

## Electronic Supplementary Information

### Iron-catalyzed decarbonylation reaction of aliphatic carboxylic acids leading to $\alpha$ -olefins

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## 1. General information.

<sup>1</sup>H NMR spectra were recorded with a JEOL JMN ECP-500 (500 MHz) spectrometer in CDCl<sub>3</sub> and are referenced at 7.26 ppm for CHCl<sub>3</sub>. Chemical shifts are reported in parts per million (δ). <sup>13</sup>C NMR spectra were recorded with a JEOL JMN-500 (125 MHz) spectrometer in CDCl<sub>3</sub> and are referenced at 77.00 ppm for CDCl<sub>3</sub>. Infrared spectra were obtained on a JASCO FT/IR-4100 spectrometer. Melting point was measured by BÜCHI Melting Point B-540. GC analysis was performed on a Shimadzu GC-2014 instrument equipped with an FID detector using a J&W Scientific DB-5 column, and a VARIAN Micro GC CP4900 instrument equipped with a TCD detector using a Molsieve 5A column and PoraPLOT Q column. The products were purified by flash chromatography on silica gel (Kanto Chem. Co. Silica Gel 60N (spherical, neutral, 40–50 μm)). Anhydrous FeCl<sub>2</sub> (powder, purity of 98%) was purchased from Sigma-Aldrich, Co. Potassium Iodide (granular powder, purity of 99.5%) was purchased from Wako Pure Chemical Industries, Ltd. Acetic anhydride (purity of 97%) was purchased from Nacalai Tesque, Inc. Other reagents were received from commercial sources and used without further purification.

## 2. Experimental procedure.

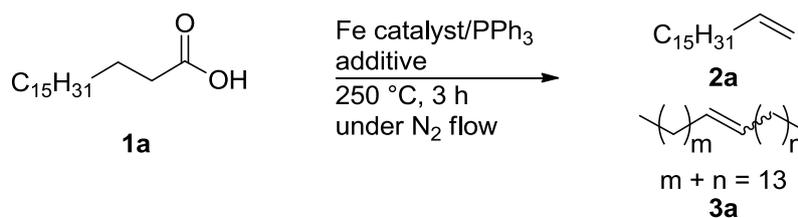
### Typical procedure for iron-catalyzed decarbonylation reaction of carboxylic acids (Table 1, Entry 10):

To a 30-mL stainless steel autoclave were added stearic acid **1a** (285.0 mg, 1.0 mmol), FeCl<sub>2</sub> (13.0 mg, 0.10 mmol), DPPent (88.4 mg, 0.20 mmol), KI (167.2 mg, 1.0 mmol), Ac<sub>2</sub>O (103.4 mg, 1.0 mmol) and a magnetic stirring bar. The autoclave was closed, purged three times with carbon monoxide, pressurized with 20 atm of CO. The reaction mixture was heated at 240 °C by a salt bath (eutectic mixture of inorganic salts: potassium nitrate 53%, sodium nitrite 40%, and sodium nitrate 7%) for 3 h. After cooling, excess CO was discharged. The reaction mixture was diluted with ether, passed through a pad of Celite, and concentrated in vacuo. The residue was purified by column chromatography on silica gel (hexane) to give heptadecenes (176.6 mg, 74%, **2a/3a** = 97/3).

### Large-scale procedure (Table 1, Entry 11):

To a 100-mL stainless steel autoclave were added stearic acid **1a** (2.9 g, 10 mmol), FeCl<sub>2</sub> (128.8 mg, 1 mmol), DPPent (883.0 mg, 2 mmol), KI (1.7 g, 10 mmol), Ac<sub>2</sub>O (1.2 g, 10 mmol) and a magnetic stirring bar. The autoclave was closed, purged three times with carbon monoxide, pressurized with 20 atm of CO. The reaction mixture was heated at 240 °C by a salt bath for 3 h. After cooling, excess CO was discharged. The reaction mixture was diluted with ether, passed through a pad of Celite, and concentrated in vacuo. The residue was purified by column chromatography on silica gel (hexane) to give heptadecenes (1.6 g, 69%, **2a/3a** = 96/4).

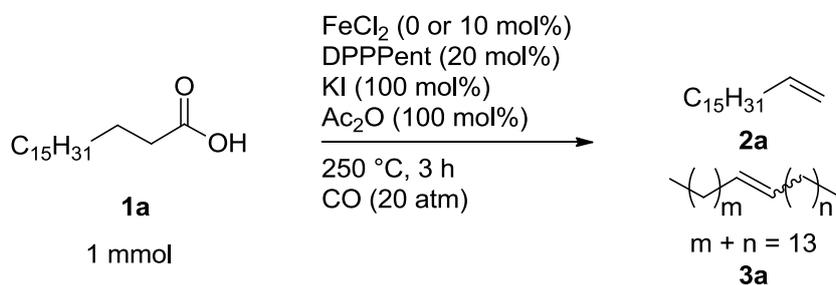
**Table S1 Decarbonylation of stearic acid with different Fe catalyst.**



Entry	Catalyst (mol%)	Additive (mol%)	Yield (%) <sup>b</sup> ( <b>2a/3a</b> ) <sup>c</sup>
1	FeCl <sub>2</sub> (10)	none	<1
2	FeCl <sub>2</sub> (10)	KI (100), Ac <sub>2</sub> O (100)	79 (19/81)
3	FeCl <sub>2</sub> (10)	HI <sup>d</sup> (100)	<1
4	FeCl <sub>2</sub> (10)	HOAc (100)	<1
5	FeI <sub>2</sub> (10)	Ac <sub>2</sub> O (100)	73 (9/91)
6	FeI <sub>2</sub> (10)	KI (100), Ac <sub>2</sub> O (100)	77 (13/87)
7	Fe <sub>2</sub> (CO) <sub>9</sub> (5)	KI (100), Ac <sub>2</sub> O (100)	<1
8	Fe <sub>3</sub> (CO) <sub>12</sub> (3.3)	KI (100), Ac <sub>2</sub> O (100)	<1
9	[Fe(CO) <sub>2</sub> Cp] <sub>2</sub> (5)	KI (100), Ac <sub>2</sub> O (100)	<1
10	FeI(CO) <sub>2</sub> Cp (10)	Ac <sub>2</sub> O (100)	40 <sup>e</sup> (14/86)
11	FeI(CO) <sub>2</sub> Cp (10)	KI (100), Ac <sub>2</sub> O (100)	37 <sup>e</sup> (14/86)

<sup>a</sup> Reaction conditions: **1a** (1.0 mmol), Fe catalyst, PPh<sub>3</sub> (40 mol%), additive, 250 °C, 3 h under N<sub>2</sub>. <sup>b</sup> Total yield of isomers after silica gel chromatography. <sup>c</sup> Selectivity was determined by <sup>1</sup>H NMR analysis. <sup>d</sup> 55 w/w aq. solution. <sup>e</sup> Yield based on <sup>1</sup>H NMR analysis relative to anisole as an internal standard.

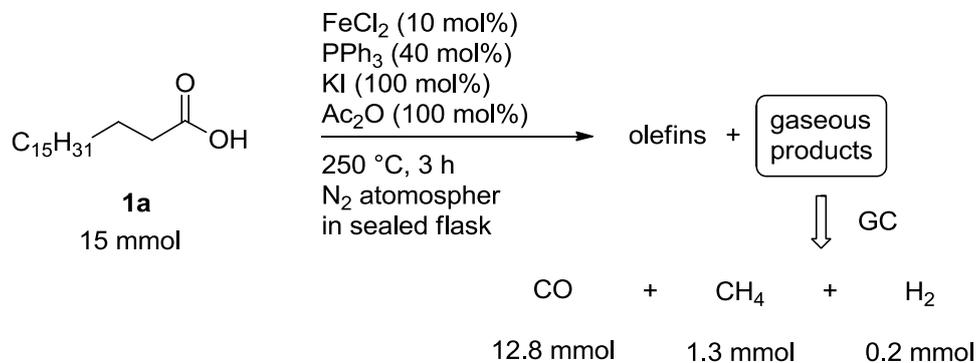
### Effect of FeCl<sub>2</sub> purity:



FeCl <sub>2</sub> purity	Yield <sup>a</sup> (%) (2a/3a)
no catalyst	<1
98% (Aldrich)	91 (92/8)
99.998% (Aldrich)	89 (93/7)

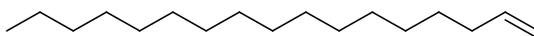
<sup>a</sup> Total yield of isomers after silica gel chromatography.

### Analysis of the gaseous products by GC-TCD:



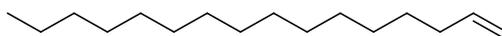
### Spectral data of products.

#### 1-Heptadecene (**2a**)<sup>1</sup>



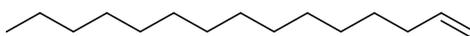
Obtained as an inseparable mixture (**2a/3a** = 97/3); colorless oil. <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ 5.77–5.86 (m, 1H), 4.92–5.01 (m, 2H), 2.02–2.06 (m, 2H), 1.25–1.39 (m, 26H), 0.88 (t, *J* = 6.9 Hz, 3H); <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ 139.19, 114.08, 33.90, 32.01, 29.78, 29.60, 29.46, 29.24, 29.03, 22.76, 14.14.

#### 1-Hexadecene (**2b**)



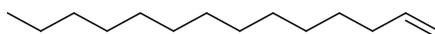
Obtained as an inseparable mixture (**2b/3b** = 98/2); colorless oil. <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ 5.77–5.86 (m, 1H), 4.91–5.01 (m, 2H), 2.01–2.08 (m, 2H), 1.26–1.39 (m, 24H), 0.88 (t, *J* = 6.9 Hz, 3H); <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ 139.24, 114.06, 33.84, 31.95, 29.70, 29.53, 29.38, 29.18, 28.97, 22.71, 14.12. The NMR data were identical with those of a commercial sample of 1-hexadecene.

#### 1-Pentadecene (**2c**)<sup>2</sup>



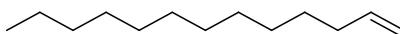
Obtained as an inseparable mixture (**2c/3c** = 97/3); colorless oil. <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ 5.78–5.86 (m, 1H), 4.92–5.01 (m, 2H), 2.02–2.06 (m, 2H), 1.26–1.39 (m, 22H), 0.88 (t, *J* = 6.9 Hz, 3H); <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ 139.25, 114.06, 33.85, 31.95, 29.70, 29.53, 29.38, 29.18, 28.97, 22.71, 14.12.

#### 1-Tetradecene (**2d**)<sup>2</sup>



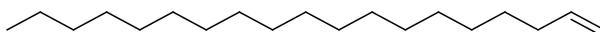
Obtained as an inseparable mixture (**2d/3d** = 97/3); colorless oil. <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ 5.78–5.86 (m, 1H), 4.92–5.01 (m, 2H), 2.01–2.06 (m, 2H), 1.26–1.39 (m, 20H), 0.88 (t, *J* = 6.9 Hz, 3H); <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ 139.15, 114.08, 33.91, 32.03, 29.77, 29.63, 29.47, 29.27, 29.05, 22.77, 14.12.

1-Tridecene (**2e**)<sup>3</sup>



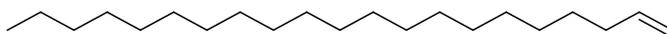
Obtained as an inseparable mixture (**2e/3e** = 97/3); colorless oil. <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ 5.77–5.86 (m, 1H), 4.91–5.01 (m, 2H), 2.02–2.06 (m, 2H), 1.26–1.39 (m, 18H), 0.88 (t, *J* = 6.9 Hz, 3H); <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ 139.23, 114.07, 33.87, 31.97, 29.69, 29.57, 29.40, 29.21, 29.01, 22.73, 14.12.

1-Nonadecene (**2f**)<sup>4</sup>



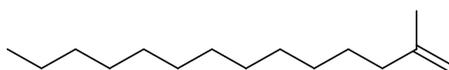
Obtained as an inseparable mixture (**2f/3f** = 98/2); colorless oil. <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ 5.77–5.86 (m, 1H), 4.91–5.01 (m, 2H), 2.01–2.06 (m, 2H), 1.25–1.39 (m, 30H), 0.88 (t, *J* = 6.9 Hz, 3H); <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ 139.20, 114.07, 33.87, 31.98, 29.57, 29.42, 29.21, 29.01, 14.13.

1-Henicosene (**2g**)<sup>5</sup>



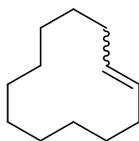
Obtained as an inseparable mixture (**2g/3g** = 98/2); white solid. mp 32.3 °C (lit.<sup>6</sup> mp 35.5 °C); <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ 5.77–5.86 (m, 1H), 4.91–5.01 (m, 2H), 2.01–2.06 (m, 2H), 1.25–1.39 (m, 34H), 0.88 (t, *J* = 6.9 Hz, 3H); <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ 139.23, 114.07, 33.86, 31.96, 29.73, 29.55, 29.41, 29.20, 28.99, 22.72, 14.13.

2-Methyl-1-tetradecene (**2j**)<sup>7</sup>



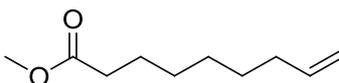
Obtained as an inseparable mixture (**2j/3j** = 92/8); colorless oil. <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ 5.77–5.86 (m, 1H), 4.91–5.01 (m, 2H), 2.02–2.06 (m, 2H), 1.26–1.39 (m, 18H), 0.88 (t, *J* = 6.9 Hz, 3H); <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ 139.23, 114.07, 33.87, 31.97, 29.69, 29.57, 29.40, 29.21, 29.01, 22.73, 14.12.

Cyclododecene (**2k**)<sup>8</sup>



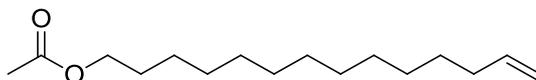
Obtained as an inseparable mixture (*E/Z* = 78/22); colorless oil. *E* isomer: <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ 1.25–1.36 (m, 12H), 1.40–1.47 (m, 4H), 2.05–2.06 (m, 4H), 5.37 (m, 2H); <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ 131.40, 32.13, 26.24, 25.60, 24.95, 24.60. *Z* isomer: <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ 1.25–1.39 (m, 12H), 1.40–1.49 (m, 4H), 2.09–2.13 (m, 4H), 5.32 (m, 2H); <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ 130.34, 26.95, 24.35, 23.93, 22.05.

Methyl 8-nonenate (**2l**)<sup>9</sup>



Obtained as an inseparable mixture (**2l/3l** = 95/5); colorless oil. <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ 5.76–5.84 (m, 1H), 4.92–5.01 (m, 2H), 3.66 (s, 3H), 2.30 (t, *J* = 7.3 Hz, 2H), 2.01–2.06 (m, 2H), 1.57–1.65 (m, 2H), 1.31–1.41 (m, 6H); <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ 174.24, 138.96, 114.24, 51.41, 34.04, 33.66, 28.94, 28.66, 24.86.

13-Tetradecenyl acetate (**2m**)<sup>10</sup>



Obtained as an inseparable mixture (**2m/3m** = 96/4); colorless oil. <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ 5.76–5.84 (m, 1H), 4.91–5.01 (m, 2H), 3.66 (s, 3H), 2.30 (t, *J* = 7.6 Hz, 2H), 2.01–2.08 (m, 2H), 1.59–1.65 (m, 2H), 1.31–1.41 (m, 6H); <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): 171.18, 139.19, 114.05, 64.62, 33.96, 29.57, 29.48, 29.23, 29.12, 28.92, 28.58, 25.88, 21.11.

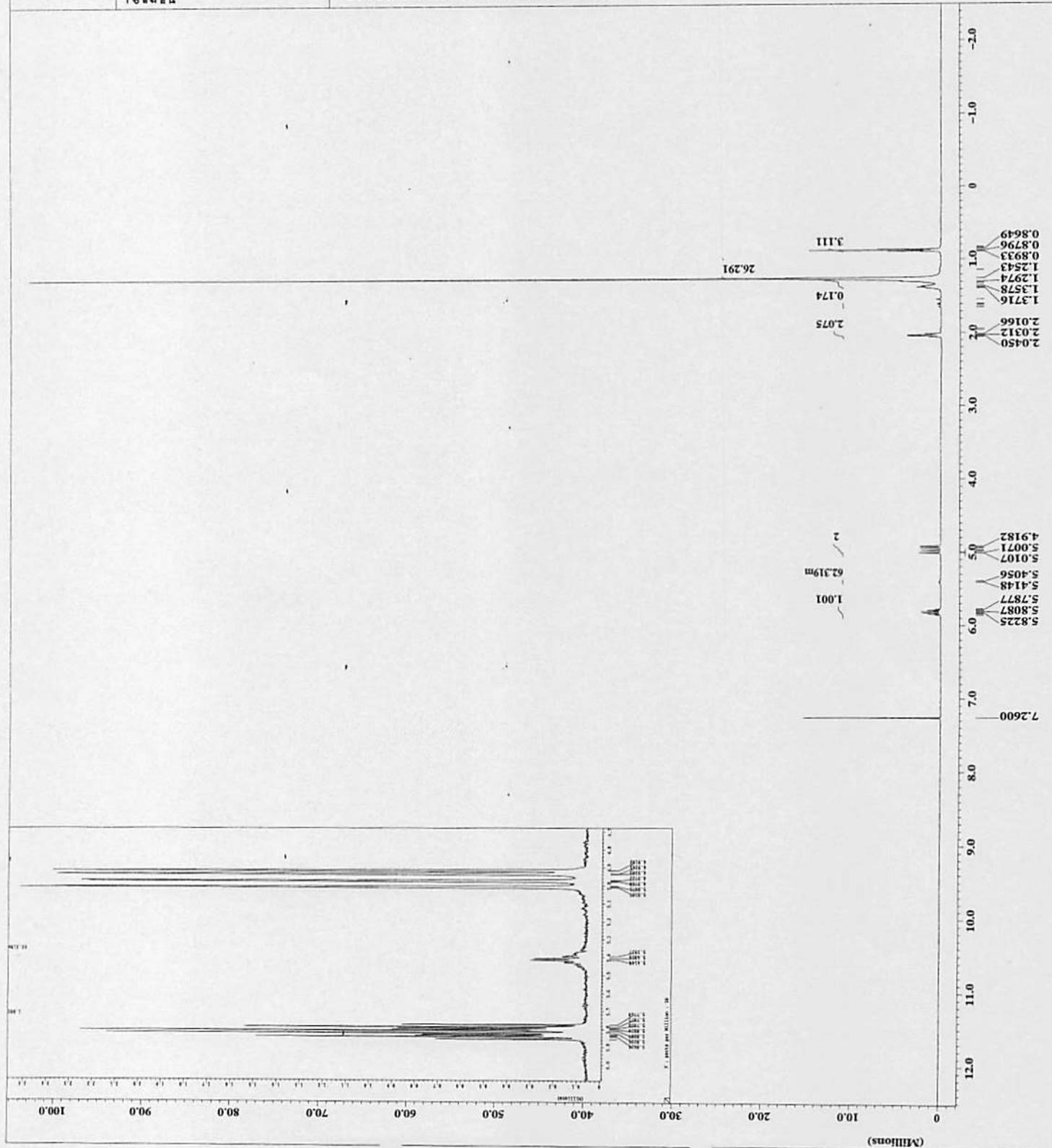
## References.

1. D. H. R. Barton, J. Boivin, E. Crepon, J. Sarma, H. Togo and S. Z. Zard, *Tetrahedron*, 1991, **47**, 7091.
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10. J. Lin, F. Liu, Y. Wang and M. Liu, *Synth. Commun.*, 1995, **25**, 3457.



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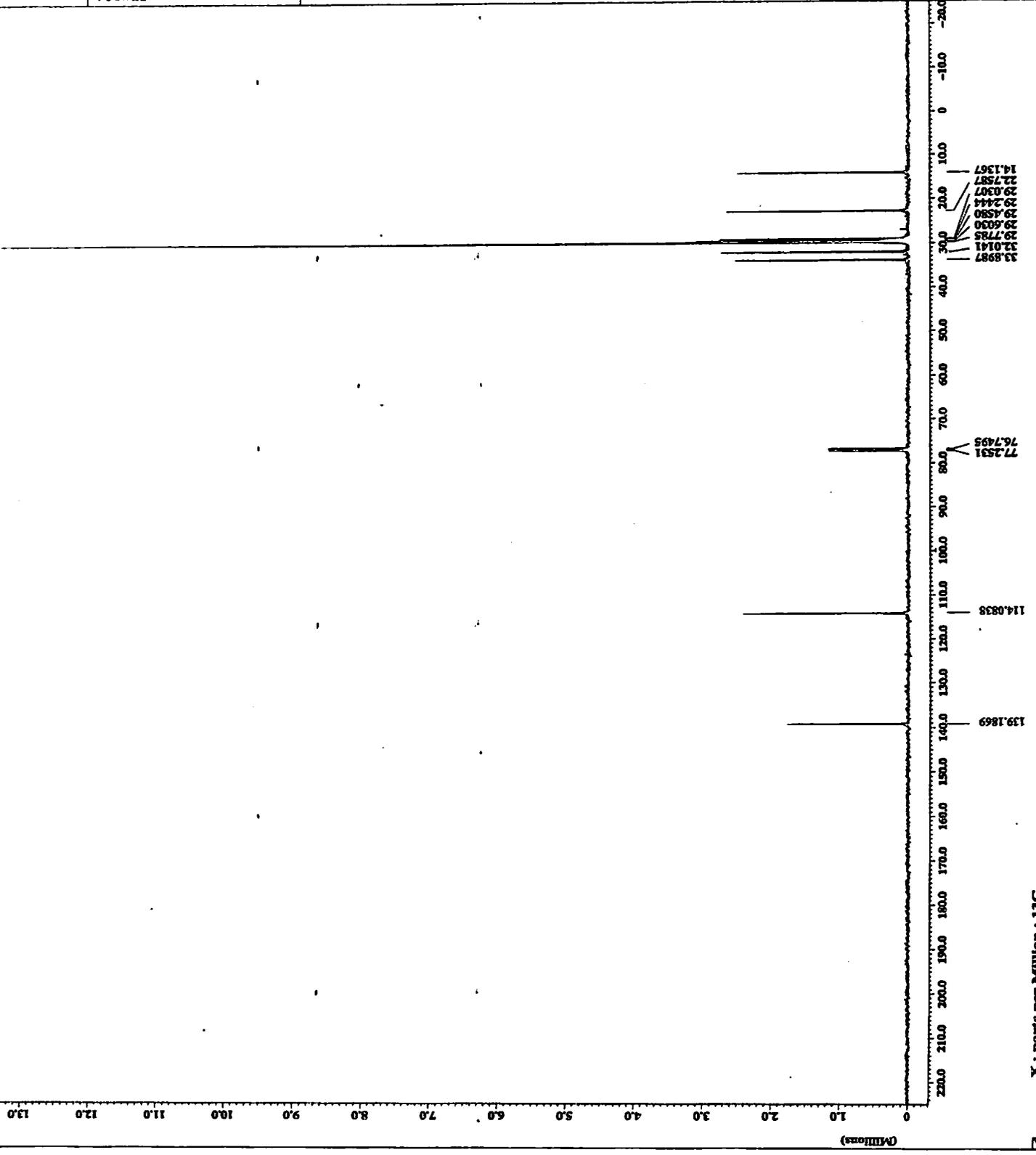


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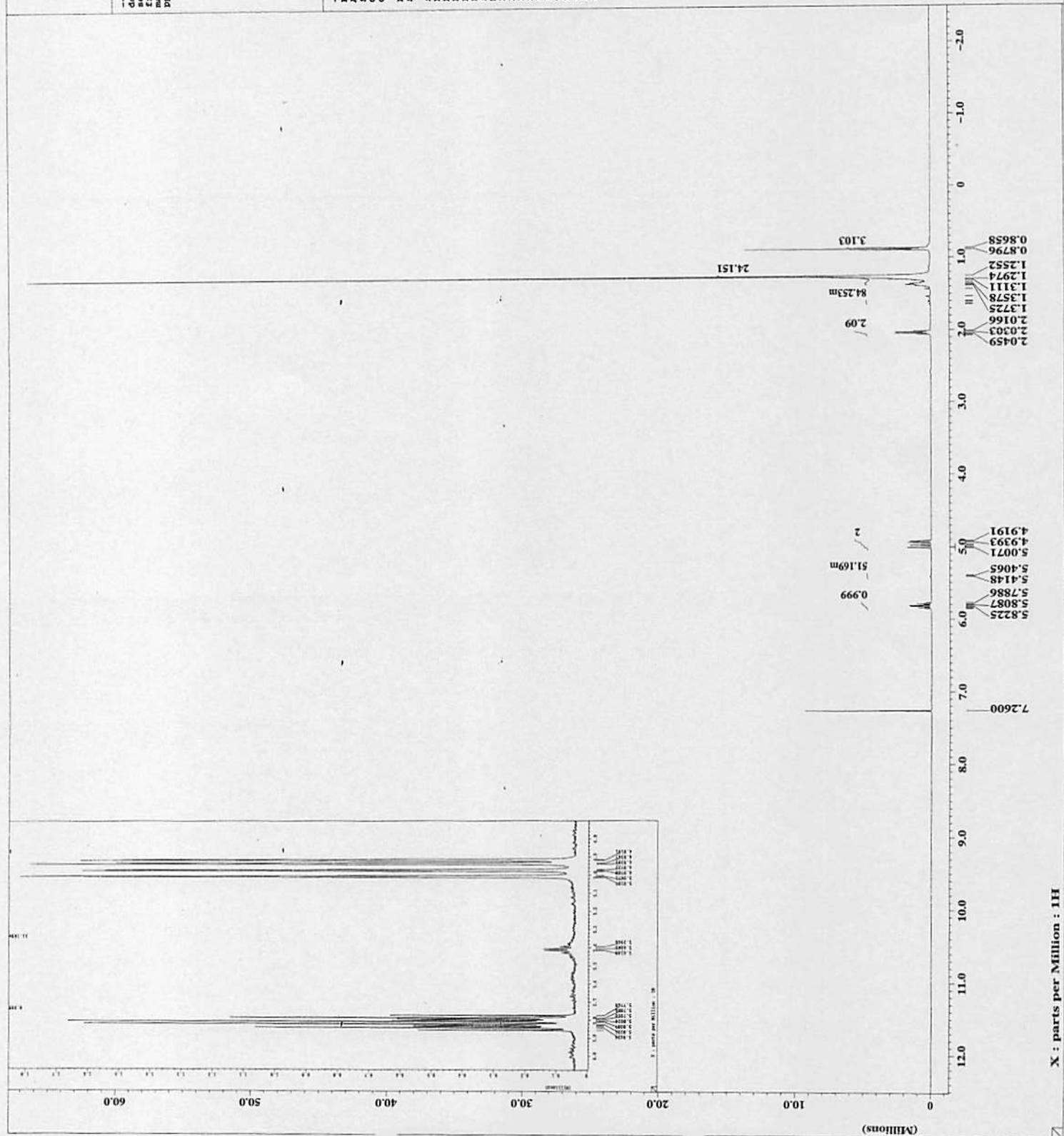


