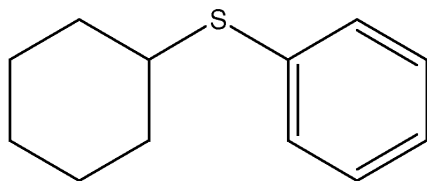


Typical Experimental Procedure

To a flame dried round bottom flask was added activated powdered 4 molecular sieves (0.50 g, 50 wt%), cyclohexylmercaptan (0.24 g, 2.05 mmol), phenylboronic acid (0.50 g, 4.1 mmol, 2.0 eq), copper (II) acetate (0.56 g, 3.08 mmol, 1.5 eq), dimethyl formamide (20 mL), and pyridine (0.5 mL, 6.15 mmol, 3.0 eq). A reflux condenser was added and the atmosphere was replaced with dry argon. The mixture was stirred at reflux under argon for three hours. During this time the color changed from green to dark brown. The reaction was judged complete by thin layer chromatography (silica, hexane; cyclohexylmercaptan: R_f = 0.55; product: R_f = 0.38, stained with iodine). The product was purified by immediate flash chromatography (silica gel 60, particle size 230-400 mesh, hexanes) to give phenylcyclohexylsulfide, (0.28 g, 72%).

Entry: 1
Compound:

Formula: $C_{12}H_{16}S$
M.W.: 192.32



1H - NMR: Field strength: 400MHz Solvent: $CDCl_3$

7.39 (d, $J = 8.4$, 2H), 7.27 (t, $J = 7.6$, 2H), 7.20 (t, $J = 7.2$), 3.10 (m, 1H), 1.98 (m, 2H), 1.77 (m, 2H), 1.60 (m, 1H), 1.31 (m, 5H)

^{13}C - NMR: Field strength: 400MHz Solvent: $CDCl_3$

135.10, 128.61, 126.43, 123.07, 46.41, 33.23, 25.95, 25.65

MS: Ionization method: 70S EI+ Magnet
monoisotopic mass = 192.097

EA:

IR: Sample type: thin film on KBr

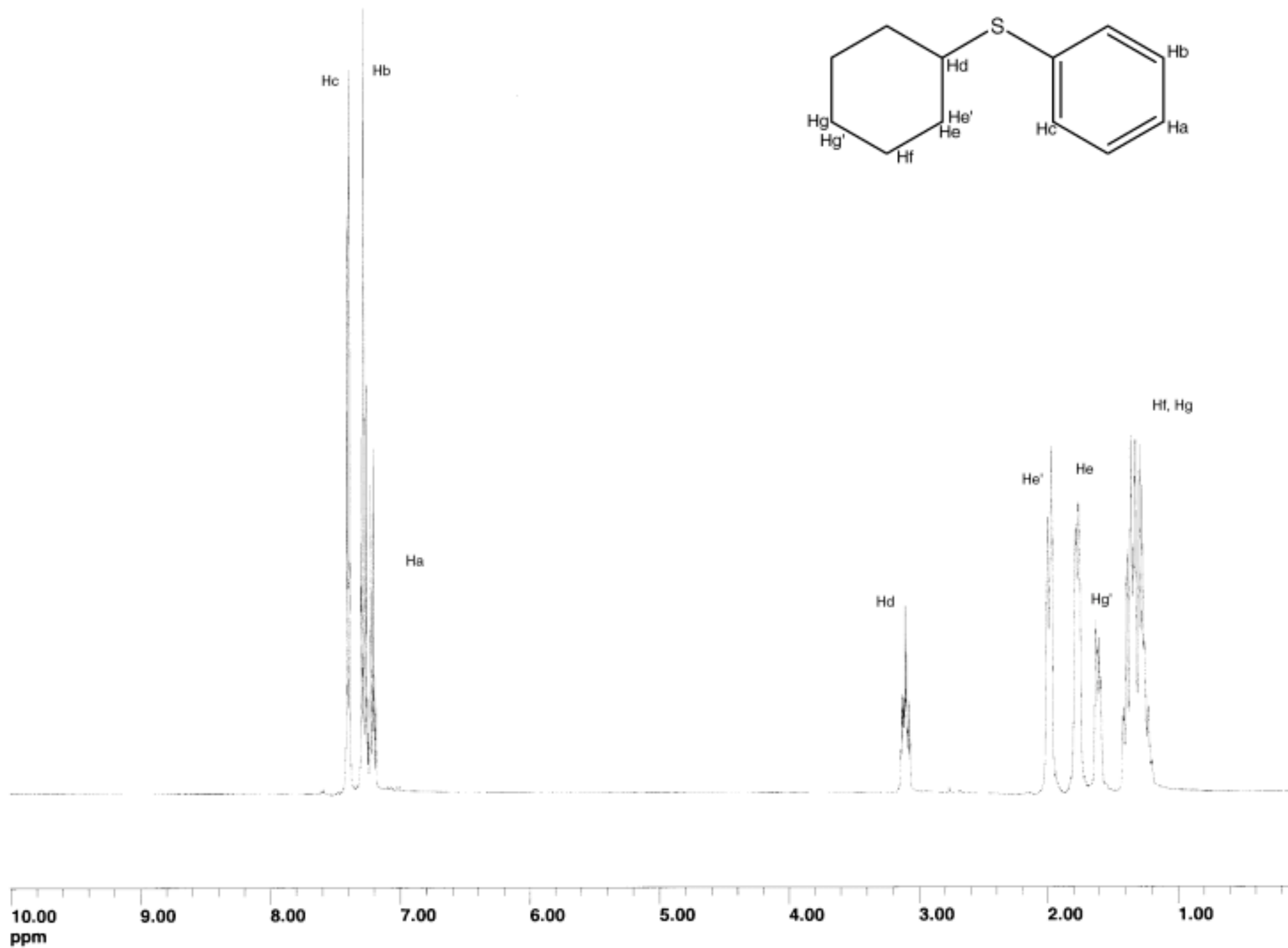
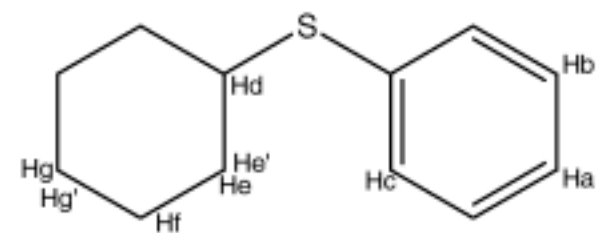
3072, 3058, 2929, 2852, 1584, 1479, 1448, 1438, 750, 735, 691

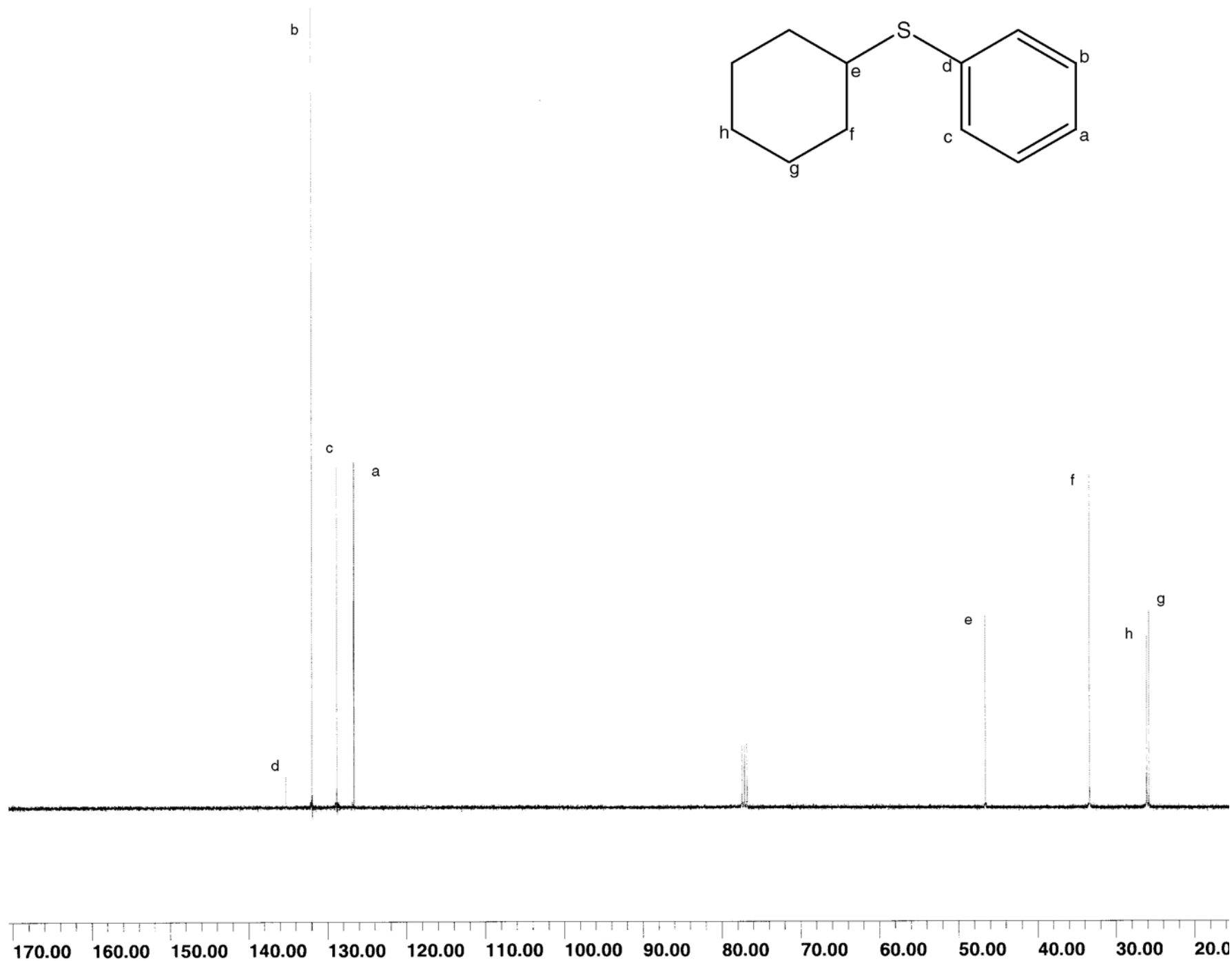
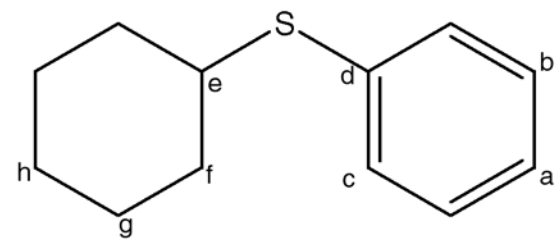
UV:

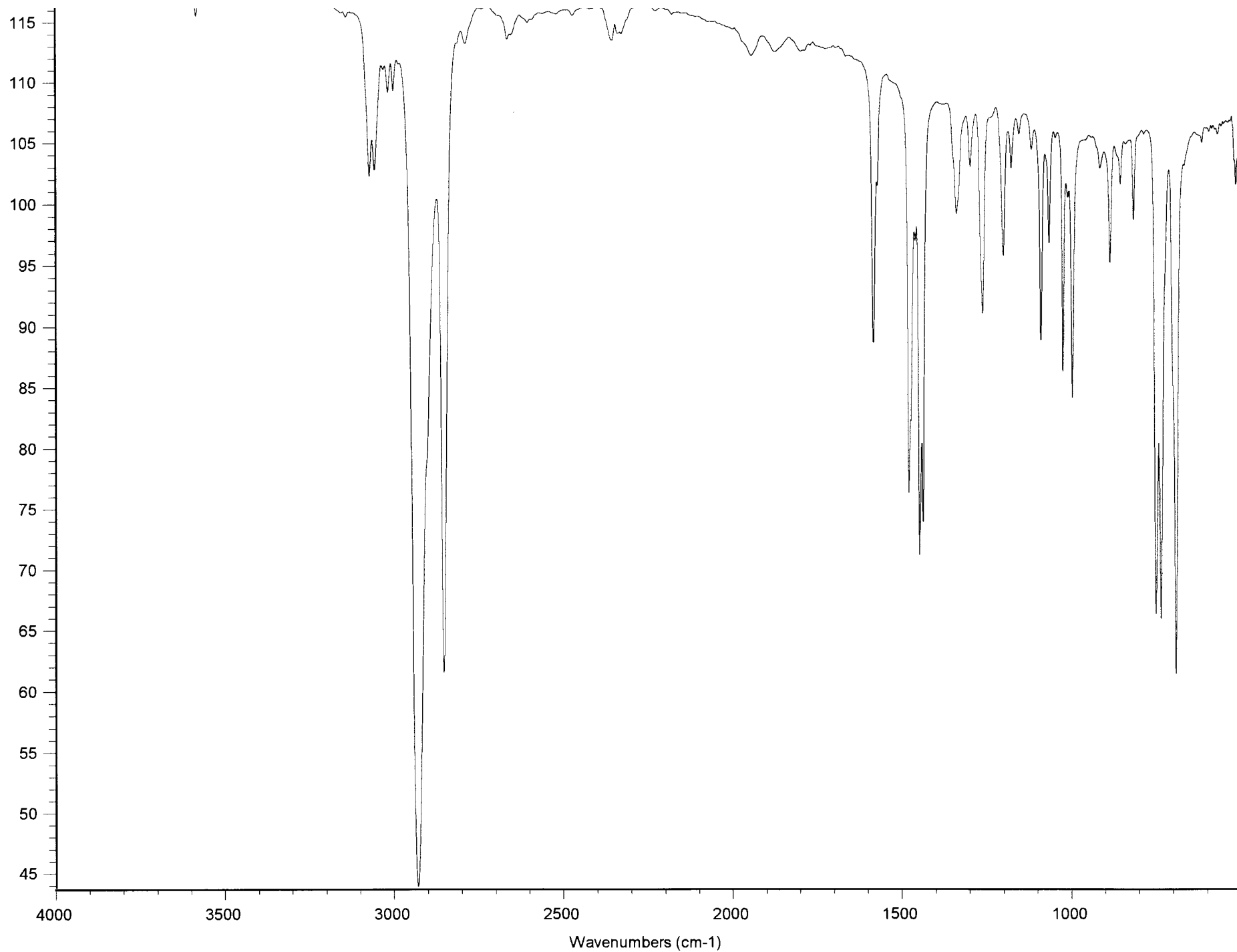
R_f : Solvent: 10% ethyl acetate in hexanes

0.79

Mp./bp.:



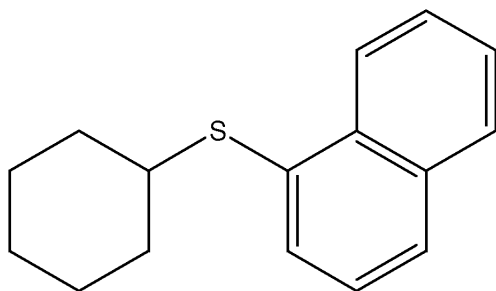




Entry: 2
Compound:

Formula: $C_{16}H_{18}S$

M.W.: 192.32



1H - NMR: Field strength: 400MHz

Solvent: $CDCl_3$

7.39 (d, $J = 8.4$, 2H), 7.27 (t, $J = 7.6$, 2H), 7.20 (t, $J = 7.2$), 3.10 (m, 1H), 1.98 (m, 2H), 1.77 (m, 2H), 1.60 (m, 1H), 1.31 (m, 5H)

^{13}C - NMR: Field strength: 400MHz

Solvent: $CDCl_3$

135.10, 128.61, 126.43, 123.07, 46.41, 33.23, 25.95, 25.65

MS: Ionization method: 70S EI+ Magnet

monoisotopic mass = 192.097

EA:

IR: Sample type: thin film on KBr

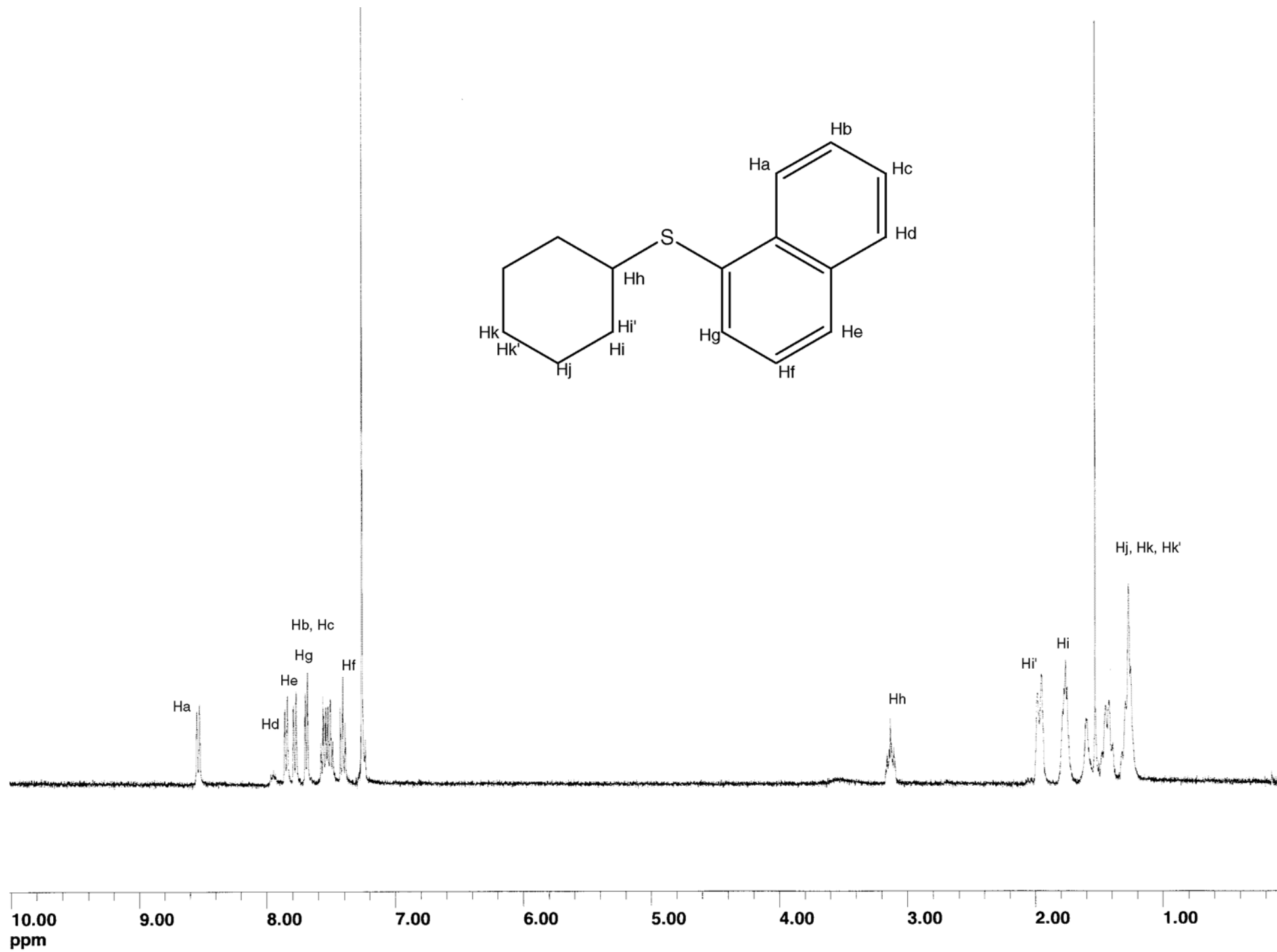
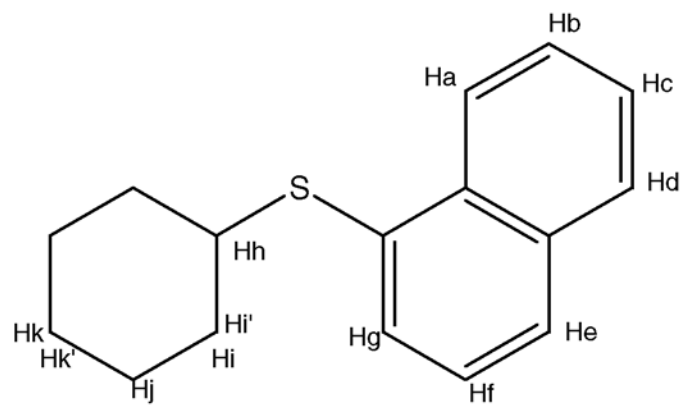
3072, 3058, 2929, 2852, 1584, 1479, 1448, 1438, 750, 735, 691

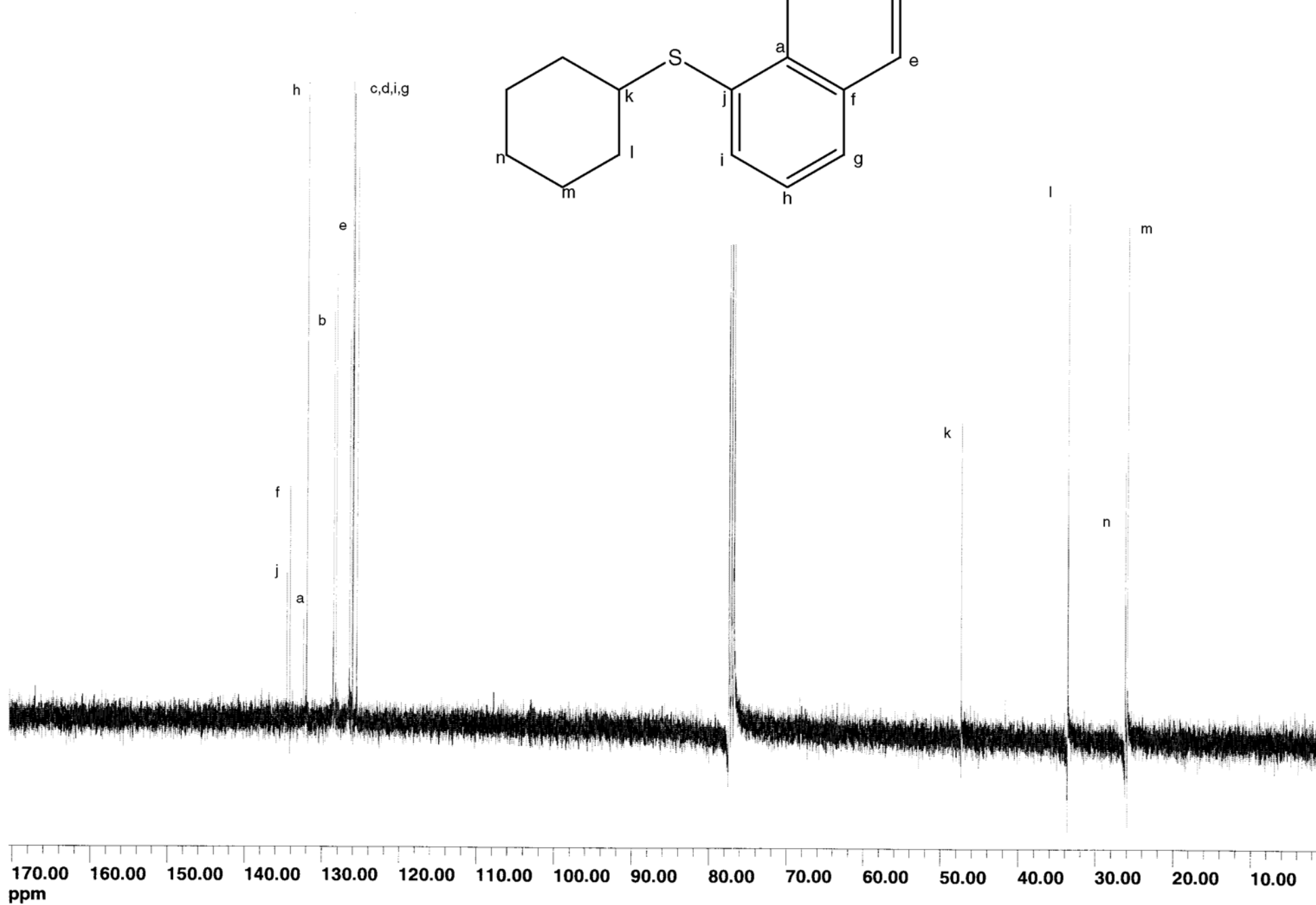
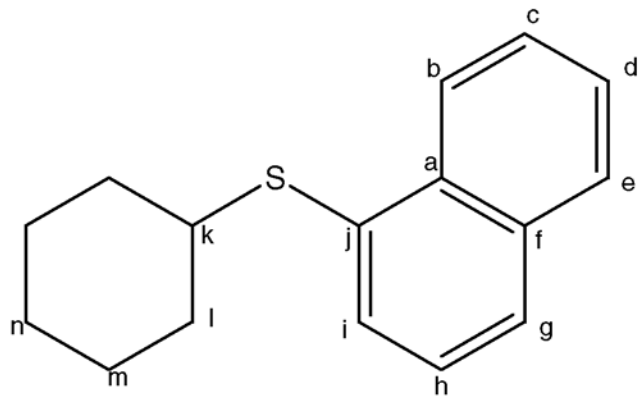
UV:

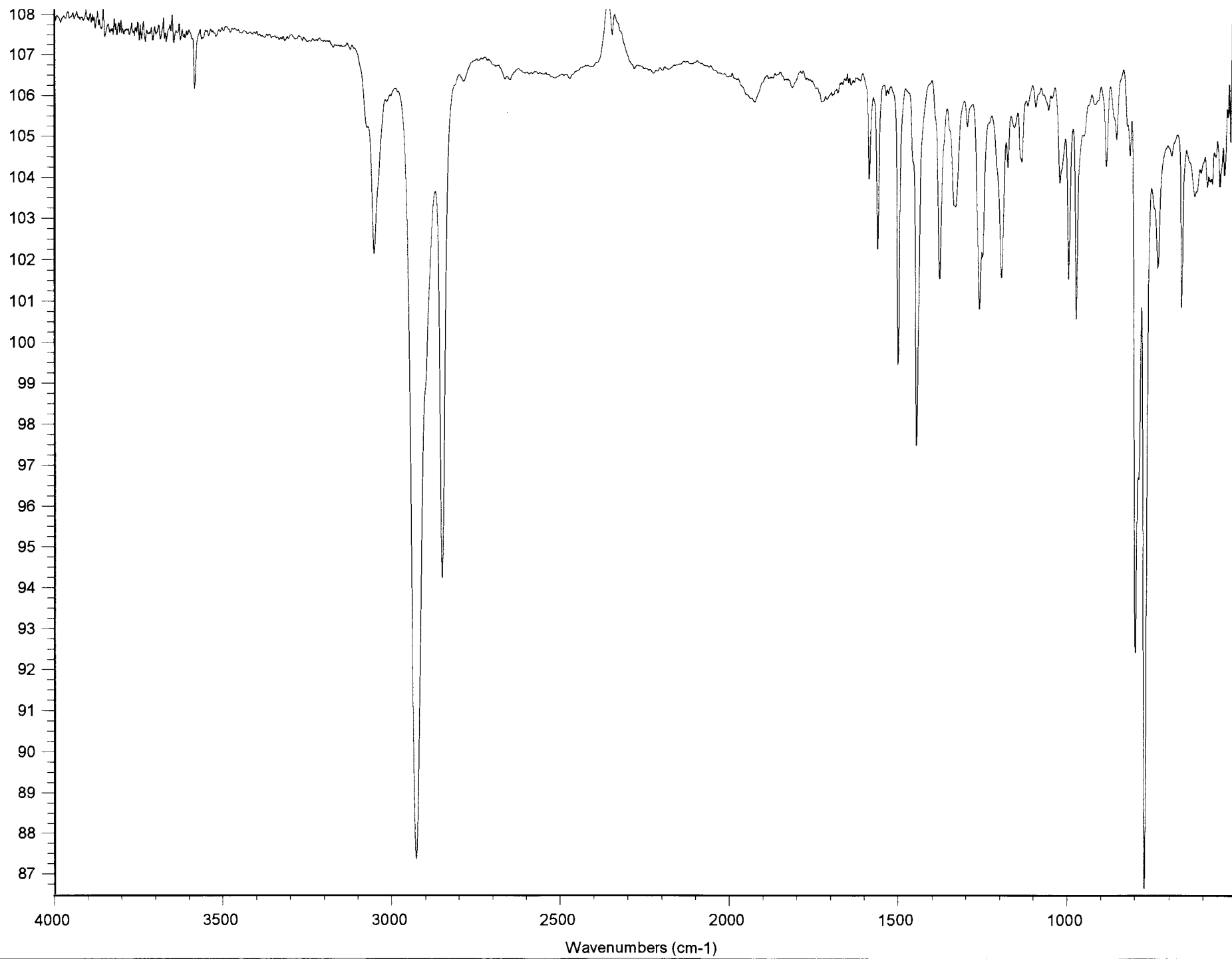
R_f : Solvent: 10% ethyl acetate in hexanes

0.79

Mp./bp.:



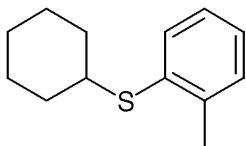




Entry: 3

Compound:

Formula: C₁₃H₁₈S



M.W.: 192.32

¹H- NMR: Field strength: 400MHz

Solvent: CDCl₃

7.39 (d, J = 8.4, 2H), 7.27 (t, J = 7.6, 2H), 7.20 (t, J = 7.2), 3.10 (m, 1H), 1.98 (m, 2H), 1.77 (m, 2H), 1.60 (m, 1H), 1.31 (m, 5H)

¹³C- NMR: Field strength: 400MHz

Solvent: CDCl₃

135.10, 128.61, 126.43, 123.07, 46.41, 33.23, 25.95, 25.65

MS: Ionization method: 70S EI+ Magnet

monoisotopic mass = 192.097

EA:

IR: Sample type: thin film on KBr

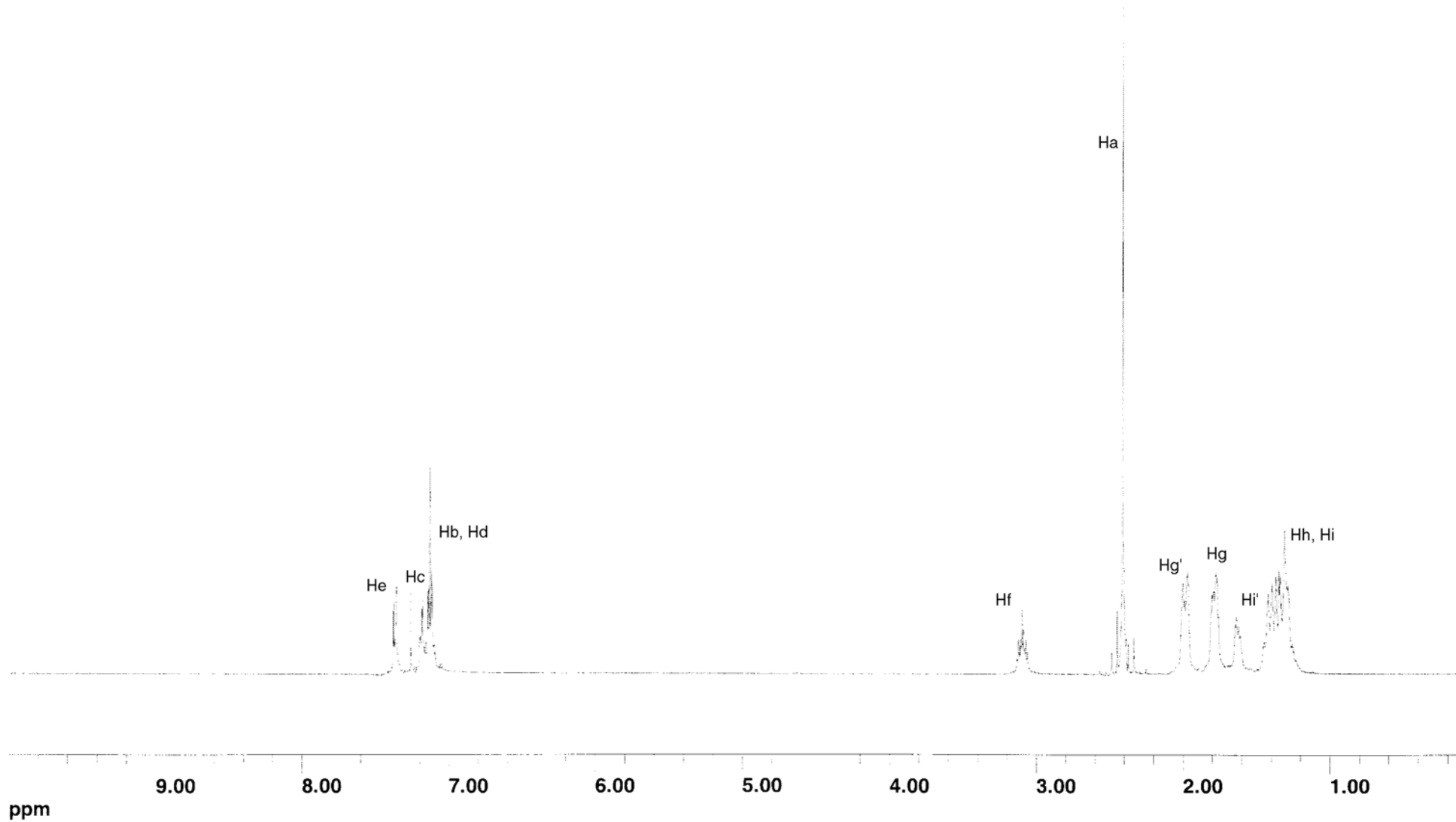
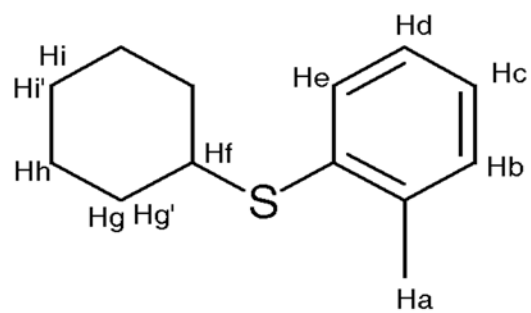
3072, 3058, 2929, 2852, 1584, 1479, 1448, 1438, 750, 735, 691

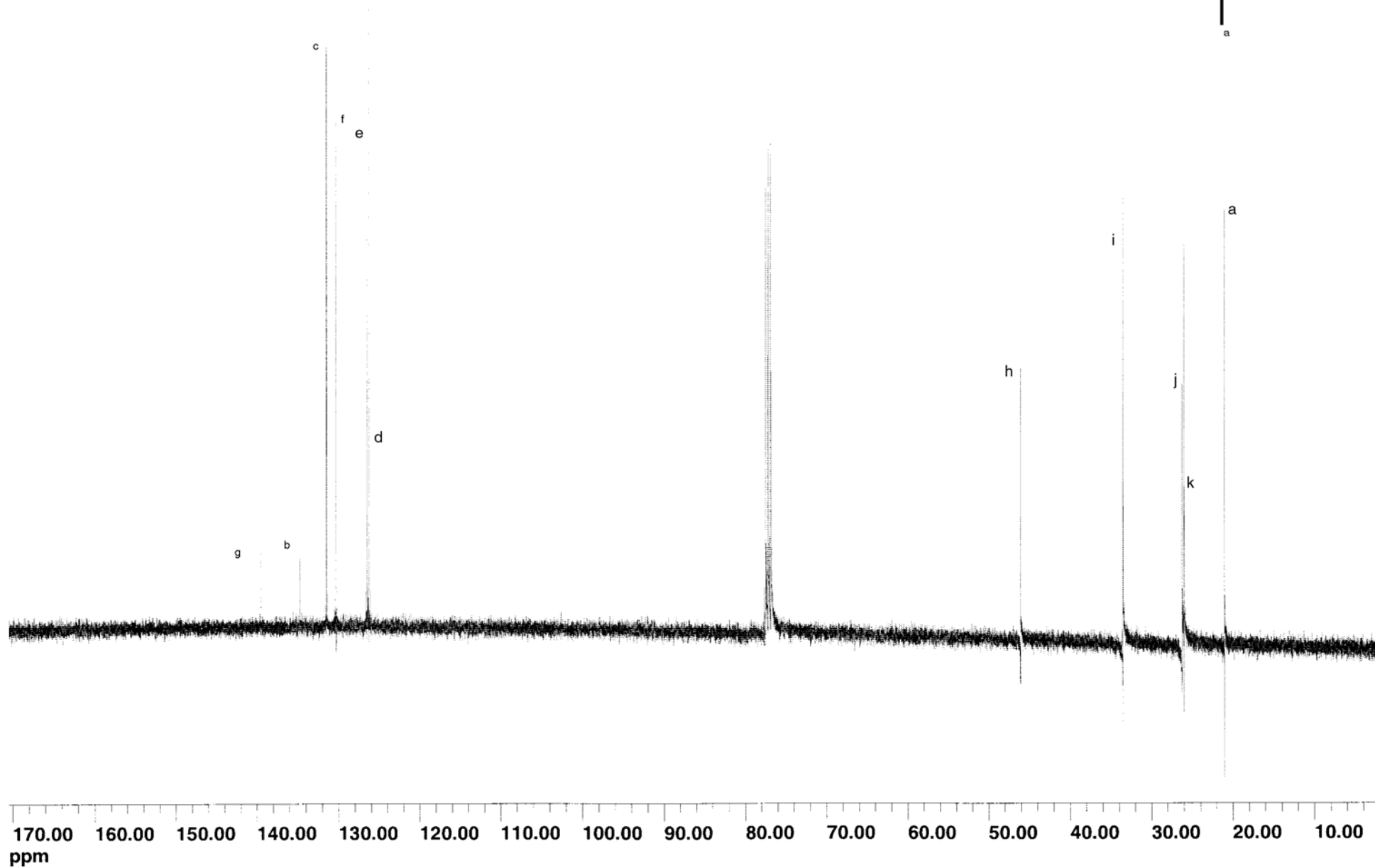
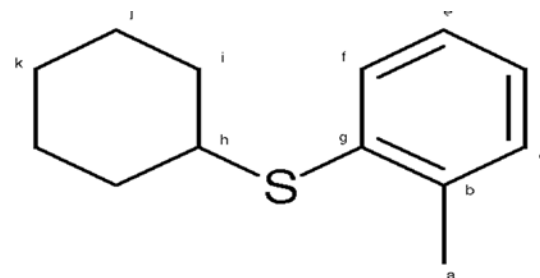
UV:

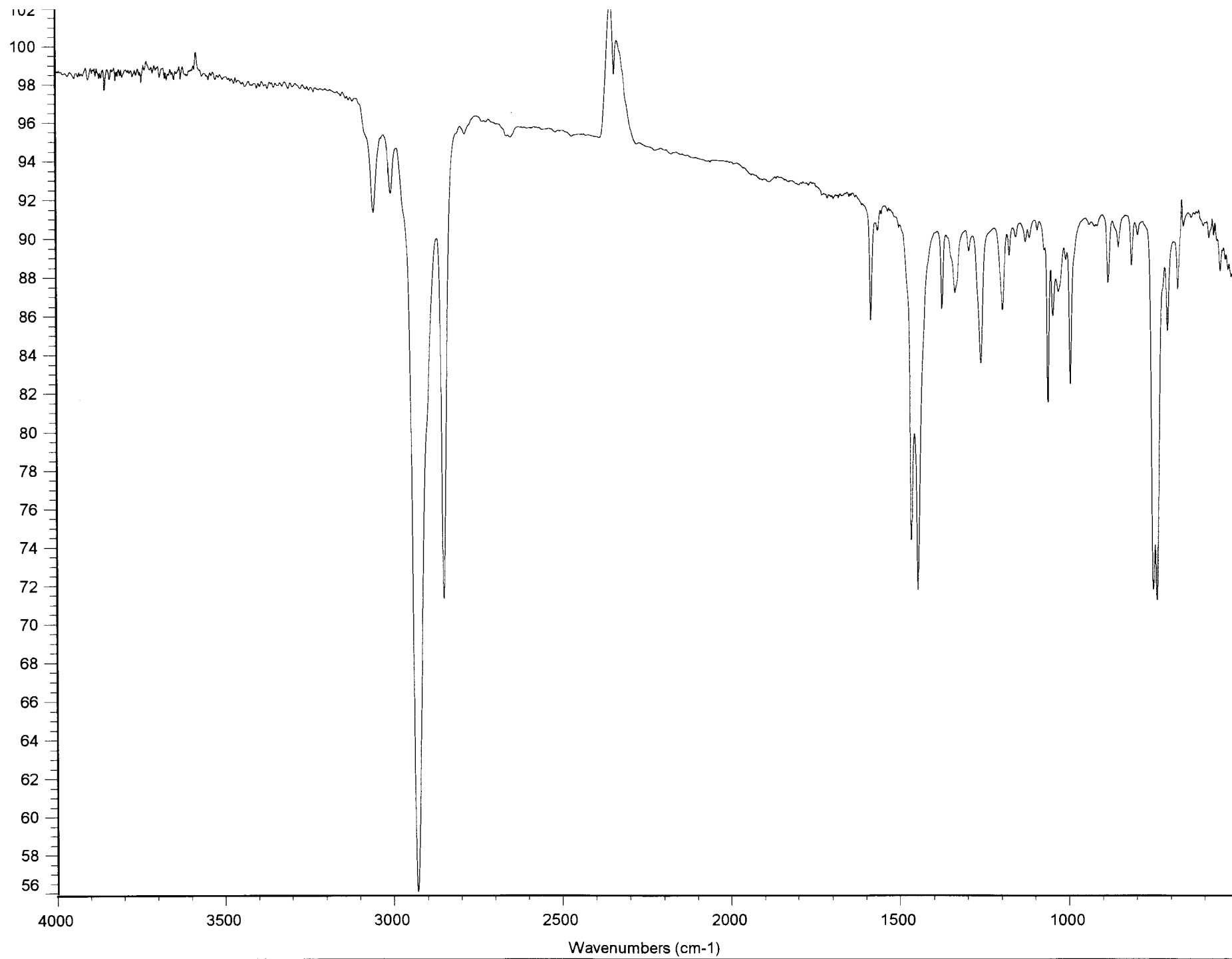
R_f: Solvent: 10% ethyl acetate in hexanes

0.79

Mp./bp.:

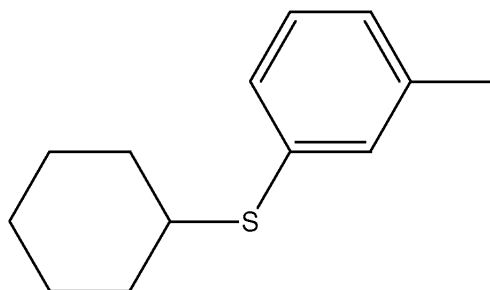






Entry: 4
Compound:

Formula: C₁₃H₁₈S



M.W.: 192.32

¹H- NMR: Field strength: 400MHz

Solvent: CDCl₃

7.39 (d, J = 8.4, 2H), 7.27 (t, J = 7.6, 2H), 7.20 (t, J = 7.2), 3.10 (m, 1H), 1.98 (m, 2H), 1.77 (m, 2H), 1.60 (m, 1H), 1.31 (m, 5H)

¹³C- NMR: Field strength: 400MHz

Solvent: CDCl₃

135.10, 128.61, 126.43, 123.07, 46.41, 33.23, 25.95, 25.65

MS: Ionization method: 70S EI+ Magnet
monoisotopic mass = 192.097

EA:

IR: Sample type: thin film on KBr

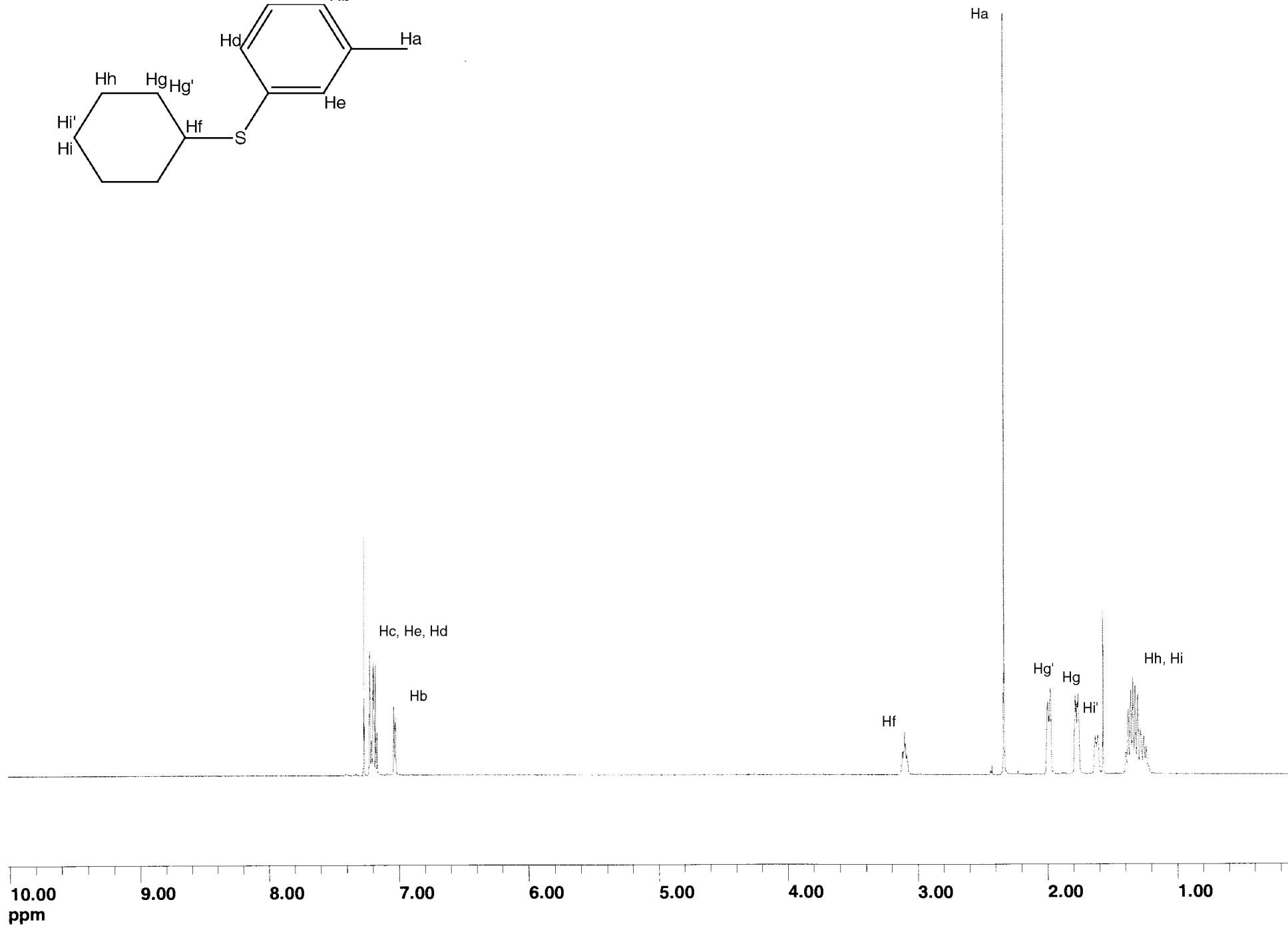
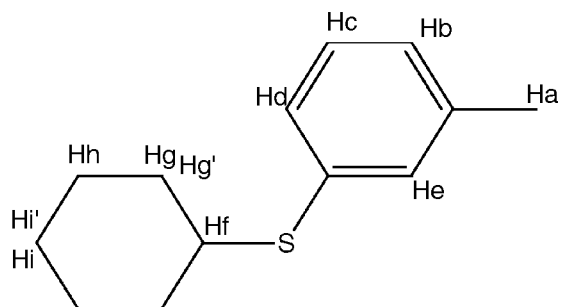
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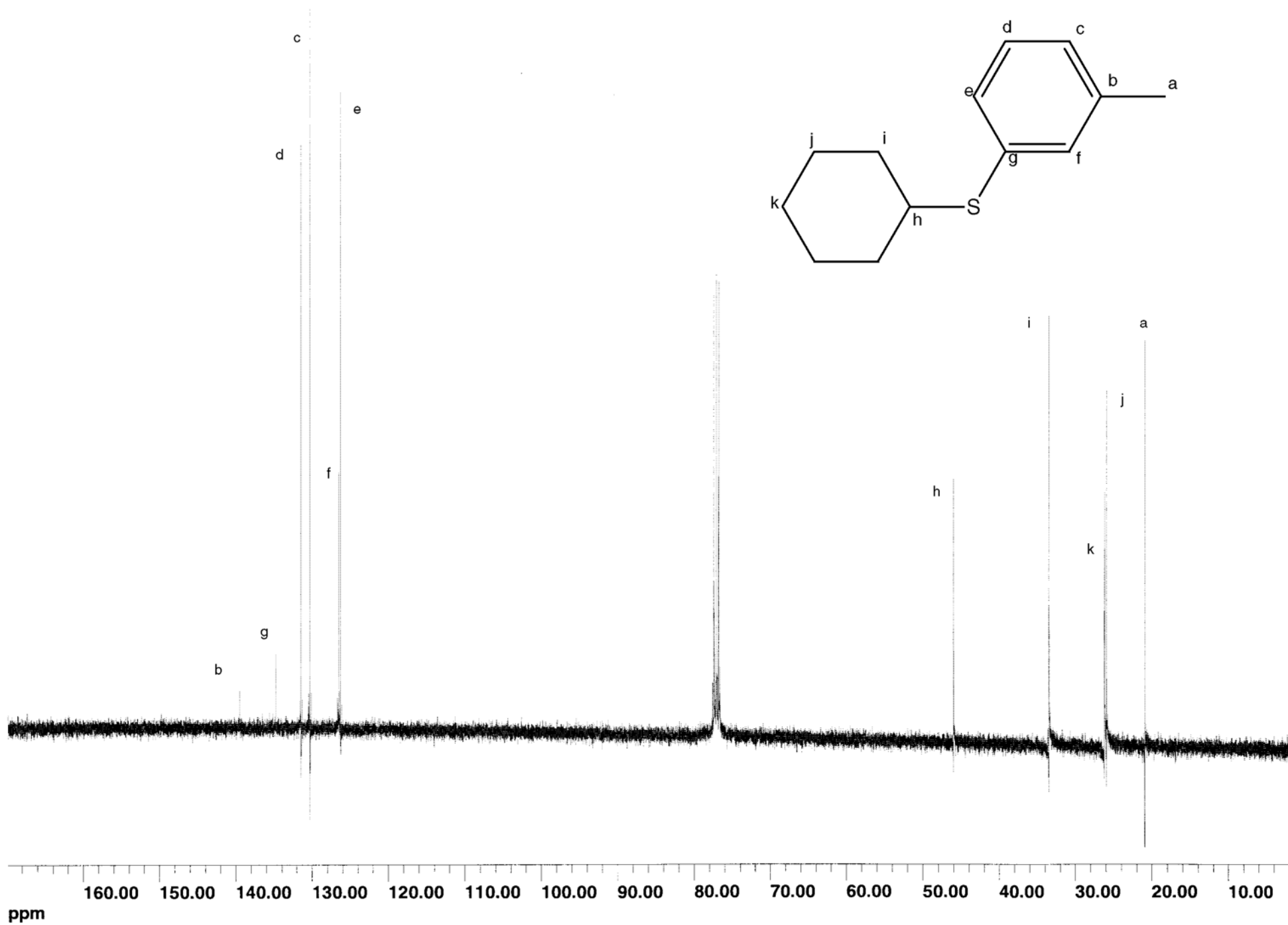
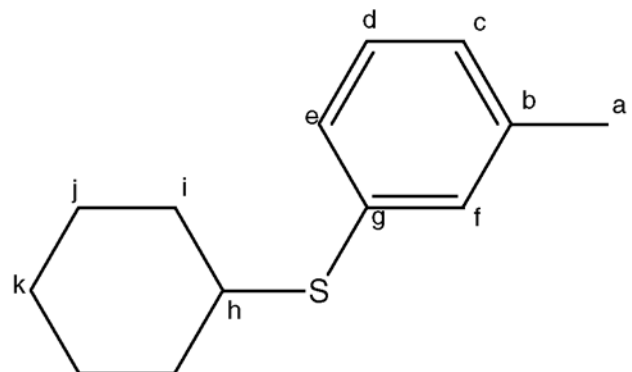
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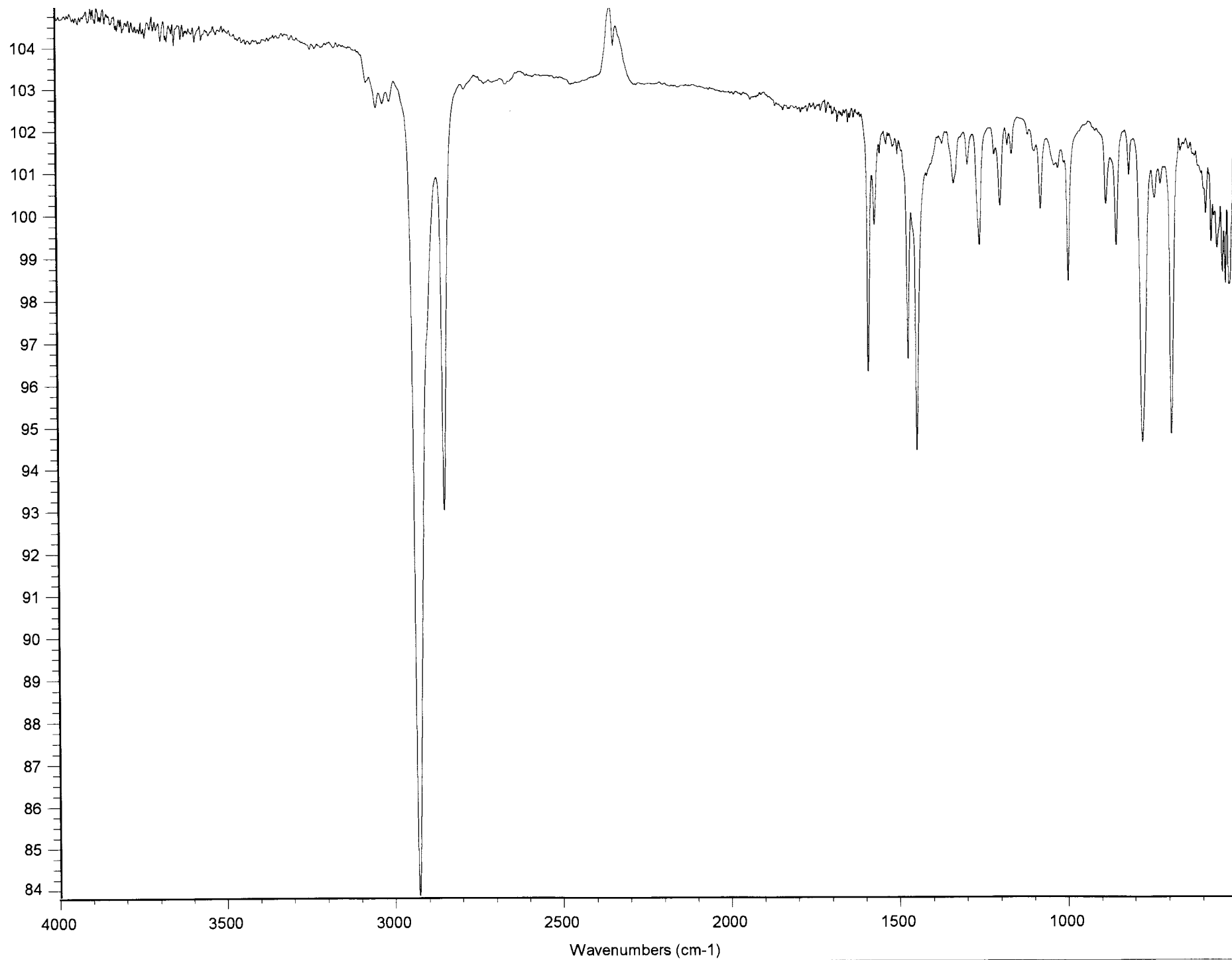
R_f: Solvent: 10% ethyl acetate in hexanes

0.79

Mp./bp.:



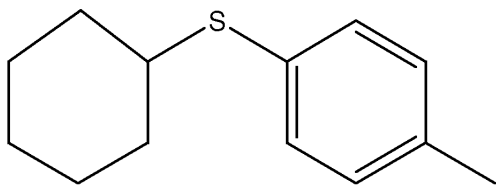




Entry: 5

Compound:

Formula: $C_{13}H_{18}S$



M.W.: 192.32

1H - NMR: Field strength: 400MHz

Solvent: $CDCl_3$

7.39 (d, $J = 8.4$, 2H), 7.27 (t, $J = 7.6$, 2H), 7.20 (t, $J = 7.2$), 3.10 (m, 1H), 1.98 (m, 2H), 1.77 (m, 2H), 1.60 (m, 1H), 1.31 (m, 5H)

^{13}C - NMR: Field strength: 400MHz

Solvent: $CDCl_3$

135.10, 128.61, 126.43, 123.07, 46.41, 33.23, 25.95, 25.65

MS: Ionization method: 70S EI+ Magnet

monoisotopic mass = 192.097

EA:

IR: Sample type: thin film on KBr

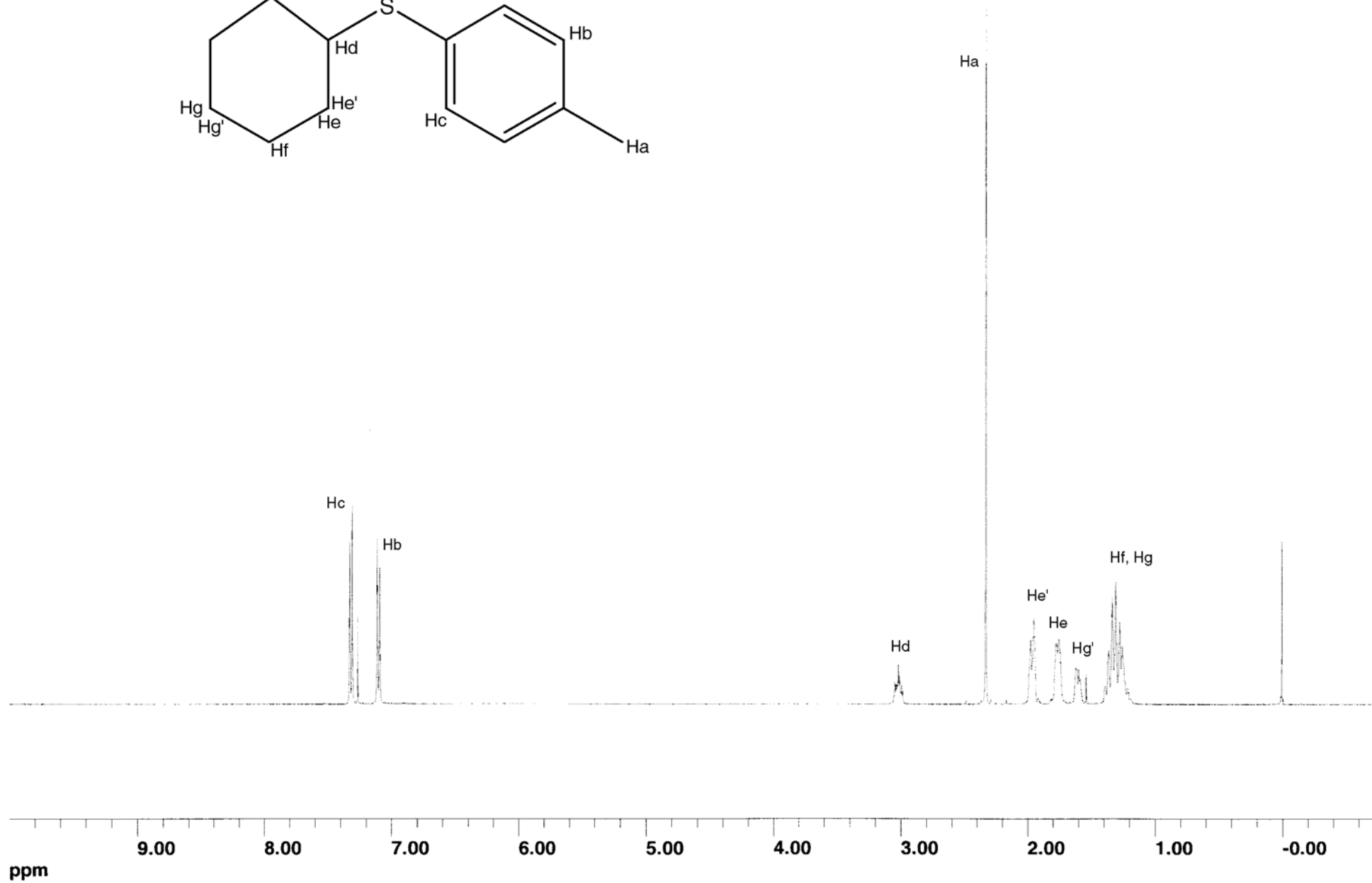
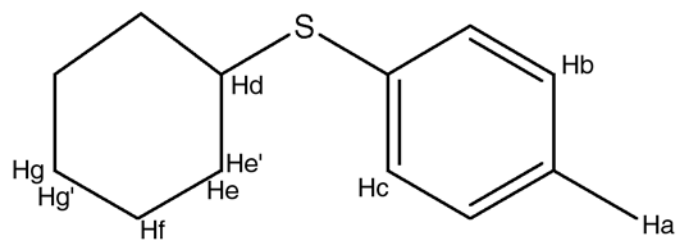
3072, 3058, 2929, 2852, 1584, 1479, 1448, 1438, 750, 735, 691

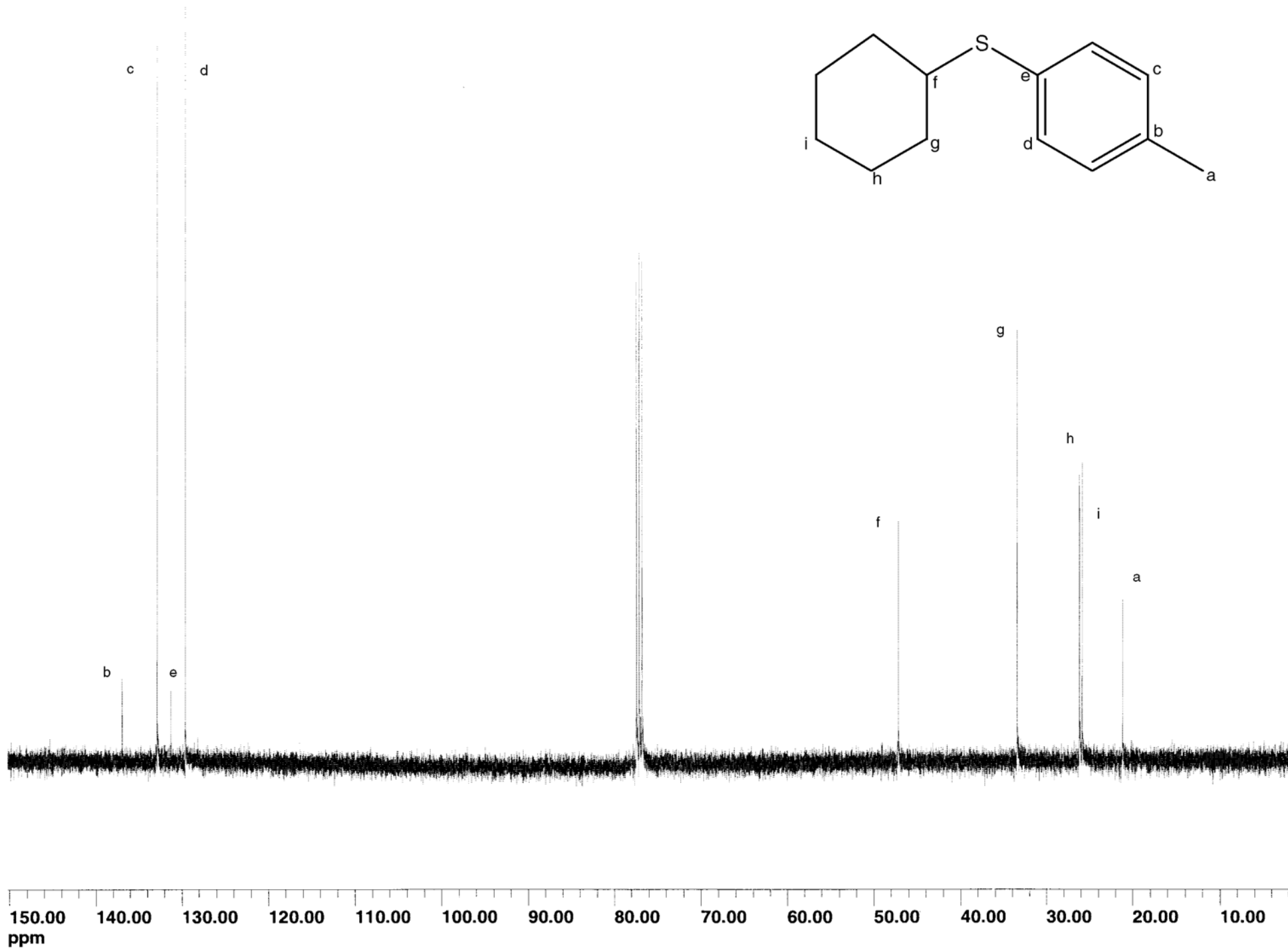
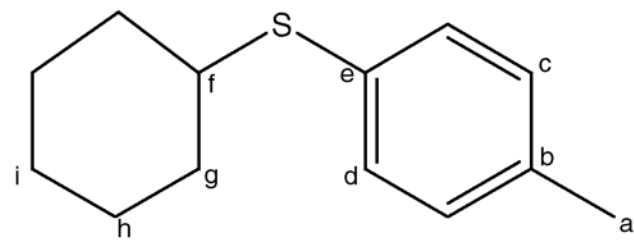
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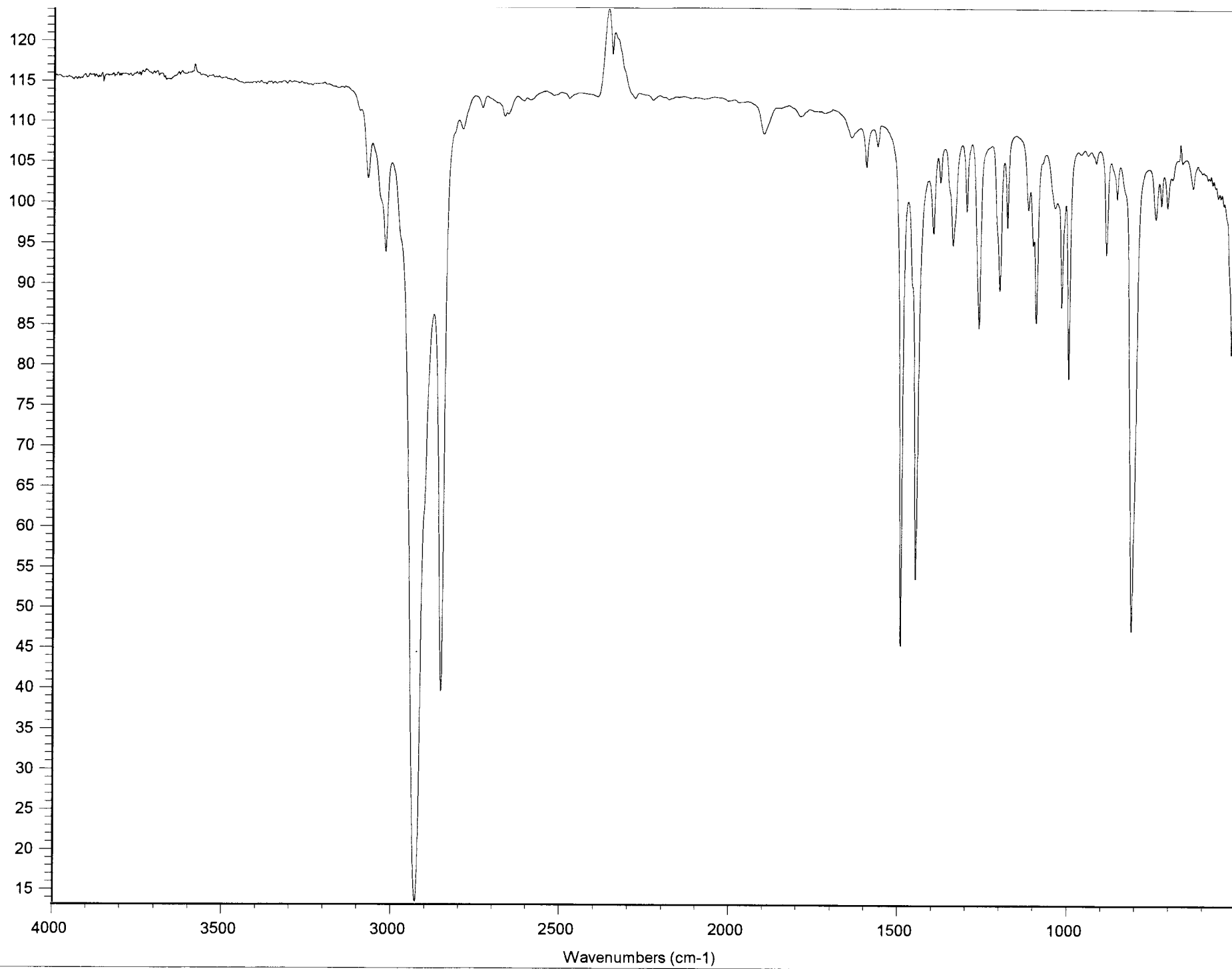
R_f : Solvent: 10% ethyl acetate in hexanes

0.79

Mp./bp.:



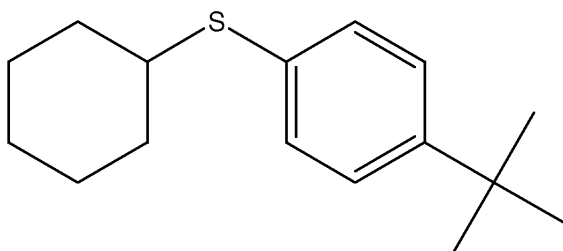




Entry: 6

Compound:

Formula: C₁₆H₂₄S



M.W.: 192.32

¹H- NMR: Field strength: 400MHz

Solvent: CDCl₃

7.39 (d, J = 8.4, 2H), 7.27 (t, J = 7.6, 2H), 7.20 (t, J = 7.2), 3.10 (m, 1H), 1.98 (m, 2H), 1.77 (m, 2H), 1.60 (m, 1H), 1.31 (m, 5H)

¹³C- NMR: Field strength: 400MHz

Solvent: CDCl₃

135.10, 128.61, 126.43, 123.07, 46.41, 33.23, 25.95, 25.65

MS: Ionization method: 70S EI+ Magnet
monoisotopic mass = 192.097

EA:

IR: Sample type: thin film on KBr

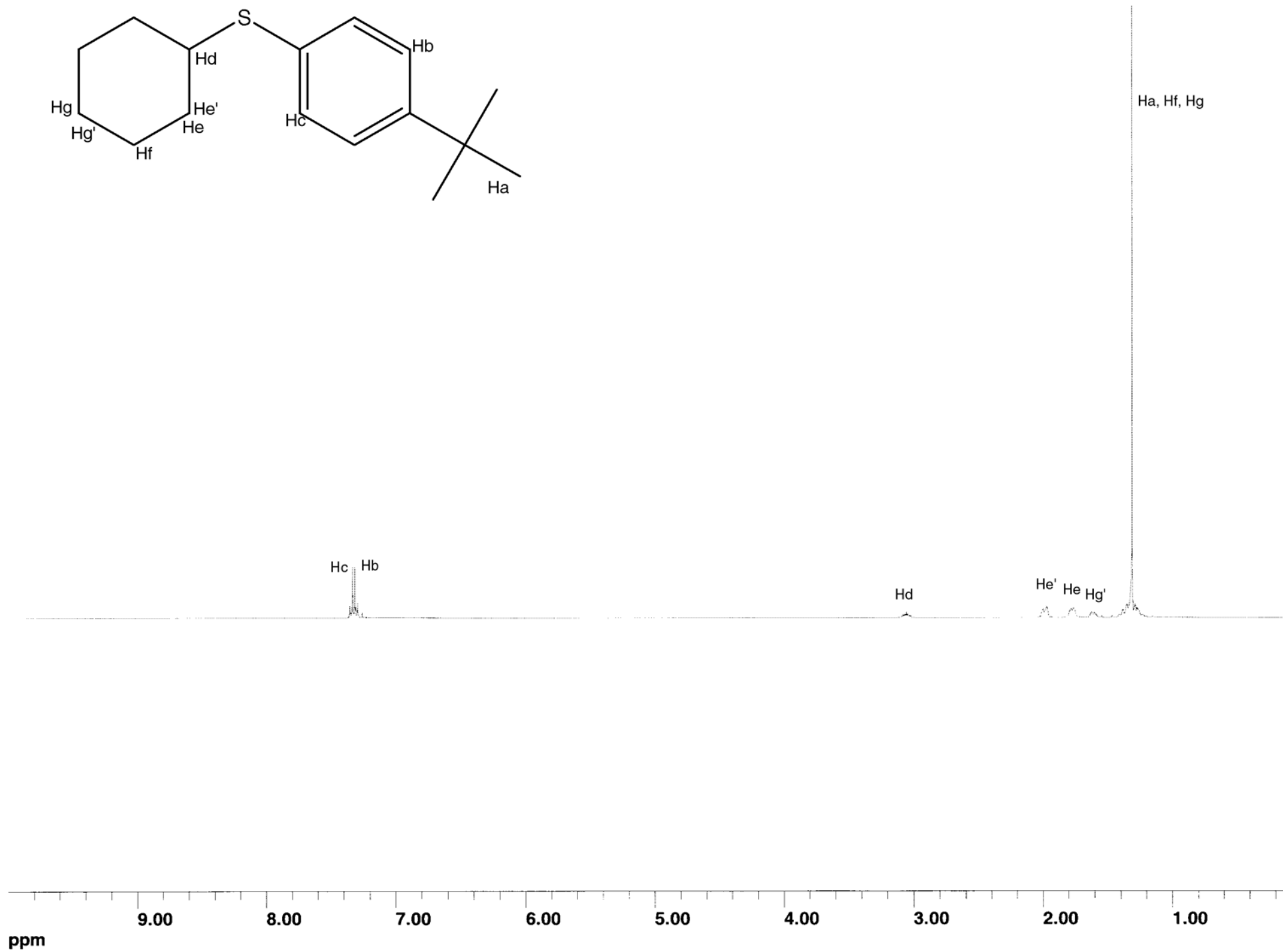
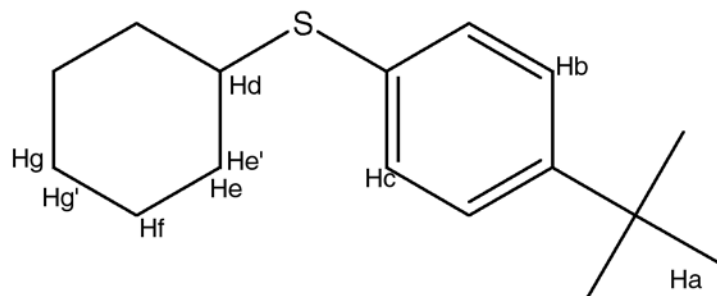
3072, 3058, 2929, 2852, 1584, 1479, 1448, 1438, 750, 735, 691

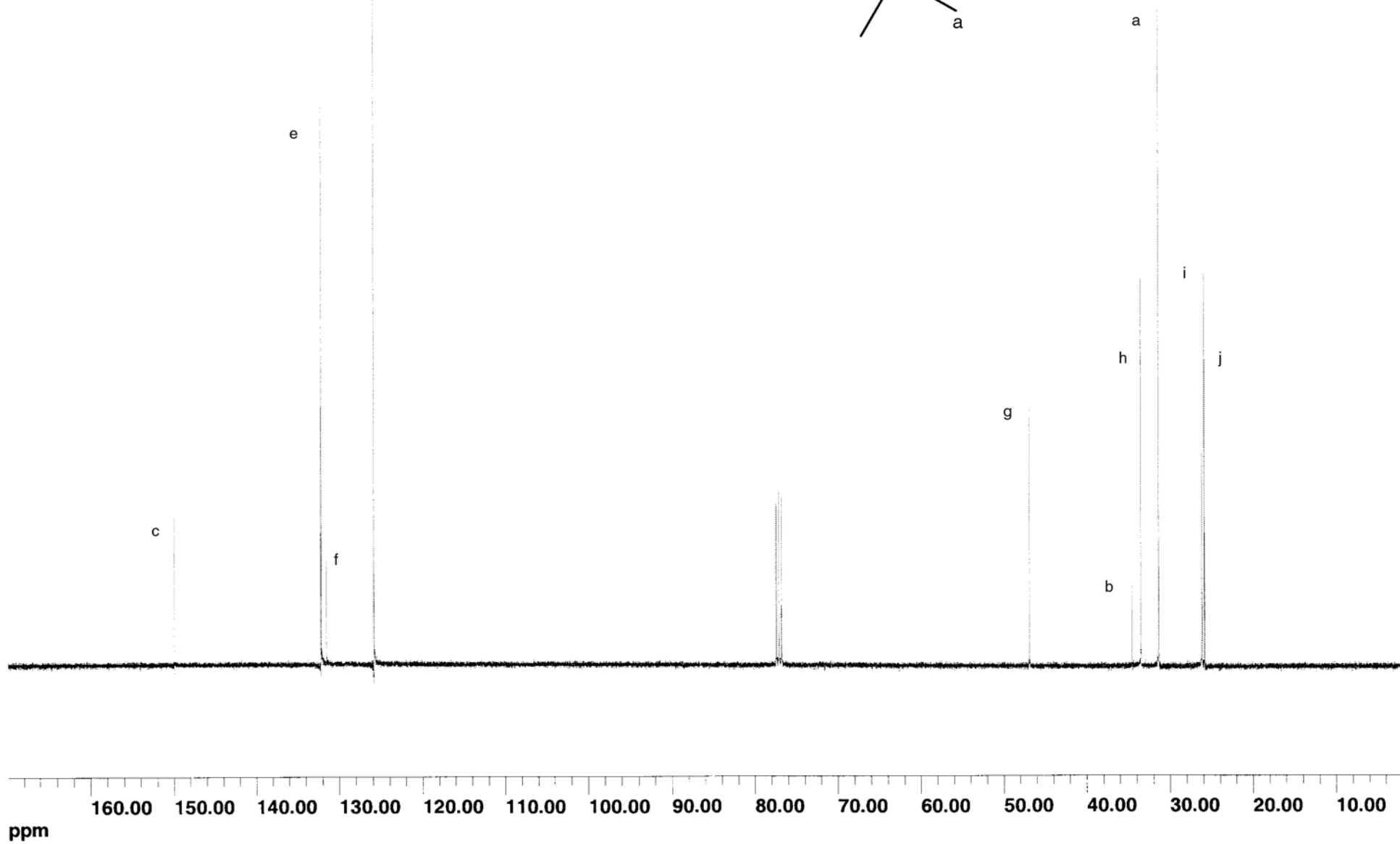
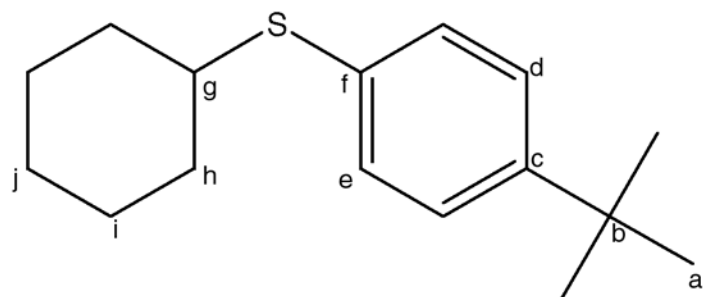
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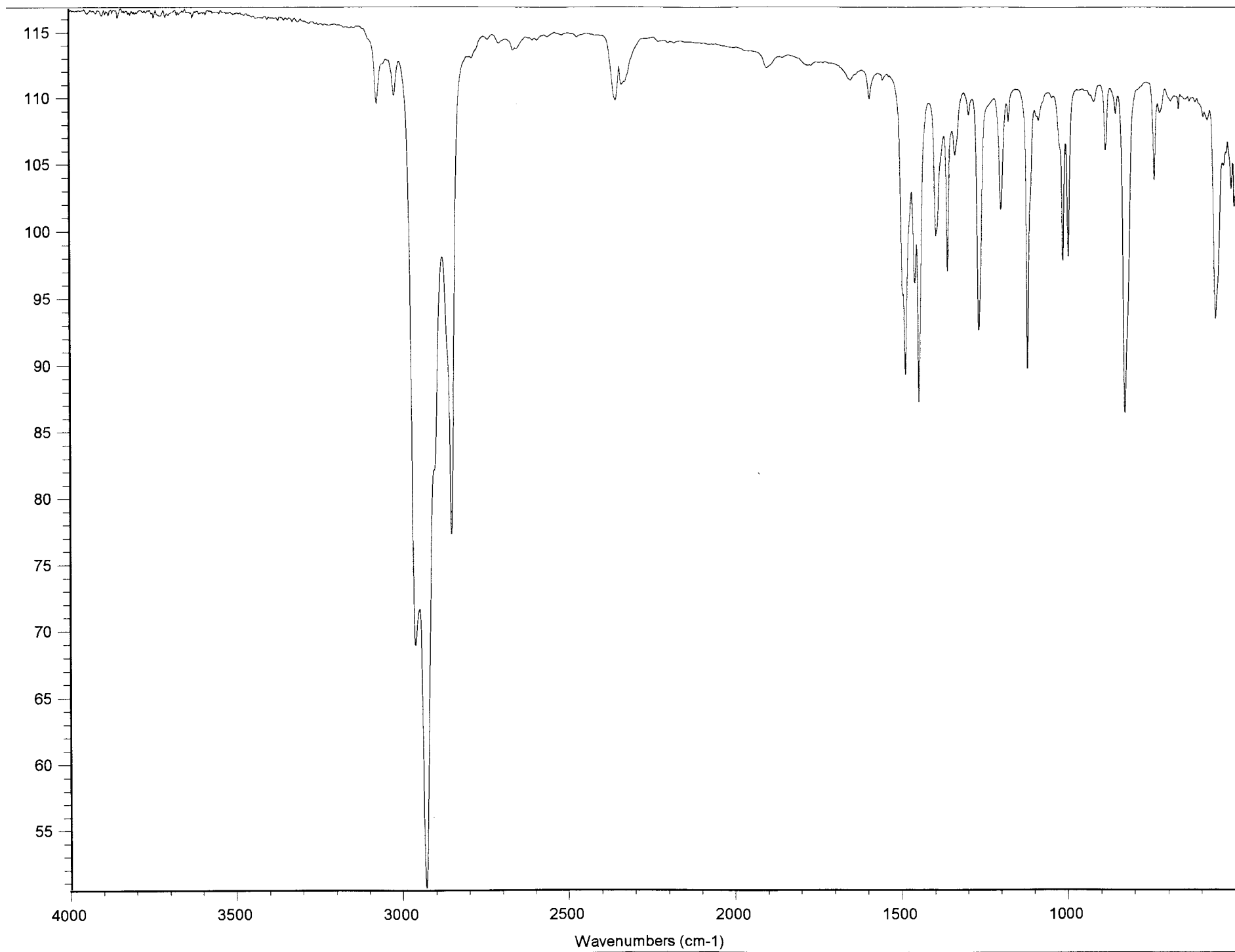
R_f: Solvent: 10% ethyl acetate in hexanes

0.79

Mp./bp.:



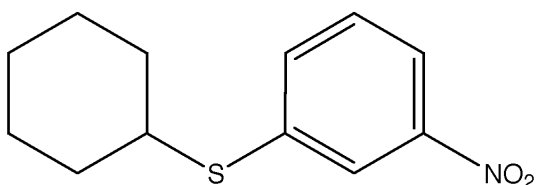




Entry: 7

Compound:

Formula: $C_{12}H_{15}NO_2S$



M.W.: 192.32

1H - NMR: Field strength: 400MHz

Solvent: $CDCl_3$

7.39 (d, $J = 8.4$, 2H), 7.27 (t, $J = 7.6$, 2H), 7.20 (t, $J = 7.2$), 3.10 (m, 1H), 1.98 (m, 2H), 1.77 (m, 2H), 1.60 (m, 1H), 1.31 (m, 5H)

^{13}C - NMR: Field strength: 400MHz

Solvent: $CDCl_3$

135.10, 128.61, 126.43, 123.07, 46.41, 33.23, 25.95, 25.65

MS: Ionization method: 70S EI+ Magnet

monoisotopic mass = 192.097

EA:

IR: Sample type: thin film on KBr

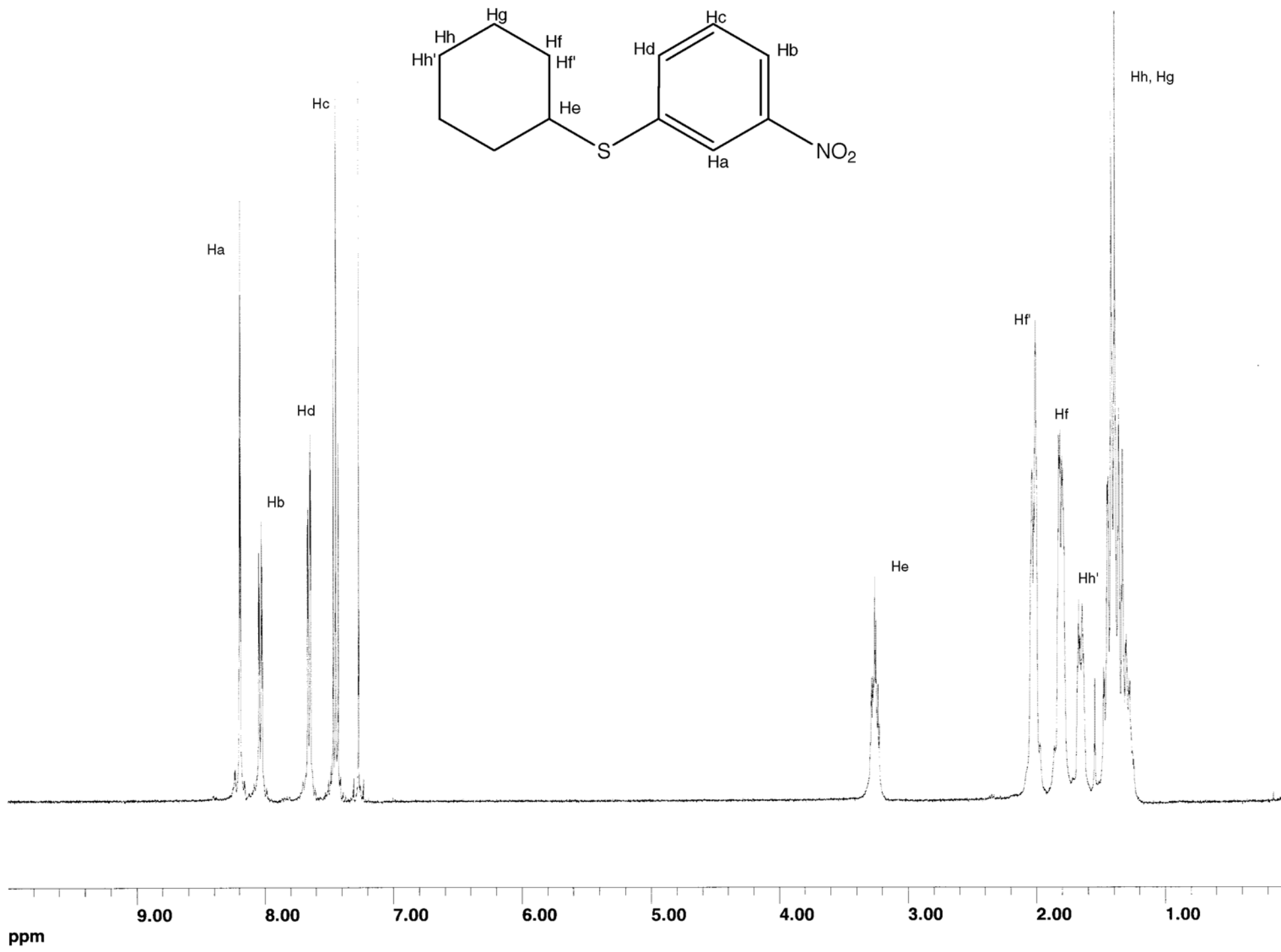
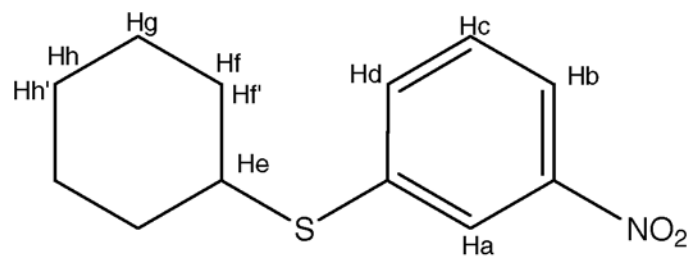
3072, 3058, 2929, 2852, 1584, 1479, 1448, 1438, 750, 735, 691

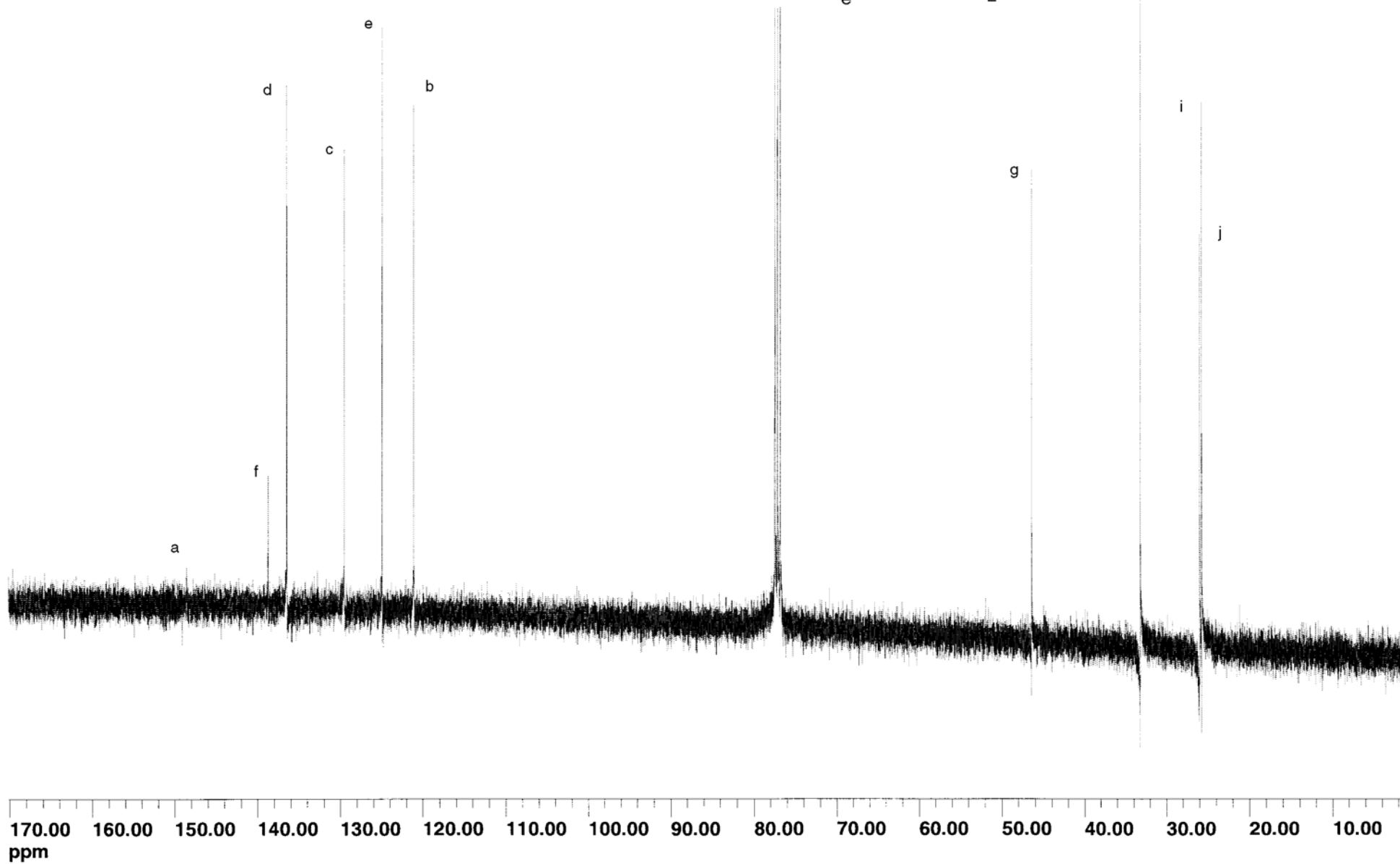
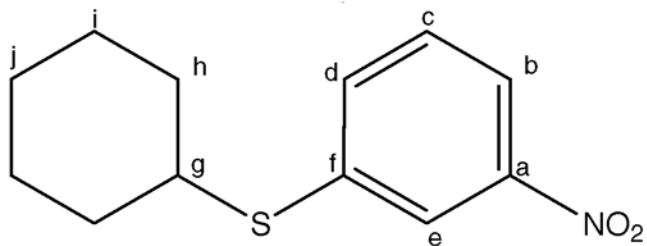
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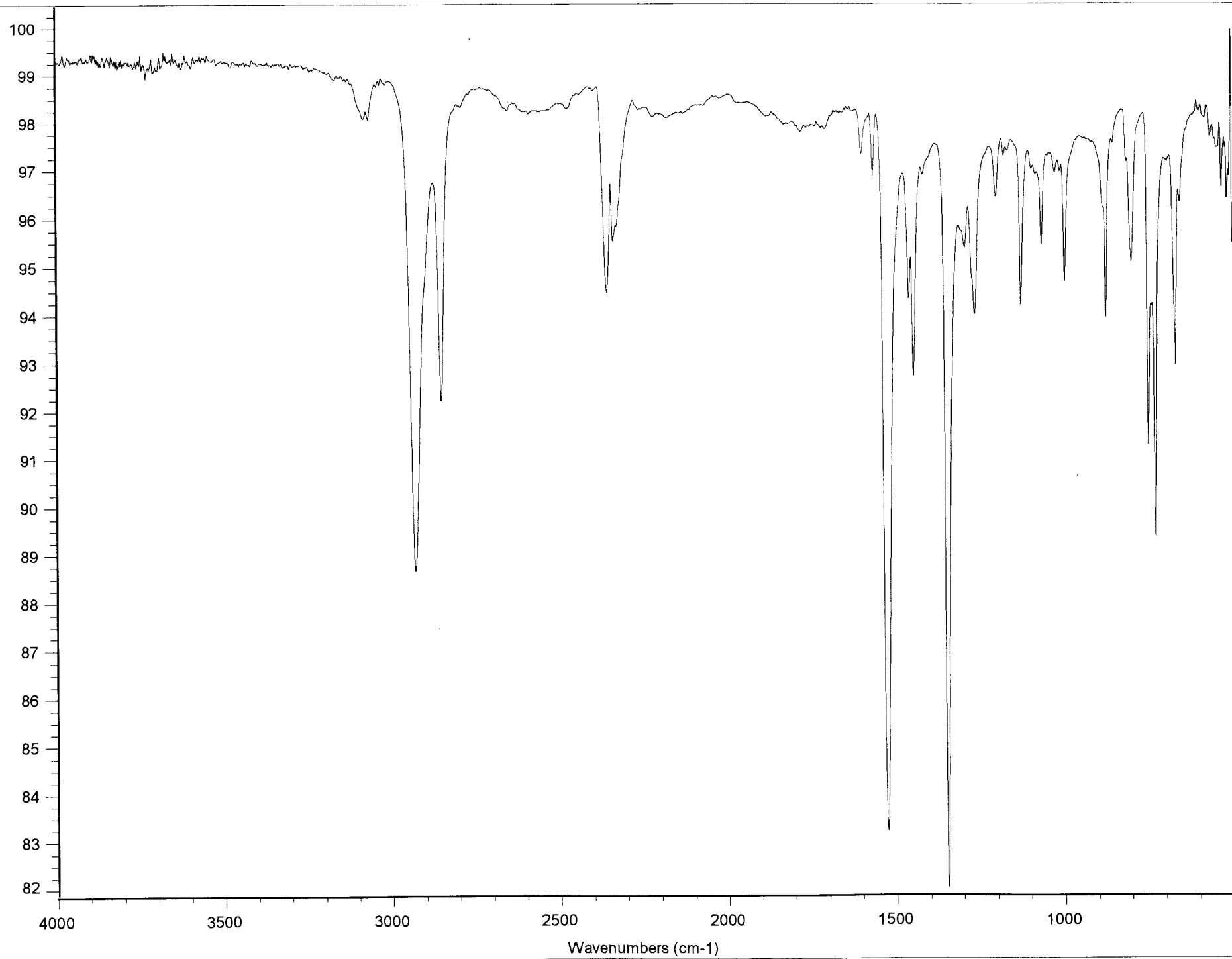
R_f : Solvent: 10% ethyl acetate in hexanes

0.79

Mp./bp.:



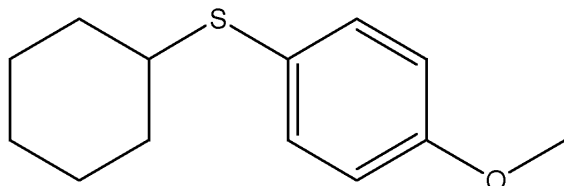




Entry: 8

Compound:

Formula: C₁₃H₁₈OS



M.W.: 192.32

¹H- NMR:

Field strength: 400MHz

Solvent: CDCl₃

7.39 (d, J = 8.4, 2H), 7.27 (t, J = 7.6, 2H), 7.20 (t, J = 7.2), 3.10 (m, 1H), 1.98 (m, 2H), 1.77 (m, 2H), 1.60 (m, 1H), 1.31 (m, 5H)

¹³C- NMR:

Field strength: 400MHz

Solvent: CDCl₃

135.10, 128.61, 126.43, 123.07, 46.41, 33.23, 25.95, 25.65

MS:

Ionization method: 70S EI+ Magnet

monoisotopic mass = 192.097

EA:

IR:

Sample type: thin film on KBr

3072, 3058, 2929, 2852, 1584, 1479, 1448, 1438, 750, 735, 691

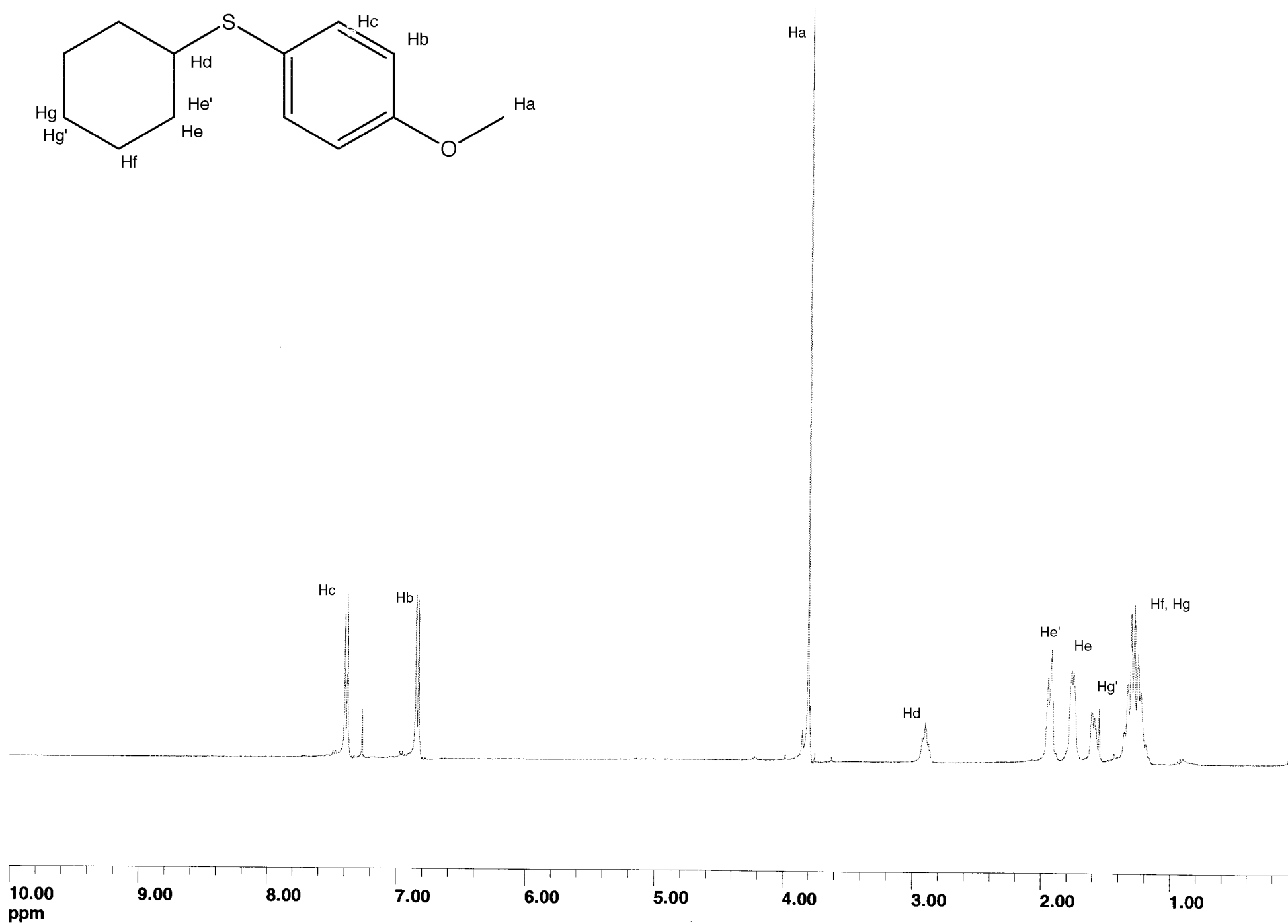
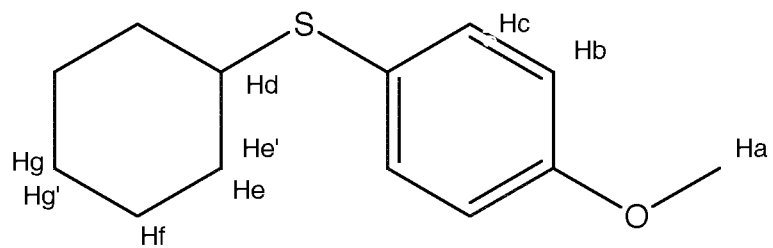
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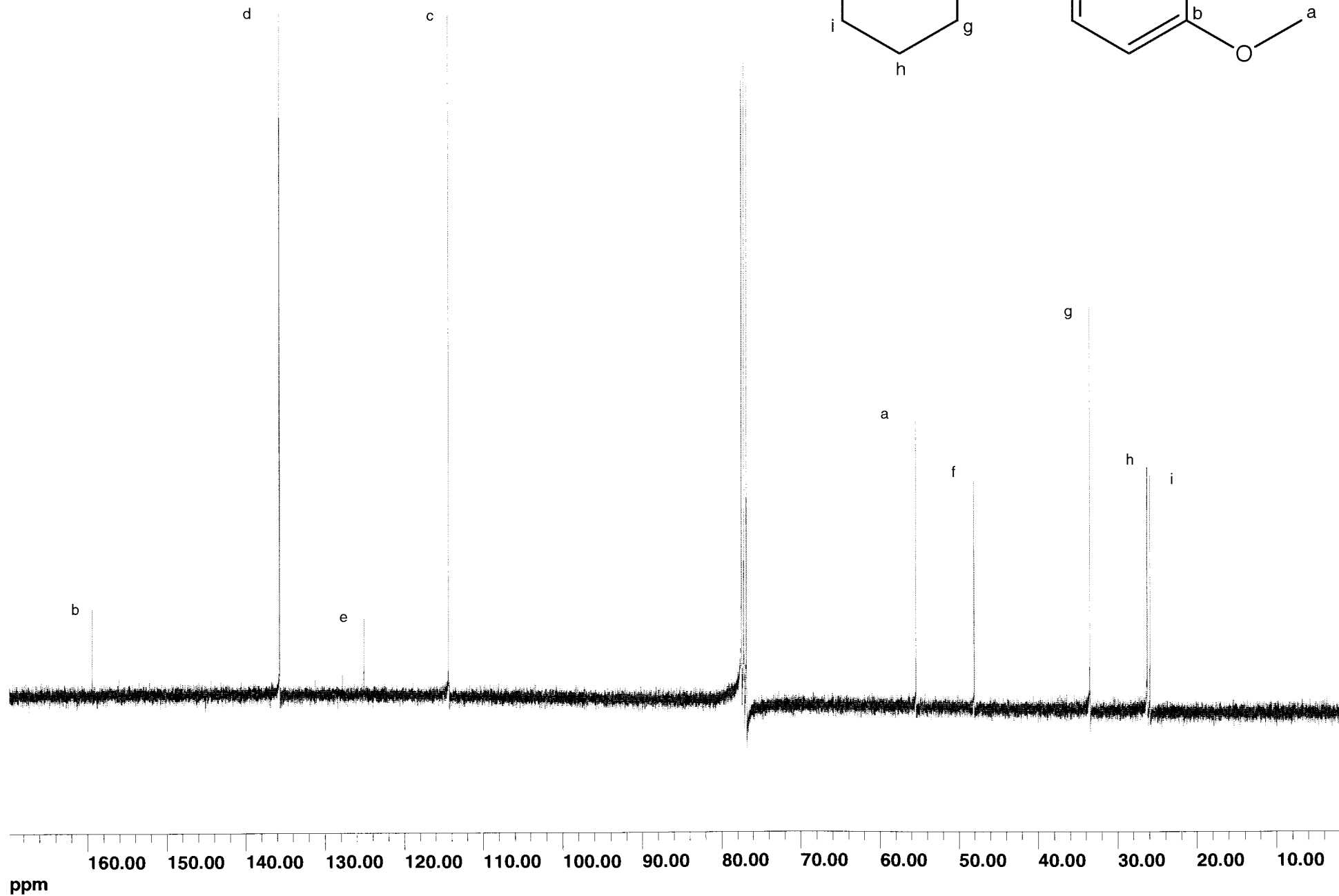
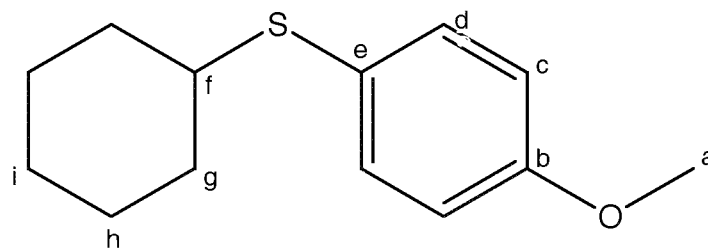
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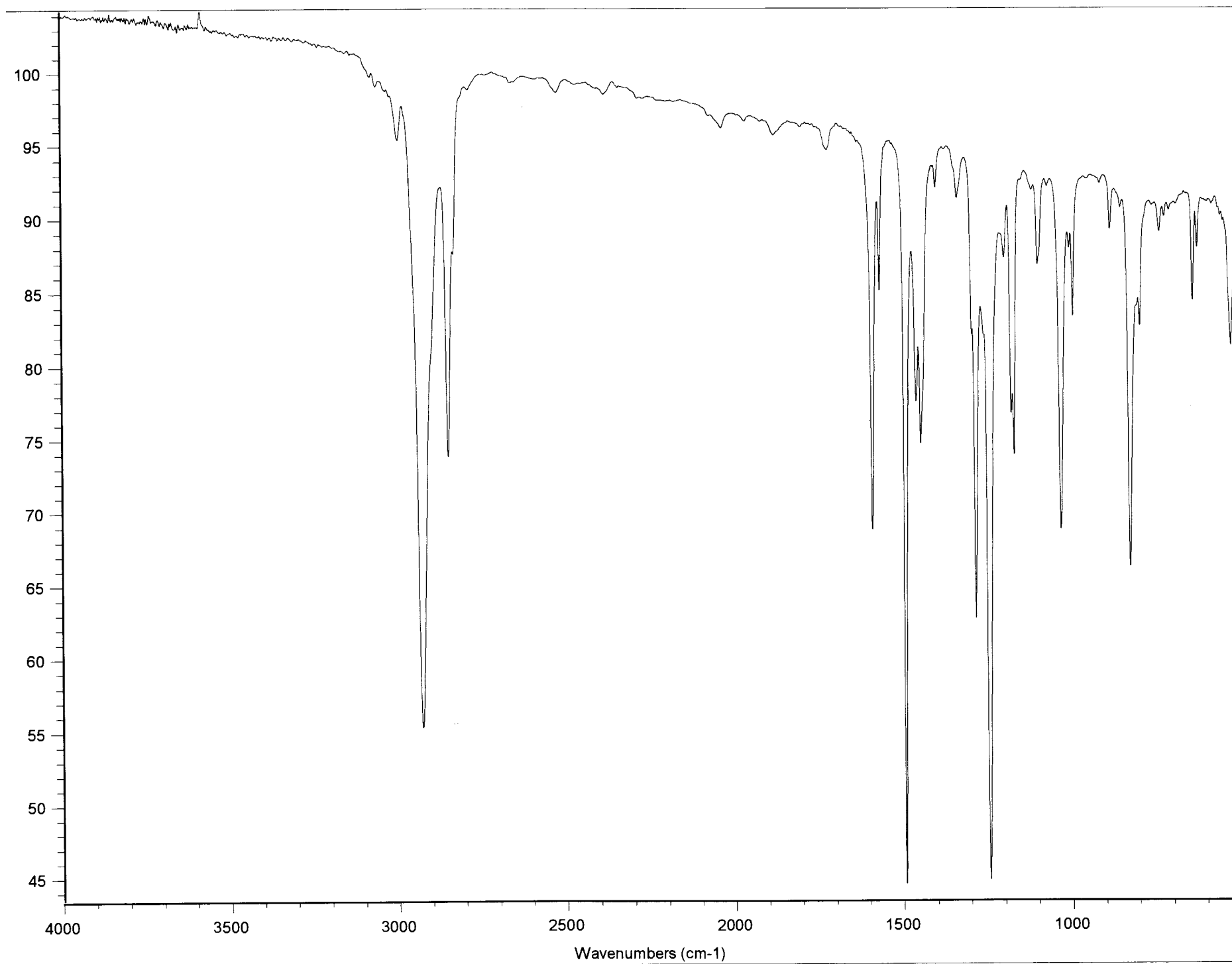
Solvent: 10% ethyl acetate in hexanes

0.79

Mp./bp.:



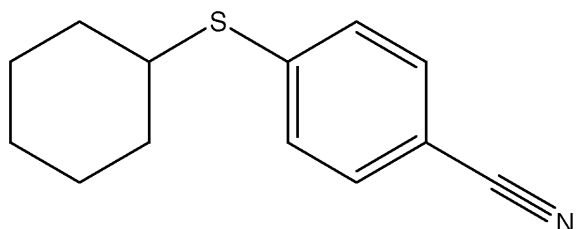




Entry: 9

Compound:

Formula: $C_{13}H_{15}NS$



M.W.: 192.32

1H - NMR: Field strength: 400MHz

Solvent: $CDCl_3$

7.39 (d, $J = 8.4$, 2H), 7.27 (t, $J = 7.6$, 2H), 7.20 (t, $J = 7.2$), 3.10 (m, 1H), 1.98 (m, 2H), 1.77 (m, 2H), 1.60 (m, 1H), 1.31 (m, 5H)

^{13}C - NMR: Field strength: 400MHz

Solvent: $CDCl_3$

135.10, 128.61, 126.43, 123.07, 46.41, 33.23, 25.95, 25.65

MS: Ionization method: 70S EI+ Magnet

monoisotopic mass = 192.097

EA:

IR: Sample type: thin film on KBr

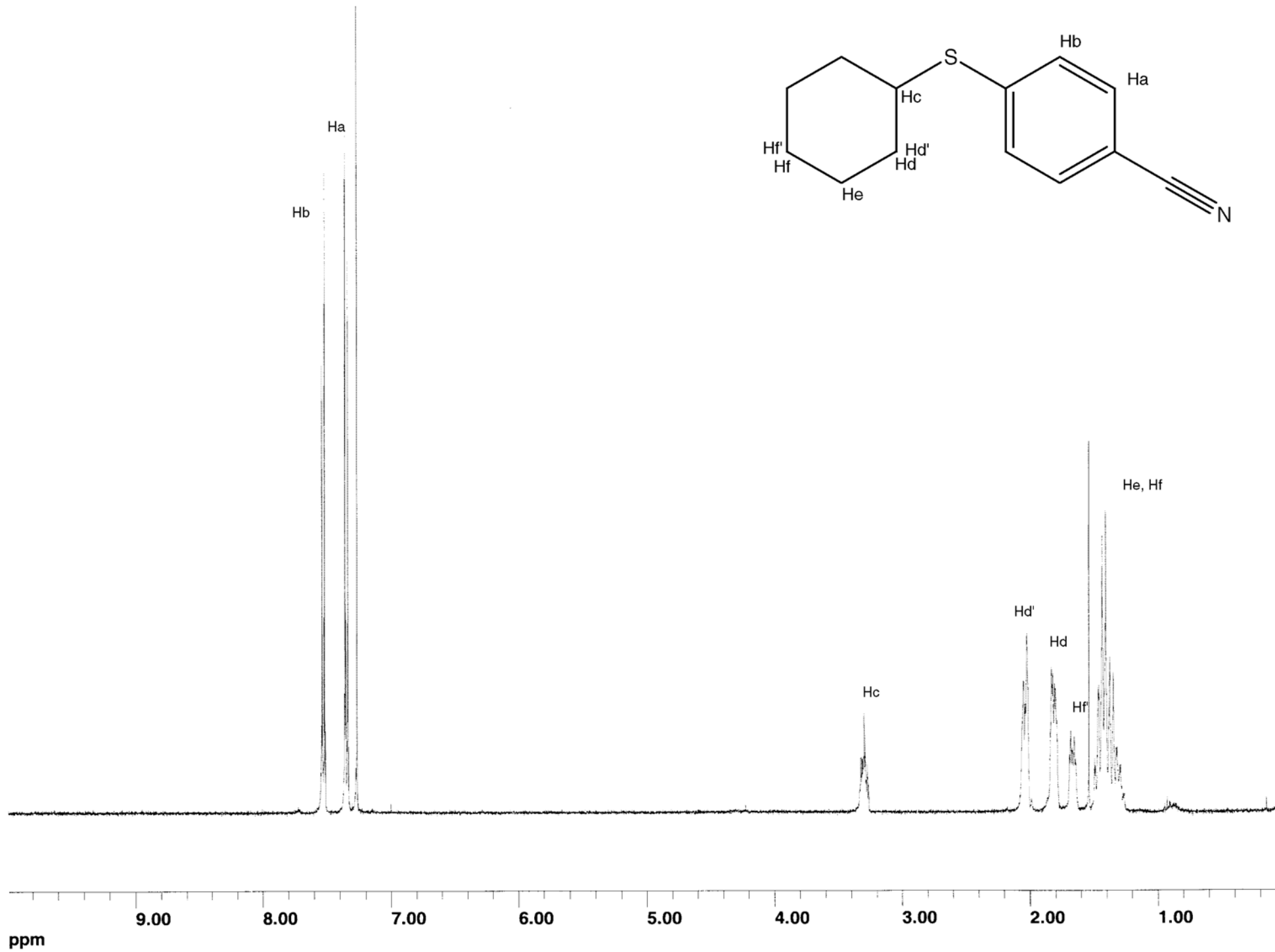
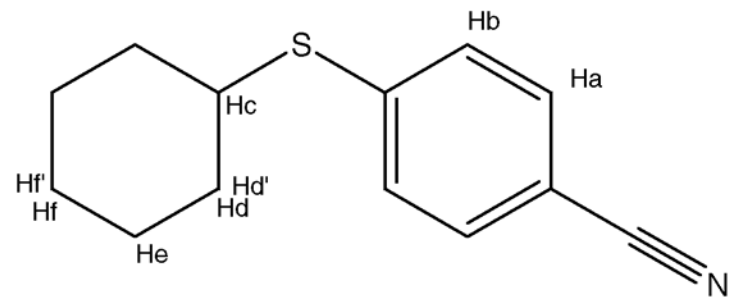
3072, 3058, 2929, 2852, 1584, 1479, 1448, 1438, 750, 735, 691

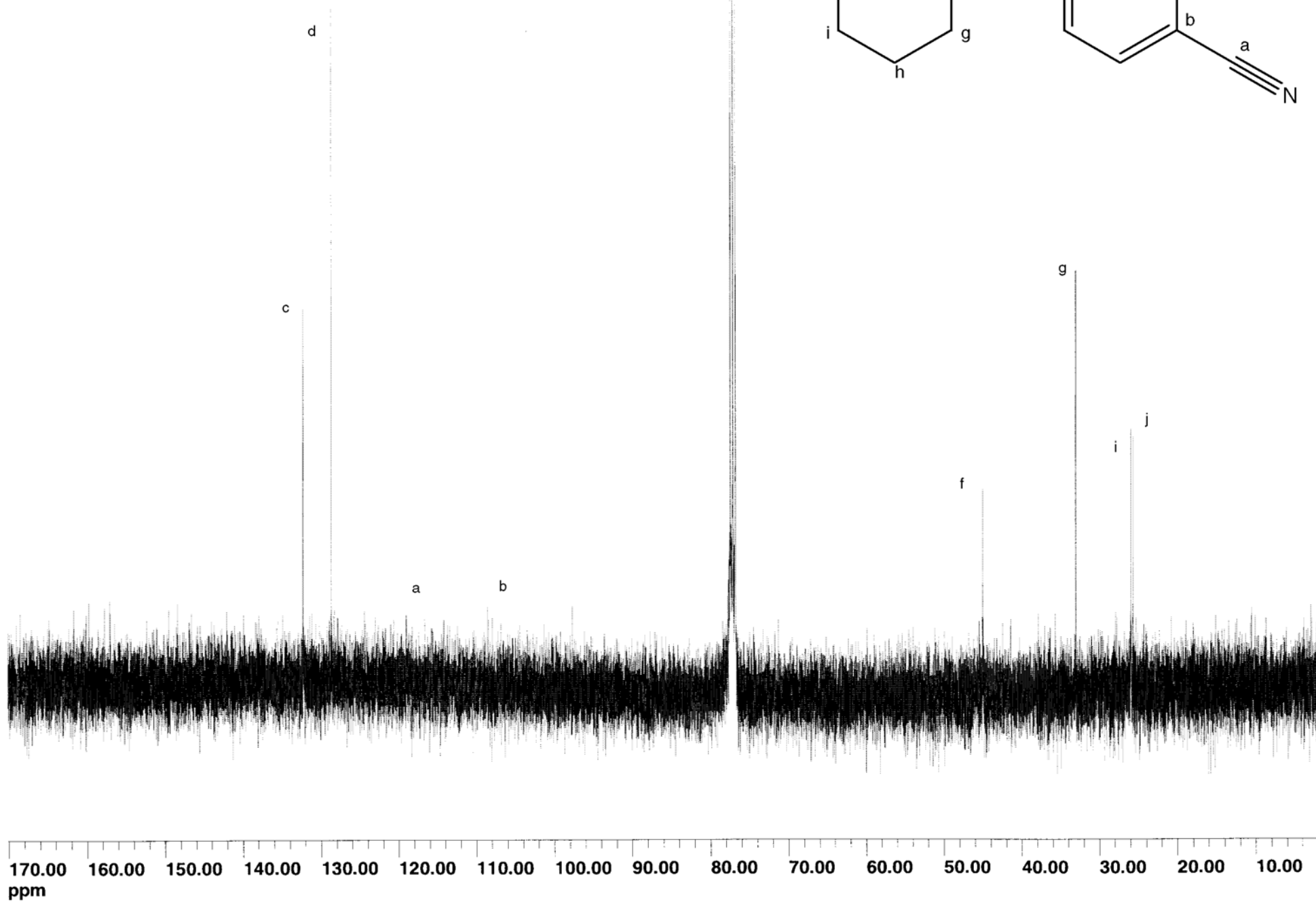
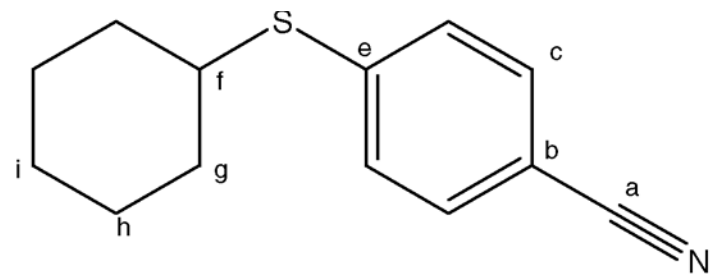
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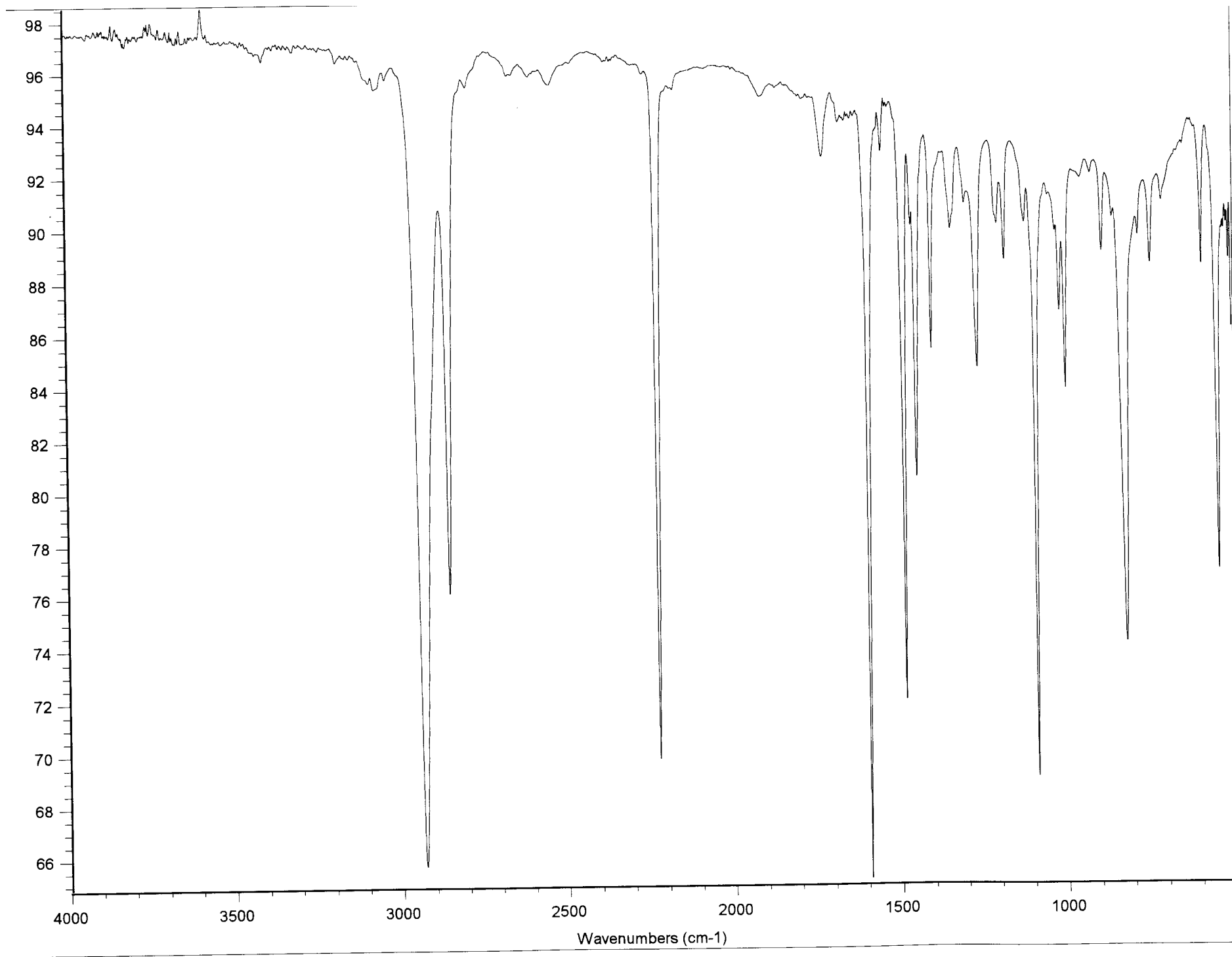
R_f : Solvent: 10% ethyl acetate in hexanes

0.79

Mp./bp.:



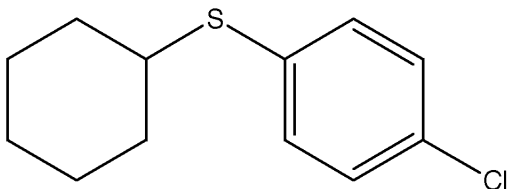




Entry: 10

Compound:

Formula: $C_{12}H_{15}ClS$



M.W.: 226.77

1H - NMR: Field strength: 400MHz

Solvent: $CDCl_3$

7.39 (d, $J = 8.4$, 2H), 7.27 (t, $J = 7.6$, 2H), 7.20 (t, $J = 7.2$), 3.10 (m, 1H), 1.98 (m, 2H), 1.77 (m, 2H), 1.60 (m, 1H), 1.31 (m, 5H)

^{13}C - NMR: Field strength: 400MHz

Solvent: $CDCl_3$

135.10, 128.61, 126.43, 123.07, 46.41, 33.23, 25.95, 25.65

MS: Ionization method: 70S EI+ Magnet

monoisotopic mass = 192.097

EA:

IR: Sample type: thin film on KBr

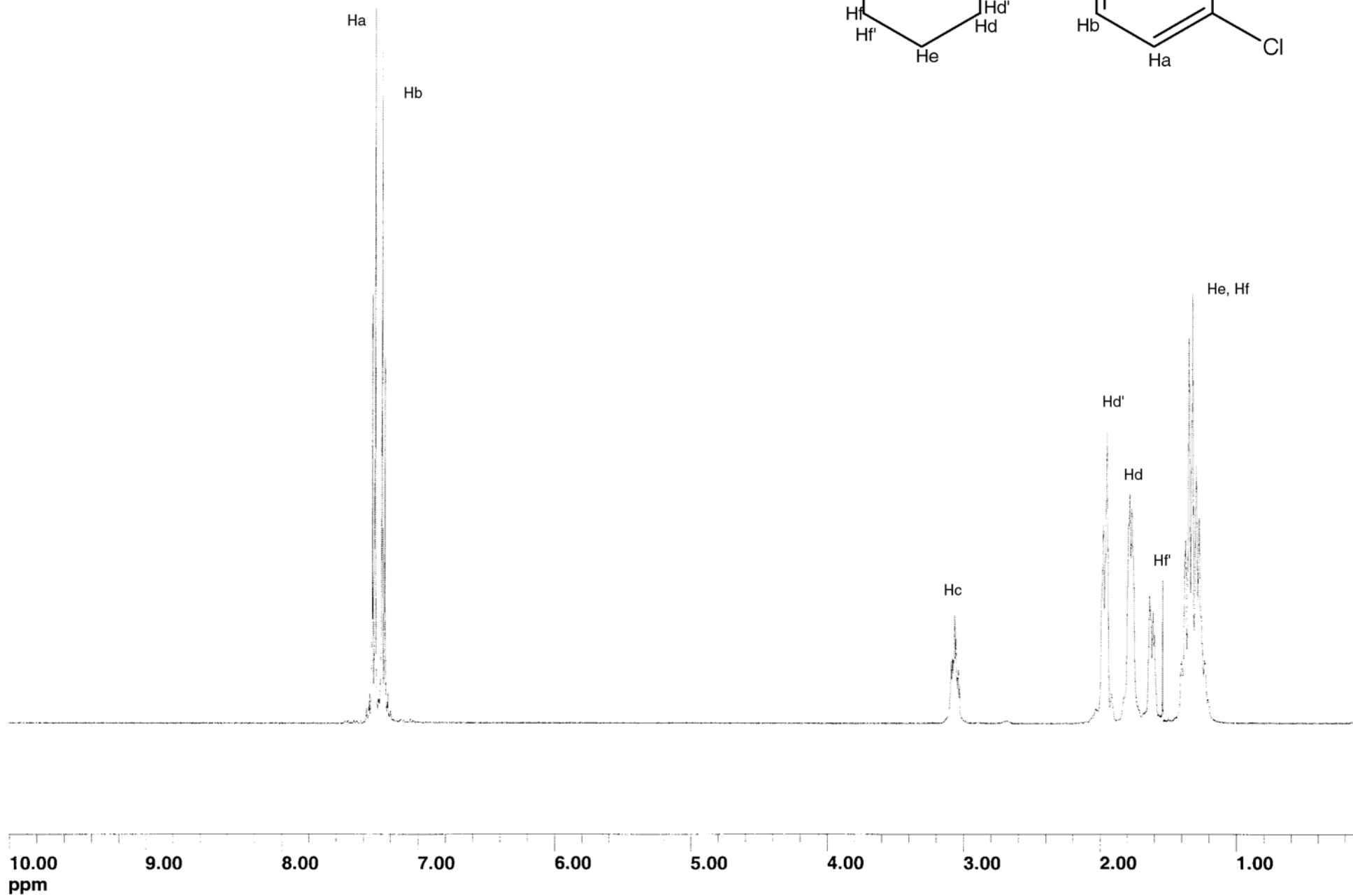
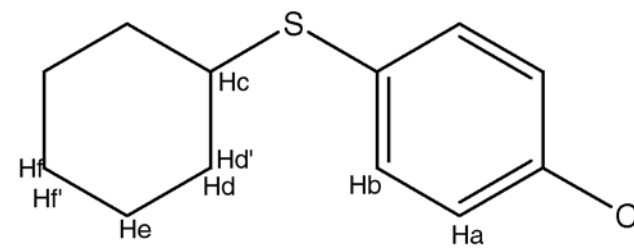
3072, 3058, 2929, 2852, 1584, 1479, 1448, 1438, 750, 735, 691

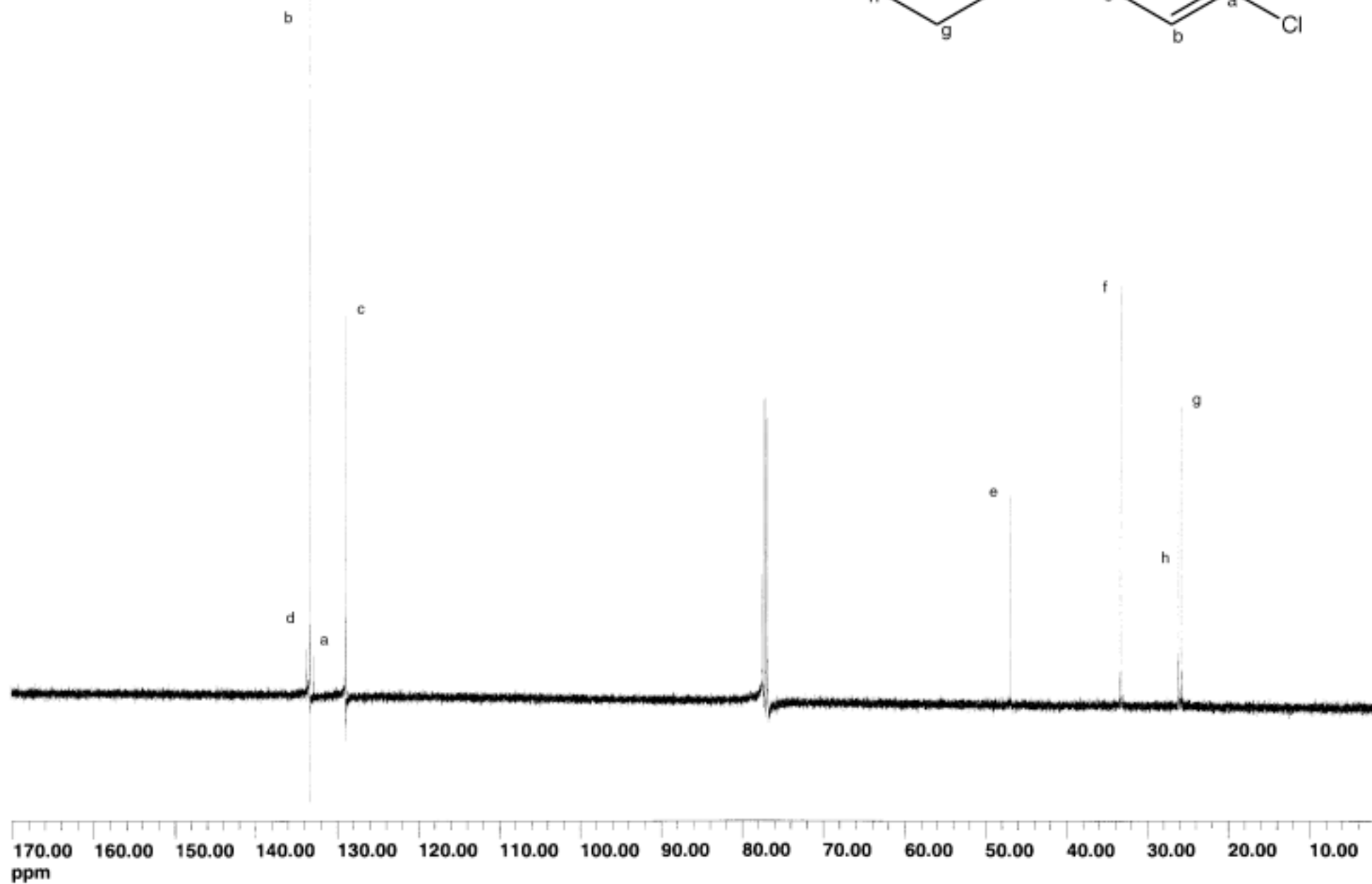
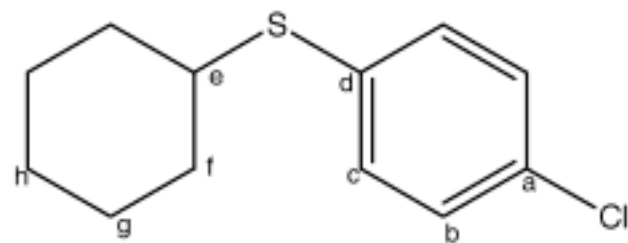
UV:

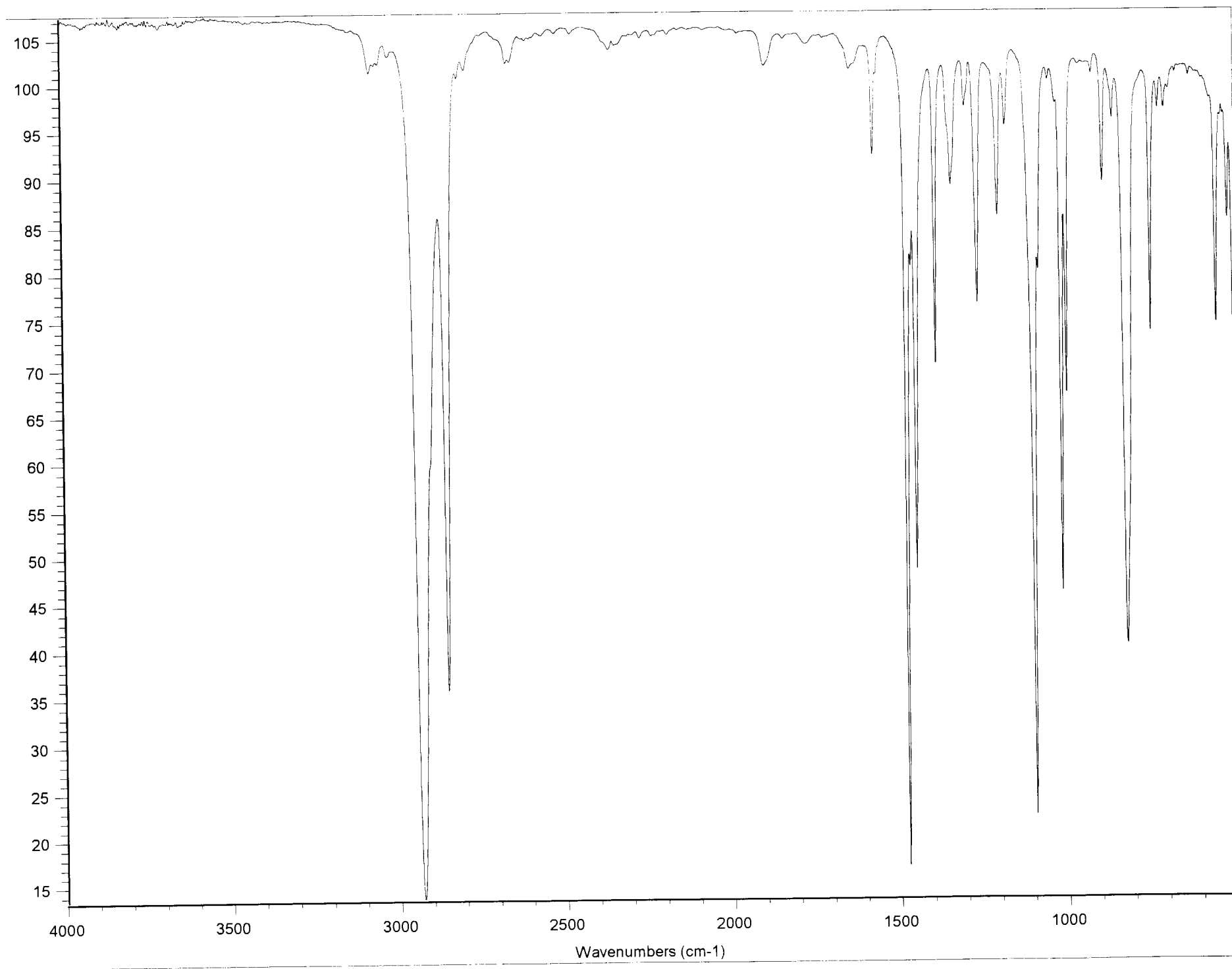
R_f : Solvent: 10% ethyl acetate in hexanes

0.79

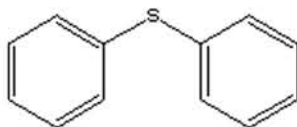
Mp./bp.:







Entry: 12
Compound:



Formula: C₁₂H₁₀S
MW: 186.27
First entry:

¹H-NMR: 400MHz in CDCl₃ 7.29 (m) 400MHz in CD
7.29 (m)

¹³C-NMR: 400MHz in CDCl₃
135.77, 130.97, 129.13, 126.96,

MS: monoisotopic mass = 192.097
186.27

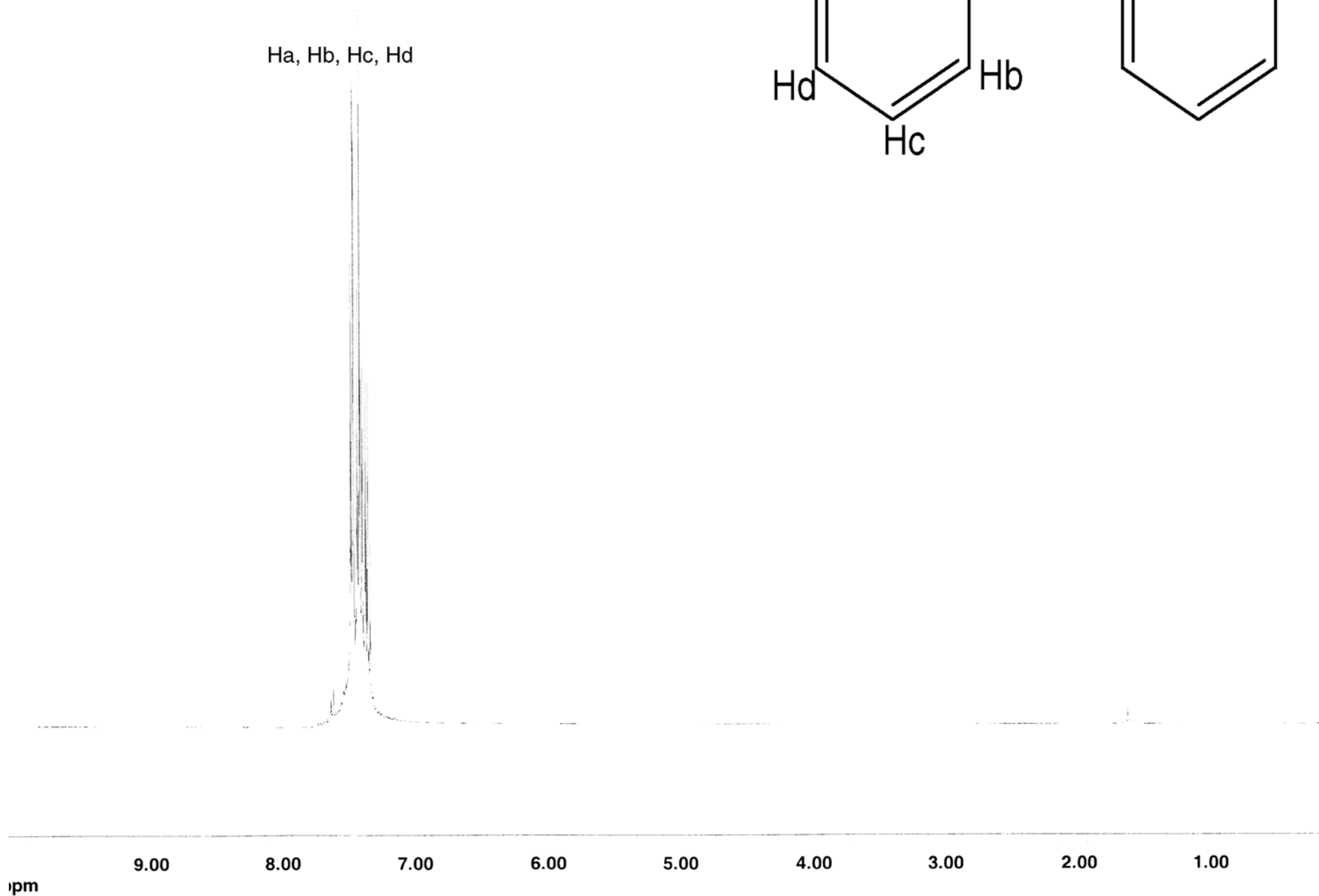
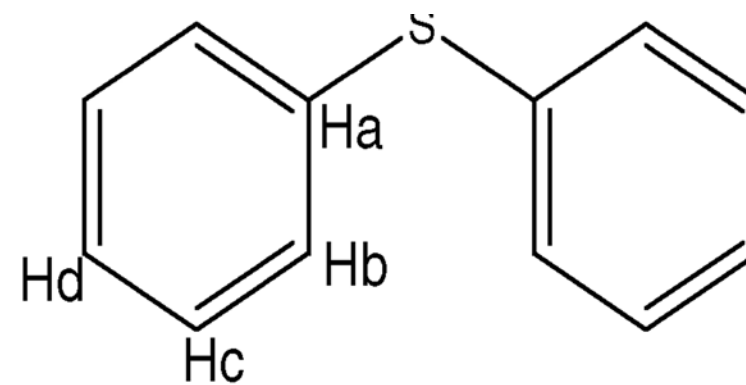
EA:

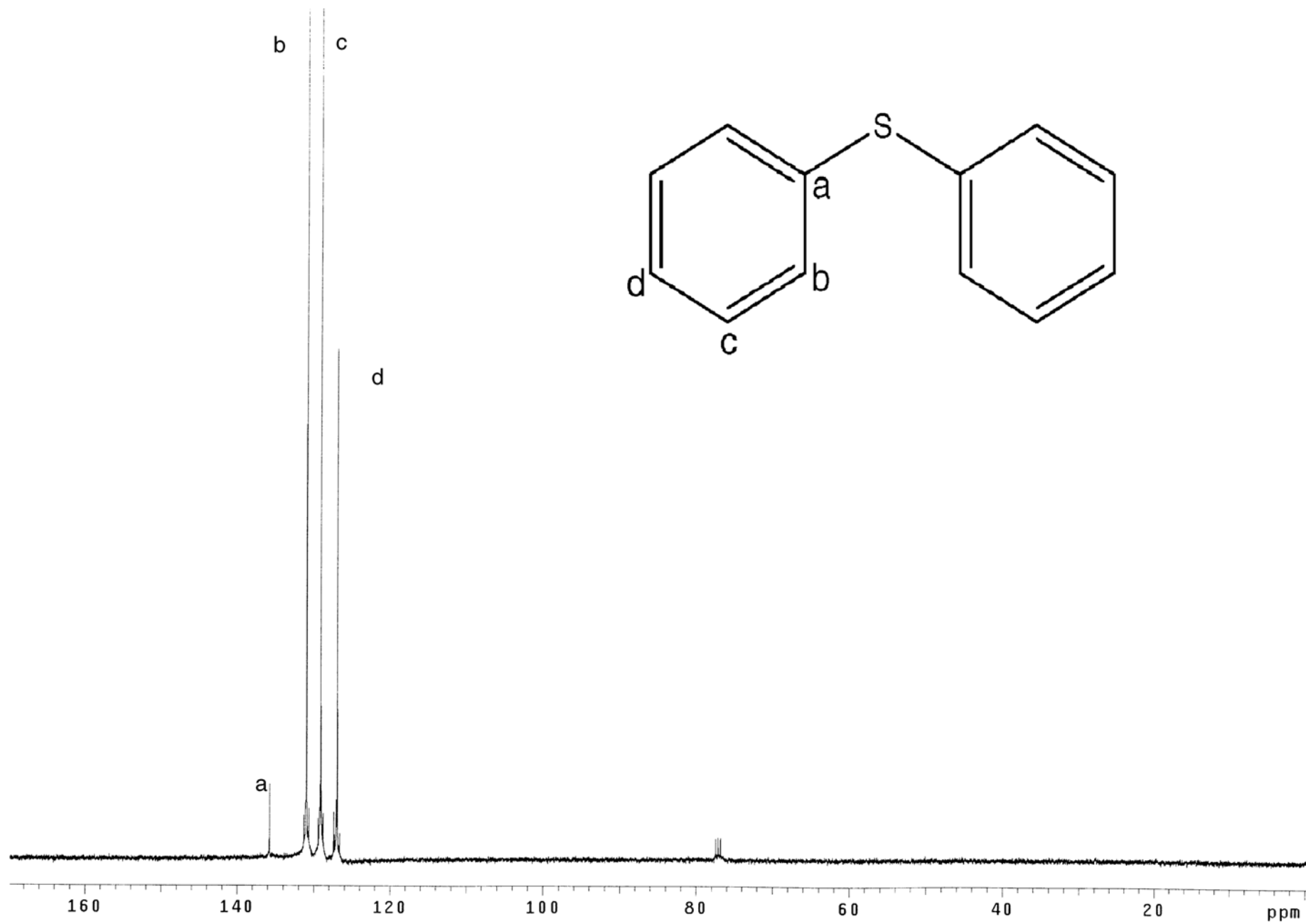
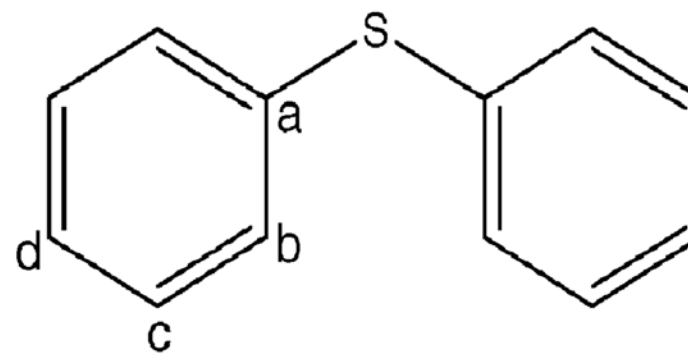
IR: CDCl₃
3072, 3058, 3034, 3003, 1580, 1475, 1439, 1023, 737, 689

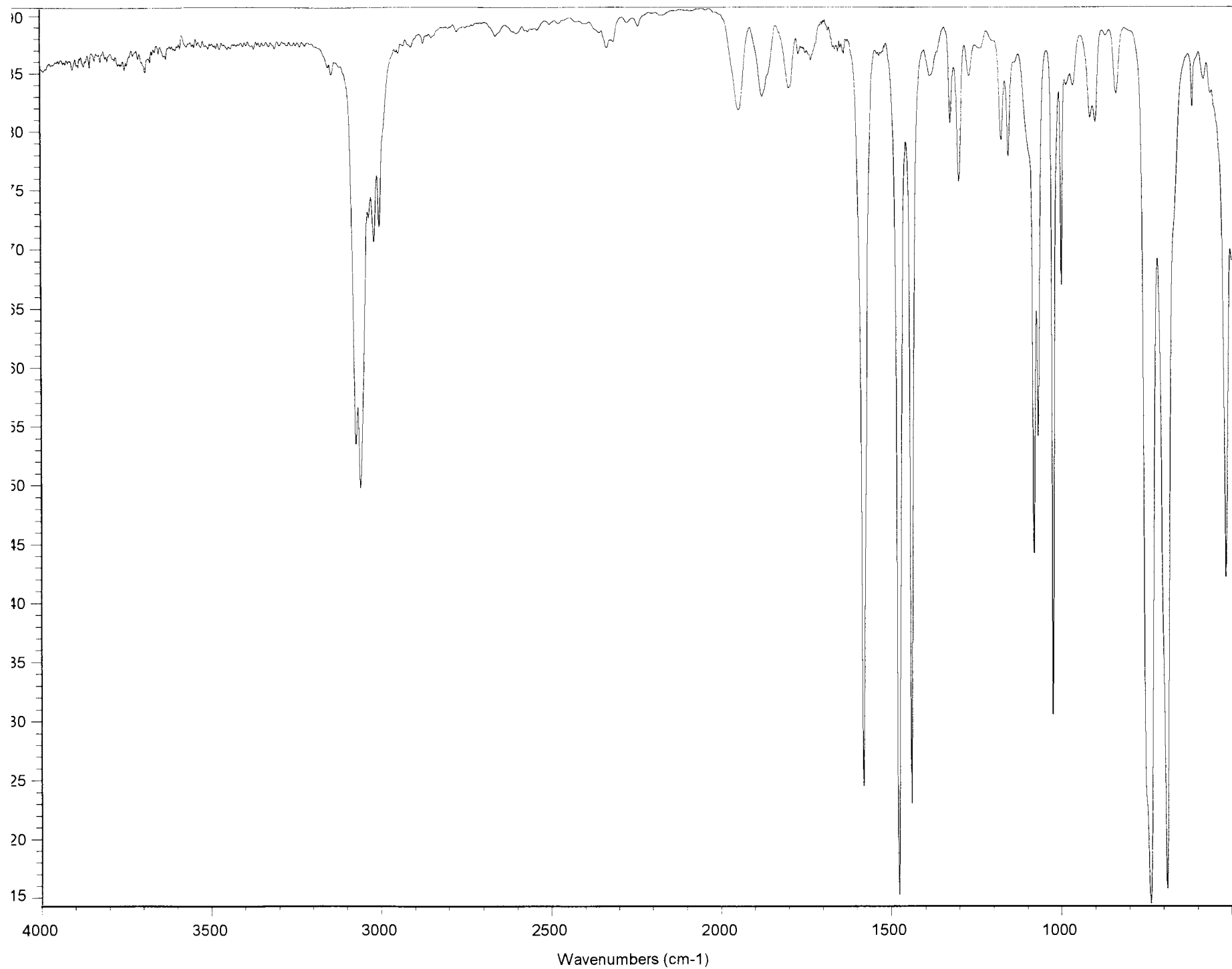
UV:

R_f:

mp./bp.:

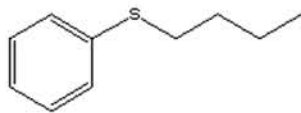






Entry: 12
Compound:

Formula: C₁₀H₁₄S
MW: 166.28
First entry:



¹H-NMR: 400MHz in CDCl₃ 7.29 (m) 400MHz in CD
7.29 (m)

¹³C-NMR: 400MHz in CDCl₃
135.77, 130.97, 129.13, 126.96,

MS: monoisotopic mass = 192.097

186.27

EA:

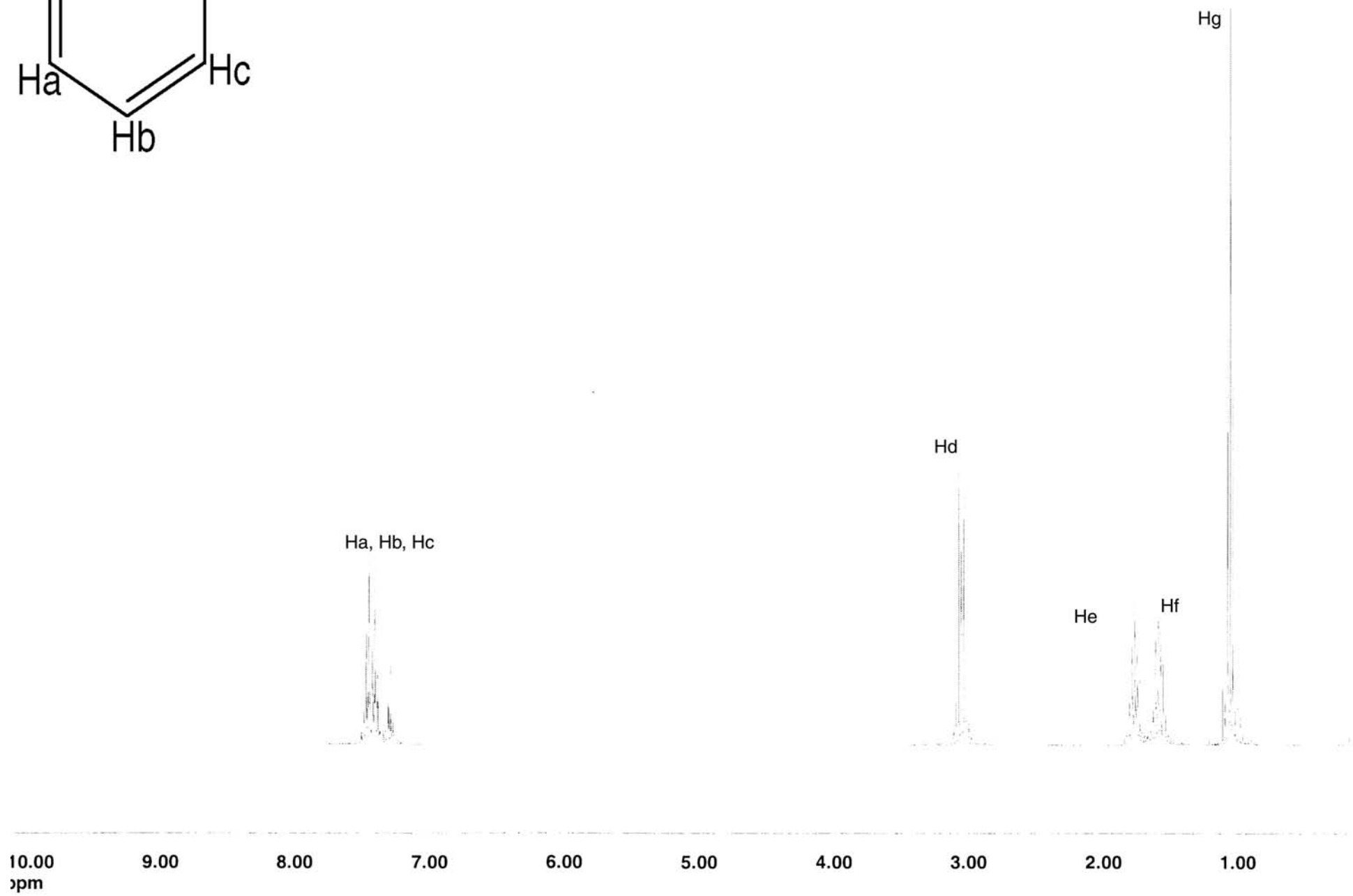
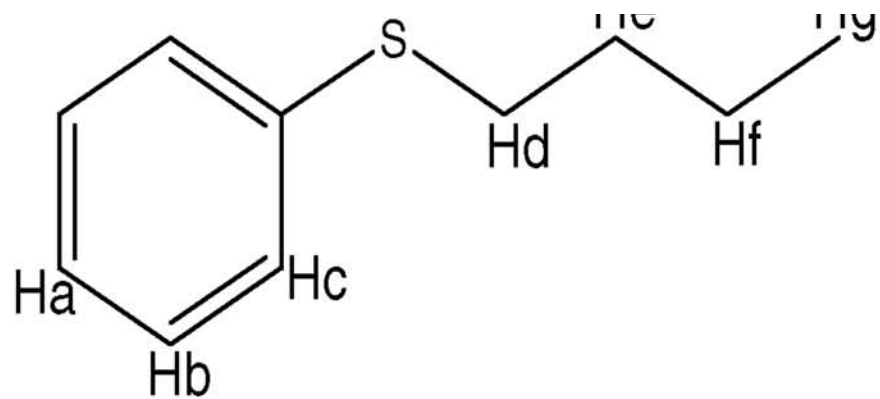
IR: CDCl₃

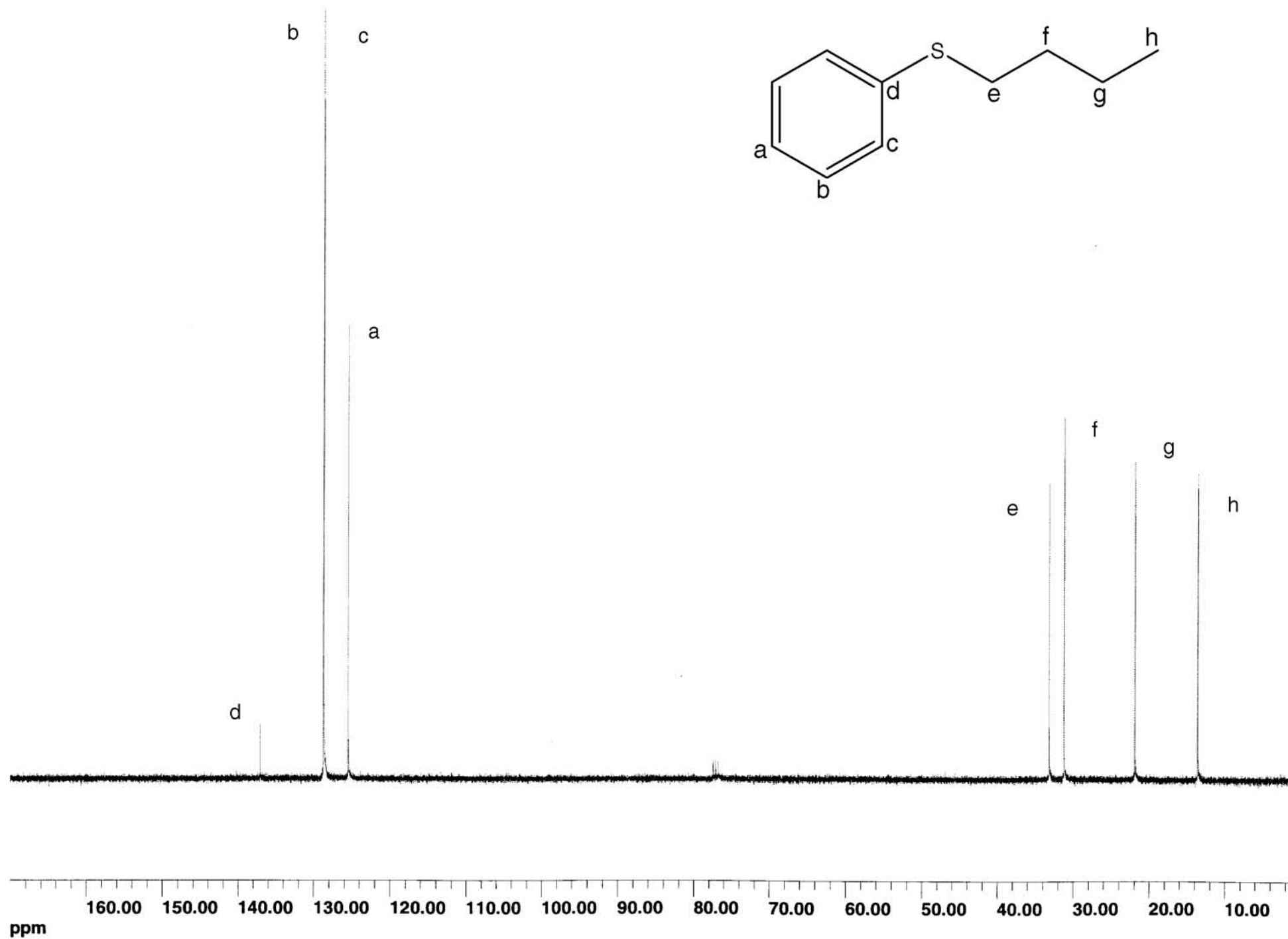
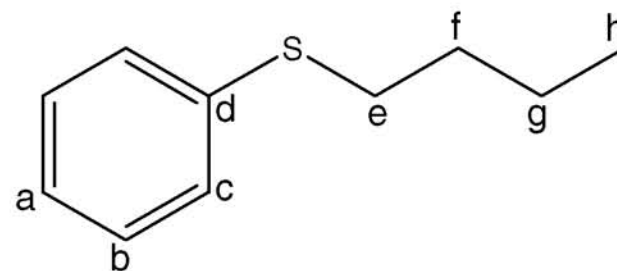
3072, 3058, 3034, 3003, 1580, 1475, 1439, 1023, 737, 689

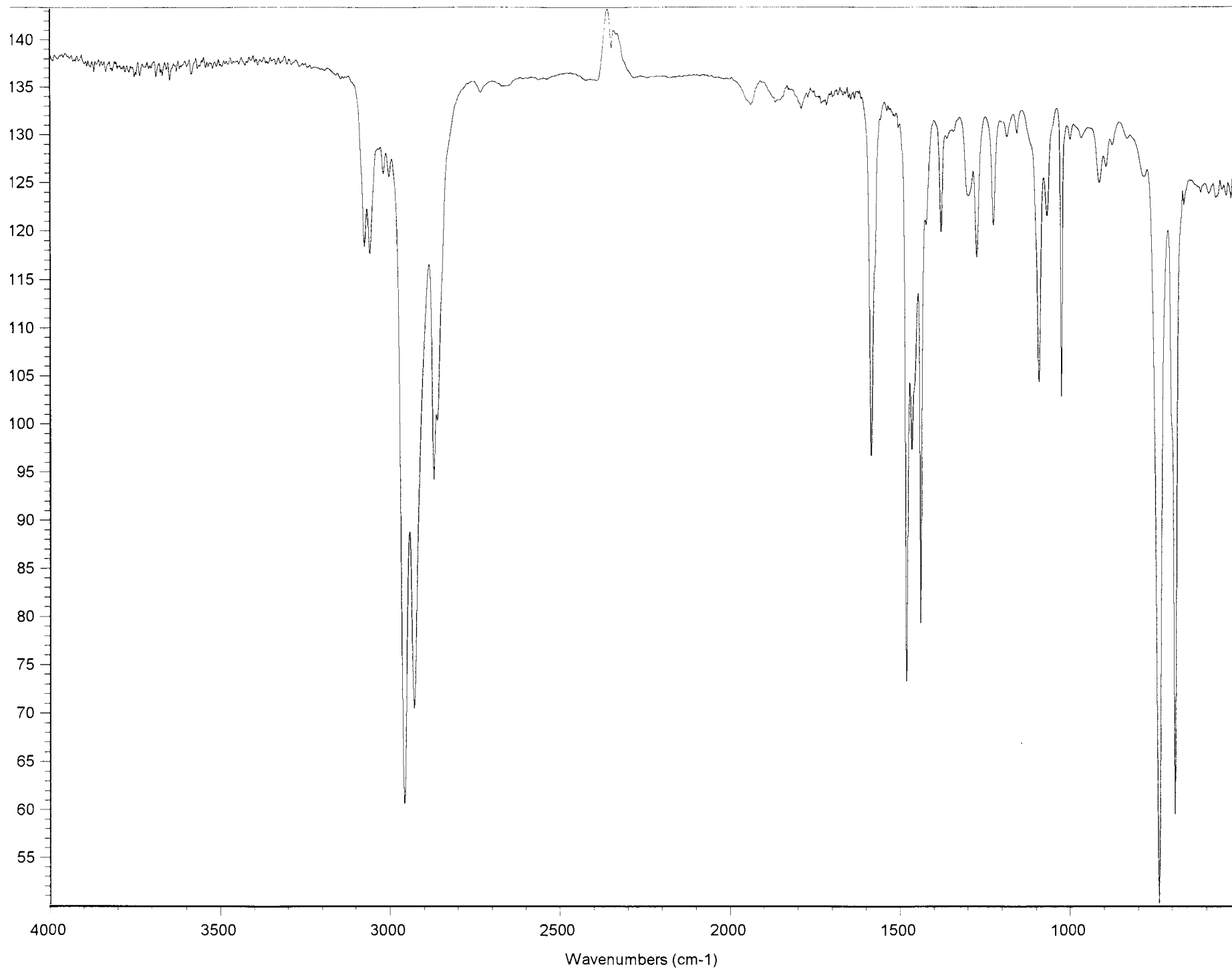
UV:

R_f:

mp./bp.:

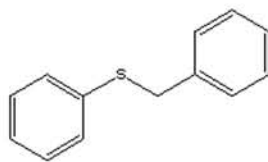






Entry: 15

Compound:



Formula: C₁₃H₁₂S

MW: 200.30

First entry:

¹H-NMR: 400MHz in CDCl₃ 7.29 (m) 400MHz in CD

7.29 (m)

¹³C-NMR: 400MHz in CDCl₃

135.77, 130.97, 129.13, 126.96,

MS: monoisotopic mass = 192.097

186.27

EA:

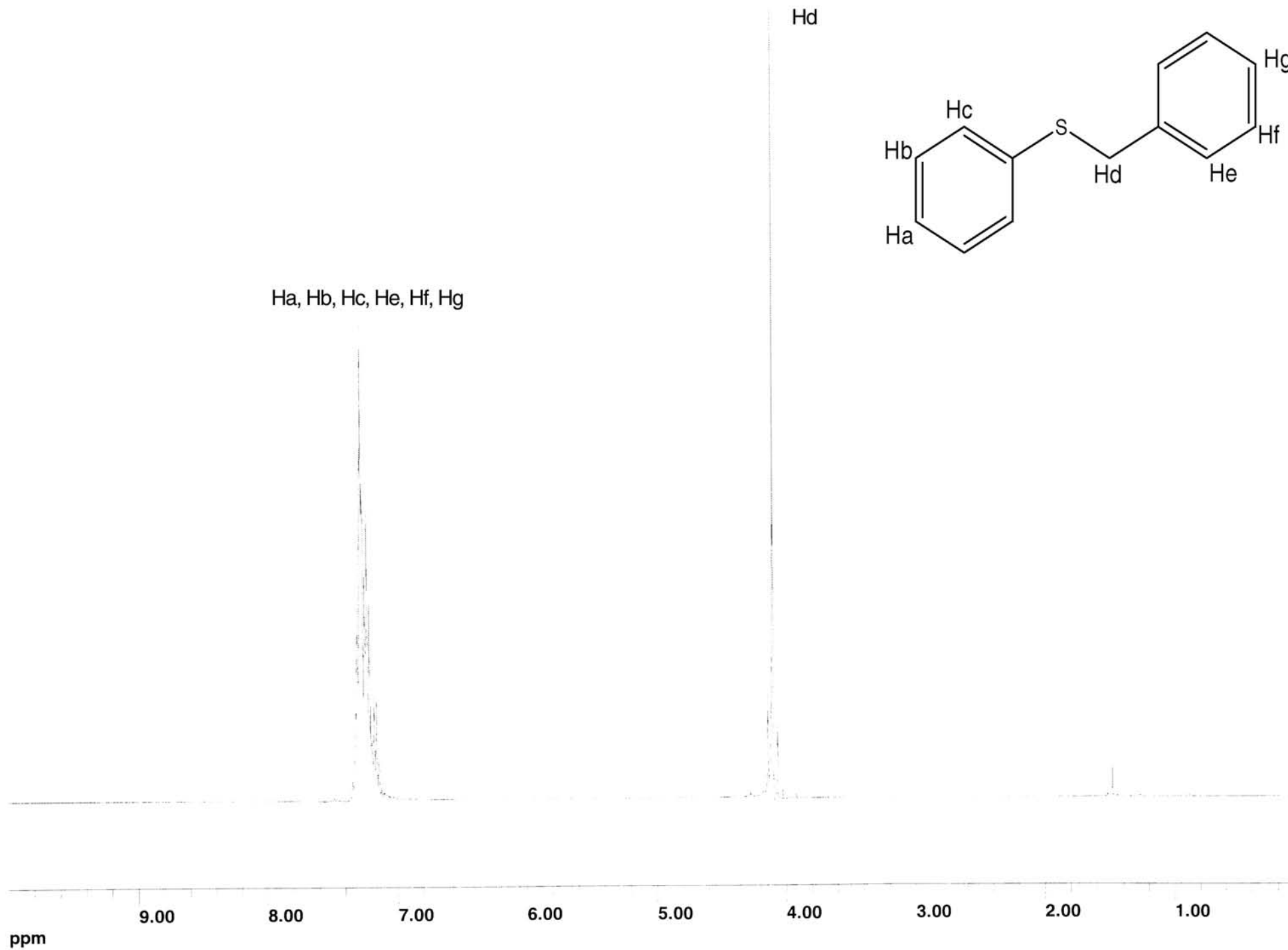
IR: CDCl₃

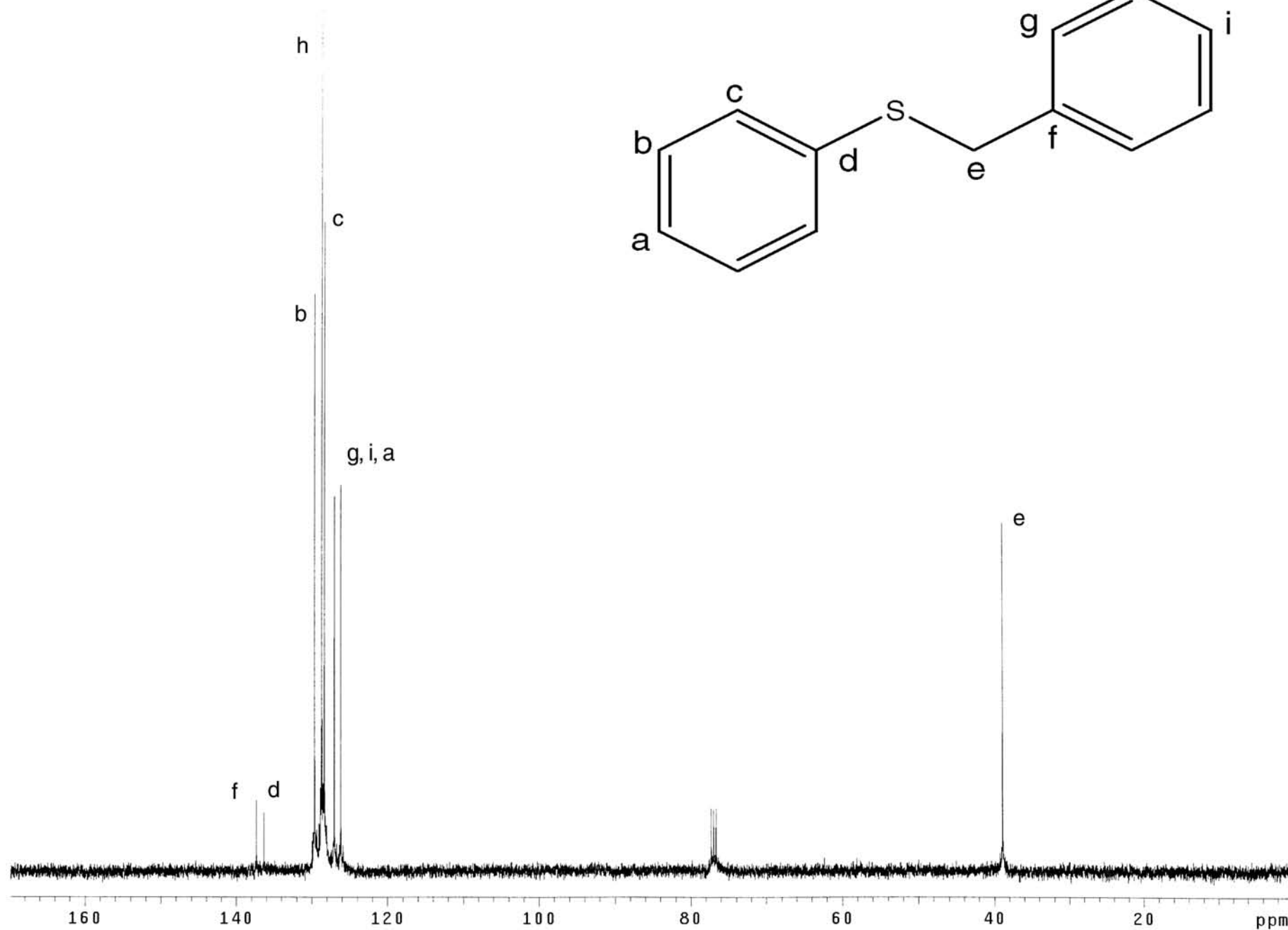
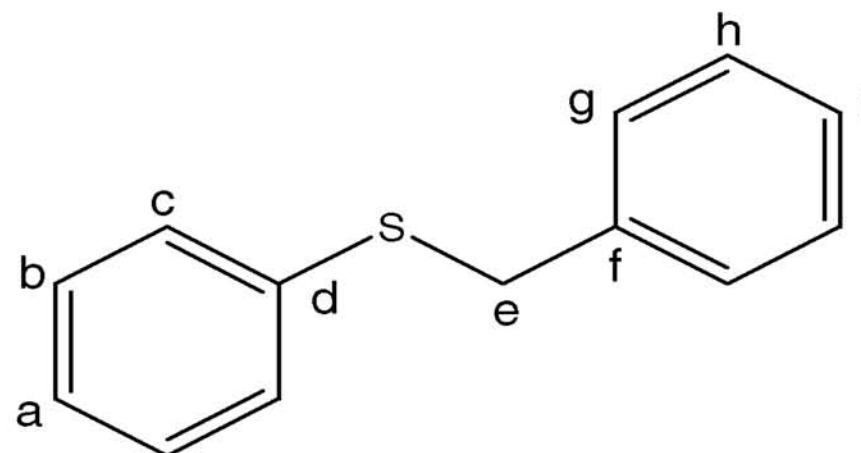
3072, 3058, 3034, 3003, 1580, 1475, 1439, 1023, 737, 689

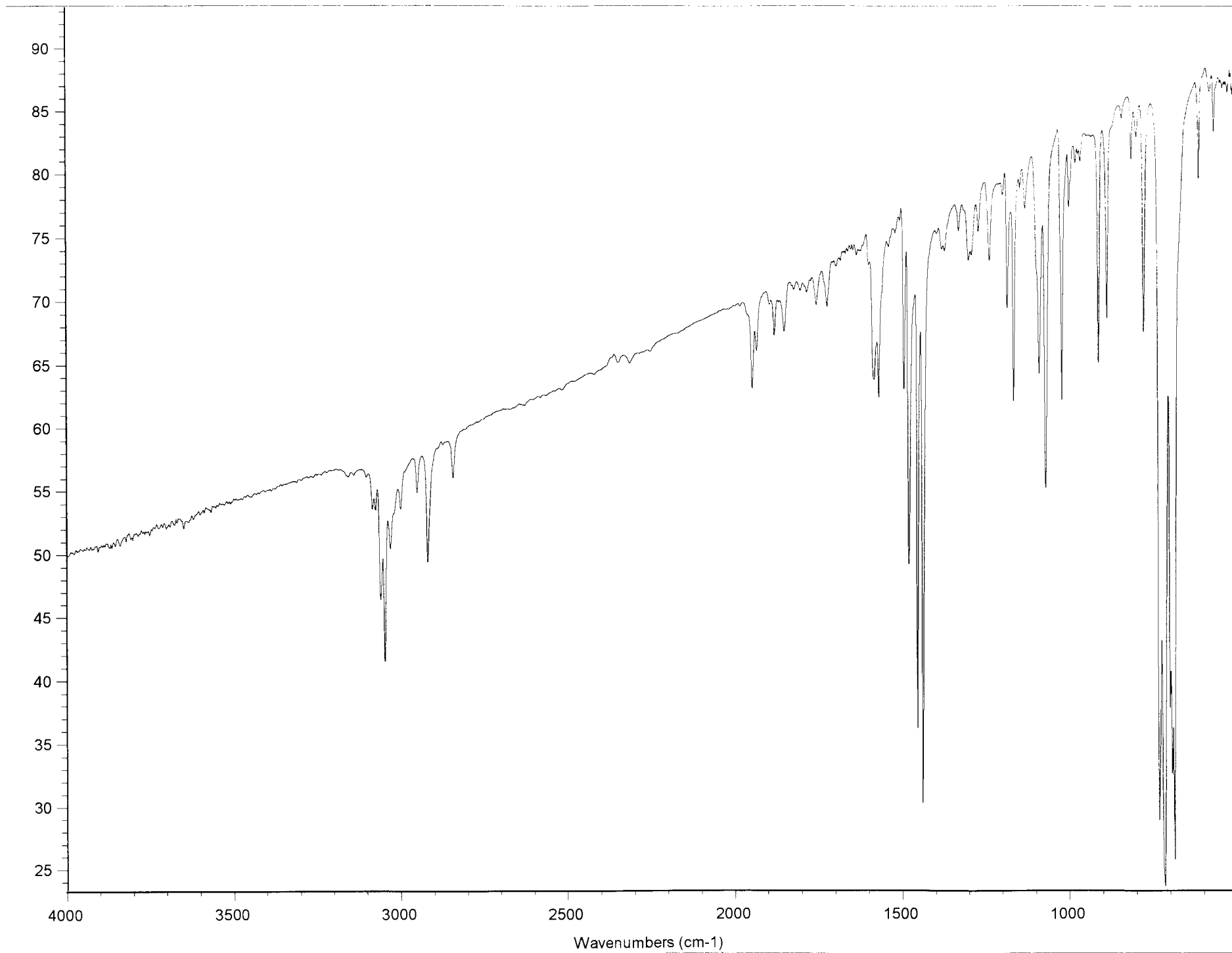
UV:

R_f:

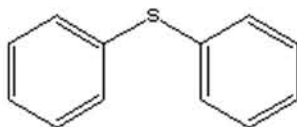
mp./bp.:







Entry: 15
Compound:



Formula: C₁₂H₁₀S
MW: 186.27
First entry:

¹H-NMR: 400MHz in CDCl₃ 7.29 (m) 400MHz in CD
7.29 (m)

¹³C-NMR: 400MHz in CDCl₃
135.77, 130.97, 129.13, 126.96,

MS: monoisotopic mass = 192.097

186.27

EA:

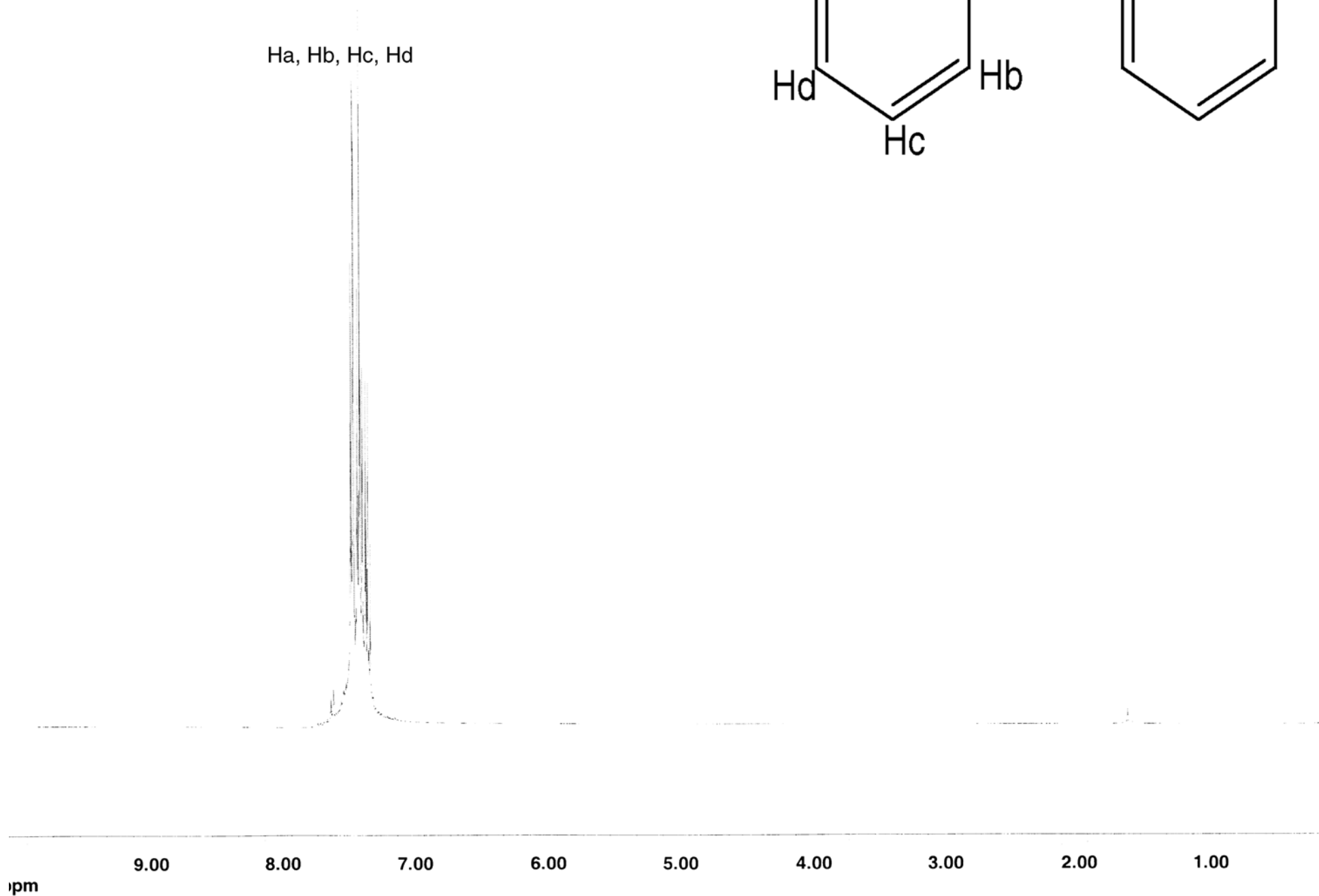
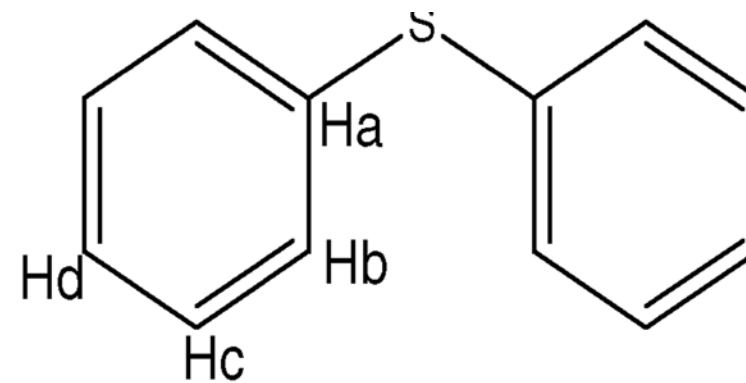
IR: CDCl₃

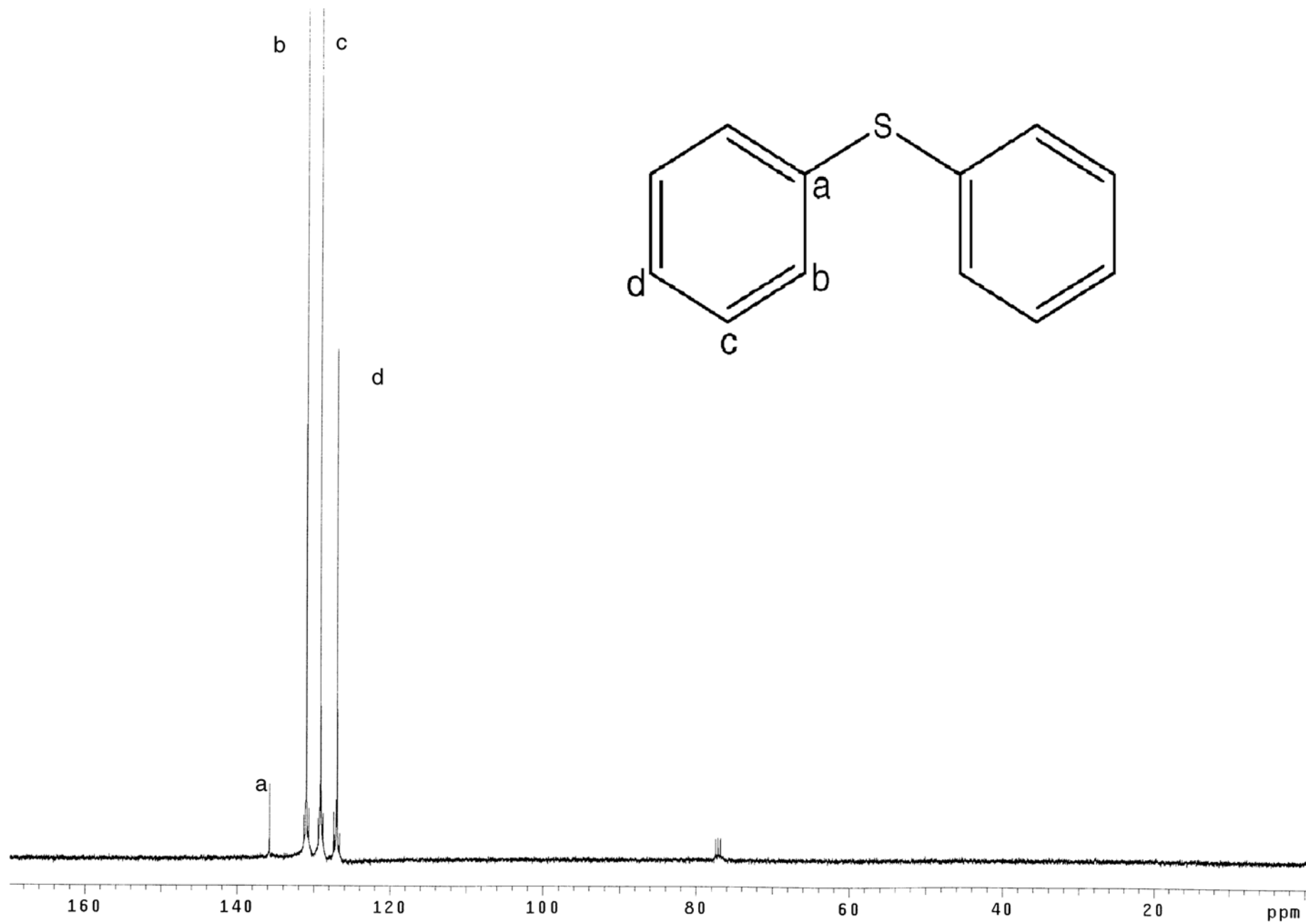
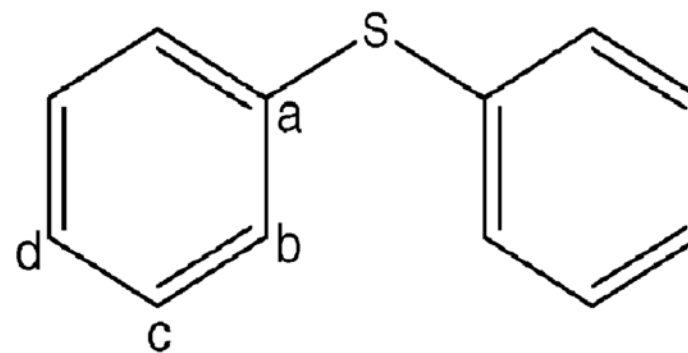
3072, 3058, 3034, 3003, 1580, 1475, 1439, 1023, 737, 689

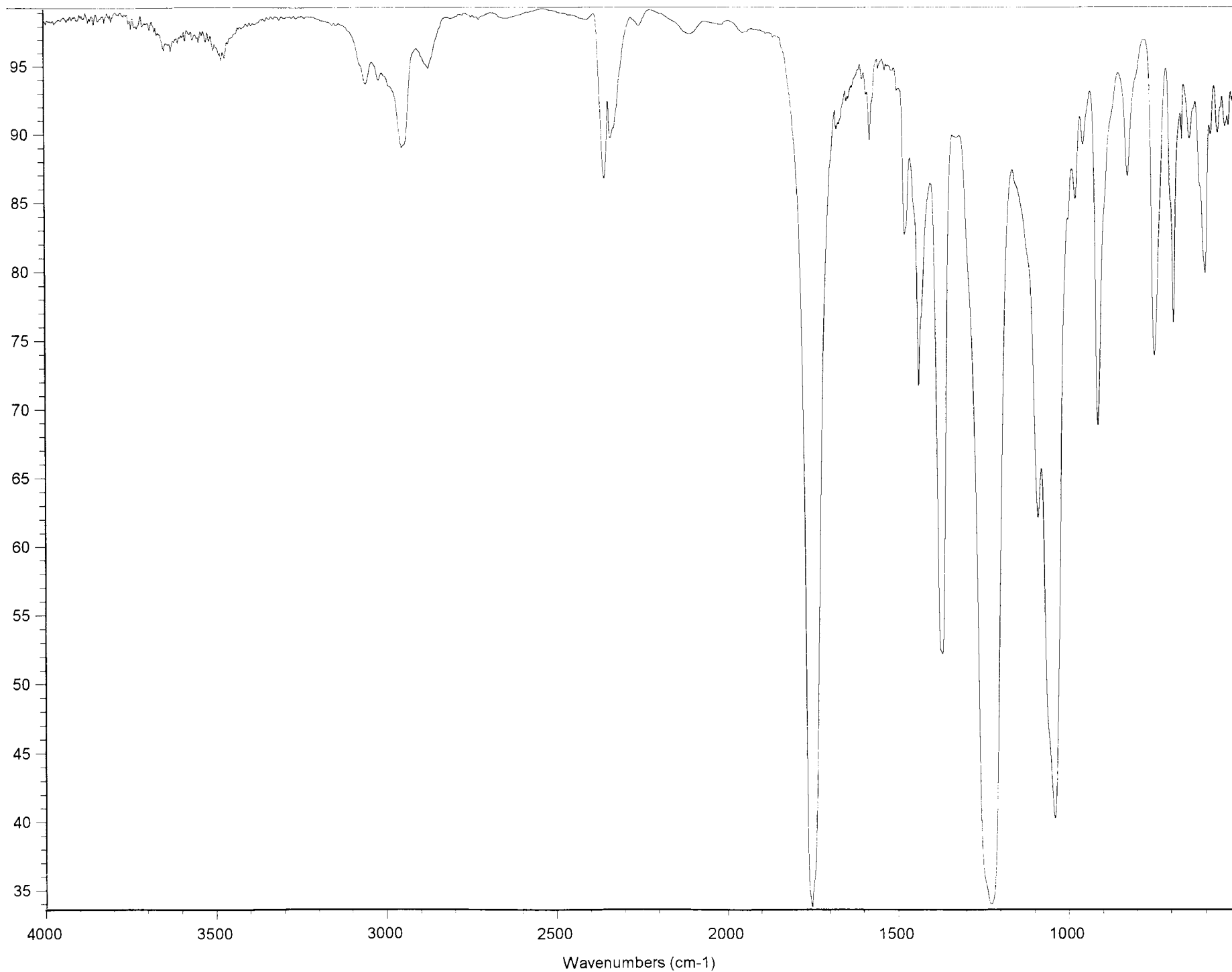
UV:

R_f:

mp./bp.:

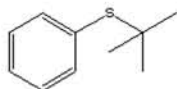






Entry: 15

Compound:



Formula: C₁₀H₁₄S

MW: 166.28

First entry:

¹H-NMR: 400MHz in CDCl₃ 7.29 (m) 400MHz in CD

7.29 (m)

¹³C-NMR: 400MHz in CDCl₃

135.77, 130.97, 129.13, 126.96,

MS: monoisotopic mass = 192.097

186.27

EA:

IR: CDCl₃

3072, 3058, 3034, 3003, 1580, 1475, 1439, 1023, 737, 689

UV:

R_f:

mp./bp.:

