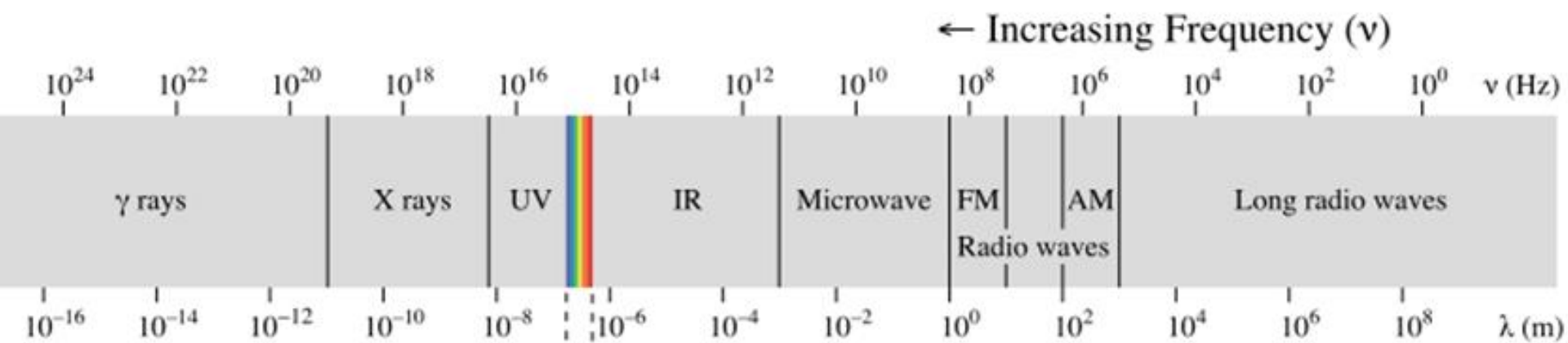
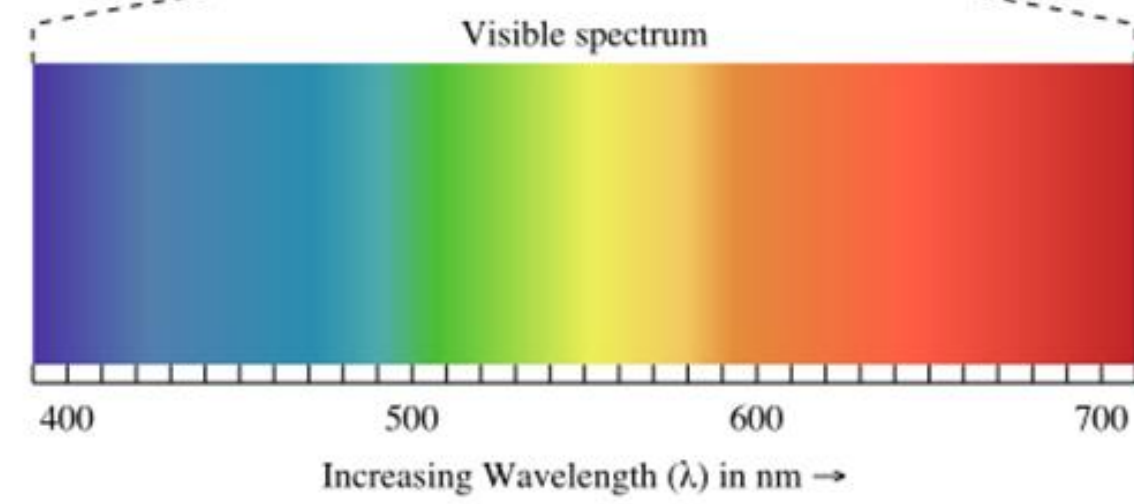
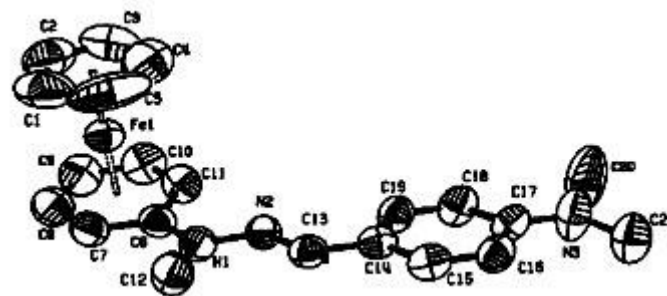
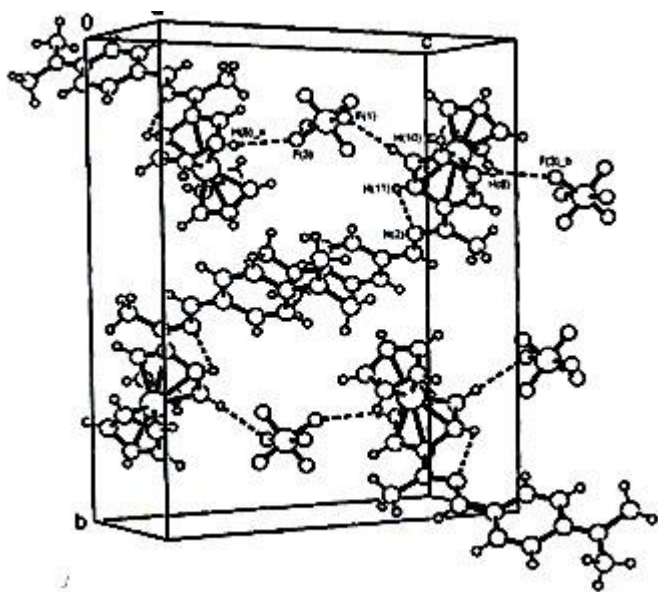
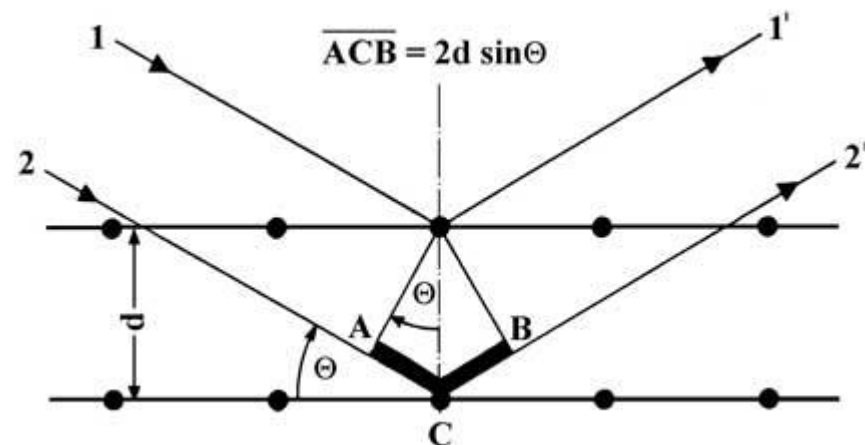
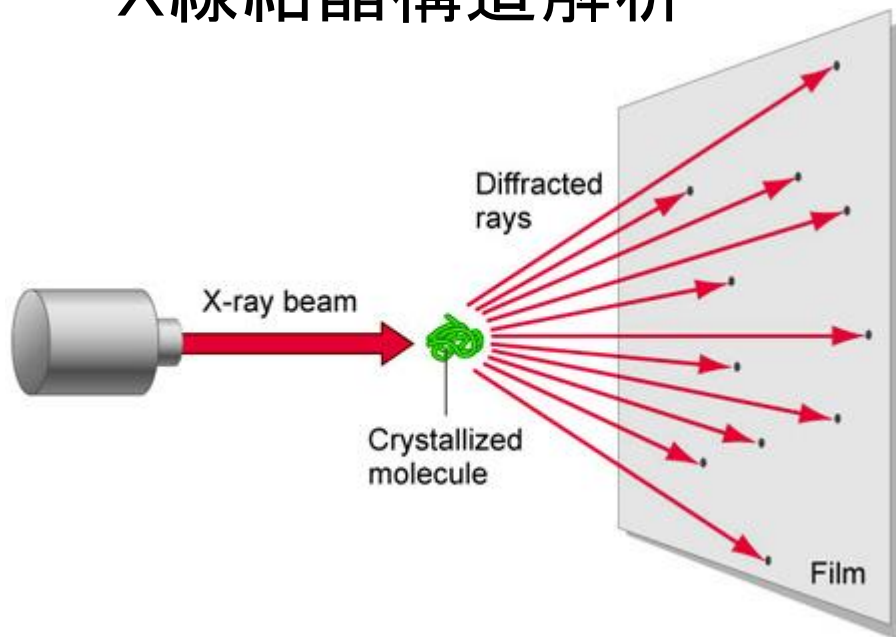




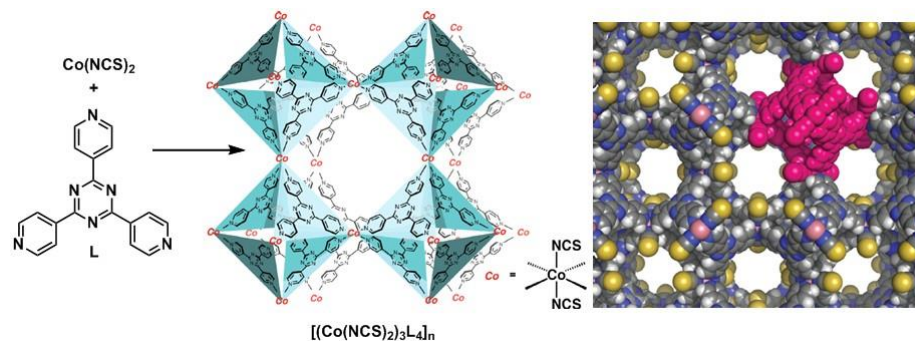
Increasing Wavelength (λ) →



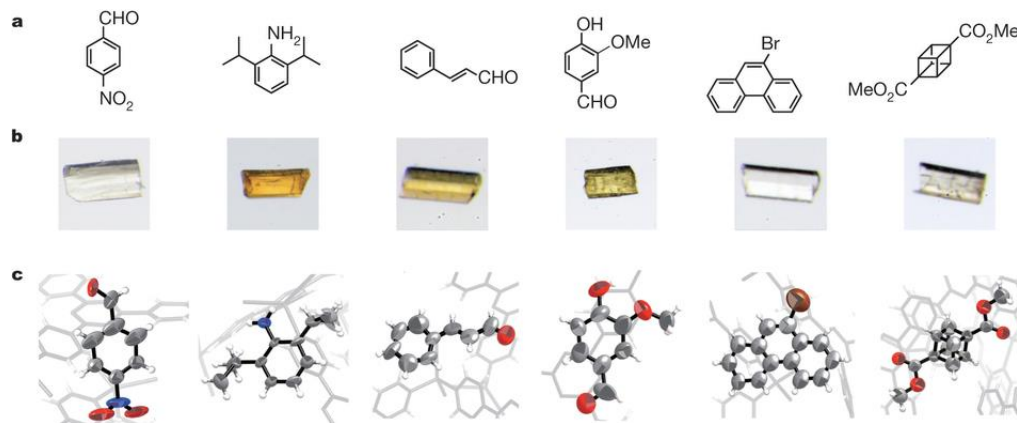
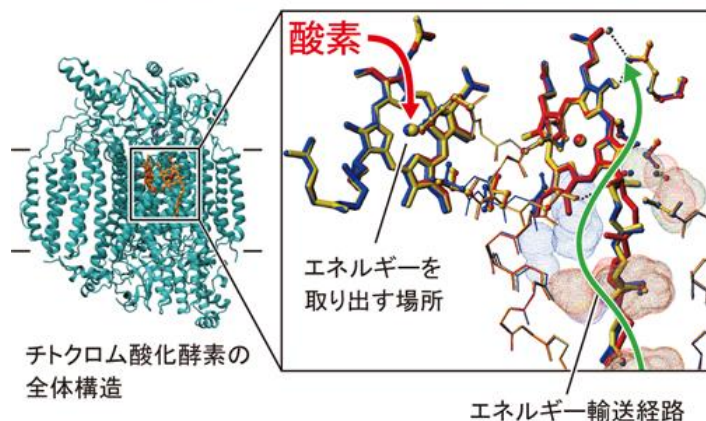
X線結晶構造解析



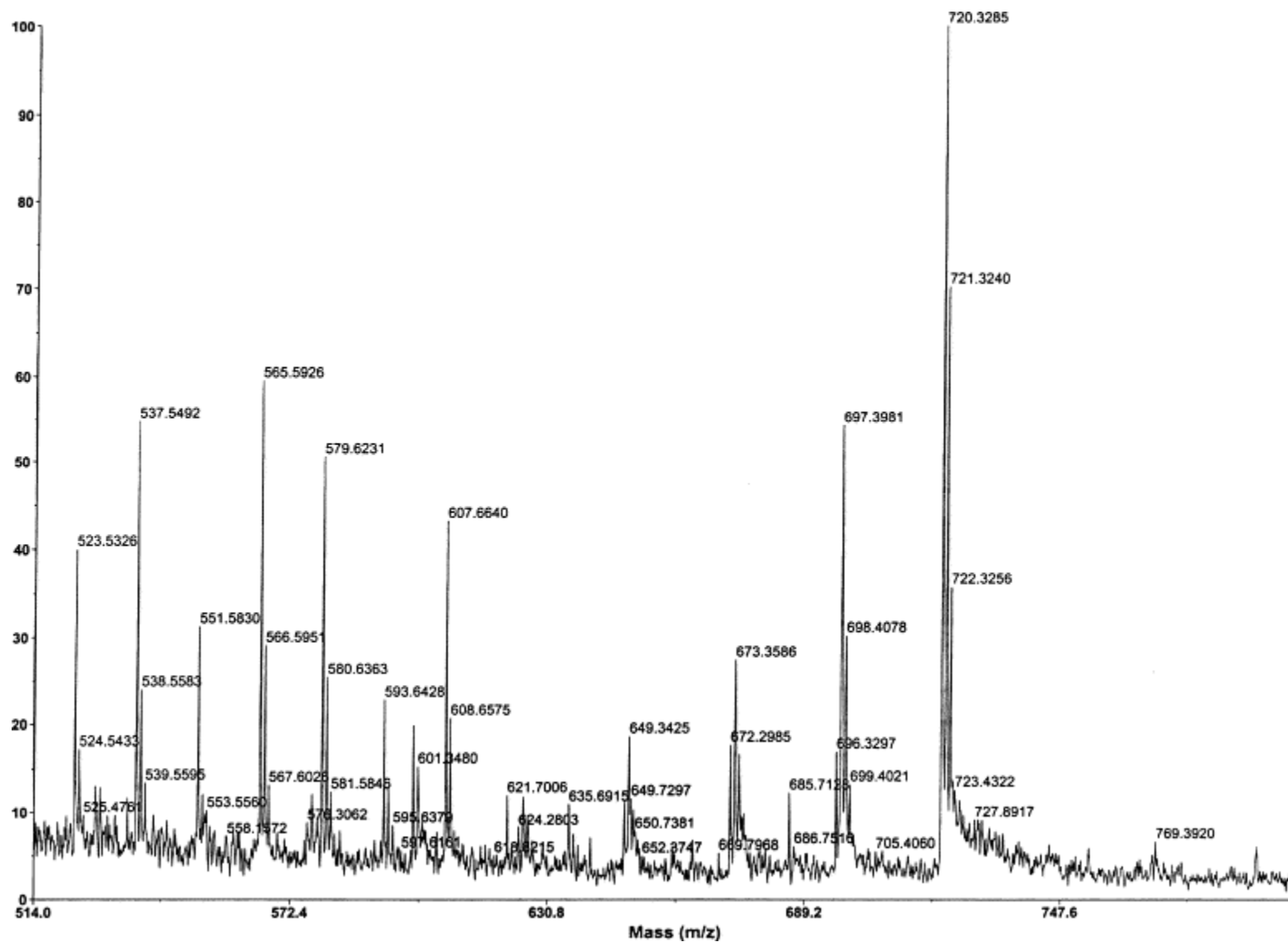
X線結晶構造解析—最先端



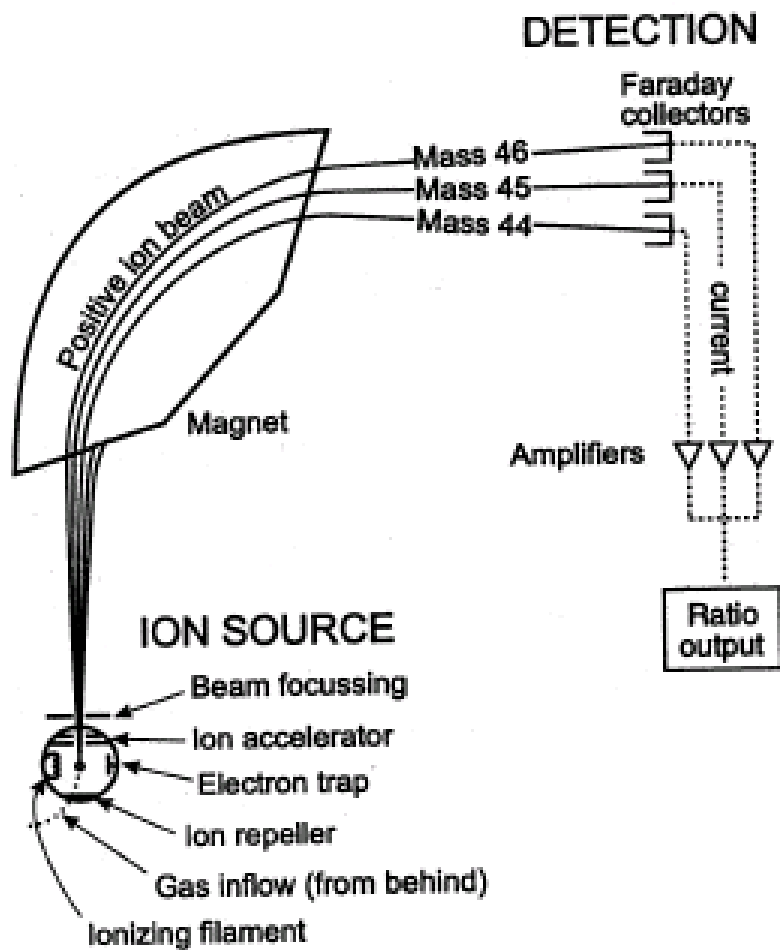
チトクロム酸化酵素がエネルギーを取り出すための構造



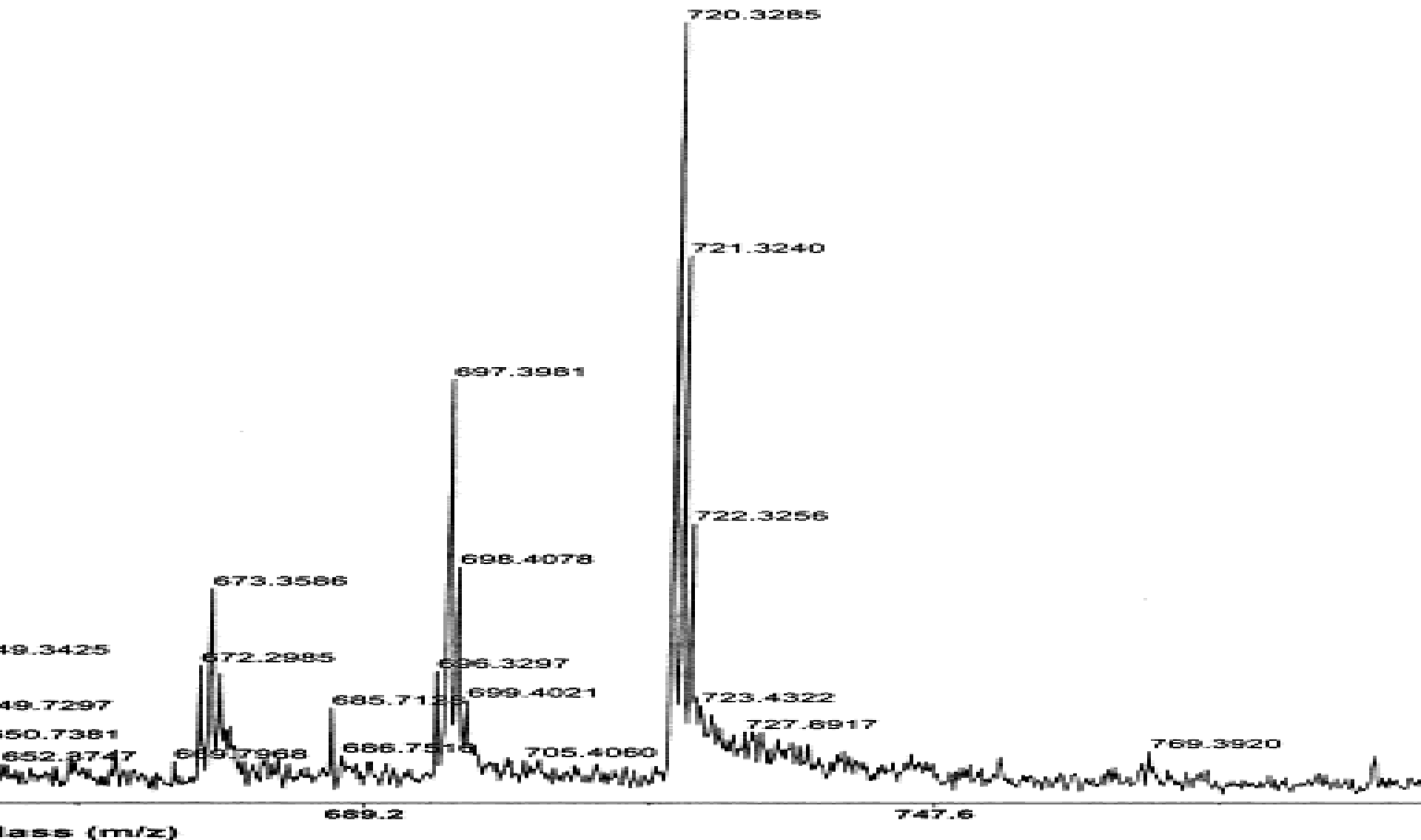
C₆₀のマスマスペクトル



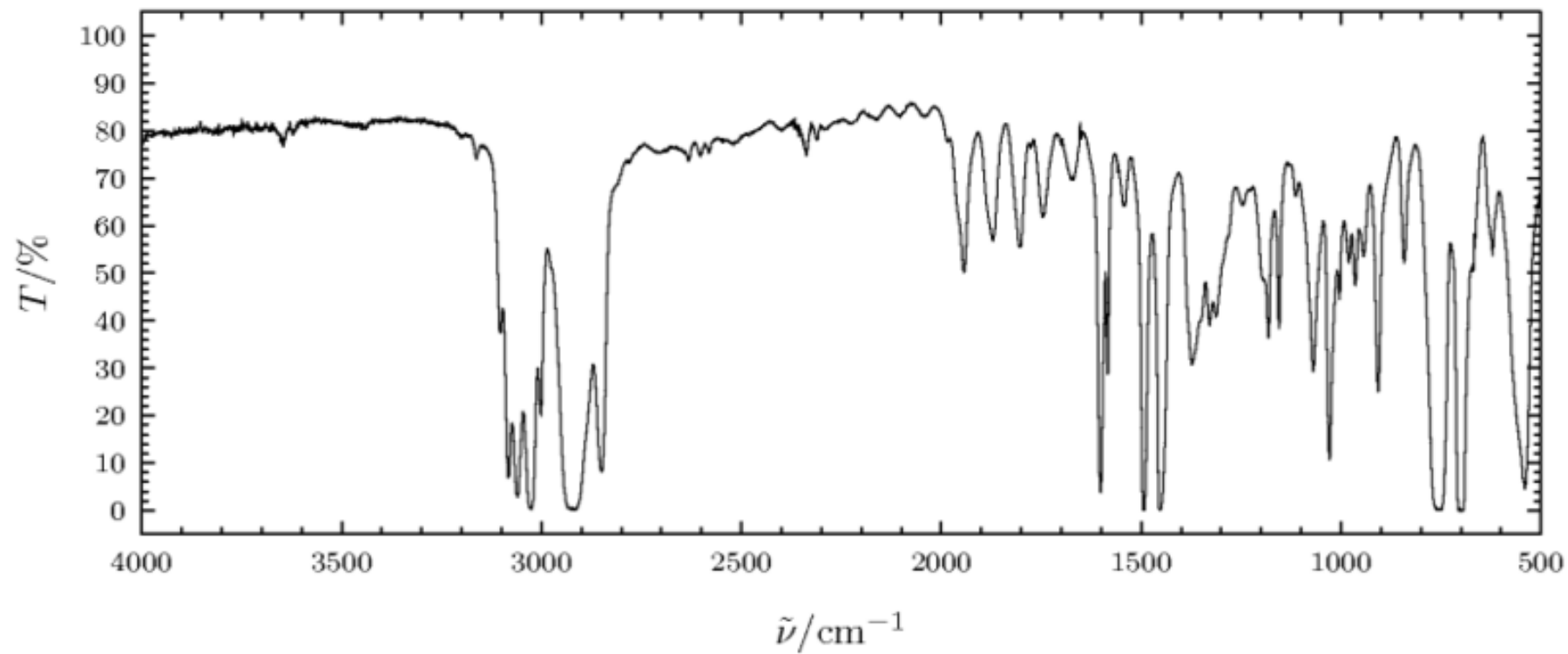
質量分析 Mass spectrum



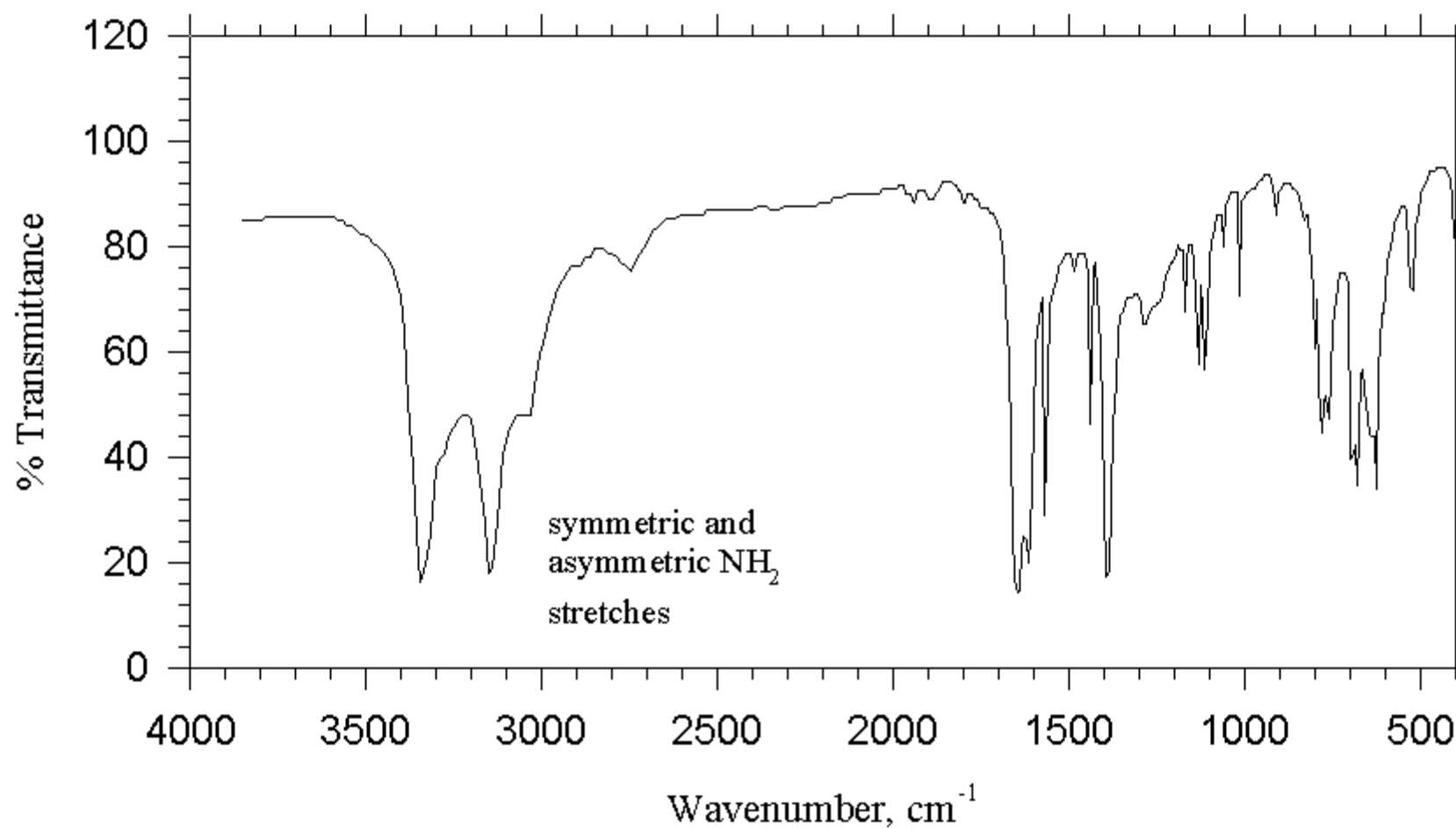
C_{60} のマススペクトル



IRスペクトル



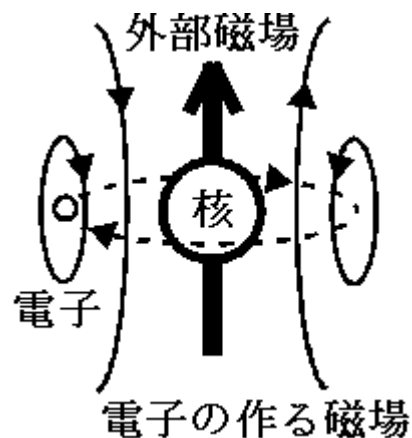
ベンズアミドのIRスペクトル



NMRスペクトル



それぞれの核が“感じる”磁場の大きさは周囲の電子の影響を受ける

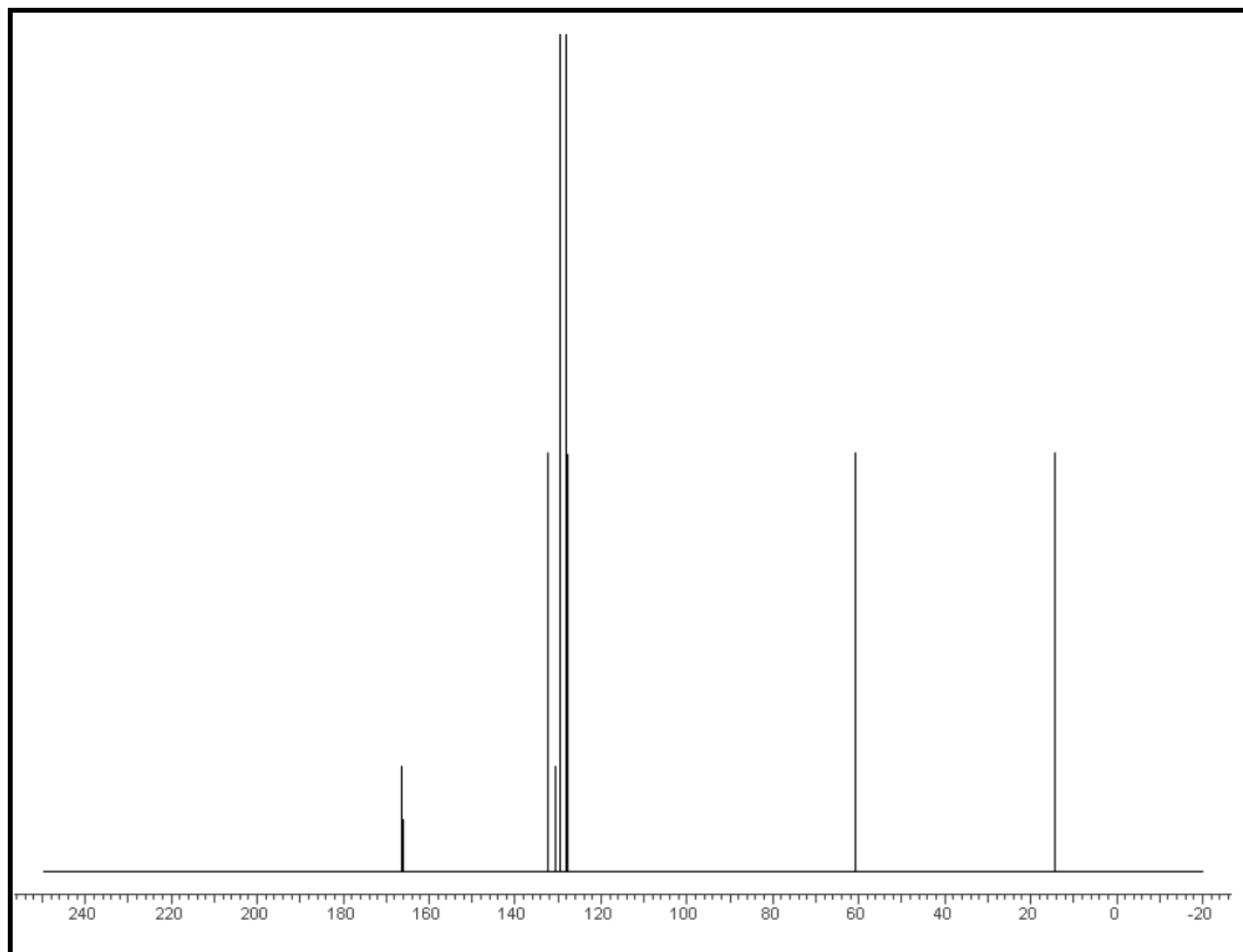


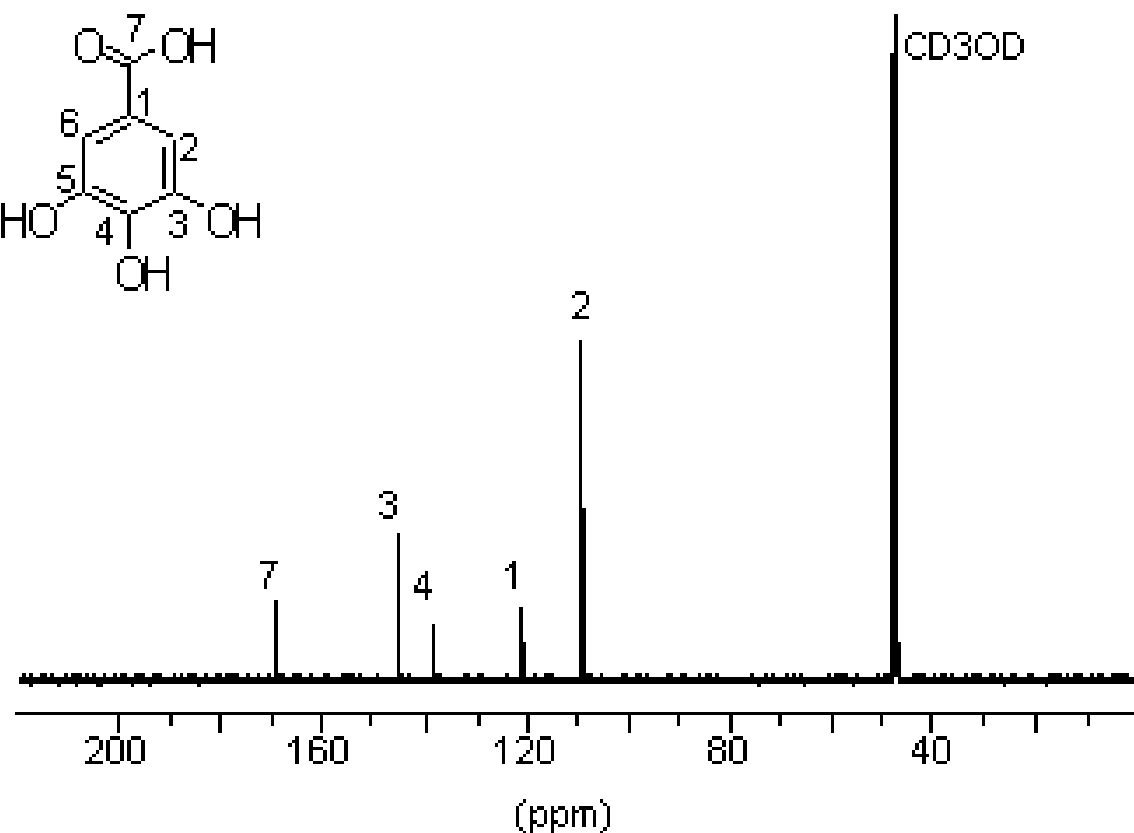
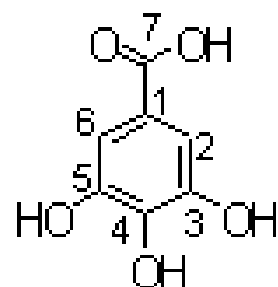
NMRスペクトル

観測可能なのは核スピンの0でない核

質量数	原子番号	核スピンI	核種の例
奇数	奇数、偶数	半整数 ($1/2, 2/3, 2/5, \dots$)	^1H , ^{15}N , ^{13}C , ^{17}O , ^{19}F , ^{31}P , ^{129}Xe , ...
偶数	偶数	0	^{12}C , ^{16}O , ^{32}S , ...
偶数	奇数	整数 ($1, 2, 3, \dots$)	^2D , ^{14}N , ...

安息香酸エチルの ^{13}C NMRスペクトル





*** Current Data Parameters ***

NAME: picogrape2

EXPNO : 5

PROCNO: 1

*** Acquisition Parameters ***

BF1 : 125.7577390 MHz

DATE_t: 11:38:35

DATE_d: Nov 12 1998

DS : 2

NS : 128

O1 : 13766.91 Hz

PROBHD : 5 mm Dual 1999/1/28-

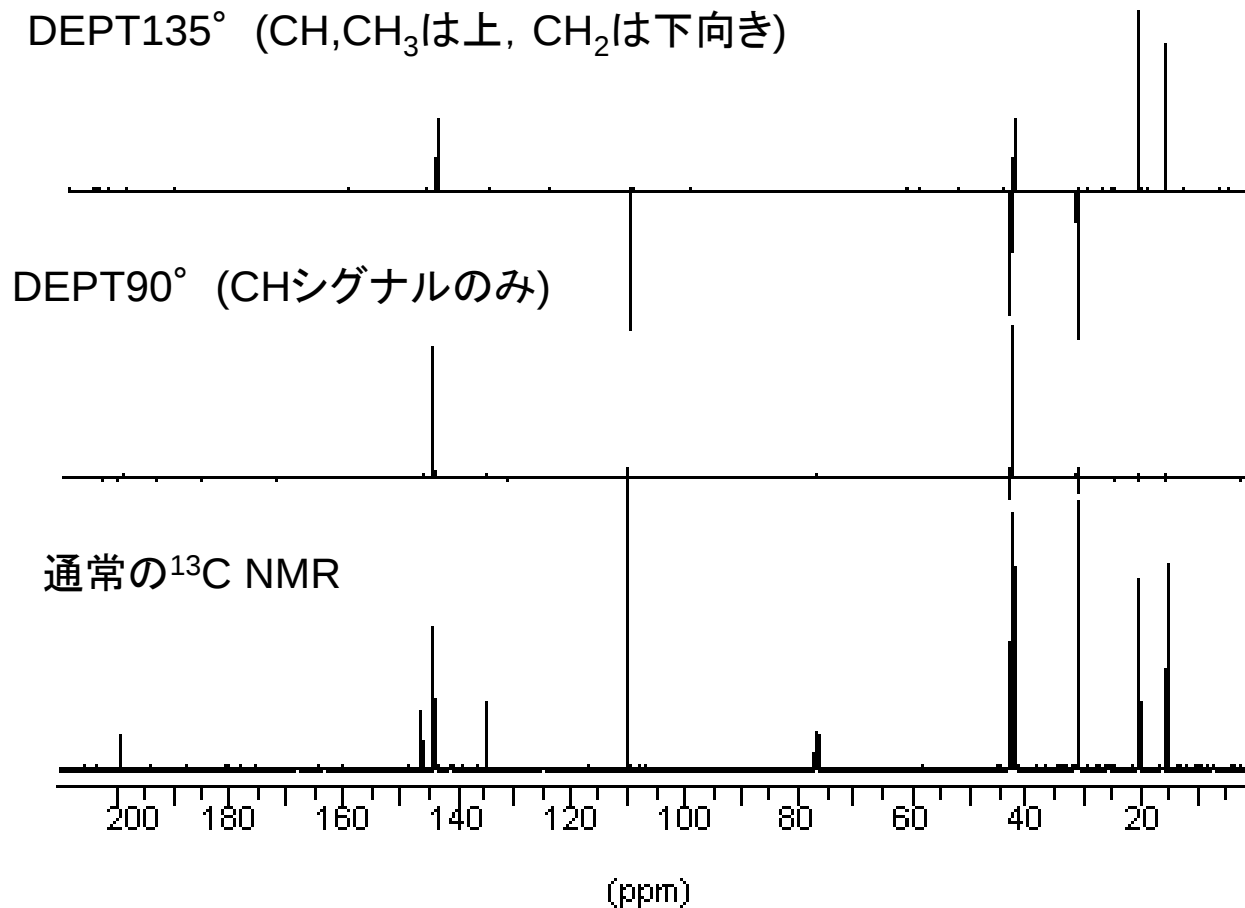
FULPROG : zgpg30.loop

SW_h : 33333.333 Hz

TD : 65536

TE : 298.0K

炭素の ^{13}C NMR (DEPT) スペクトル



*** Current Data Parameters ***

NAME piccarv

EXPNO 4

PROCNO 1

*** Acquisition Parameters ***

BF1 : 125.7577000

D[1] : 2.0000000

DATE_t 10:42:30

DATE_d Apr 06 1998

DL[0] : dB 10.00

DS : 2

HL1 : dB 90

L[1] : 1000

NS : 32

O1 : 13766.912

P[1] : usec 7.4

P[3] : 16.0sec

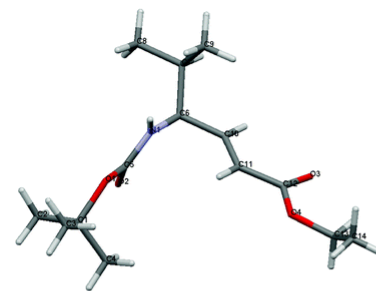
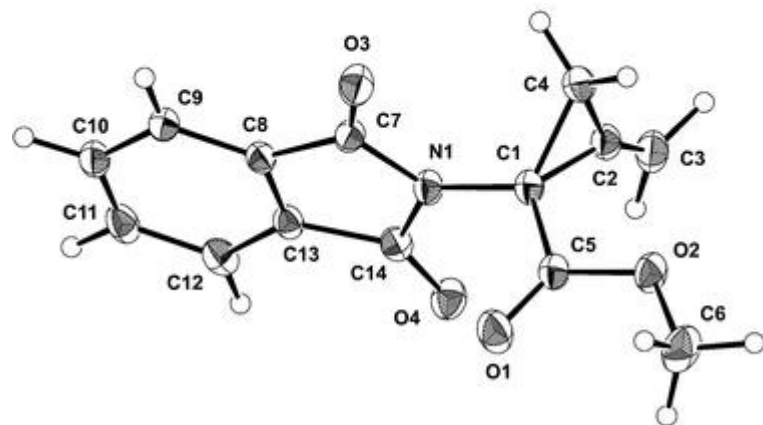
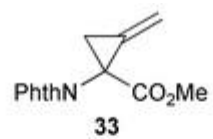
PROBHD5 mm Dual 13C/MH

PULPROGzgpg30

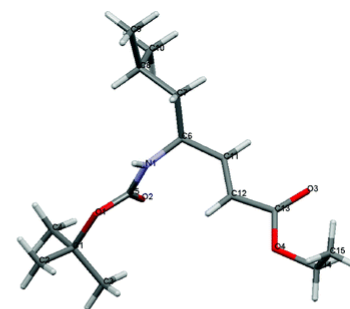
SWH_h 33333.128

TD : 65536

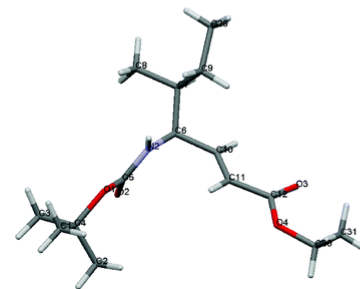
TE : 298.0



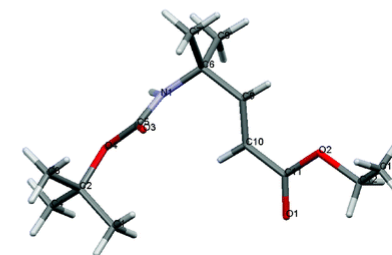
2C



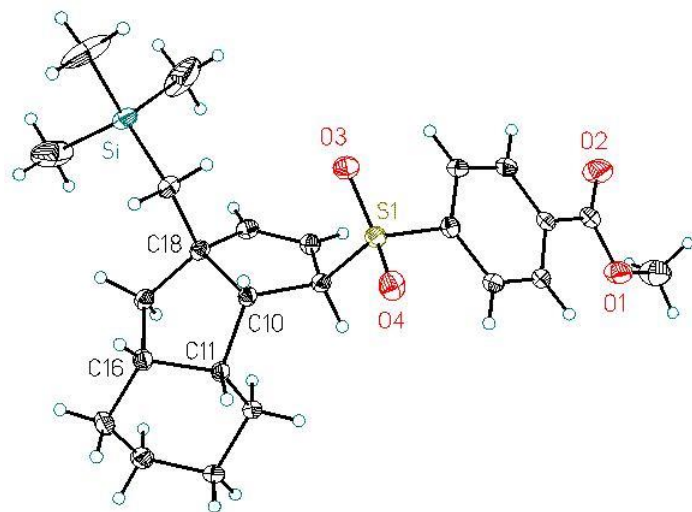
4C



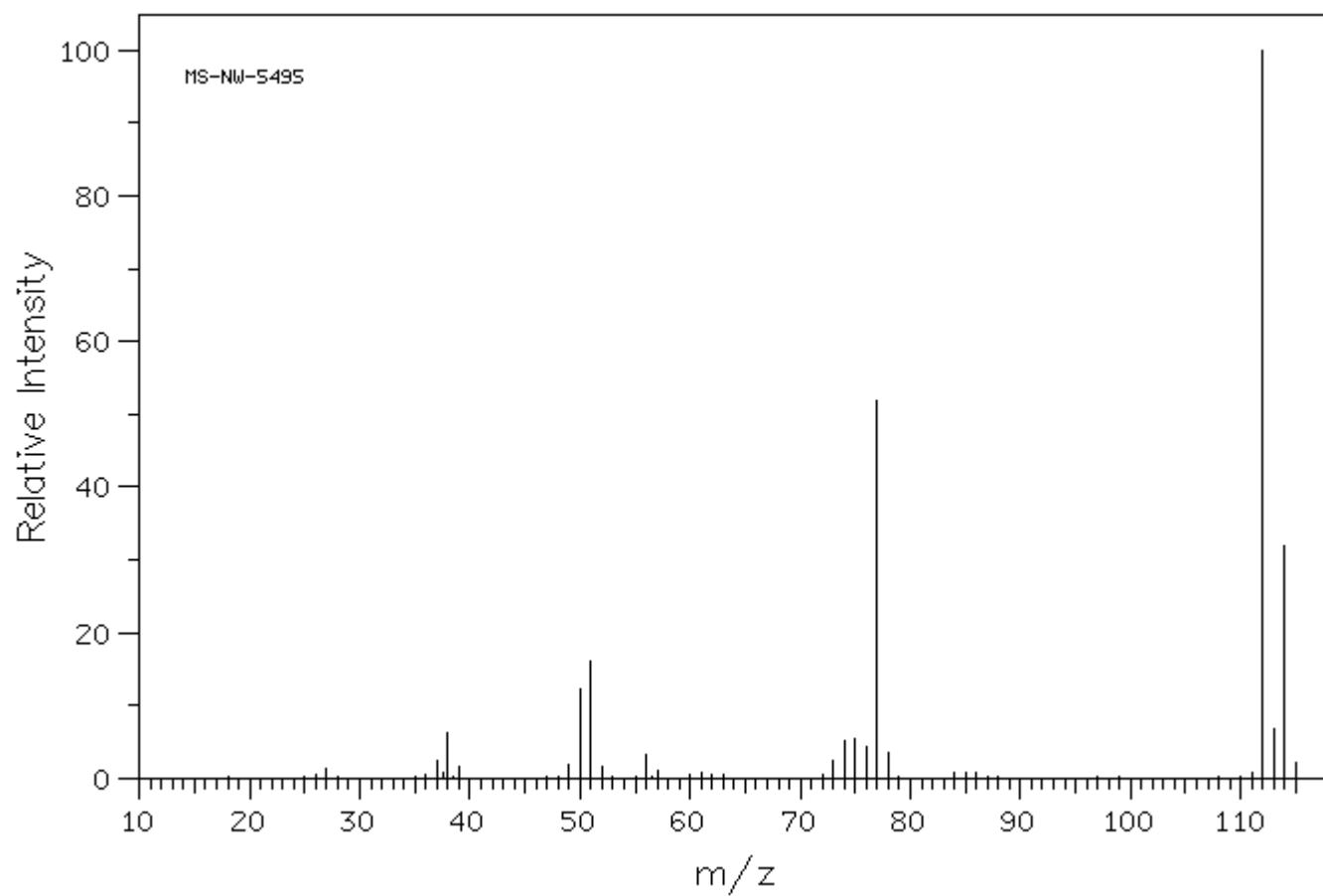
5C

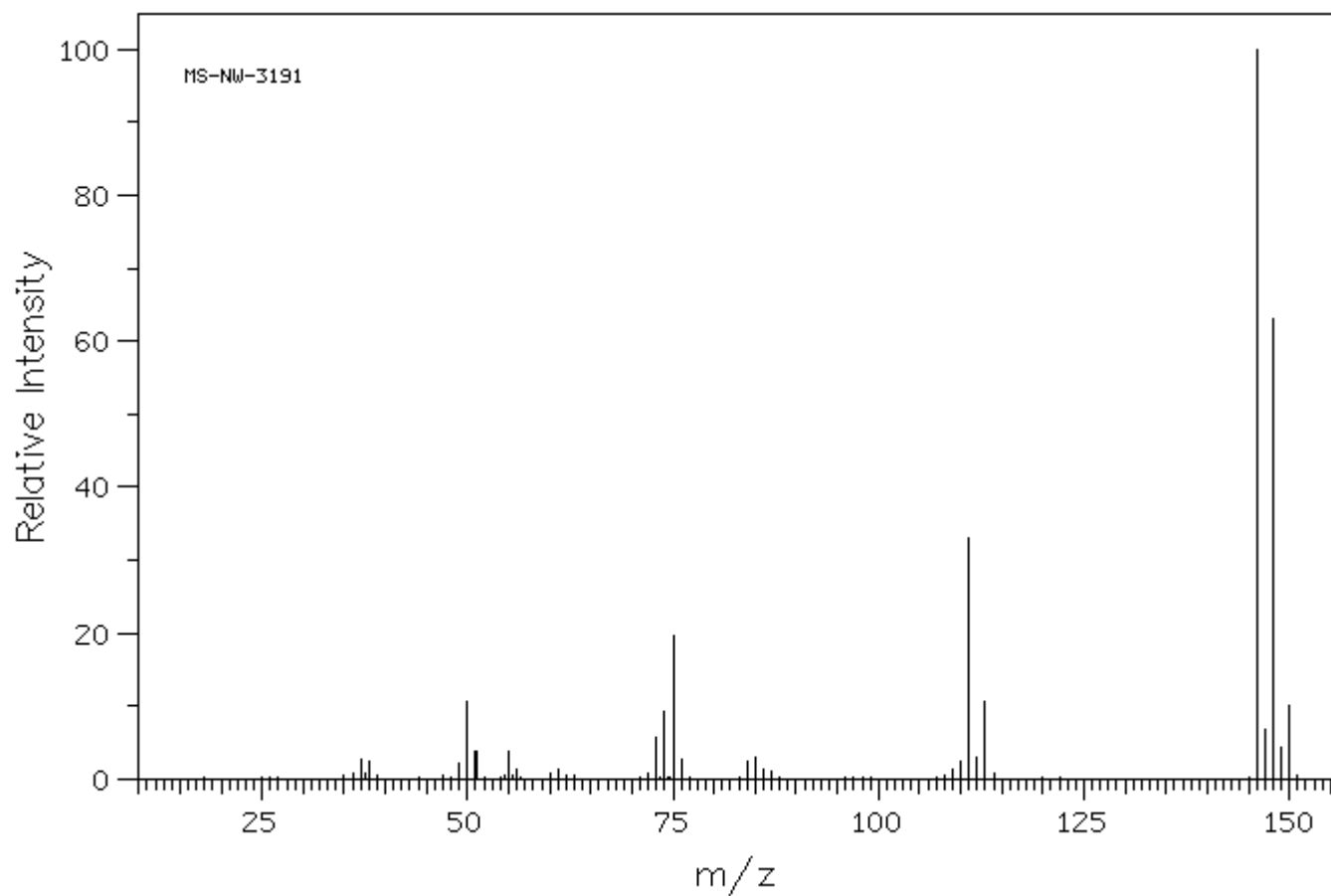
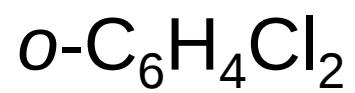


