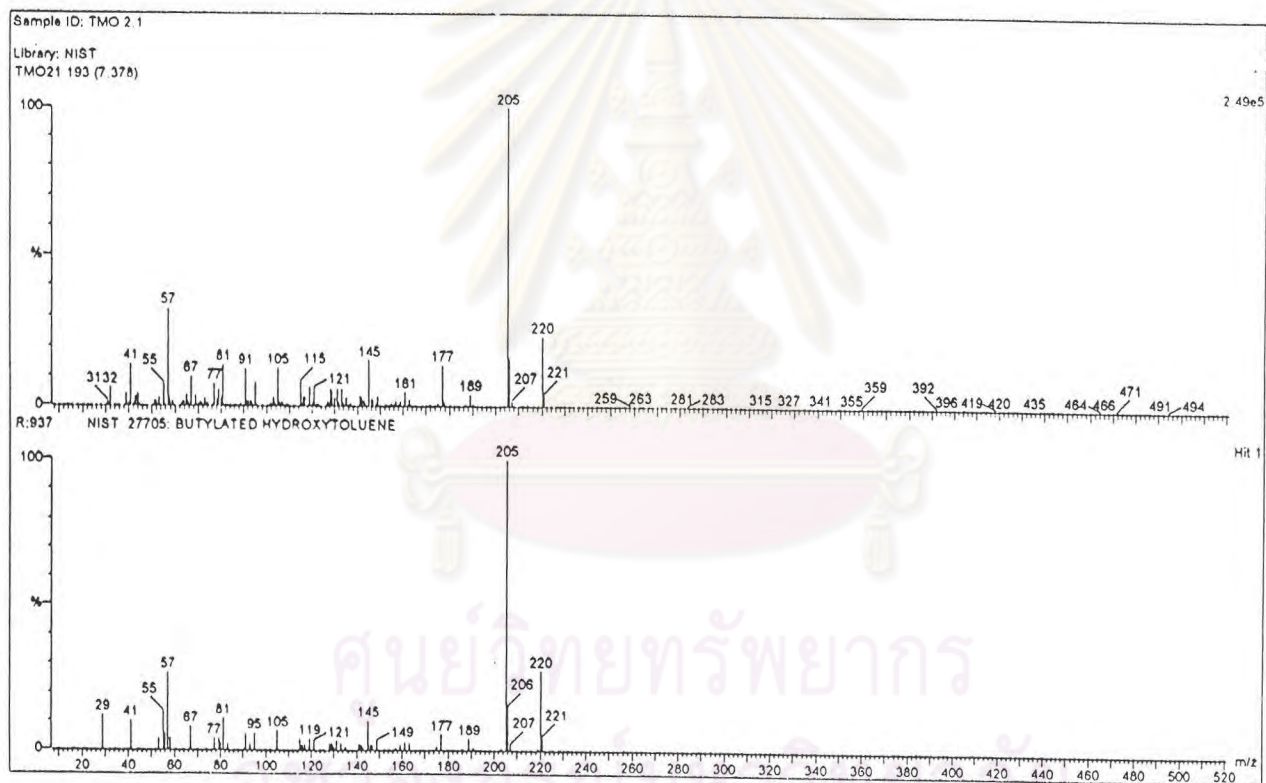


Figure A11 The mass spectrum of TMO1 at retention time 7.378





Figure A12 The mass spectrum of TMO1 at retention time 10.556 to 30.771 min

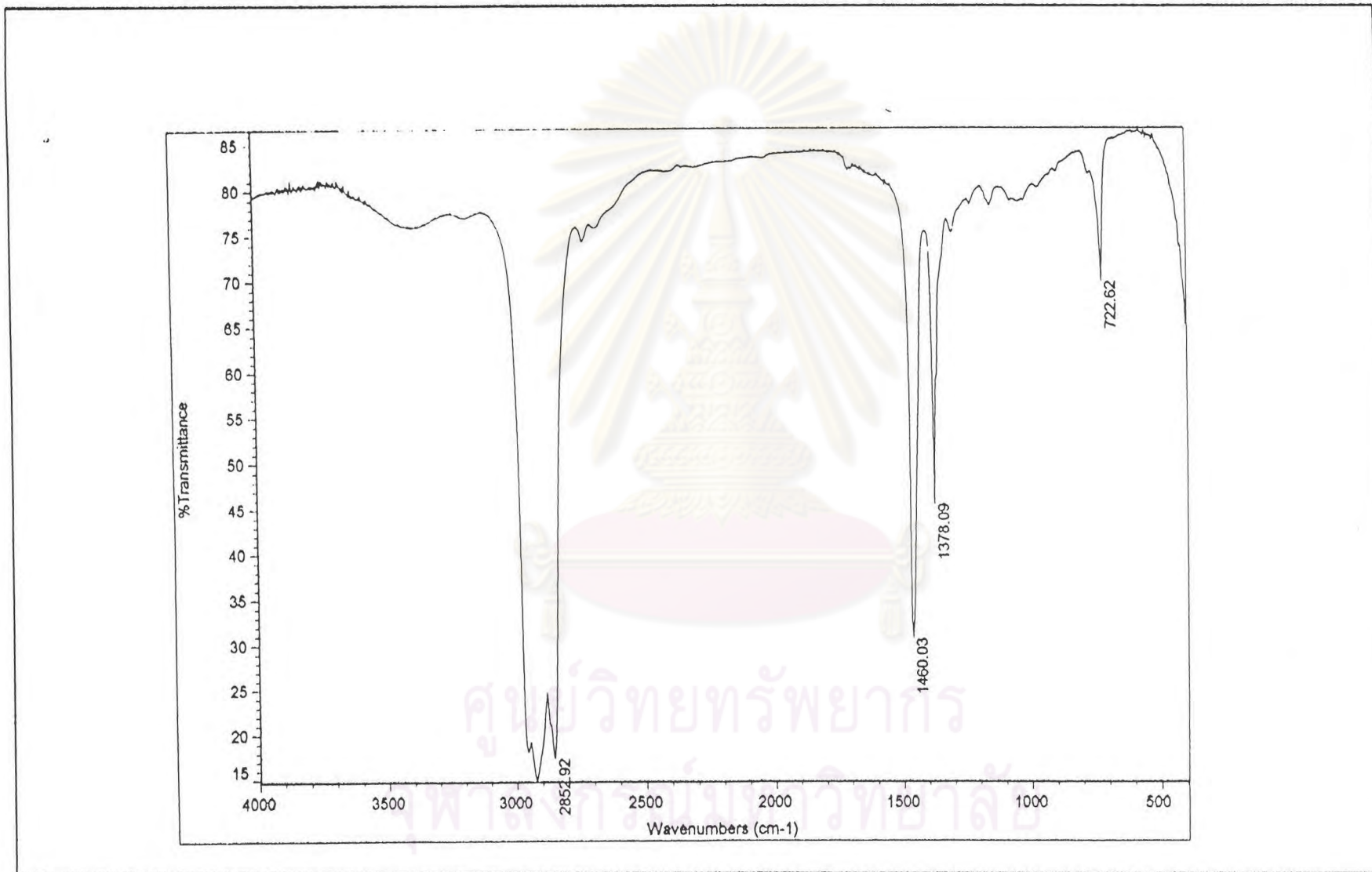


Figure A13 The IR spectrum of BP1

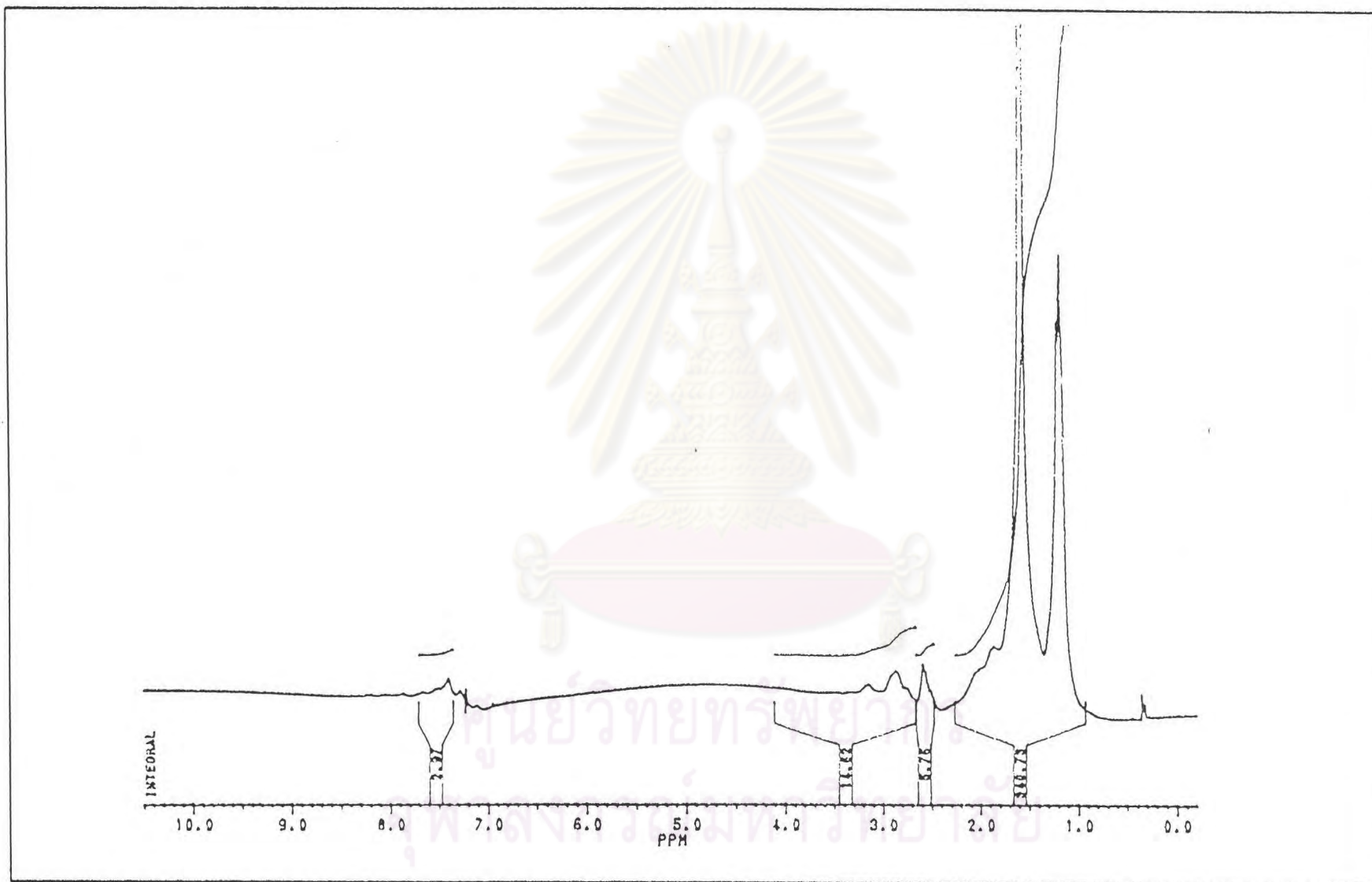


Figure A14 The  $^1\text{H}$  NMR spectrum of BP1

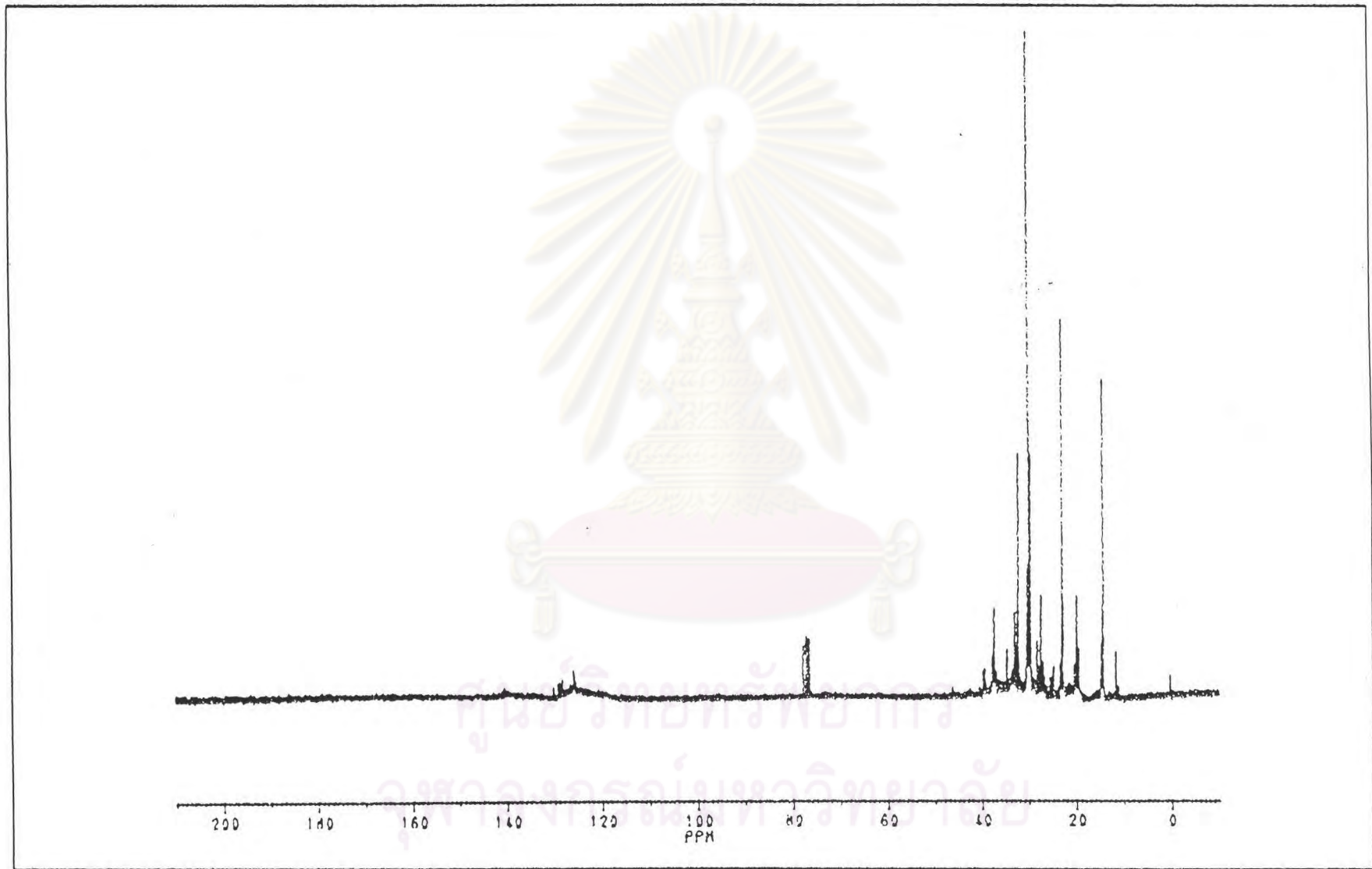


Figure A15 The  $^{13}\text{C}$  NMR spectrum of BP1

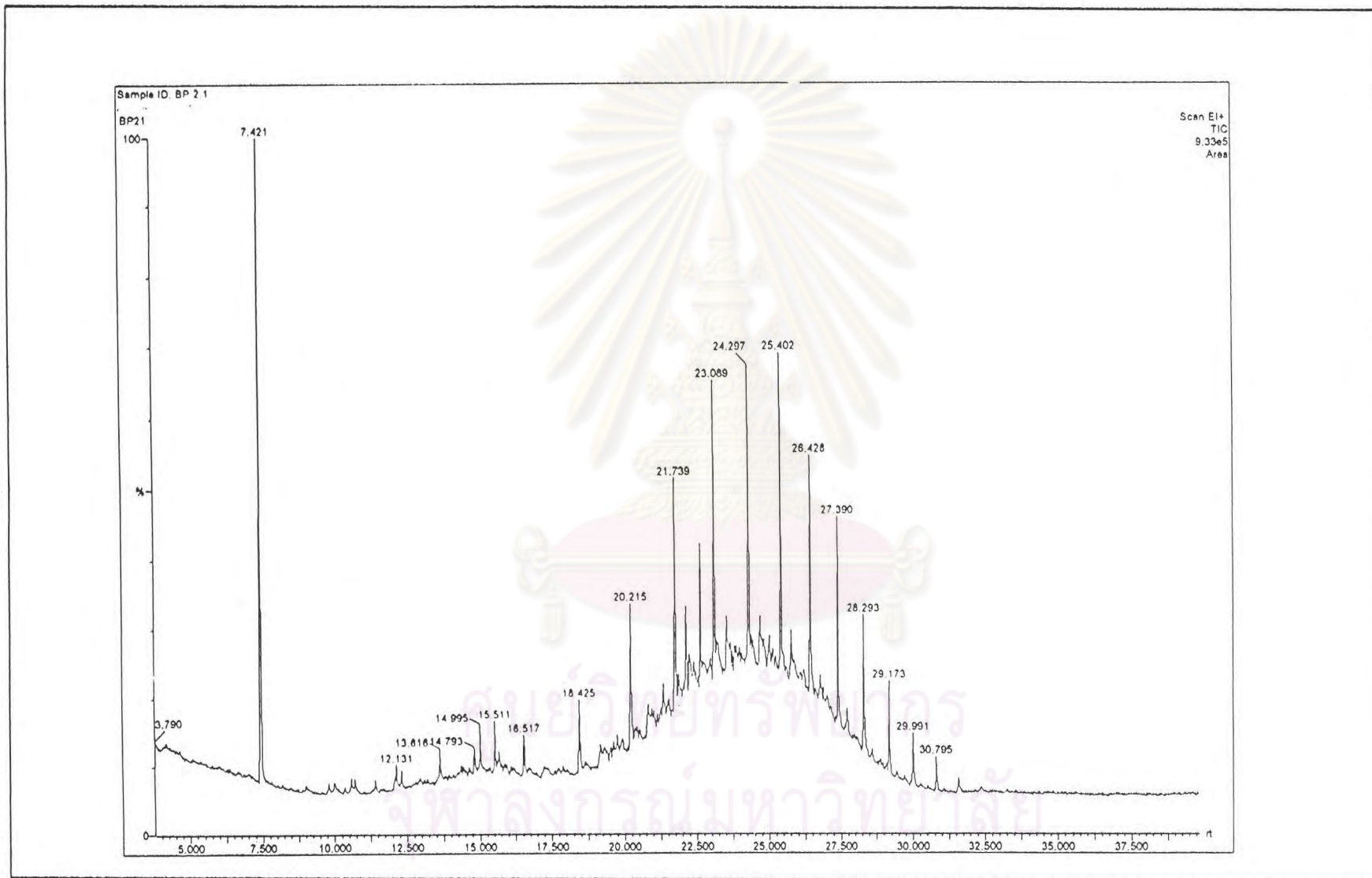


Figure A16 The GC-MS chromatogram of BP1

Sample ID: BP 2.1  
Library: NIST  
BP21 197 (7.421)

1.63e5

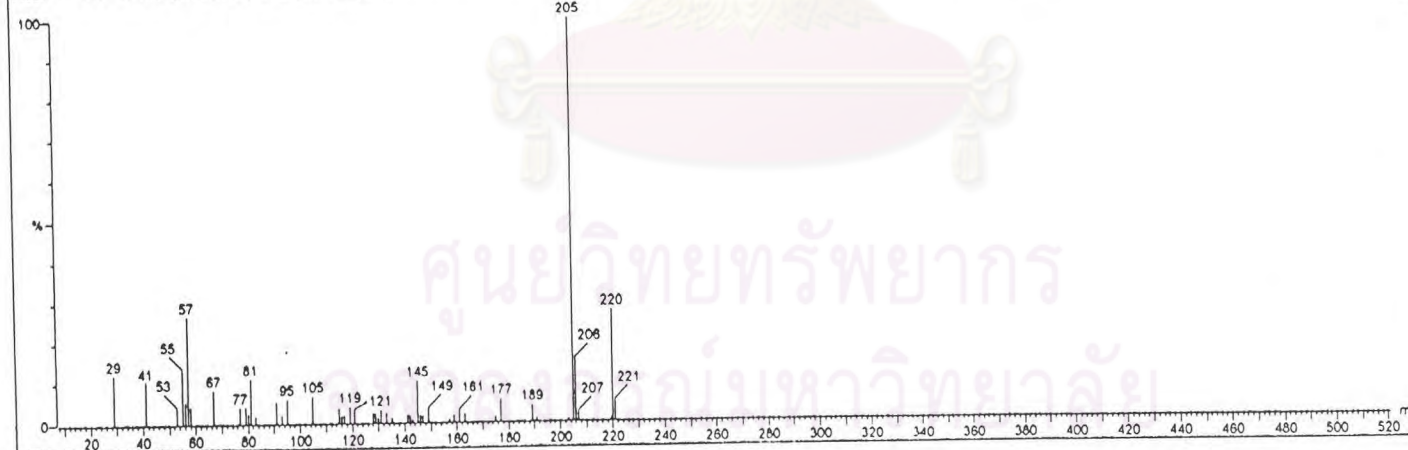
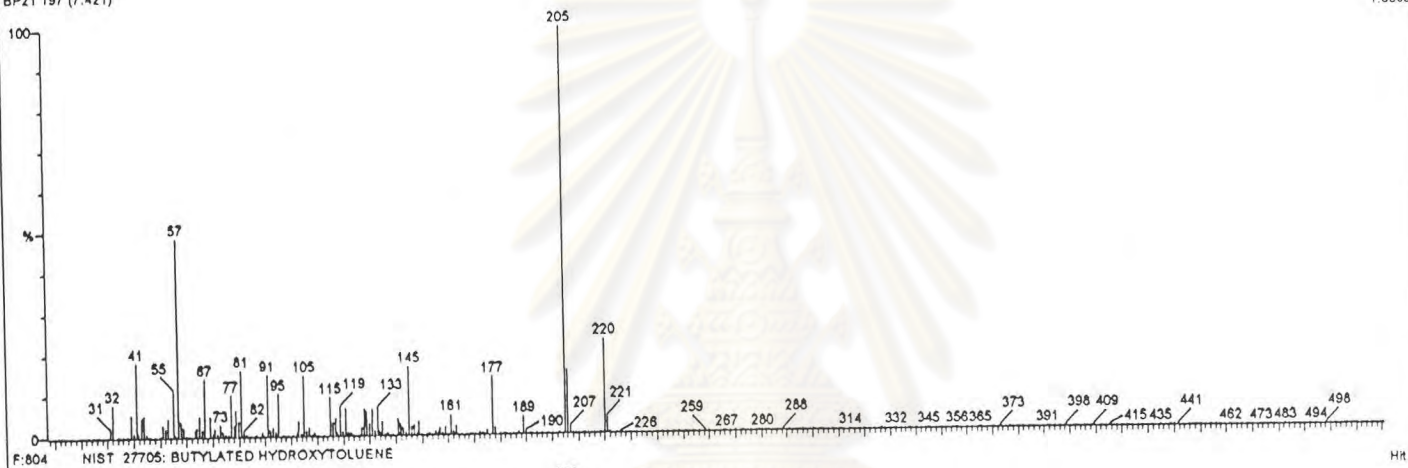


Figure A17 The mass spectrum of BP1 at retention time 7.421 min.

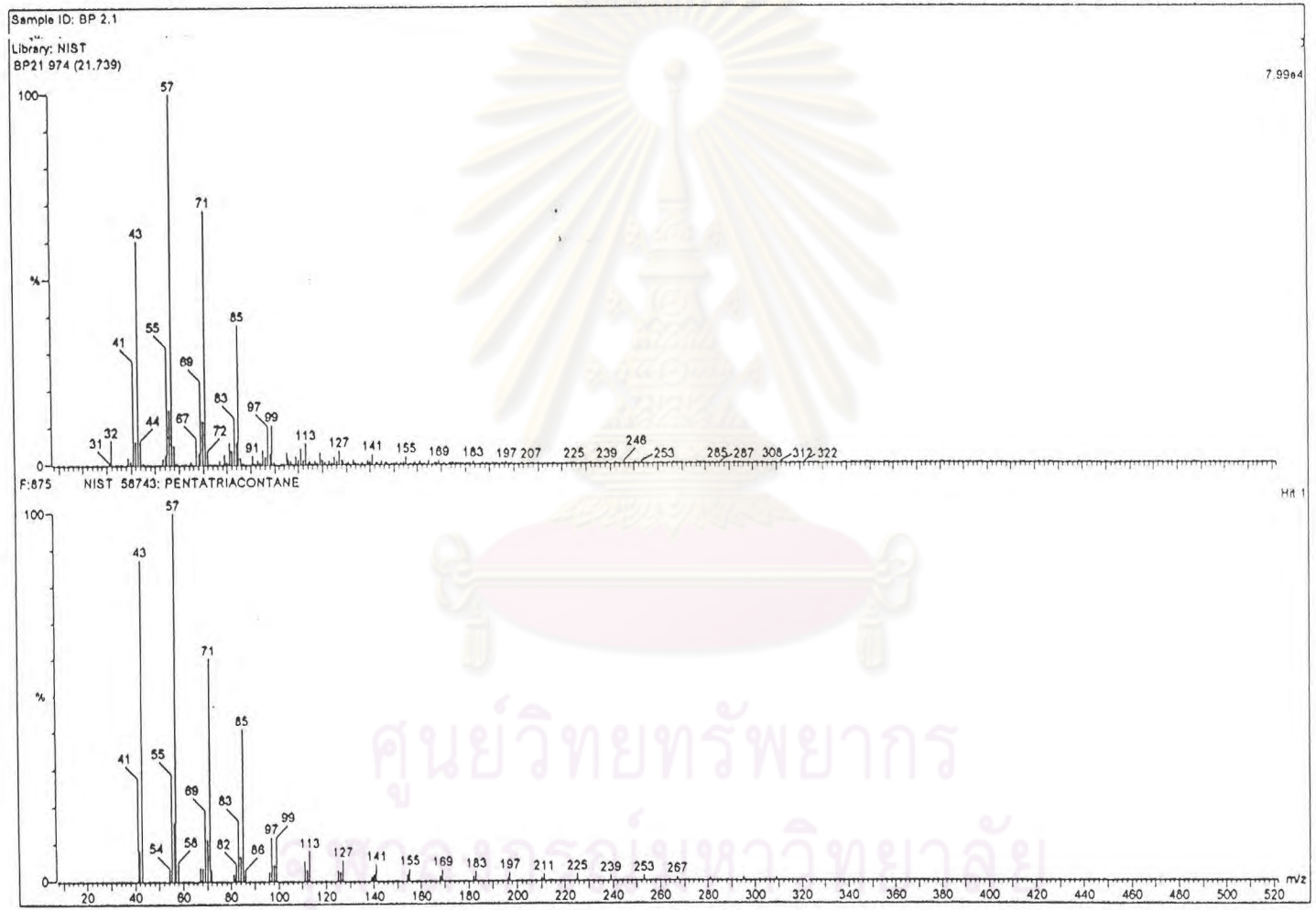


Figure A18 The mass spectrum of BP1 at retention time 18.425 to 30.795 min.

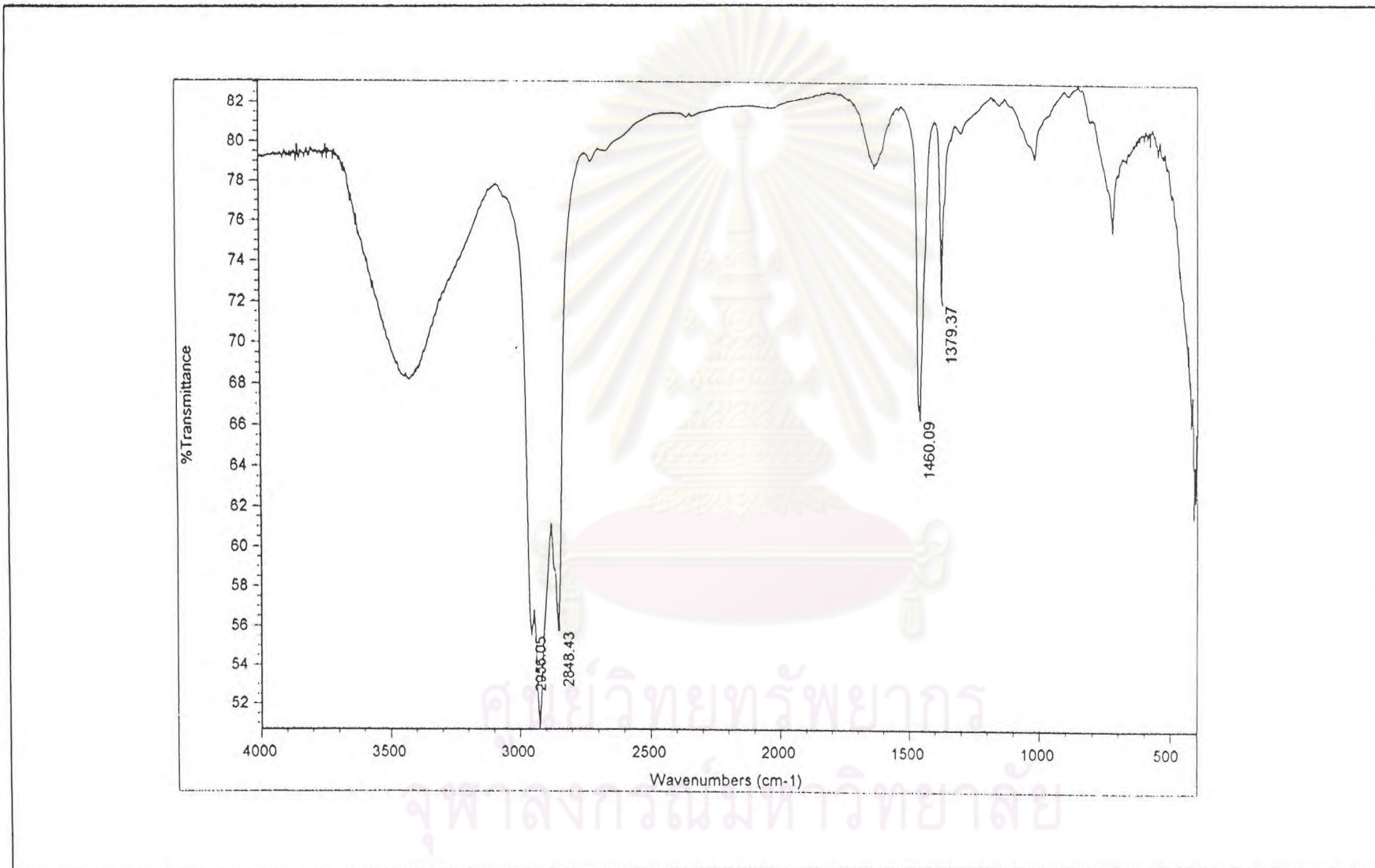


Figure A19 The IR spectrum of CAS1



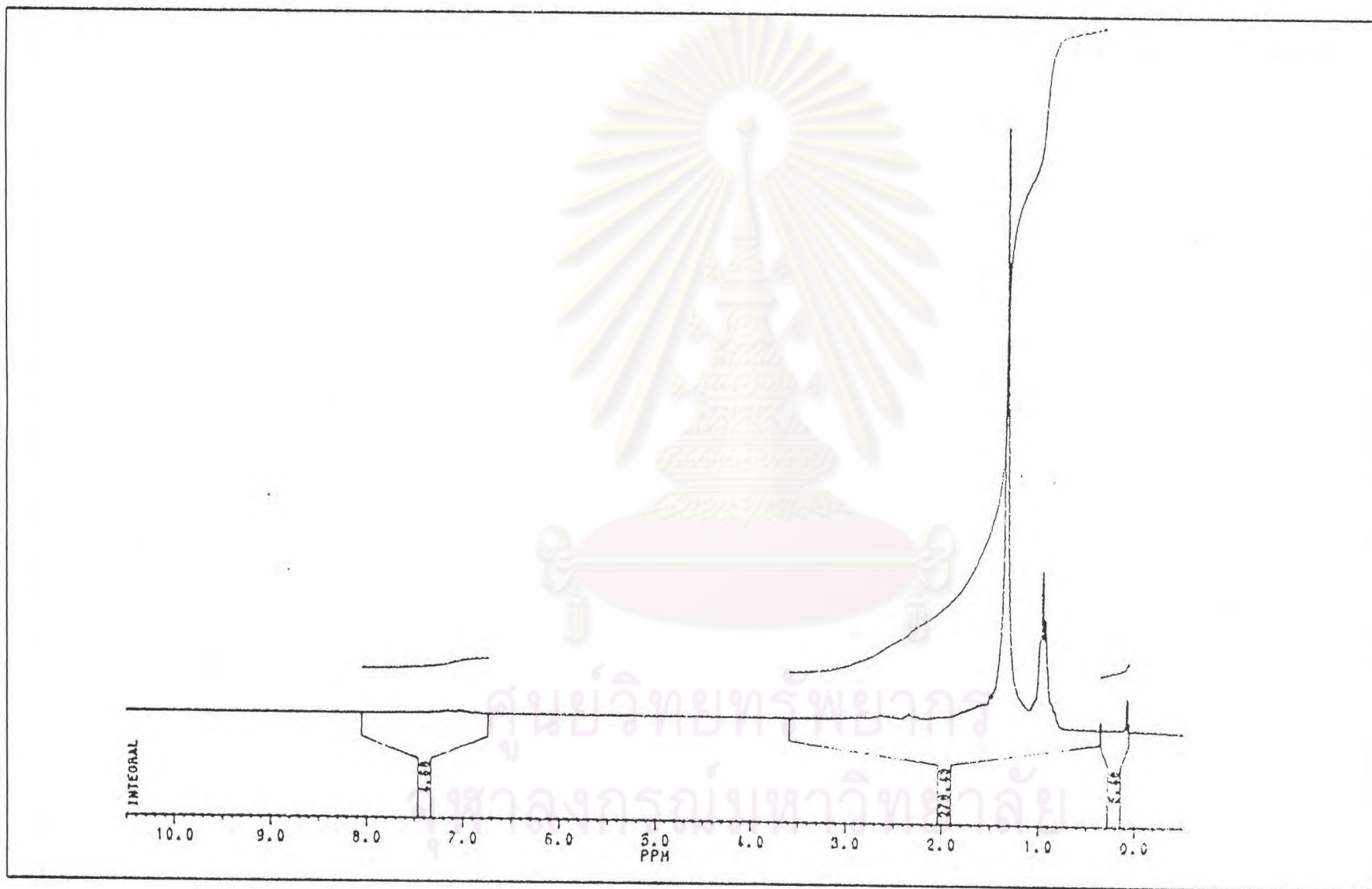


Figure A20 The  $^1\text{H}$  NMR spectrum of CAS1

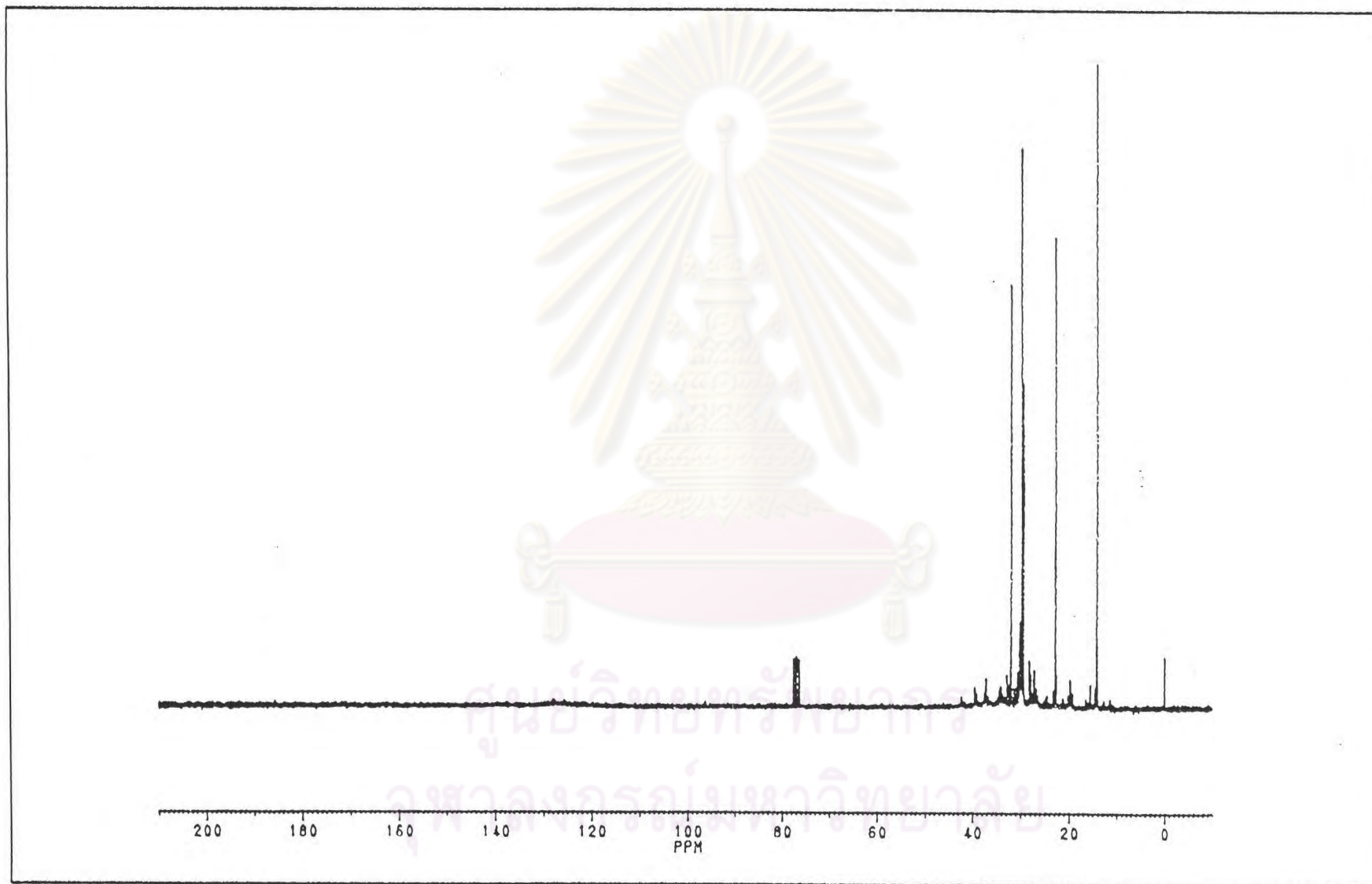


Figure A21 The  $^{13}\text{C}$  NMR spectrum of CAS1

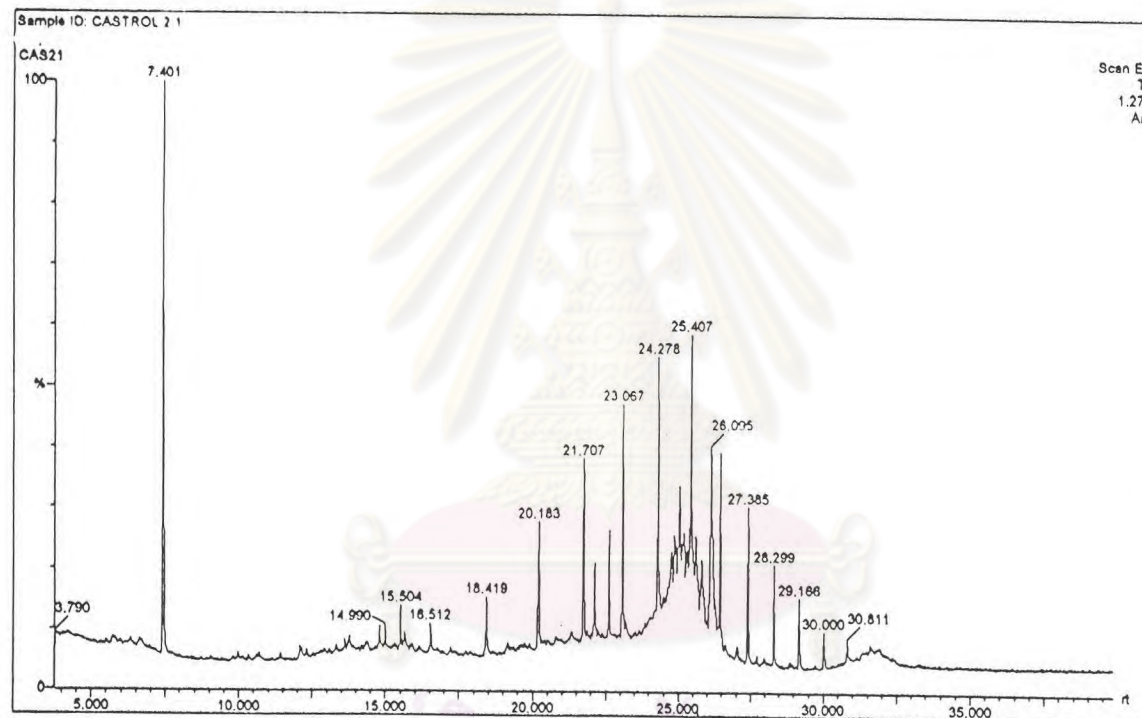


Figure A22 The GC-MS chromatogram of CAS1

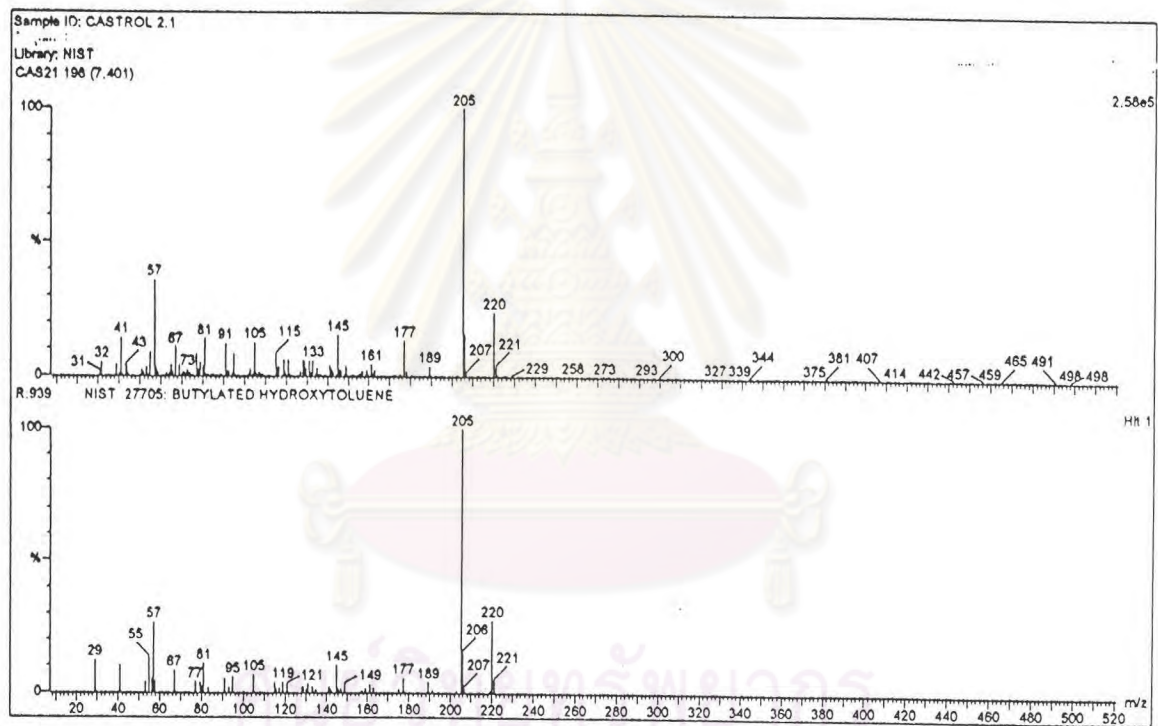


Figure A23 The mass spectrum of CAS1 at retention time 7.401 min.

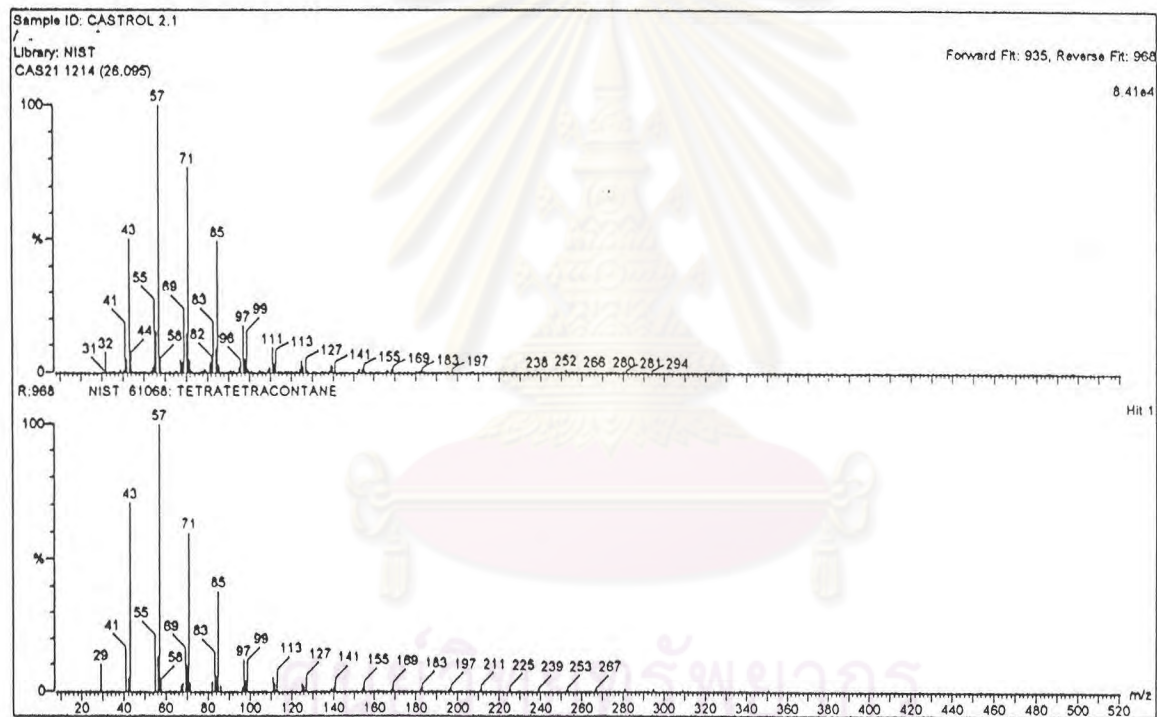


Figure A24 The mass spectrum of CAS1 at retention time 18.419 to 30.000 min.

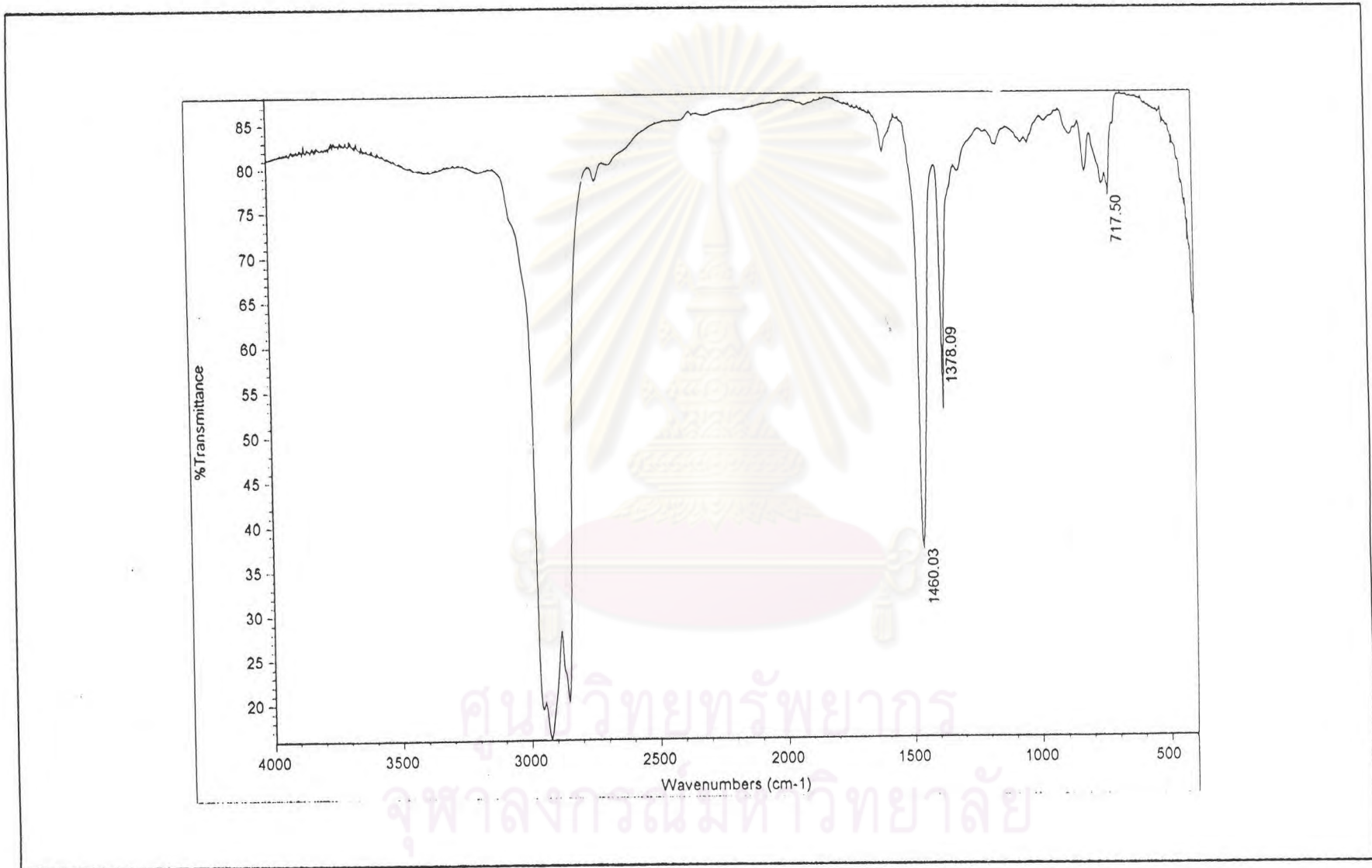


Figure A25 The IR spectrum of MOB1

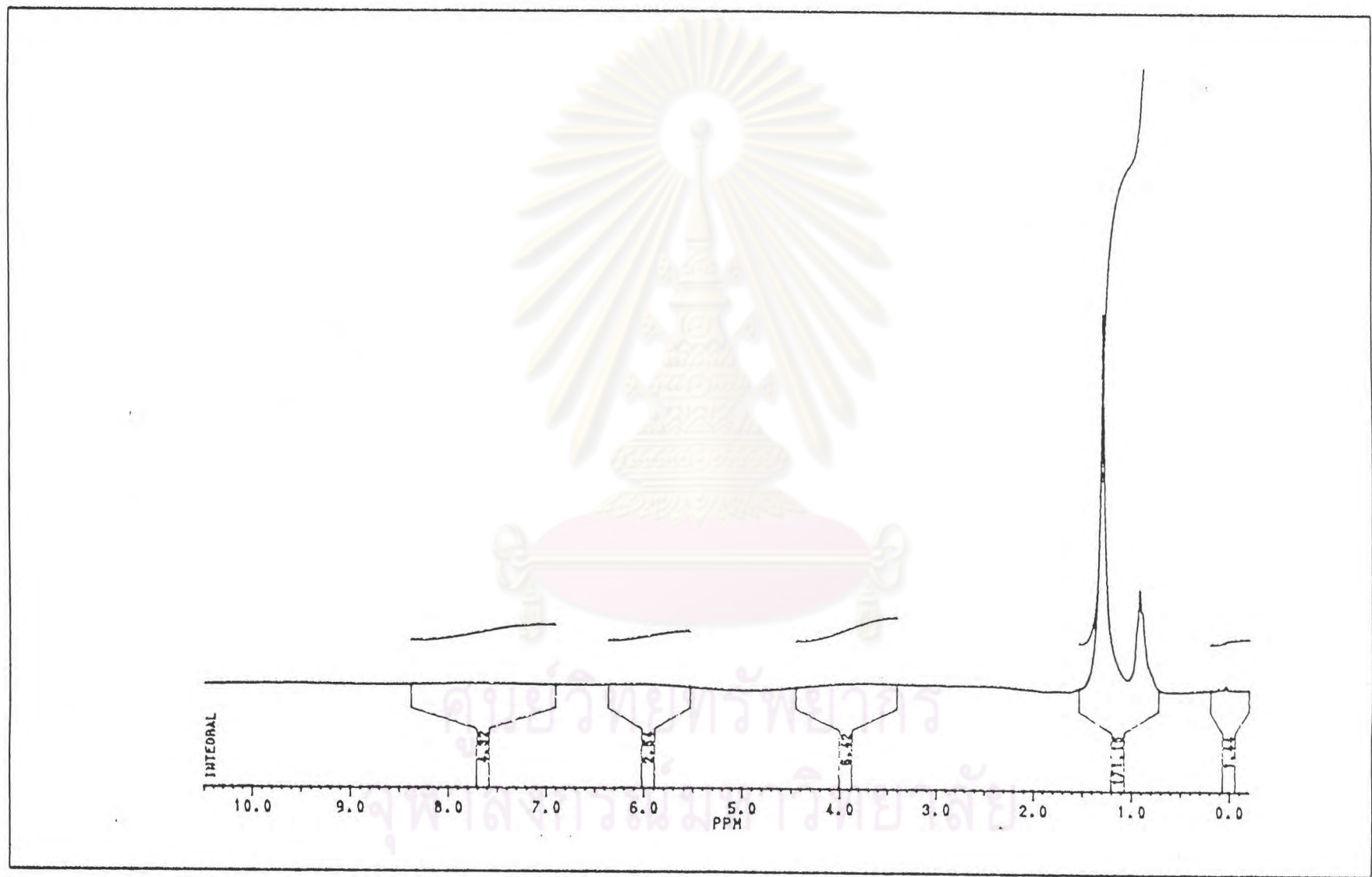


Figure A26 The  $^1\text{H}$  NMR spectrum of MOB1

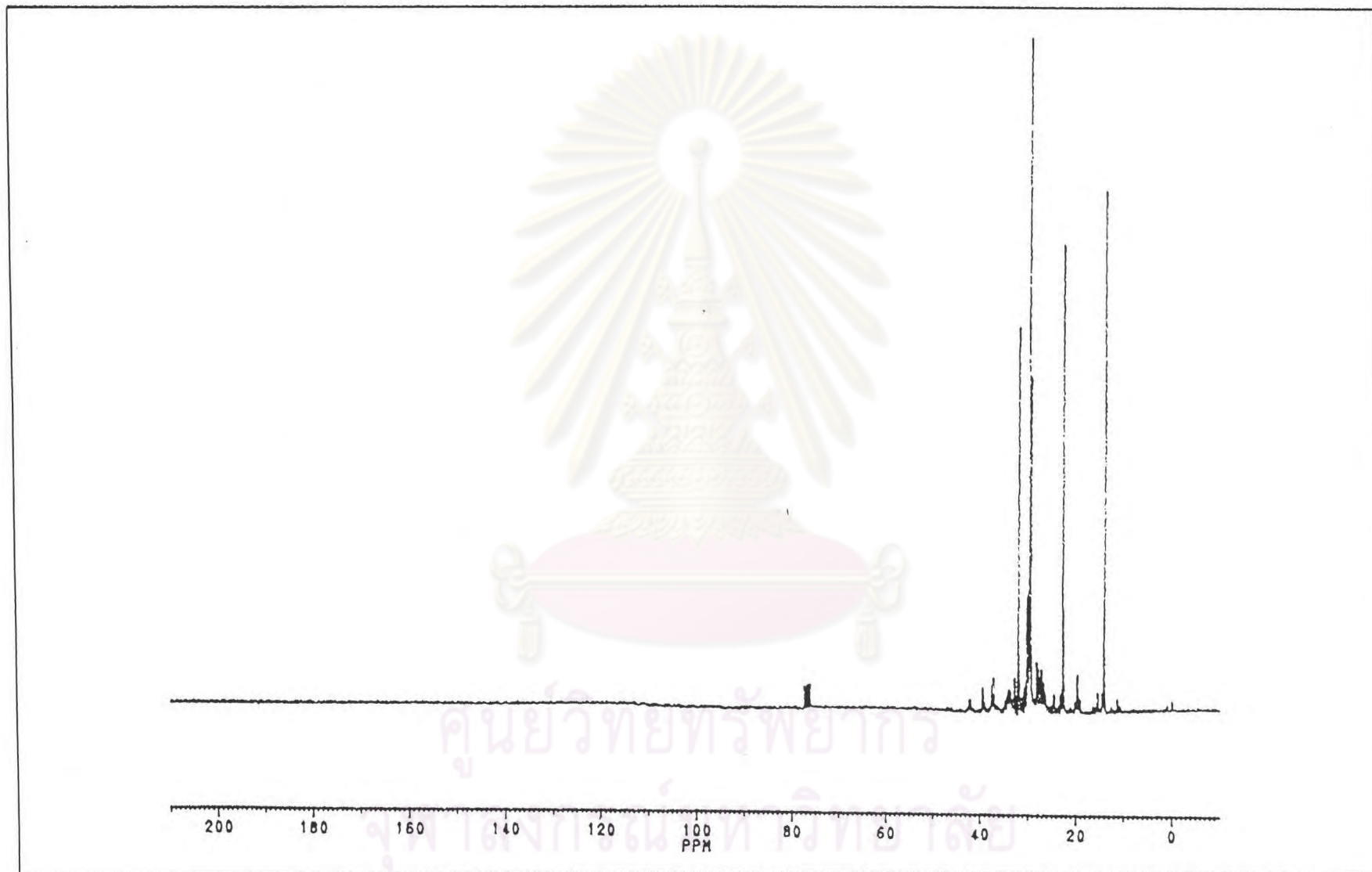


Figure A27 The  $^{13}\text{C}$  NMR spectrum of MOB1



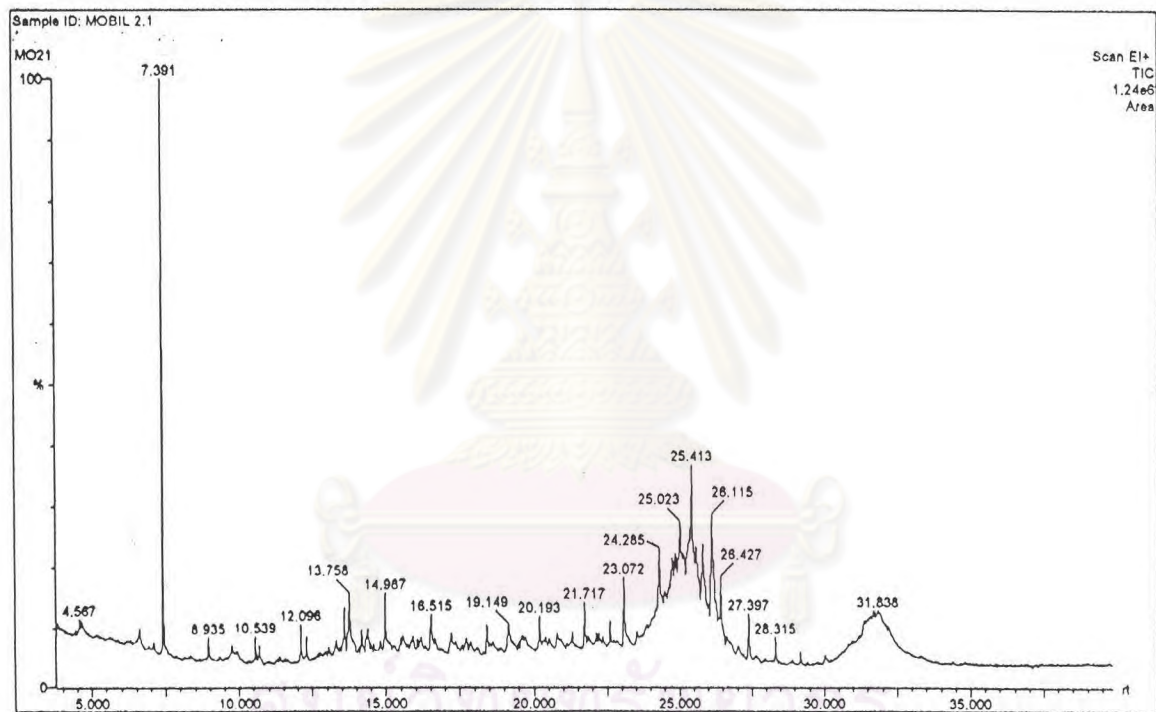


Figure A28 The GC-MS chromatogram of MOB1

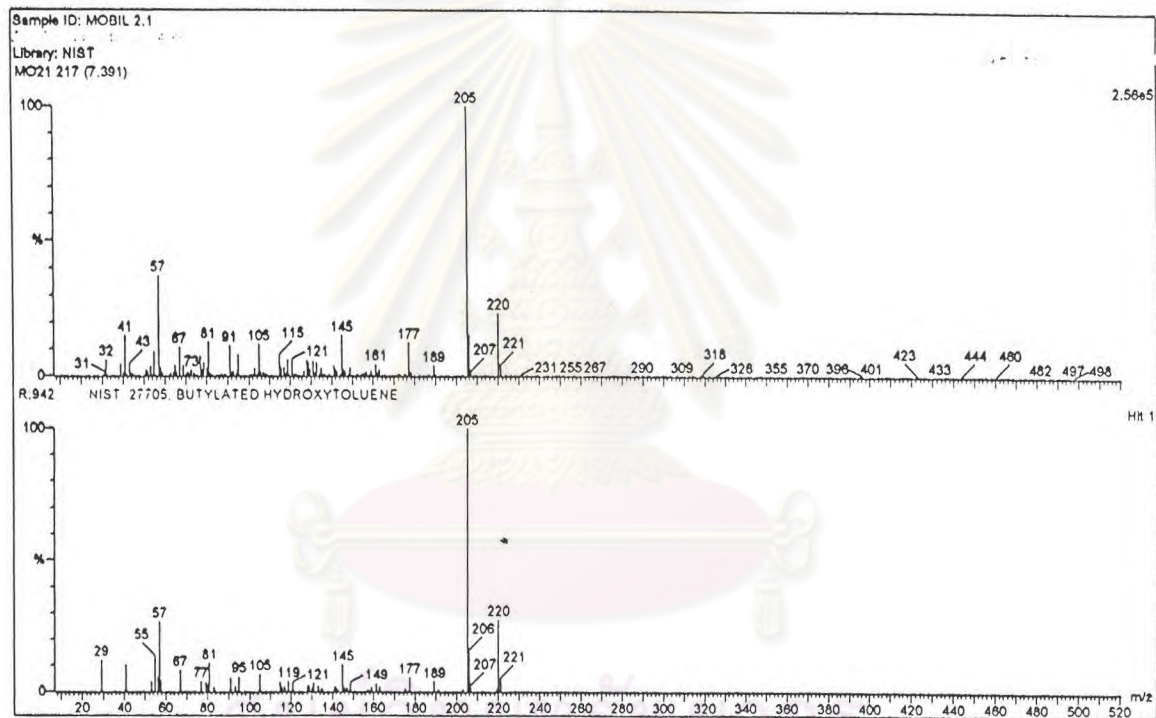


Figure A29 The mass spectrum of MOB1 at retention time 7.391 min.

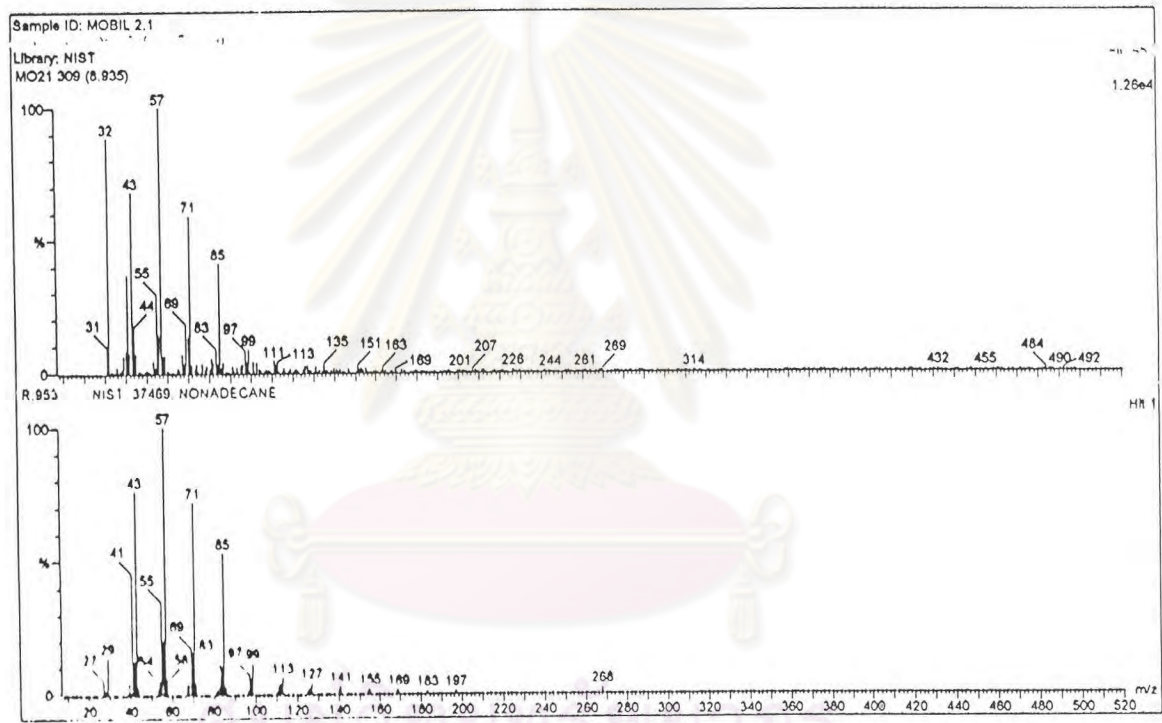


Figure A30 The mass spectrum of MOB1 at retention time 8.935 to 31.838 min.



**APPENDIX B**

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย

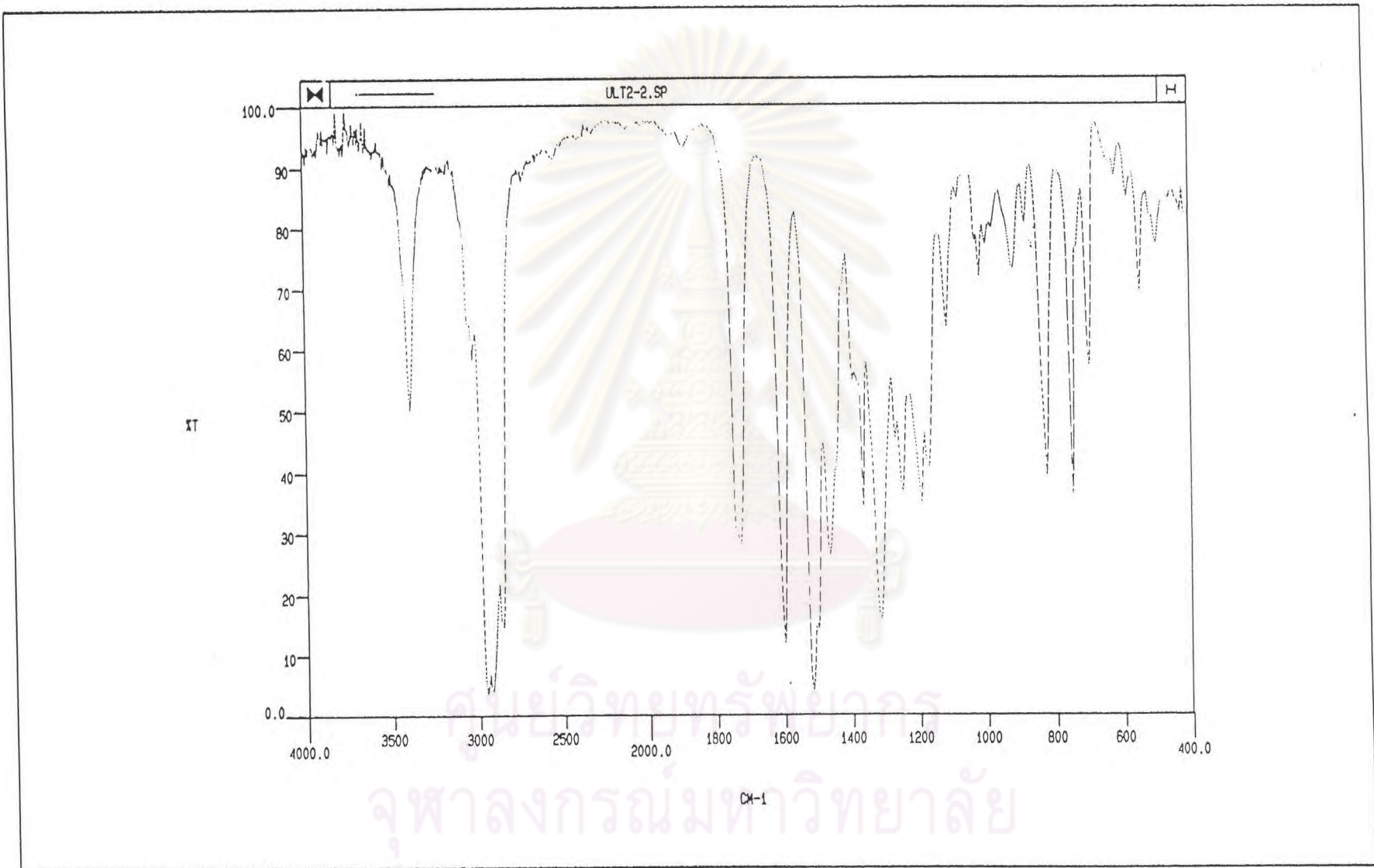


Figure B1 The IR spectrum of ULT2

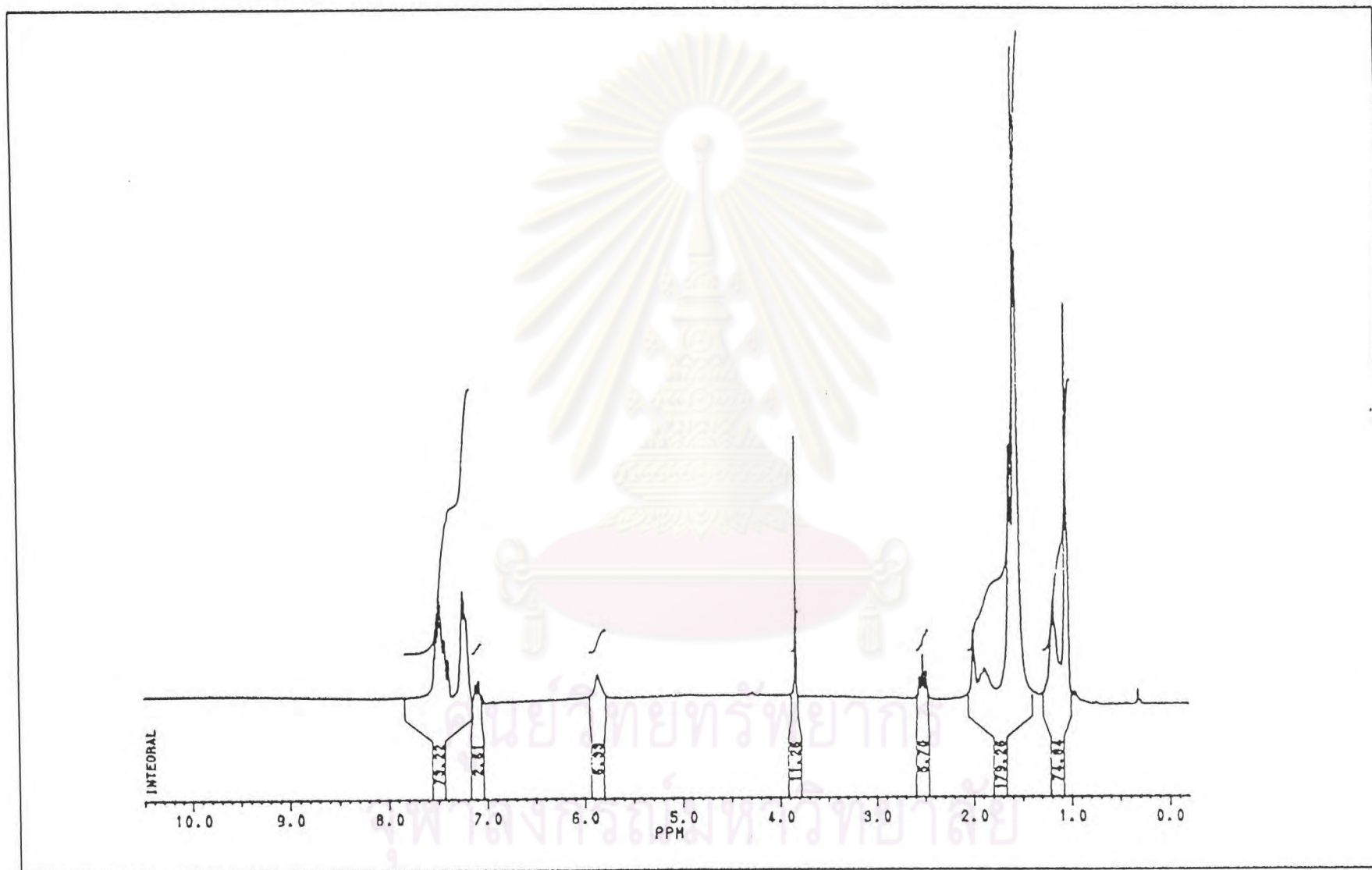


Figure B2 The  $^1\text{H}$  NMR spectrum of ULT2

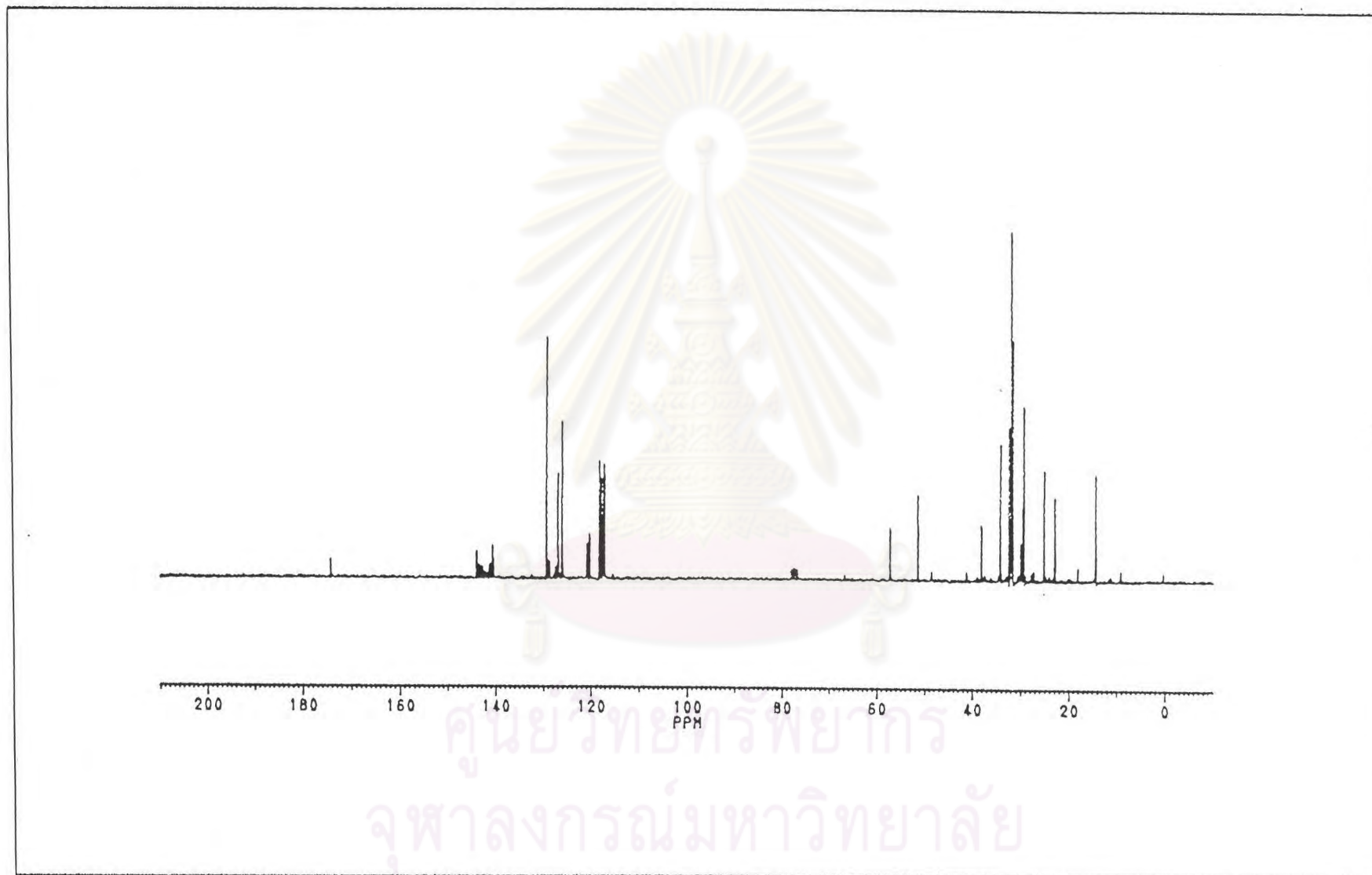


Figure B3 The  $^{13}\text{C}$  NMR spectrum of ULT2

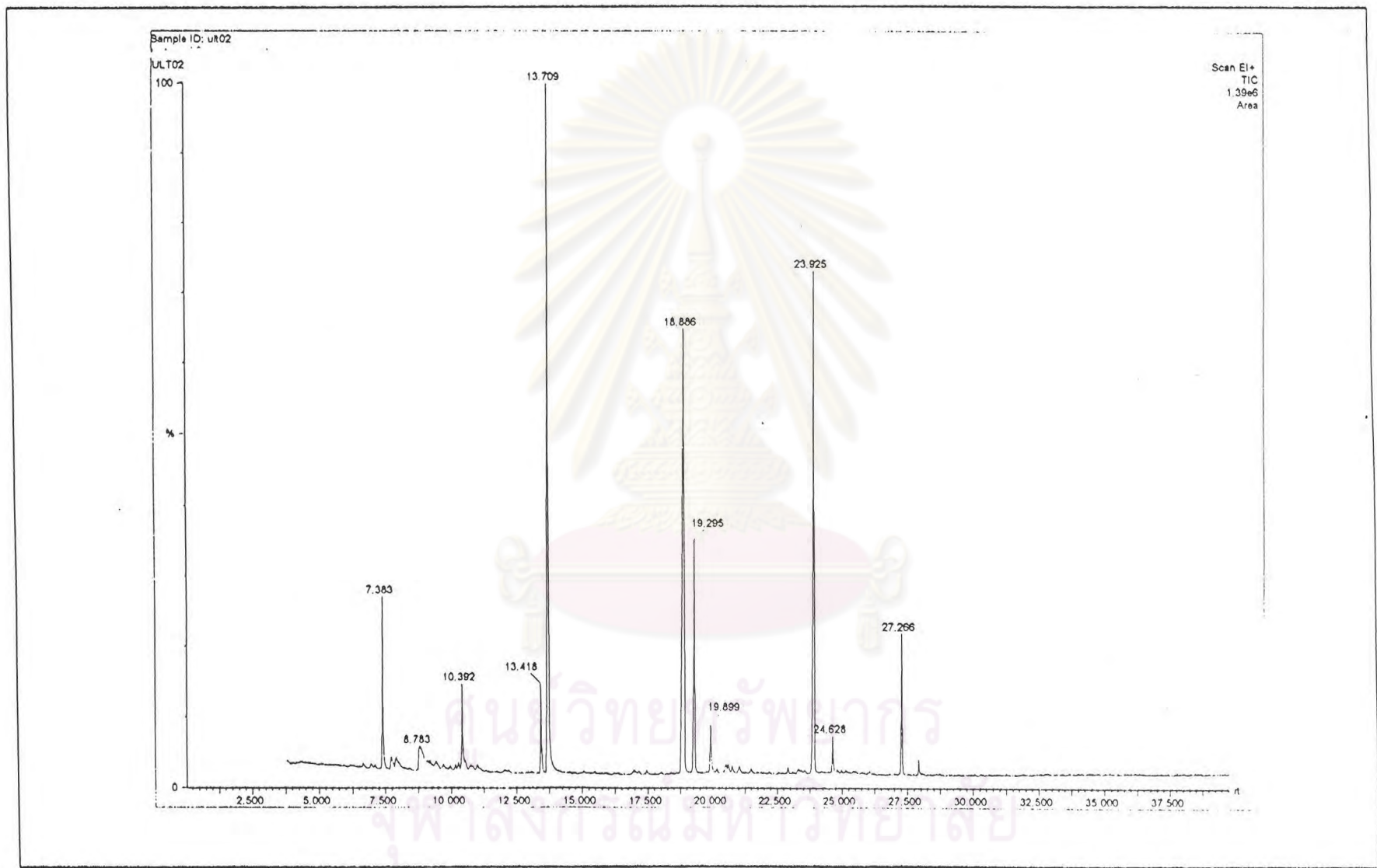


Figure B4 The GC-MS chromatogram of ULT2



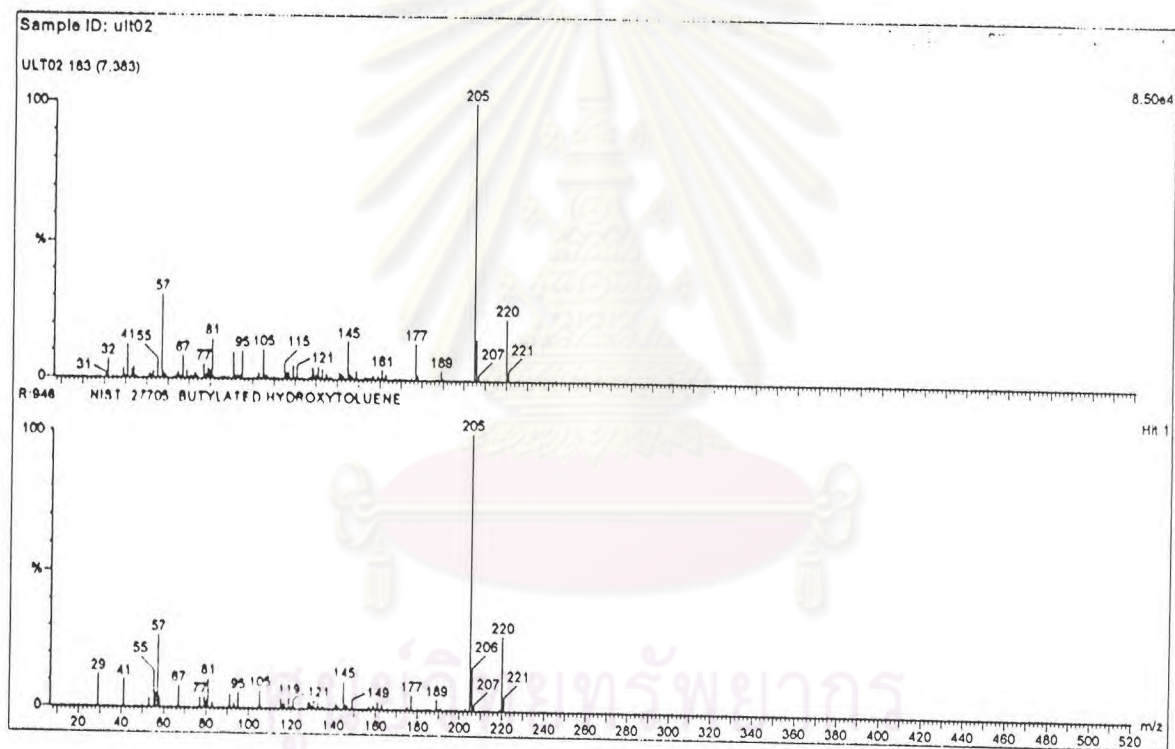


Figure B5 The mass spectrum of ULT2 at retention time 7.383 min.

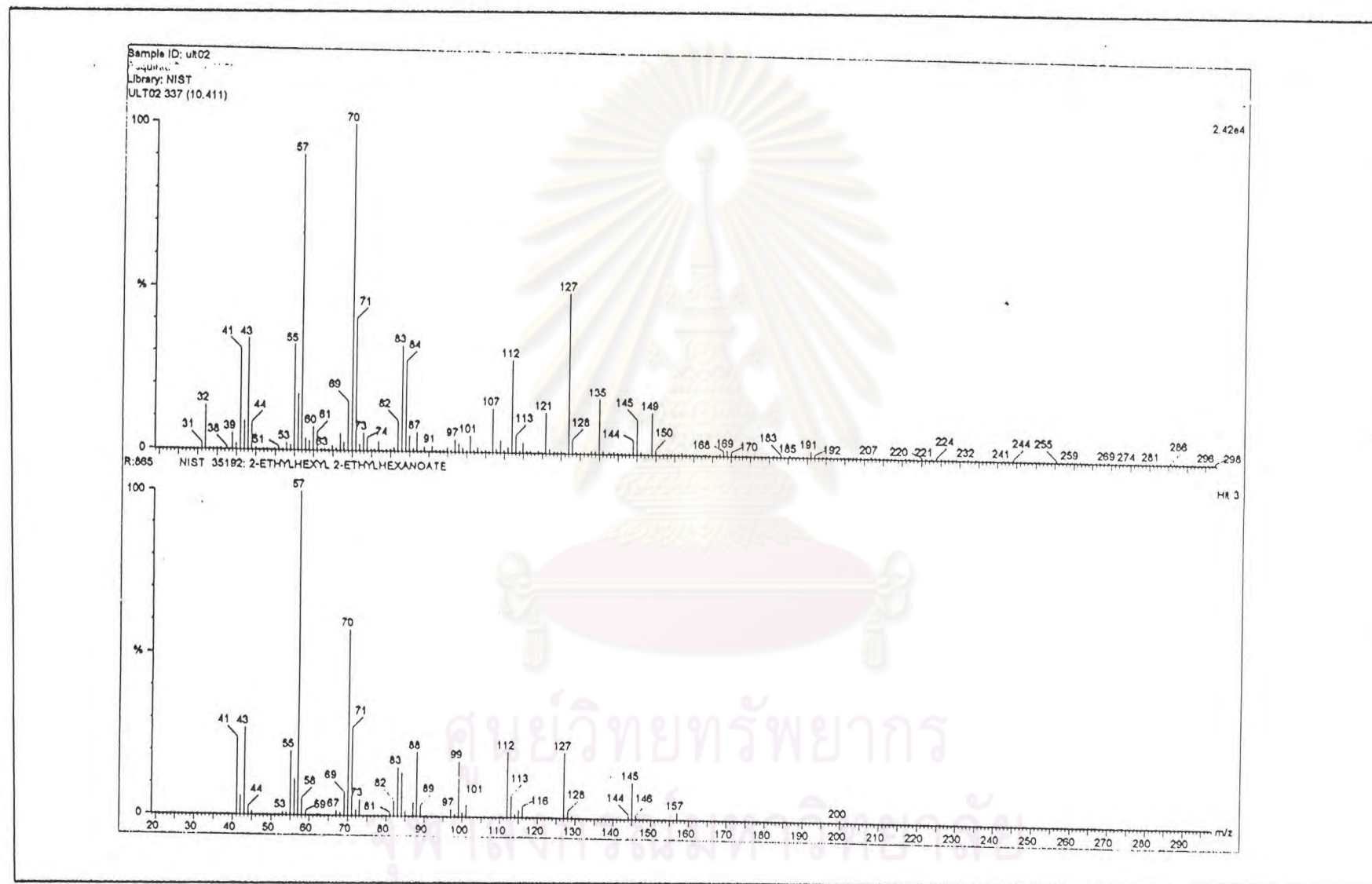


Figure B6 The mass spectrum of ULT2 at retention time 10.392 min.

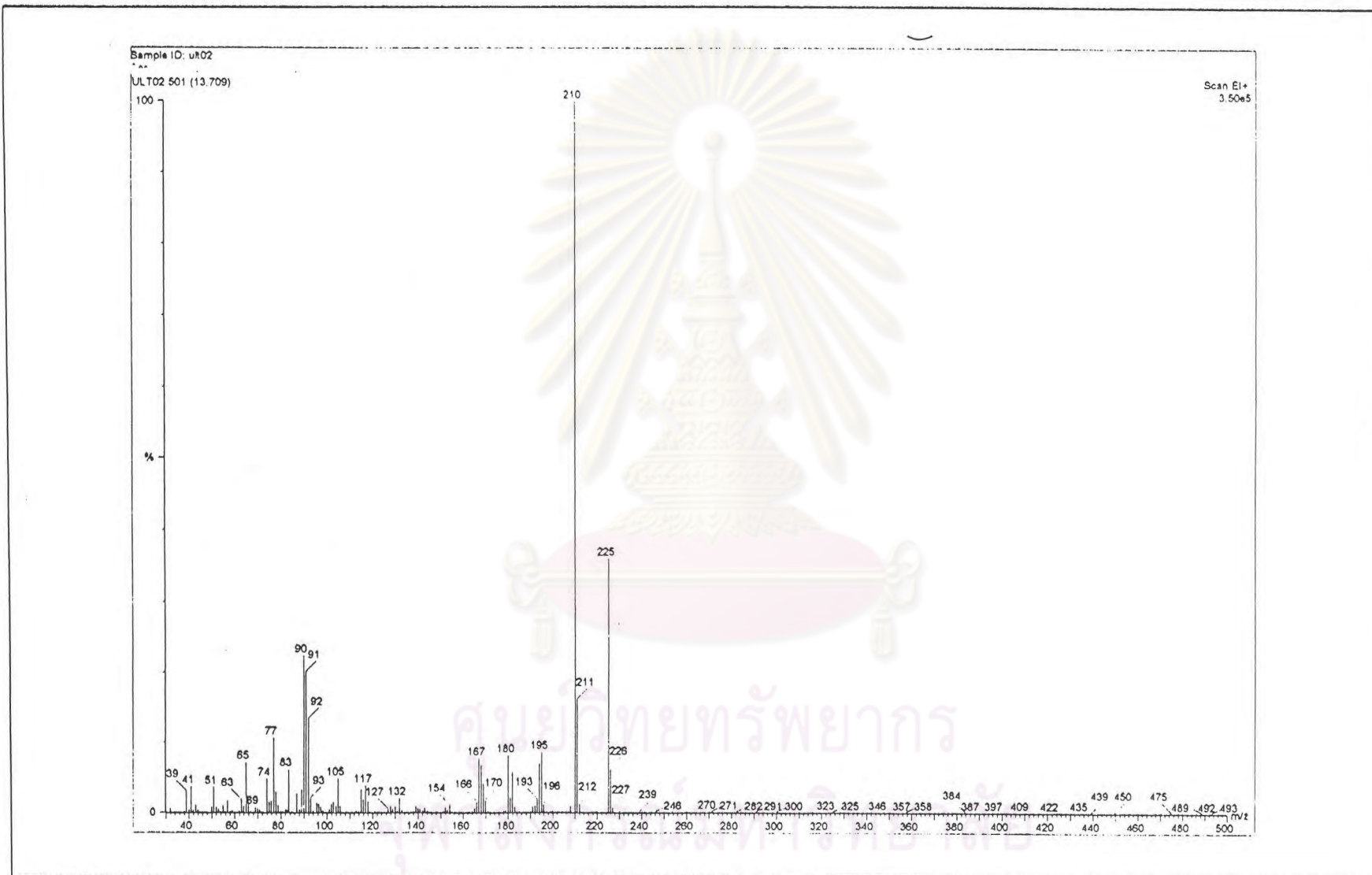


Figure B7 The mass spectrum of ULT2 at retention time 13.709 min.

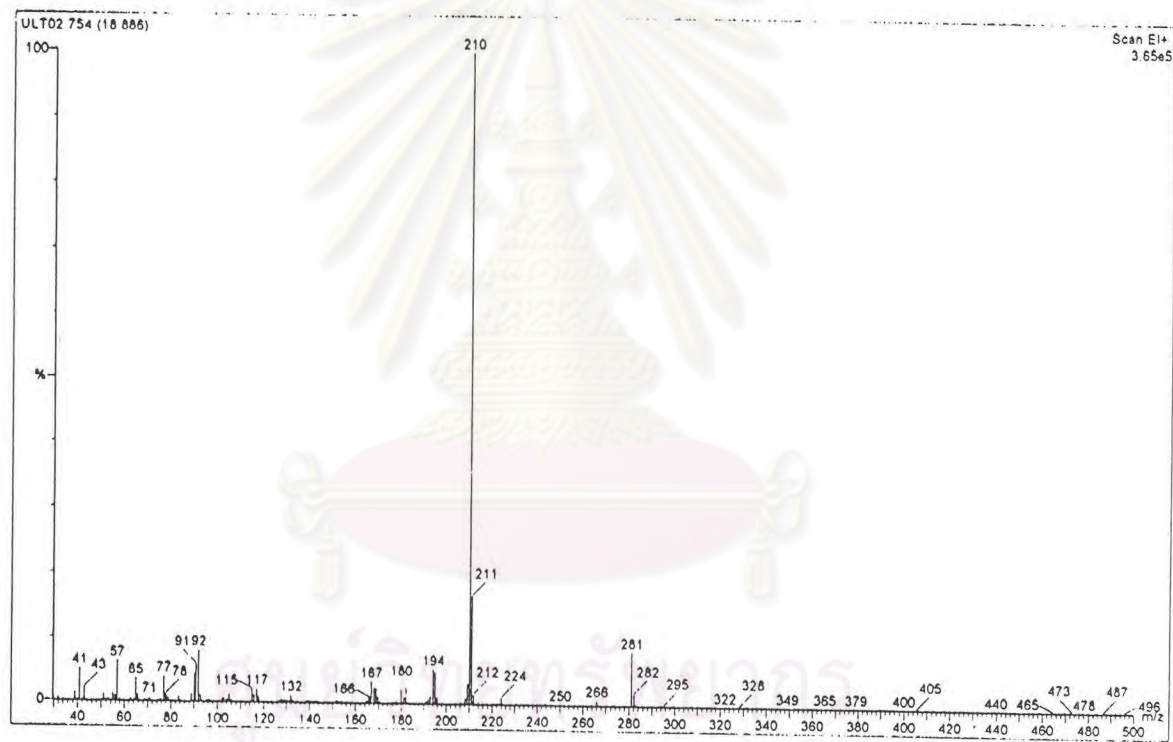


Figure B8 The mass spectrum of ULT2 at retention time 18.886 min.

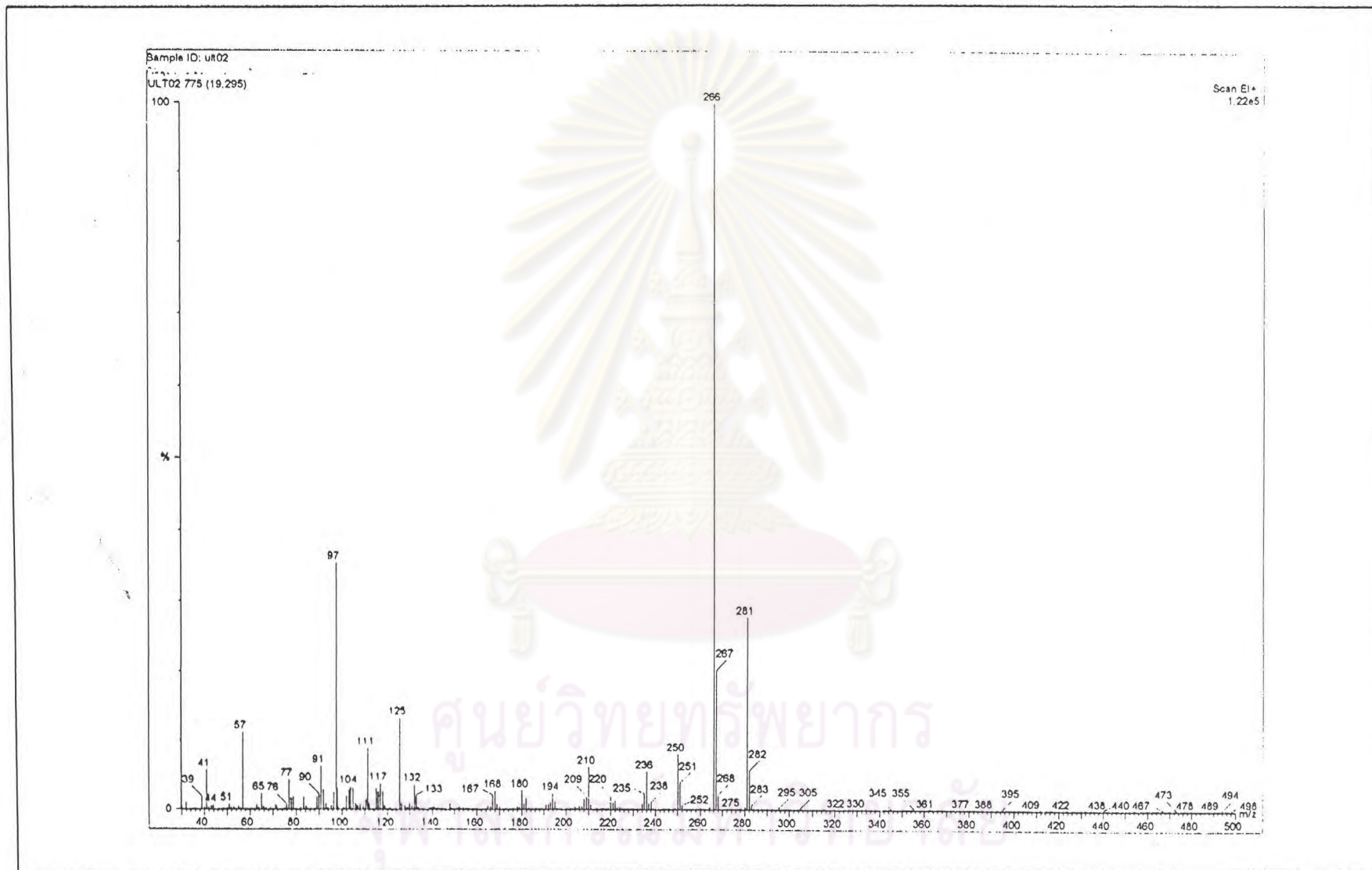


Figure B9 The mass spectrum of ULT2 at retention time 19.295 min.

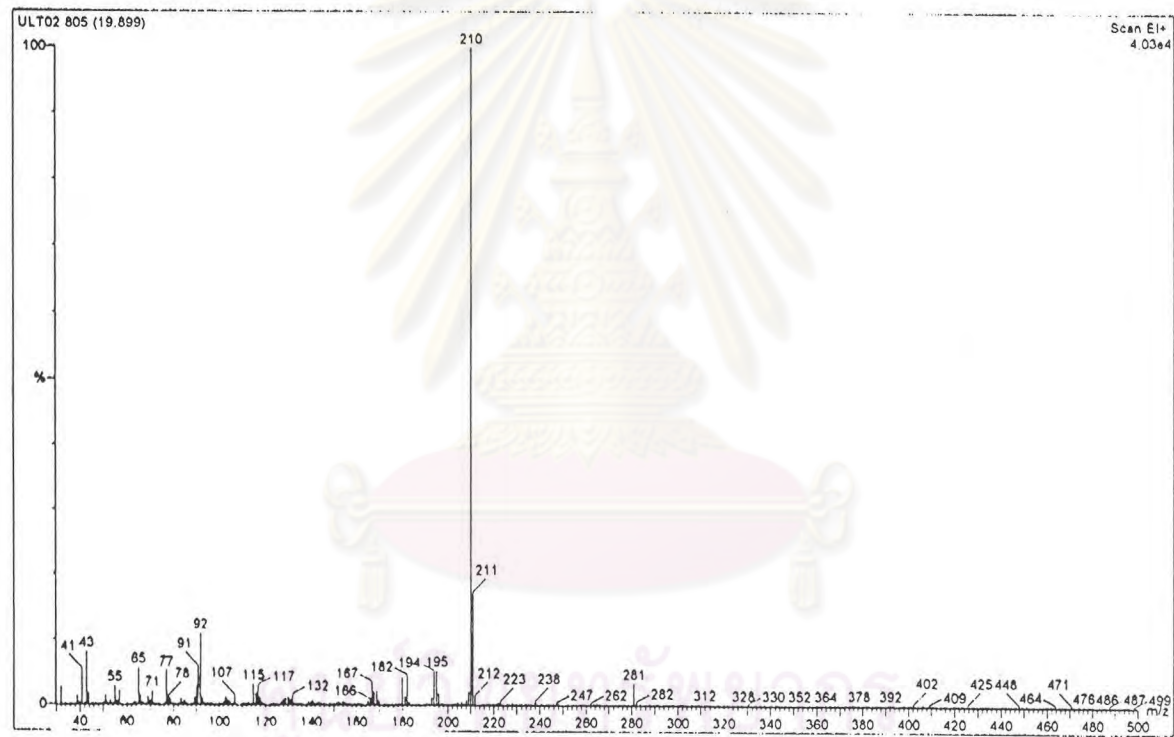


Figure B10 The mass spectrum of ULT2 at retention time 19.899 min.

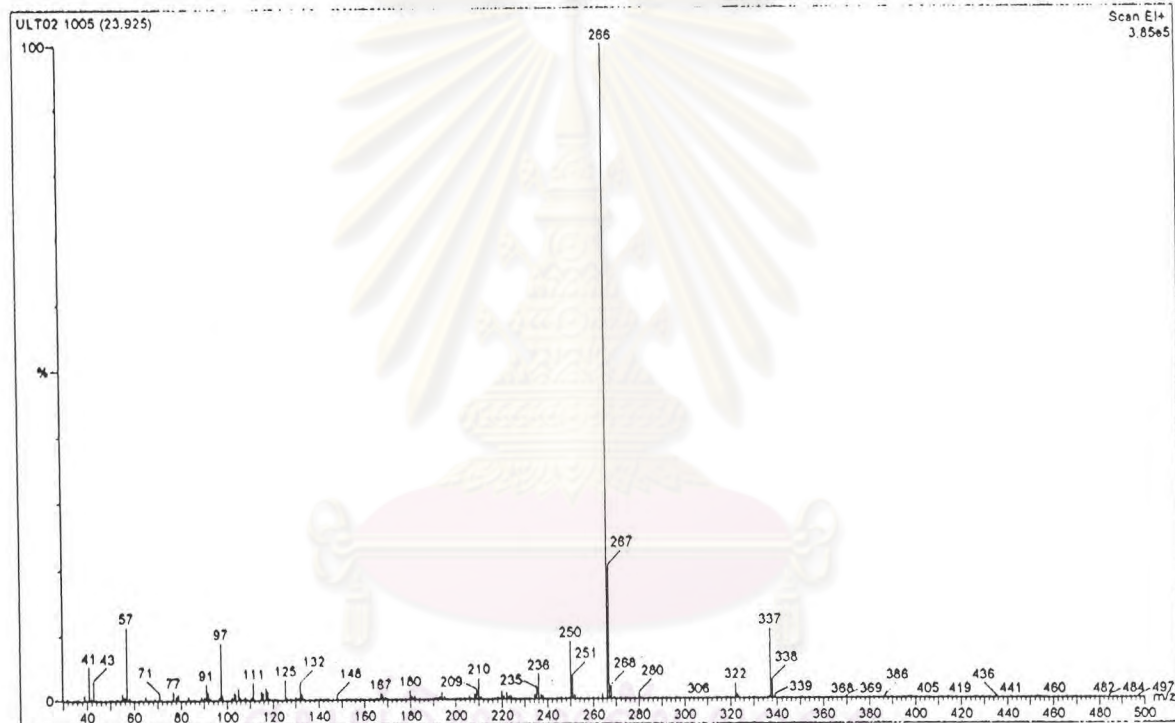


Figure B11 The mass spectrum of ULT2 at retention time 23.925 min.

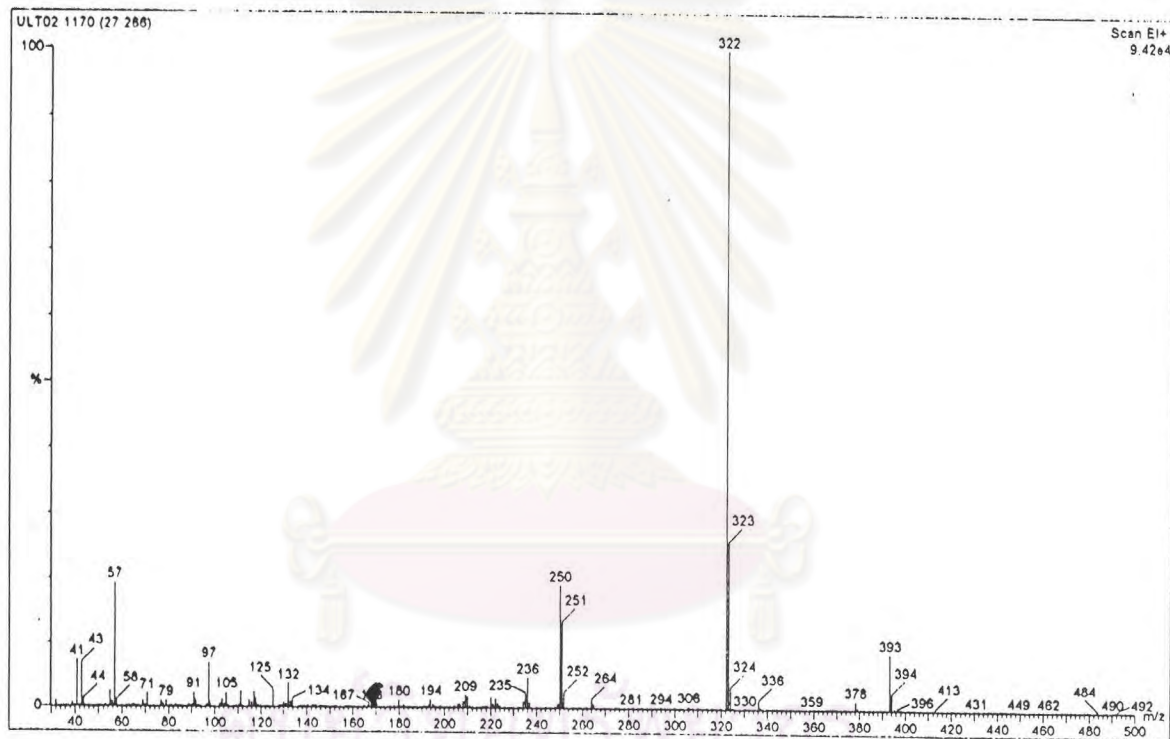


Figure B12 The mass spectrum of ULT2 at retention time 27.266 min.



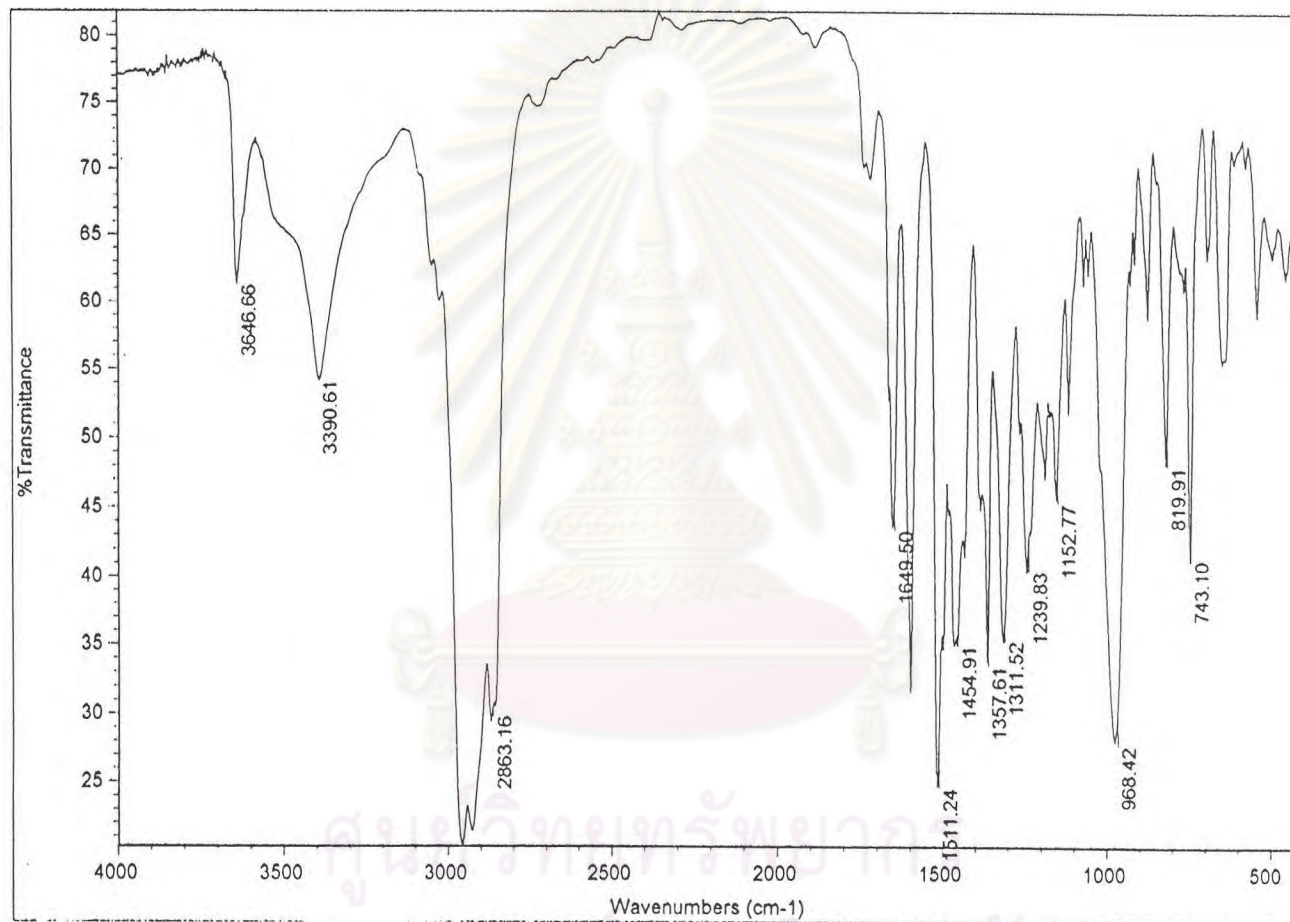


Figure B13 The IR spectrum of TMO2

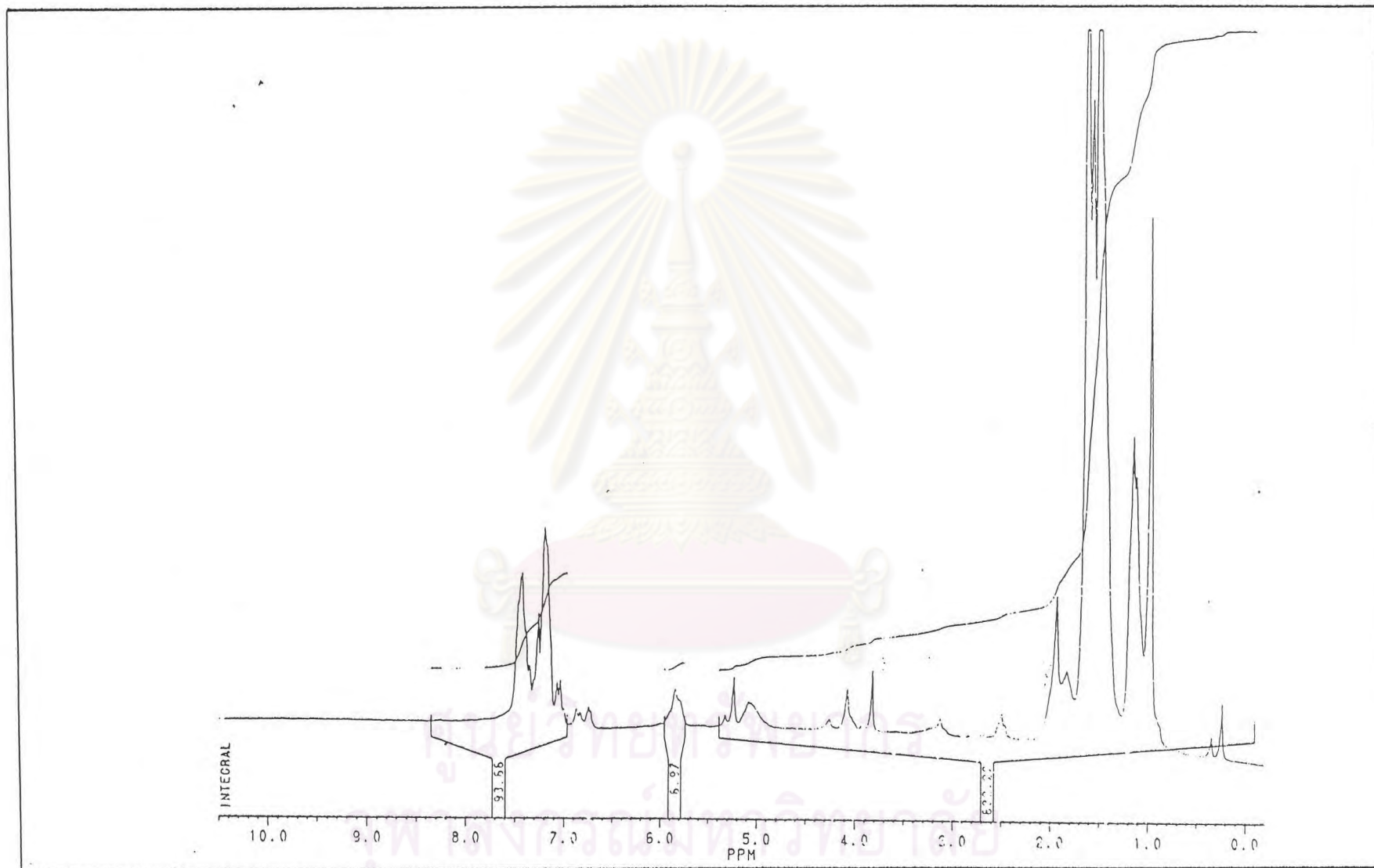


Figure B14 The  $^1\text{H}$  NMR spectrum of TMO2

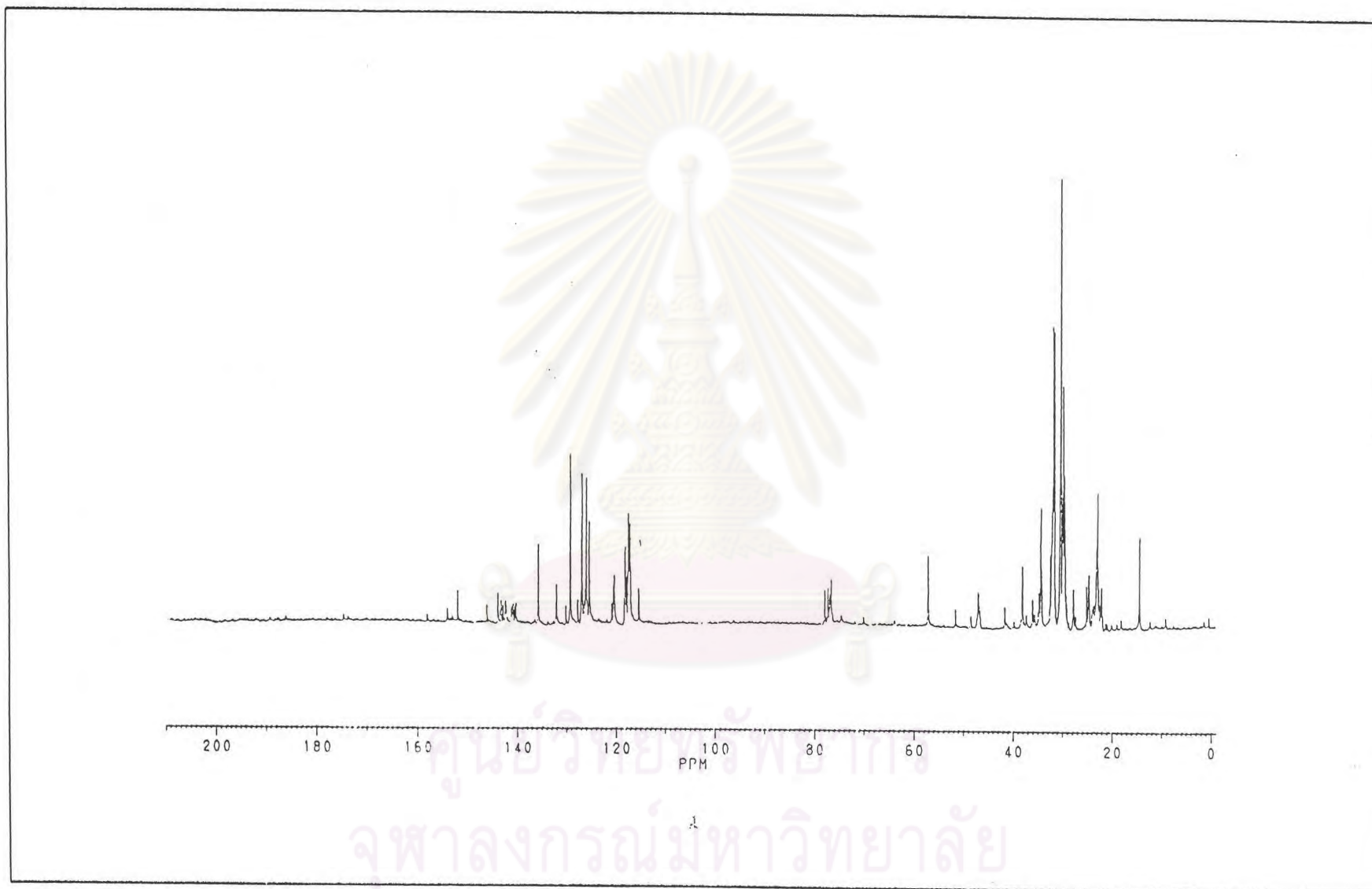


Figure B15 The  $^{13}\text{C}$  NMR spectrum of TMO2

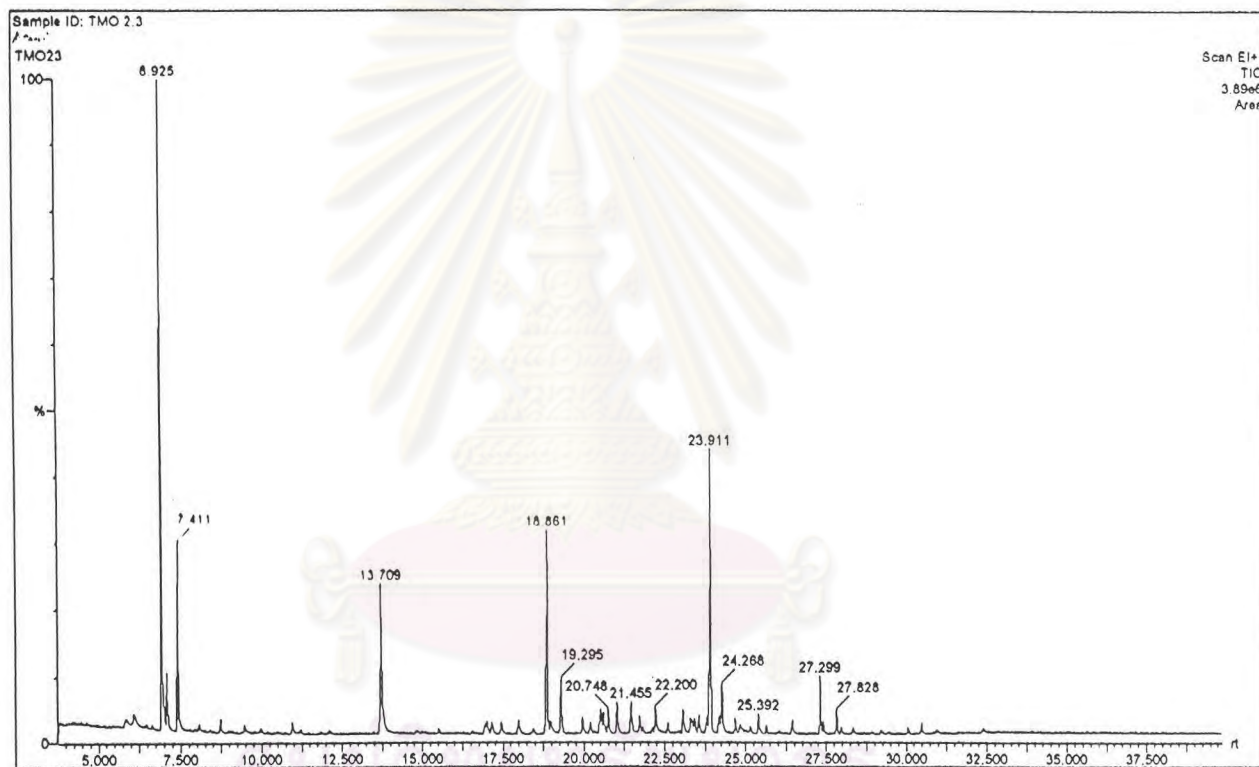


Figure B16 The GC-MS chromatogram of TMO2

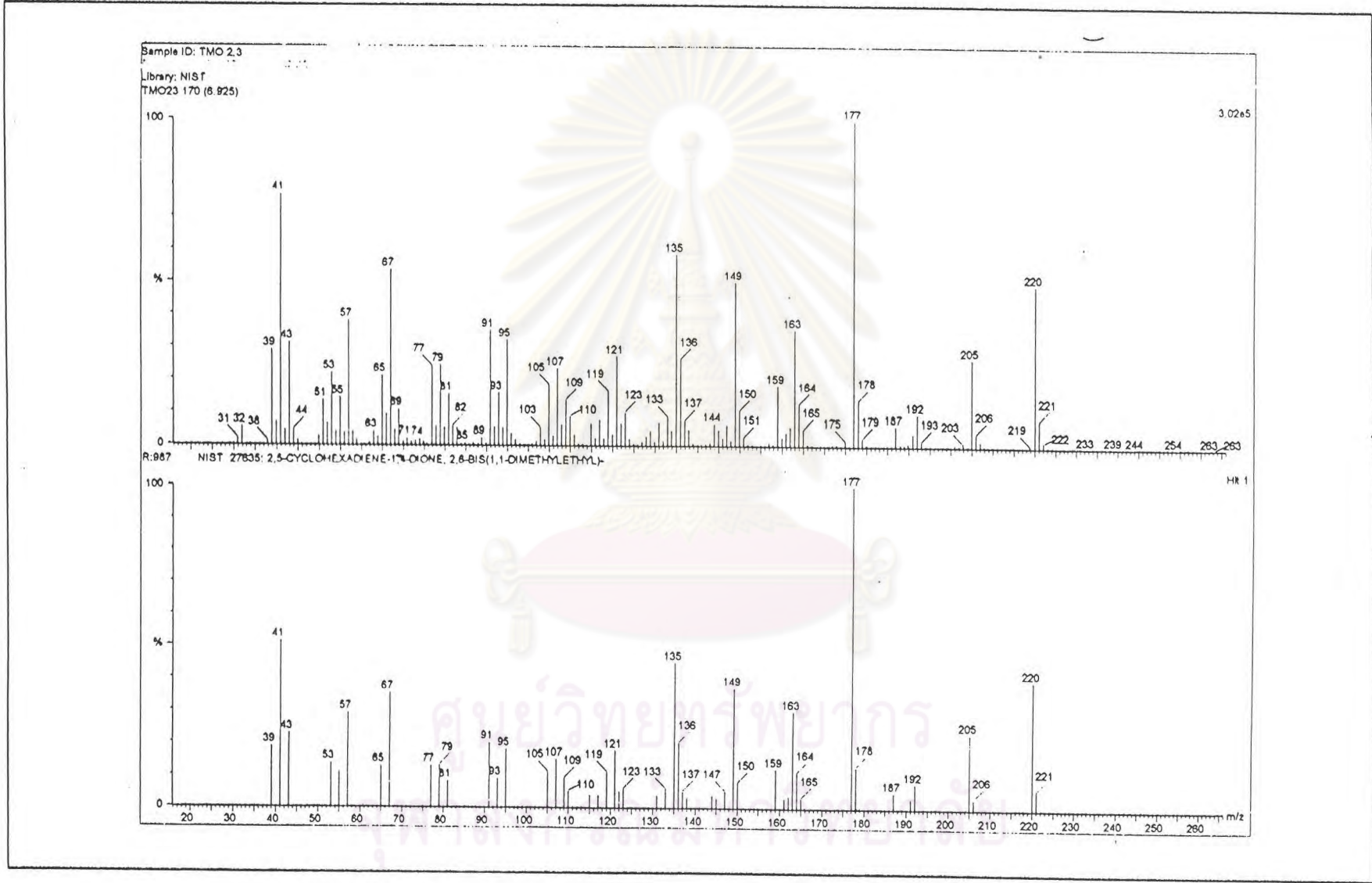


Figure B17 The mass spectrum of TMO2 at retention time 6.925 min.

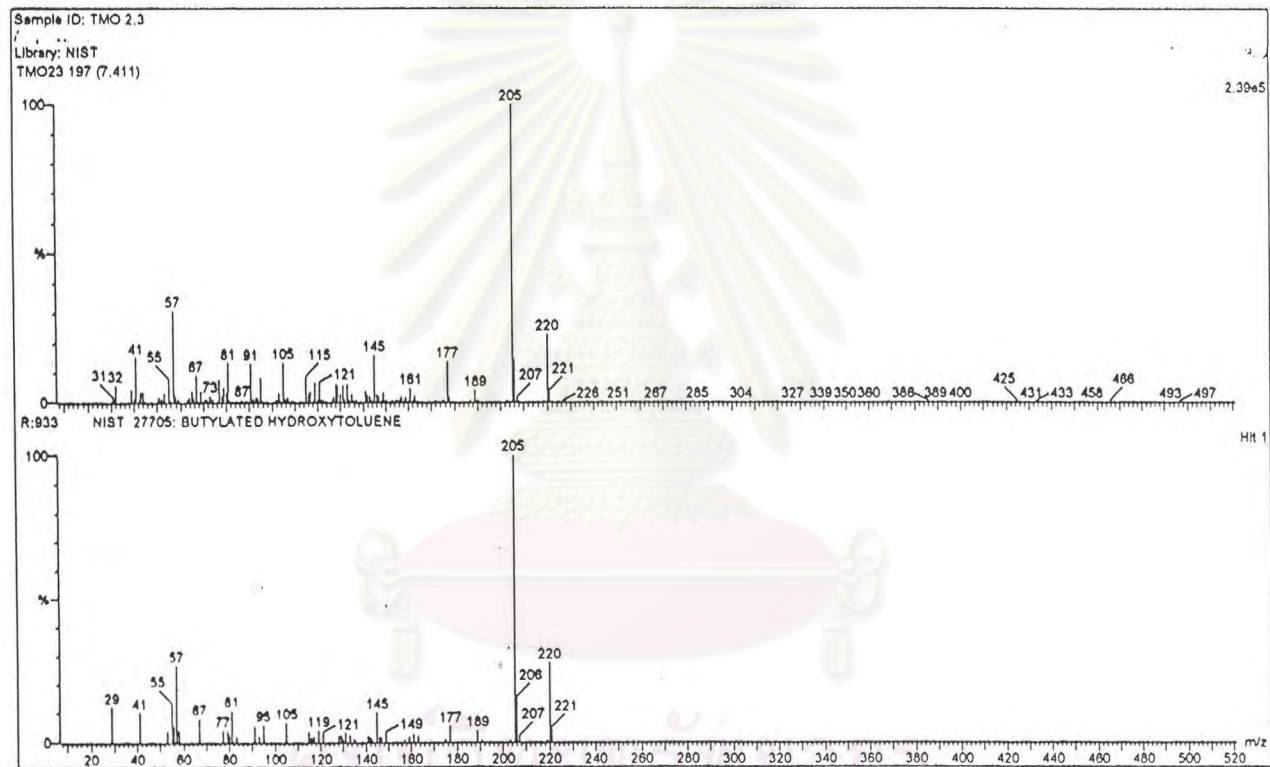


Figure B18 The mass spectrum of TMO2 at retention time 7.411 min.

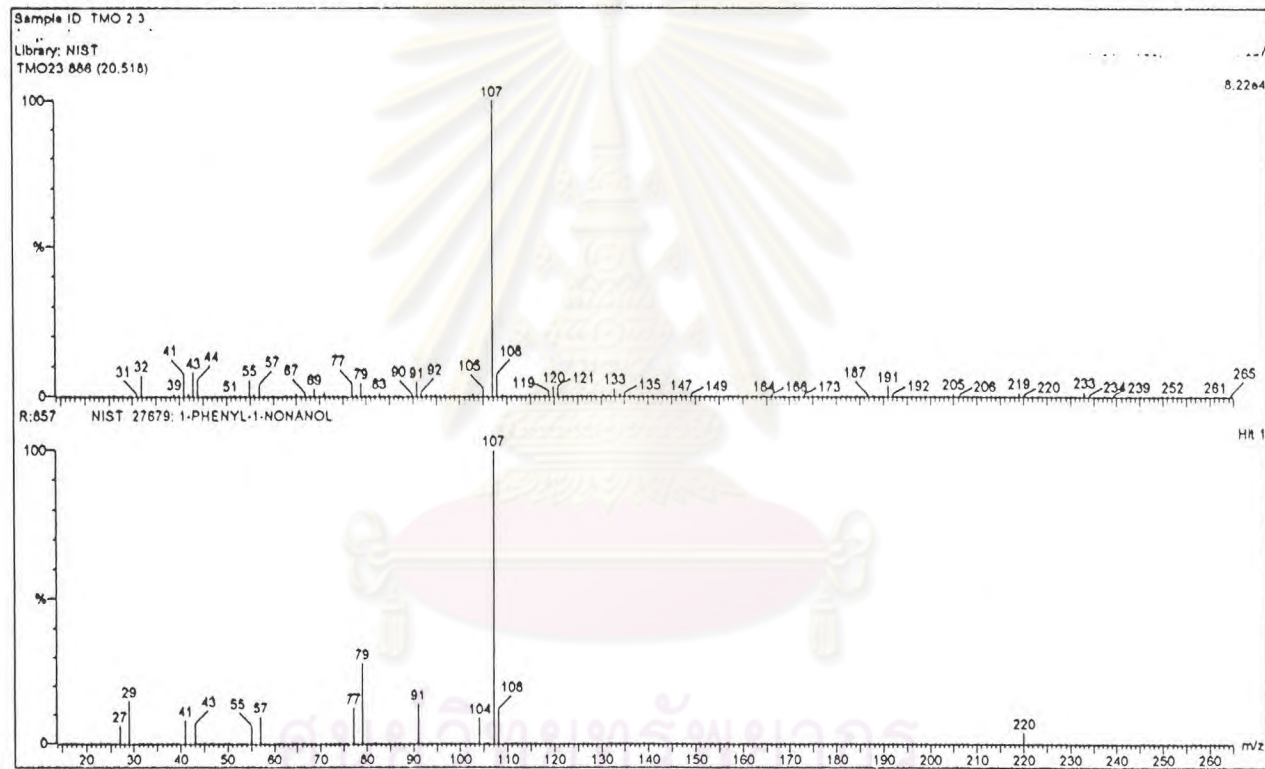


Figure B19 The mass spectrum of TMO2 at retention time 20.518 min.

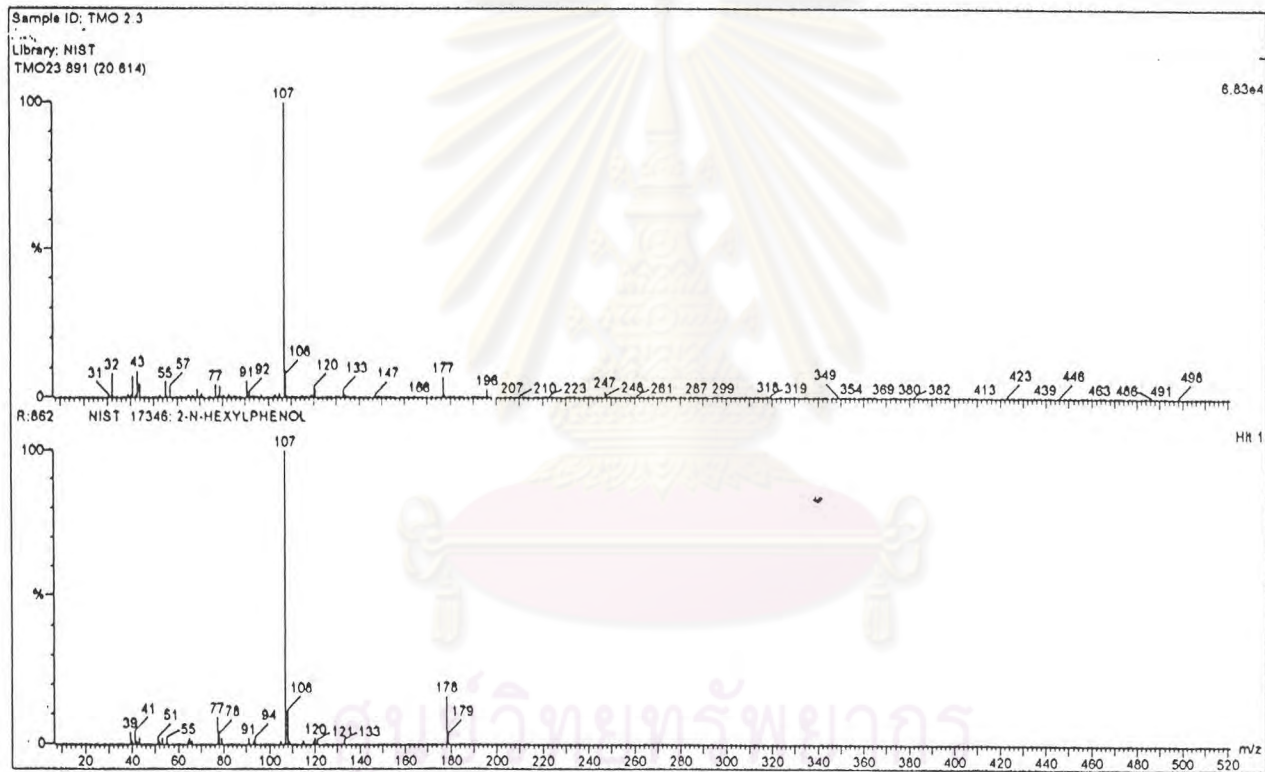


Figure B20 The mass spectrum of TMO2 at retention time 20.614 min.



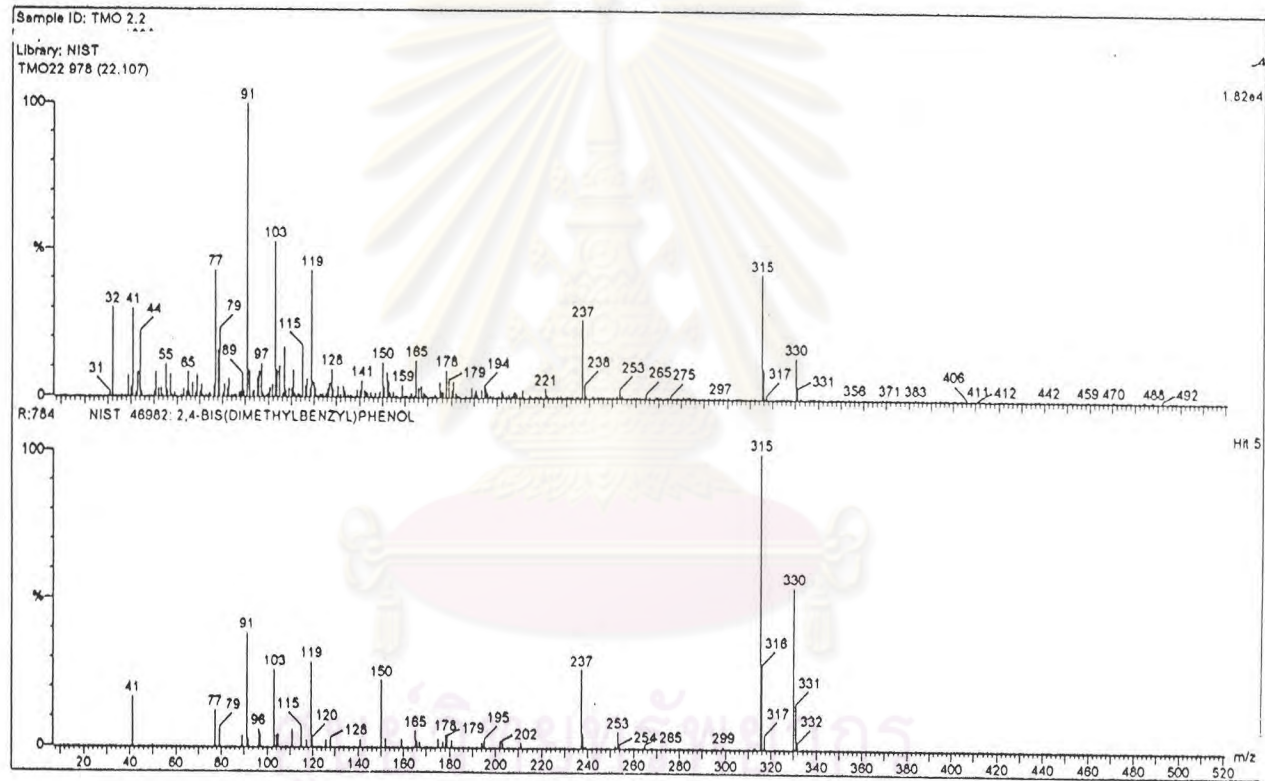


Figure B21 The mass spectrum of TMO2 at retention time 22.107 min.

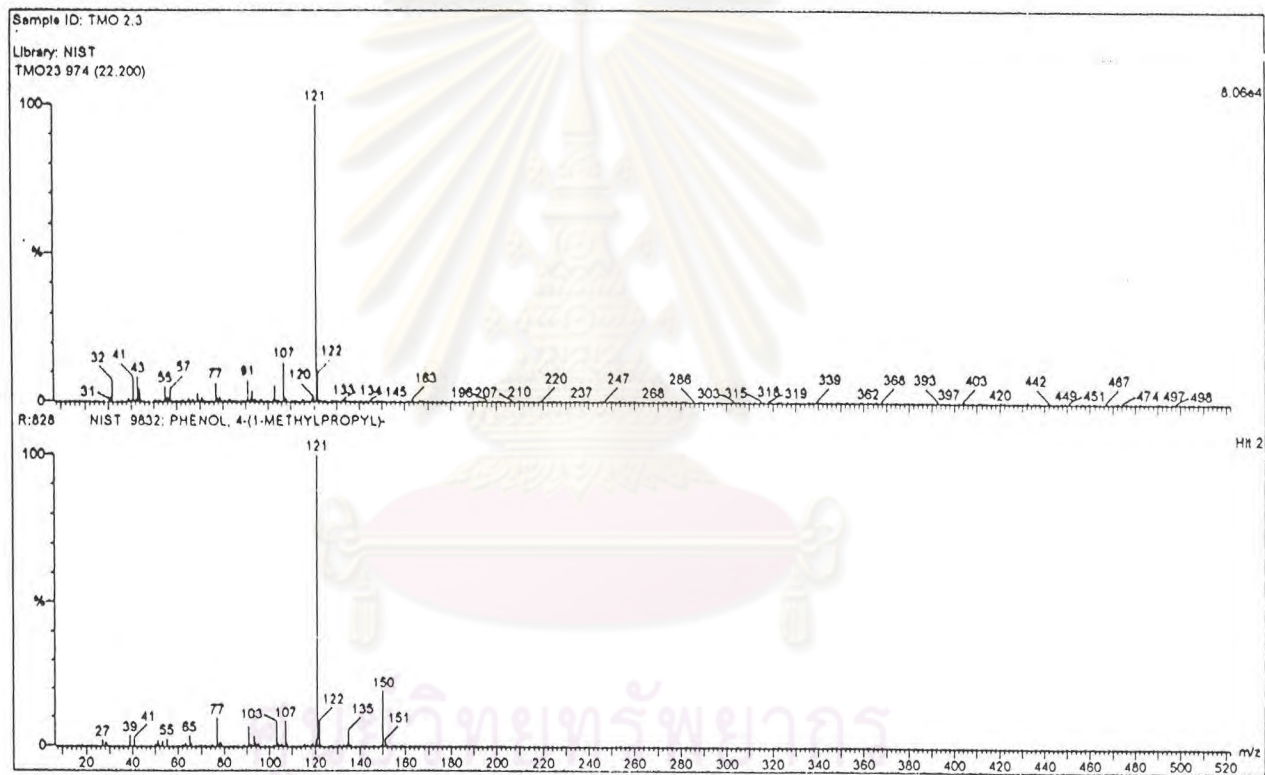


Figure B22 The mass spectrum of TMO2 at retention time 22.220 min.

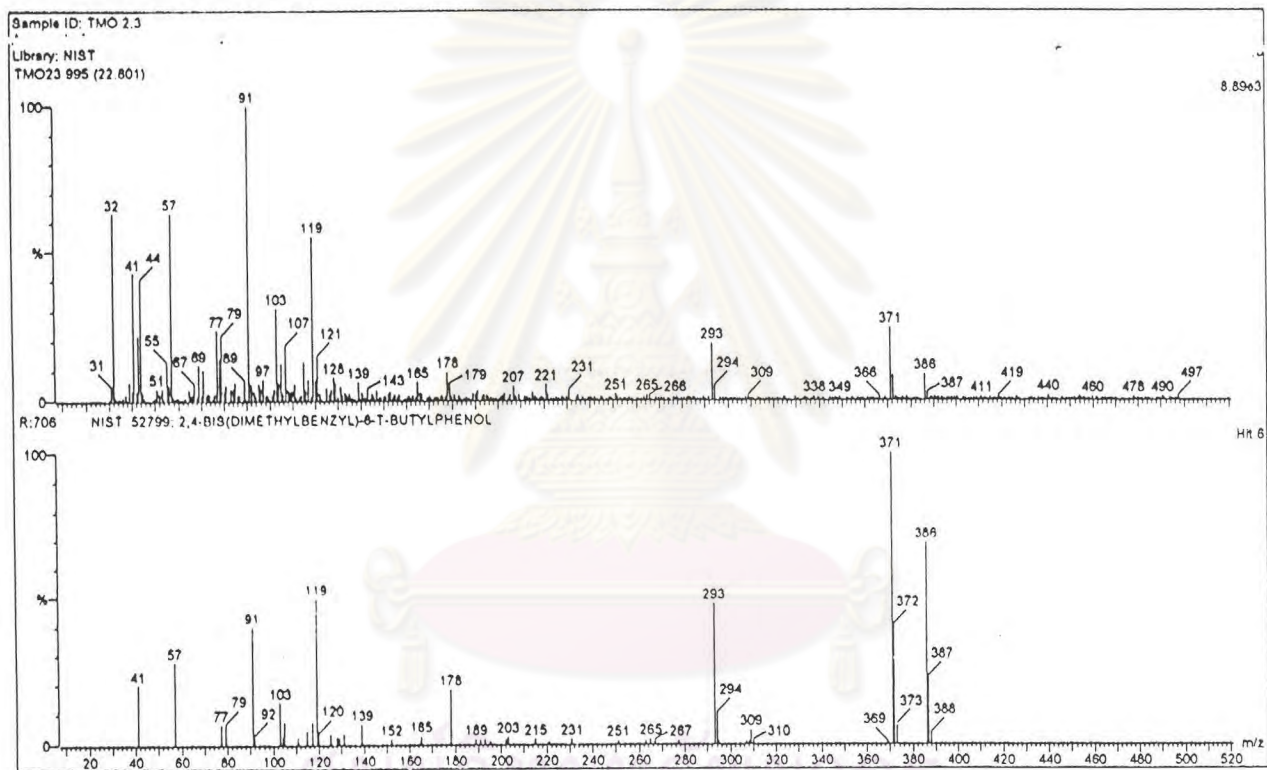


Figure B23 The mass spectrum of TMO2 at retention time 22.601 min.

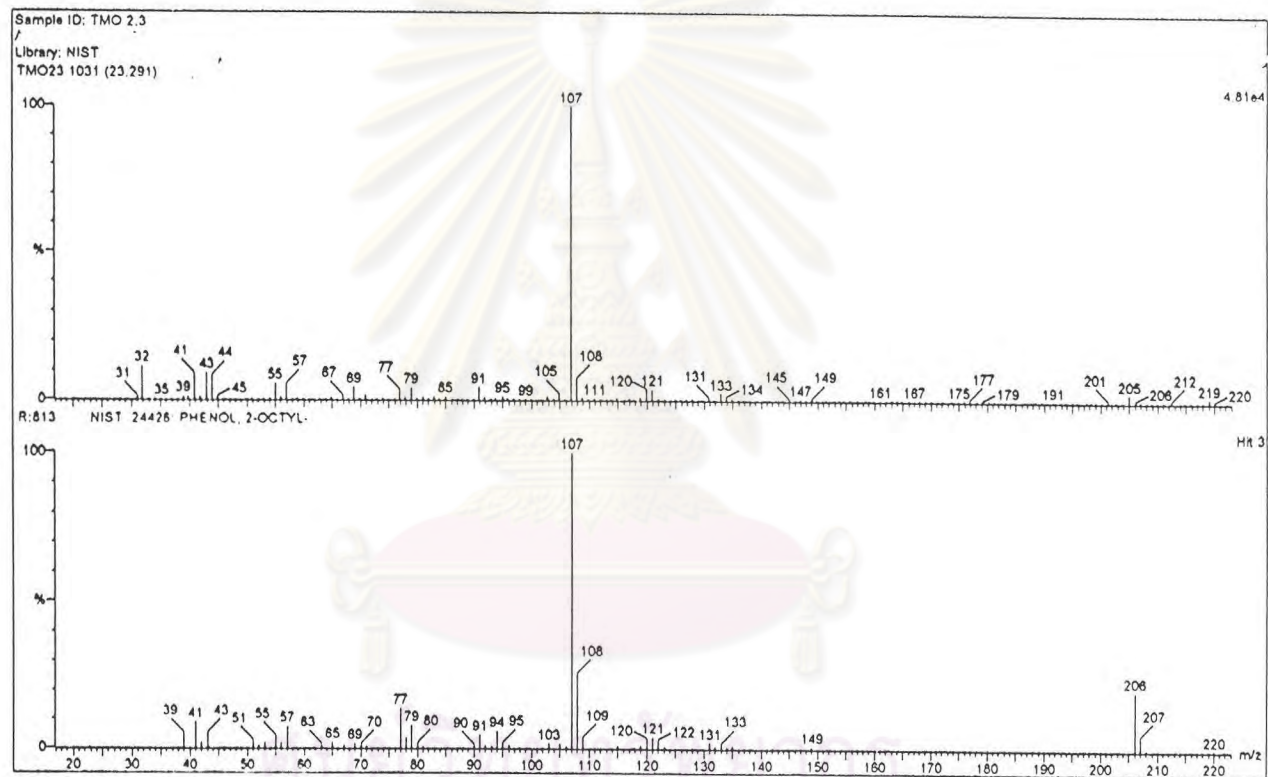


Figure B24 The mass spectrum of TMO2 at retention time 23.291 min.

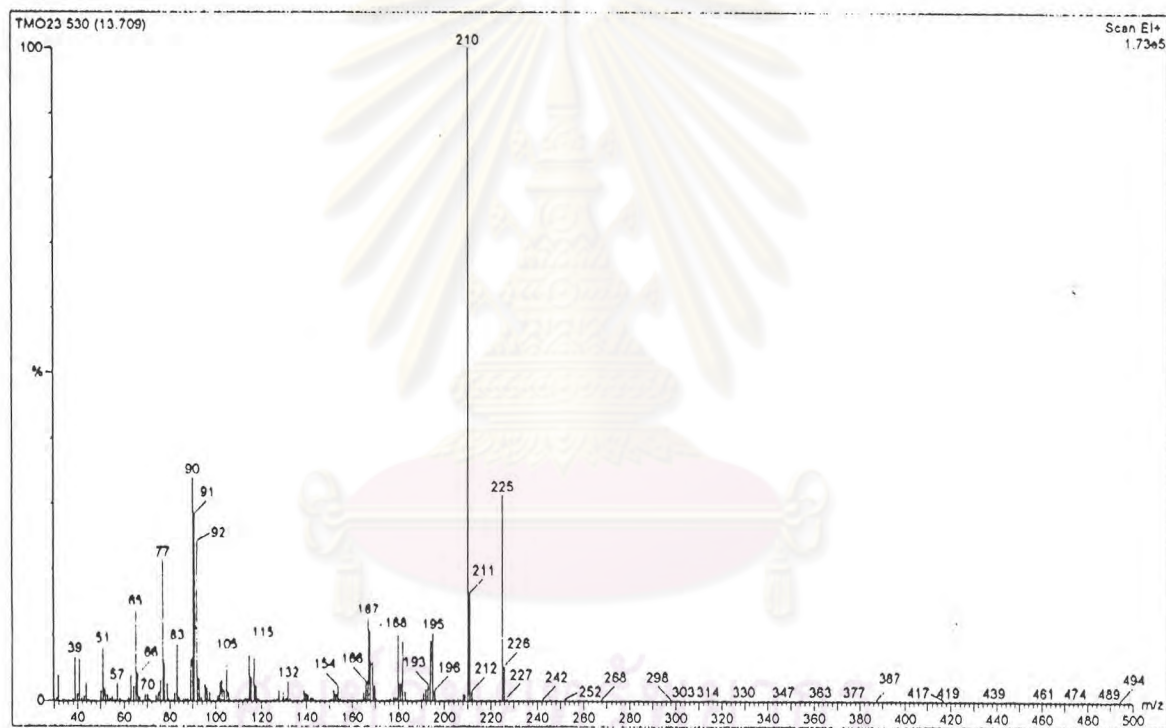


Figure B25 The mass spectrum of TMO2 at retention time 13.709 min.

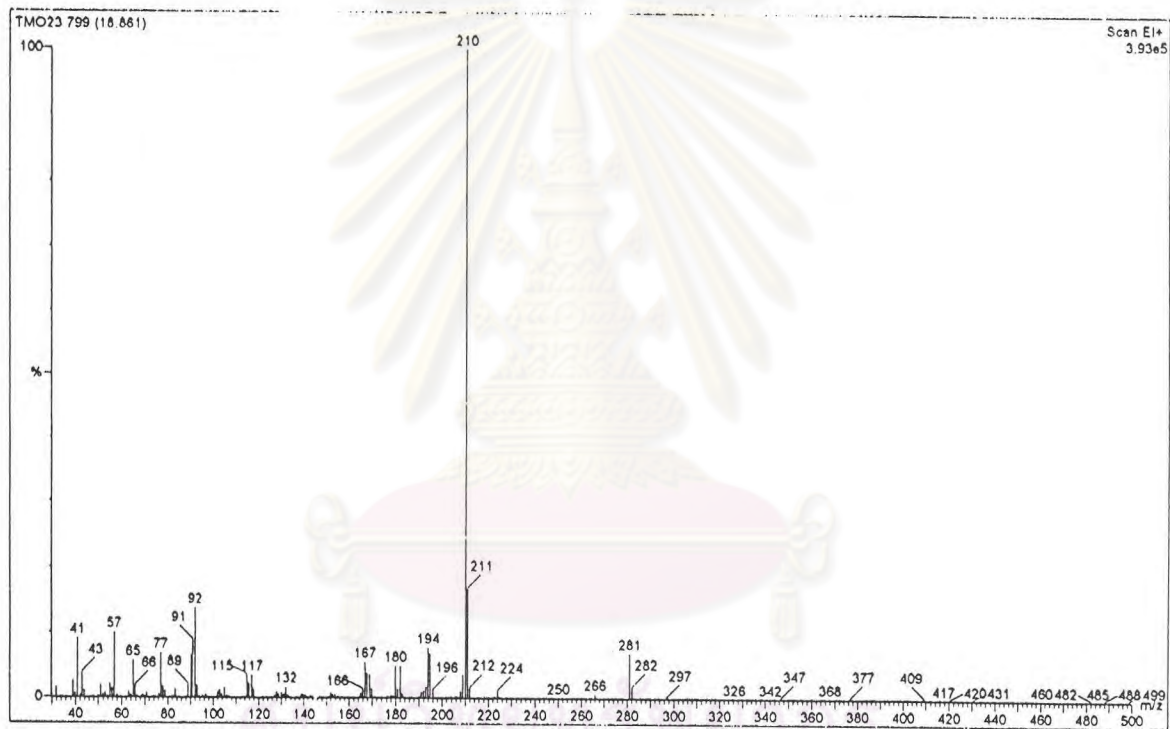


Figure B26 The mass spectrum of TMO2 at retention time 18.861 min.

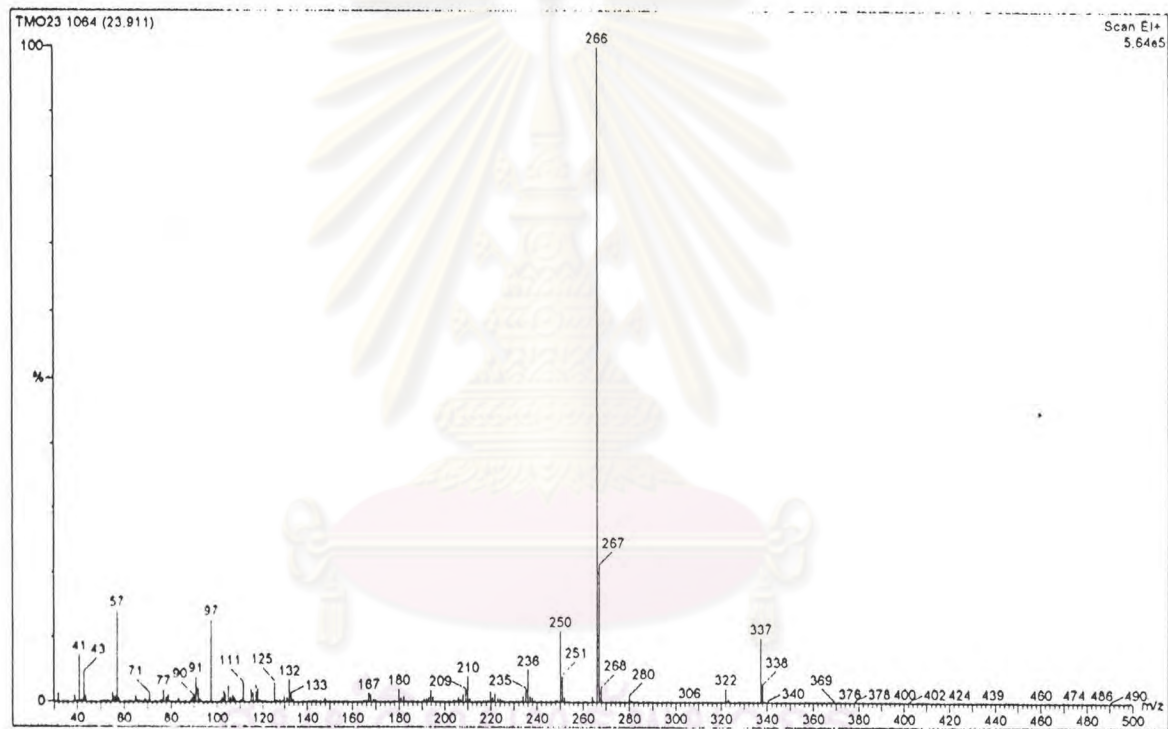


Figure B27 The mass spectrum of TMO2 at retention time 23.911 min.

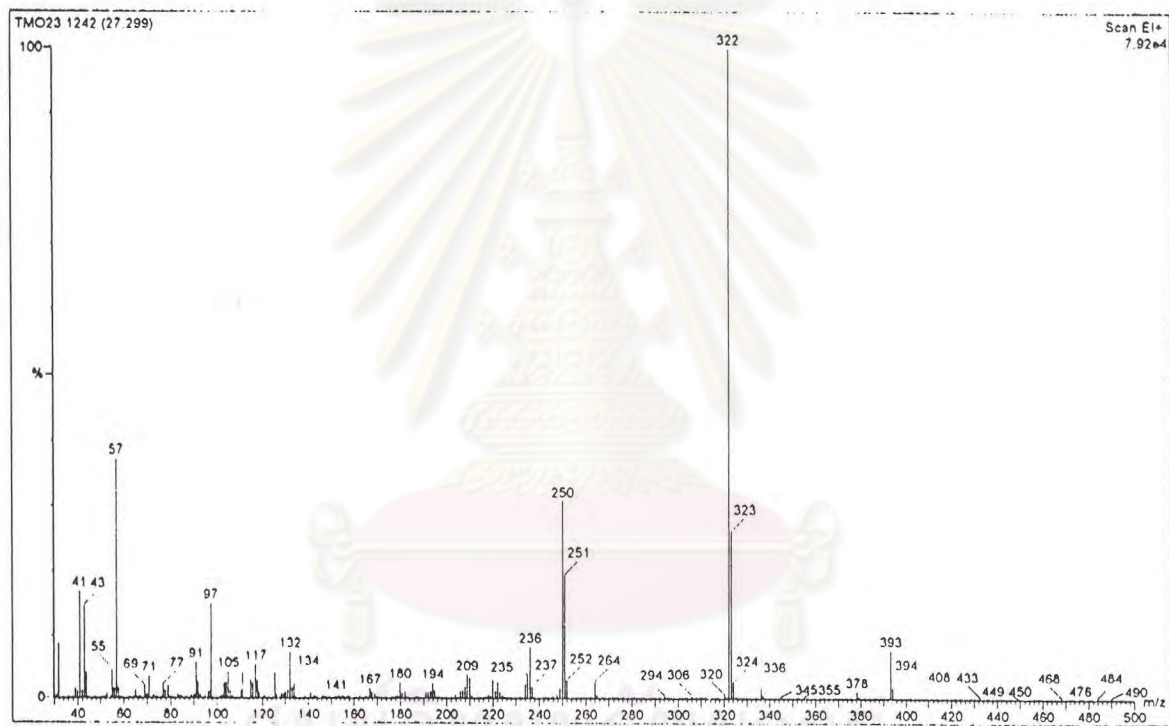


Figure B28 The mass spectrum of TMO2 at retention time 27.299 min.



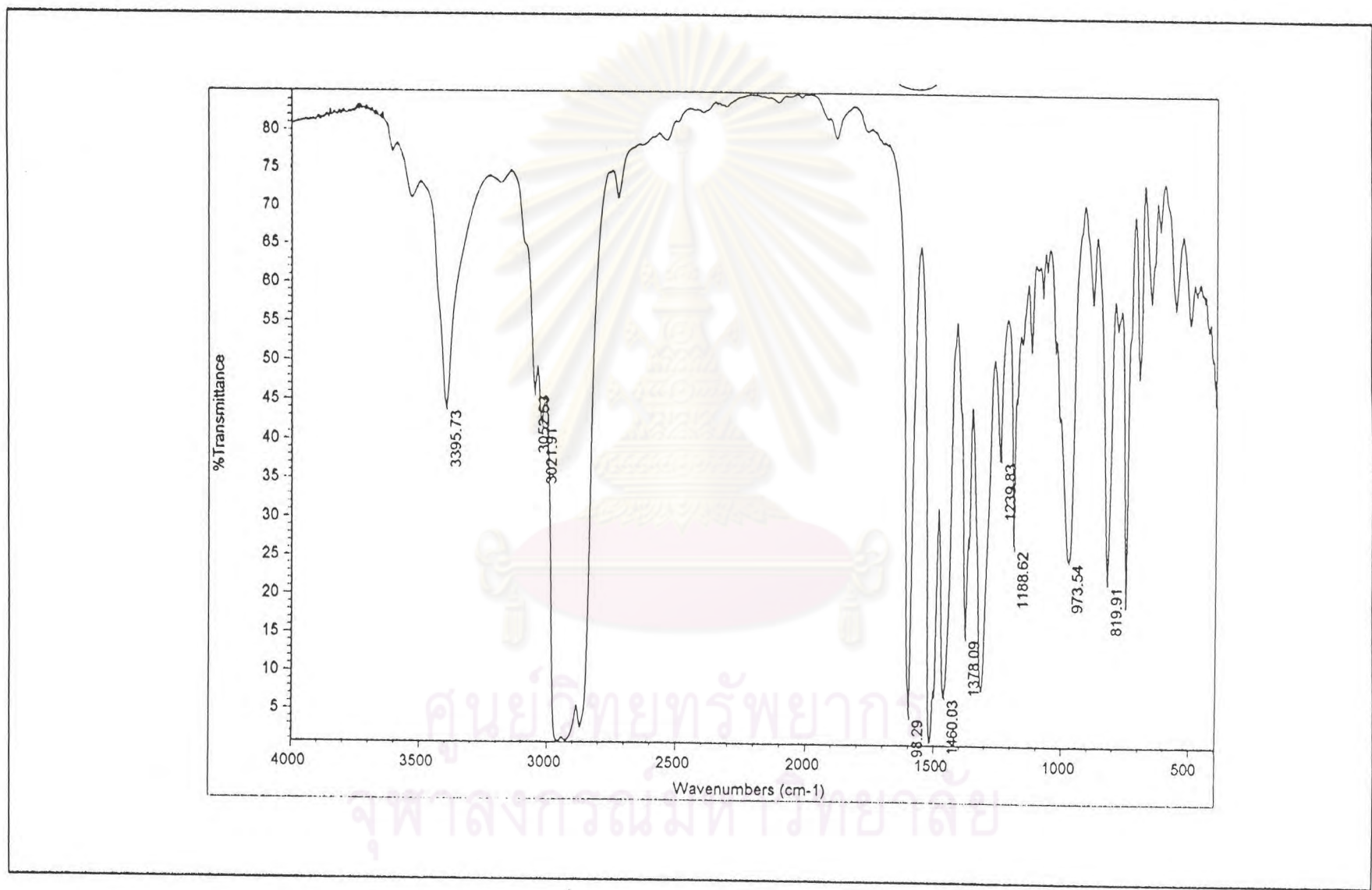


Figure B29 The IR spectrum of BP2

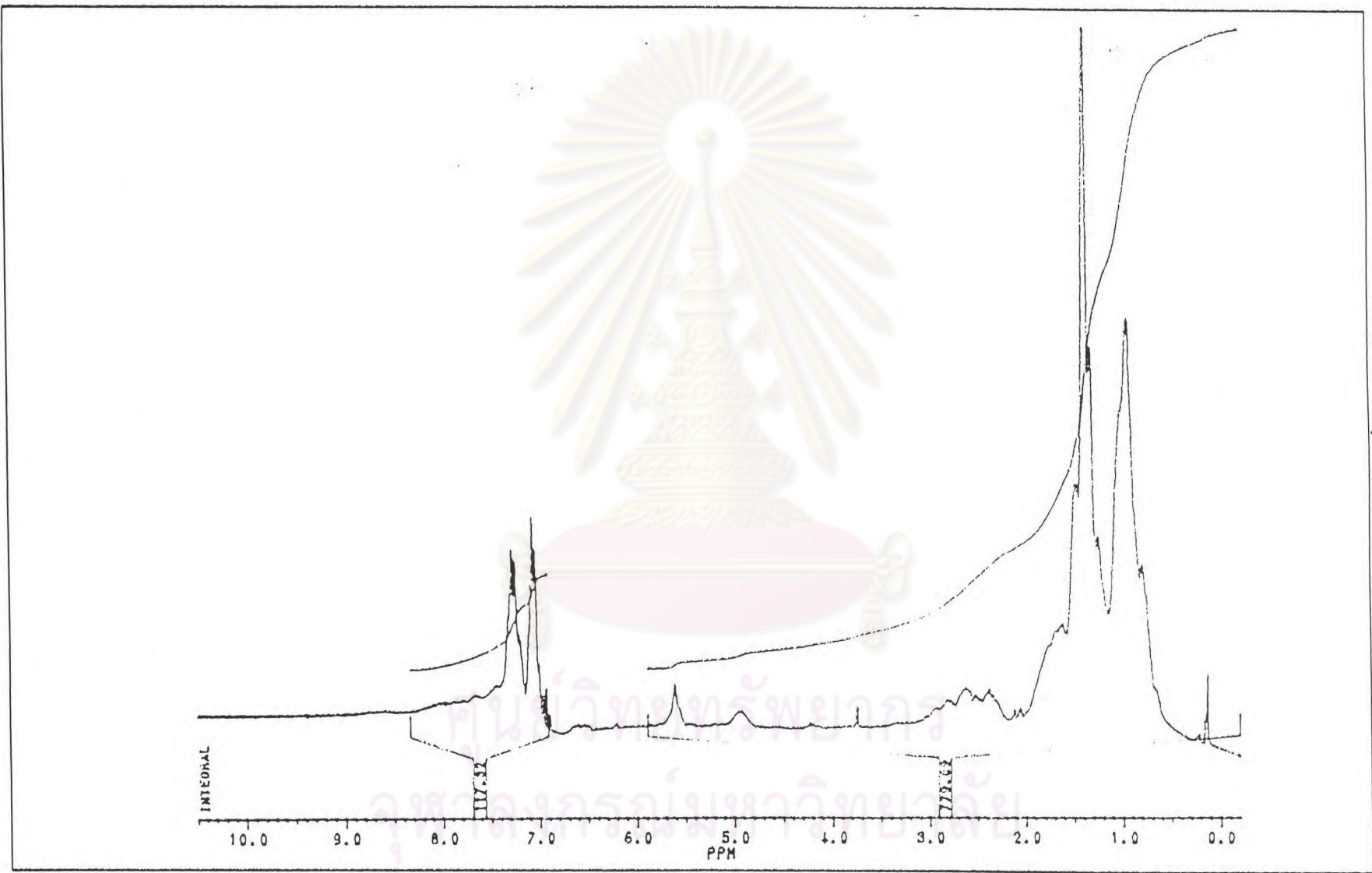


Figure B30 The  $^1\text{H}$  NMR spectrum of BP2

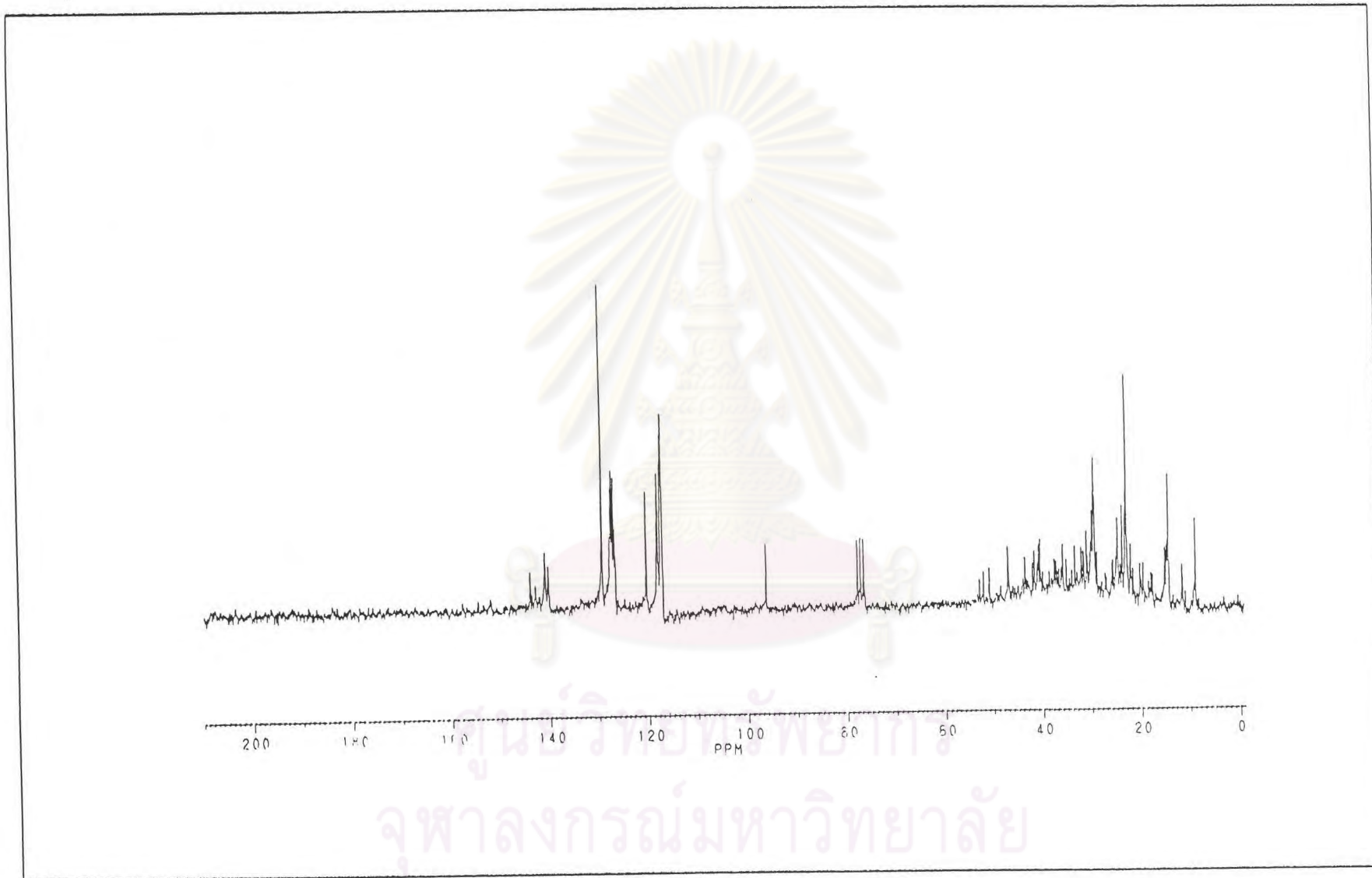


Figure B31 The  $^{13}\text{C}$  NMR spectrum of BP2

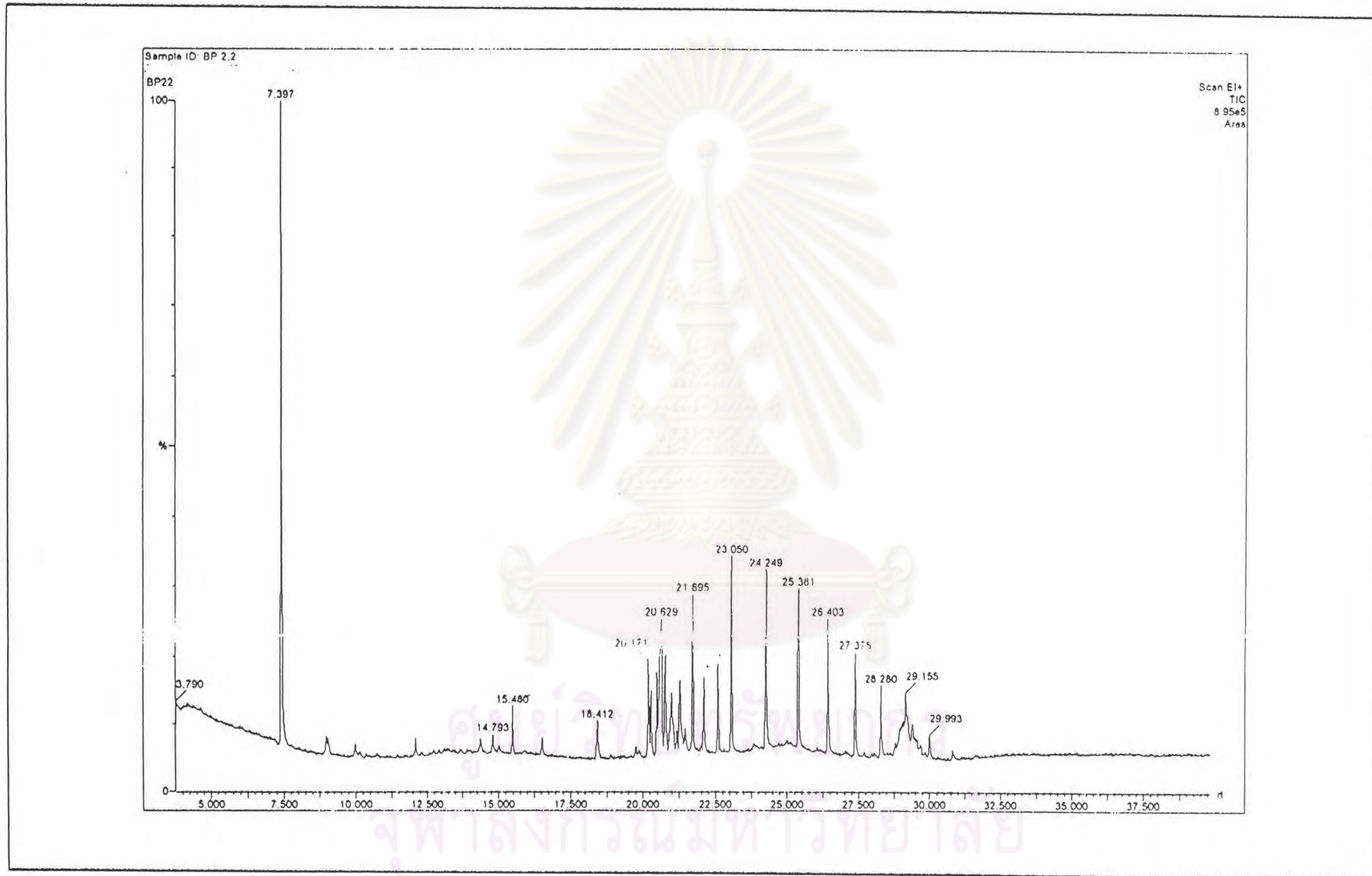


Figure B32 The GC-MS chromatogram of BP2

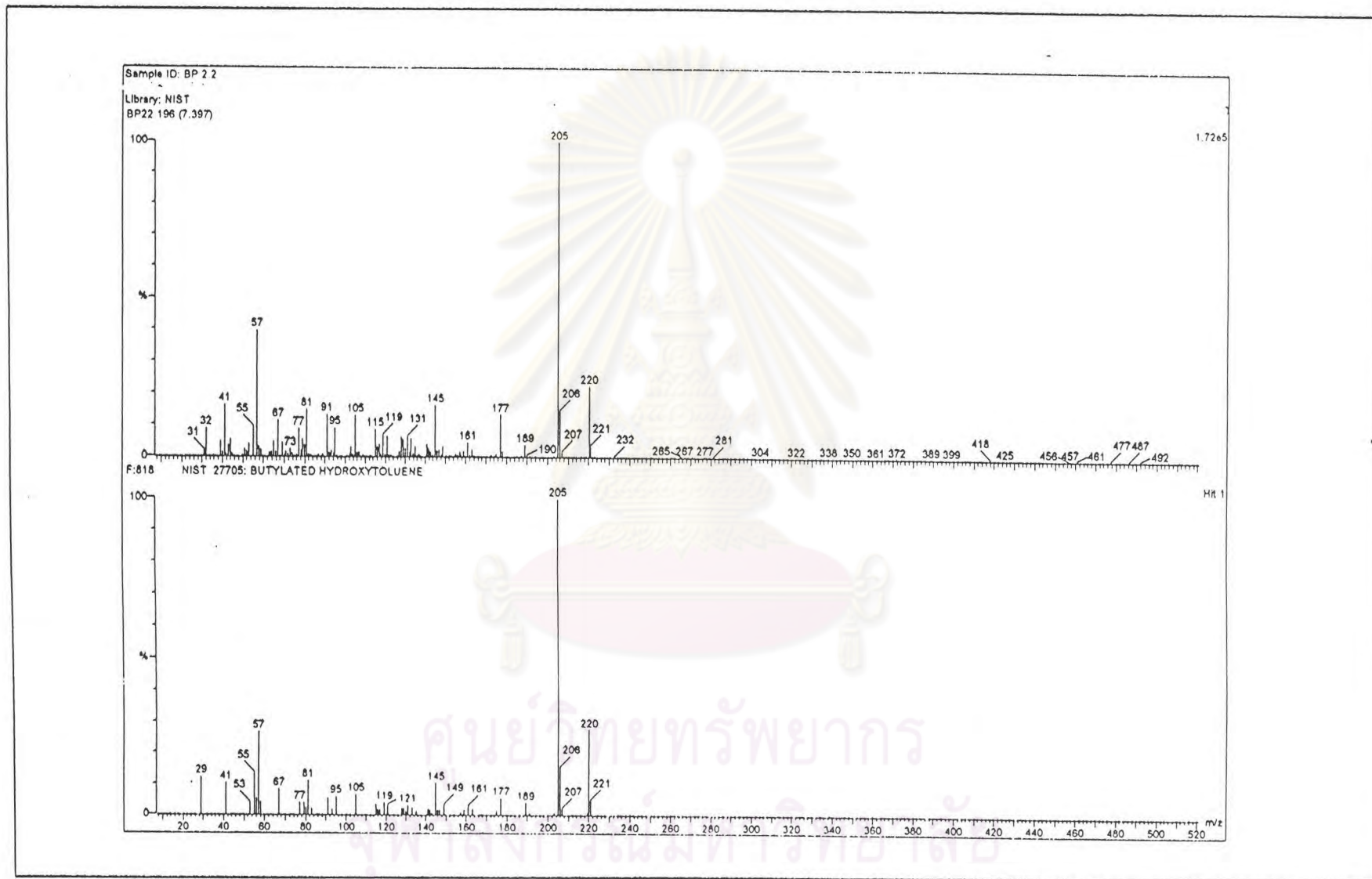


Figure B33 The mass spectrum of BP2 at retention time 7.397 min.

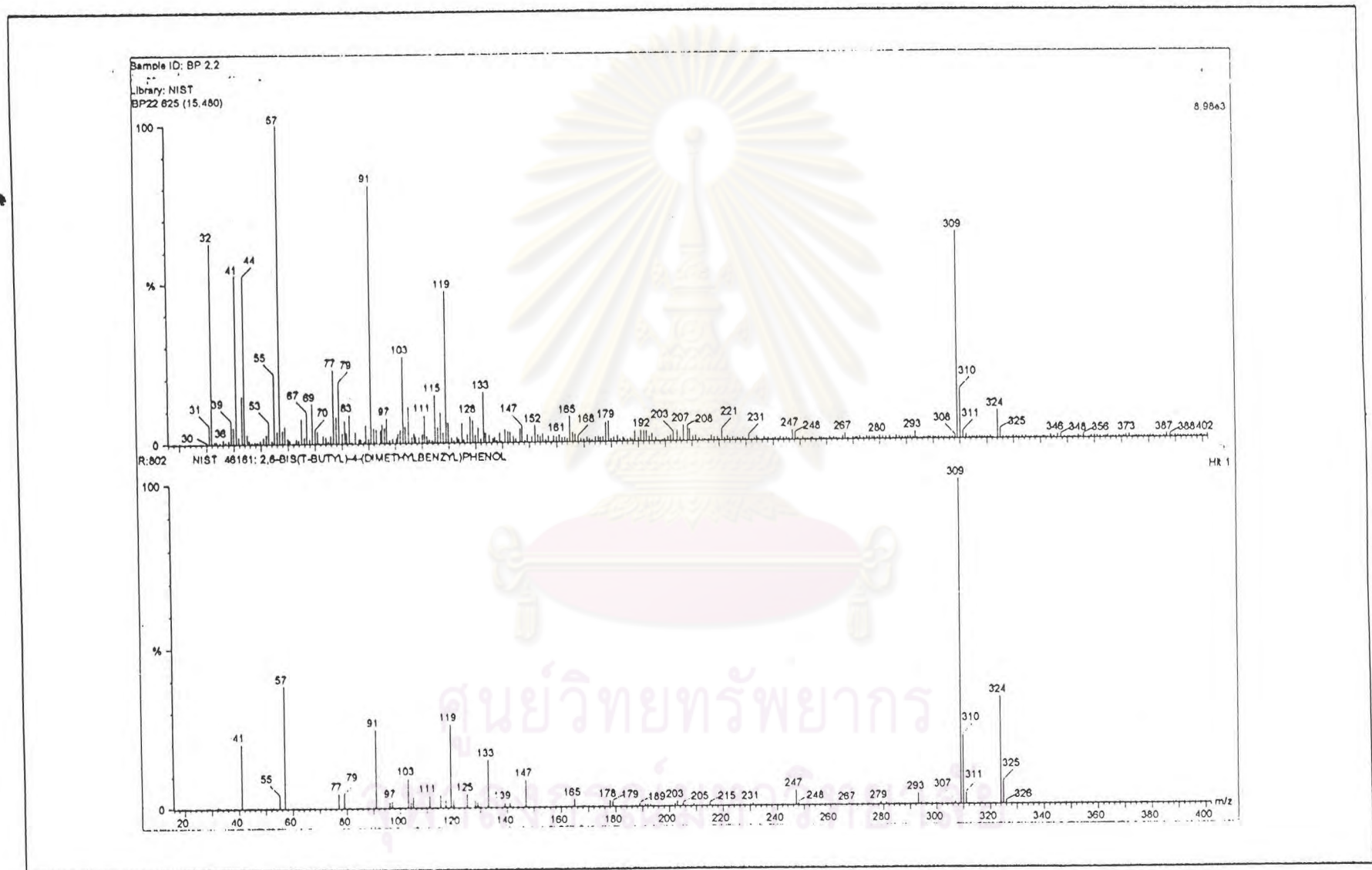


Figure B34 The mass spectrum of BP2 at retention time 15.480 min.

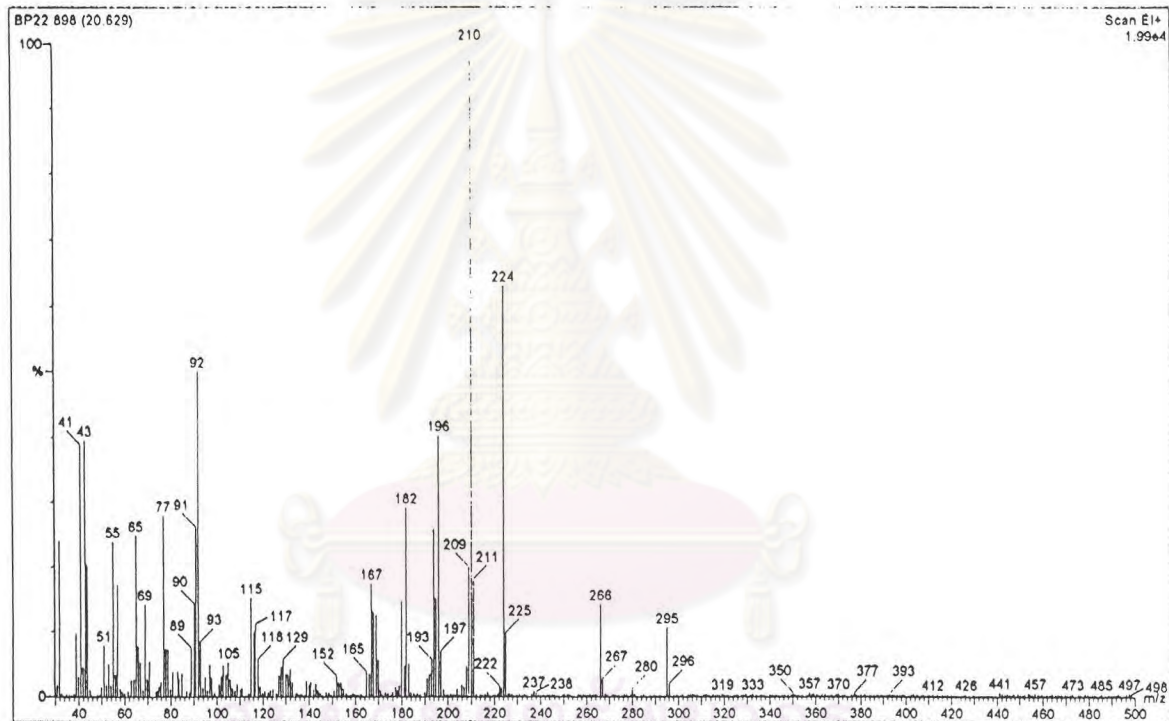


Figure B35 The mass spectrum of BP2 at retention time 20.629 min.

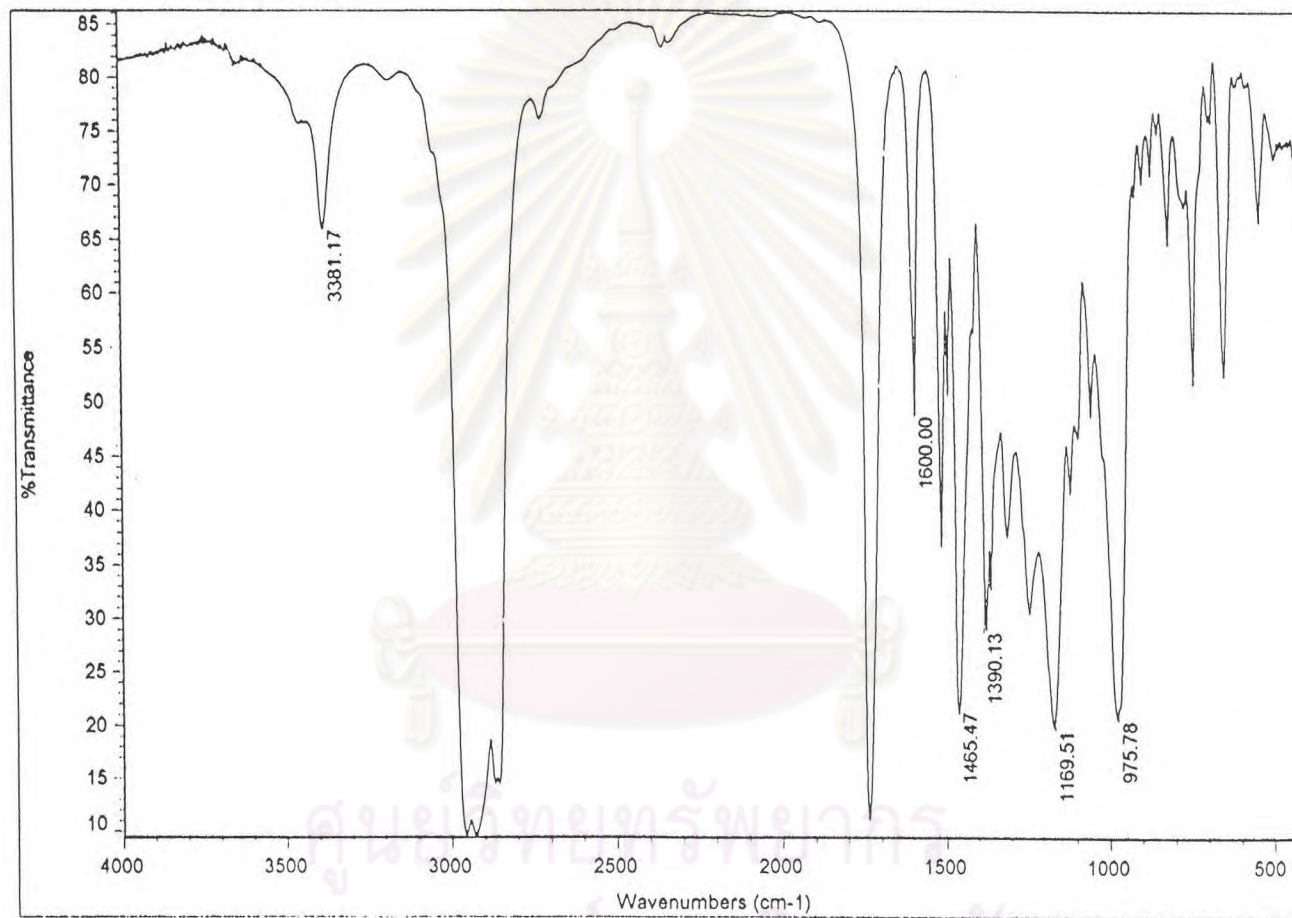


Figure B36 The IR spectrum of CAS2



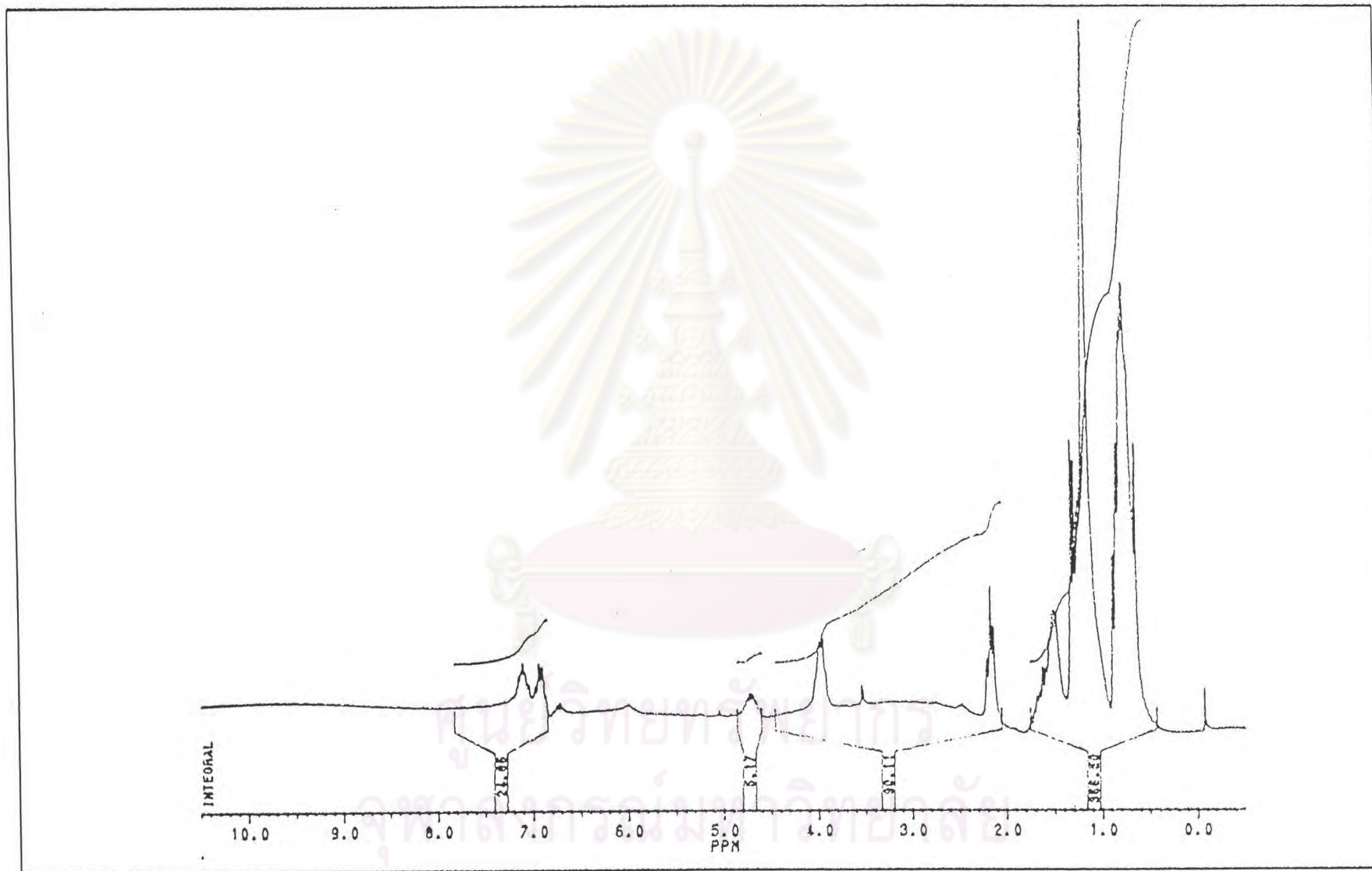


Figure B37 The  $^1\text{H}$  NMR spectrum of CAS2

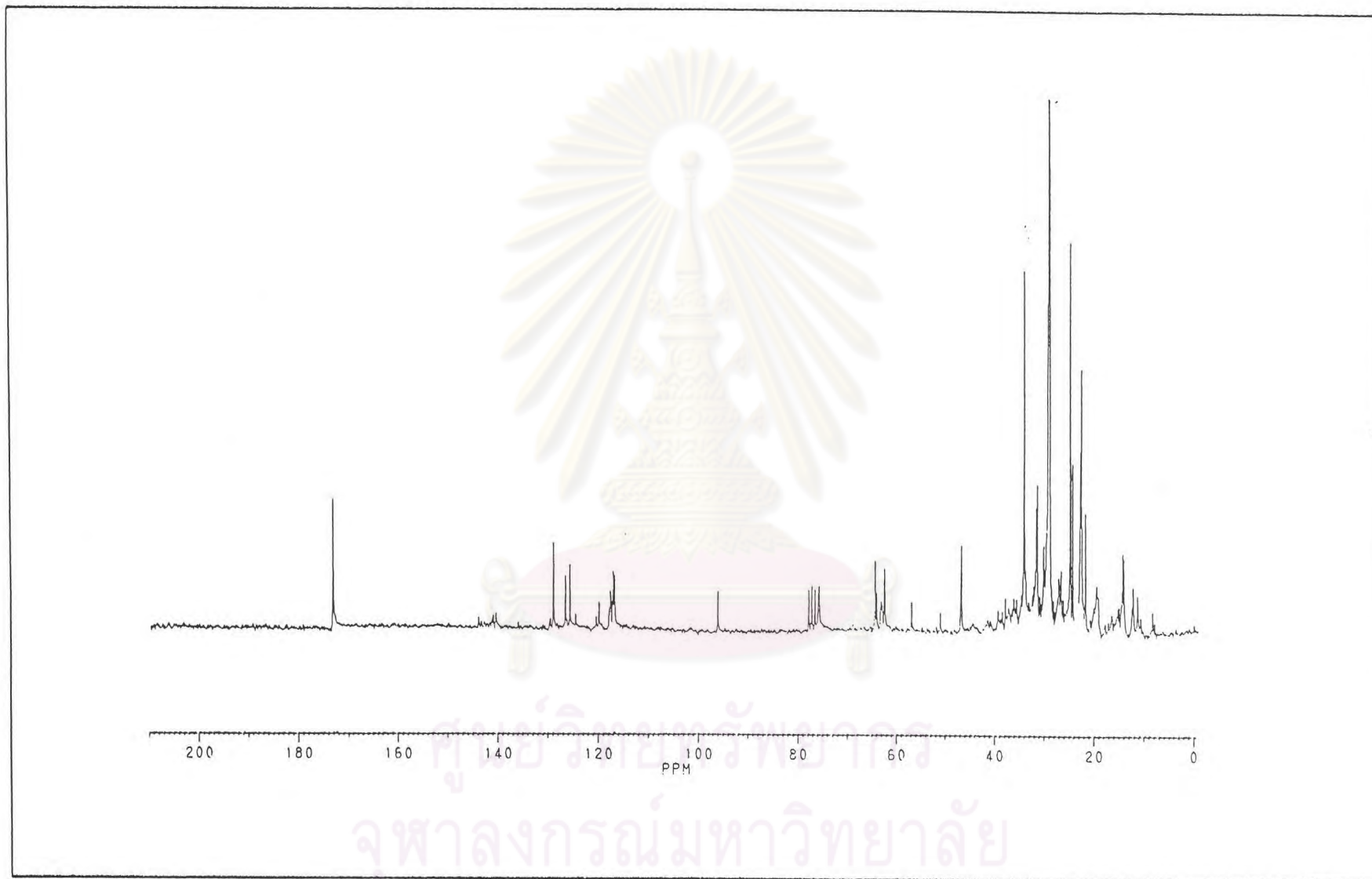


Figure B38 The  $^{13}\text{C}$  NMR spectrum of CAS2

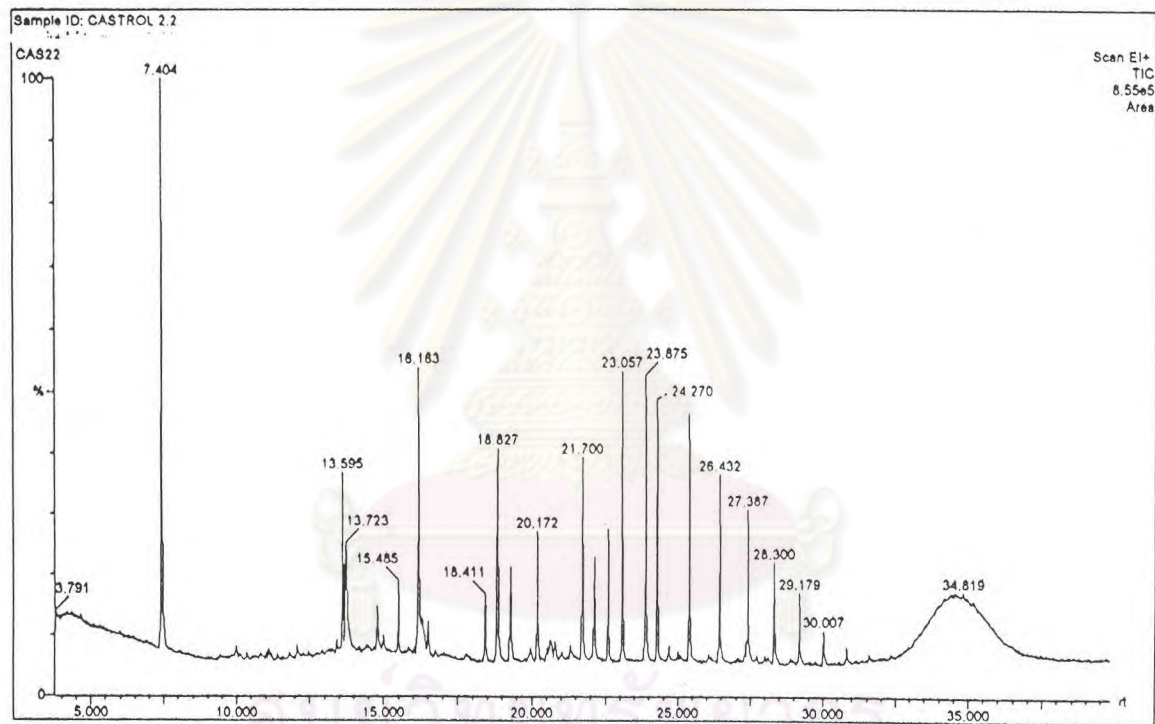


Figure B39 The GC-MS chromatogram of CAS2

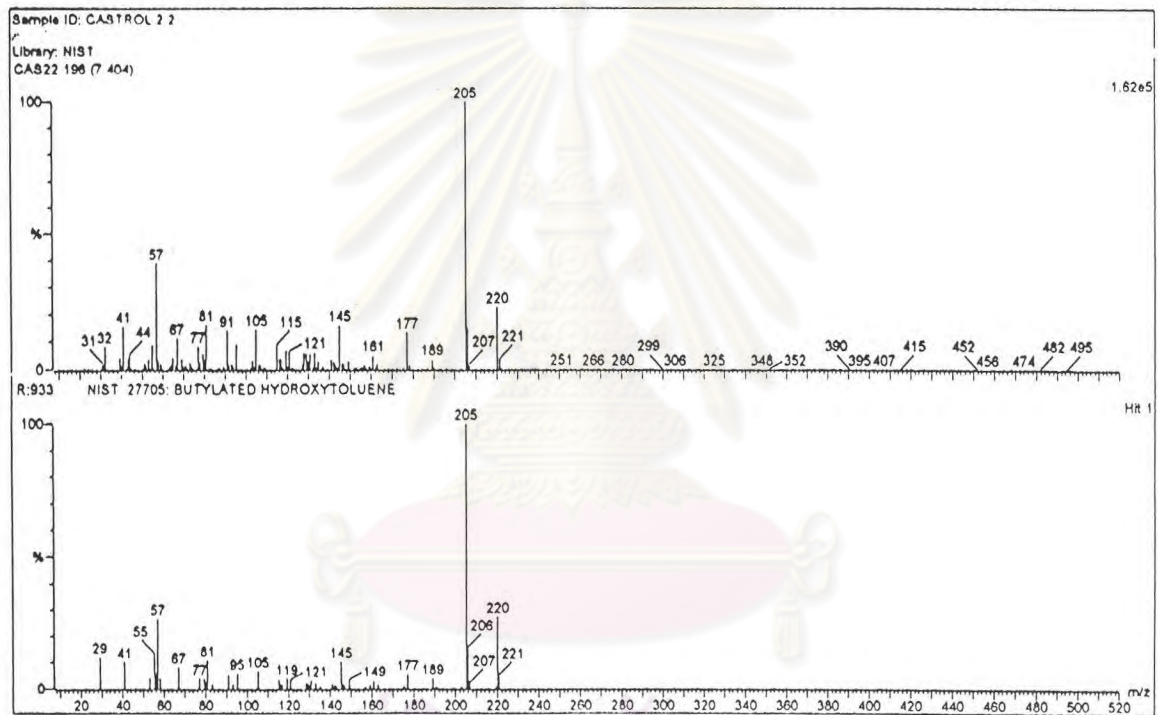


Figure B40 The mass spectrum of CAS2 at retention time 7.404 min.

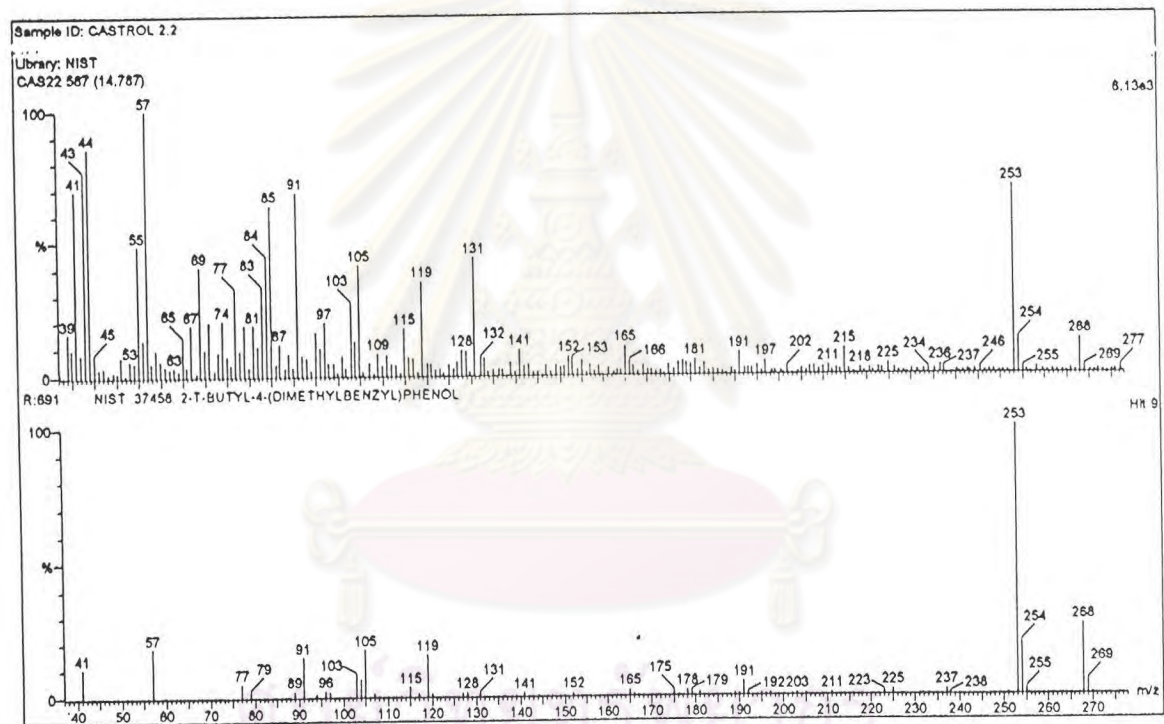


Figure B41 The mass spectrum of CAS2 at retention time 14.787 min.

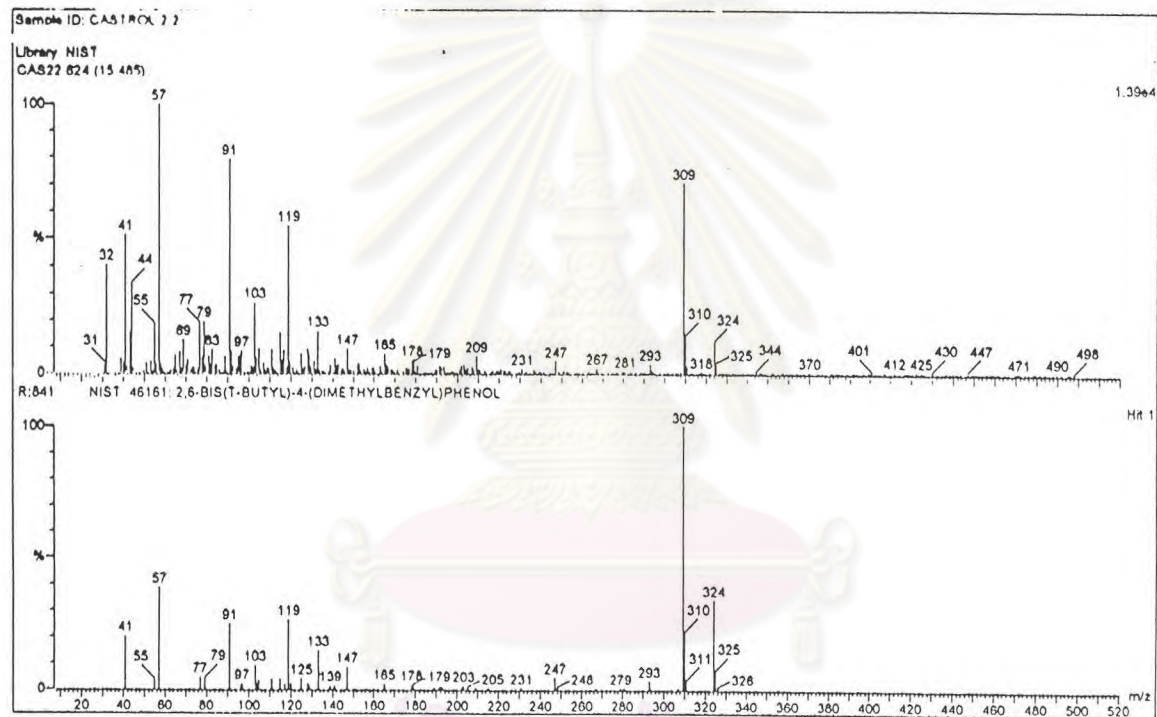


Figure B42 The mass spectrum of CAS2 at retention time 15.485 min.

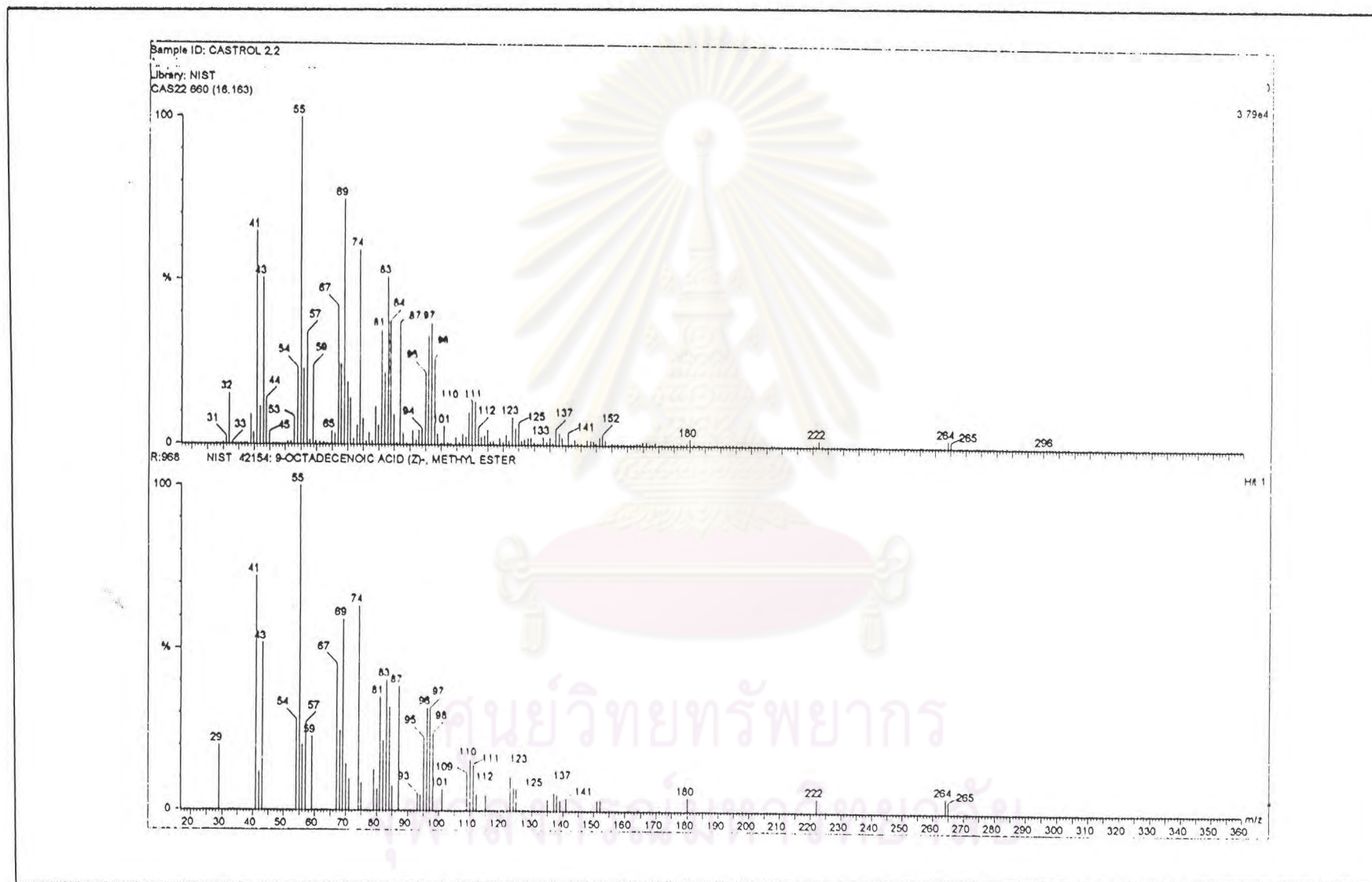


Figure B43 The mass spectrum of CAS2 at retention time 16.163 min.

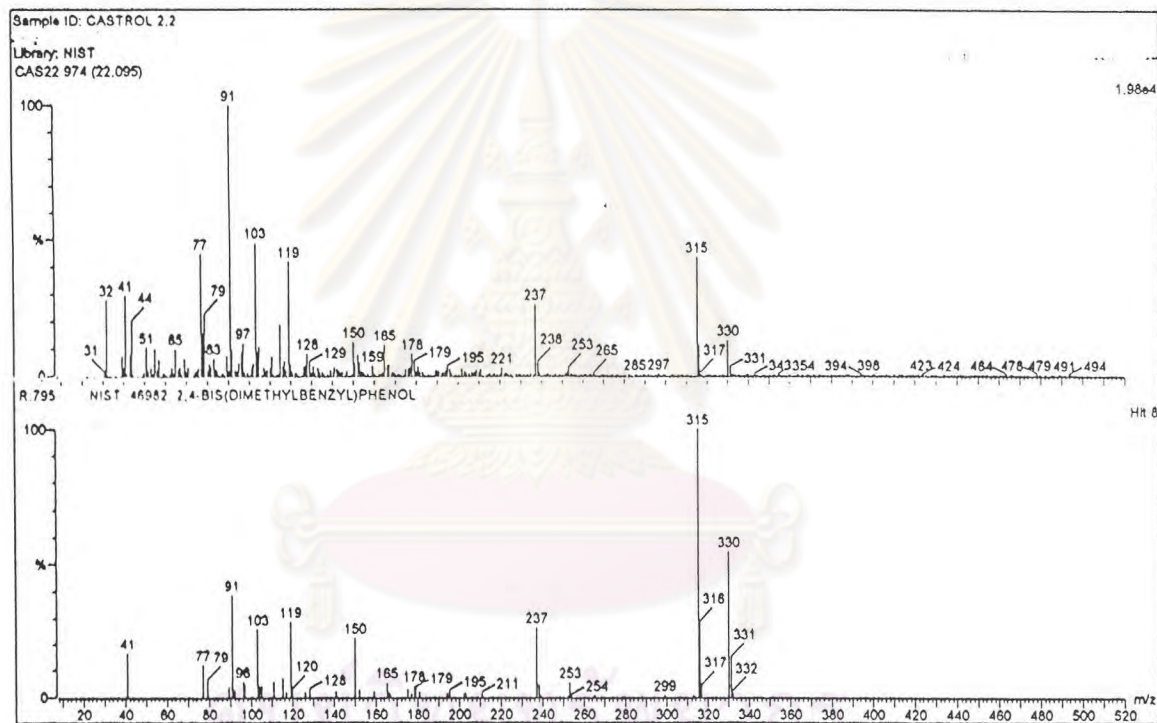


Figure B44 The mass spectrum of CAS2 at retention time 22.095 min.



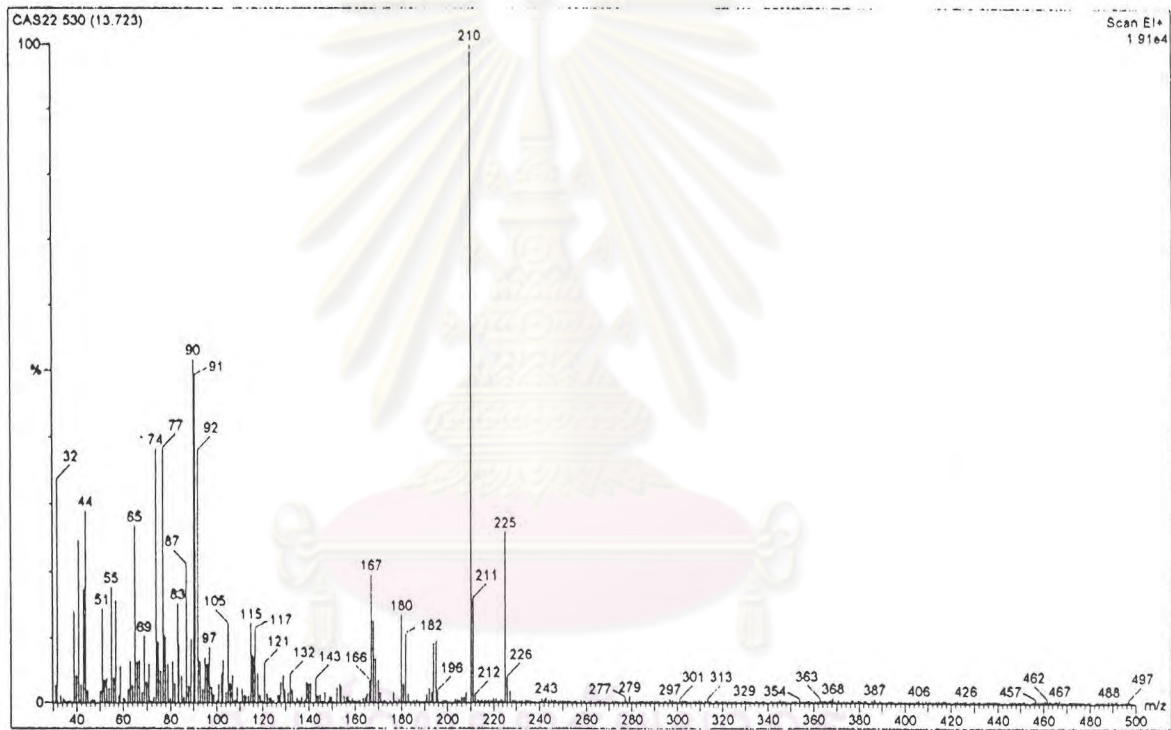


Figure B45 The mass spectrum of CAS2 at retention time 13.723 min.

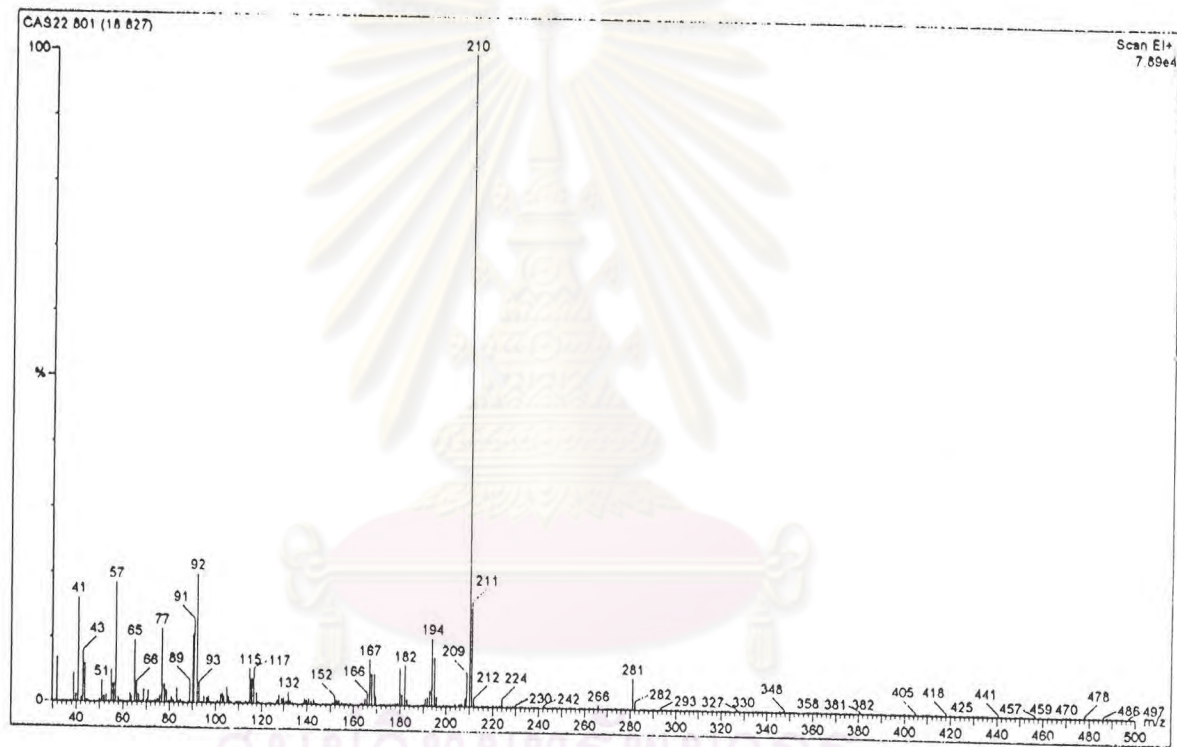


Figure B46 The mass spectrum of CAS2 at retention time 18.827 min.

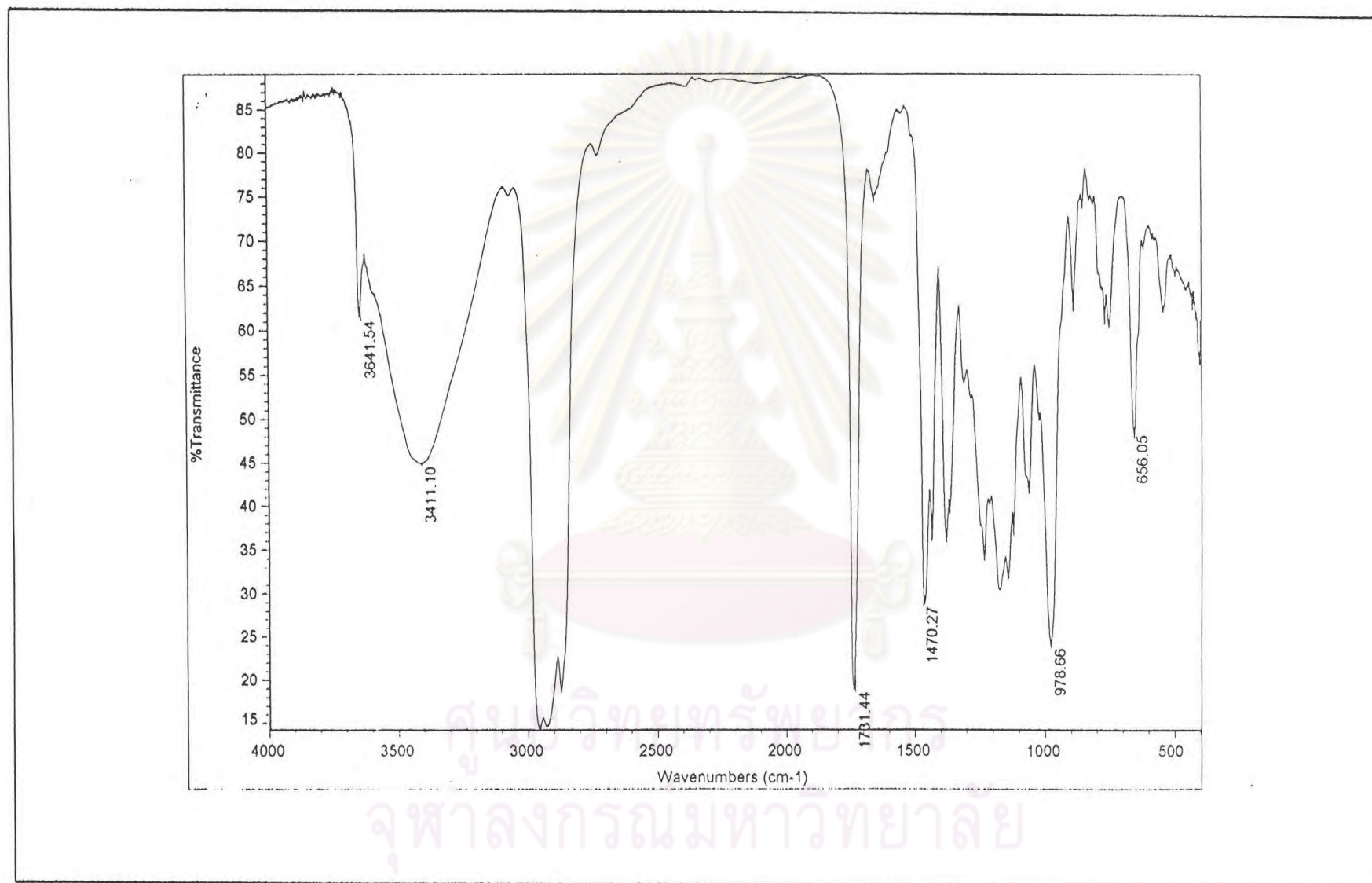


Figure B47 The IR spectrum of MOB2

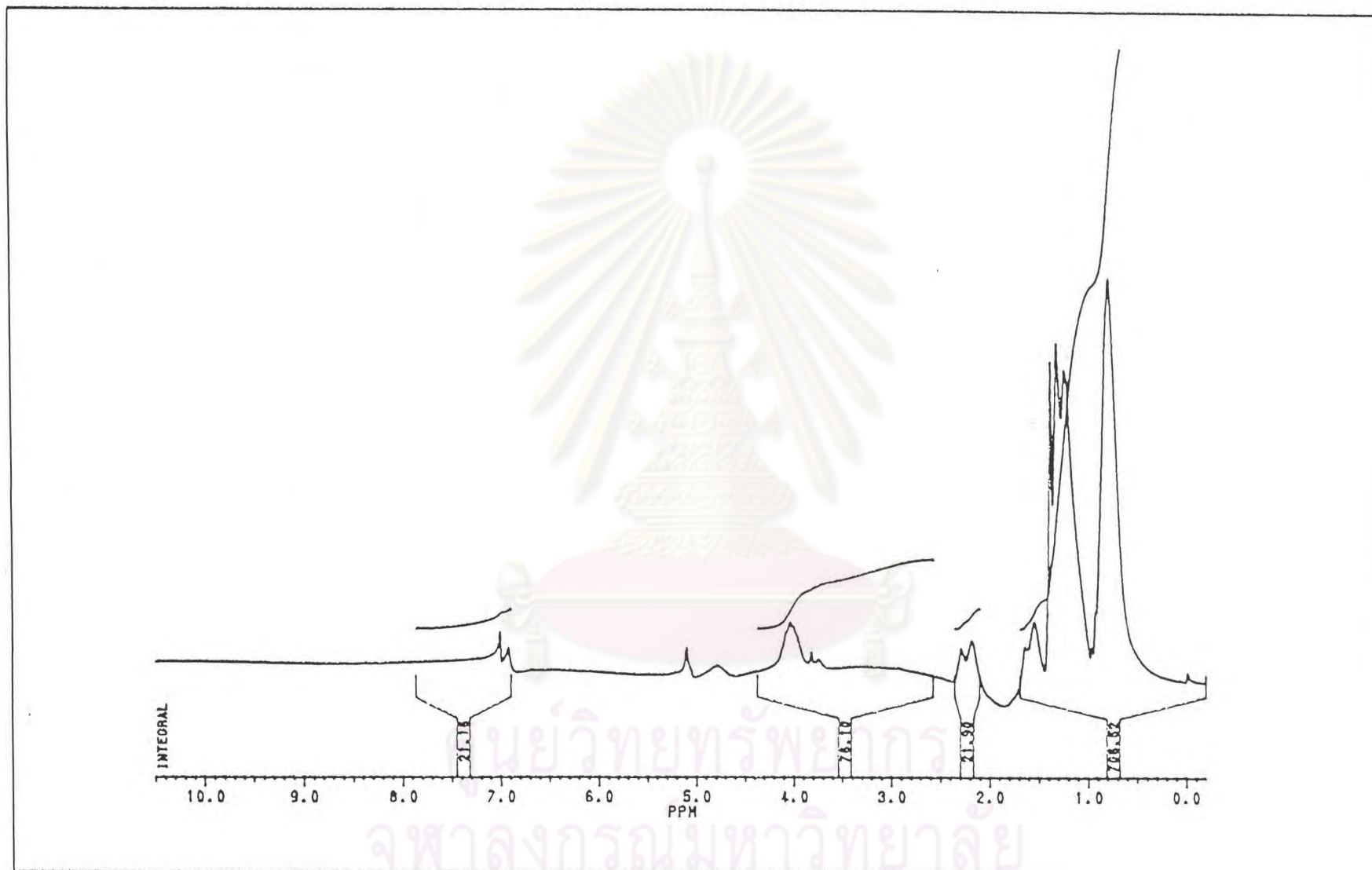


Figure B48 The  $^1\text{H}$  NMR spectrum of MOB2

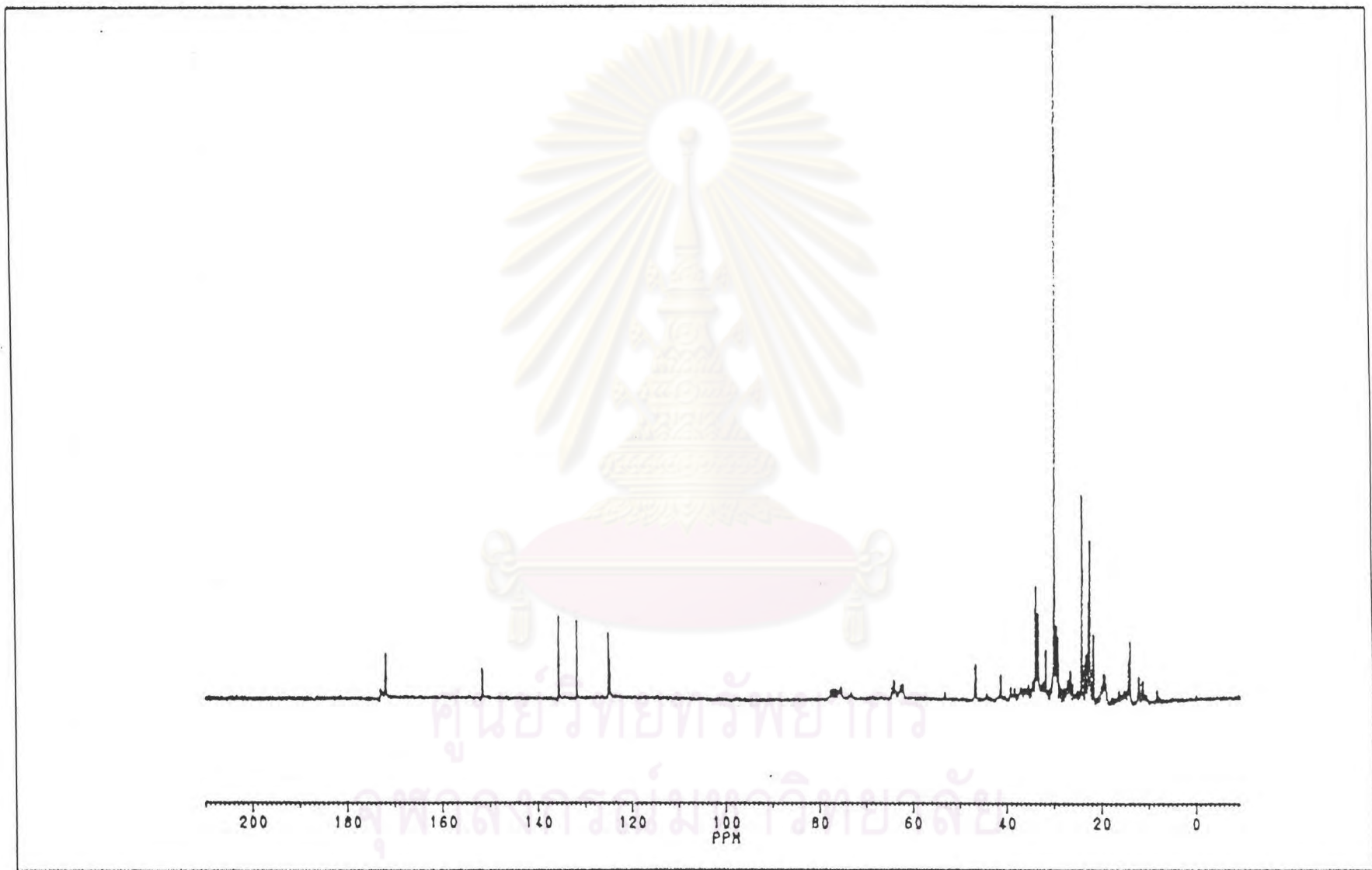
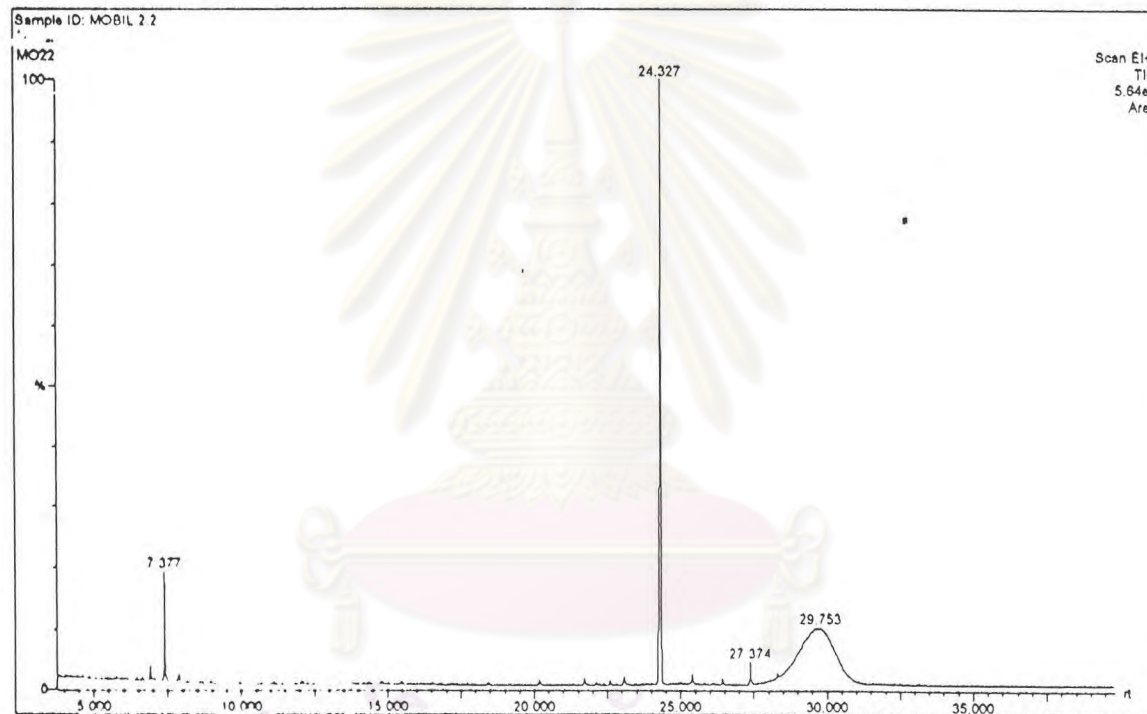


Figure B49 The  $^{13}\text{C}$  NMR spectrum of MOB2



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Figure B50 The GC-MS chromatogram of BP2

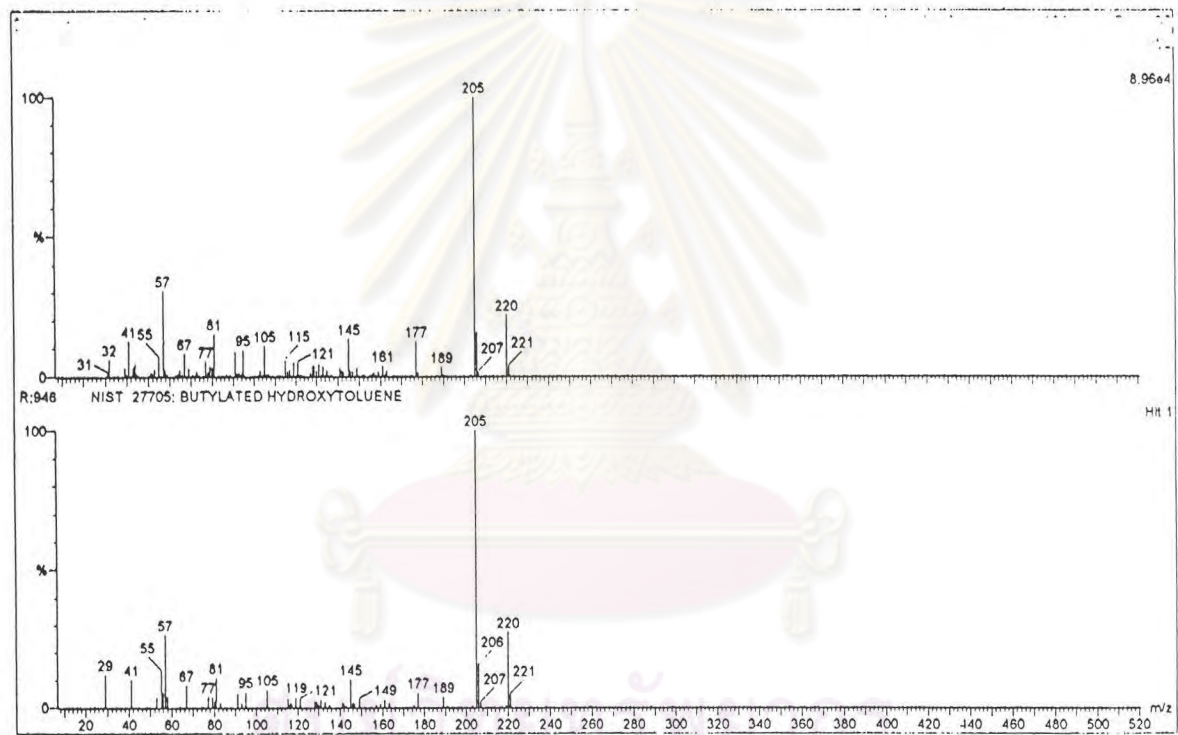


Figure B51 The mass spectrum of MOB2 at retention time 7.377 min.

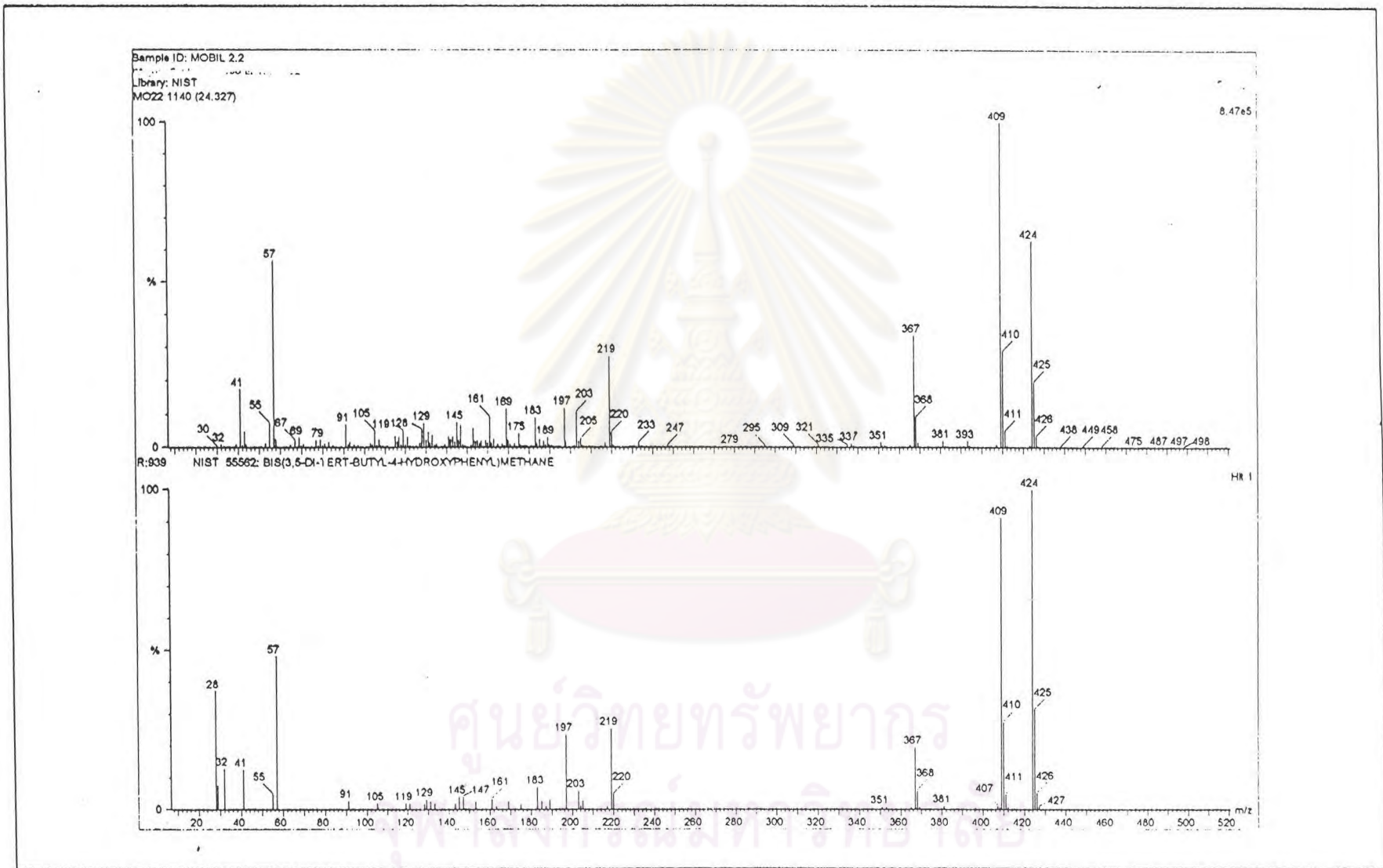


Figure B52 The mass spectrum of MOB2 at retention time 24.327 min.



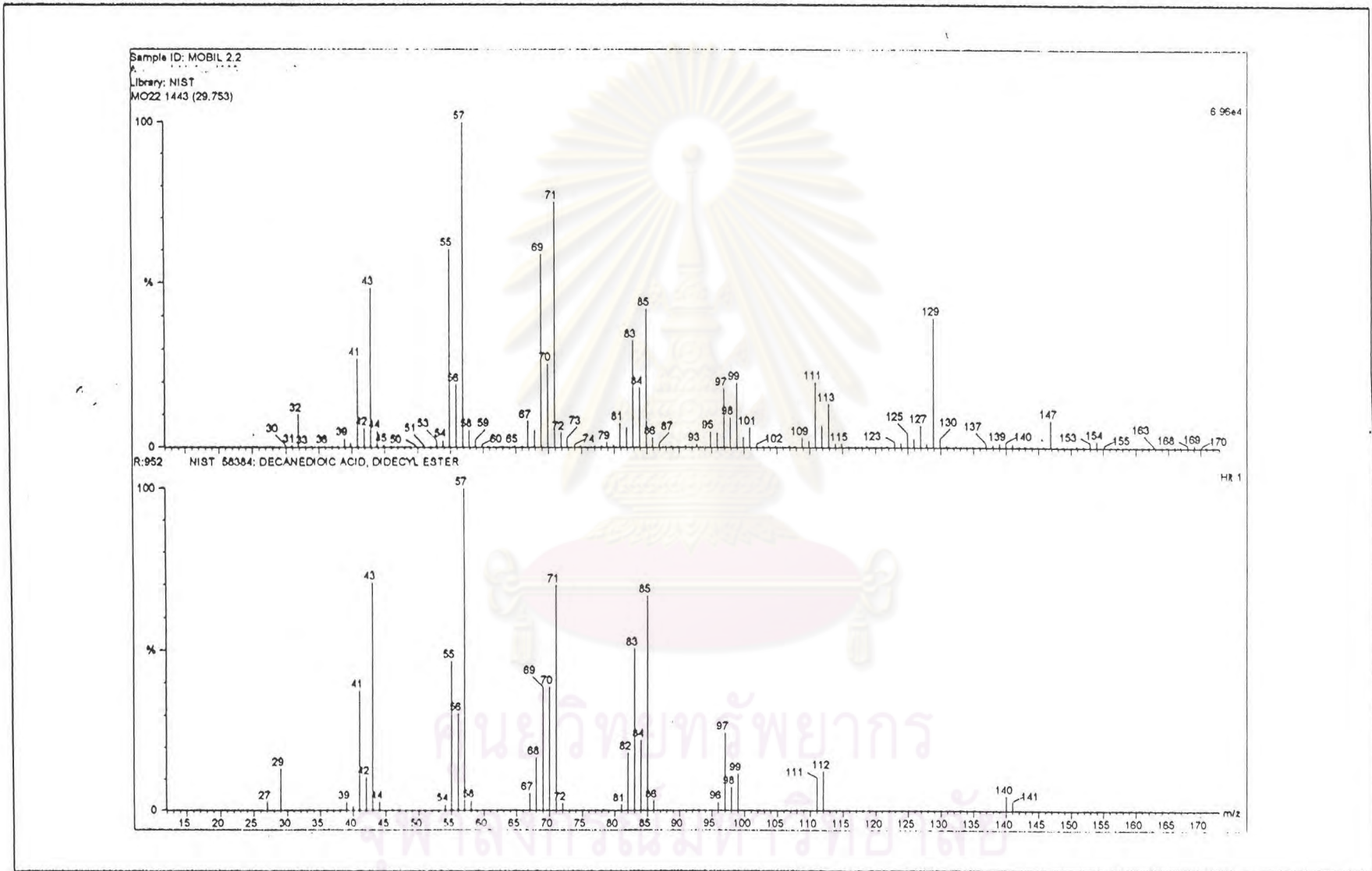


Figure B53 The mass spectrum of MOB2 at retention time 29.753 min.



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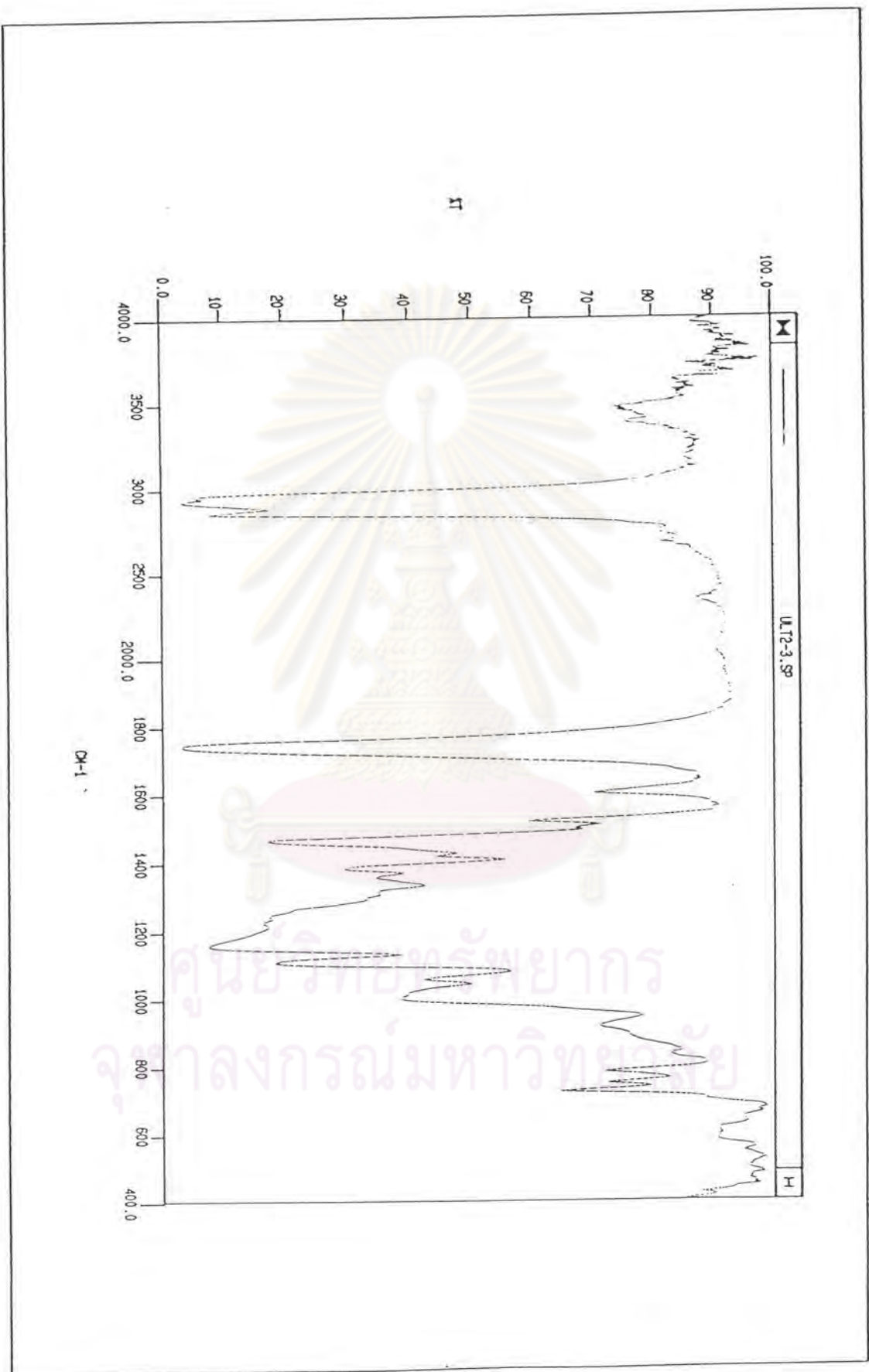


Figure C1 The IR spectrum of ULT3

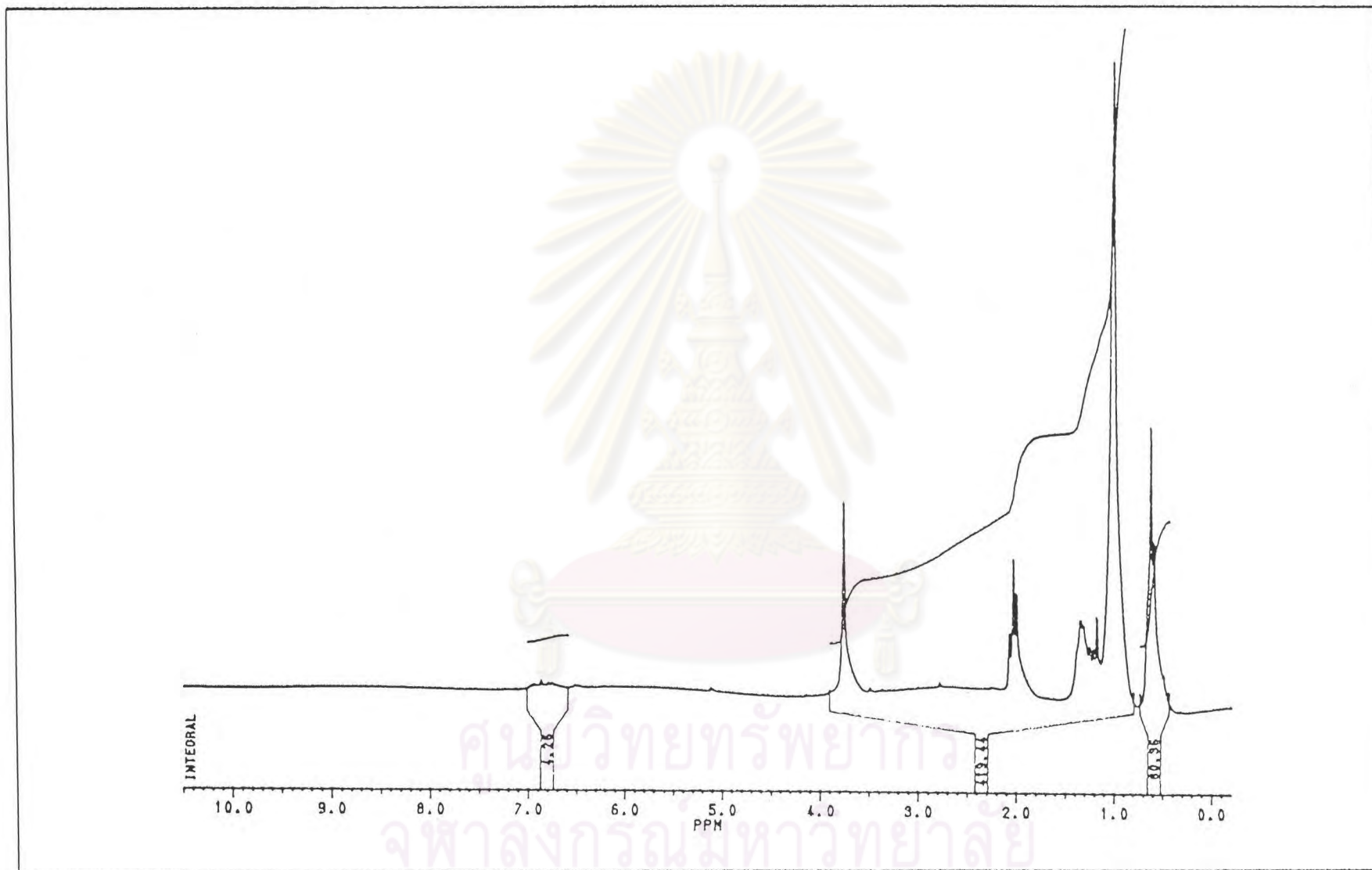


Figure C2 The  $^1\text{H}$  NMR spectrum of ULT3

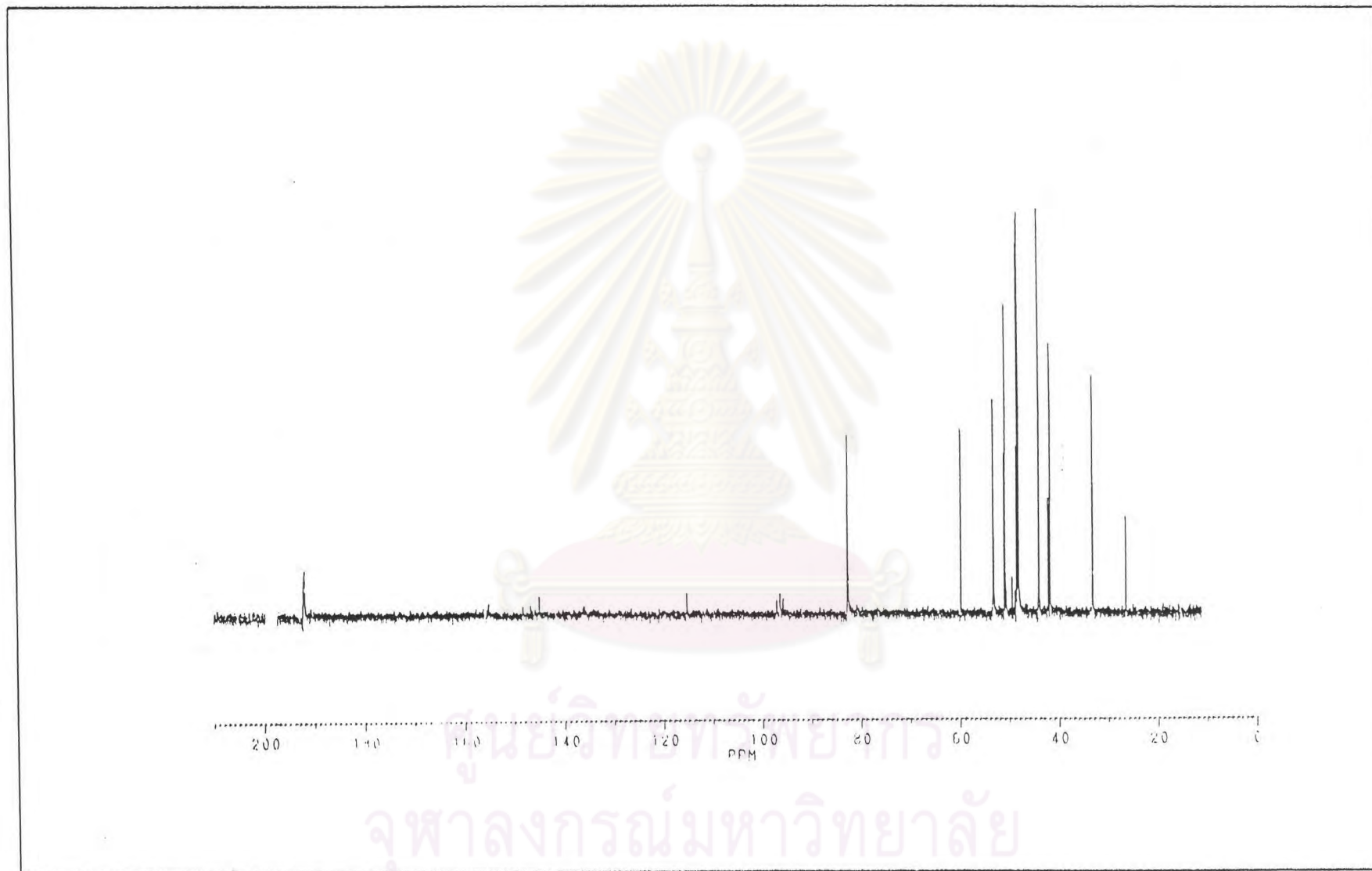


Figure C3 The  $^{13}\text{C}$  NMR spectrum of ULT3

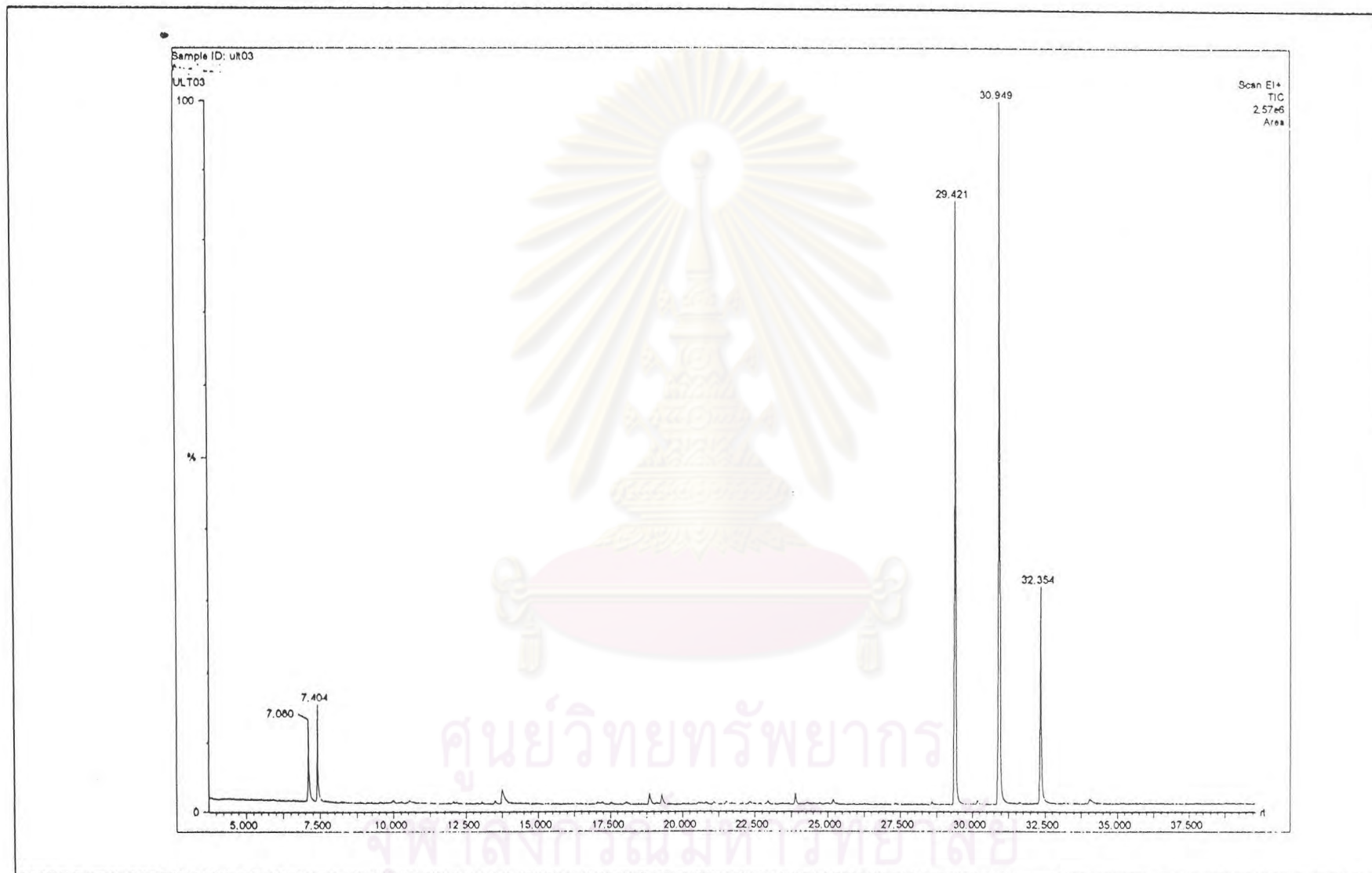
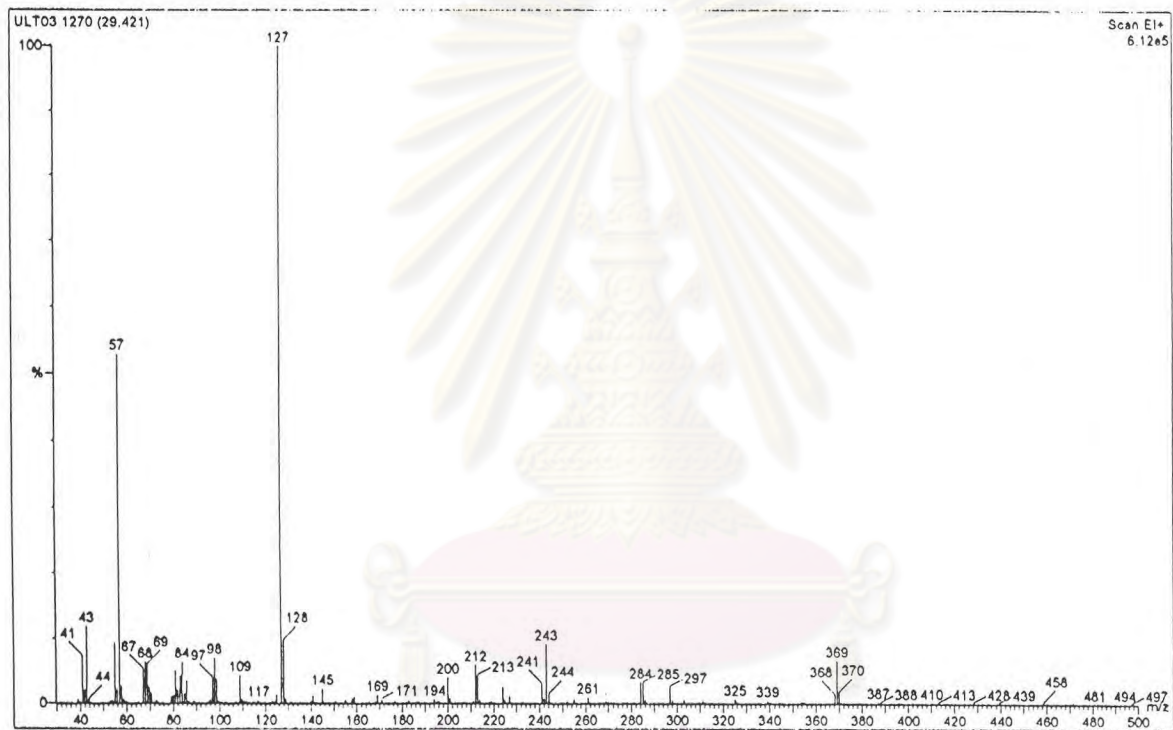


Figure C4 The GC-MS chromatogram of ULT3



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Figure C5 The mass spectrum of ULT3 at retention time 29.421 min.

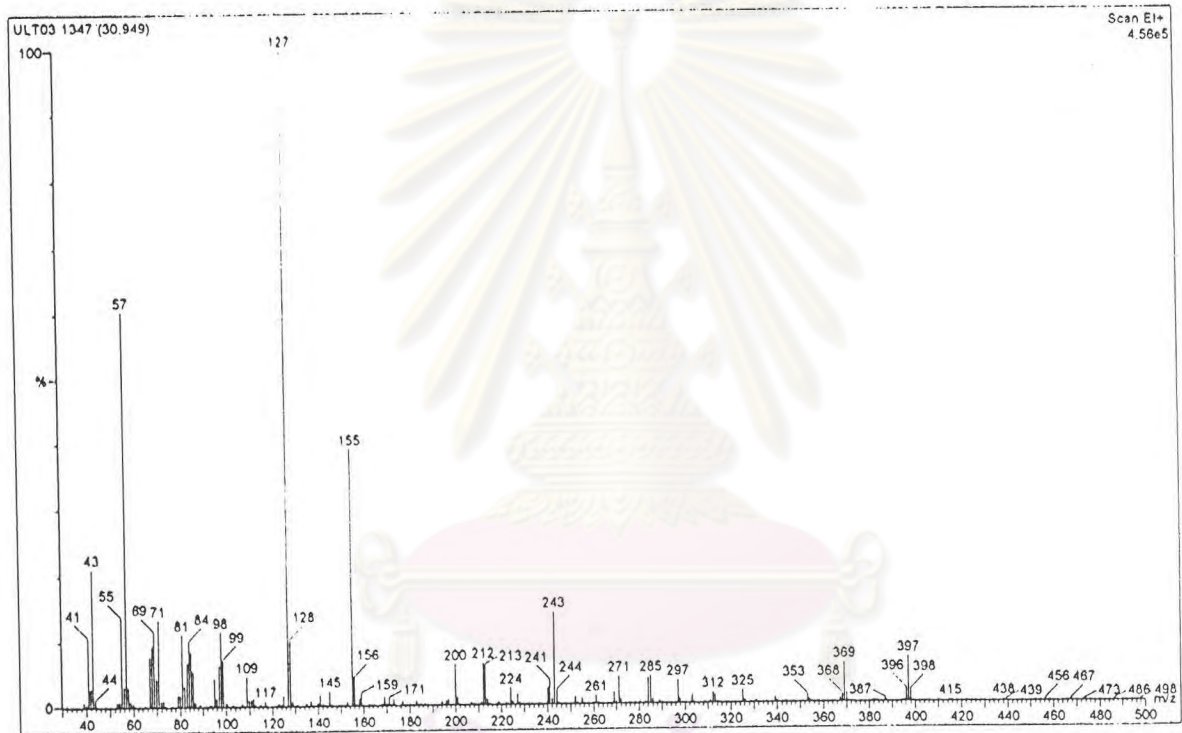


Figure C6 The mass spectrum of ULT3 at retention time 30.949 min.



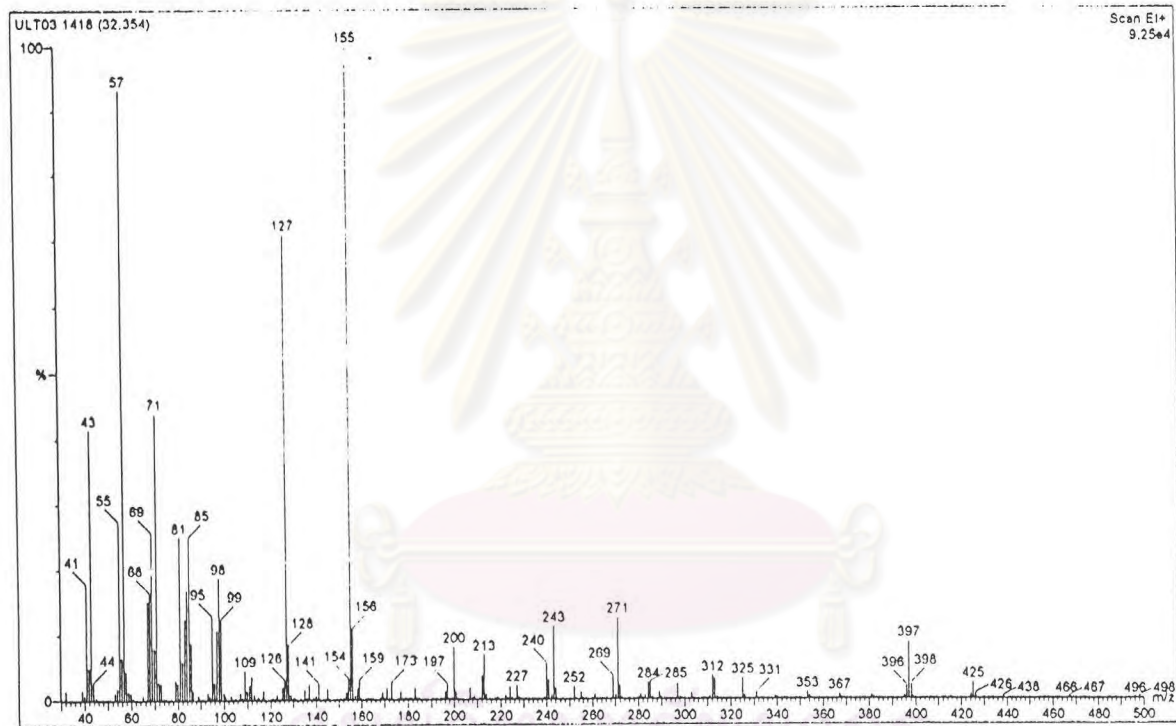


Figure C7 The mass spectrum of ULT3 at retention time 32.354 min.

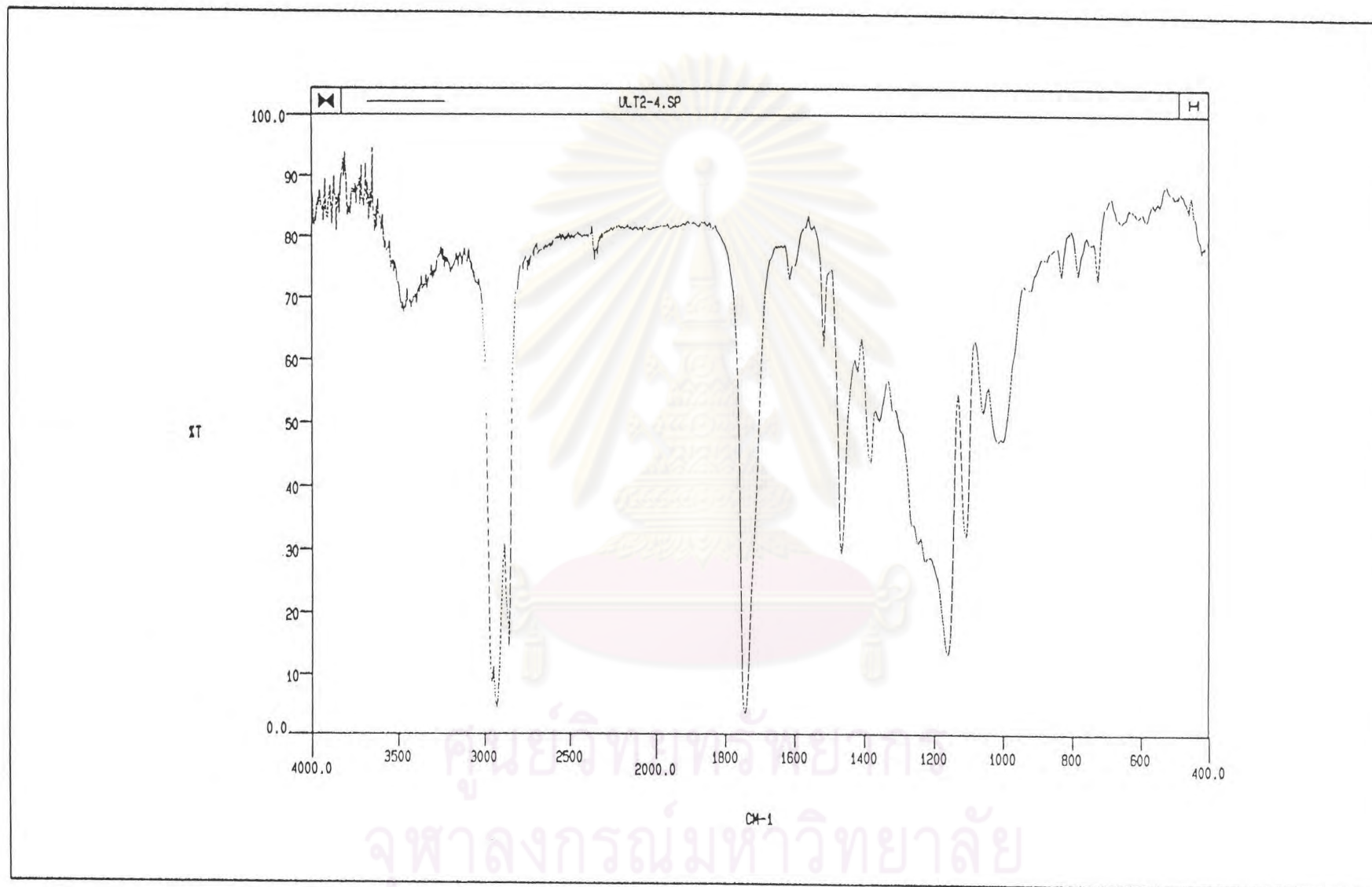


Figure C8 The IR spectrum of ULT4

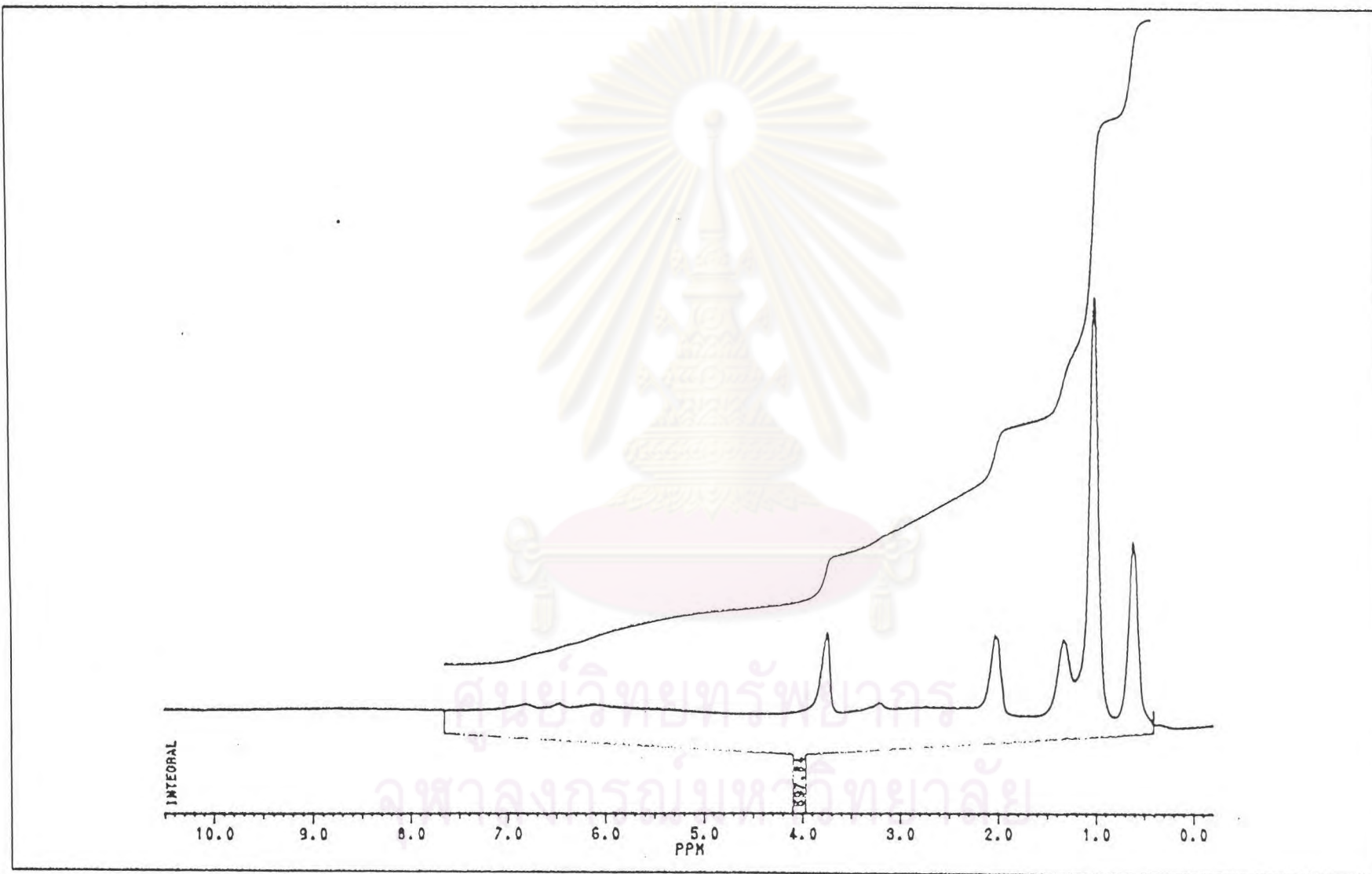


Figure C9 The  $^1\text{H}$  NMR spectrum of ULT4

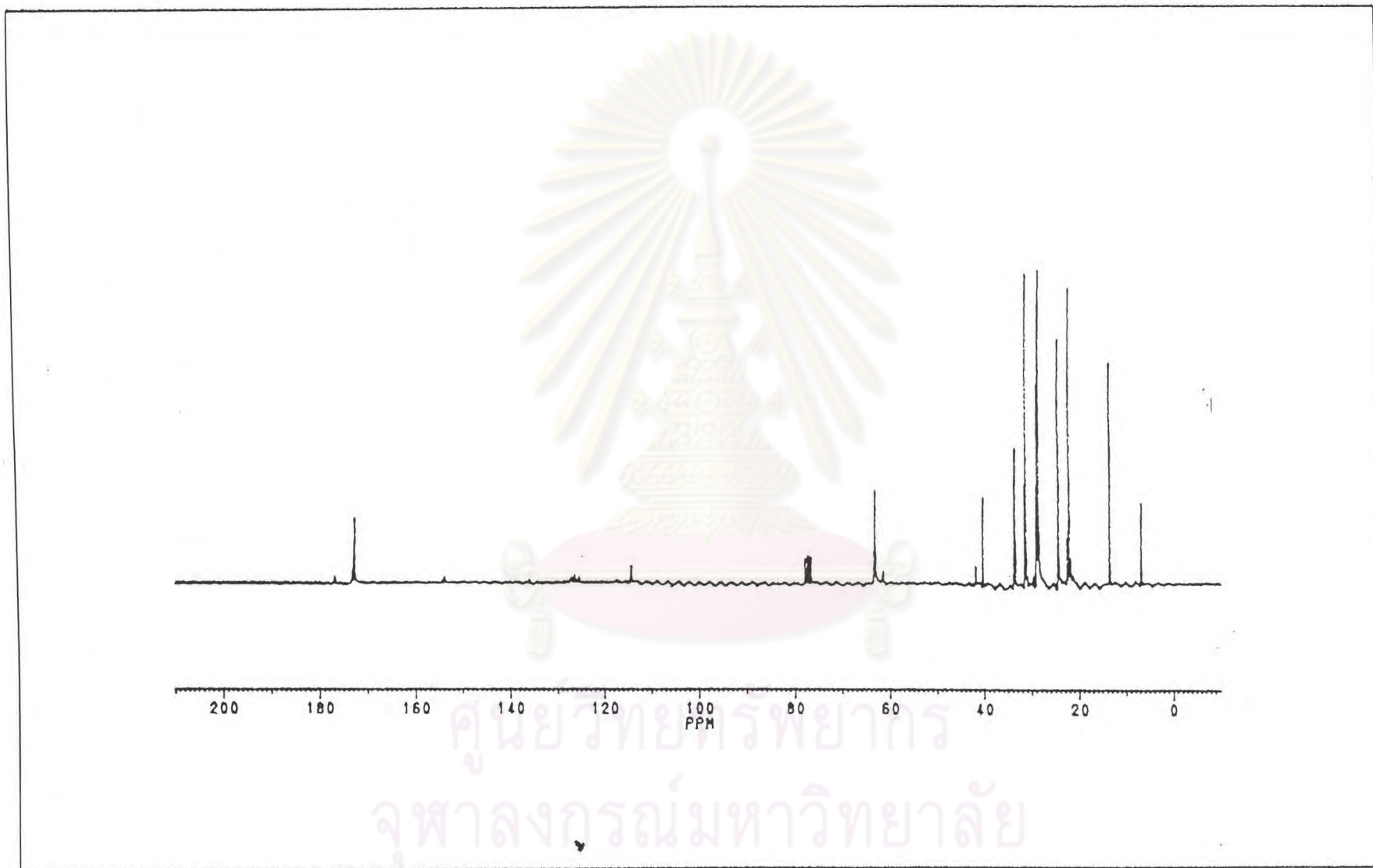


Figure C10 The  $^{13}\text{C}$  NMR spectrum of ULT4

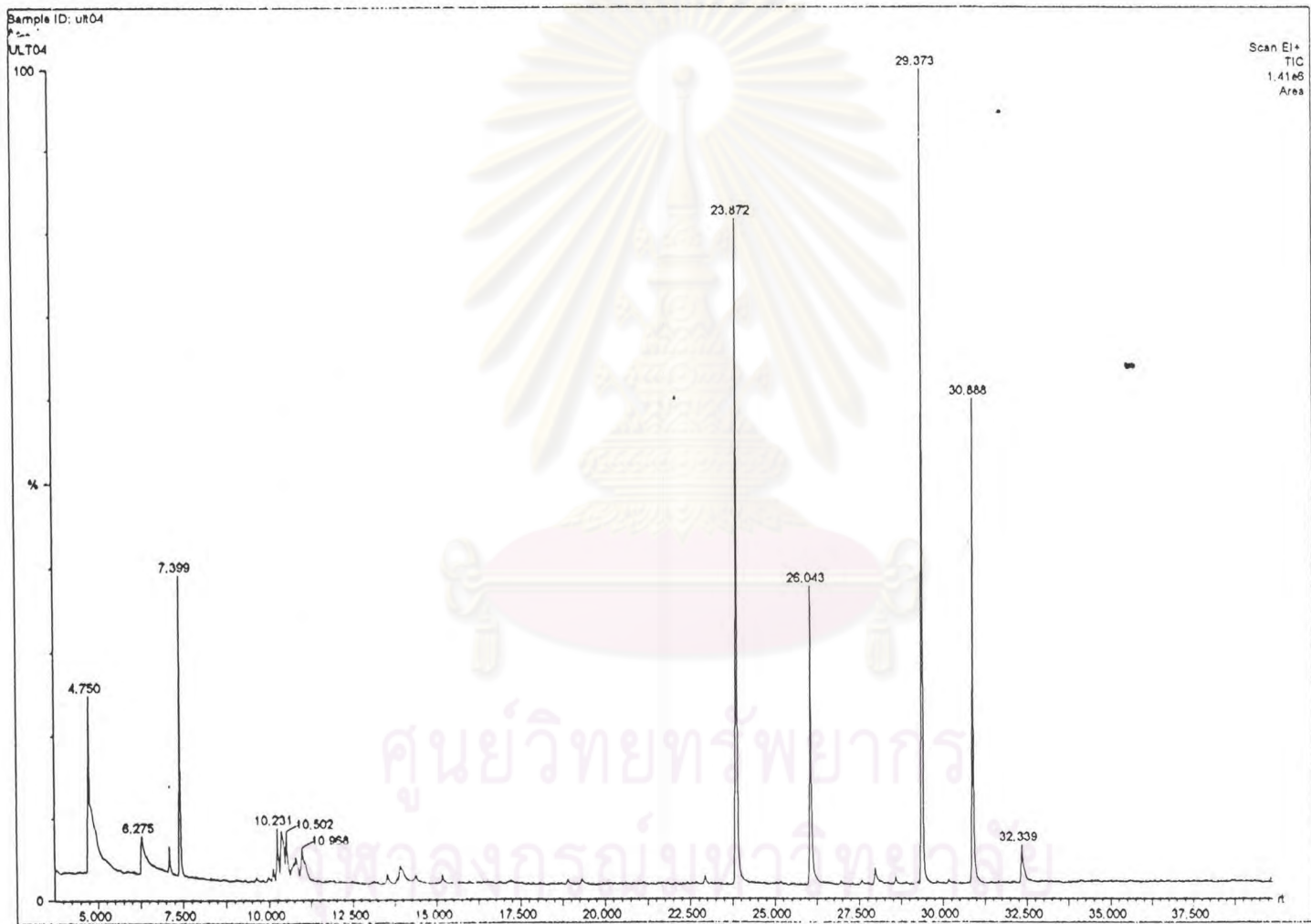


Figure C11 The GC-MS chromatogram of ULT4

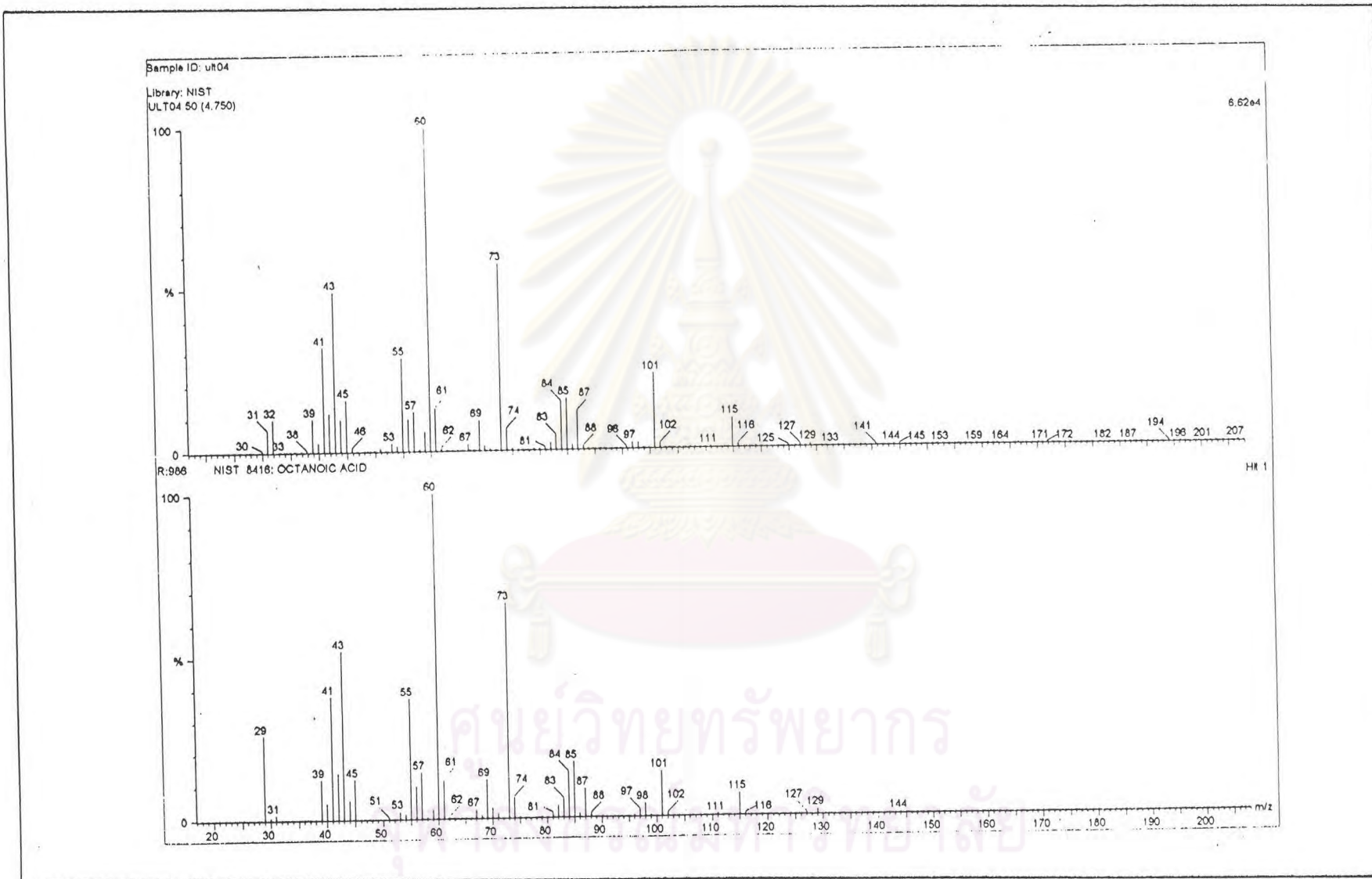


Figure C12 The mass spectrum of ULT4 at retention time 4.750 min.

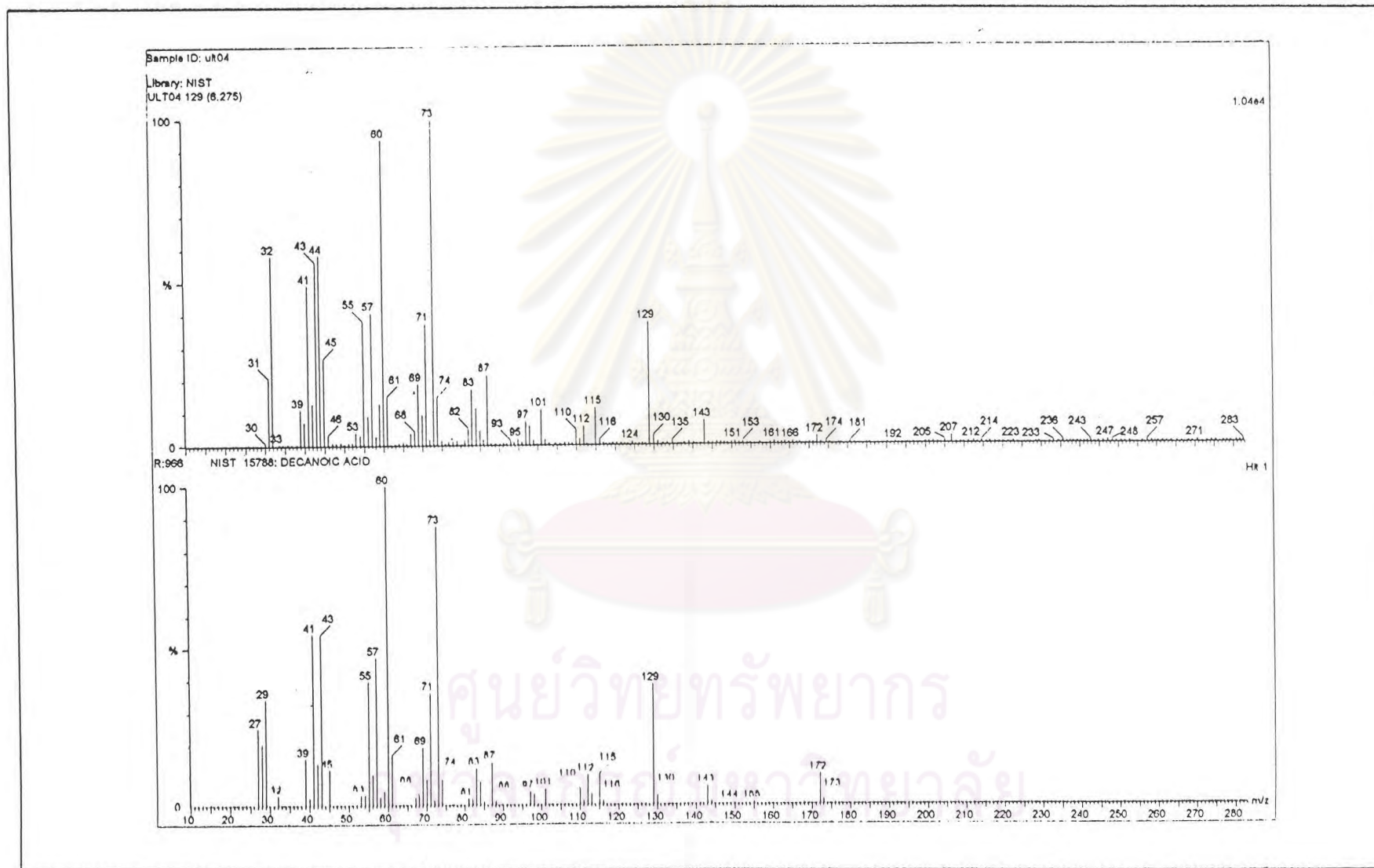


Figure C13 The mass spectrum of ULT4 at retention time 6.275 min.

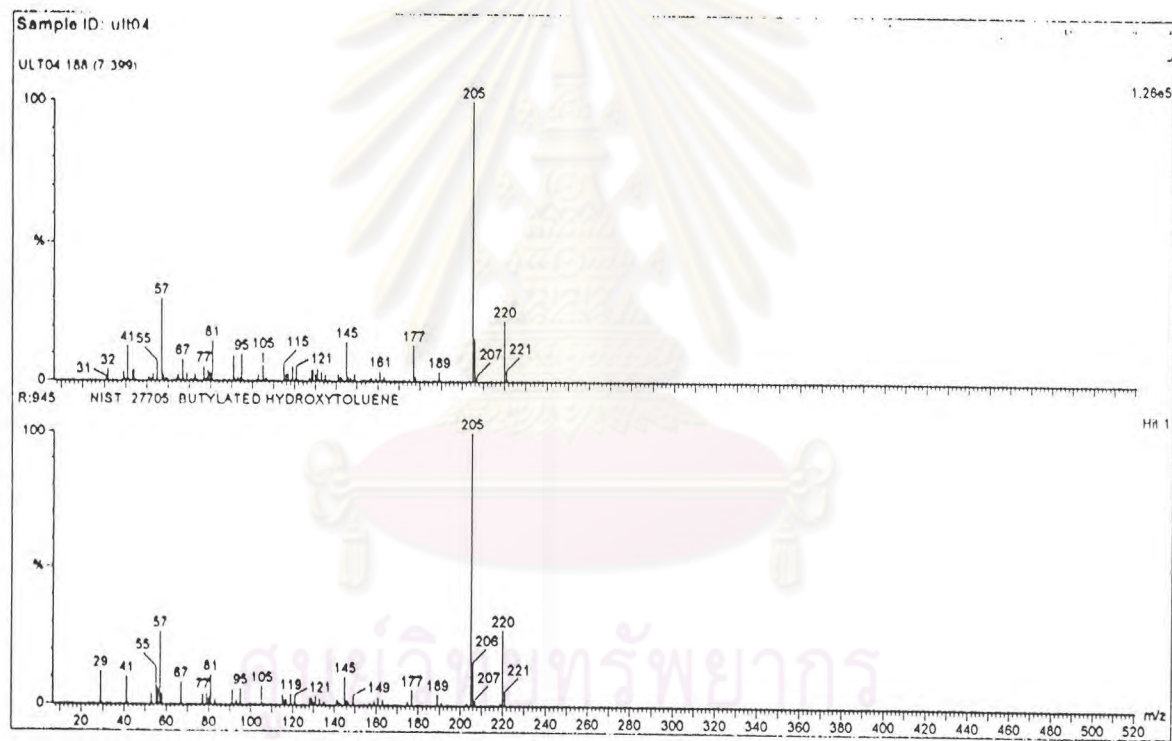


Figure C14 The mass spectrum of ULT4 at retention time 7.399 min.



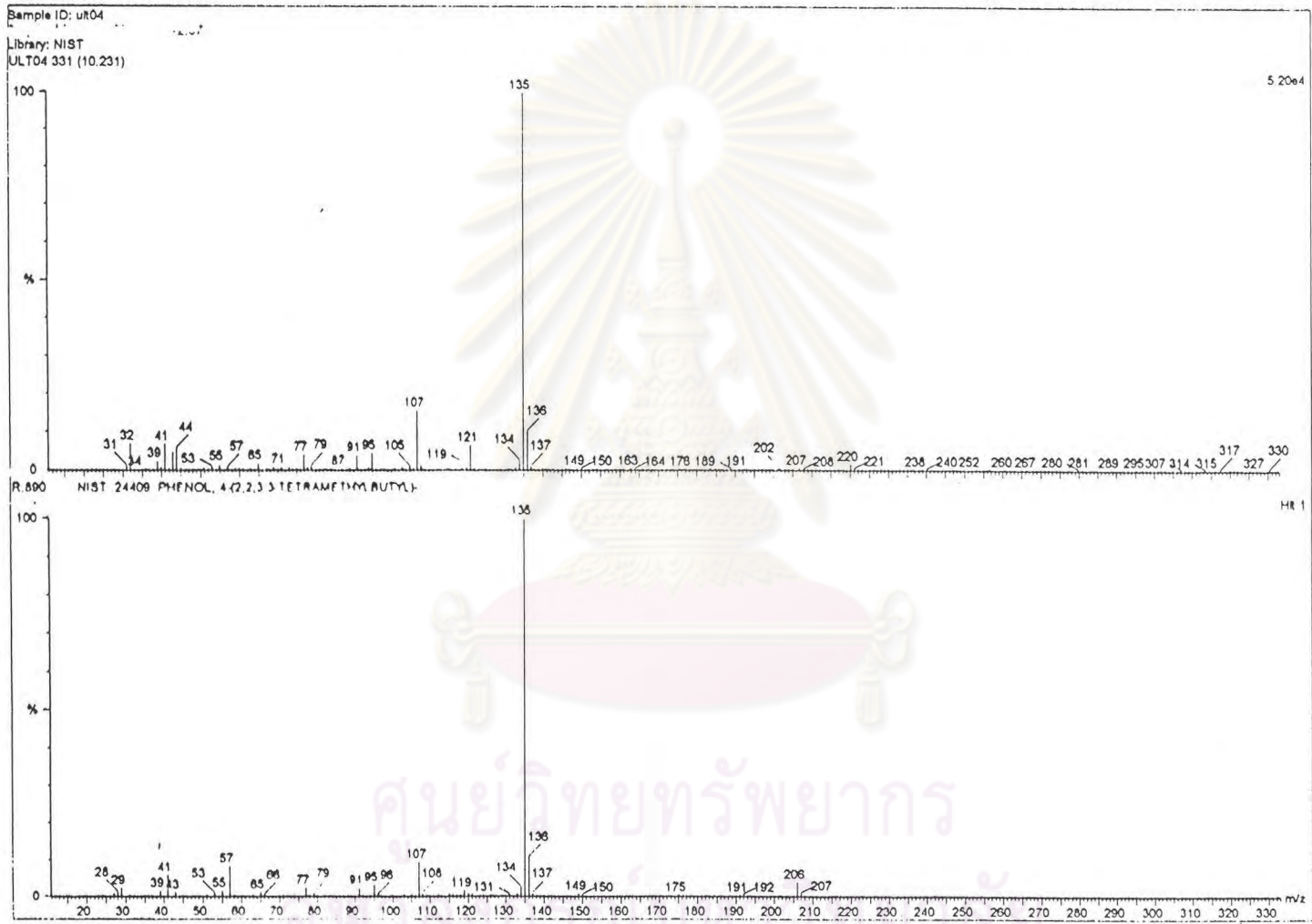


Figure C15 The mass spectrum of ULT4 at retention time 10.231 min.

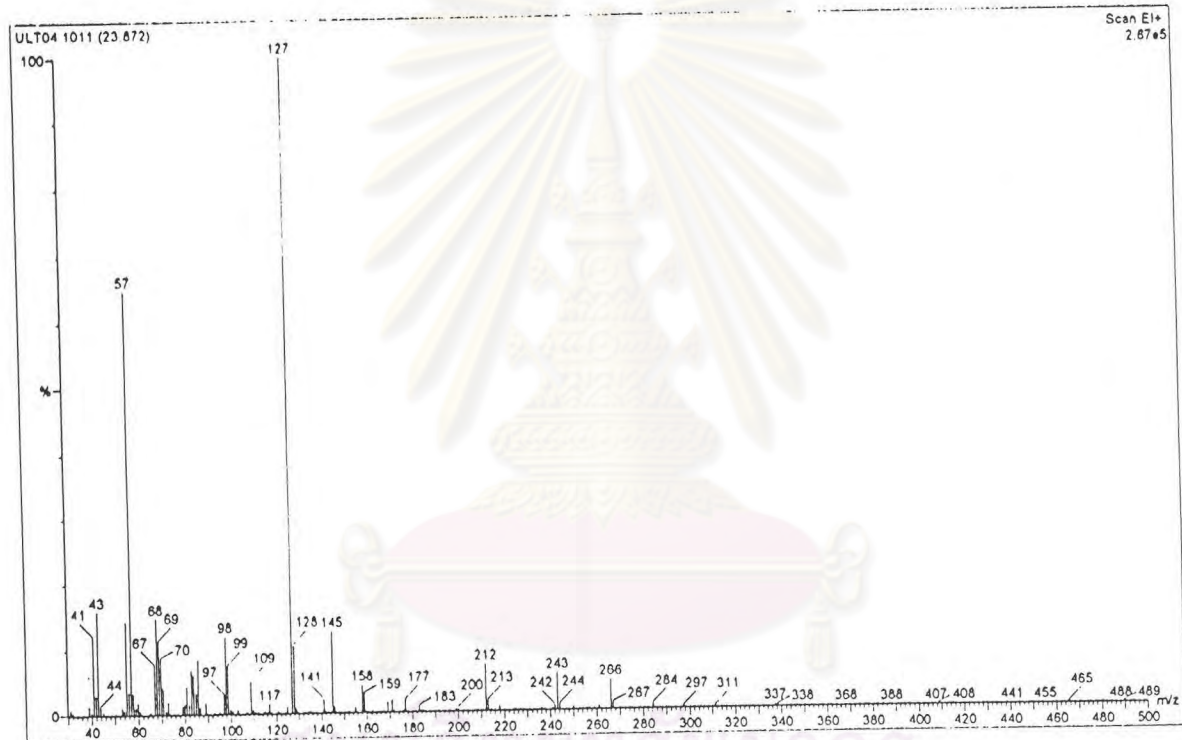


Figure C16 The mass spectrum of ULT4 at retention time 23.872 min.

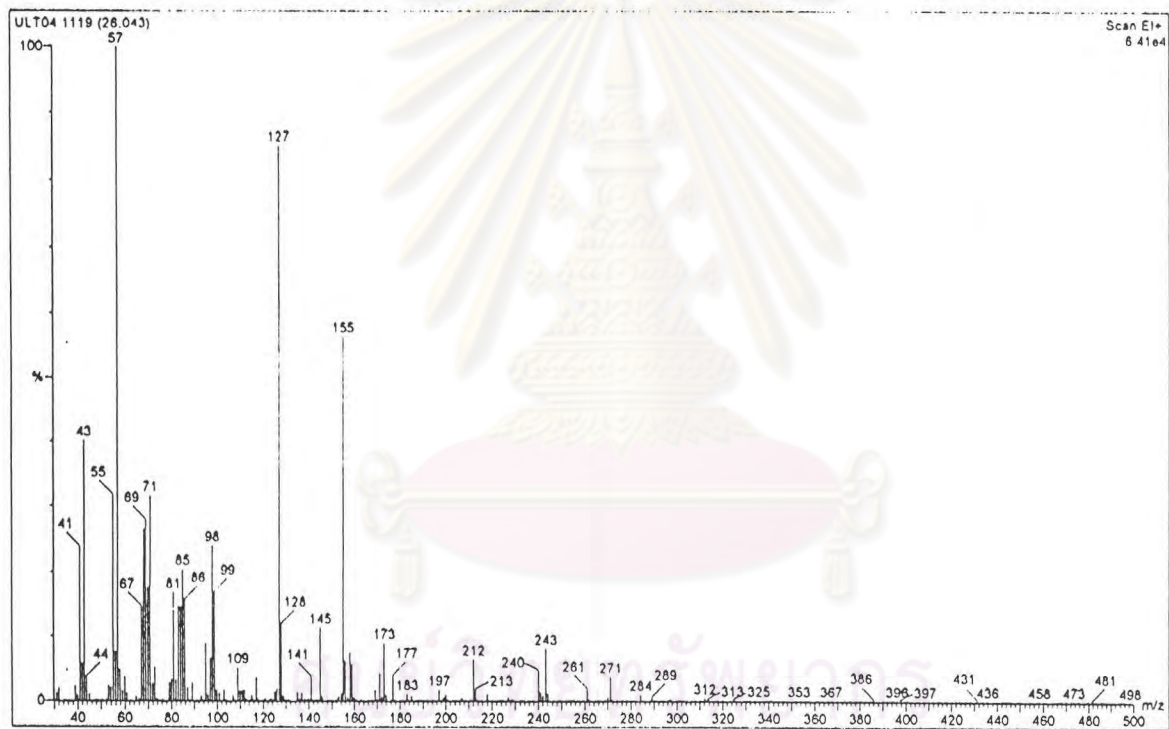


Figure C17 The mass spectrum of ULT4 at retention time 26.043 min.

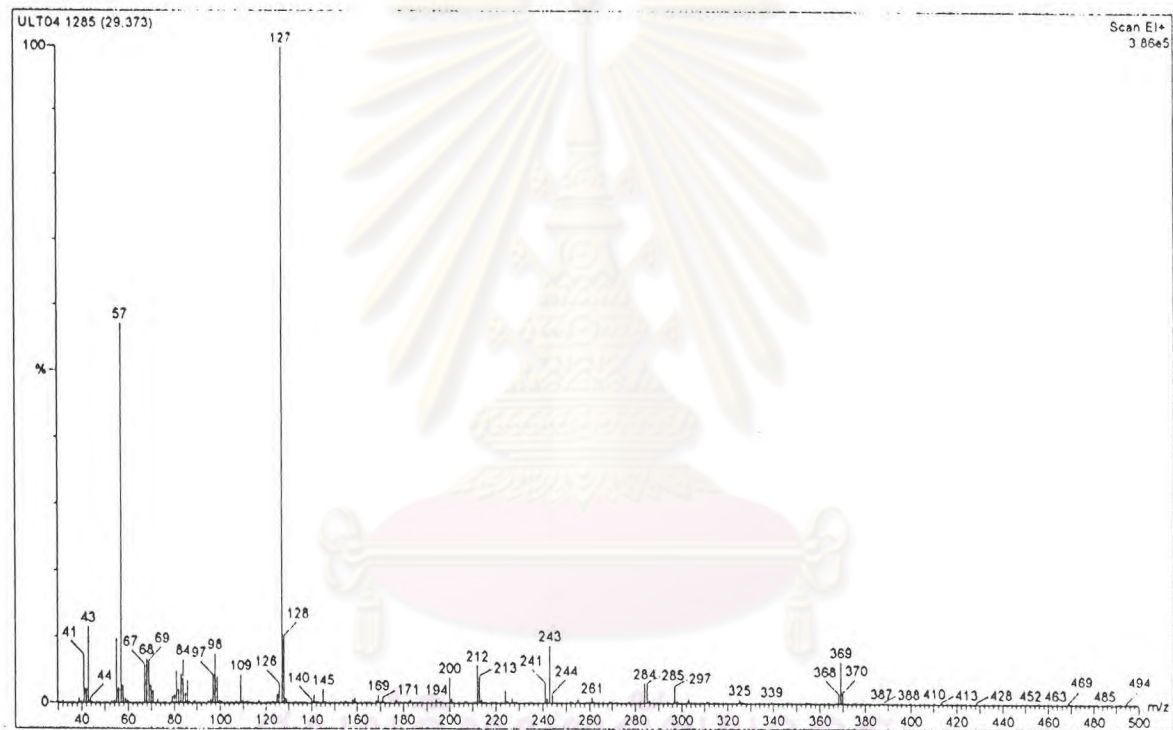


Figure C18 The mass spectrum of ULT4 at retention time 29.373 min.

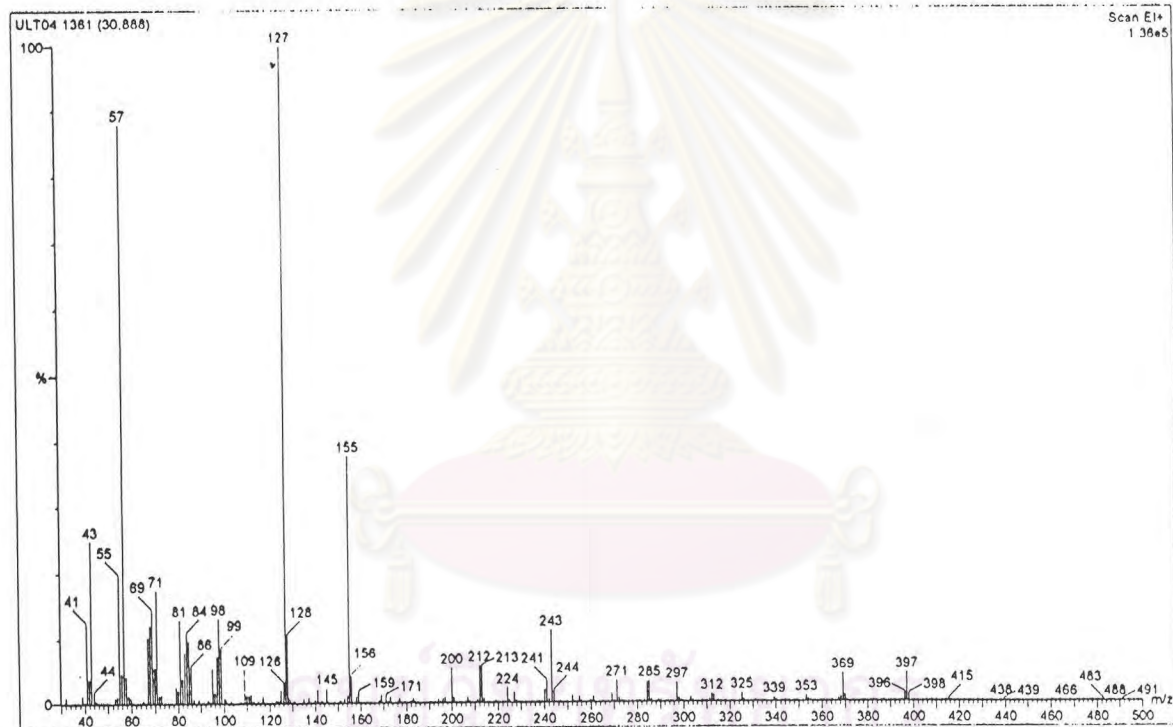


Figure C19 The mass spectrum of ULT4 at retention time 30.888 min.

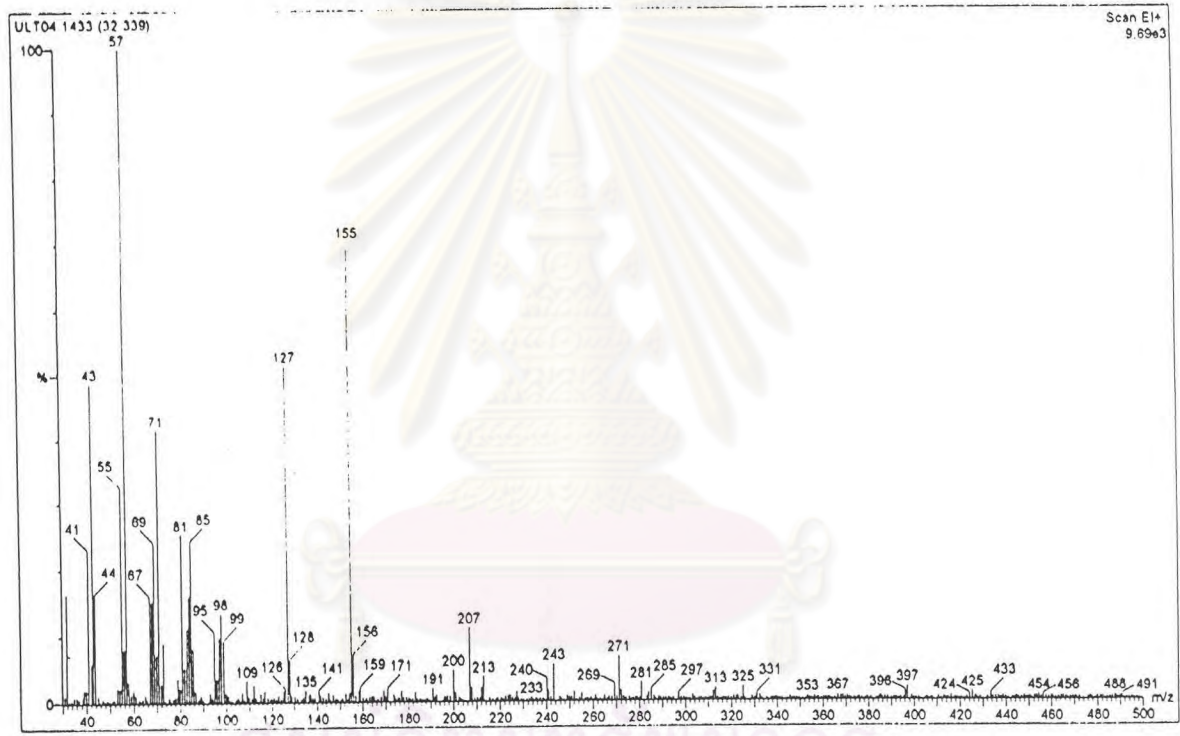


Figure C20 The mass spectrum of ULT4 at retention time 32.339 min.

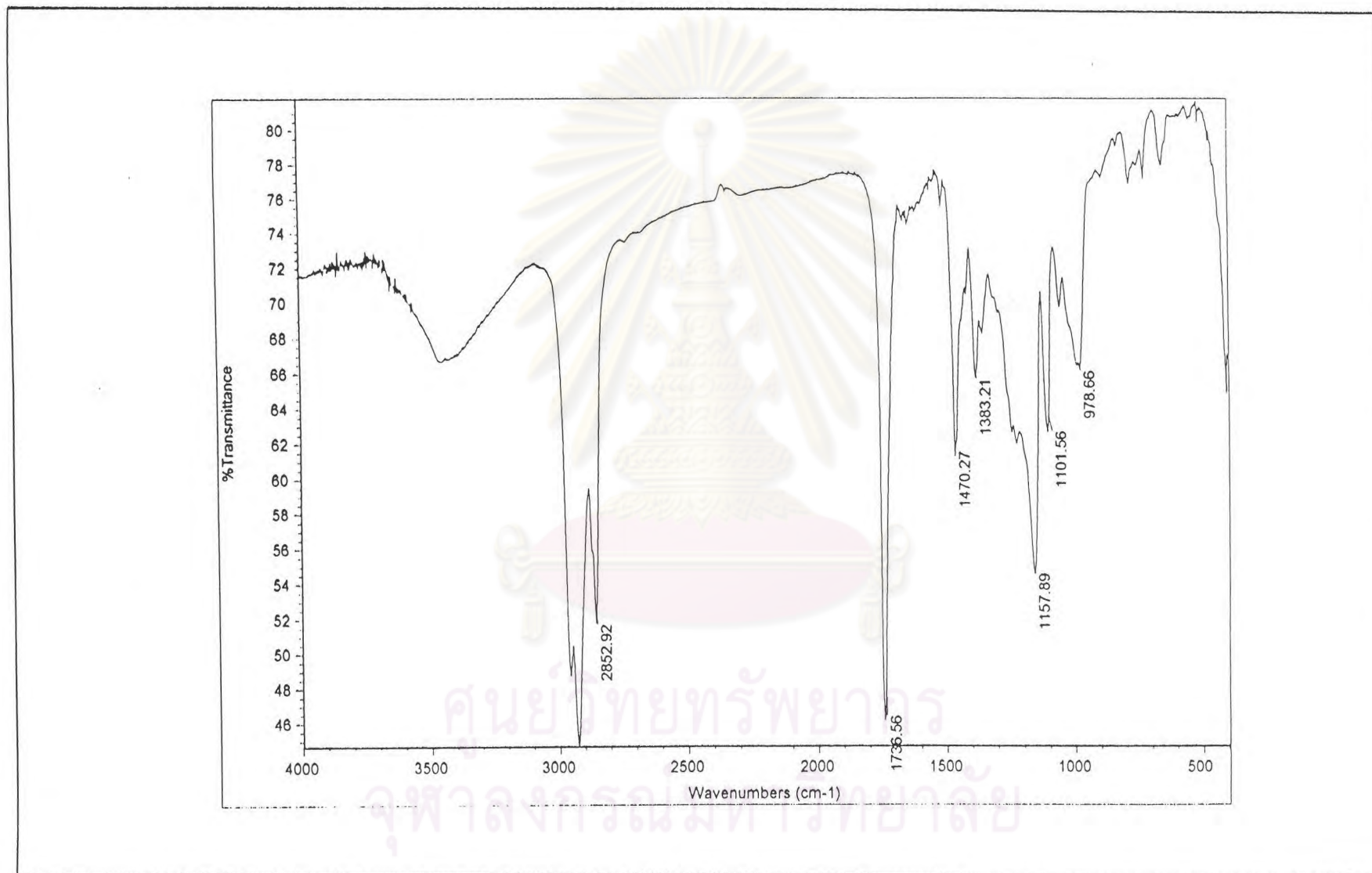


Figure C21 The IR spectrum of TMO3

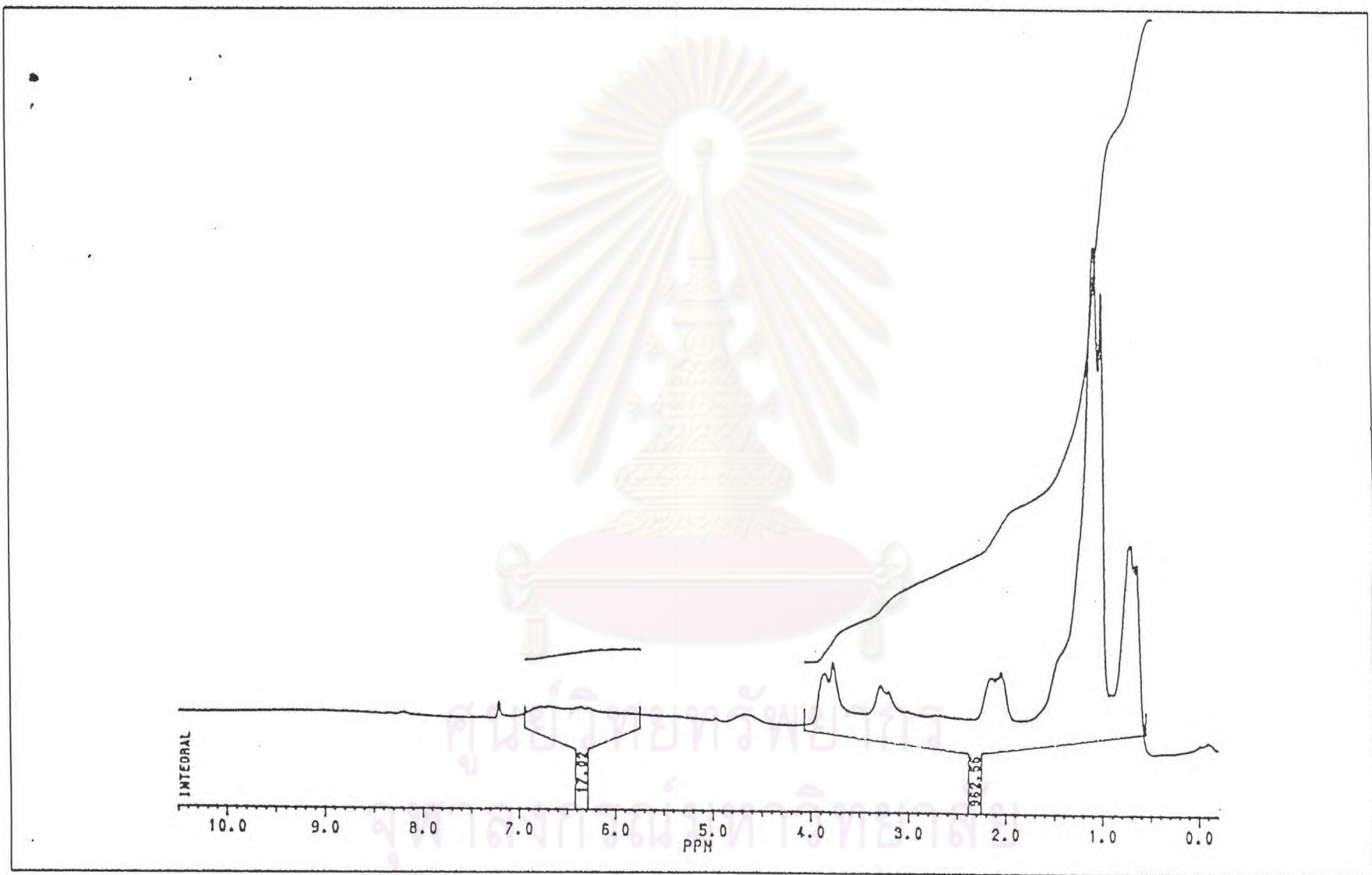


Figure C22 The  $^1\text{H}$  NMR spectrum of TMO<sub>3</sub>



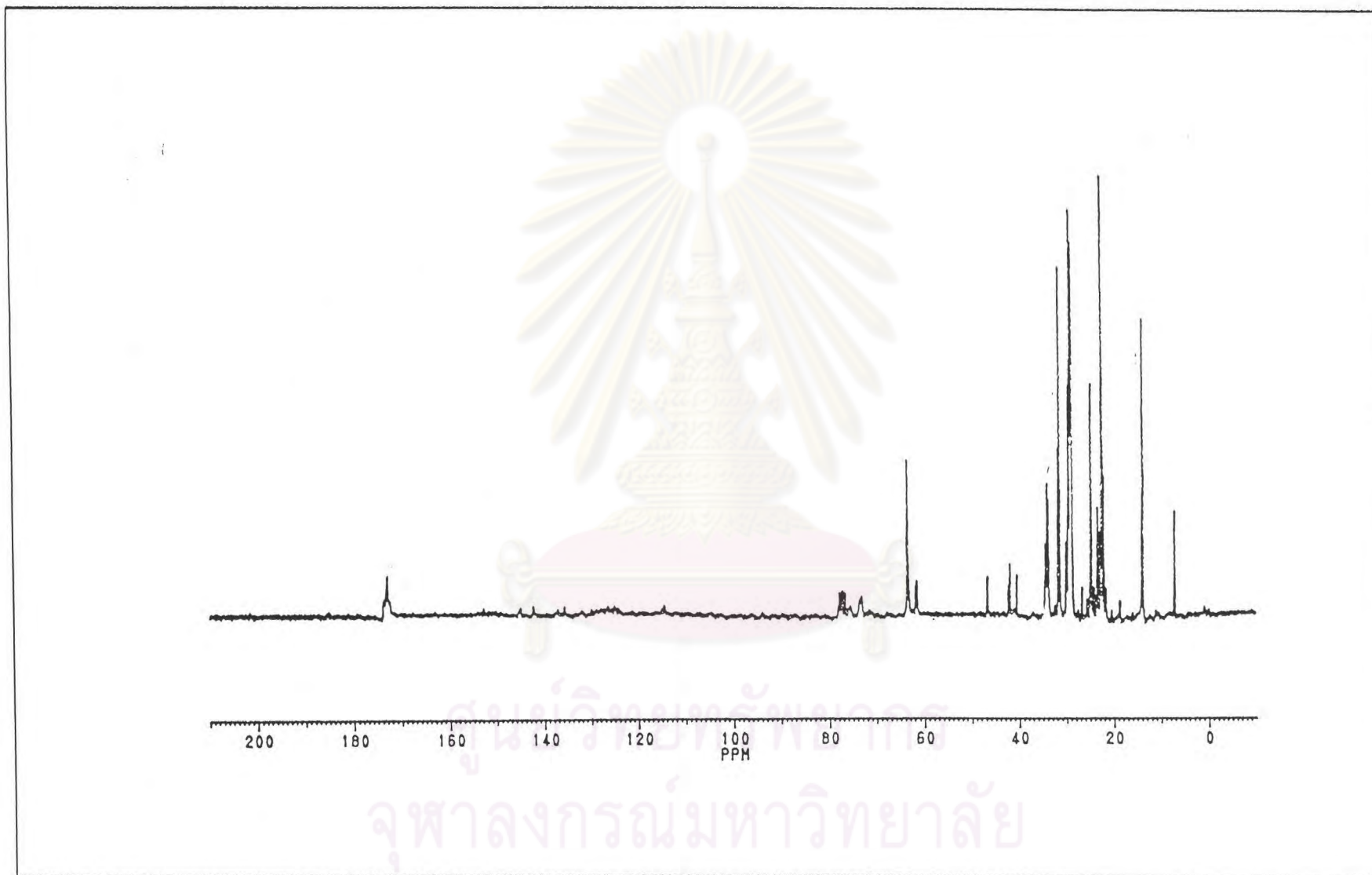


Figure C23 The  $^{13}\text{C}$  NMR spectrum of TMO<sub>3</sub>

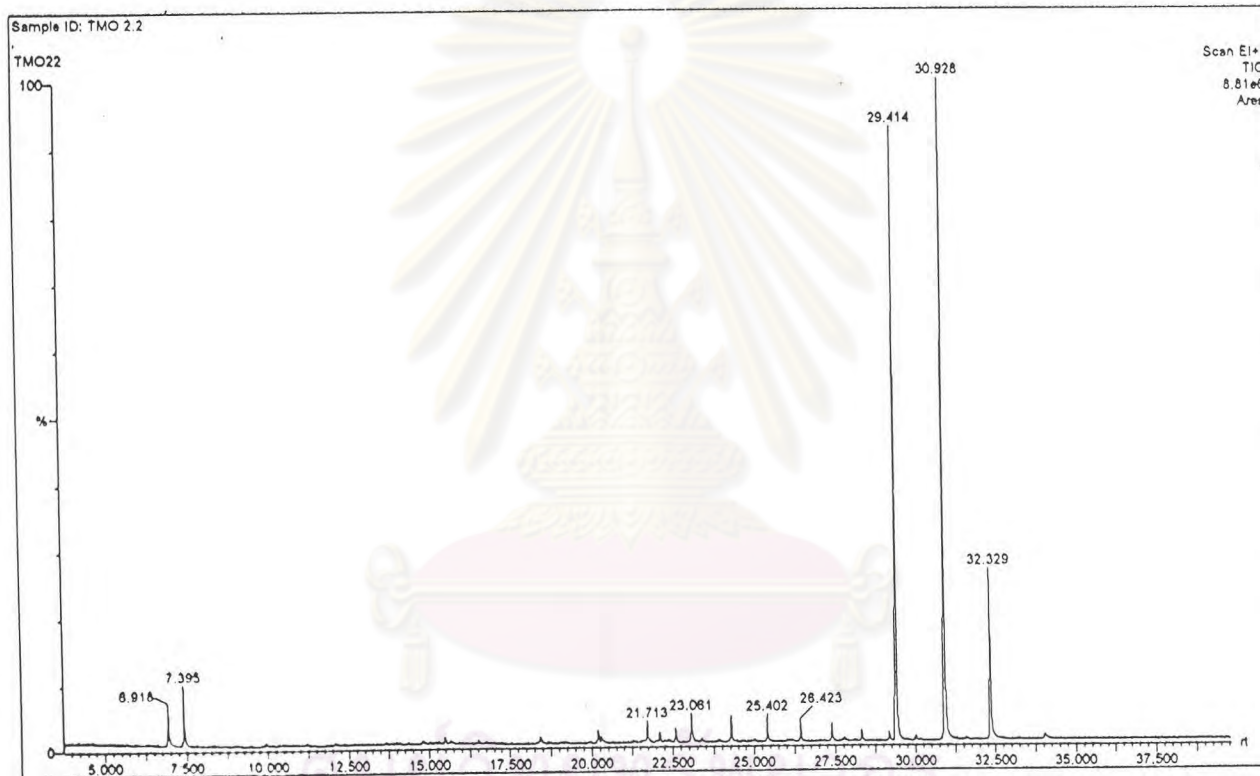


Figure C24 The GC-MS chromatogram of TMO3

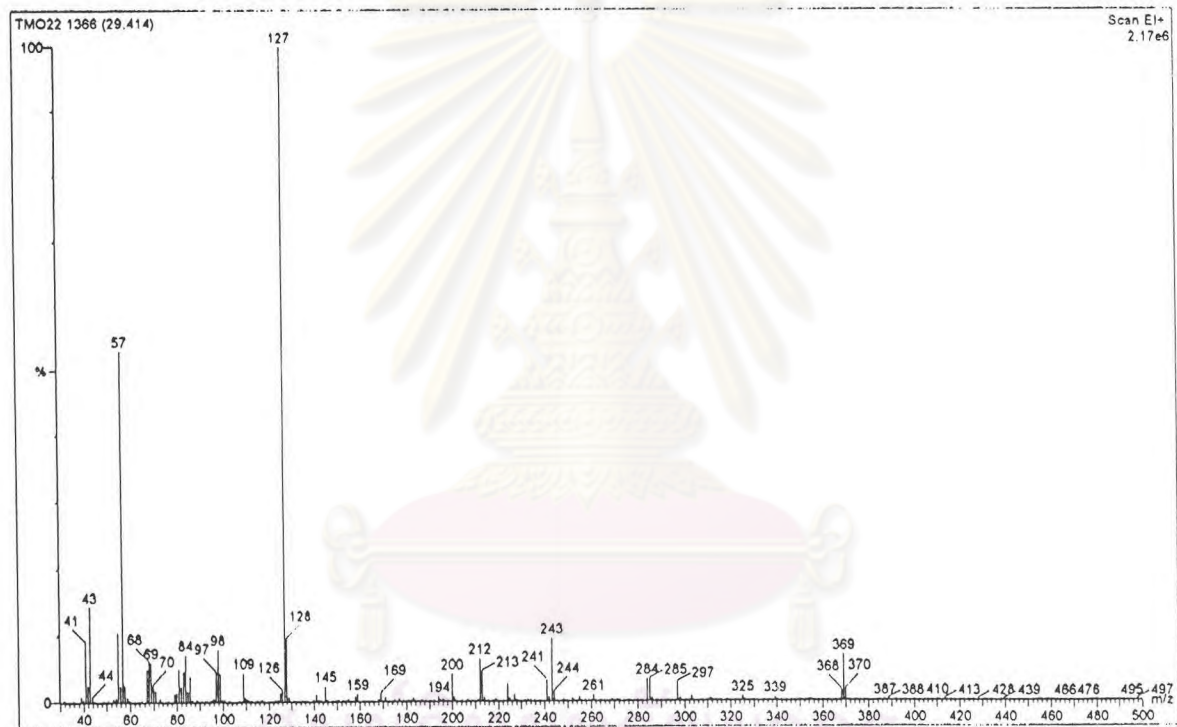


Figure C25 The mass spectrum of TMO3 at retention time 29.421 min.

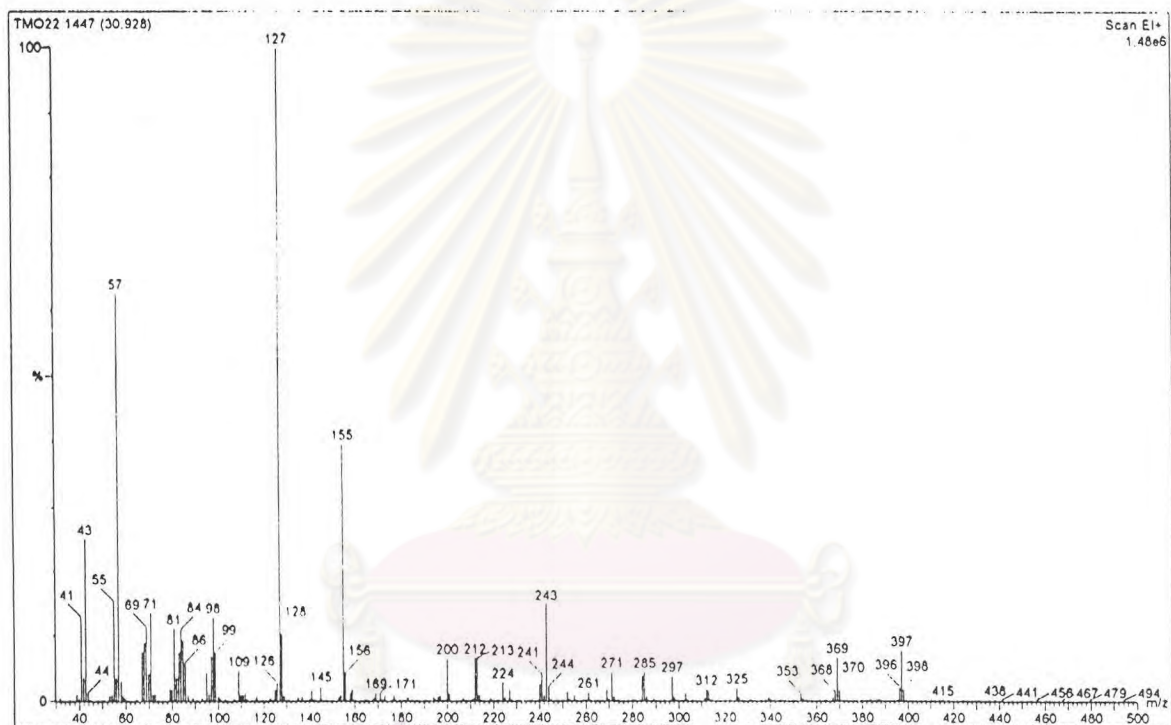


Figure C26 The mass spectrum of TMO3 at retention time 30.928 min.

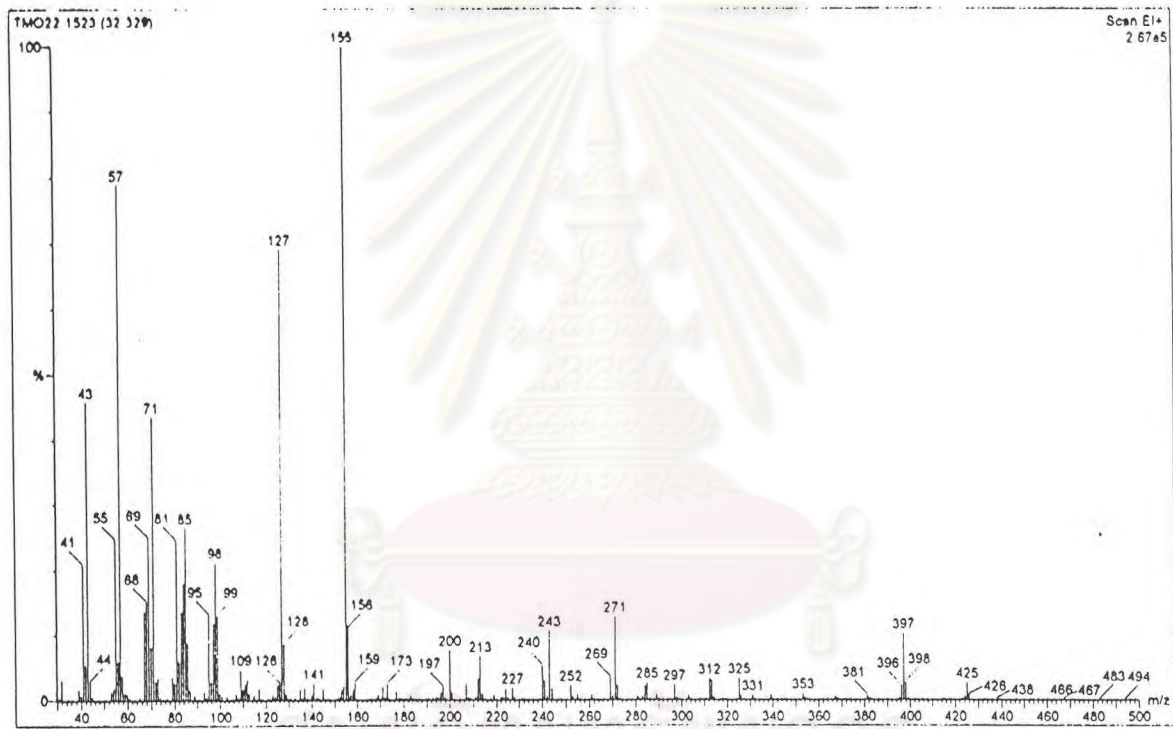


Figure C27 The mass spectrum of TMO3 at retention time 32.329 min.

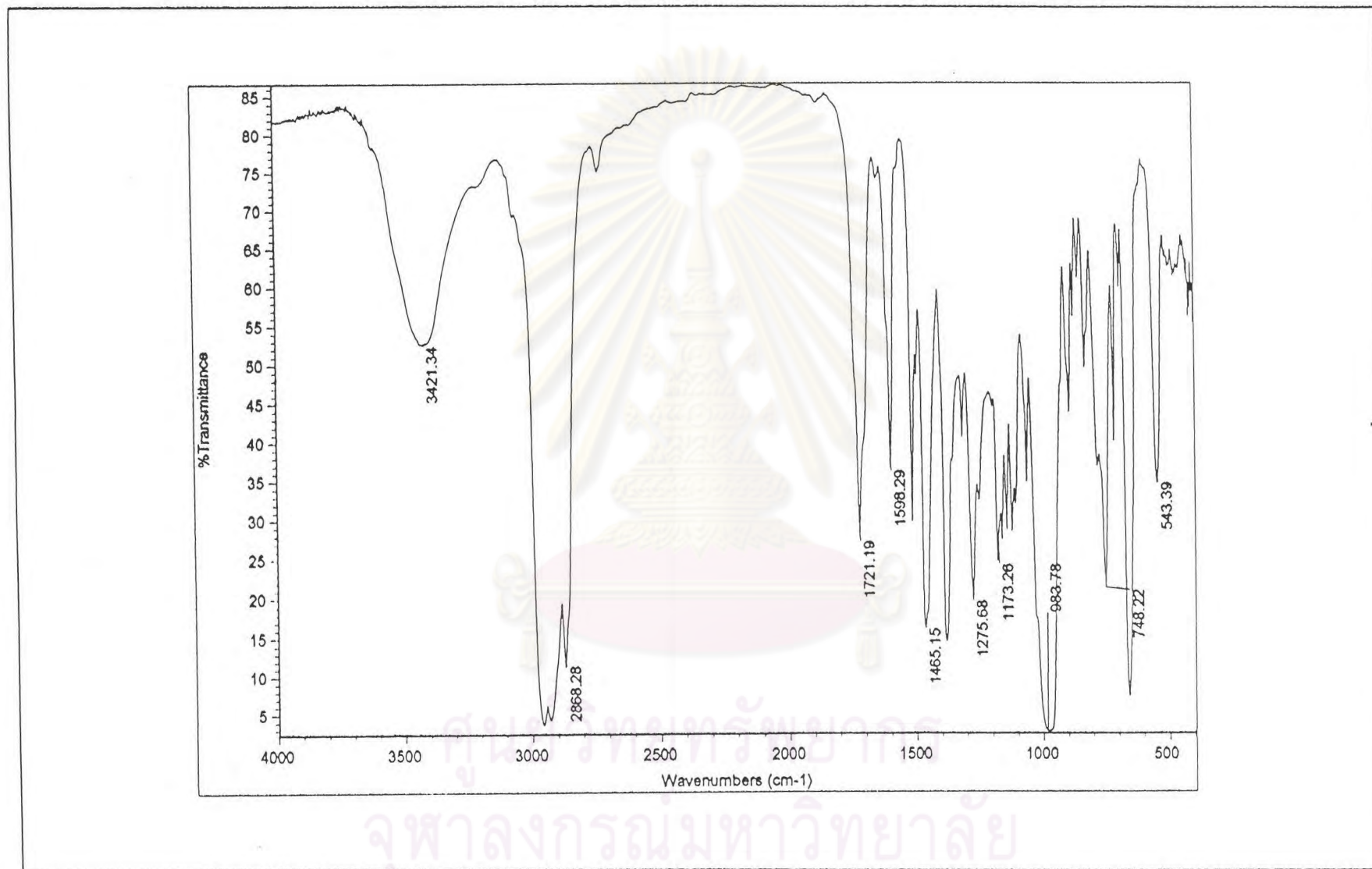


Figure C28 The IR spectrum of BP3

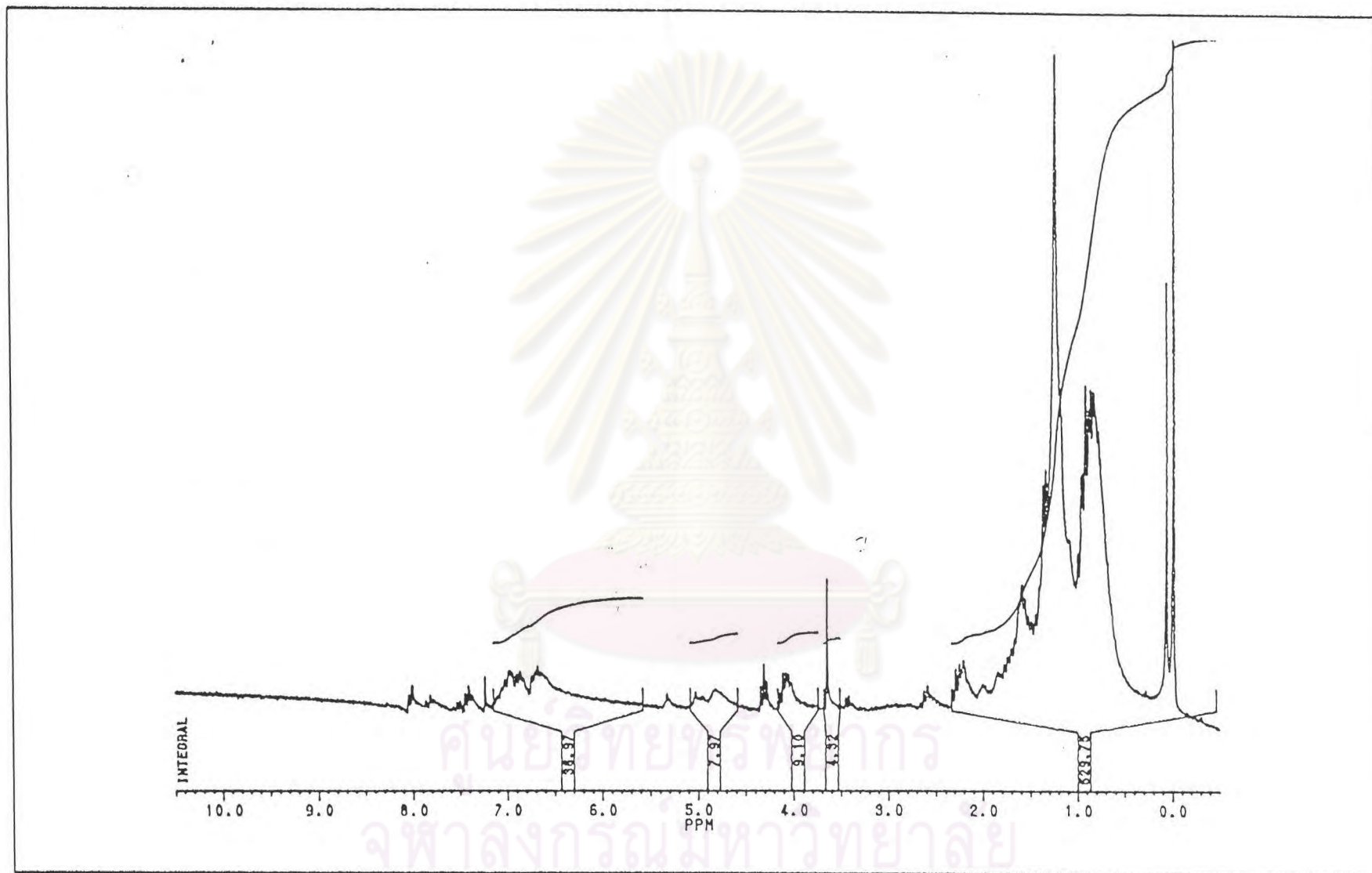


Figure C29 The  $^1\text{H}$  NMR spectrum of BP3

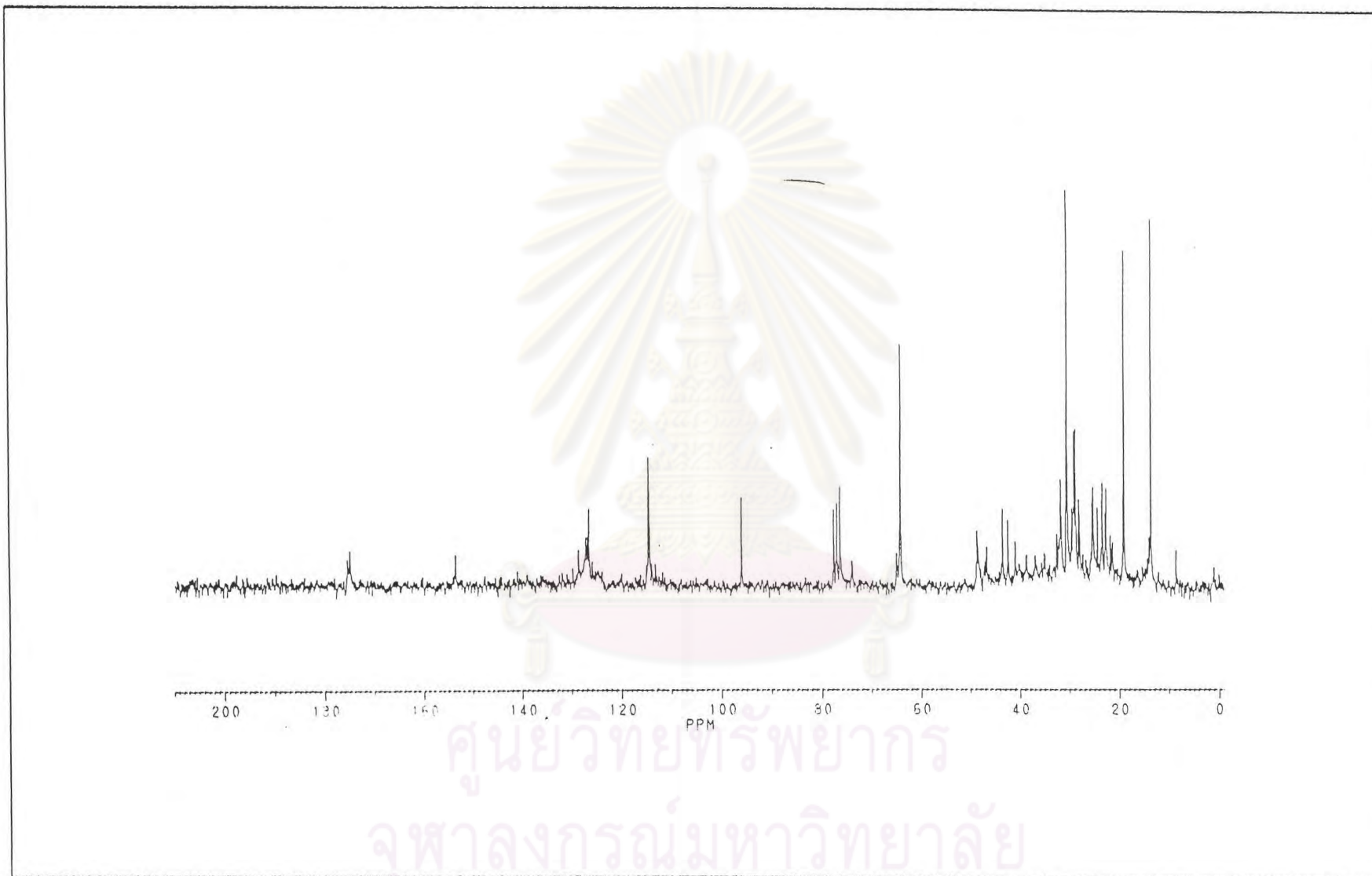


Figure C30 The  $^{13}\text{C}$  NMR spectrum of BP3



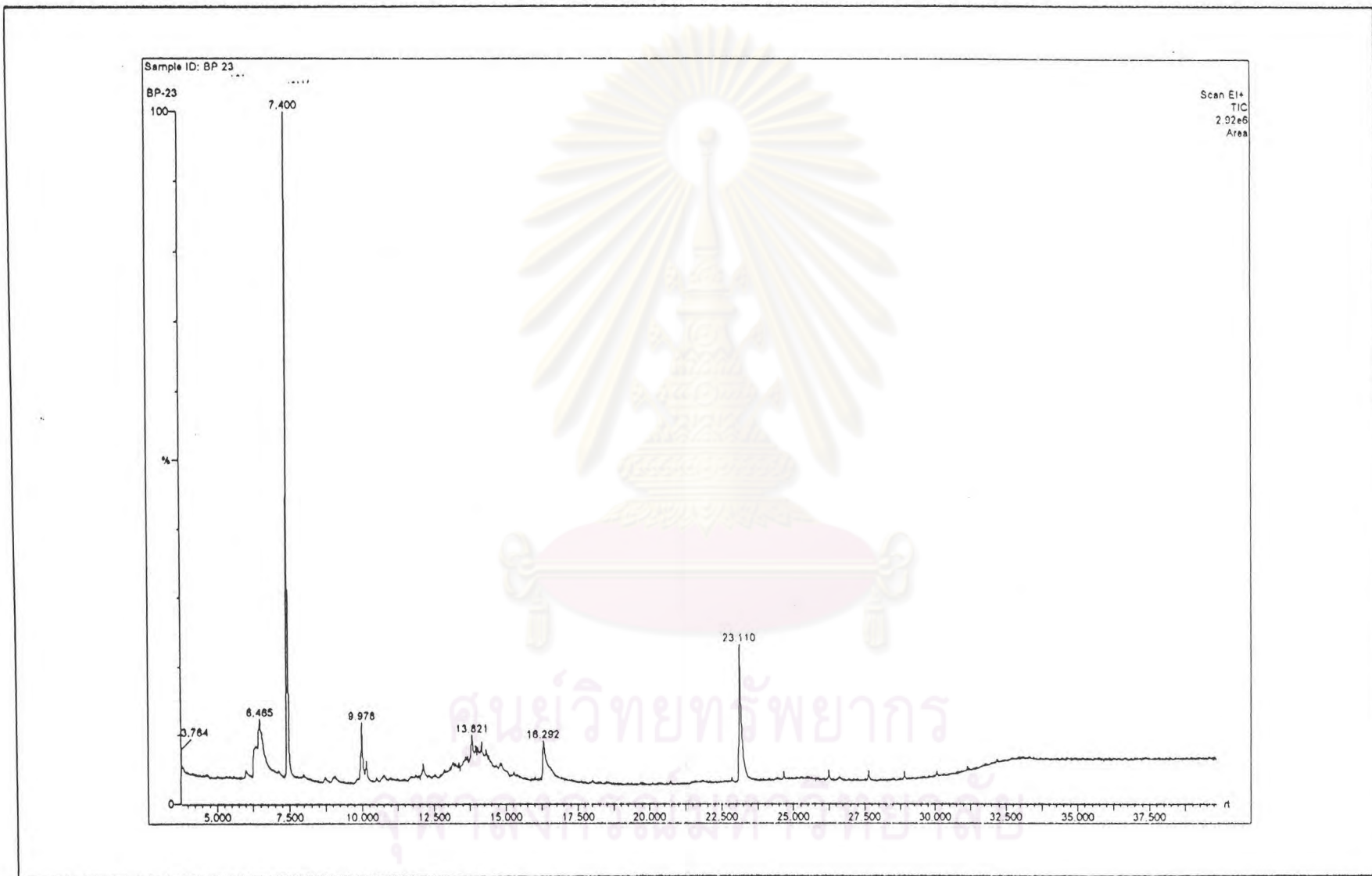


Figure C31 The GC-MS chromatogram of BP3

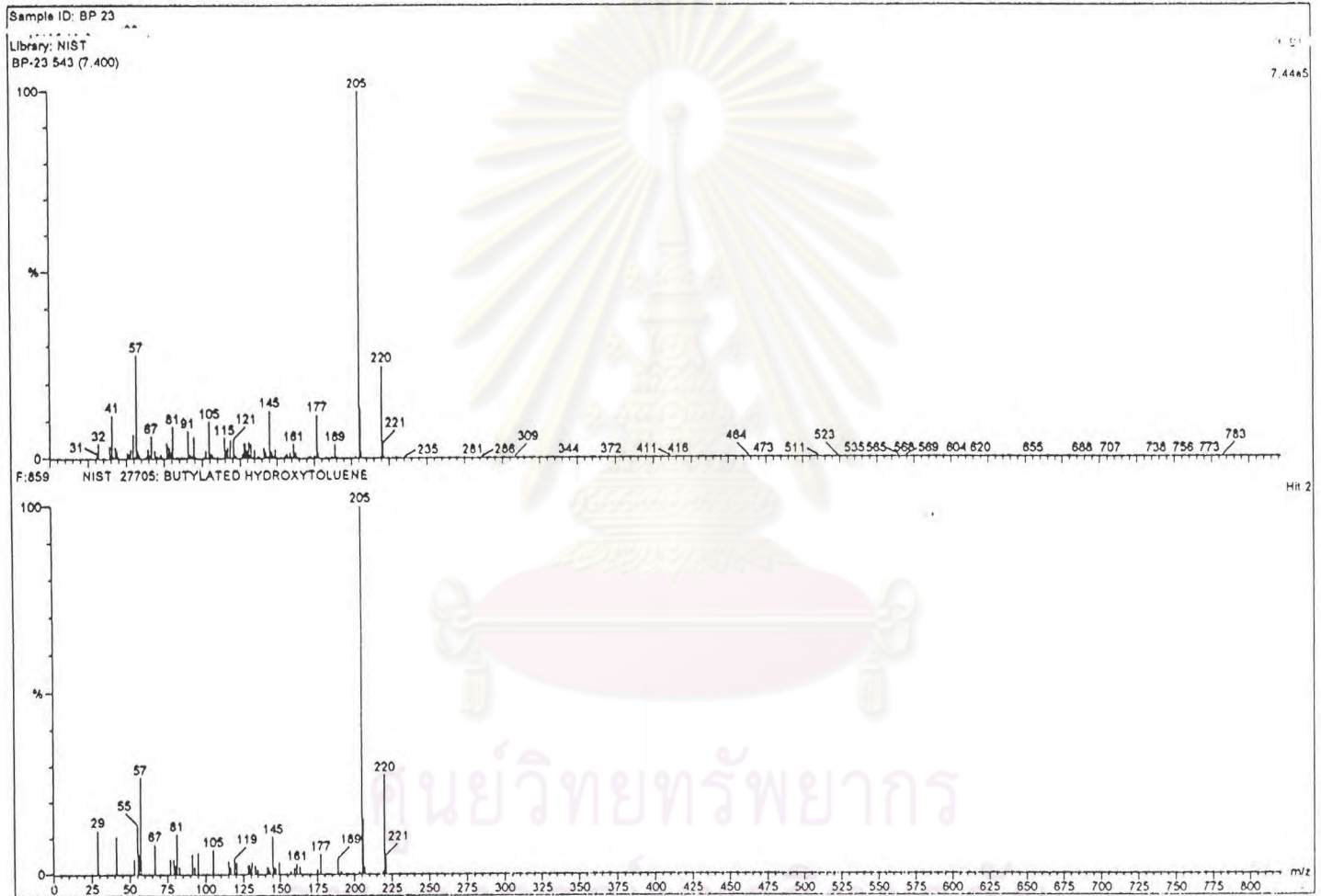


Figure C32 The mass spectrum of BP3 at retention time 7.400 min.

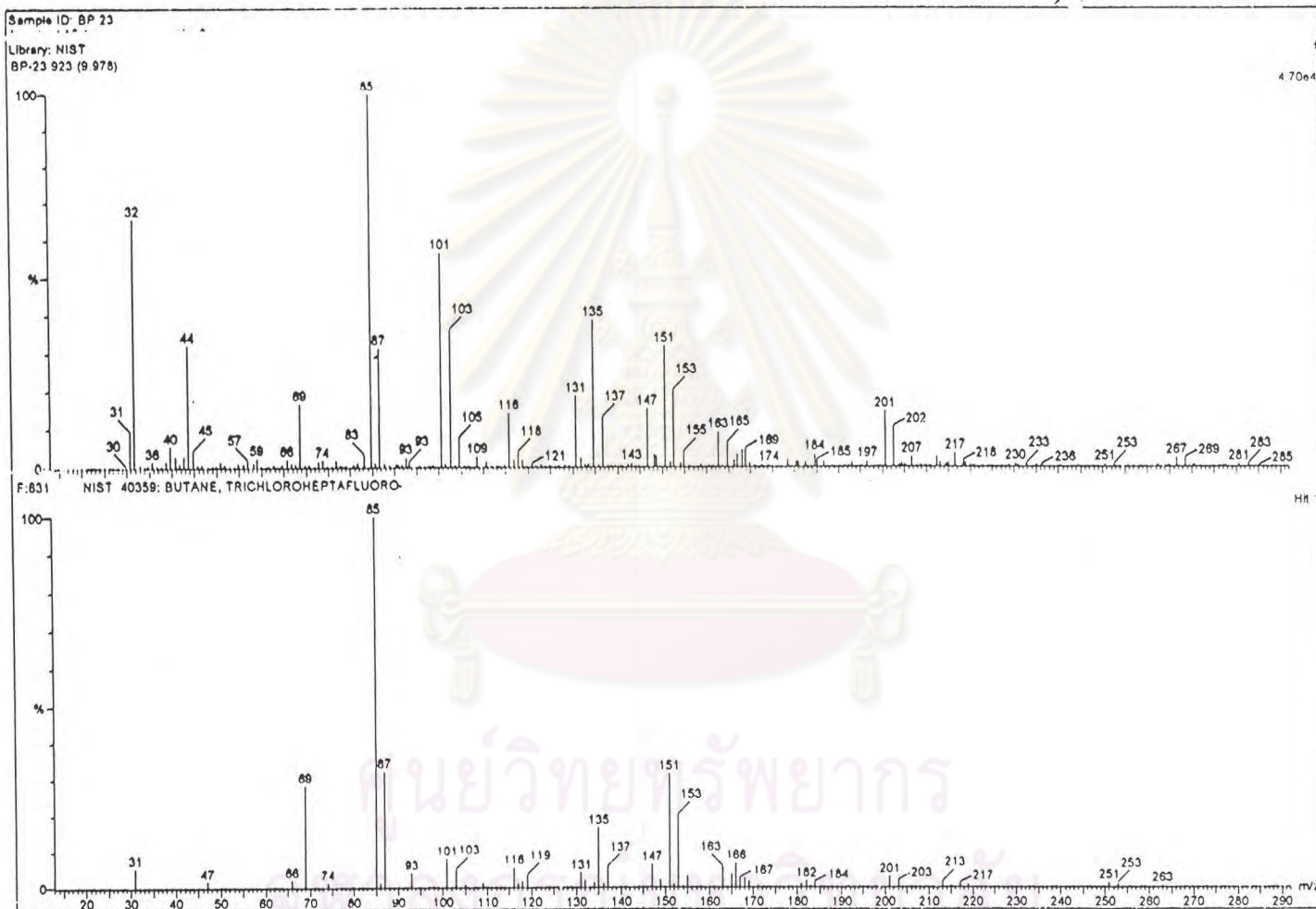


Figure C33 The mass spectrum of BP3 at retention time 9.978 min.

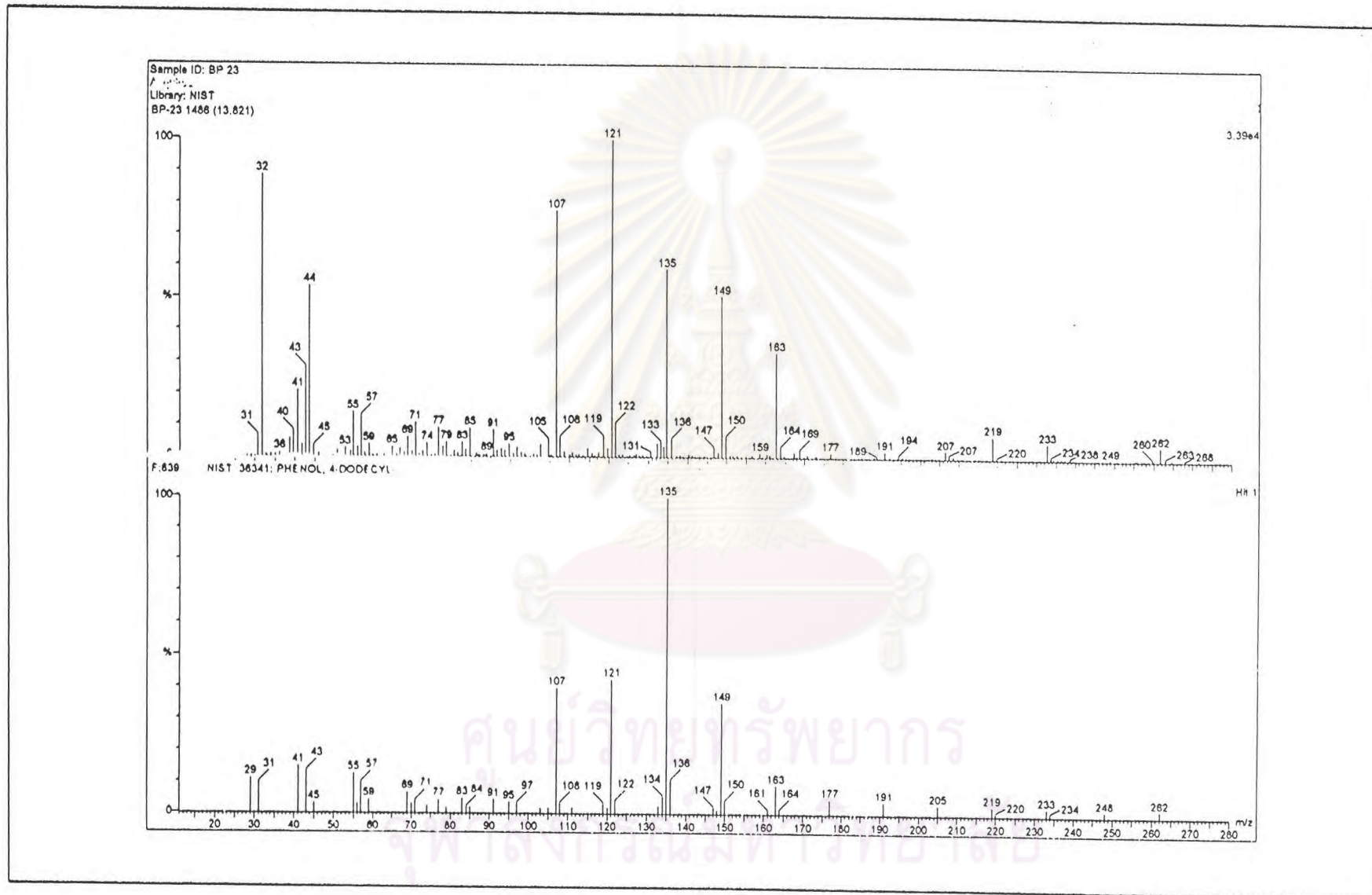


Figure C34 The mass spectrum of BP3 at retention time 13.821 min.

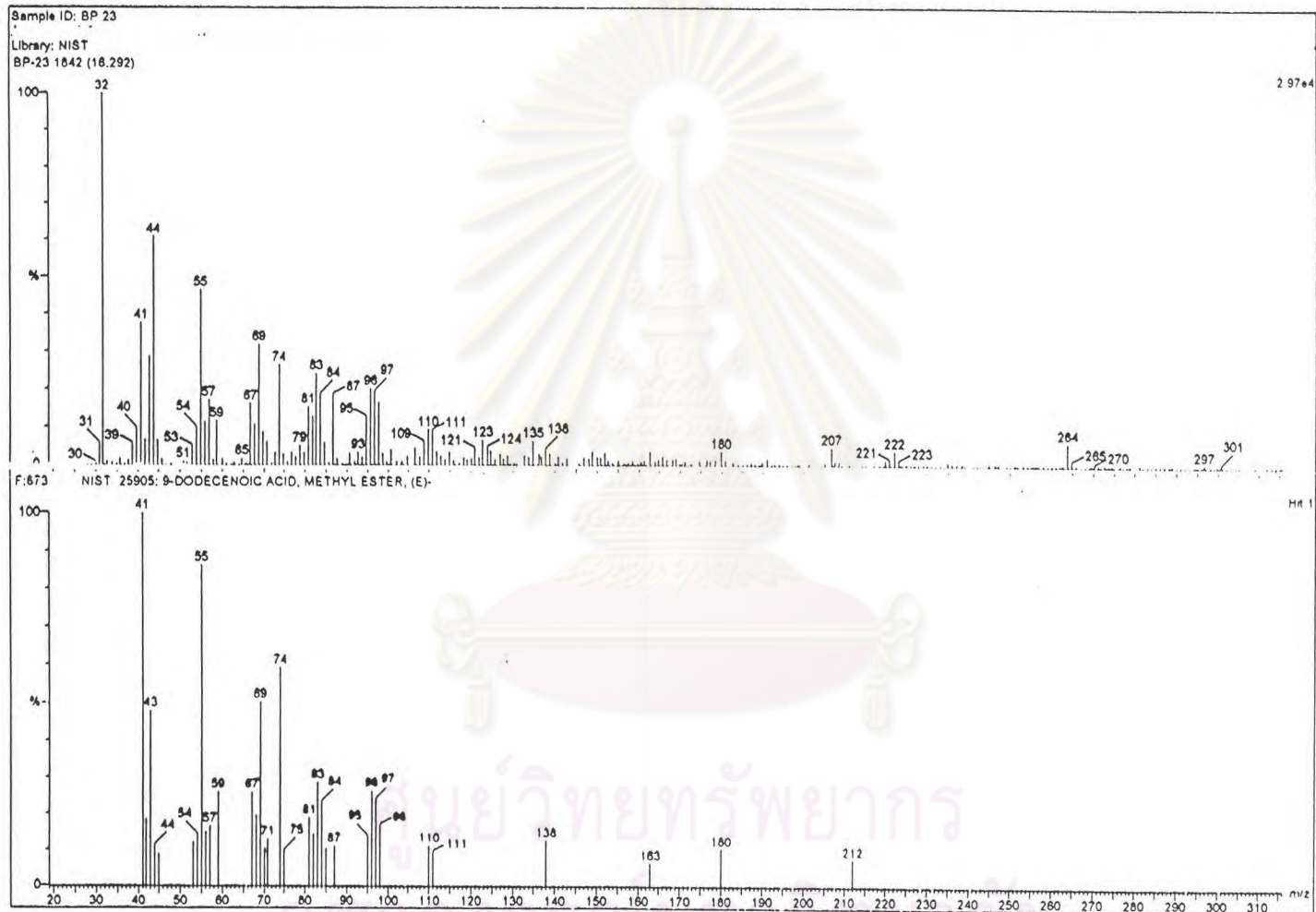


Figure C35 The mass spectrum of BP3 at retention time 16.292 min.

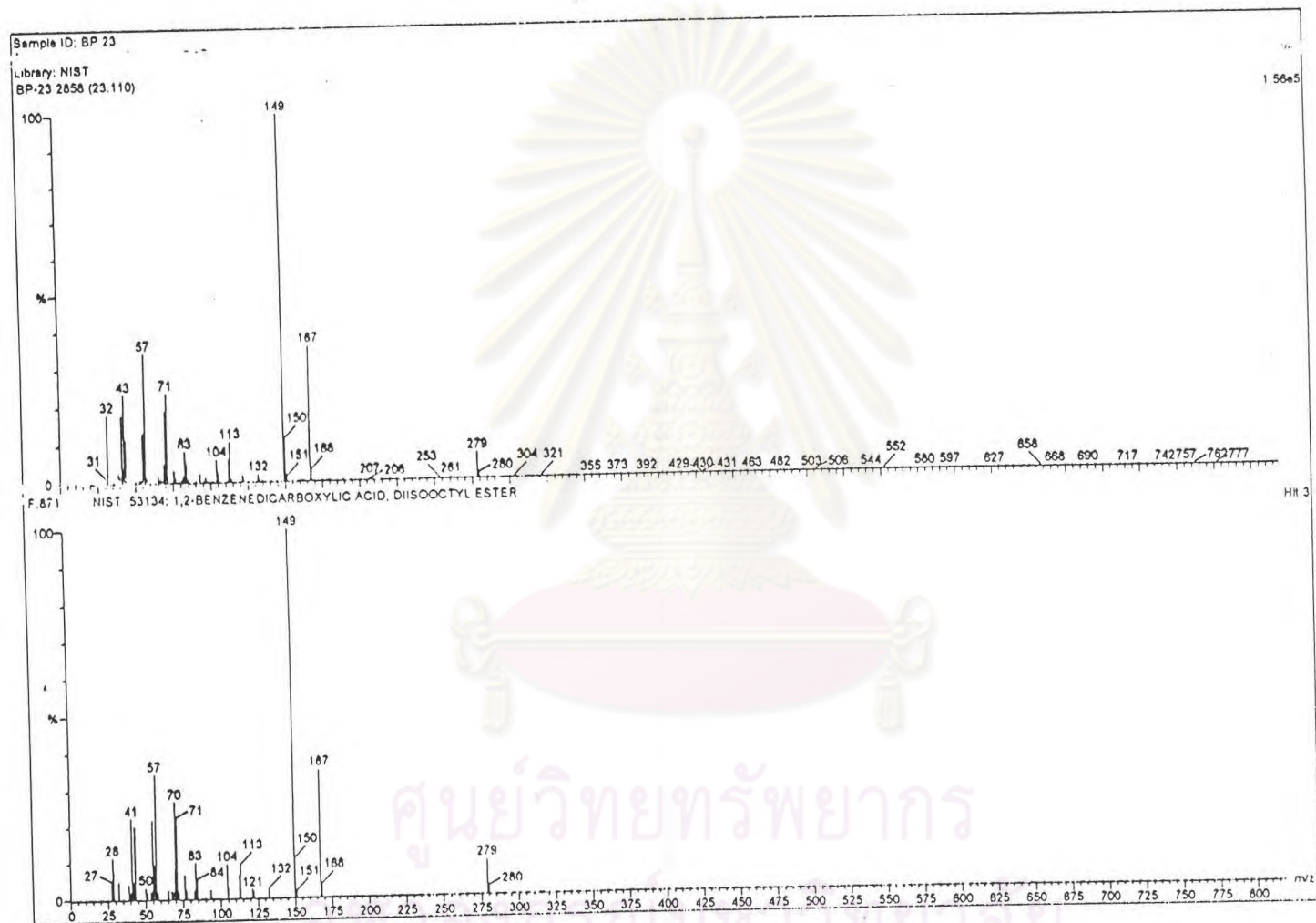


Figure C36 The mass spectrum of BP3 at retention time 23.110 min.

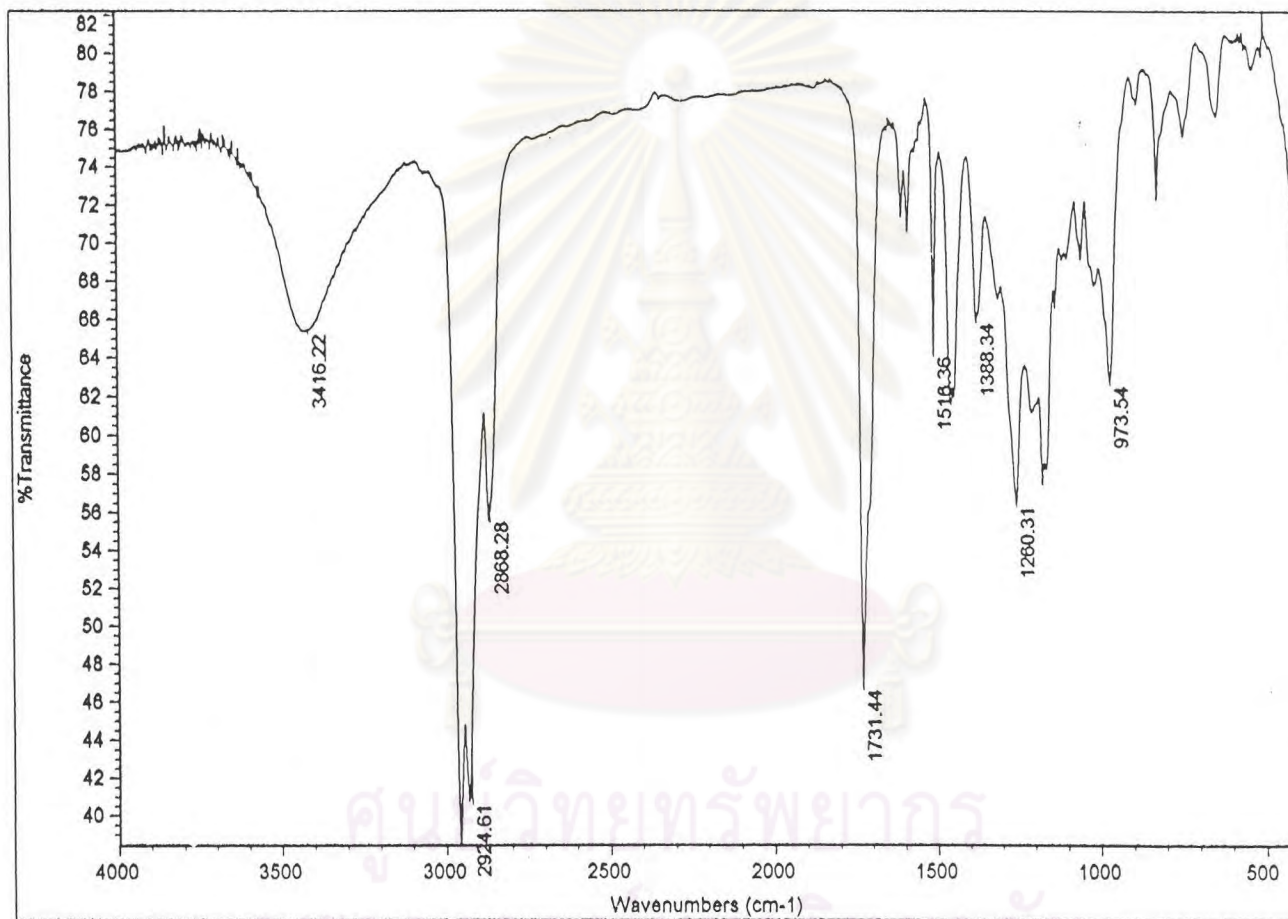


Figure C37 The IR spectrum of BP4

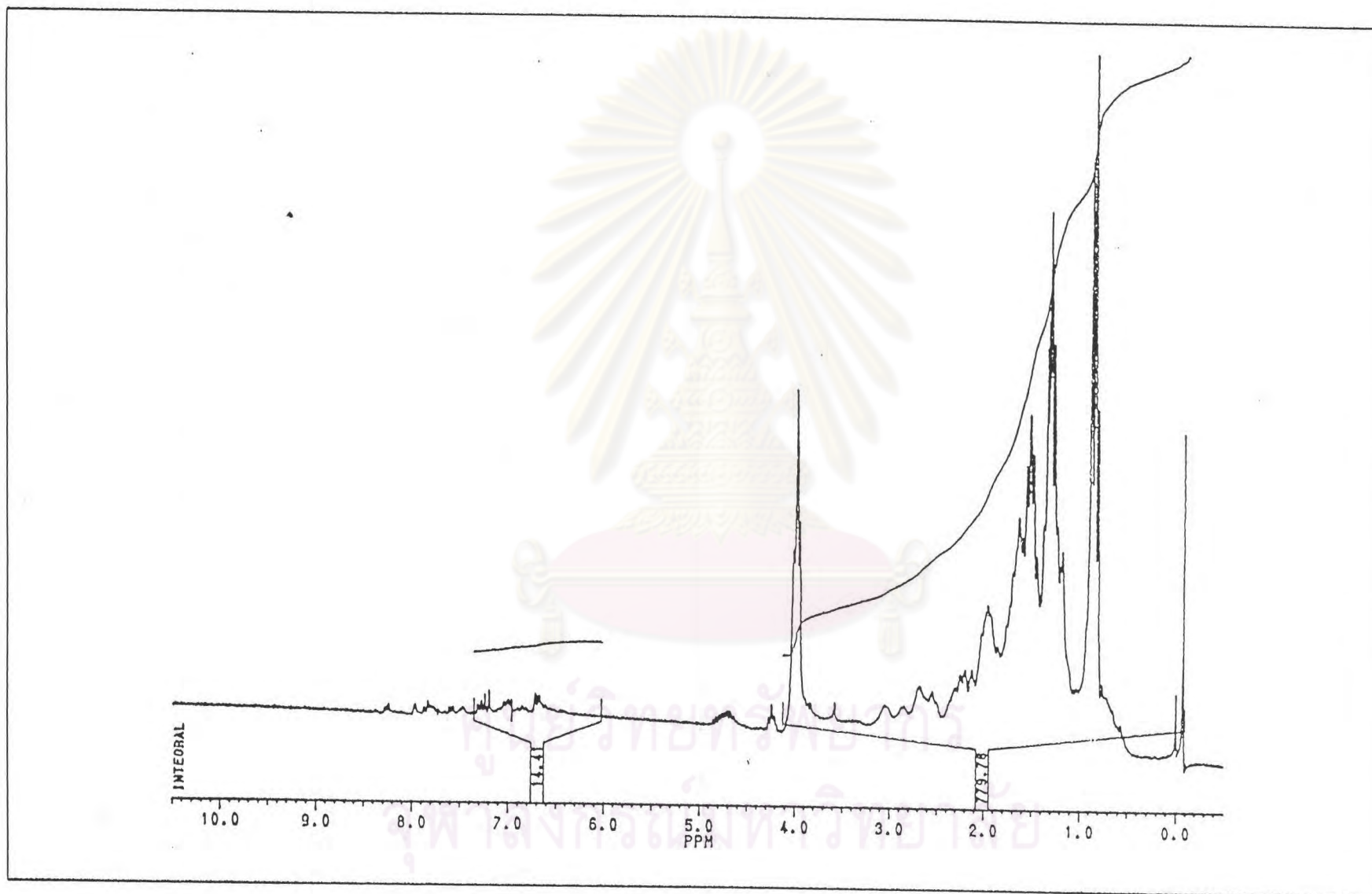


Figure C38 The  $^1\text{H}$  NMR spectrum of BP4



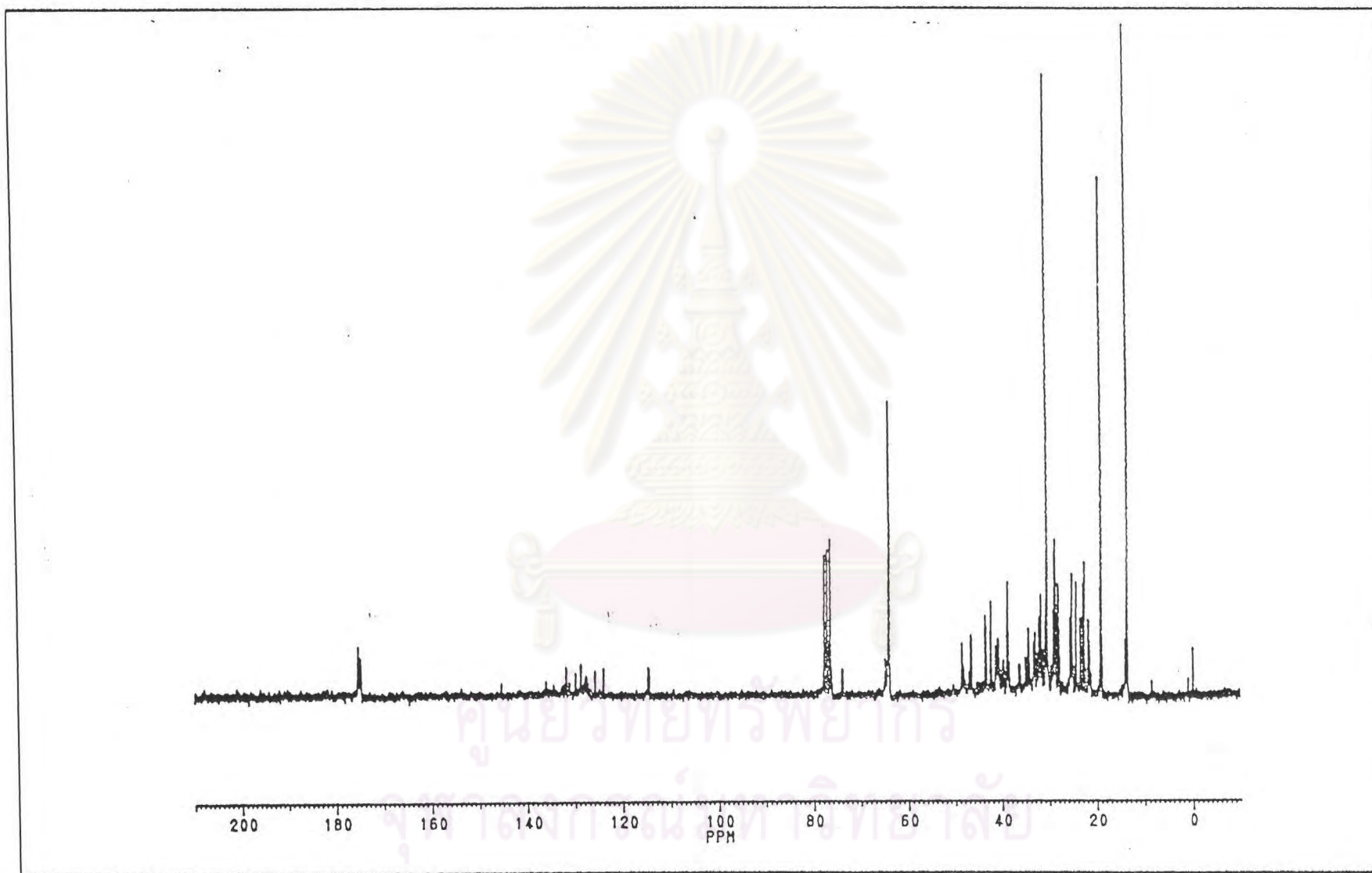


Figure C39 The  $^{13}\text{C}$  NMR spectrum of BP4

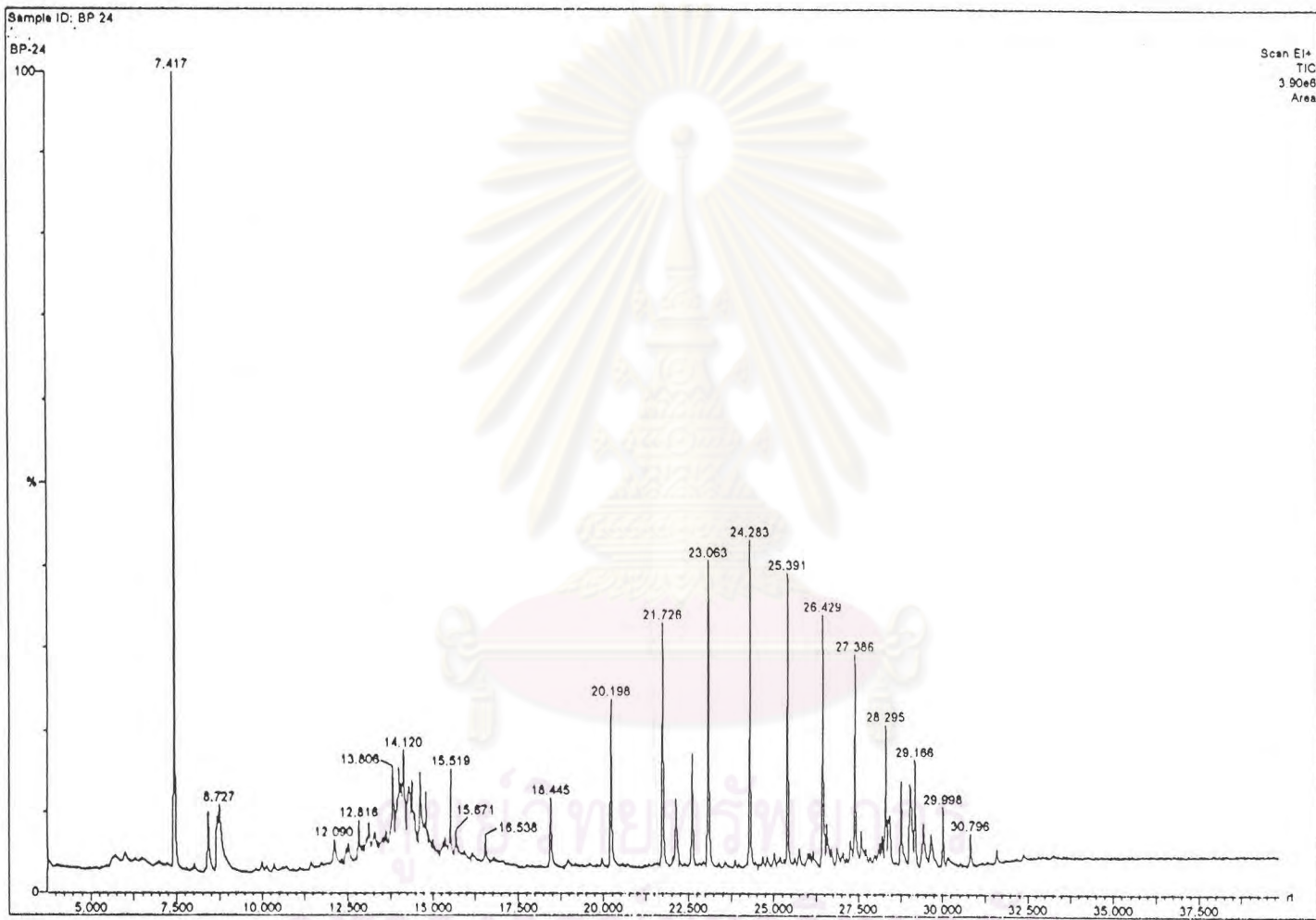


Figure C40 The GC-MS chromatogram of BP4

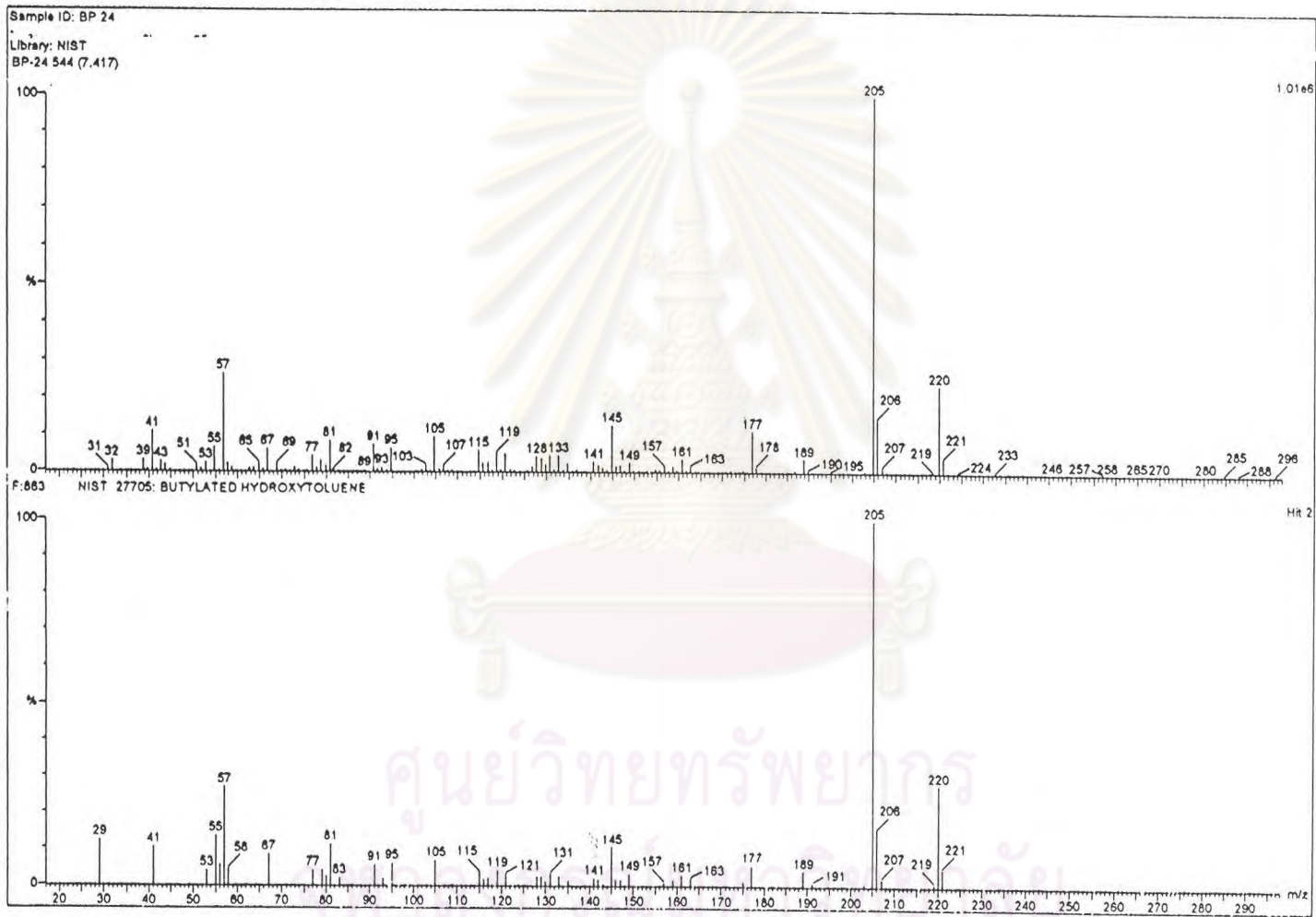


Figure C41 The mass spectrum of BP4 at retention time 7.417 min.

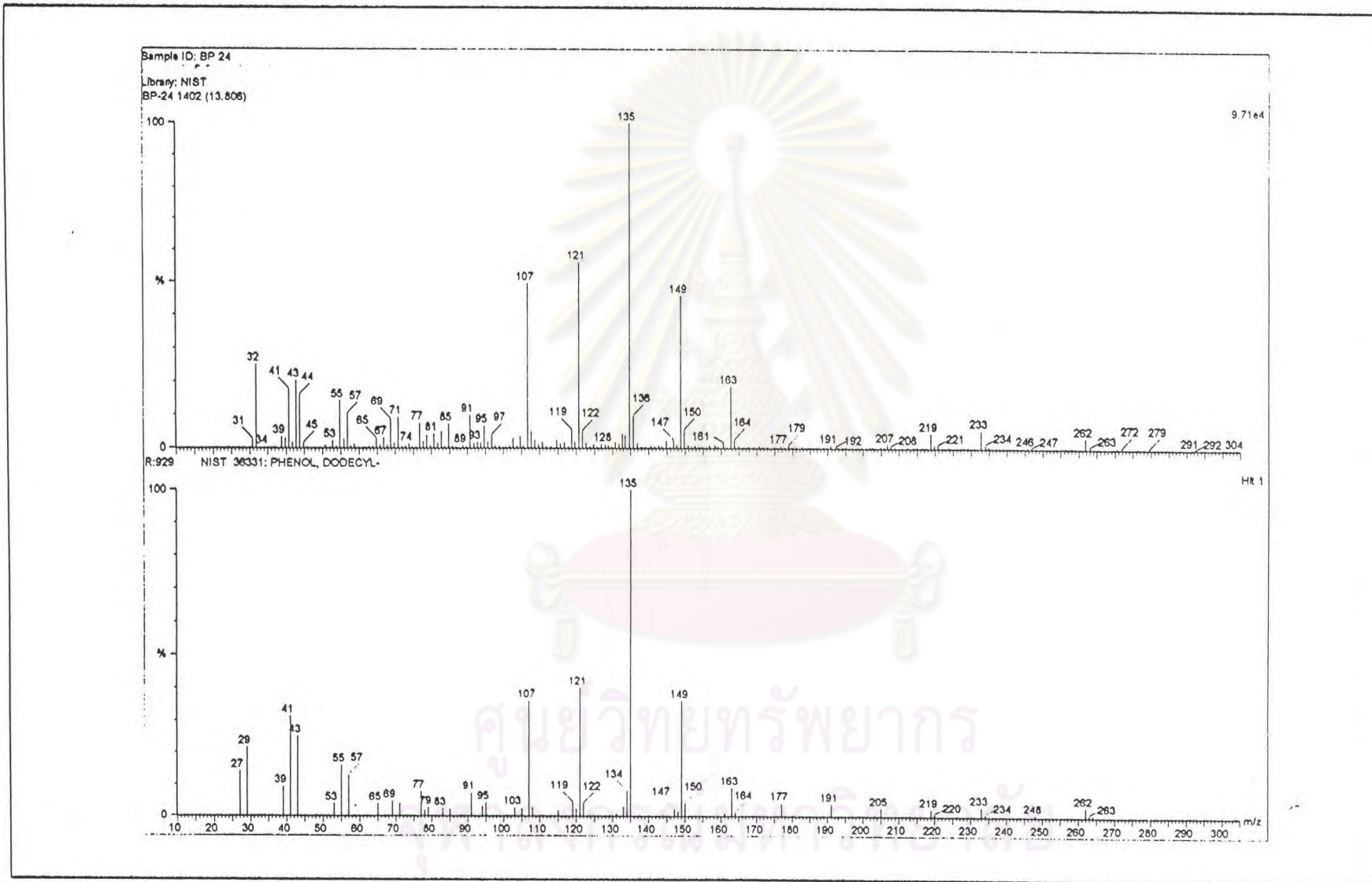


Figure C42 The mass spectrum of BP4 at retention time 13.806 min.

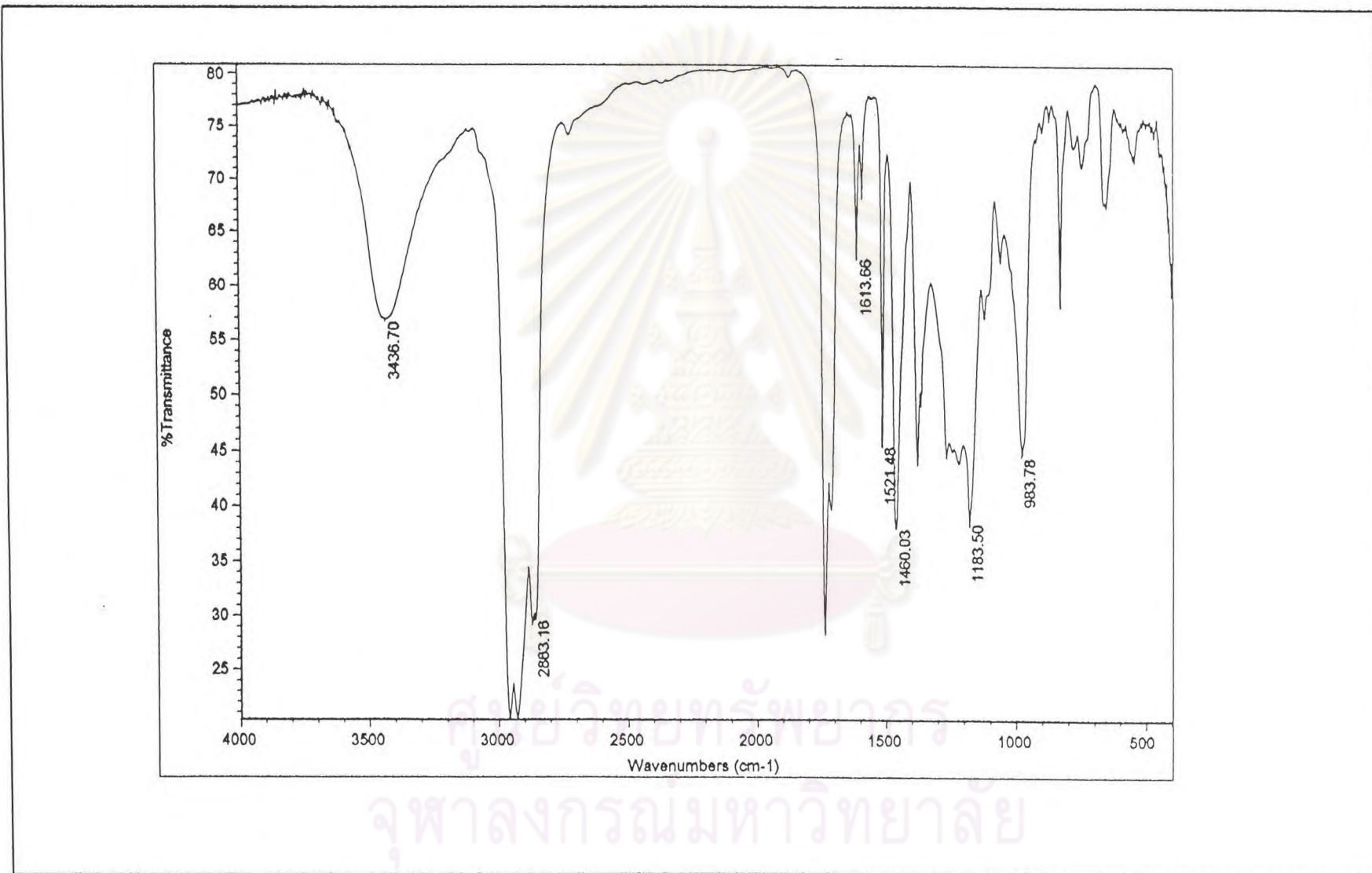


Figure C43 The IR spectrum of CAS3

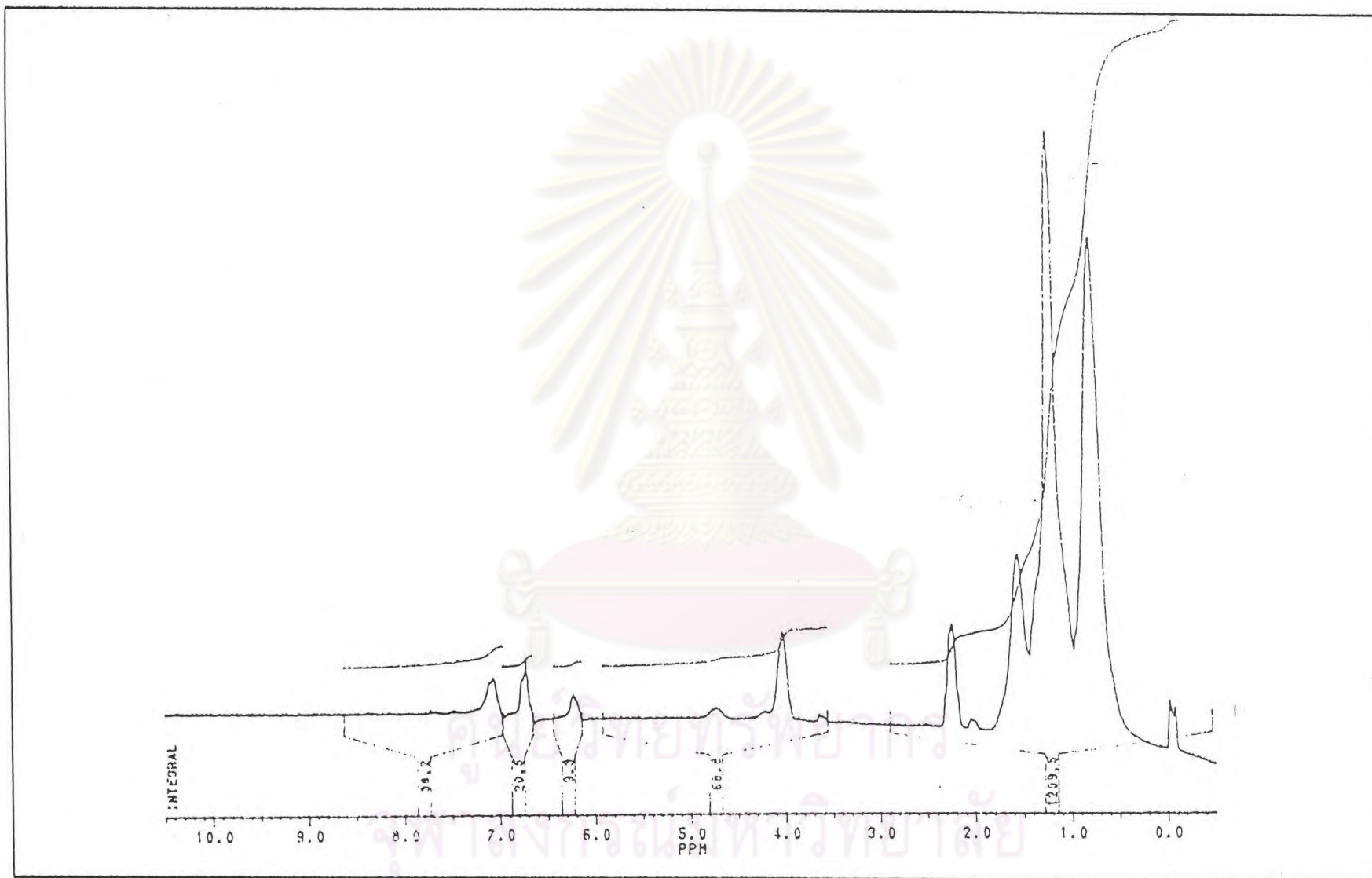


Figure C44 The  $^1\text{H}$  NMR spectrum of CAS3

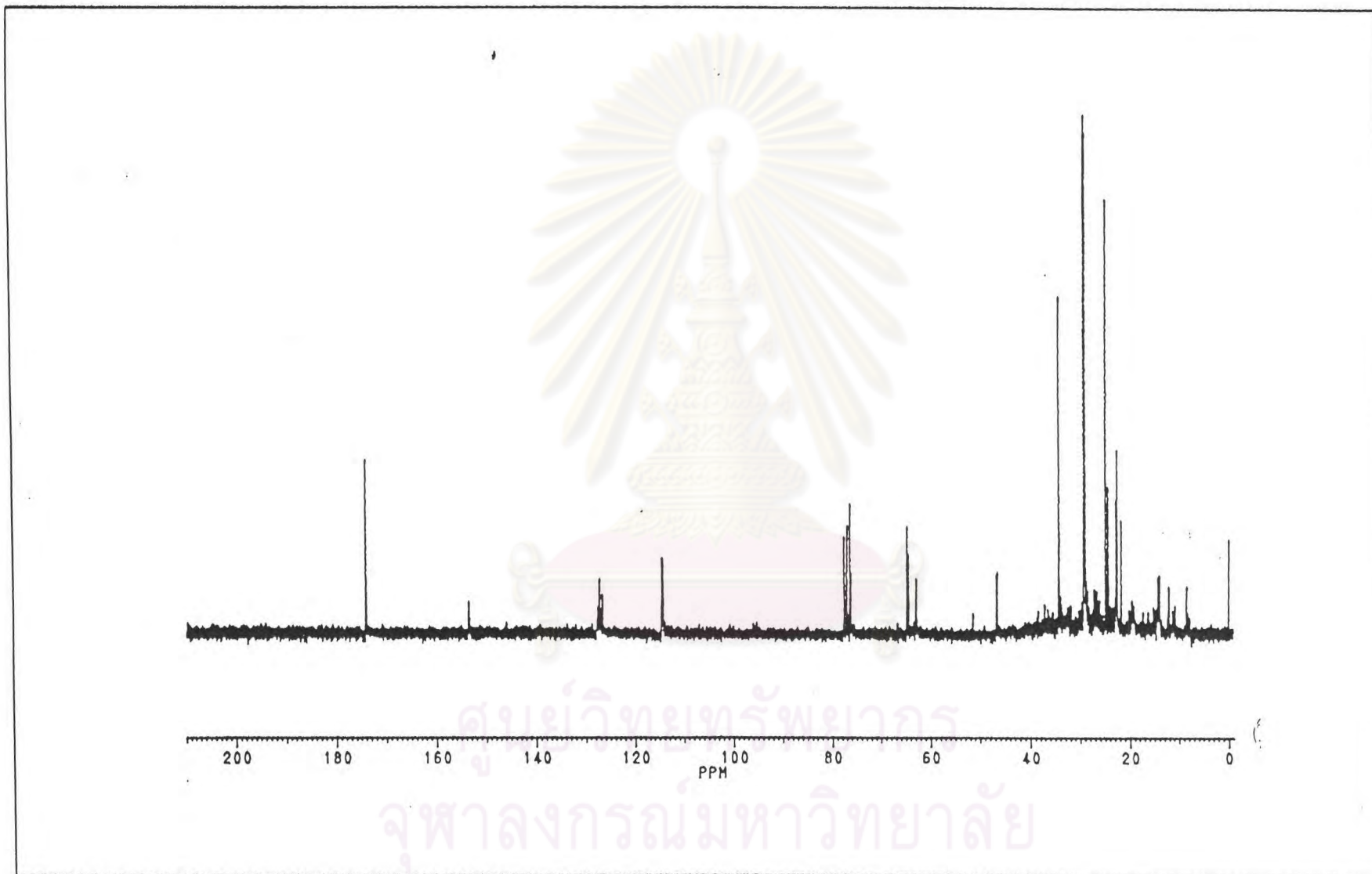
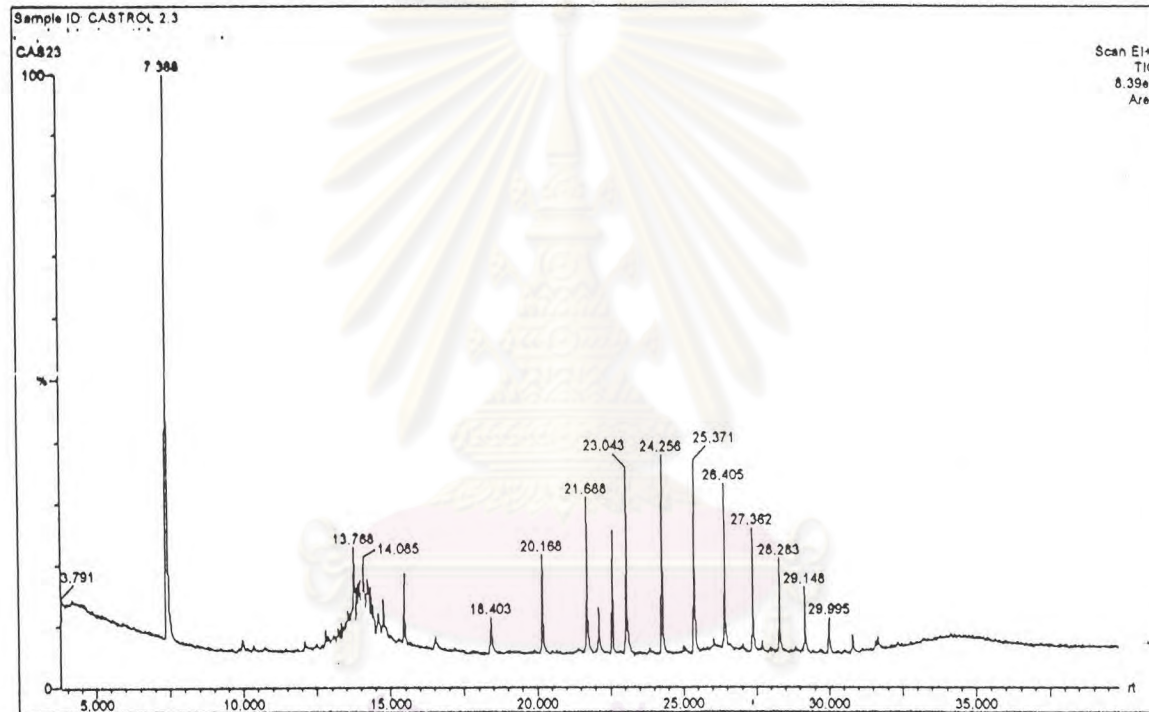


Figure C45 The  $^{13}\text{C}$  NMR spectrum of CAS3



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Figure C46 The GC-MS chromatogram of CAS3



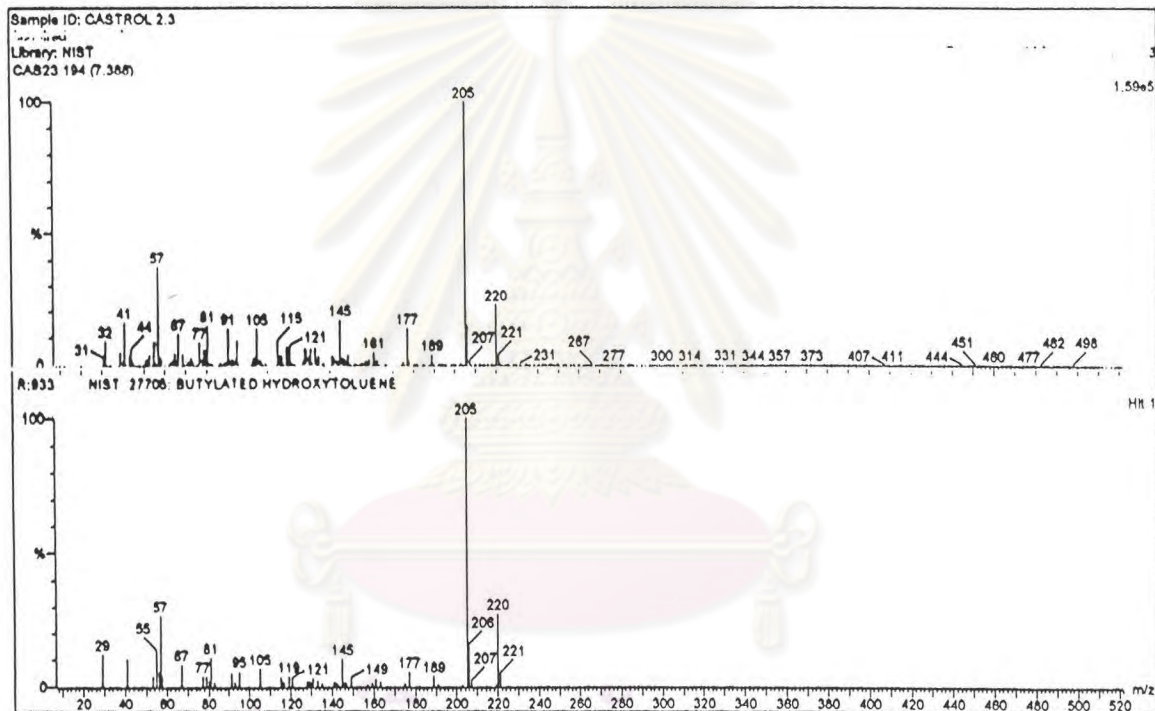


Figure C47 The mass spectrum of CAS3 at retention time 7.388 min.

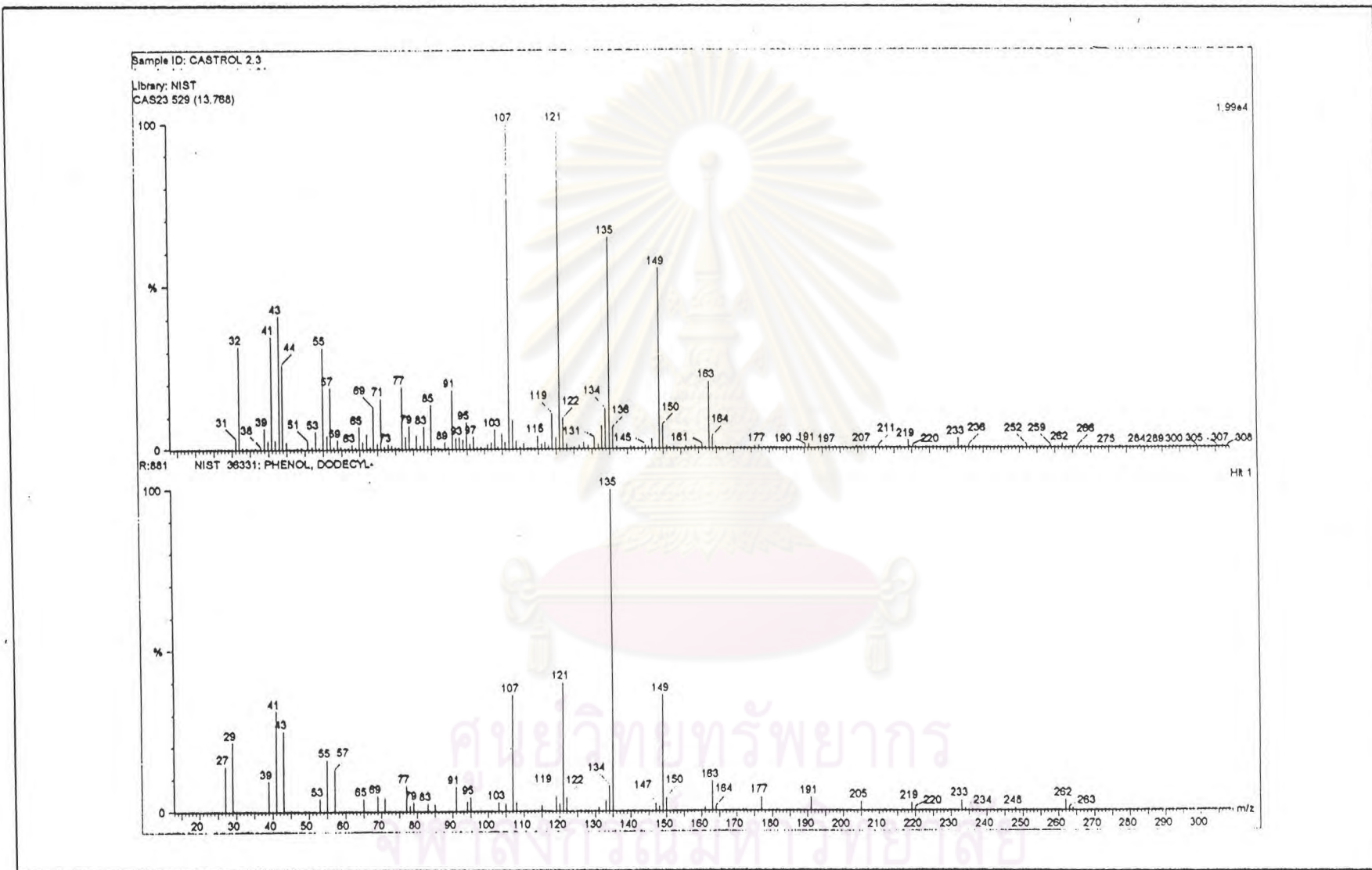


Figure C48 The mass spectrum of CAS3 at retention time 13.768 min.

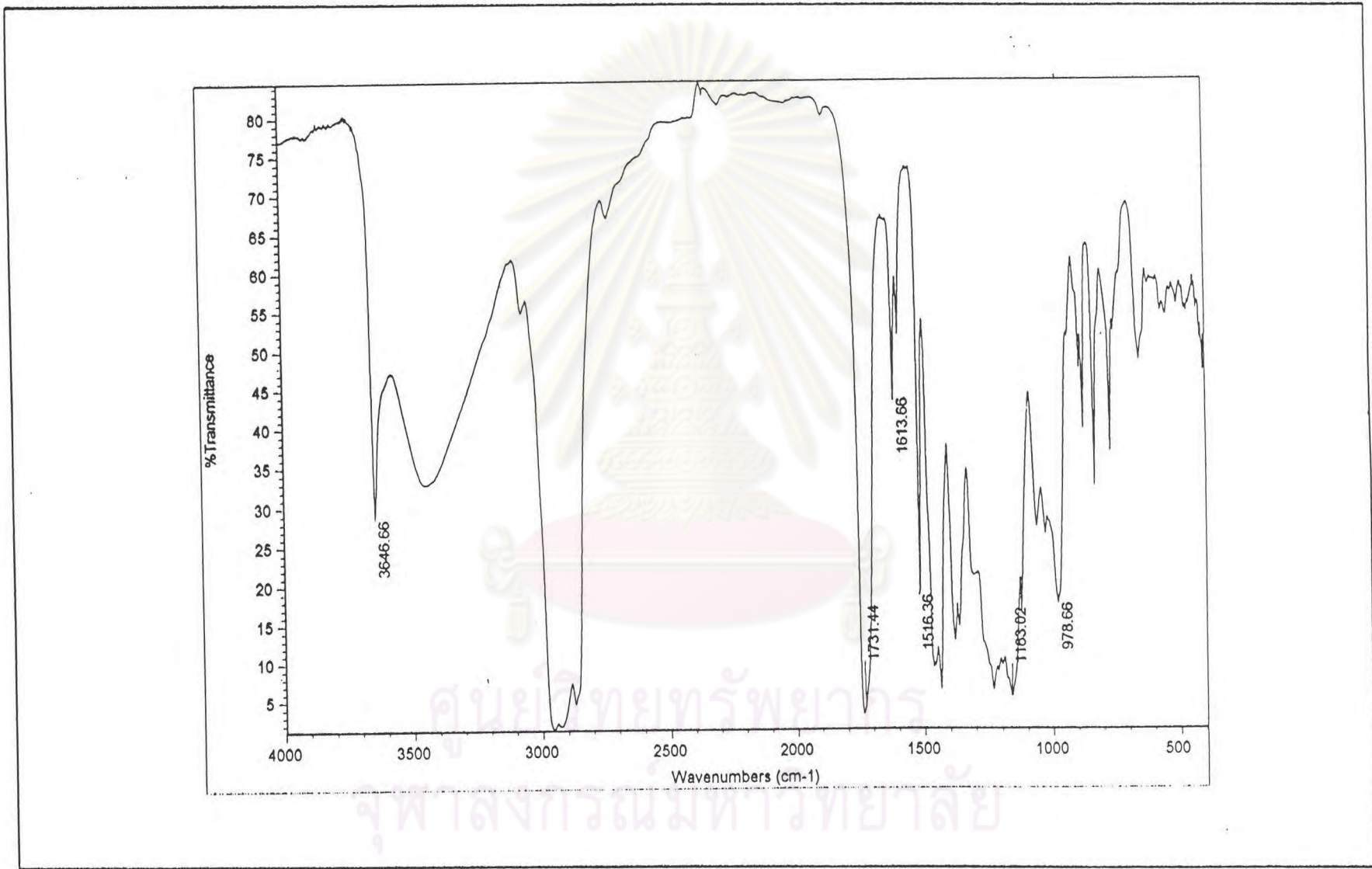


Figure C49 The IR spectrum of CAS4

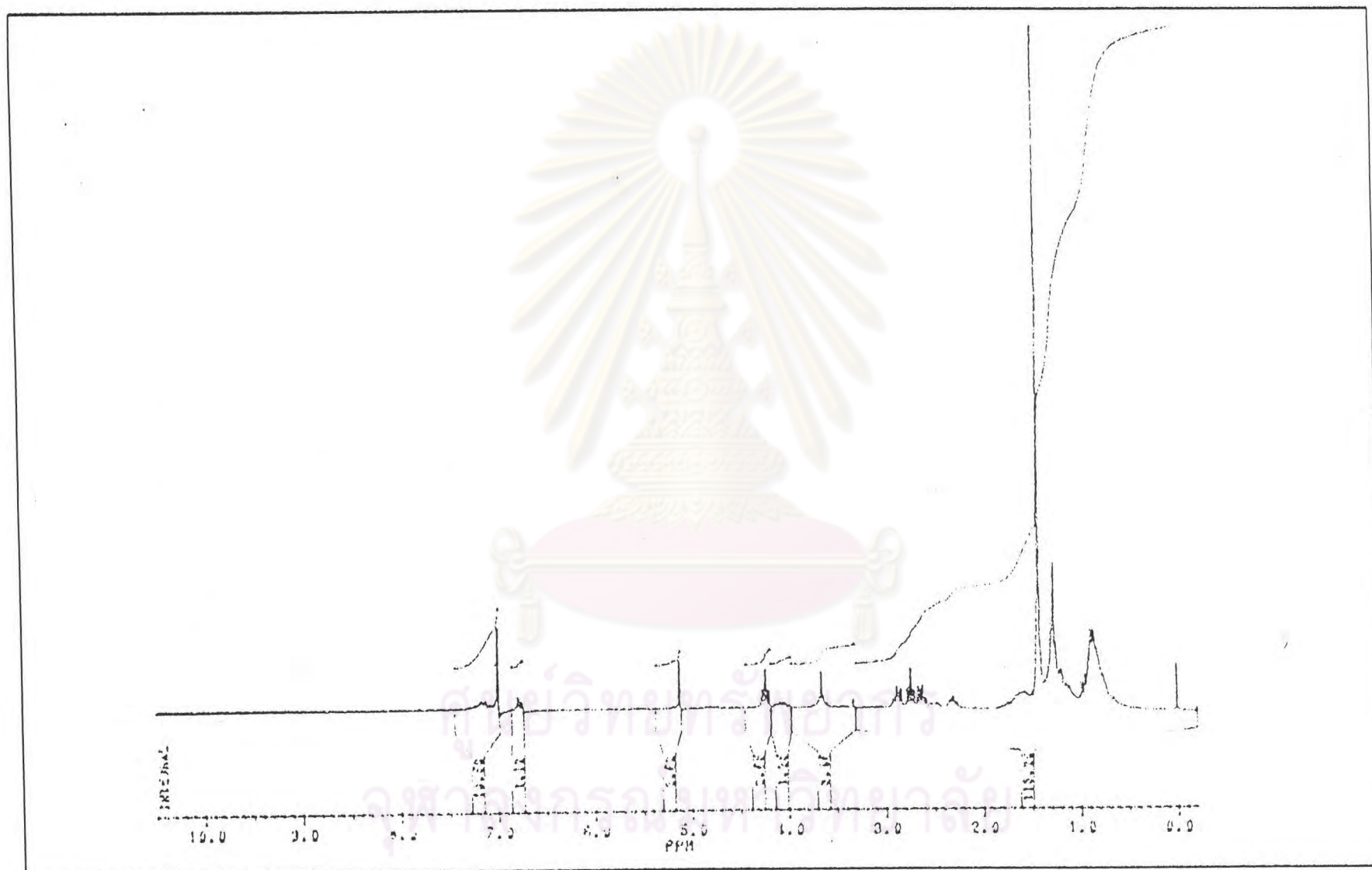


Figure C50 The  $^1\text{H}$  NMR spectrum of CAS4

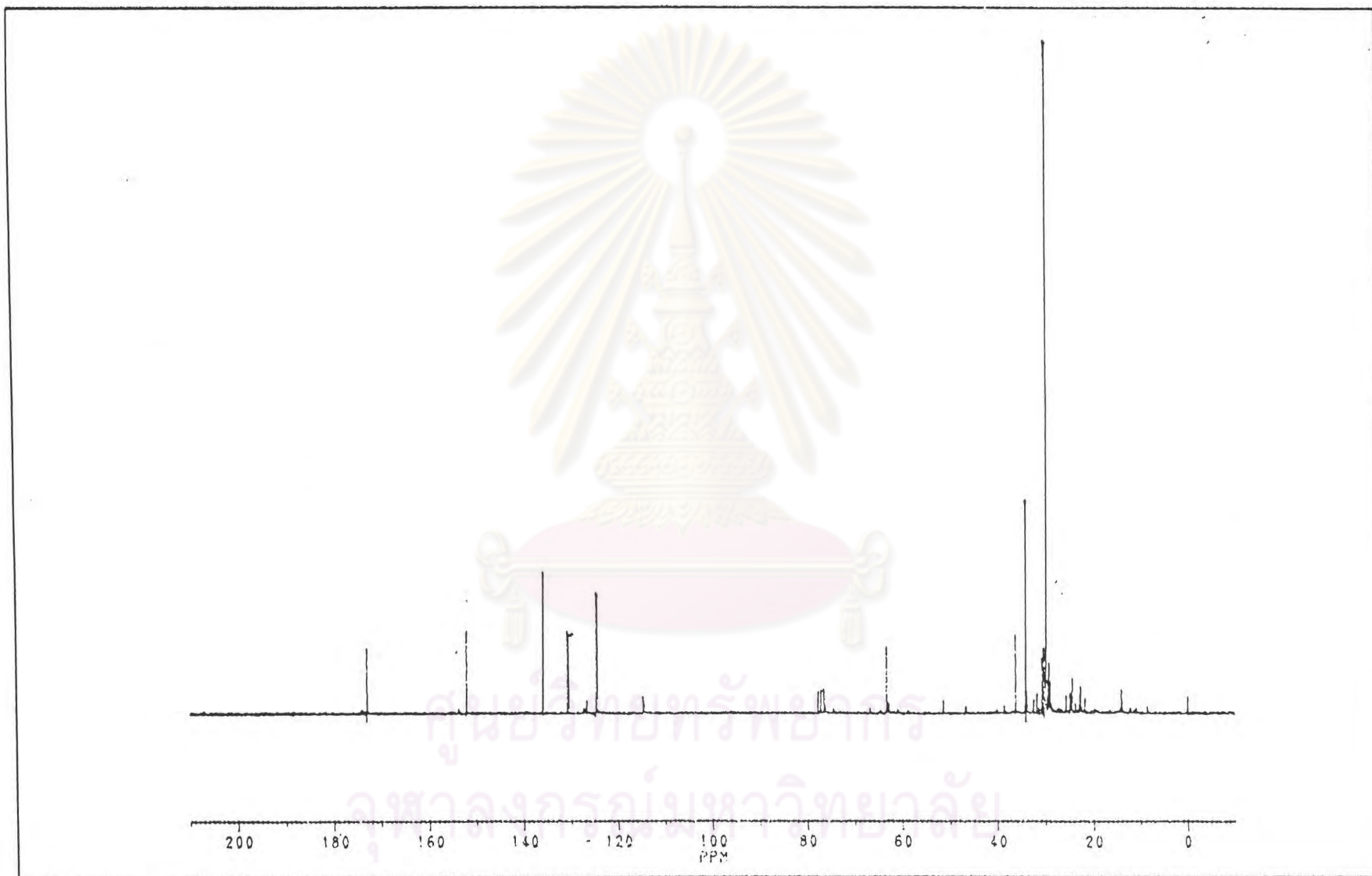


Figure C51 The  $^{13}\text{C}$  NMR spectrum of CAS4

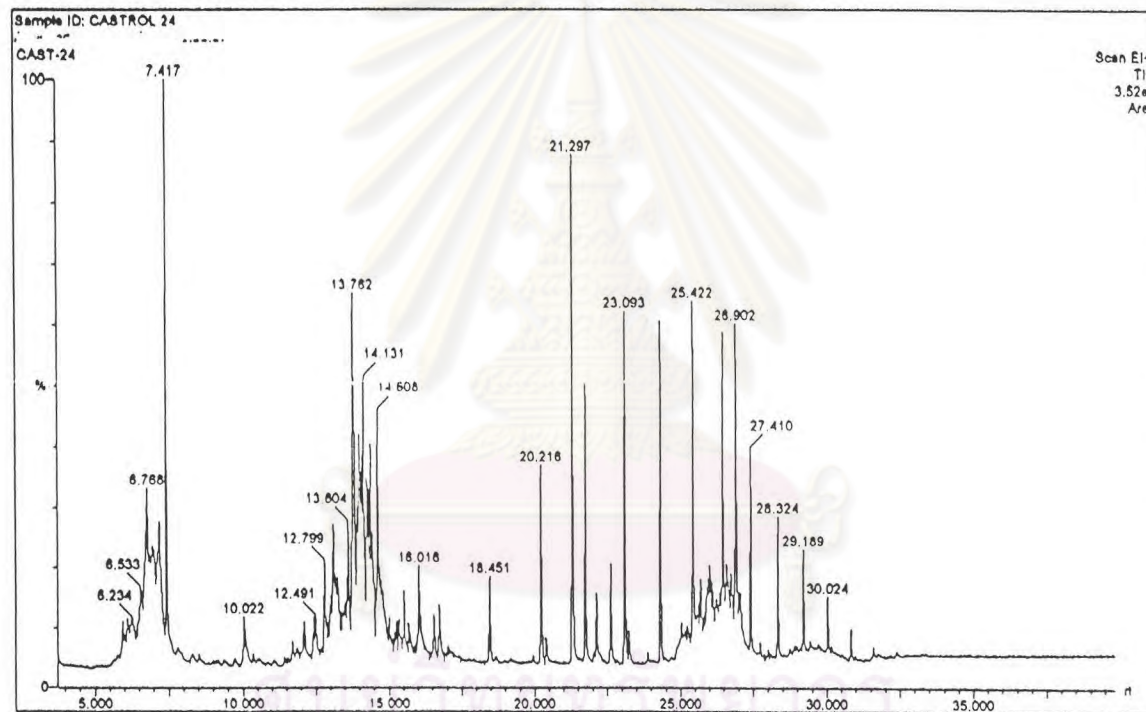


Figure C52 The GC-MS chromatogram of CAS4

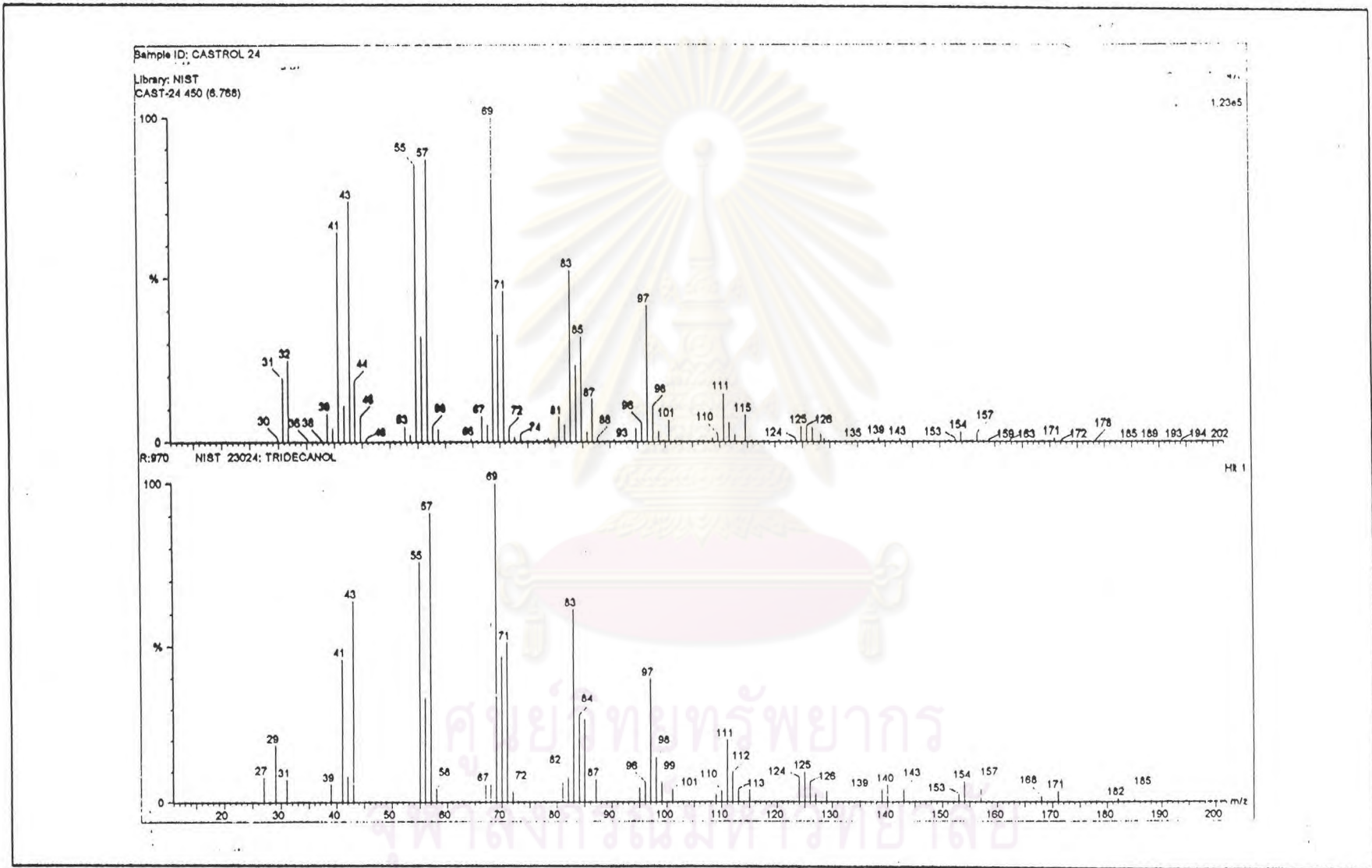


Figure C53 The mass spectrum of CAS4 at retention time 6.768 min.

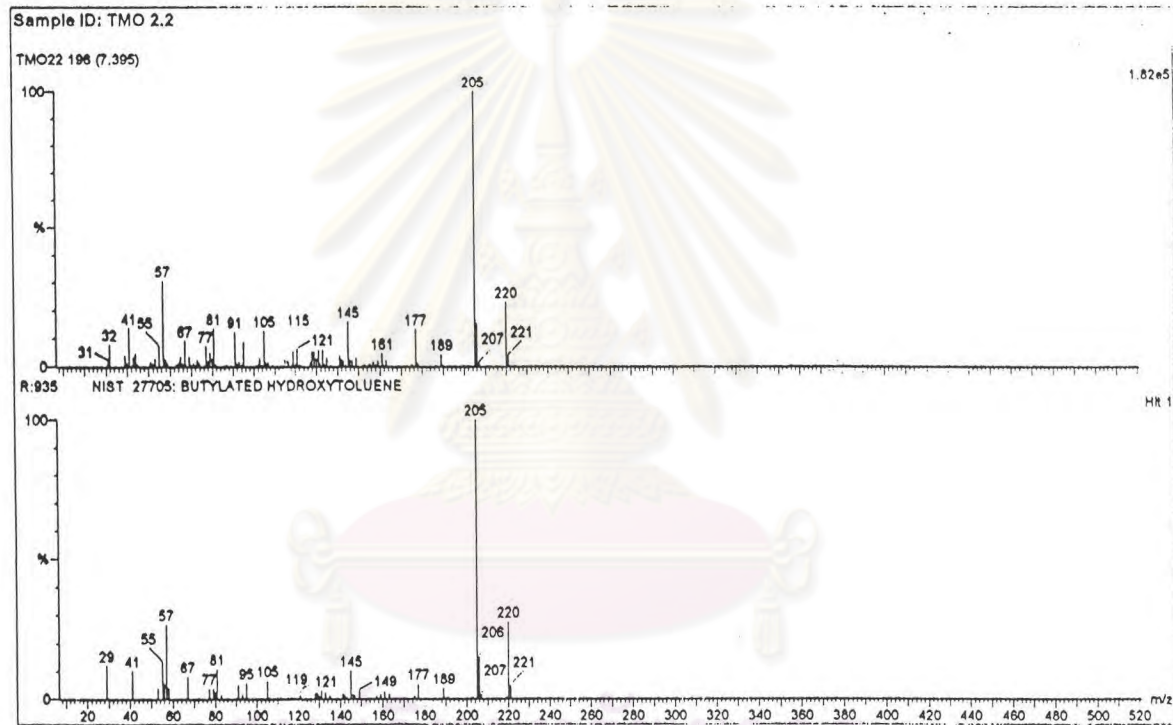


Figure C54 The mass spectrum of CAS4 at retention time 7.395 min.



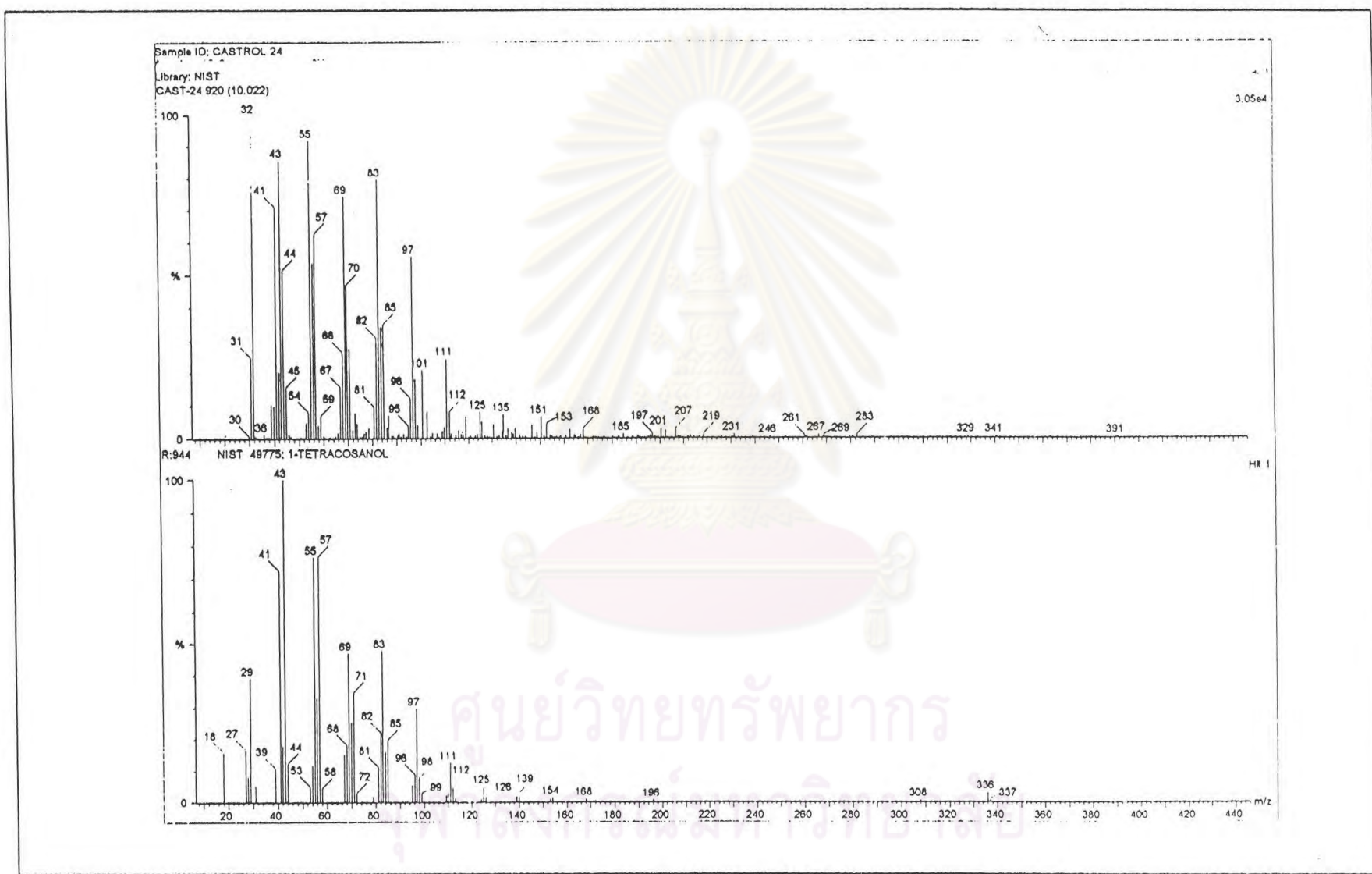


Figure C55 The mass spectrum of CAS4 at retention time 10.022 min.

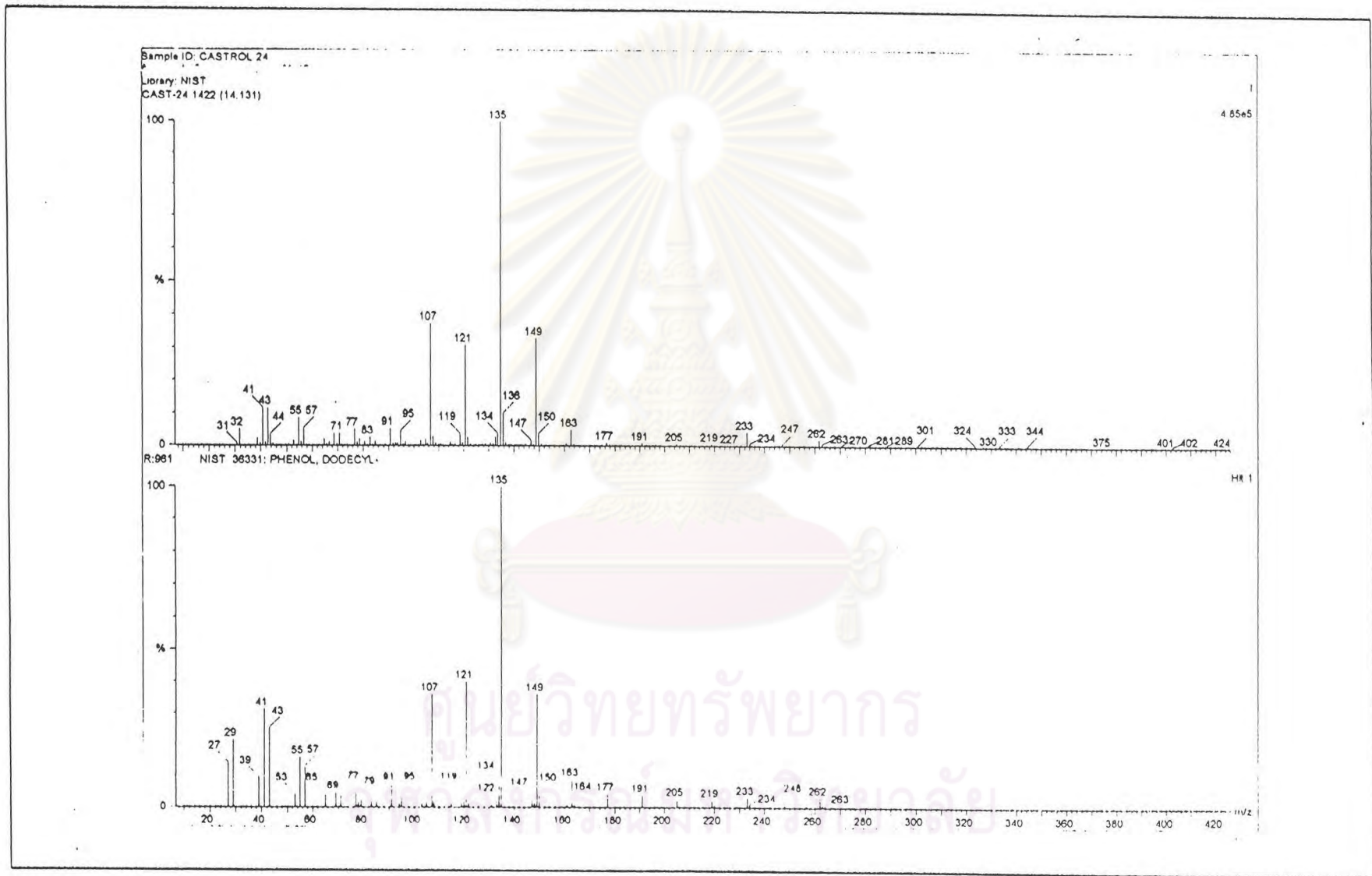


Figure C56 The mass spectrum of CAS4 at retention time 14.431 min.

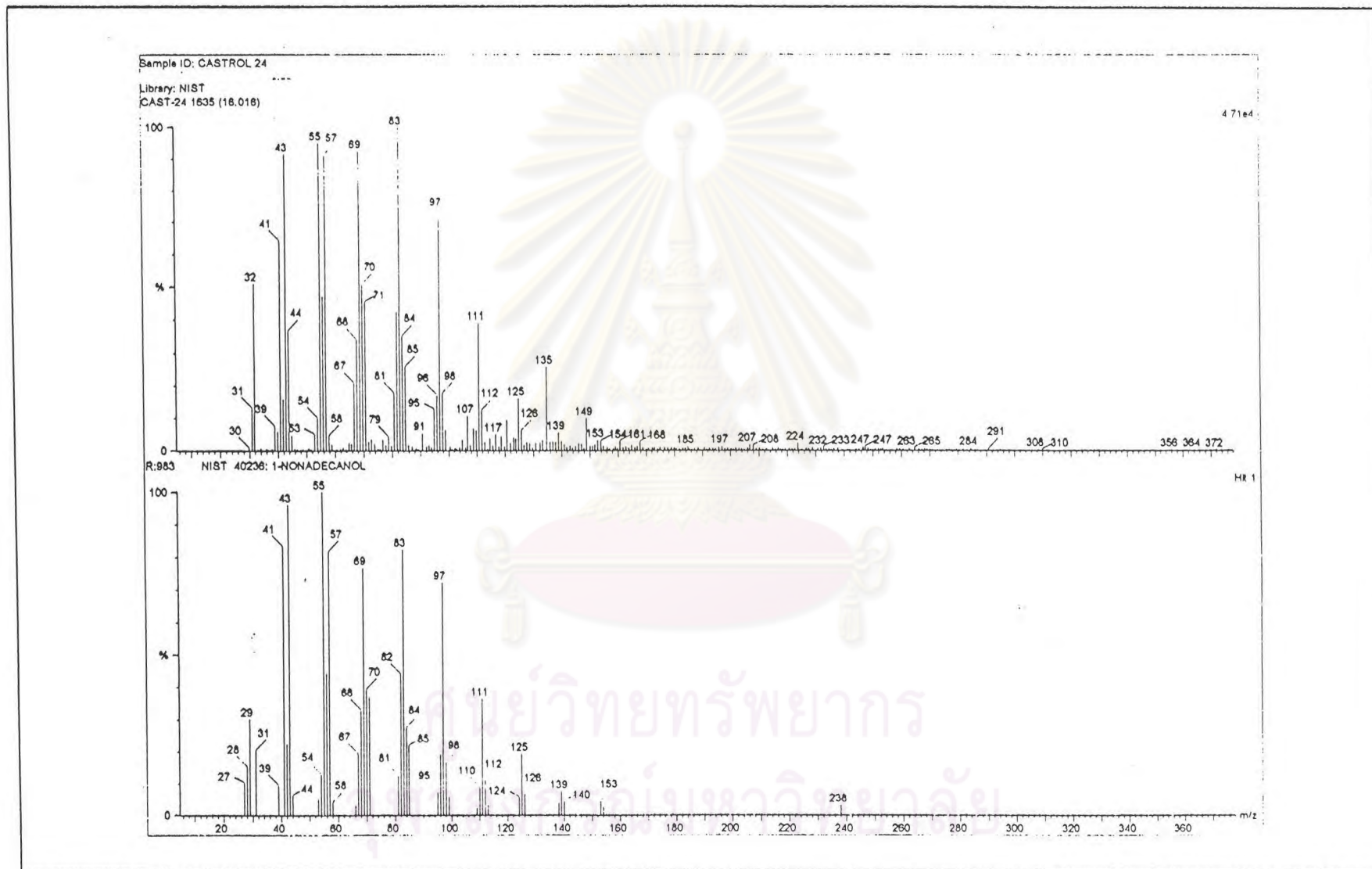


Figure C57 The mass spectrum of CAS4 at retention time 16.016 min.

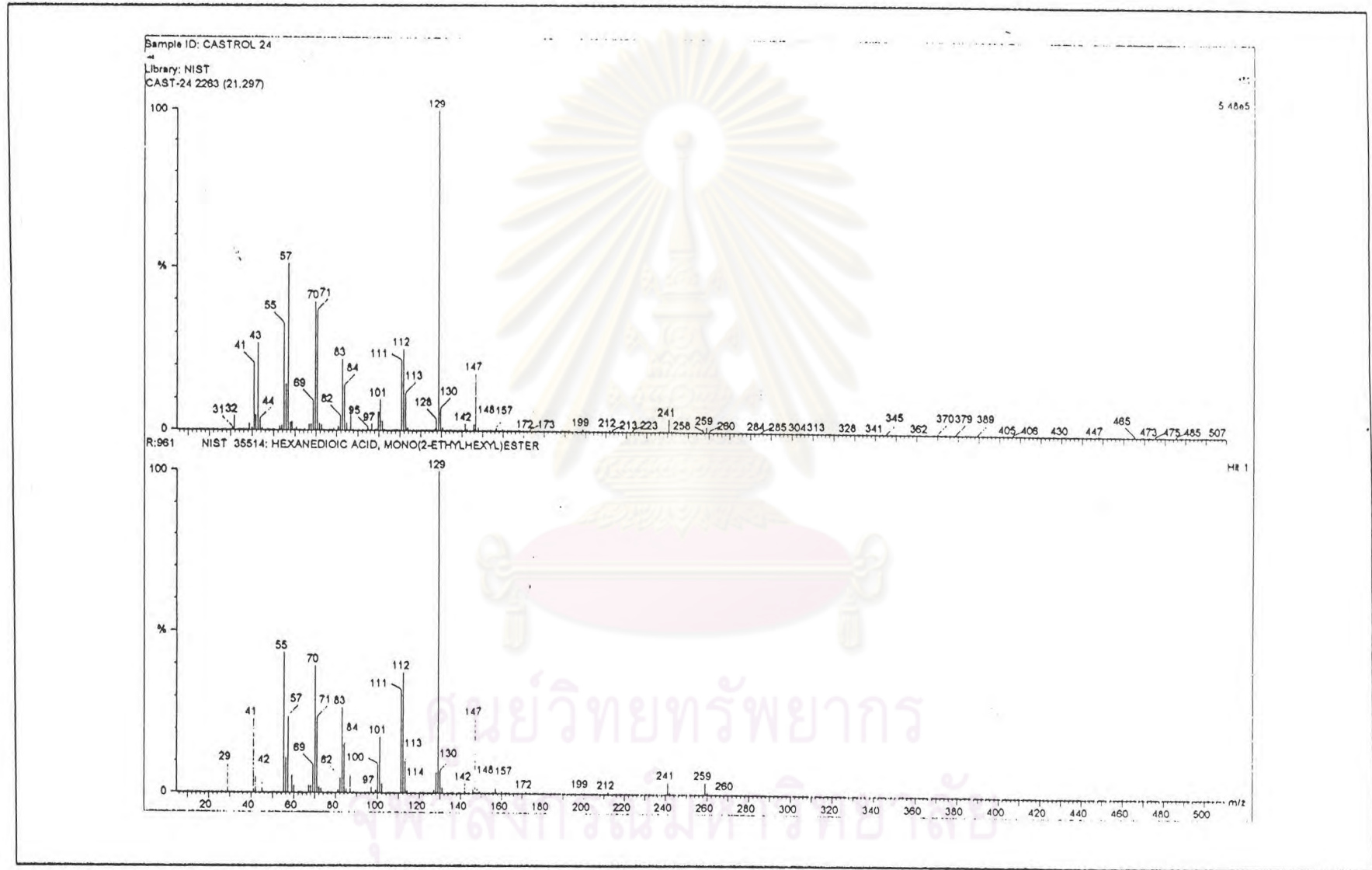


Figure C58 The mass spectrum of CAS4 at retention time 21.297 min.

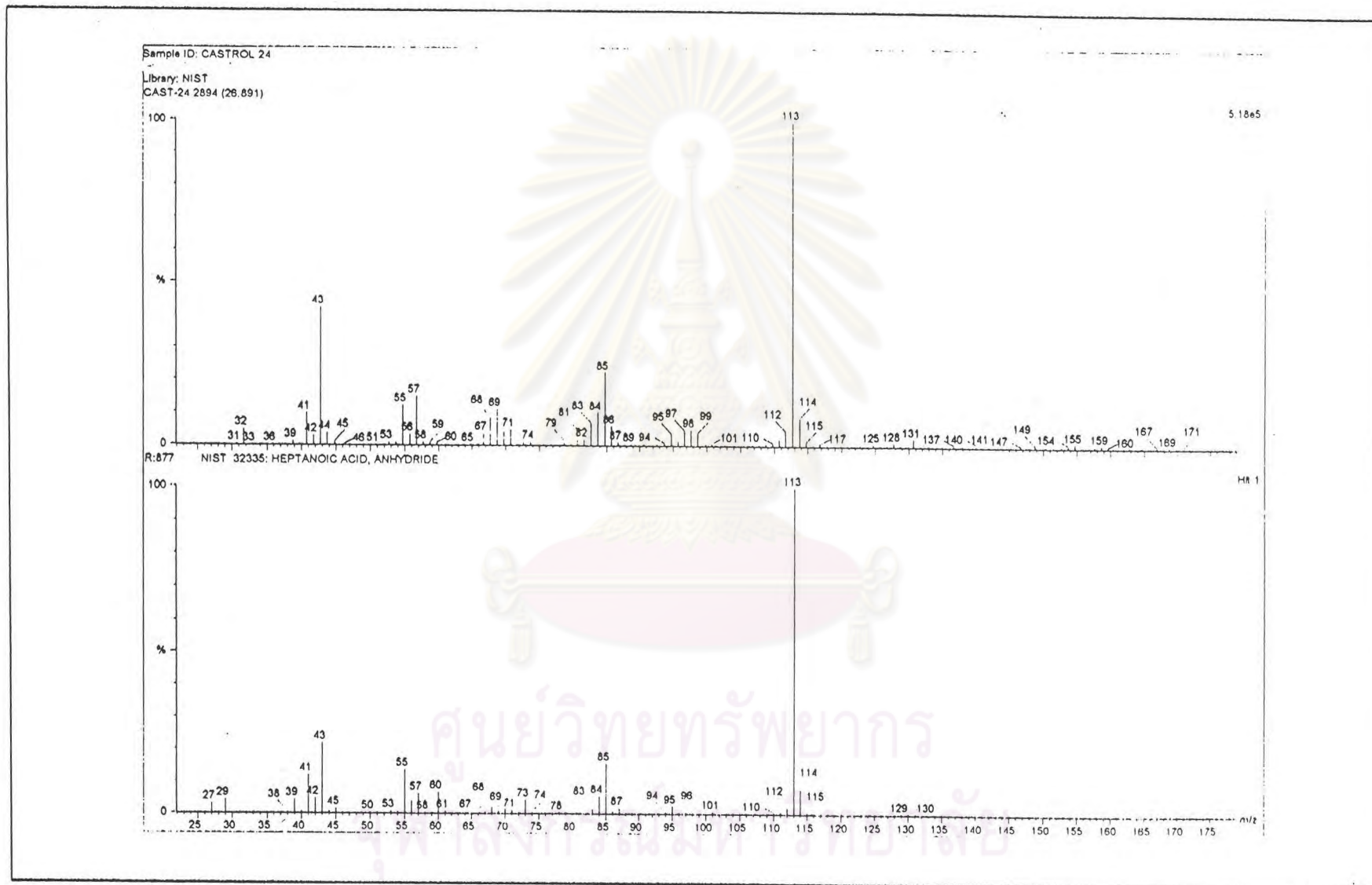


Figure C59 The mass spectrum of CAS4 at retention time 26.891 min.

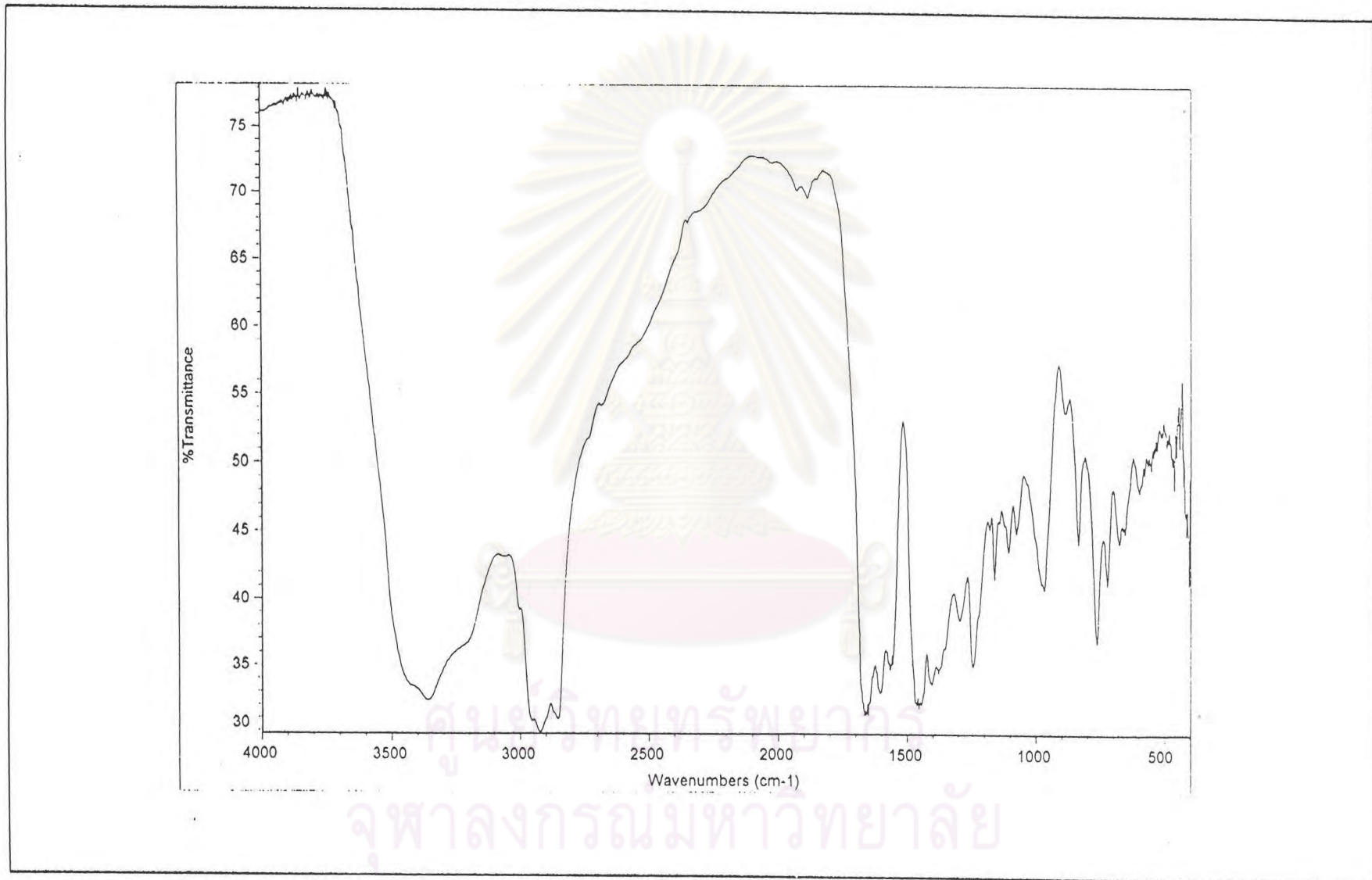


Figure C60 The IR spectrum of MOB3

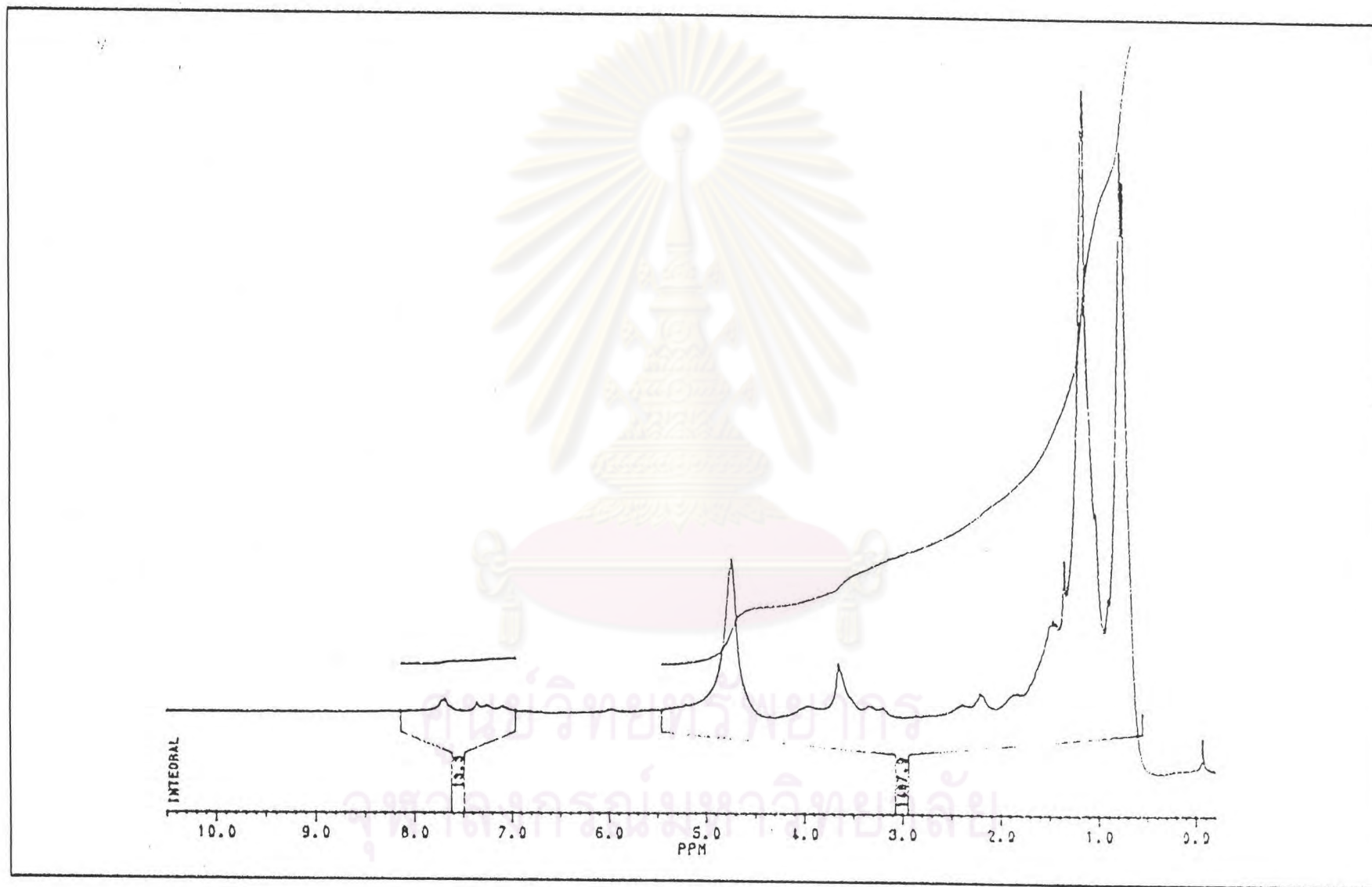


Figure C61 The  $^1\text{H}$  NMR spectrum of MOB3

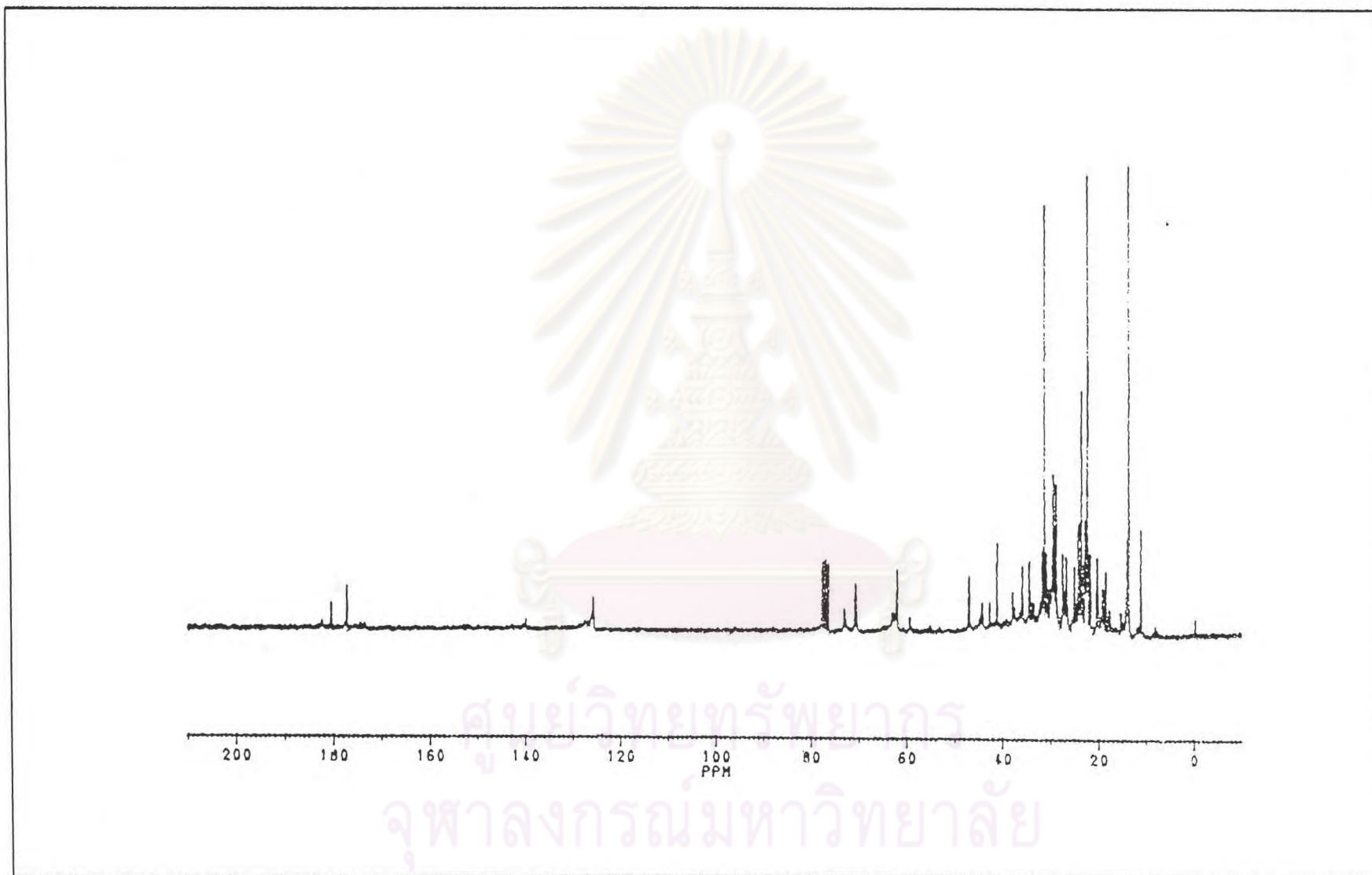


Figure C62 The  $^{13}\text{C}$  NMR spectrum of MOB3



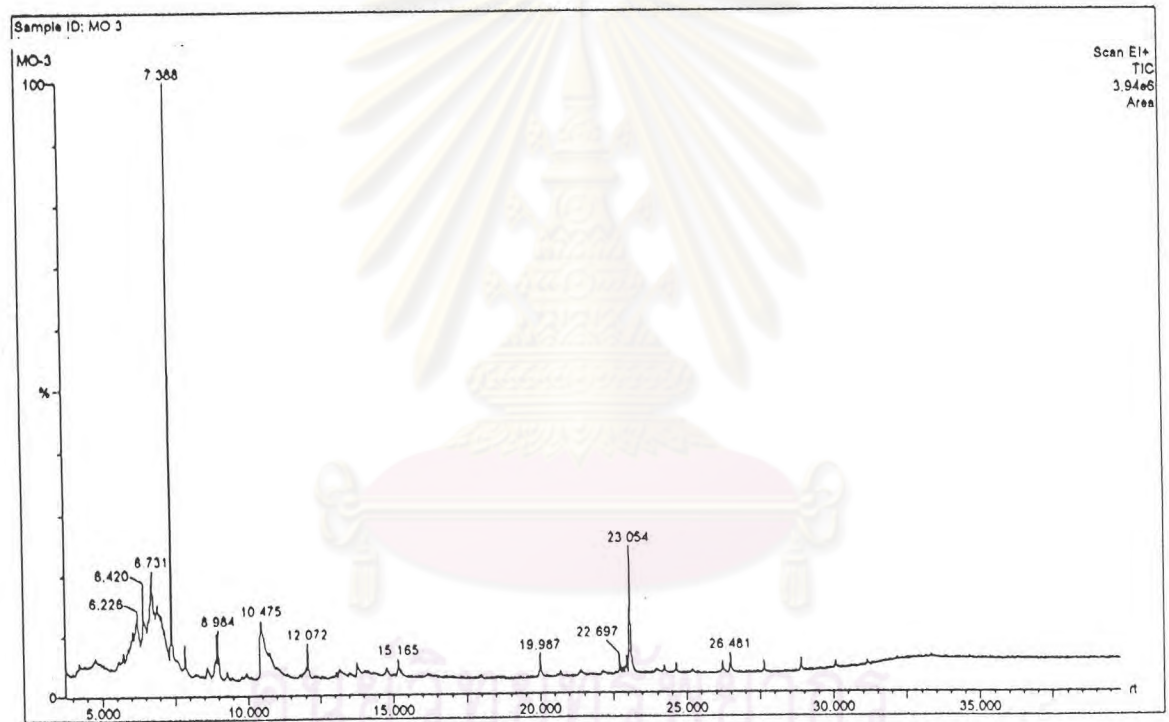


Figure C63 The GC-MS chromatogram of MOB3

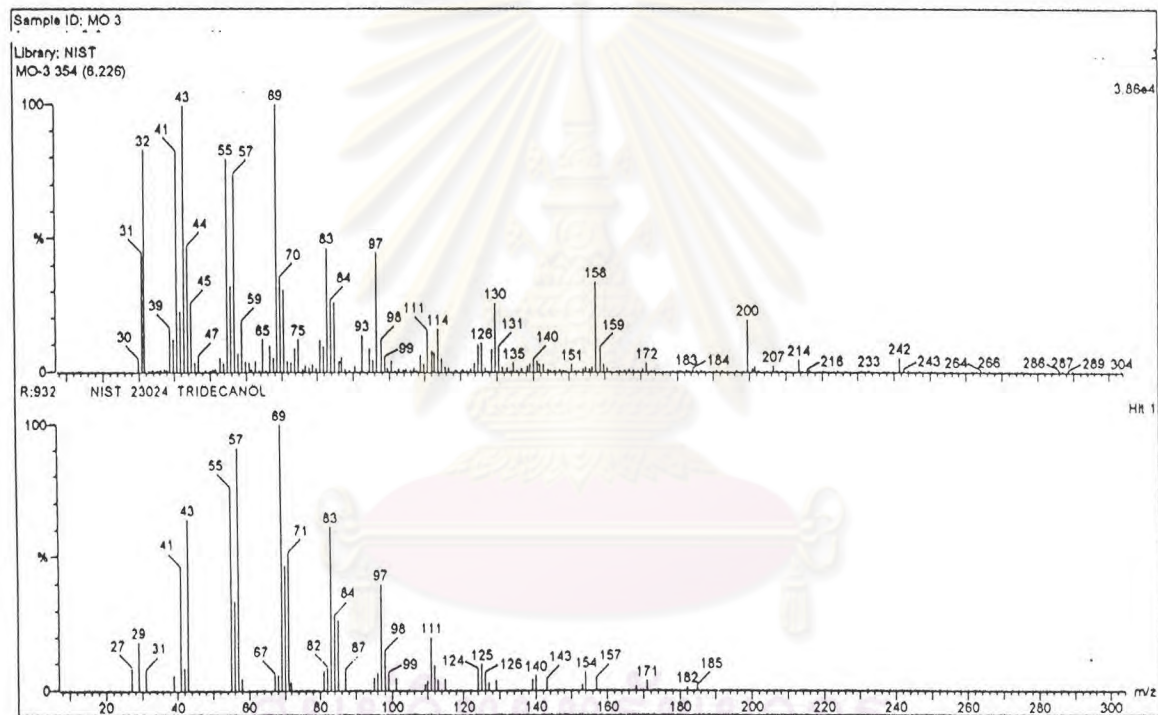


Figure C64 The mass spectrum of MOB3 at retention time 6.226 min.

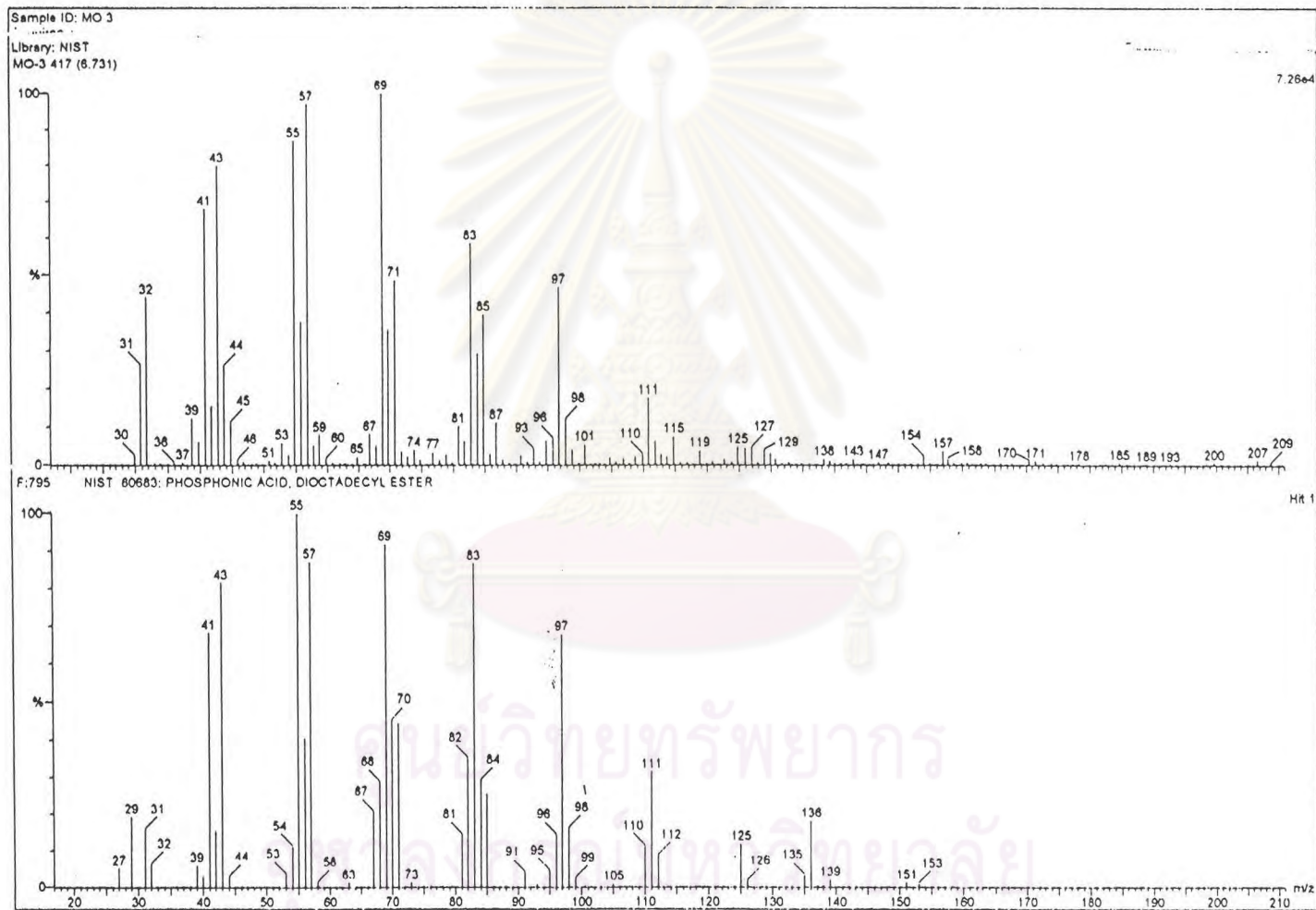


Figure C65 The mass spectrum of MOB3 at retention time 6.731 min.

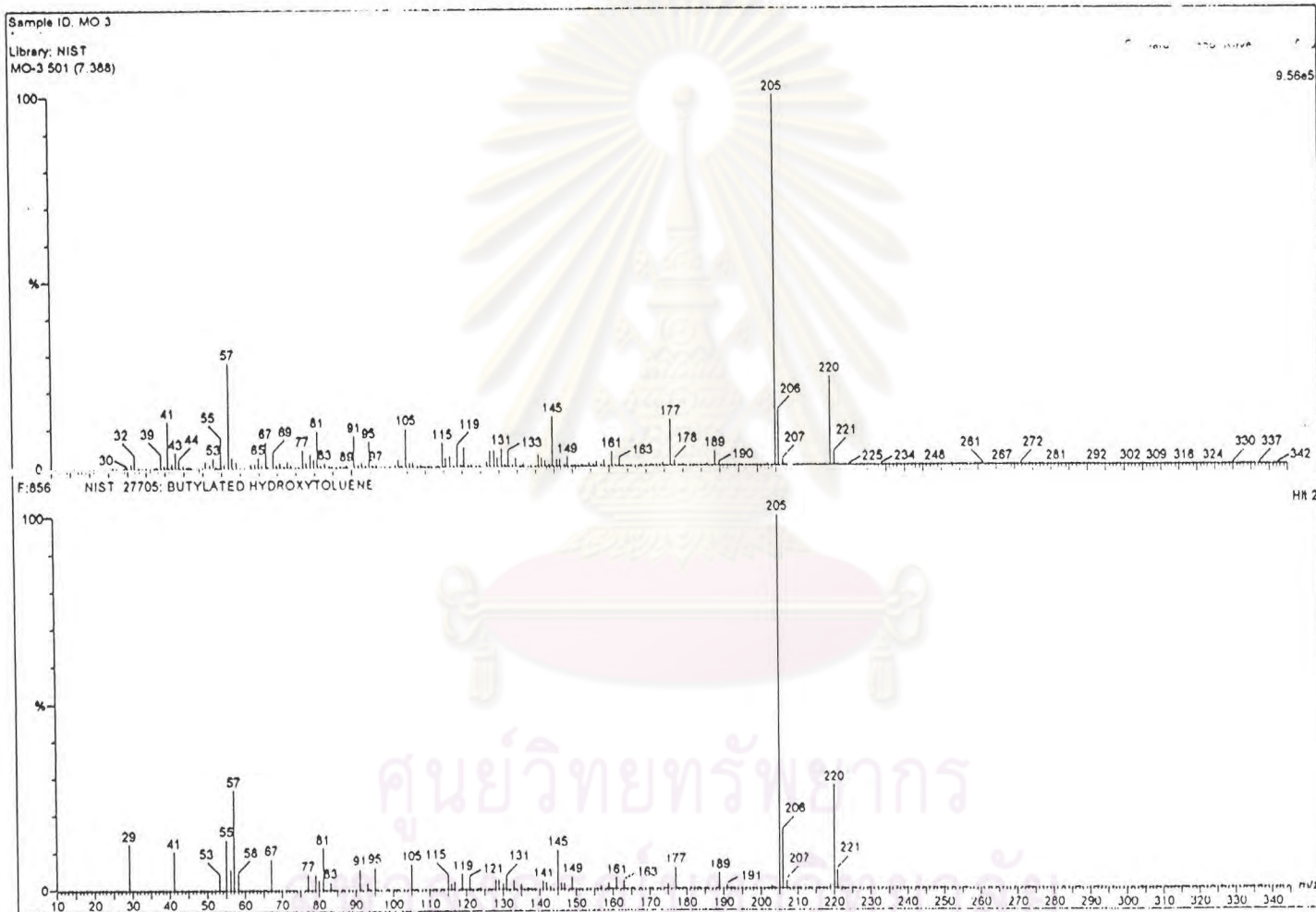


Figure C66 The mass spectrum of MOB3 at retention time 7.388 min.

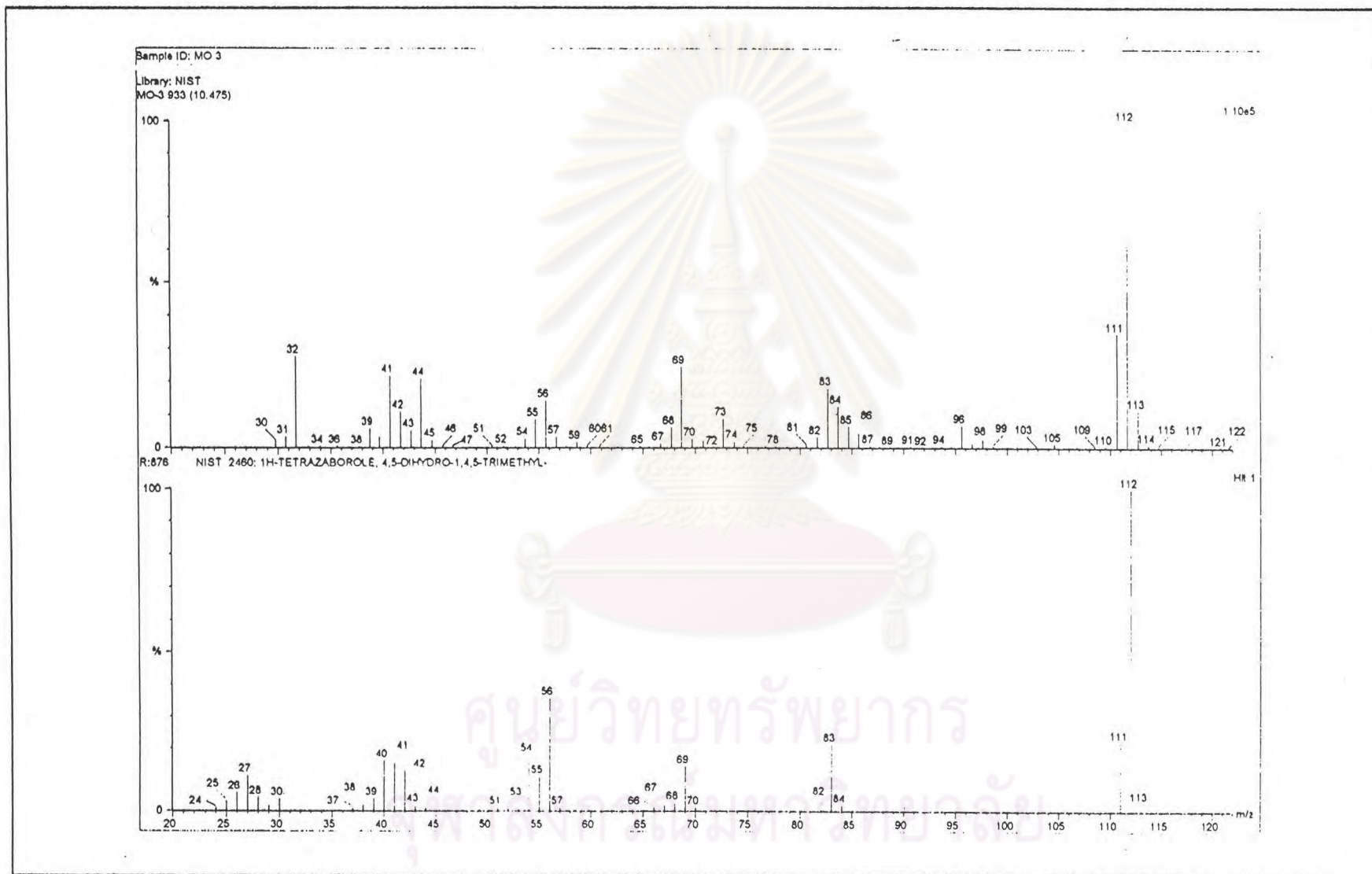


Figure C67 The mass spectrum of MOB3 at retention time 10.475 min.

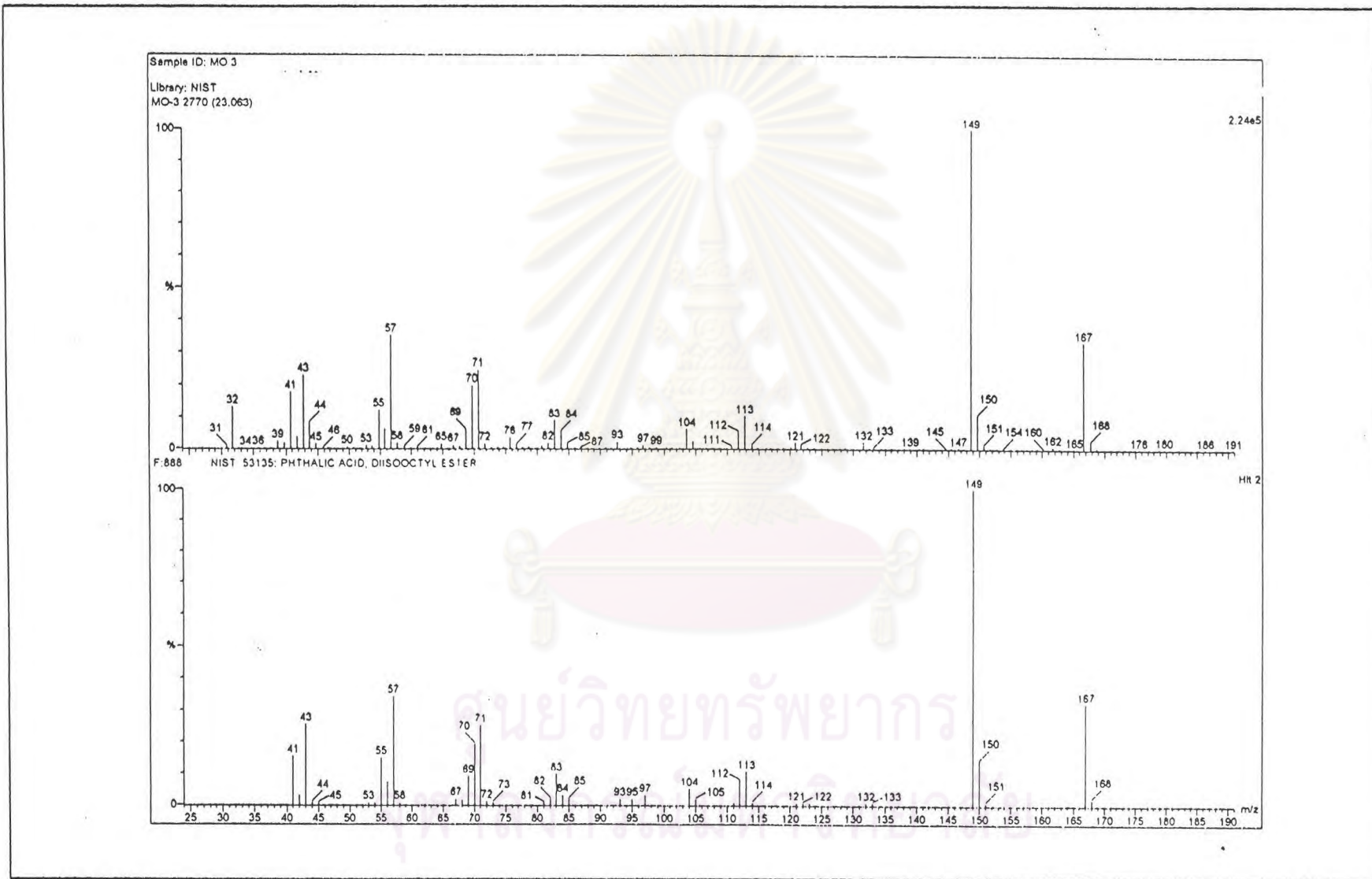
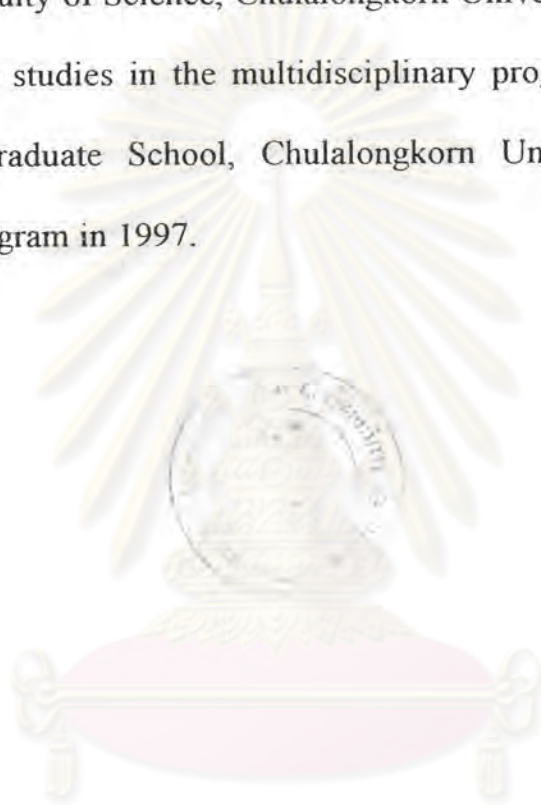


Figure C68 The mass spectrum of MOB3 at retention time 23.063 min.

## VITA

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