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2b



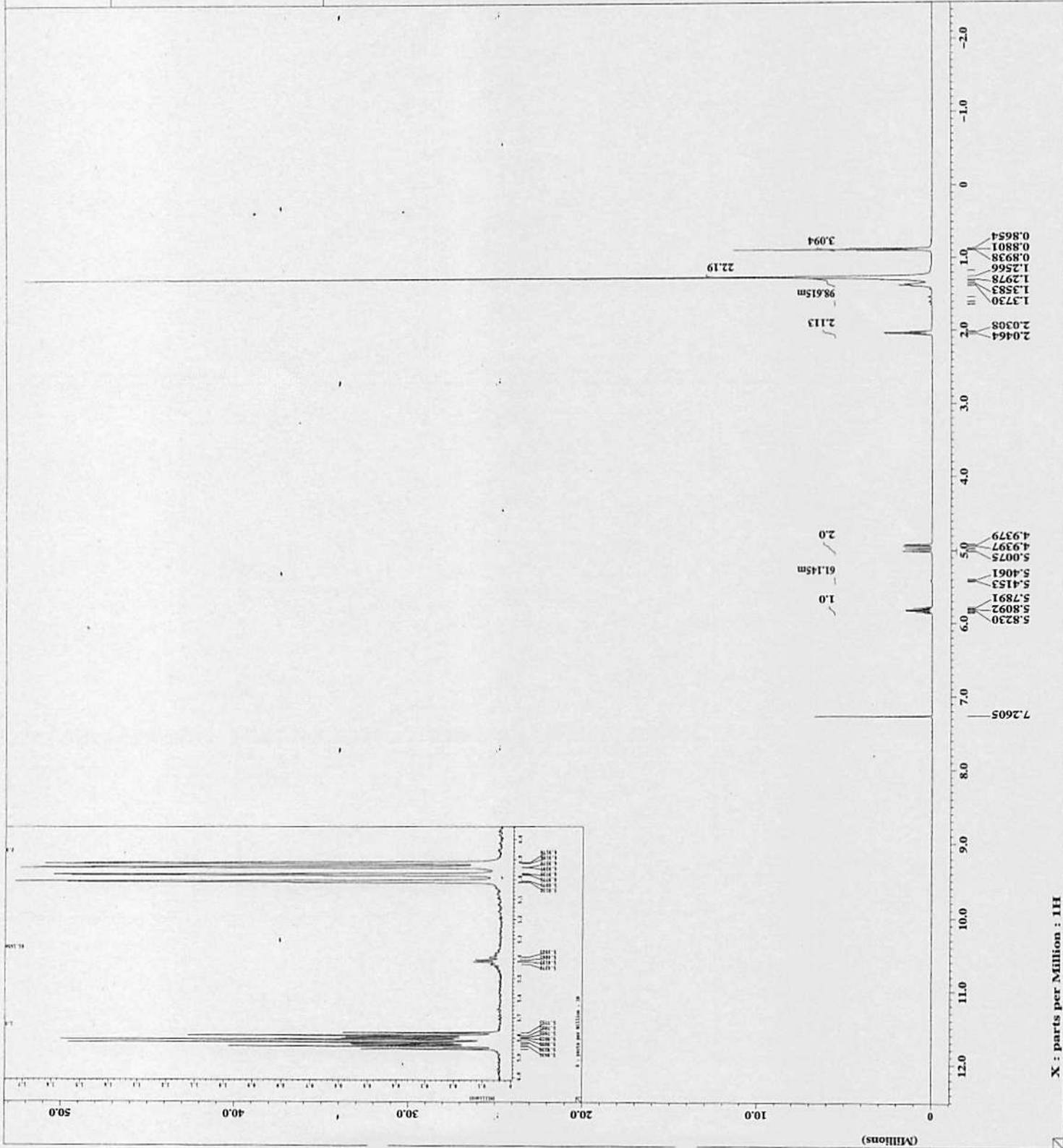
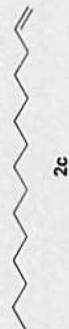
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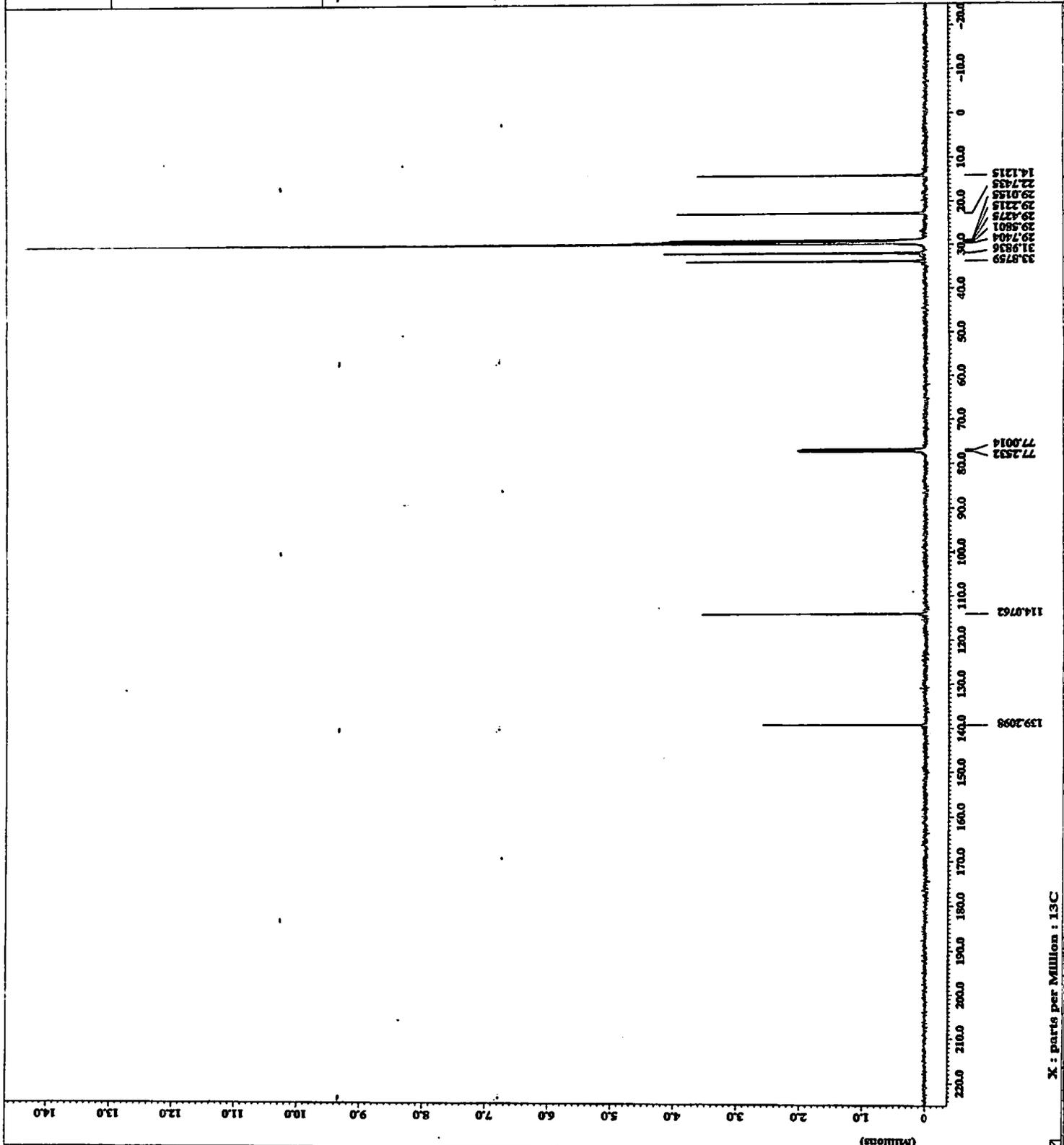


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 X\_Axis : 13c  
 X\_Offset : 100 [ppm]  
 X\_Scale : 133.77707547 [ppm]  
 X\_Min : 31.465468 [ppm]  
 X\_Max : 34.1024 [ppm]  
 Y\_Axis : 20.21 [a.u.]  
 Y\_Offset : 16  
 Y\_Scale : 11.7491979 [V]  
 Filter : 1000  
 Filter\_Min : 13.73866221 [ppm]  
 Filter\_Max : 13.73866221 [ppm]

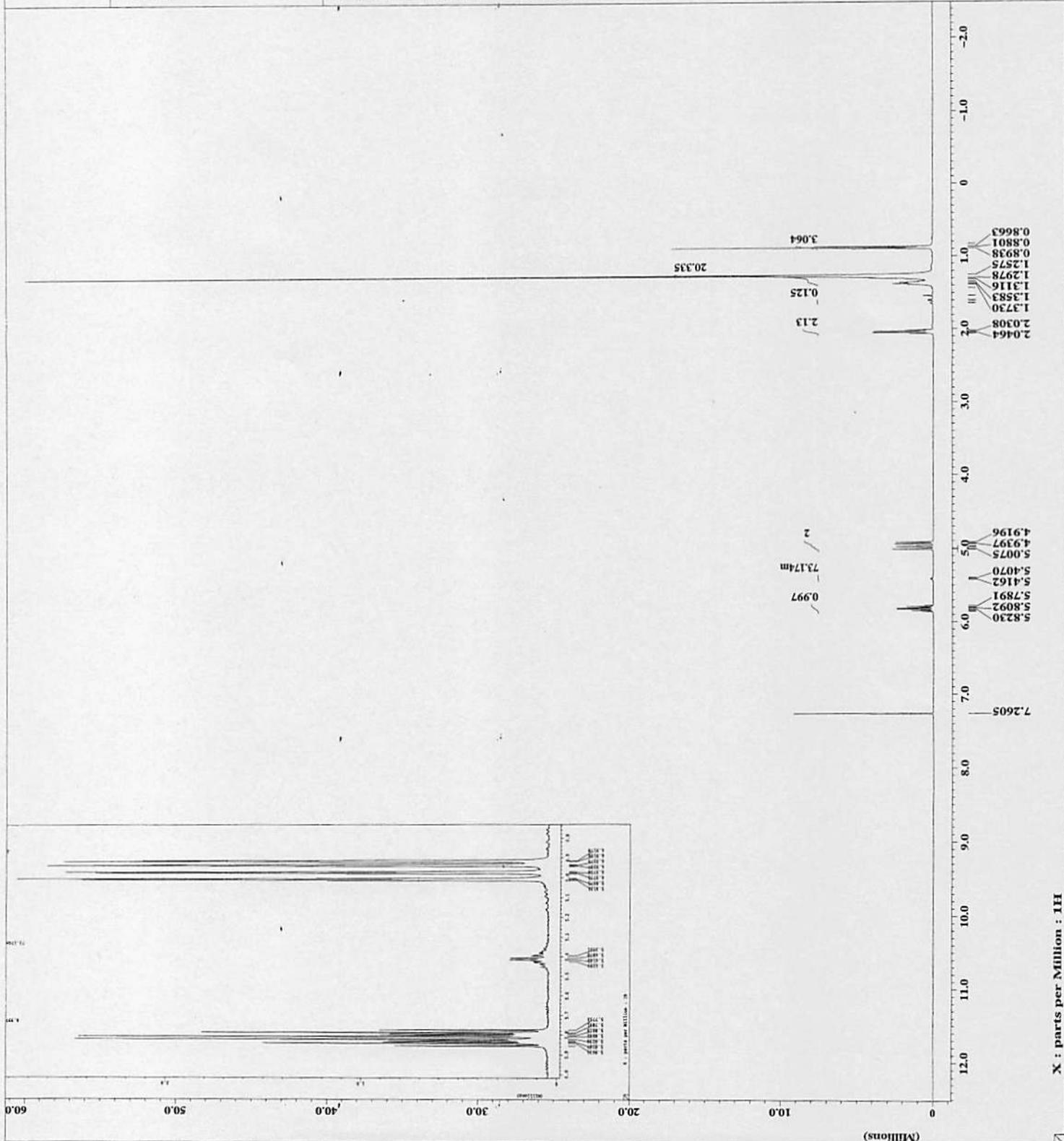
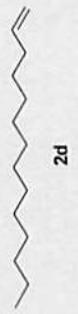


X : parts per Million : 13C



----- PROCESSING PARAMETERS -----  
 dc\_balance = 0.1 [Hz]  
 f2 = 6.1 [Hz]  
 machinephase =  
 ppm  
 reference = 7.262 [ppm] : 7.26 [ppm]

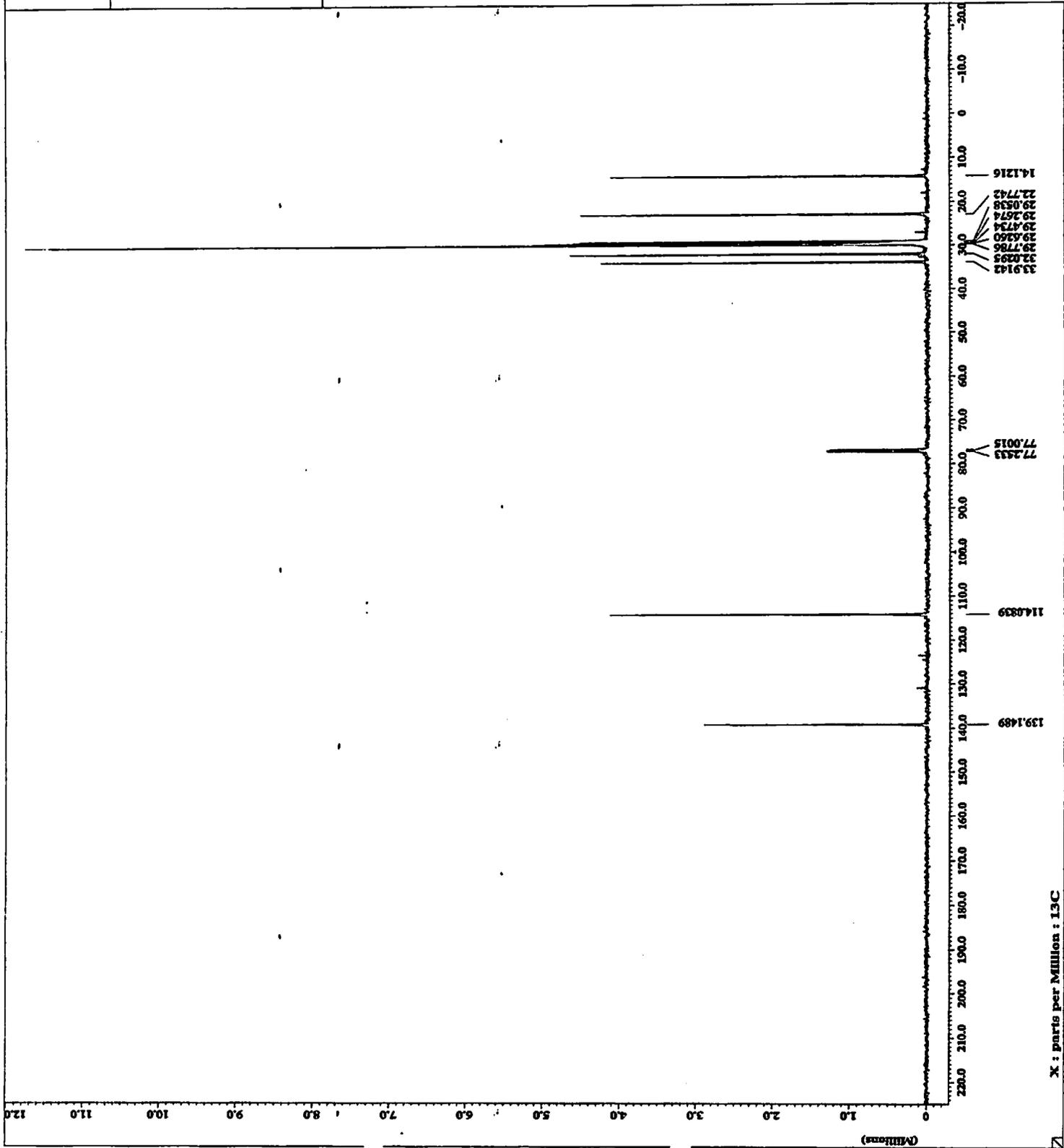
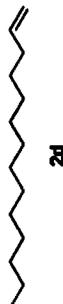
----- ACQUISITION PARAMETERS -----  
 File Name = 1d\_spectrum.467  
 Author =  
 Sample ID = SH-D2-h-12 pure H  
 Content = 81ug 80%  
 Creation Date = 6-APR-2011 11:01:07  
 Revision Date = 9-APR-2011 06:13:47  
 Spec Site = ECP500  
 Spec Type = DELTA NMR  
 Data Format = ID COMPLEX  
 Dimensions = X  
 Dim Title = H  
 Dim Size = 16384  
 Scans = 8  
 Mod\_return = 1  
 X\_domain = H  
 X\_offset = 5 [ppm]  
 X\_start = 0.000000 [MHz]  
 X\_freq = 7.50750751 [MHz]  
 Solvent = CHLOROFORM-D  
 Spin\_get = 16 [Hz]  
 Temp\_get = 20.6 [°C]  
 Accu\_gain = 11.7473575 [T]  
 File\_Length = 11.7473575 [T]  
 Filter\_Mode = BURRHOUGH  
 Filter\_Width = 3.75119936 [MHz]





----- PROCESSING PARAMETERS -----  
 GC\_Balance : 1.0000  
 GC\_P : 3 (Hz)  
 GC\_Q : 1  
 GC\_R : 1  
 Macromolecule :  
 reference : 77.026 (ppm) : 77 (ppm)  
 reference : 77.026 (ppm) : 77 (ppm)  
 reference : 77.026 (ppm) : 77 (ppm)

----- ACQUISITION PARAMETERS -----  
 File Name : 14\_13c\_spectrum.f0  
 Author :  
 Sample ID : 06-03-b-13 pure C  
 Content : single pulse with broad  
 Creation Date : 6-12-2011 11:23:15  
 Revision Date : 9-12-2011 05:07:44  
 Spec site : 202950  
 Spec Type : 13C NMR  
 Dimensions : 1D COMPLEX  
 Dimensions : X  
 Dia Title : 13C  
 Dia Size : 32768  
 Dia Units : (ppm)  
 Dia Incre : 0.5  
 Solv\_System : 1  
 X\_Compain : 13C  
 X\_Offset : 100 (ppm)  
 X\_Freq : 125.761181 (MHz)  
 X\_Prog : 13C (g) (90) (ppm)  
 Solvent : CDCl3/acetone-d6  
 Spin\_Prot : 16 (Hz)  
 Temp\_Ref : 31 (C)  
 Acqy\_Gain : 16  
 Filter\_Freq : 16 (13C/139 MHz)  
 Filter\_Type : 200000000  
 Filter\_Width : 15.7266221 (kHz)



X : parts per Million : 13C





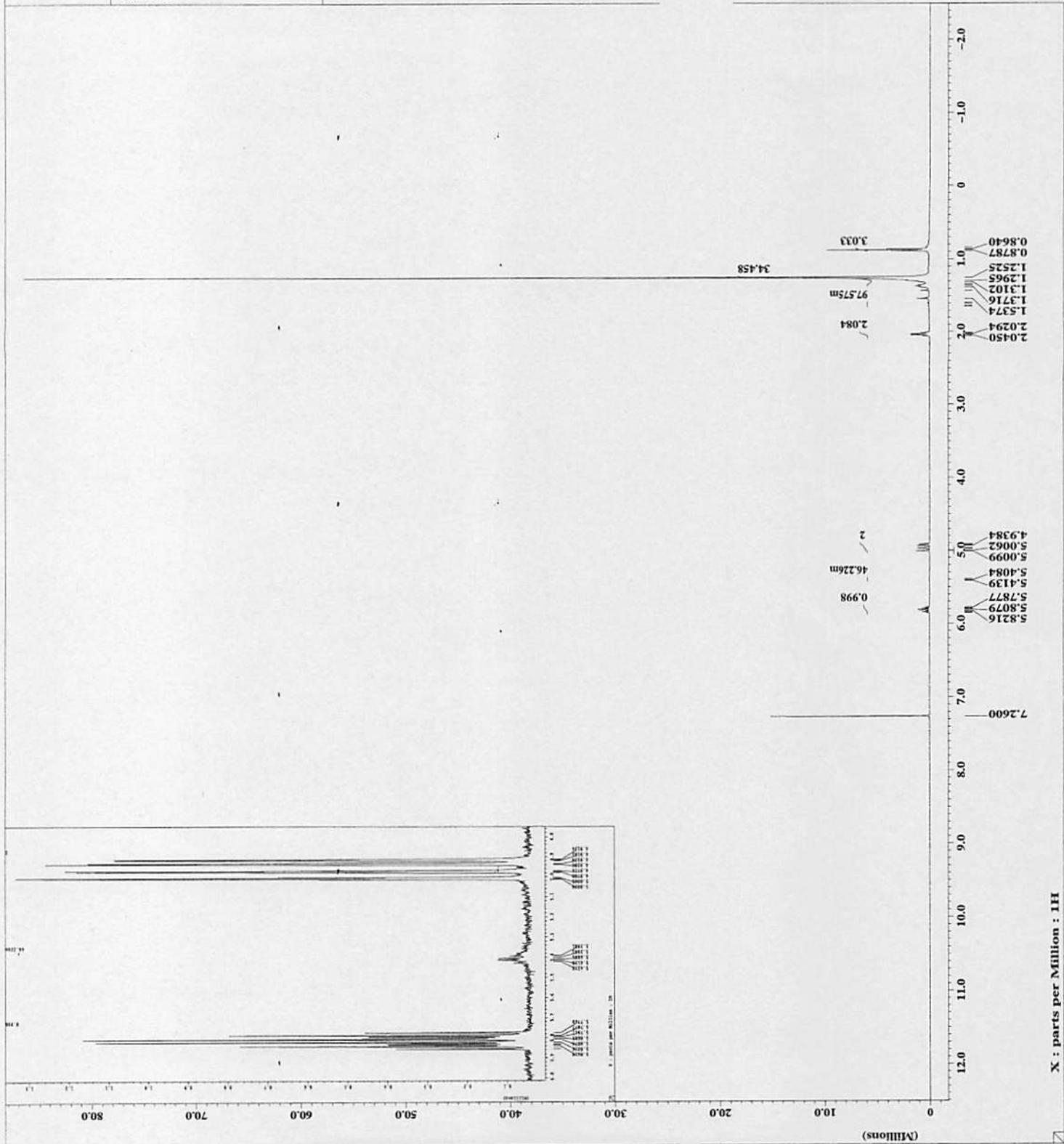






----- PROCESSING PARAMETERS -----  
 dc\_balance =  
 saxp : 0.2[Hz]  
 ffc : 1  
 phase :  
 ppm

----- ACQUISITION PARAMETERS -----  
 F1: Name = 1C\_spectrum.32  
 Auto =  
 Sample ID = SH-D2-b-18 pure H  
 Content = Single Pulse Experiment  
 Creation Date = 8-APR-2011 17:35:36  
 Revision Date = 11-APR-2011 09:41:03  
 Spec Site = ECP500  
 Spec Type = DELTA\_BMR  
 Data Format = 1D\_COMPLEX  
 Data Size = 16  
 Dia Title =  
 Dia Size = 16384  
 Dia Units = [ppm]  
 Scale = 3  
 Name =  
 X\_domain = 1H  
 X\_offset = 5[ppm]  
 X\_freq = 500.16241602[MHz]  
 X\_sweep = 50750751[MHz]  
 C1\_program = D  
 Spin\_get = 13[Hz]  
 Temp\_get = 21.4[°C]  
 Recvr\_gain = 25  
 Field\_strength = 11.7473579[T]  
 Filter\_width = 3.76119936[MHz]



X : parts per Million : 1H





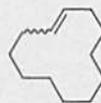




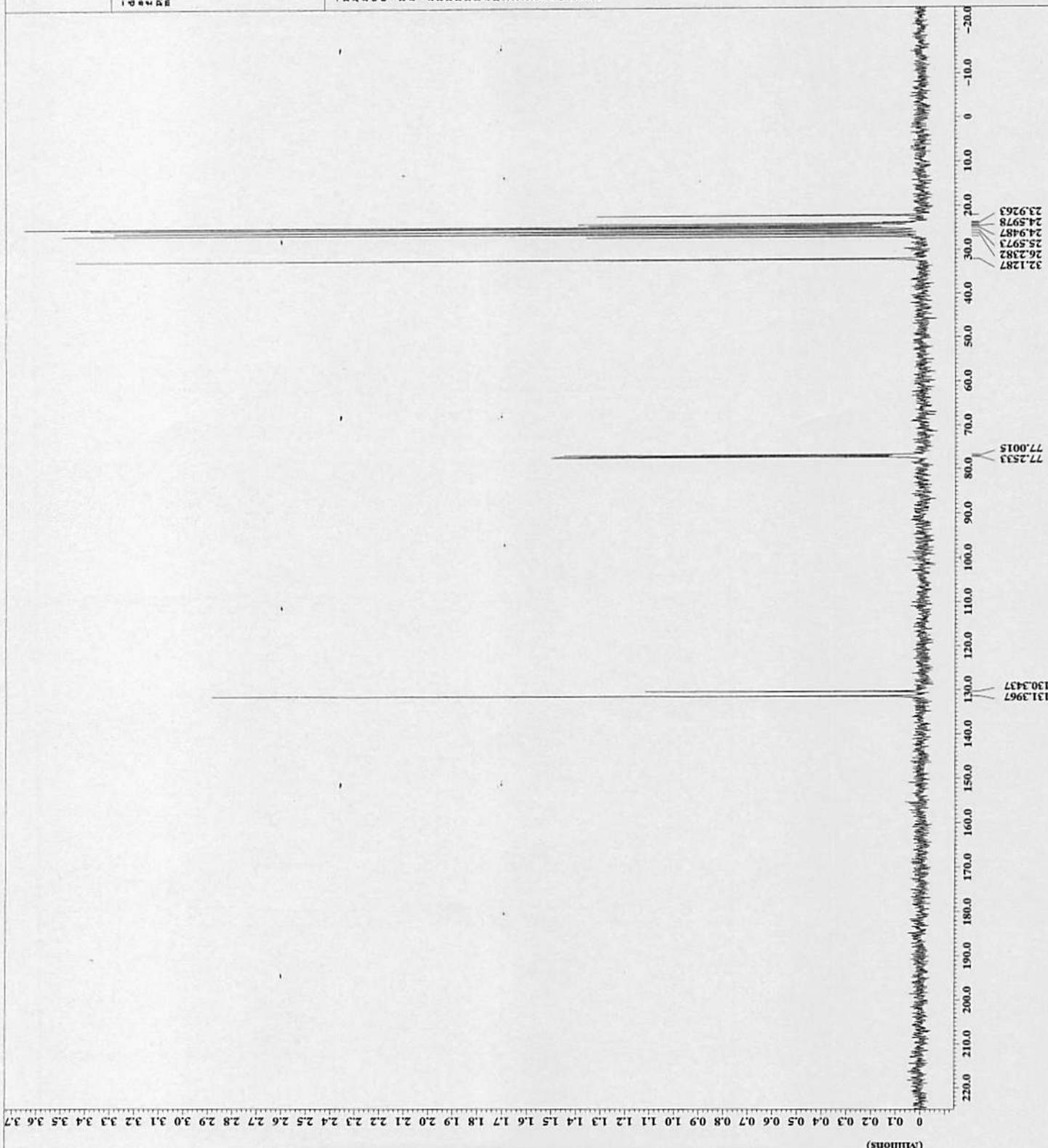


----- PROCESSING PARAMETERS -----  
dc\_balance = 0.000000  
freq = 125.761 (MHz)  
ft = 1  
ppm  
machinephase

----- ACQUISITION PARAMETERS -----  
File Name = 14\_13c\_spectrum.12  
Author = SH-DJ-h-25 pure C  
Sample ID = 140508125  
Content = 125 MHz 13C NMR broad  
Creation Date = 12-APR-2011 19:54:56  
Revision Date = 15-APR-2011 11:40:47  
Spec Site = ECP500  
Spec Type = DELTA\_NMR  
Data Format = 1D\_COMPLEX  
Dimensions = X  
Dim Title = 13C  
Dim Size = 32768  
Dim Units = ppm  
Scans = 109  
Mod\_return = 1  
X\_domain = 13C  
X\_offset = 100 (ppm)  
X\_range = 11.74737519 (MHz)  
X\_res = 31.44554088 (kHz)  
X\_solvent = CHLOROFORM-D  
Solvant = CHLOROFORM-D  
Spin\_get = 15 (Hz)  
Temp\_get = 23.6 (degC)  
Pulse\_gain = 6  
Pulse\_length = 11.74737519 (s)  
Filter\_mode = BPPRESMORPH  
Filter\_width = 15.72066221 (kHz)



2k

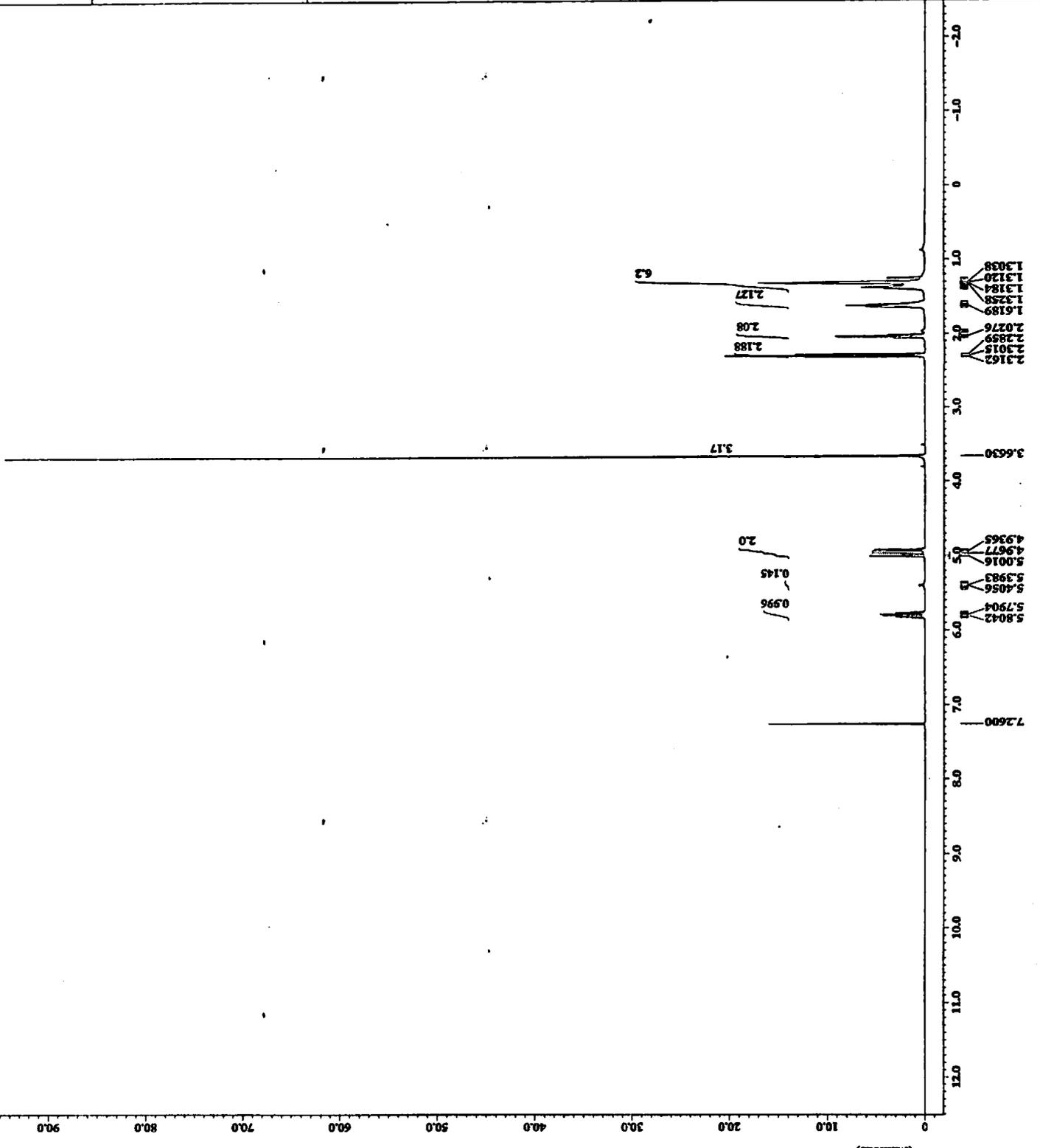


X : parts per Million : 13C



----- PROCESSING PARAMETERS -----  
 File Name: 16\_spectra\_132  
 Date: 20-02-2011 07:21:14  
 Time: 11:02:11  
 User: jk  
 Machine: spect  
 Operator: jk

----- ACQUISITION PARAMETERS -----  
 File Name: 16\_spectra\_132  
 Sample ID: 20-02-2011 07:21:14  
 Content: Single Pulse Experiment  
 Creation Date: 15-07-2011 15:08:23  
 Revision Date: 15-07-2011 07:21:14  
 Spec Site: EXP010  
 Spec Type: 1D COSY  
 Data Format: 1D COSY  
 Num Channels: 1  
 Num P1: 1  
 Num P2: 1  
 Num P3: 1  
 Num P4: 1  
 Num P5: 1  
 Num P6: 1  
 Num P7: 1  
 Num P8: 1  
 Num P9: 1  
 Num P10: 1  
 Num P11: 1  
 Num P12: 1  
 Num P13: 1  
 Num P14: 1  
 Num P15: 1  
 Num P16: 1  
 Num P17: 1  
 Num P18: 1  
 Num P19: 1  
 Num P20: 1  
 Num P21: 1  
 Num P22: 1  
 Num P23: 1  
 Num P24: 1  
 Num P25: 1  
 Num P26: 1  
 Num P27: 1  
 Num P28: 1  
 Num P29: 1  
 Num P30: 1  
 Num P31: 1  
 Num P32: 1  
 Num P33: 1  
 Num P34: 1  
 Num P35: 1  
 Num P36: 1  
 Num P37: 1  
 Num P38: 1  
 Num P39: 1  
 Num P40: 1  
 Num P41: 1  
 Num P42: 1  
 Num P43: 1  
 Num P44: 1  
 Num P45: 1  
 Num P46: 1  
 Num P47: 1  
 Num P48: 1  
 Num P49: 1  
 Num P50: 1  
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 Num P90: 1  
 Num P91: 1  
 Num P92: 1  
 Num P93: 1  
 Num P94: 1  
 Num P95: 1  
 Num P96: 1  
 Num P97: 1  
 Num P98: 1  
 Num P99: 1  
 Num P100: 1

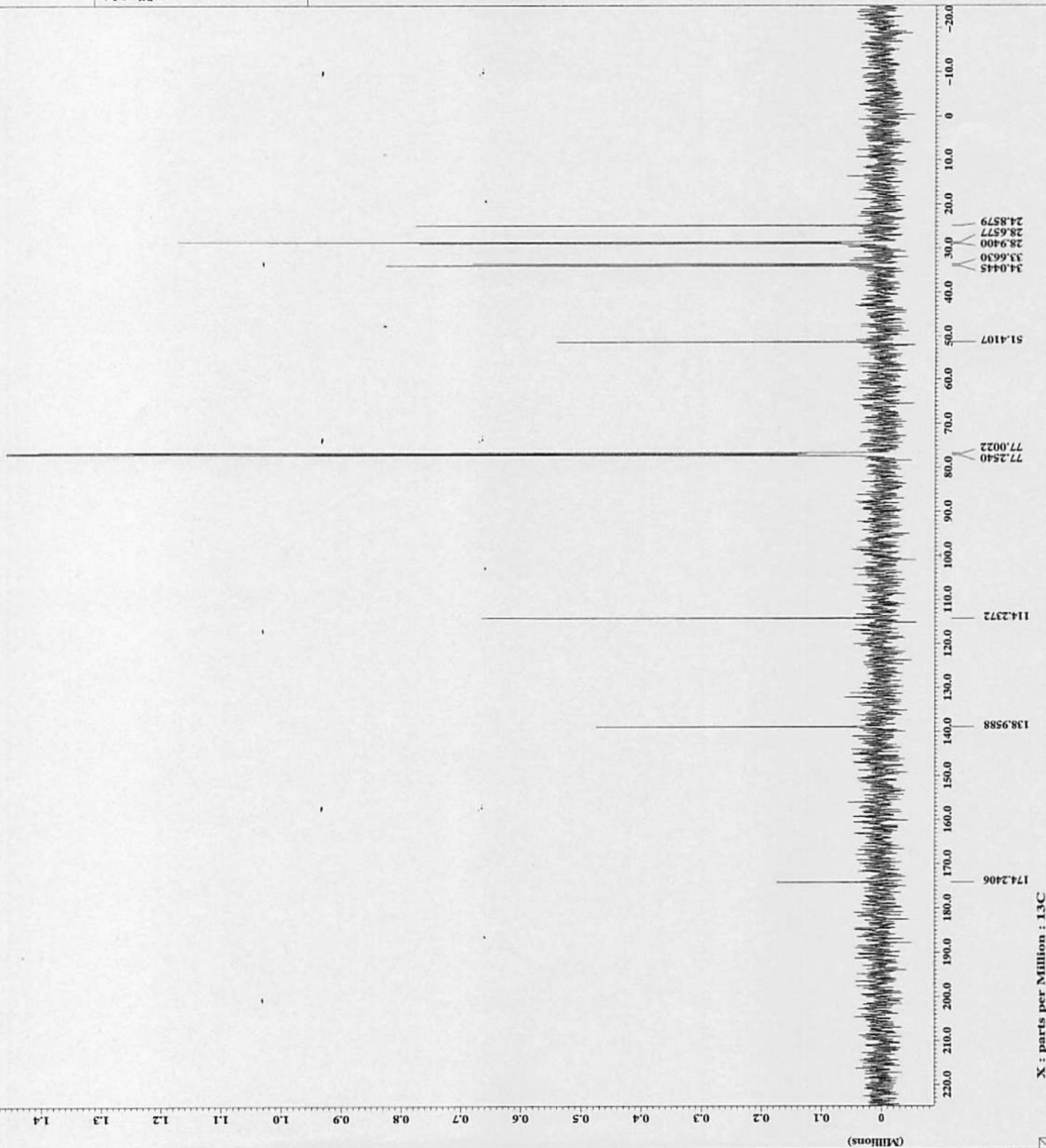
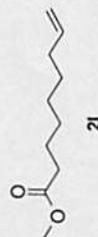


X: parts per Million : 1H



----- PROCESSING PARAMETERS -----  
dc\_balance = 0.000000  
freq = 125.761 [MHz]  
ftc = 1  
Dm = 1  
machinephase =

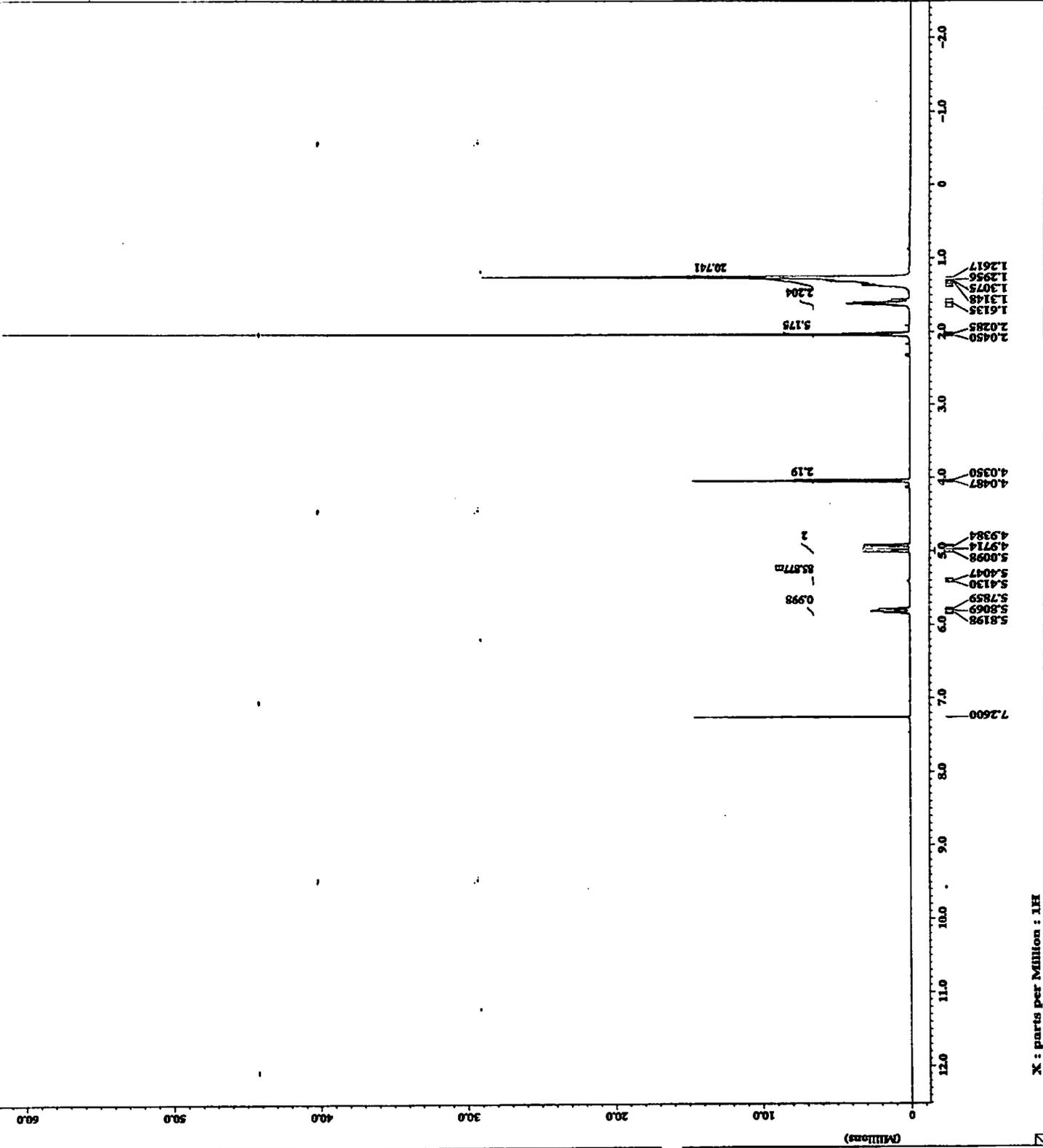
----- ACQUISITION PARAMETERS -----  
File Name = 1d\_13c\_spectrum.14  
Author =  
Sample ID = SN-D2-h-29 pure C  
Content = Single pulse with Broad  
Creation Date = 19-APR-2011 15:19:19  
Revision Date = 18-APR-2011 07:28:15  
Spec Site = ECP500  
Spec Type = WALTZ16\_NMR  
Data Format = 1D\_COMPLEX  
Dimensions = X  
Dim Title = 13C  
Dim Size = 32768  
Dim Units = ppm  
Scans = 101  
Mod\_return = 1  
X\_domain = 13C  
X\_offset = 100 [ppm]  
X\_resolution = 7547 [Hz]  
X\_sweep = 31.44654088 [kHz]  
Solvent = CHLOROFORM-D  
Spin\_get = 14 [Hz]  
Temp\_get = 32.8 [C]  
Acq\_start = 11.7473578 [T]  
Field\_strength = 11.7473578 [T]  
Filter\_mode = BUTTERWORTH  
Filter\_width = 15.72066221 [kHz]





----- PROCESSING PARAMETERS -----  
 da balance  
 exp : 0.1[Hz]  
 ft : 1  
 phase  
 ppm

----- ACQUISITION PARAMETERS -----  
 File Name : 1A\_spectrum\_168  
 Sample :  
 Sample ID : 20-02-b-13 Sr. 8-14 B  
 Content : Single Pulse Experiment  
 Creation Date : 16-APR-2011 13:19:17  
 Revision Date : 16-APR-2011 05:35:07  
 Spec Site : 202500  
 Spec Type : HELIX\_MW  
 Data Format : 1D CHEM2K  
 Data Size : 1k  
 Dia Size : 16384  
 Dia Units : (ppm)  
 Scans : 0  
 Acquisition : 0  
 X\_Axis : 0  
 X\_Offset : 5 [ppm]  
 X\_Freq : 500.16241602 [MHz]  
 X\_Pulsep : 7.50780751 [Pps]  
 X\_Pulse : 0  
 X\_PulseOff : 0  
 X\_PulseOn : 31 [ns]  
 X\_PulseOff : 20.7 [ns]  
 X\_PulseOn : 25  
 X\_PulseOff : 0  
 X\_PulseOn : 31.7493782 [ns]  
 X\_PulseOff : 0  
 X\_PulseOn : 3.75119934 [ns]



X : parts per Million : 1H