6C

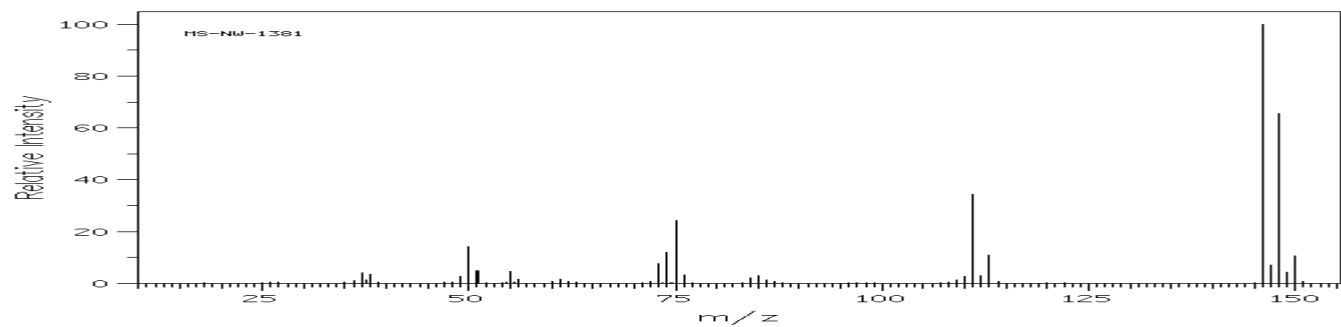
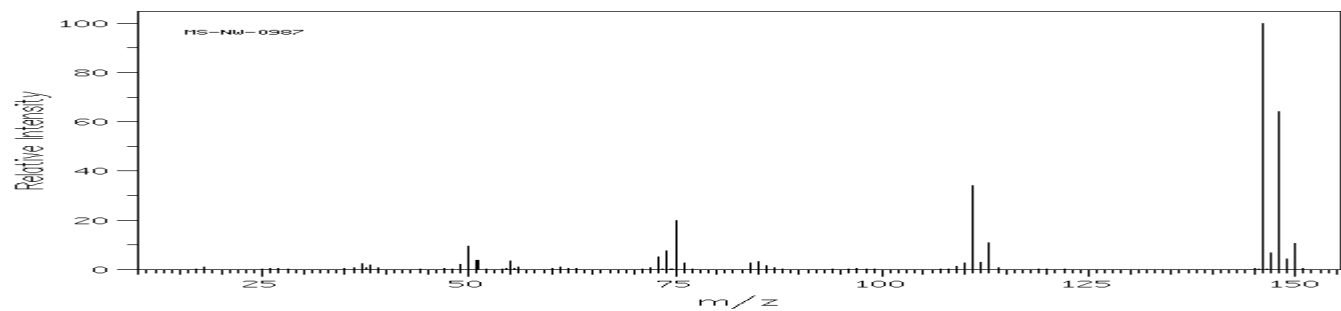
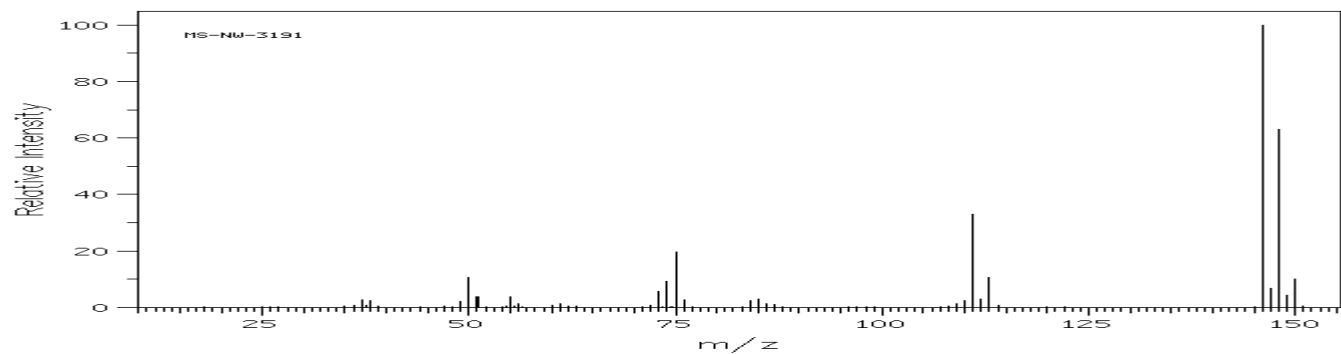


PhCl

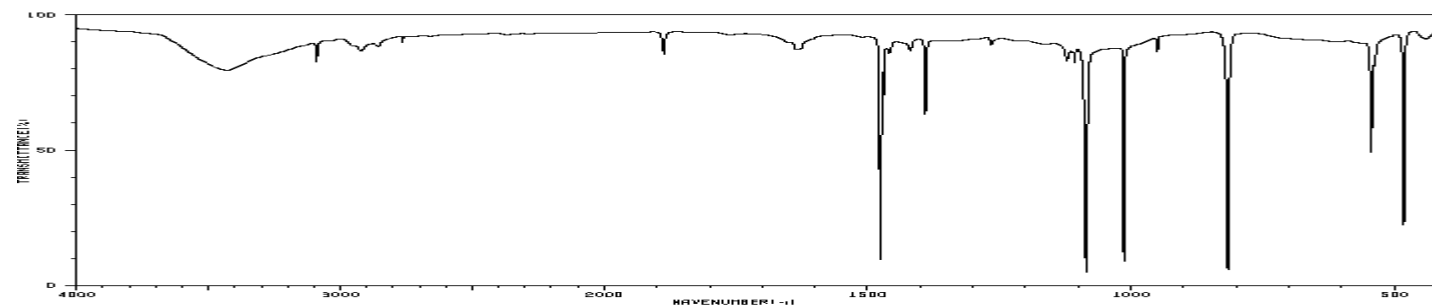
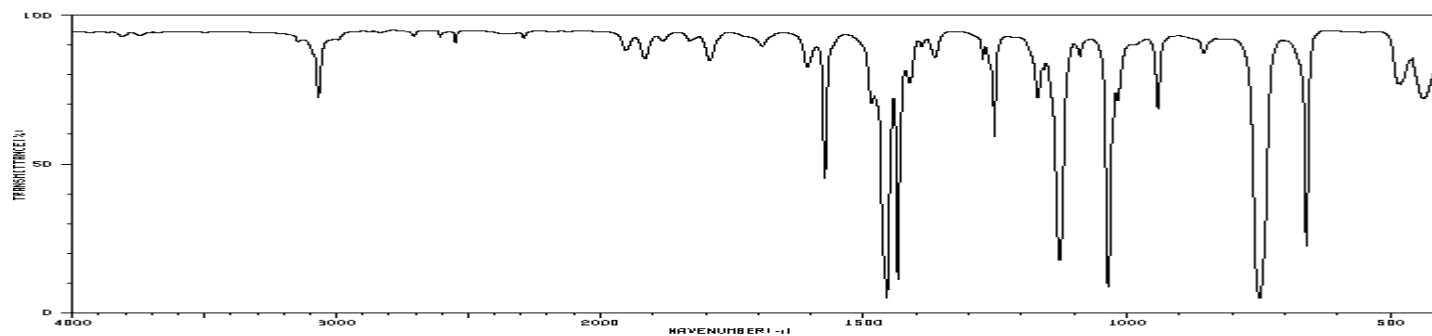
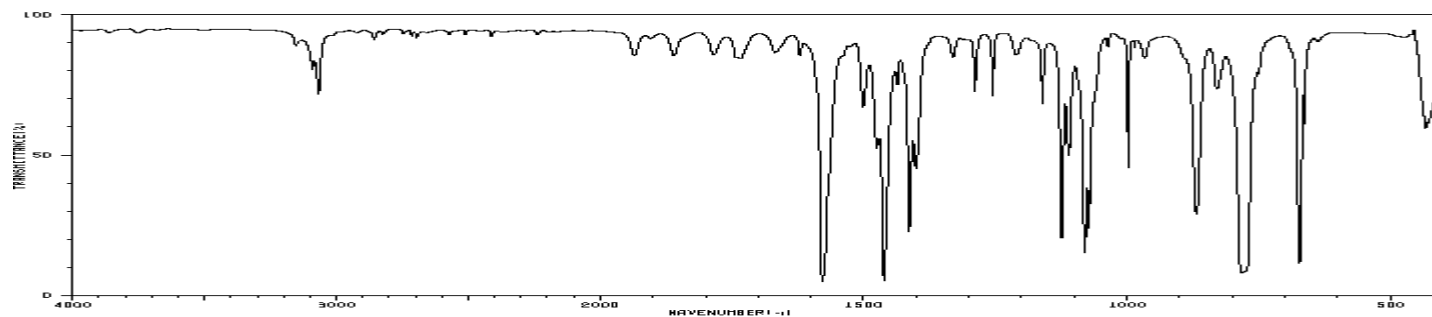




$\text{C}_6\text{H}_4\text{Cl}_2$ の各異性体。どれが何？

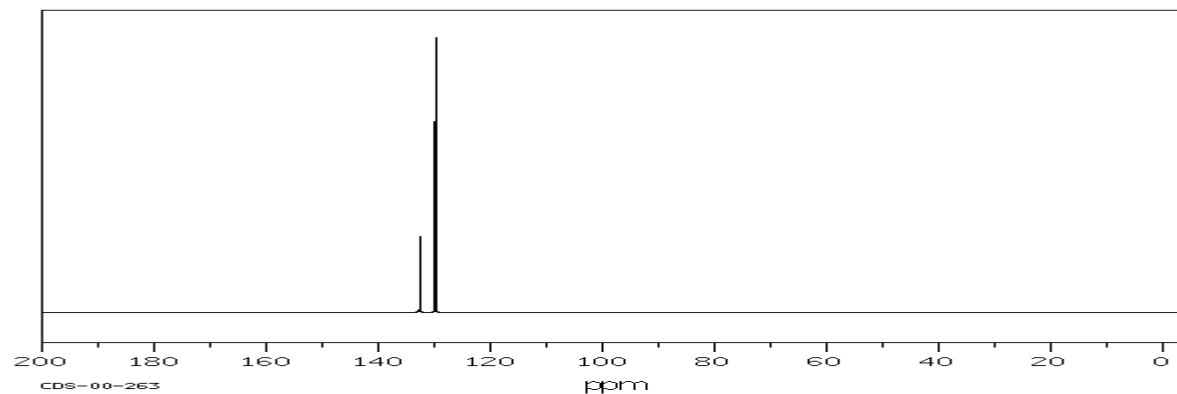
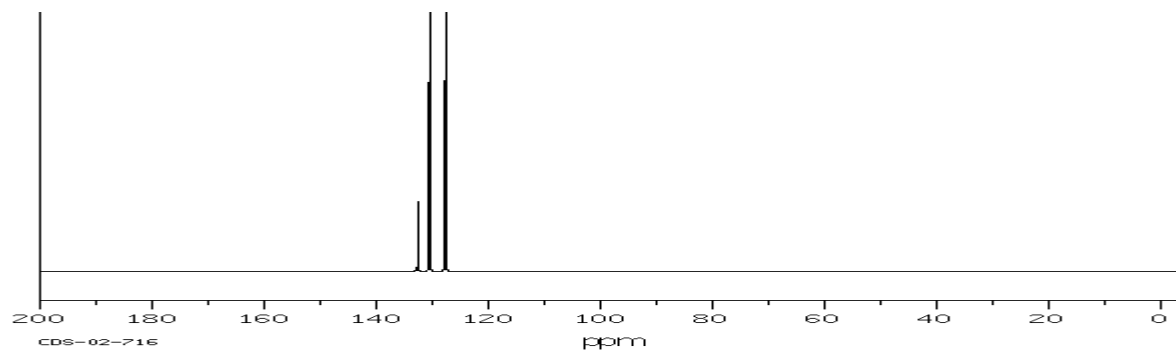
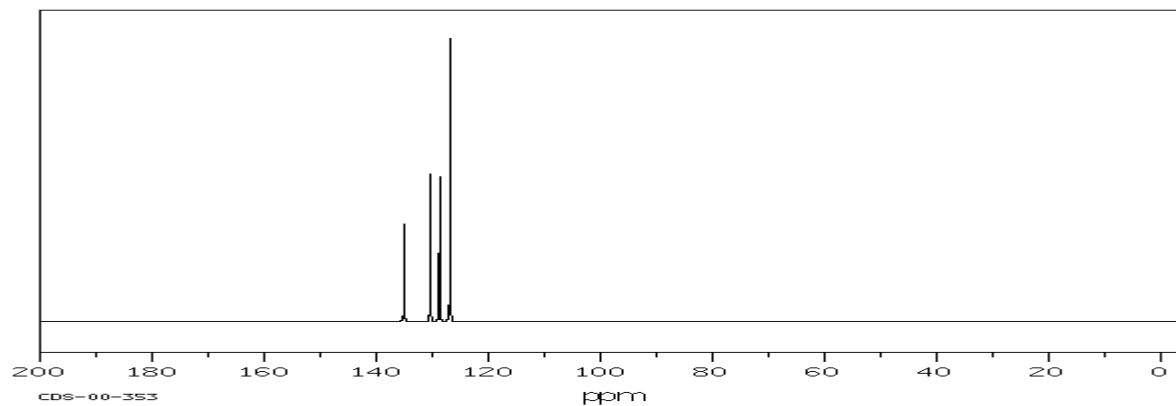


$\text{C}_6\text{H}_4\text{Cl}_2$ の各異性体。どれが何？



4000 3000 2000 1500 1000 500

$\text{C}_6\text{H}_4\text{Cl}_2$ どれが何？

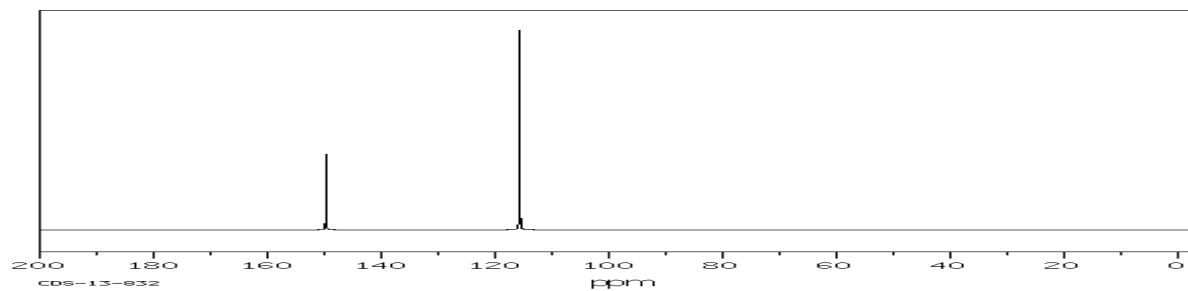
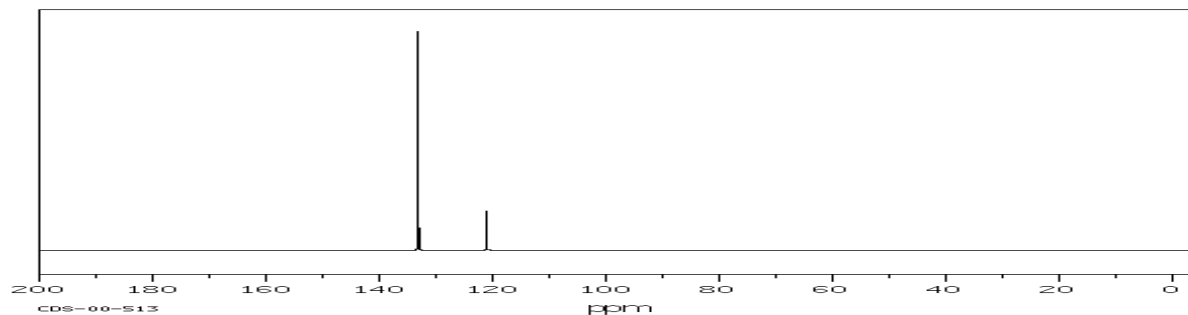
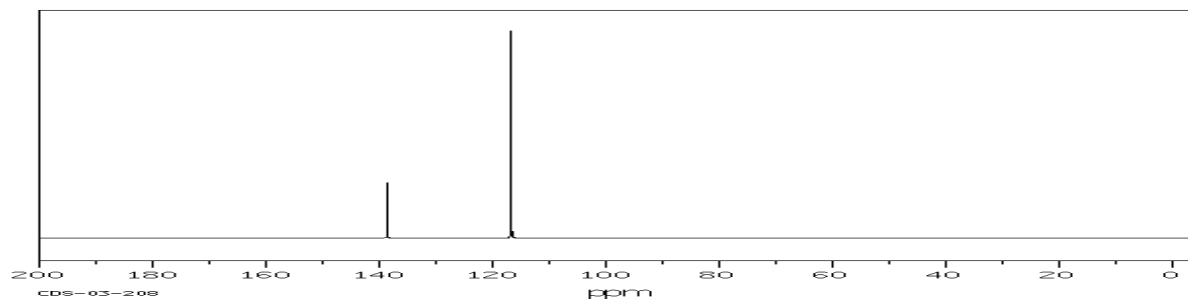


200

100

0

$p\text{-C}_6\text{H}_4\text{X}_2$ (X=OH, Br, NH₂) どれがどれ? ¹³C NMR

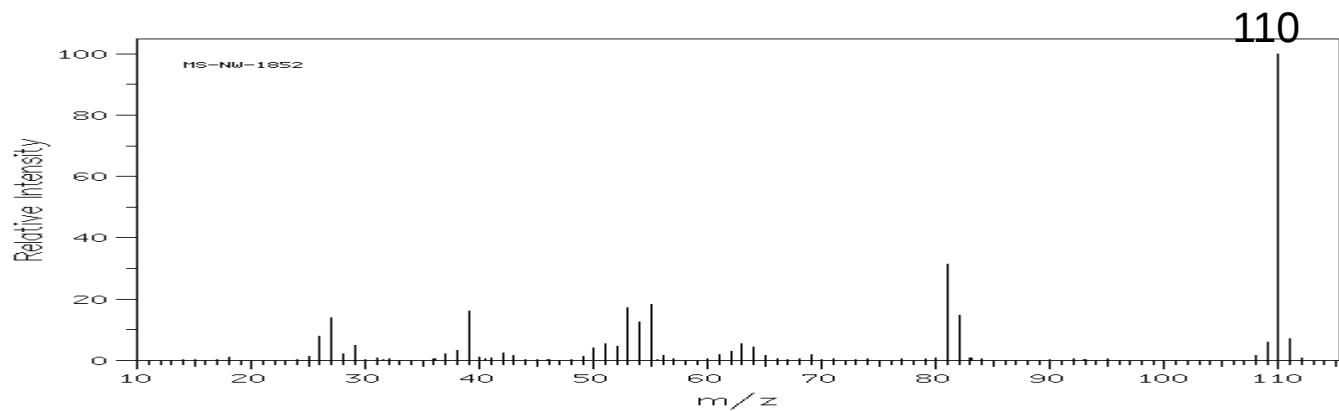
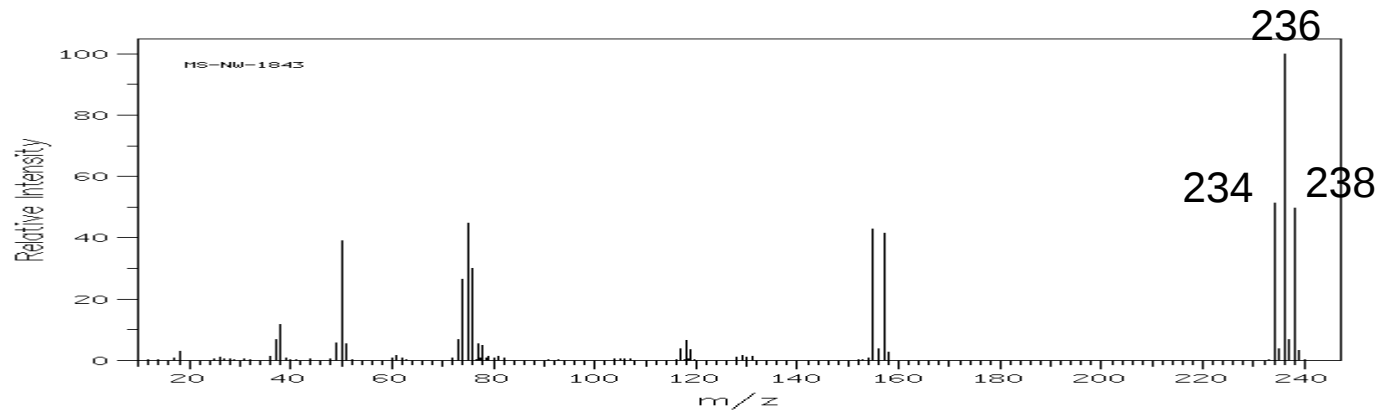
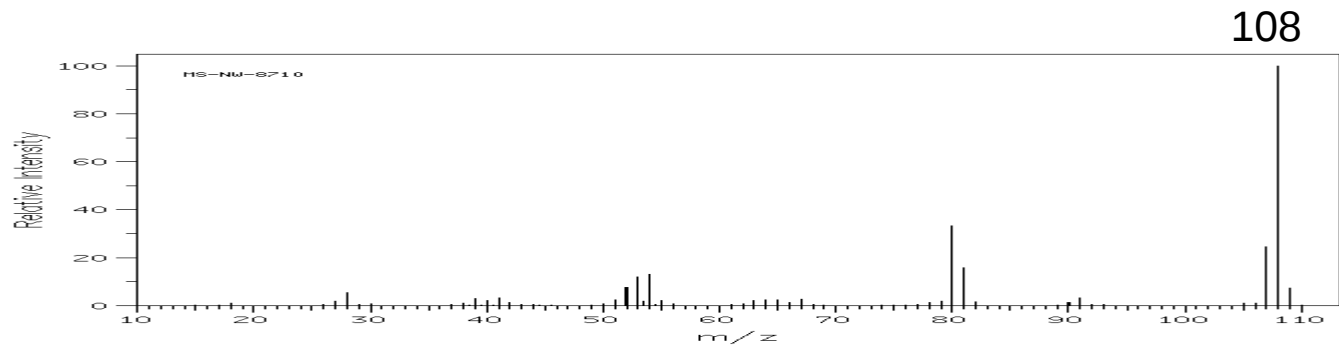


200

100

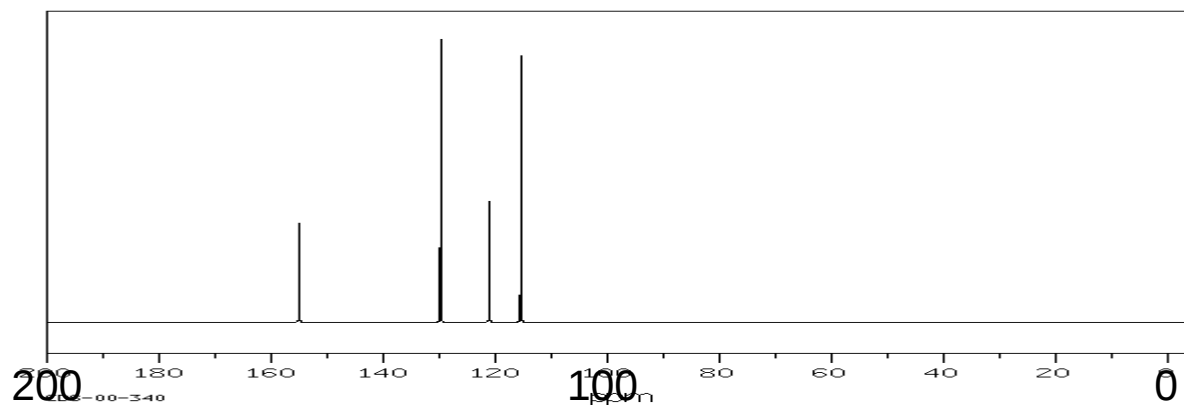
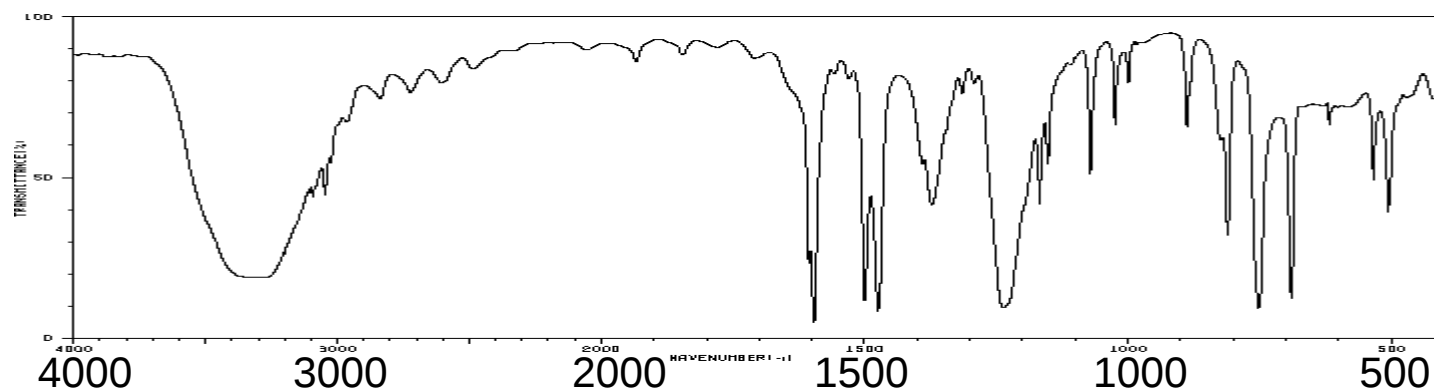
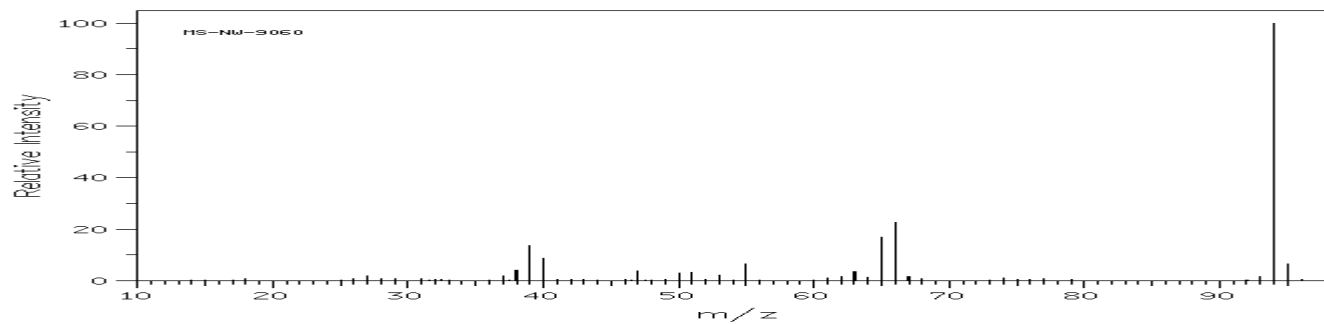
0

$p\text{-C}_6\text{H}_4\text{X}_2$ (X=OH, NH₂, Br) どれがどれ？

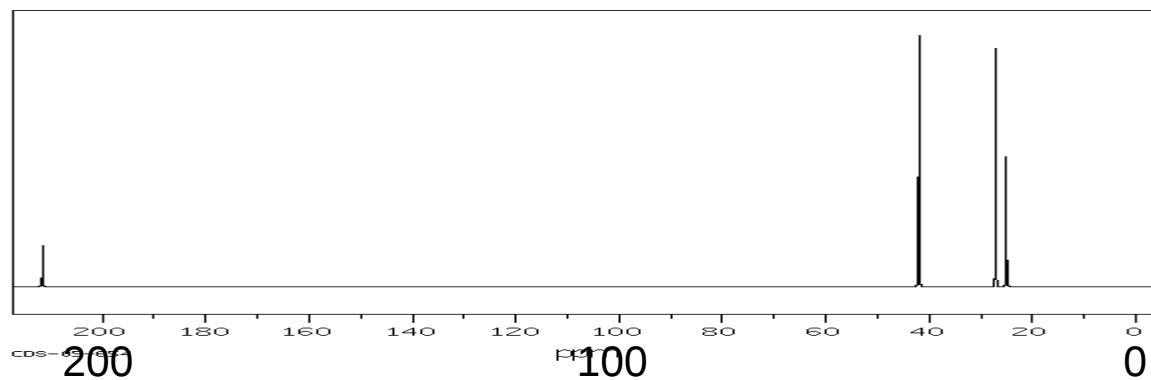
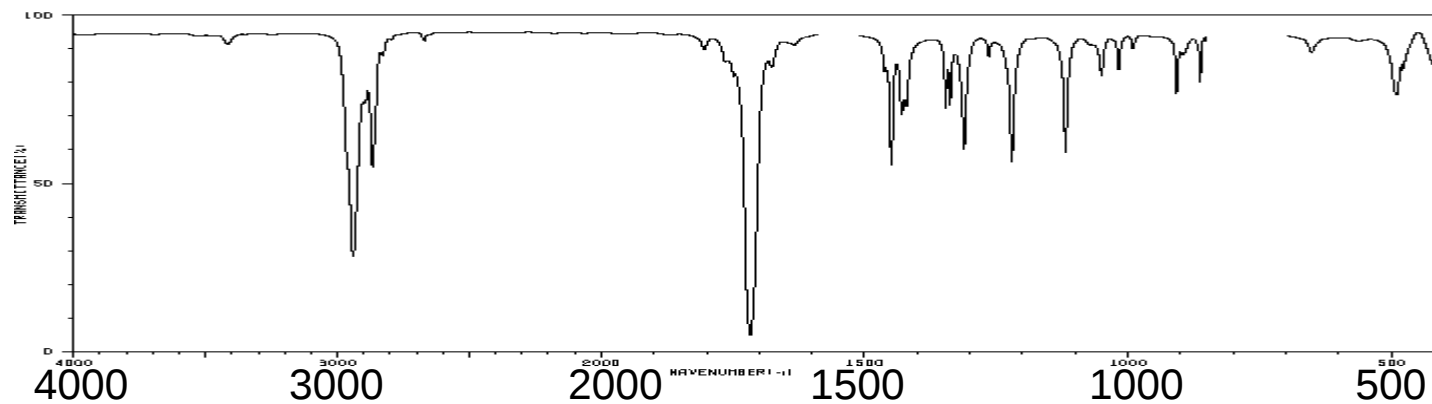
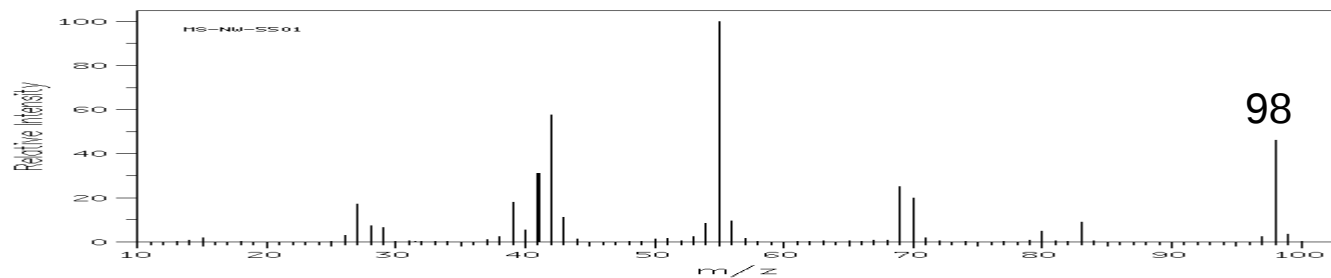


例題1:

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例題2:



例題3:

