Electronic Supplementary Information (ESI)

Driving an equilibrium acetalization to completion in the presence of water

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General Information:

A microchannel reactor having a channel pattern of 100 μm width, 40 μm depth, 20, 40, or 120 mm length, and a Y-junction (purchased from the Institute of Microchemical Technology, Co., Ltd., (Kanagawa, Japan; URL: http://www.i-mt.co.jp) was used, the ends of which were connected via a PTFE tubing (ϕ_{inside} = 0.2 mm; ϕ_{outer} = 0.4 mm) to a flow-controlled syringe on syringe pumps. Water was deionized with a Millipore system as a Milli-Q grade. ^{1}H NHR spectra were recorded with in $CDCl_3$ at 25 °C on a JEOL JNM-AL500 spectrometer (500 MHz). For ^{1}H NMR spectra, proton chemical shifts (δ) are given in ppm relative to tetramethylsilane (0.00 ppm) in $CDCl_3$. Multiplicities are indicated by s (singlet), d (doublet), t (triplet), m (multiplet), and br (broad). For ^{13}C NMR spectra, carbon chemical shifts were internally referenced to the deuterated solvent signal of CD Cl_3 (77.16 ppm). SEM images were obtained by using a scanning electron microscope (JEOL JSM-6700F). The flow reactions were performed in a microchannel reactor under an atmospheric air.

Experimental Section:

Preparation of a poly(4-styrenesulfonic acid)-poly(4-vinylpyridine) membrane inside a microchannel.

An aqueous solution of poly(4-styrenesulfonic acid) (60 mM: solution A) and an 2-propanol solution of poly(4-vinylpyridine) (1.0 mM: solution B) were charged oppositely into the microchannel at 25 °C for 10 min with a flow rate of 10 μL/min. Two-phase parallel laminar flow was formed under the flowing conditions and a polymer membrane was precipitated out at the interface between the two parallel flows. (thickness of membrane = 20 μm).

General procedure for the acetal formation using a microchannel having a polymeric acid catalyst.

A toluene solution of carbonyl compound (100 mM; solution A) and an ethylene glycol solution (solution B) were oppositely introduced the membrane-divided channel at 50-80°C with a flow rate of 0.1 μl/min, and two parallel laminar layers flowed through the channel 19-38 seconds. The organic/ethylene glycol micro stream was collected from the outlet of the channel to give 1,3-dioxolane (64-97% conversion).

^{1}H and ^{13}C NMR data of products

1,4-dioxaspiro[4.5]decane (3a)

^{1}H NMR (500 MHz, $CDCl_3$): δ 1.41 (brs, 2H), 1.59-1.61 (m, 8H), 3.94 (s, 4H). ^{13}C NMR (125 MHz, $CDCl_3$): δ 24.1, 25.3, 35.3, 64.3, 109.3. GC-TOF HRMS: calcd for $C_8H_{14}O_2$ $[M]^+$ 142.0994, found 142.0990.

2-pentyl-1,3-dioxolane (3b)

^{1}H NMR (500 MHz, $CDCl_3$): δ 0.88-0.91 (m, 3H), 1.30-1.45 (m, 6H), 1.64-1.67 (m, 2H), 3.82-4.00 (m, 4H), 4.85 (t, *J* = 4.7 Hz, 1H). ^{13}C NMR (125 MHz, $CDCl_3$): δ 14.1, 22.7, 23.9, 31.9, 34.0, 65.0, 104.9. GC-TOF HRMS: calcd for $C_8H_{15}O_2$ $[M-H]^+$ 143.1072, found 143.1042.

2-hexyl-1,3-dioxolane (3c)

^{1}H NMR (500 MHz, $CDCl_3$): δ 0.87-0.90 (m, 3H), 1.26-1.43 (m, 8H), 1.63-1.67 (m, 2H), 3.82-4.00 (m, 4H), 4.84 (t, *J* = 5.0 Hz, 1H). ^{13}C NMR (125 MHz, $CDCl_3$): δ 14.2, 22.7, 24.2, 29.4, 31.9, 34.1, 65.0, 104.9. GC-TOF HRMS: calcd for $C_9H_{17}O_2$ $[M-H]^+$ 157.1229, found 157.1204.

2-heptyl-1,3-dioxolane (3d)

^{1}H NMR (500 MHz, $CDCl_3$): δ 0.86-0.89 (m, 3H), 1.27-1.43 (m, 10H), 1.63-1.67 (m, 2H), 3.82-4.00 (m, 4H), 4.84 (t, *J* = 5.0 Hz, 1H). ^{13}C NMR (125 MHz, $CDCl_3$): δ 14.2, 22.8, 24.3, 29.4, 29.7, 31.9, 34.1, 65.0, 104.9. GC-TOF HRMS: calcd for $C_{10}H_{19}O_2$ $[M-H]^+$ 171.1385, found 171.1380.

(*E*)-2-(pent-3-enyl)-1,3-dioxolane (3e)

^{1}H NMR (500 MHz, CDCl$_3$): *δ* 0.90-0.93 (m, 3H), 1.43 (sext, *J* = 7.4 Hz, 2H), 2.04-2.09 (m, 2H), 3.86-4.03 (m, 4H), 5.19 (d, *J* = 6.3 Hz, 1H), 5.48 (dddd, *J* = 1.2, 1.8, 6.9, 15.5 Hz, 1H), 5.94 (dt, *J* = 6.9 Hz, 15.5 Hz, 1H). ^{13}C NMR (125 MHz, CDCl$_3$): *δ* 13.8, 22.0, 34.2, 65.1, 104.4, 126.4, 138.0. GC-TOF HRMS: calcd for $C_8H_{13}O_2$ [M-H]$^+$ 141.0916, found 141.0899.

2-phenyl-1,3-dioxolane (3f)

^{1}H NMR (500 MHz, CDCl$_3$): *δ* 4.01-4.16 (m, 4H), 5.82 (s, 1H), 7.35-7.40 (m, 3H), 7.46-7.49 (m, 2H). ^{13}C NMR (125 MHz, CDCl$_3$): *δ* 65.5, 103.9, 126.5, 128.5, 129.3, 138.0. GC-TOF HRMS: calcd for $C_9H_{10}O_2$ [M]$^+$ 150.0681, found 150.0683.

2-(4-bromophenyl)-1,3-dioxolane (3g)

^{1}H NMR (500 MHz, CDCl$_3$): *δ* 4.00-4.14 (m, 4H), 5.77 (s, 1H), 7.35 (d, *J* = 8.4 Hz, 2H), 7.51 (d, *J* = 8.4 Hz, 2H). ^{13}C NMR (125 MHz, CDCl$_3$): *δ* 65.5, 103.2, 123.4, 128.3, 131.7, 137.2. GC-TOF HRMS: calcd for $C_9H_9O_2Br$ [M]$^+$ 227.9786, found 227.9801.

2-(furan-2-yl)-1,3-dioxalane (3h)

^{1}H NMR (500 MHz, CDCl$_3$): *δ* 3.97-4.97 (m, 4H), 5.92 (s, 1H), 6.35 (dd, *J* = 1.2, 2.0 Hz, 1H), 6.44 (d, *J* = 2.9 Hz, 1H), 7.42 (m, 1H). ^{13}C NMR (125 MHz, CDCl$_3$): *δ* 65.3, 97.8, 108.8, 110.2, 143.3, 151.2. GC-TOF HRMS: calcd for $C_7H_8O_3$ [M]$^+$ 140.0473, found 140.0485.

2-(thiophen-2-yl)-1,3-dioxolane (3i)

^{1}H NMR (500 MHz, CDCl$_3$): *δ* 3.99-4.17 (m, 4H), 6.12 (s, 1H), 6.70 (dd, *J* = 1.2, 3.7 Hz, 1H), 7.17

(d, J = 2.9 Hz, 1H), 7.33 (dd, J = 1.2, 5.2 Hz). ^{13}C NMR (125 MHz, $CDCl_3$): δ 65.4, 100.4, 126.4, 126.5, 126.8, 141.9. GC-TOF HRMS: calcd for $C_7H_8O_2S$ $[M]^+$ 156.2032, found 156.2057.

6-methyl-1,4-dioxaspiro[4.5]decane (3j)

^{1}H NMR (500 MHz, $CDCl_3$): δ 0.88 (d, J = 6.9 Hz, 3H), 1.21-1.38 (m, 3H), 1.43-1.77 (m, 6H), 3.90-3.98 (m, 4H). ^{13}C NMR (125 MHz, $CDCl_3$): δ 14.4, 24.3, 24.9, 32.5, 35.0, 39.7, 65.0, 65.2, 110.9. GC-TOF HRMS: calcd for $C_9H_{16}O_2$ $[M]^+$ 156.1150, found 156.1167.

1,4-dioxa-8-aza-spiro[4.5]decane-8-carboxylic acid *tert*-butyl ester (3k)

^{1}H NMR (500 MHz, $CDCl_3$): δ 1.46 (s, 9H), 1.65 (t, J = 5.6 Hz, 4H), 3.50 (t, J = 5.6 Hz, 4H), 3.97 (s, 4H). ^{13}C NMR (125 MHz, $CDCl_3$): δ 28.6, 35.0, 42.0, 64.5, 79.7, 107.3, 154.8. GC-TOF HRMS: calcd for $C_{12}H_{21}O_4N[M]^+$ 243.1471, found 243.1445.

octahydro-spiro[1,3-dioxolane-2,1’(2’*H*)-naphthalene] (3l)

^{1}H NMR (500 MHz, $CDCl_3$): δ 0.90-1.44 (m, 8H), 1.46-1.84 (m, 8H), 3.85-3.98 (m, 4H). ^{13}C NMR (125 MHz, $CDCl_3$): δ 23.2, 24.3, 26.3, 26.3, 33.5, 34.5, 35.8, 40.0, 50.4, 65.1, 65.4, 110.4. GC-TOF HRMS: calcd for $C_{12}H_{20}O_2$ $[M]^+$ 196.1463, found 196.1439.

8a’-methyl-3’,4’,8’,8a’-tetrahydro-2’*H*-spiro[1,3-dioxolane-2,1’-naphthalen]-6’(7’*H*)-one (3m)

^{1}H NMR (500 MHz, $CDCl_3$): δ 1.36 (s, 3H), 1.63-1.82 (m, 5H), 1.87-1.93 (m, 1H), 2,26-2.47 (m, 6H), 3.92-4.00 (m, 4H), 5.82 (d, J = 2.3 Hz, 1H). ^{13}C NMR (125 MHz, $CDCl_3$): δ 20.7, 21.9, 27.0, 30.2, 31.6, 34.1, 45.2, 65.2, 65.5, 112.5, 125.8, 167.8, 199.4. GC-TOF HRMS: calcd for $C_{13}H_{18}O_3$

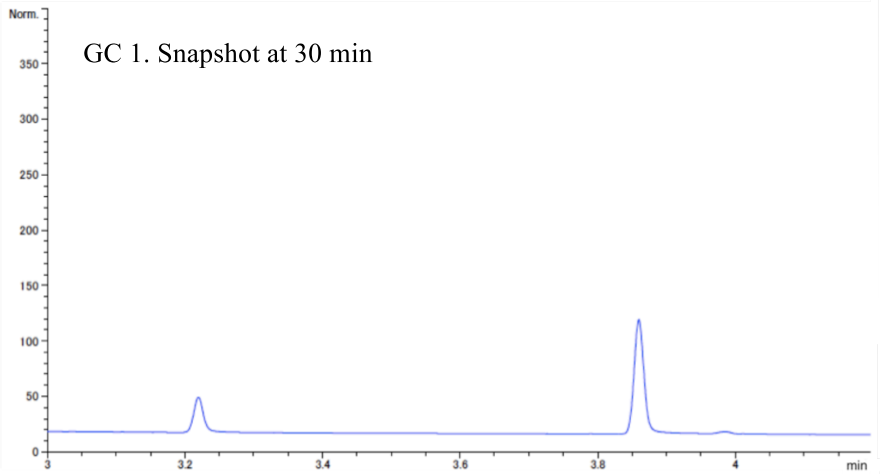
$[M]^+$ 222.1256, found 222.1244.

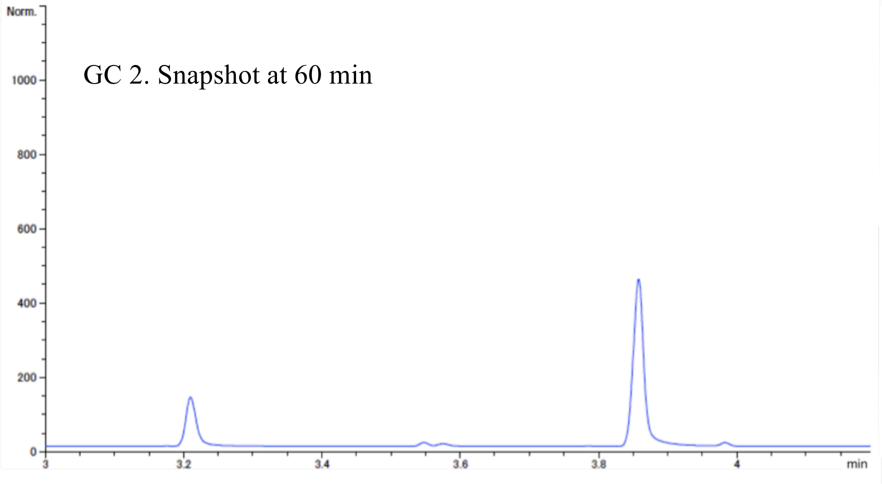
1,5-dioxaspiro[5.5]undecane (3n)

^{1}H NMR (500 MHz, $CDCl_3$): δ 1.39-1.43 (m, 2H), 1.50-1.54 (m, 4H), 1.69-1.78 (m, 6H), 3.89-3.91 (m, 4H). ^{13}C NMR (125 MHz, $CDCl_3$): δ 22.5, 25.9, 25.9, 33.2, 59.2, 98.0. GC-TOF HRMS: calcd for $C_9H_{16}O_2$ $[M]^+$ 156.1150, found 156.1152.

Reaction Snapshots with GC

Cyclohexanone (**1a**: retention time: 3.2 min) and 1,4-dioxaspiro[4.5]decane (**3a**: retention time: 3.8 min)


GC 1. Snapshot at 30 min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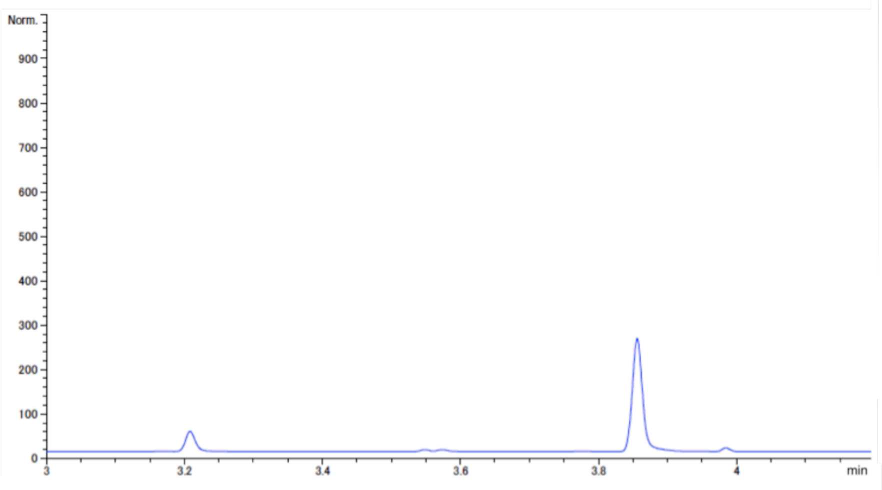
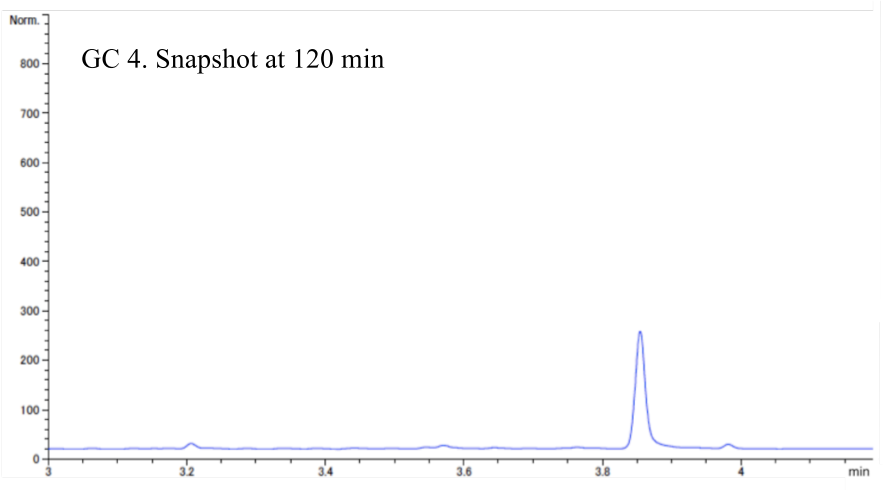
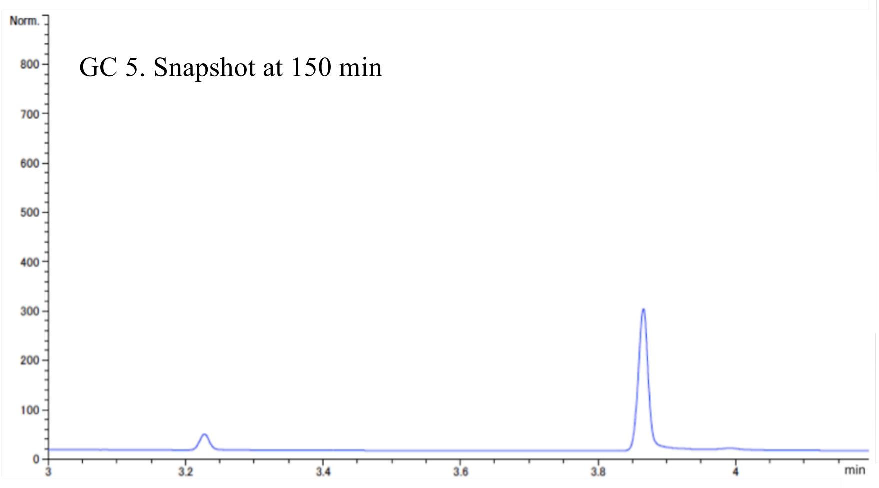



GC 4. Snapshot at 120 min


GC 5. Snapshot at 150 min

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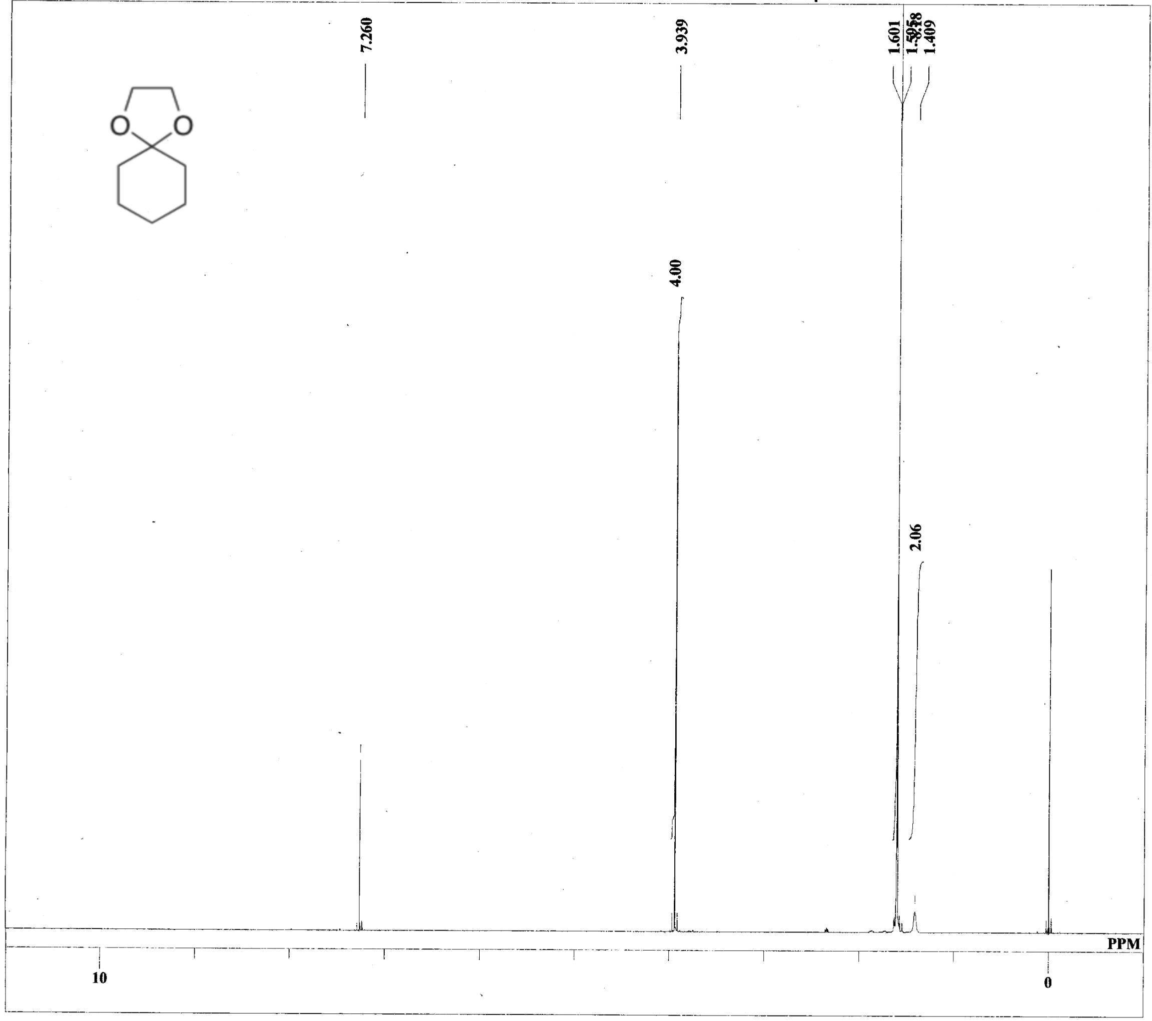

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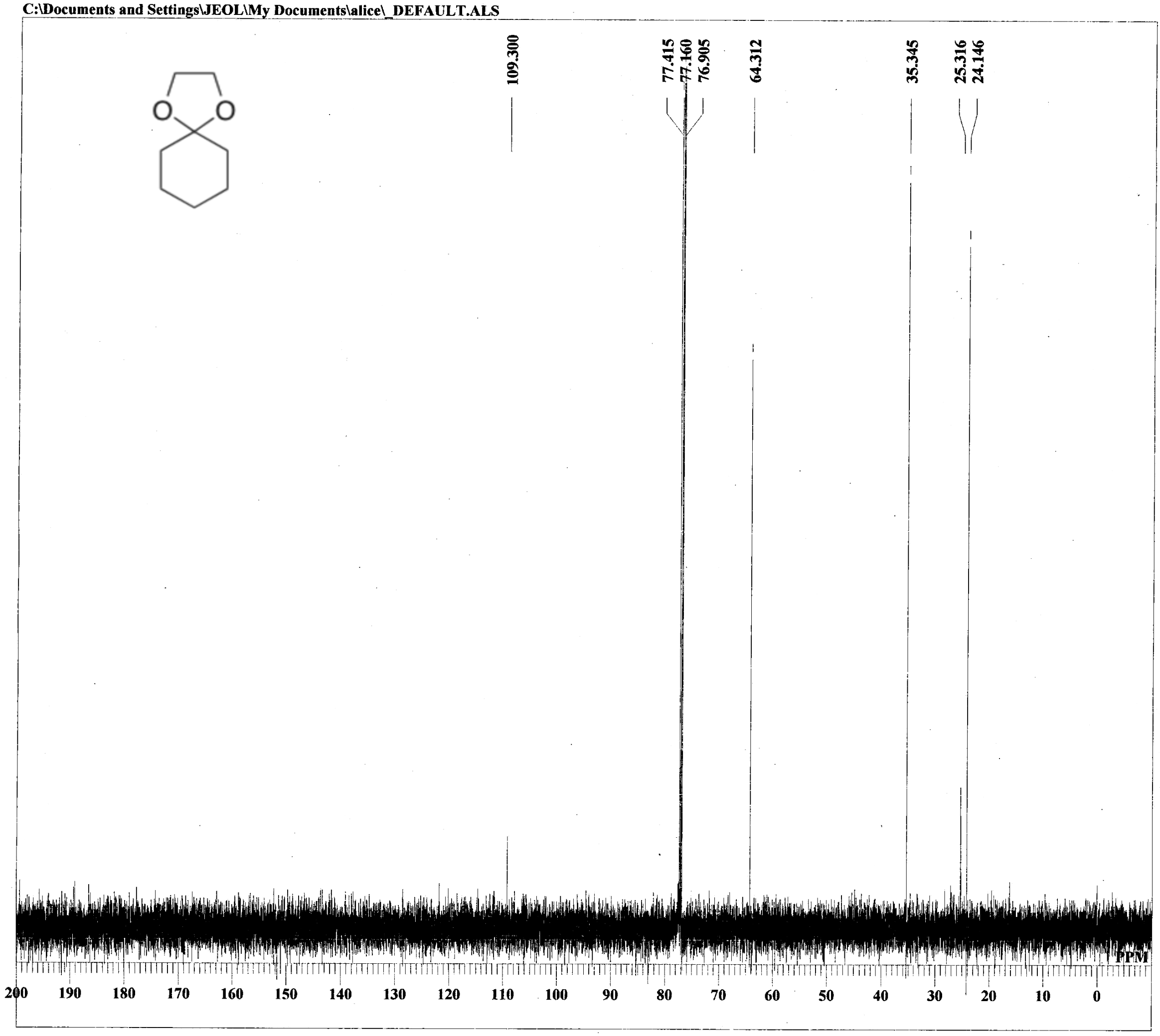

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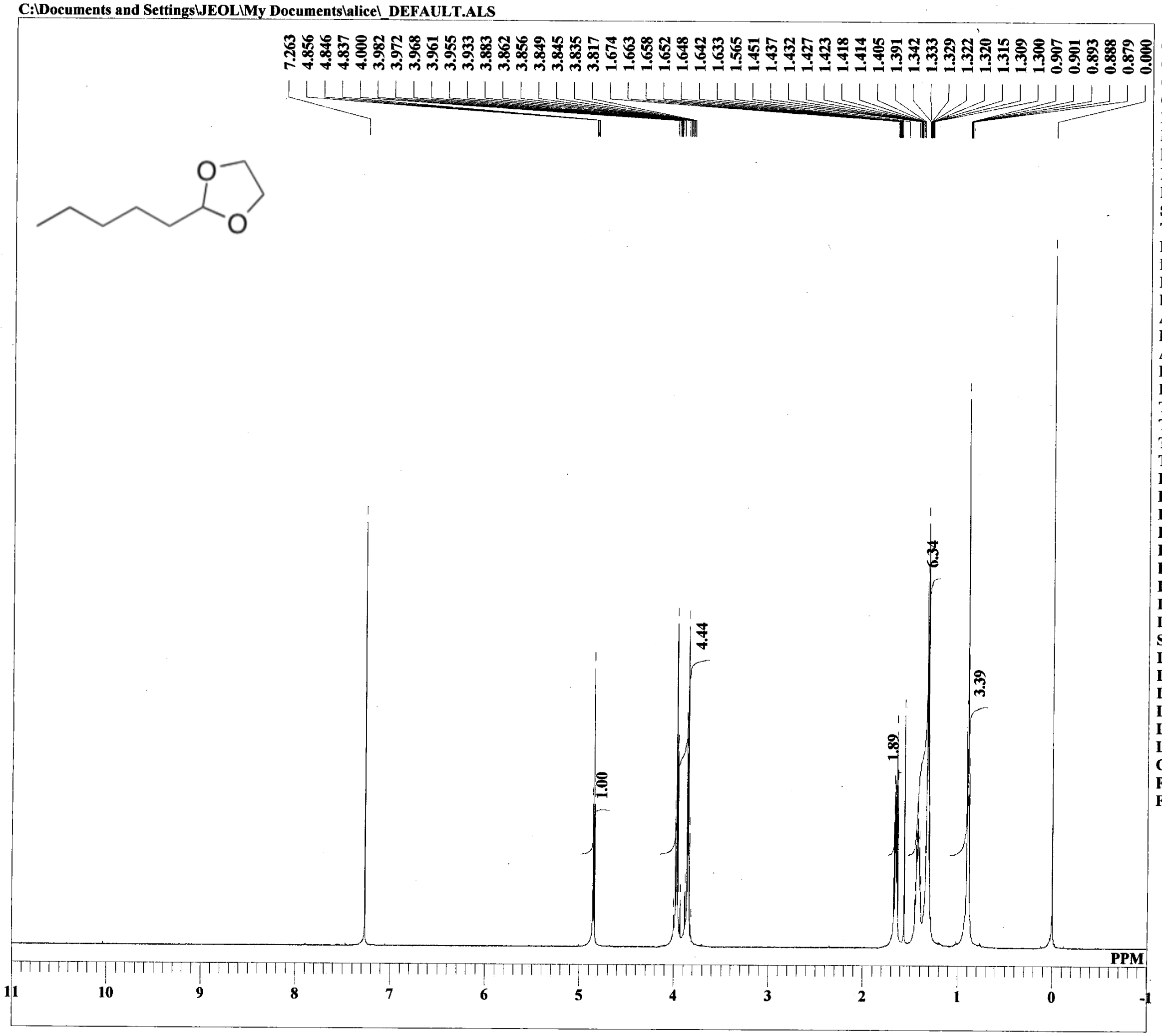

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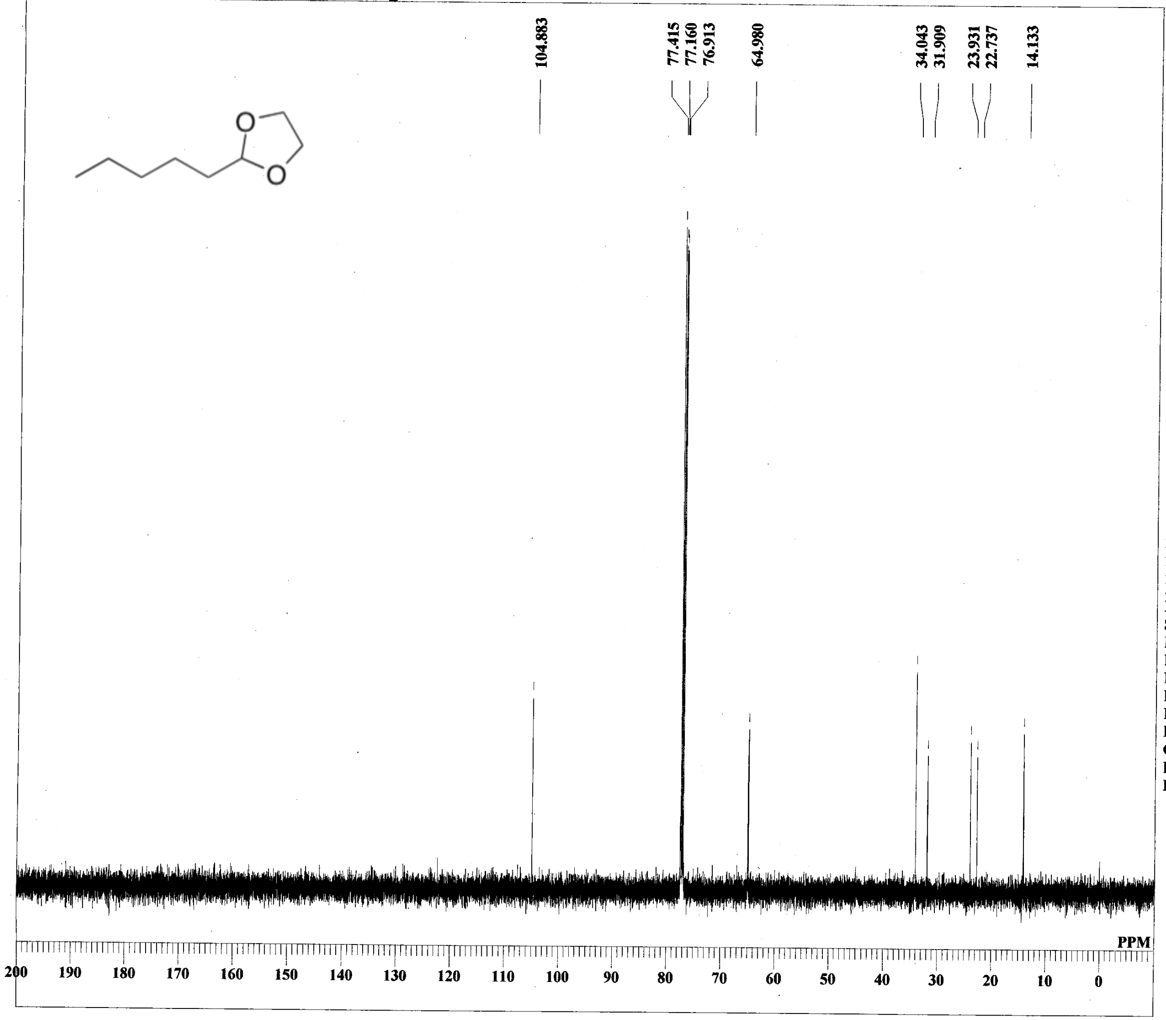

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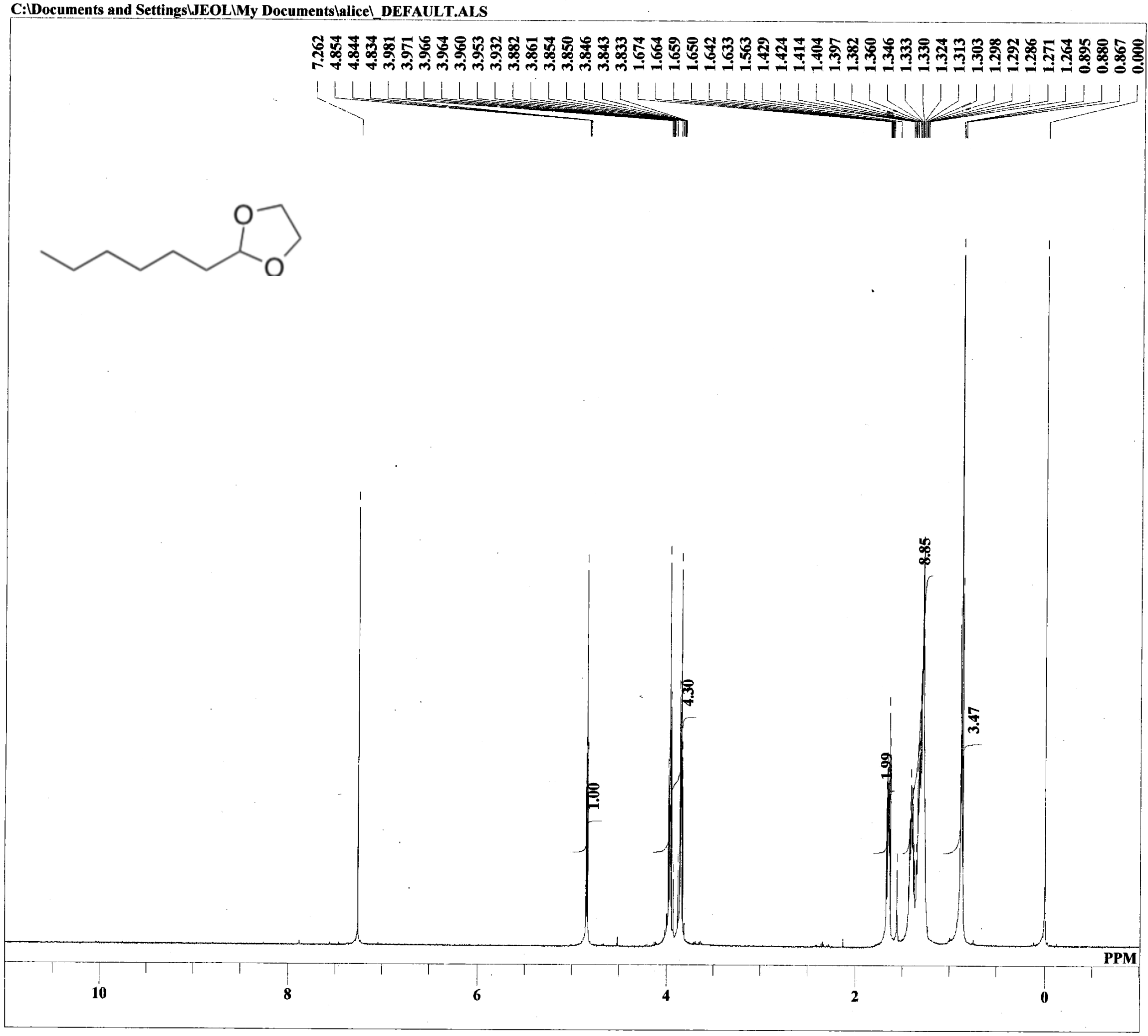

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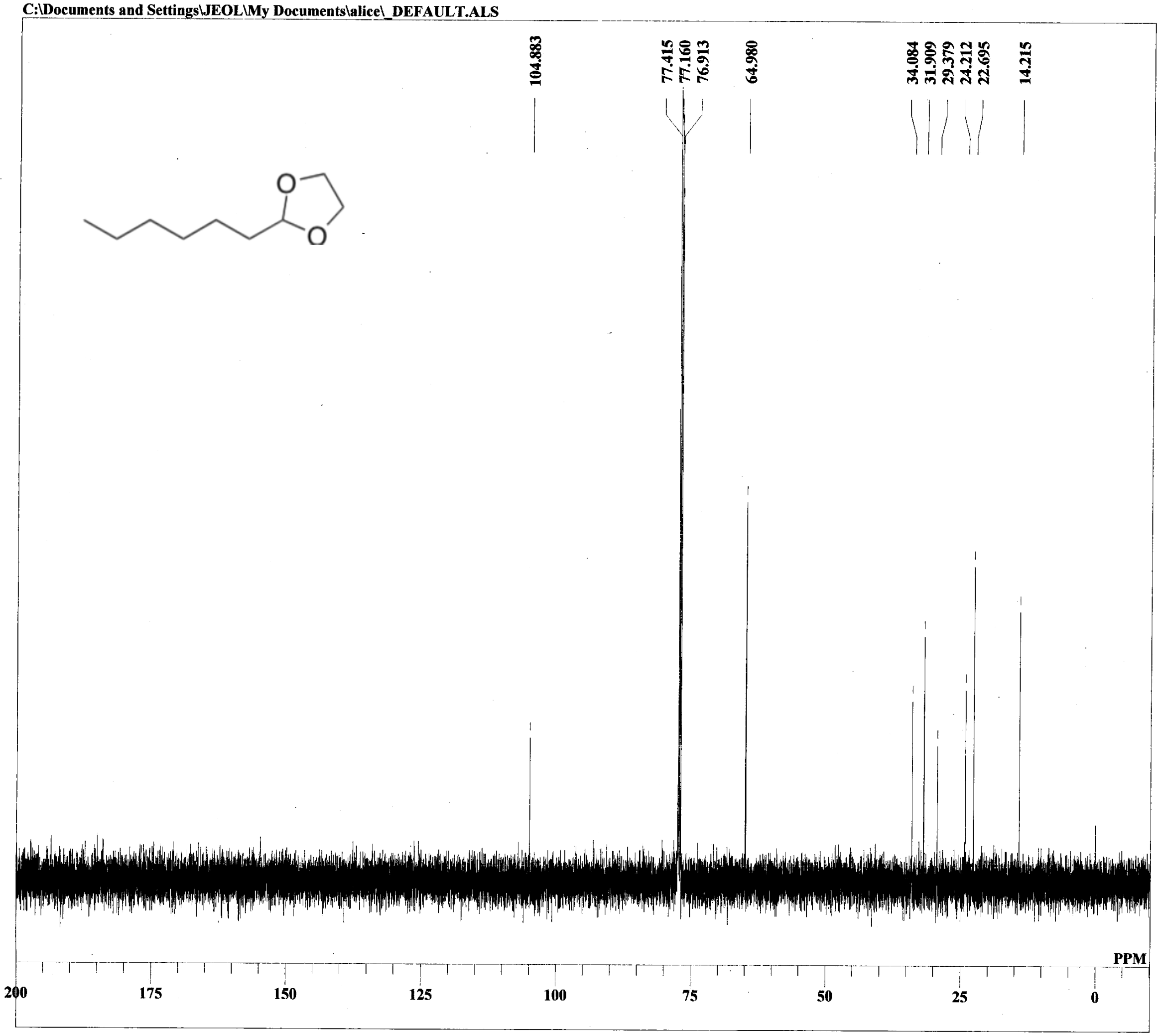

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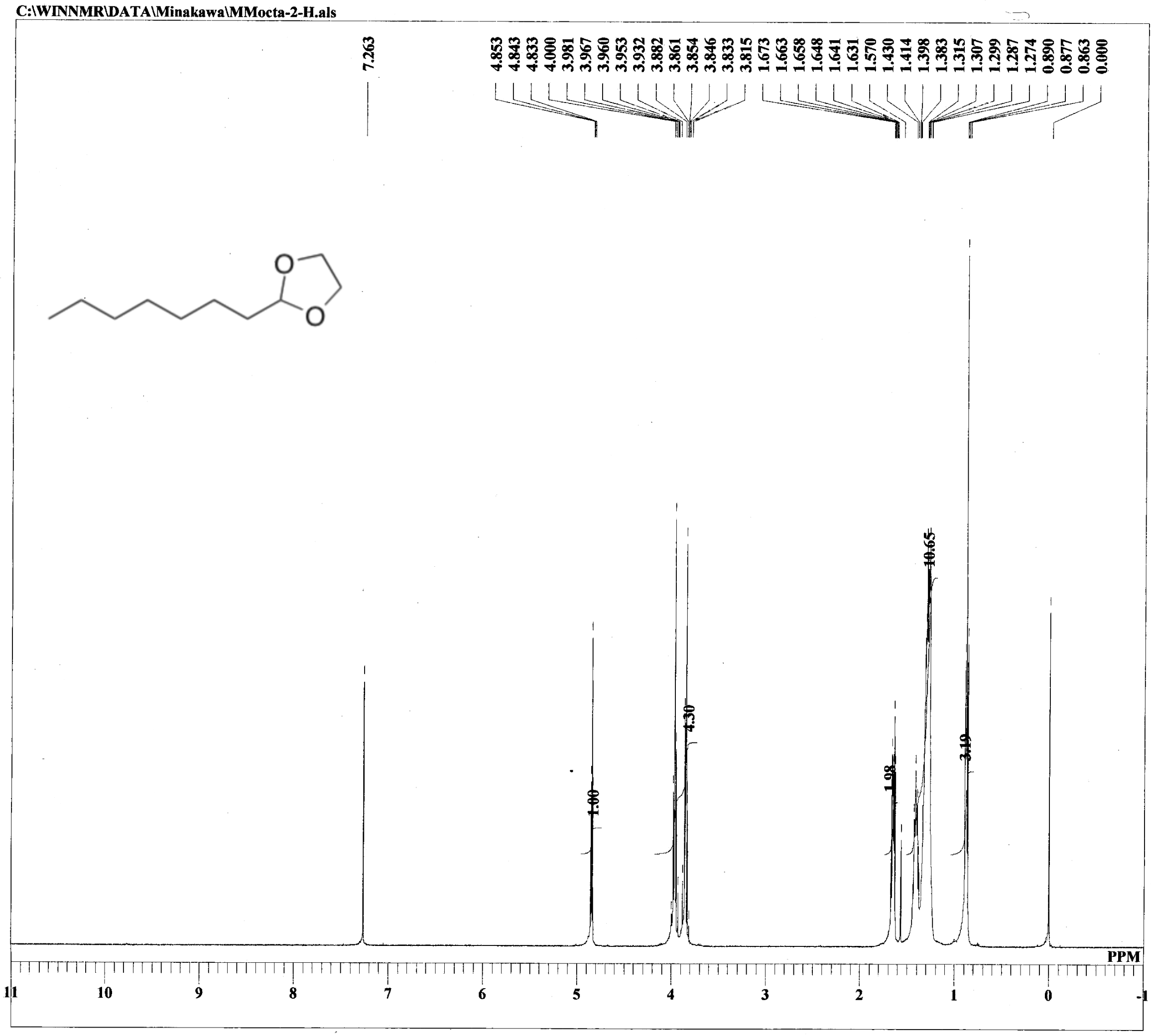

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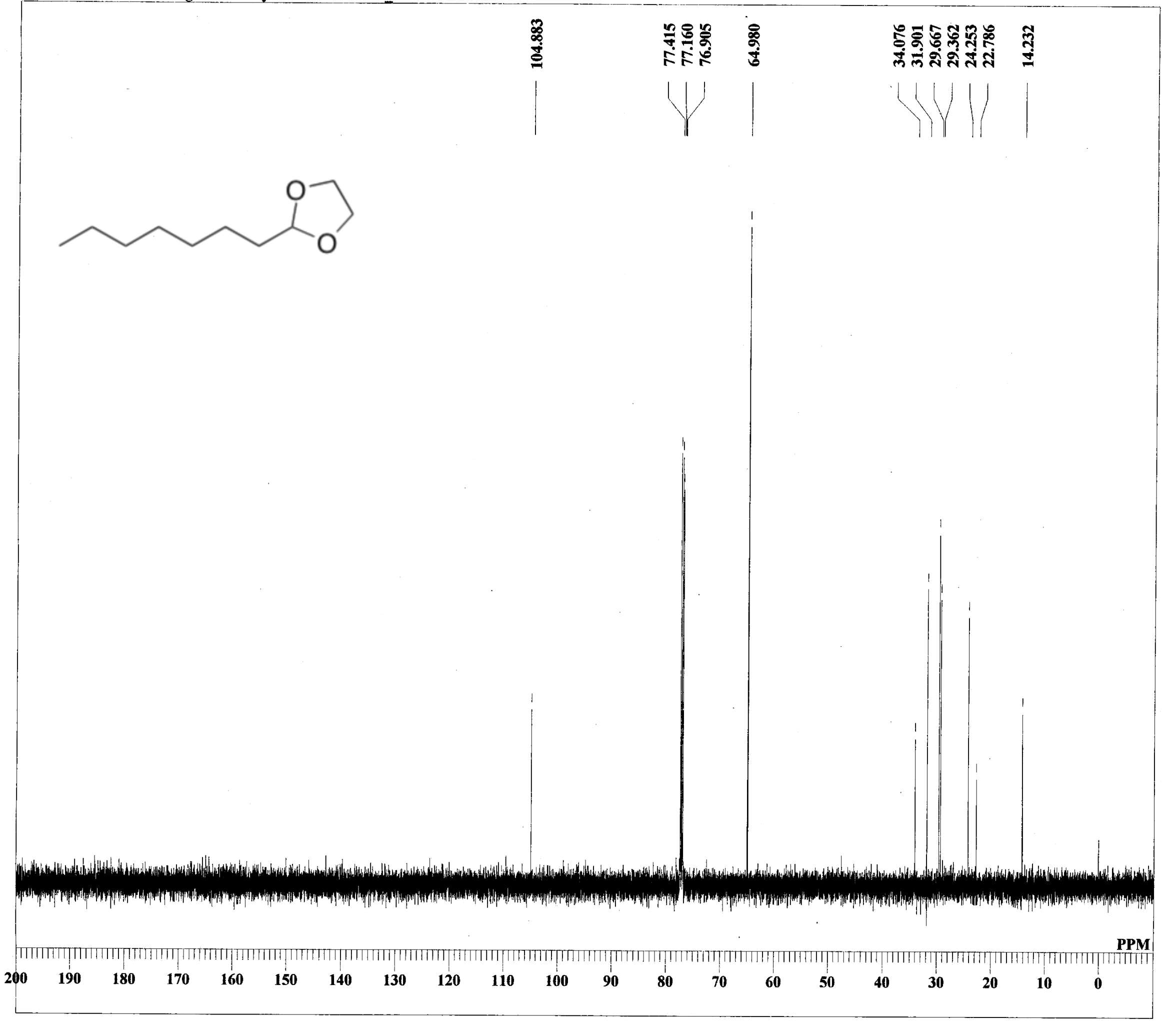

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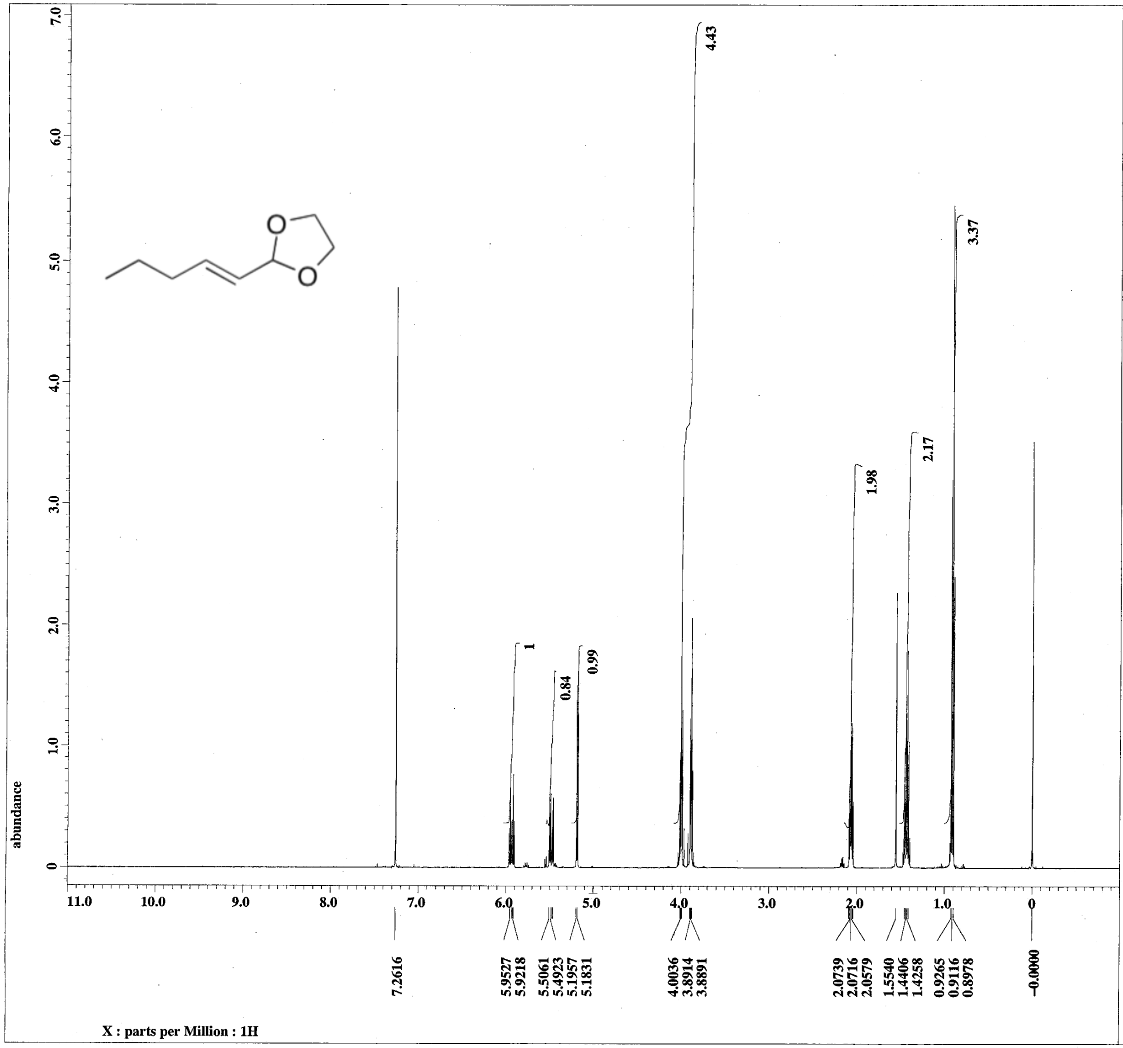
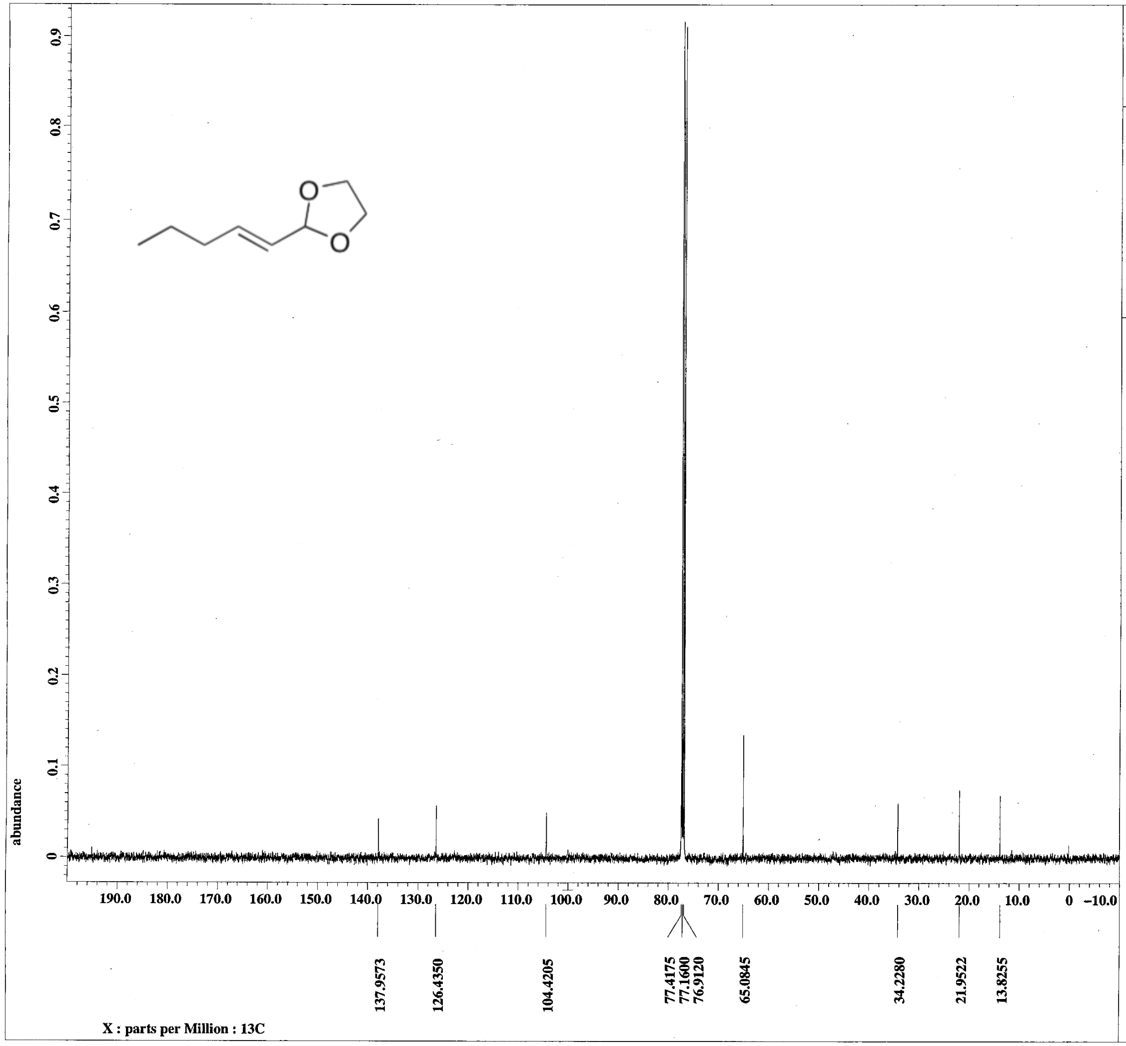
LKPHS	91
LKSIG	1384
CSPED	16 Hz
FILDC	
FILDF	



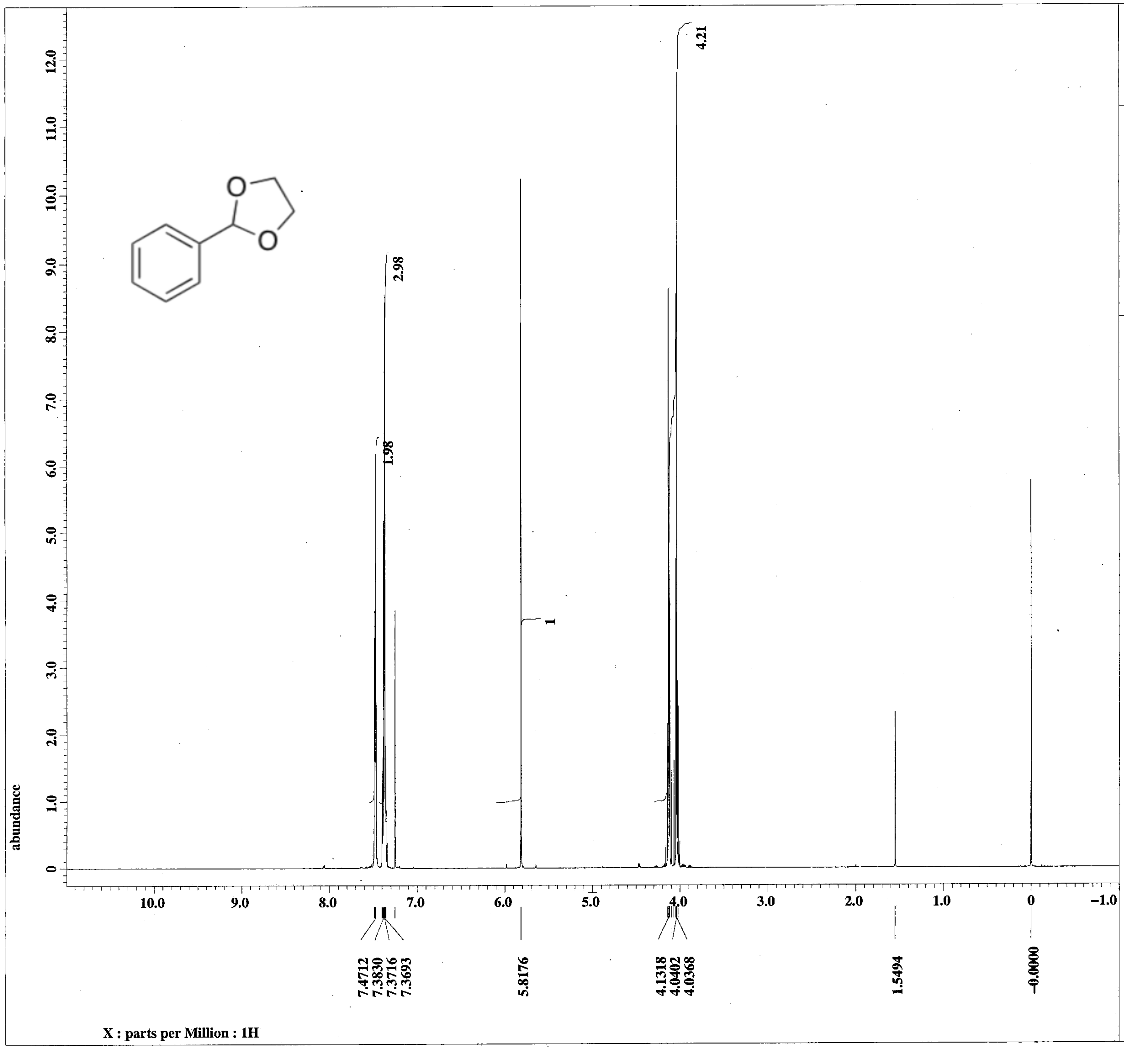
```
---- PROCESSING PARAMETERS ----
dc_balance : 0 : FALSE
sexp : 0.2[Hz] : 0.0[s]
trapezoid3 : 0[%] : 80[%] : 100[%]
zerofill : 1
fft : 1 : TRUE : TRUE
machinephase
ppm
reference : -0.008[ppm] : 0[ppm]
reference : 0.006[ppm] : 0[ppm]

Derived from: single_pulse-33.jdf
```

```
Filename         = single_pulse-38.jdf
Author           = delta
Experiment       = single_pulse.ex2
Sample_id        = 030112
Solvent          = CHLOROFORM-D
Creation_time    =  1-MAR-2012 12:23:06
Revision_time    =  1-MAR-2012 13:02:09
Current_time     =  1-MAR-2012 13:03:12

Comment          = single_pulse
Data_format      = 1D COMPLEX
Dim_size         = 13107
Dim_title        = 1H
Dim_units        = [ppm]
Dimensions       = X
Site             = ECA 500
Spectrometer     = JNM-ECA500

Field_strength   = 11.7473579[T] (500[MH
X_acq_duration   = 1.74587904[s]
X_domain         = 1H
X_freq           = 500.15991521[MHz]
X_offset         = 5.0[ppm]
X_points         = 16384
X_prescans       = 1
X_resolution     = 0.57277737[Hz]
X_sweep          = 9.38438438[kHz]
Irr_domain       = 1H
Irr_freq         = 500.15991521[MHz]
Irr_offset       = 5.0[ppm]
Tri_domain       = 1H
Tri_freq         = 500.15991521[MHz]
Tri_offset       = 5.0[ppm]
Clipped          = FALSE
Mod_return       = 1
Scans            = 8
Total_scans      = 8

X_90_width       = 14.2[us]
X_acq_time       = 1.74587904[s]
X_angle          = 45[deg]
X_atn            = 4[dB]
X_pulse          = 7.1[us]
Irr_mode         = Off
Tri_mode         = Off
Dante_presat     = FALSE
Initial_wait     = 1[s]
Recvr_gain       = 48
Relaxation_delay = 5[s]
Repetition_time  = 6.74587904[s]
Temp_get         = 23.8[dC]
```



JEOL

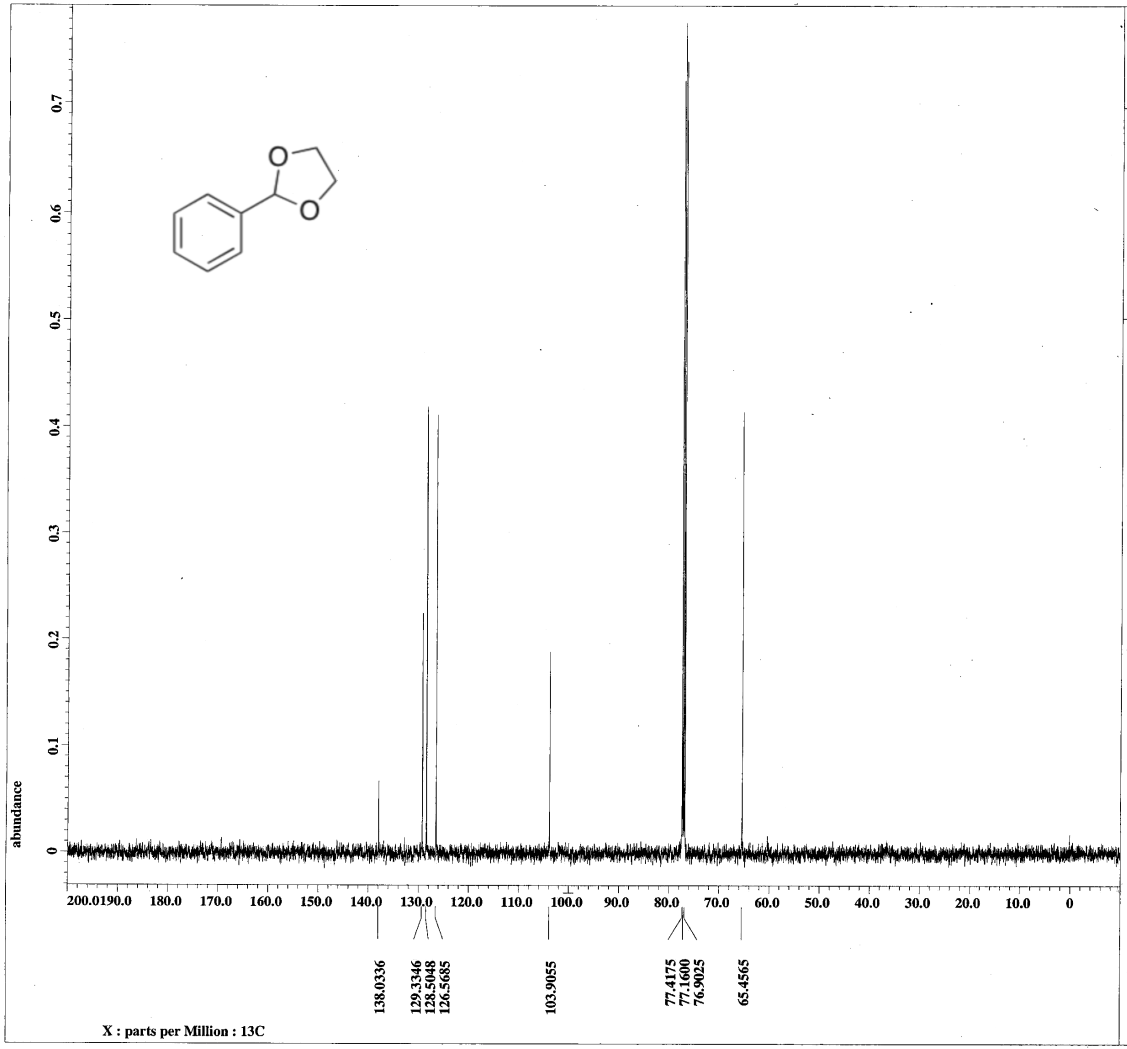
```
---- PROCESSING PARAMETERS ----
dc_balance : 0 : FALSE
sexp : 2.0[Hz] : 0.0[s]
trapezoid3 : 0[%] : 80[%] : 100[%]
zerofill : 1
fft : 1 : TRUE : TRUE
machinephase
ppm

Derived from: single_pulse_dec-6.jdf

Filename          = single_pulse_dec-8.jd
Author            = delta
Experiment        = single_pulse_dec
Sample_id         = 030112C
Solvent           = CHLOROFORM-D
Creation_time     =  1-MAR-2012 13:08:54
Revision_time     =  1-MAR-2012 13:40:12
Current_time      =  1-MAR-2012 13:40:45

Comment           = single pulse decouple
Data_format       = 1D COMPLEX
Dim_size          = 26214
Dim_title         = 13C
Dim_units         = [ppm]
Dimensions        = X
Site              = ECA 500
Spectrometer      = JNM-ECA500

Field_strength    = 11.7473579[T] (500[MH
X_acq_duration    = 0.83361792[s]
X_domain          = 13C
X_freq            = 125.76529768[MHz]
X_offset          = 100[ppm]
X_points          = 32768
X_prescans        = 4
X_resolution      = 1.19959034[Hz]
X_sweep           = 39.3081761[kHz]
Irr_domain        = 1H
Irr_freq          = 500.15991521[MHz]
Irr_offset        = 5.0[ppm]
Clipped           = FALSE
Mod_return        = 1
Scans             = 619
Total_scans       = 619

X_90_width        = 10.6[us]
X_acq_time        = 0.83361792[s]
X_angle           = 30[deg]
X_atn             = 9.2[dB]
X_pulse           = 3.53333333[us]
Irr_atn_dec       = 20.22999[dB]
Irr_atn_noe       = 20.22999[dB]
Irr_noise         = WALTZ
Decoupling        = TRUE
Initial_wait      = 1[s]
Noe               = TRUE
Noe_time          = 2[s]
Recvr_gain        = 54
Relaxation_delay  = 2[s]
Repetition_time   = 2.83361792[s]
Temp_get          = 24.2[dC]
```



JEOL

```
---- PROCESSING PARAMETERS ----
dc_balance : 0 : FALSE
sexp : 0.2[Hz] : 0.0[s]
trapezoid3 : 0[%] : 80[%] : 100[%]
zerofill : 1
fft : 1 : TRUE : TRUE
machinephase
ppm

Derived from: MM-beHH-2.jdf
```

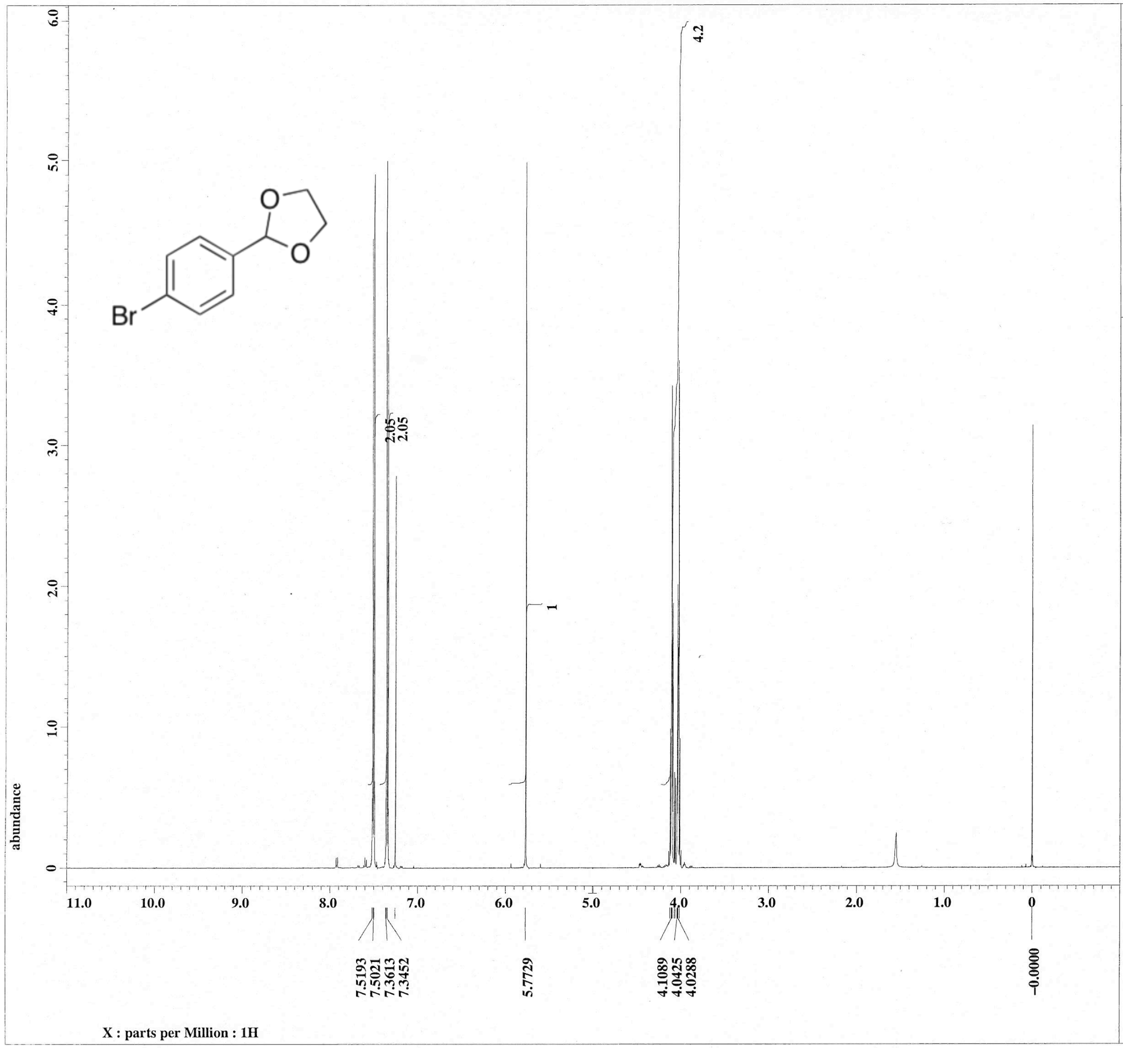
```
Filename          = MM-beHH-2.jdf
Author            = delta
Experiment        = single_pulse.ex2
Sample_id         = MM-be
Solvent           = CHLOROFORM-D
Creation_time     = 17-FEB-2012 17:05:10
Revision_time     = 28-FEB-2012 22:10:12
Current_time      = 28-FEB-2012 22:10:45

Comment           = single_pulse
Data_format       = 1D COMPLEX
Dim_size          = 13107
Dim_title         = 1H
Dim_units         = [ppm]
Dimensions        = X
Site              = ECA 500
Spectrometer      = JNM-ECA500

Field_strength    = 11.7473579[T] (500[MH
X_acq_duration    = 1.74587904[s]
X_domain          = 1H
X_freq            = 500.15991521[MHz]
X_offset          = 5.0[ppm]
X_points          = 16384
X_prescans        = 1
X_resolution      = 0.57277737[Hz]
X_sweep           = 9.38438438[kHz]
Irr_domain        = 1H
Irr_freq          = 500.15991521[MHz]
Irr_offset        = 5.0[ppm]
Tri_domain        = 1H
Tri_freq          = 500.15991521[MHz]
Tri_offset        = 5.0[ppm]
Clipped           = FALSE
Mod_return        = 1
Scans             = 8
Total_scans       = 8

X_90_width        = 14.2[us]
X_acq_time        = 1.74587904[s]
X_angle           = 45[deg]
X_atn             = 4[dB]
X_pulse           = 7.1[us]
Irr_mode          = Off
Tri_mode          = Off
Dante_presat      = FALSE
Initial_wait      = 1[s]
Recvr_gain        = 50
Relaxation_delay  = 5[s]
Repetition_time   = 6.74587904[s]
Temp_get          = 24.9[dC]
```



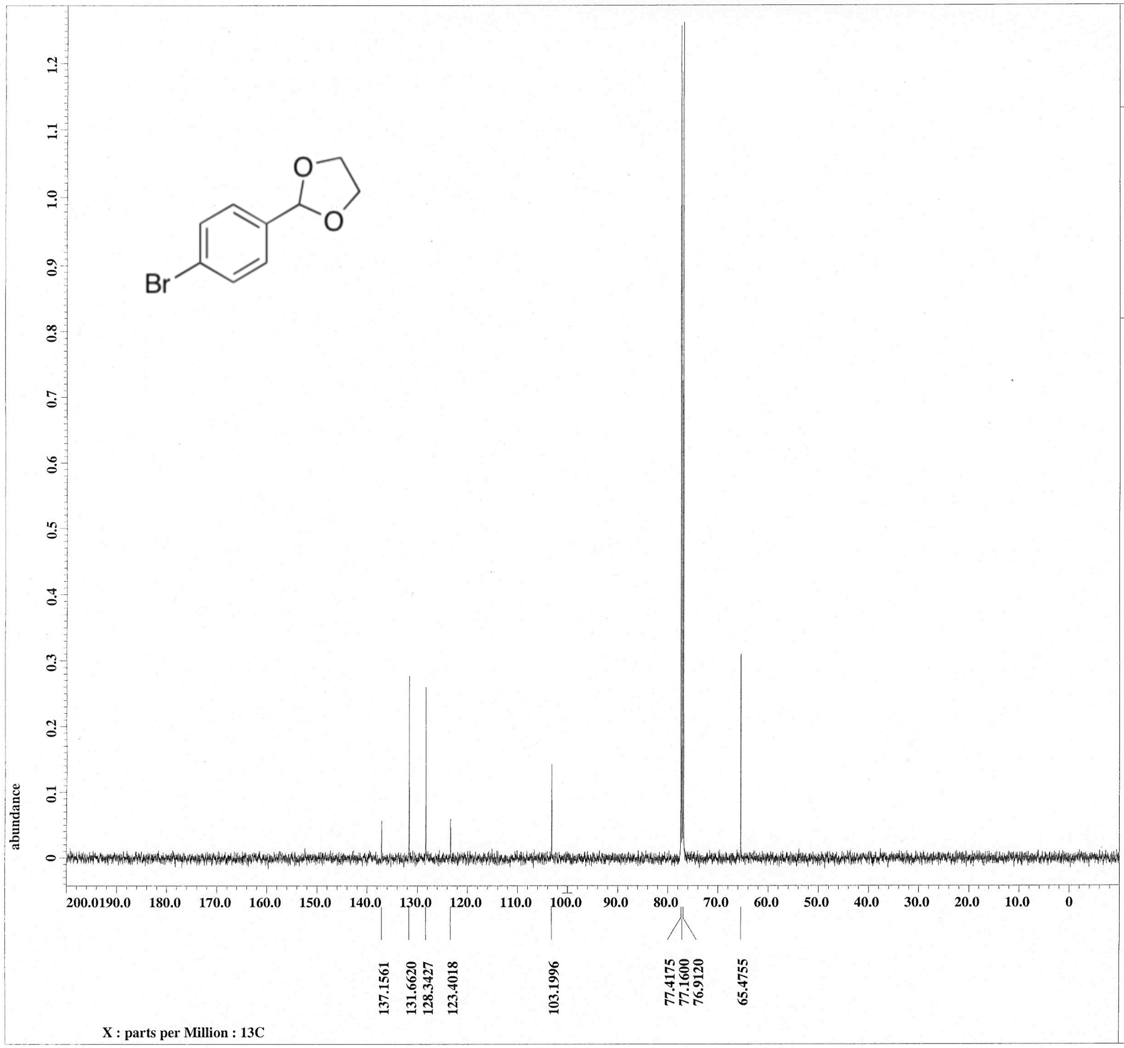
JEOL

```
---- PROCESSING PARAMETERS ----
dc_balance : 0 : FALSE
sexp : 2.0[Hz] : 0.0[s]
trapezoid3 : 0[%] : 80[%] : 100[%]
zerofill : 1
fft : 1 : TRUE : TRUE
machinephase
ppm

Derived from: single_pulse_dec-2.jdf
```

```
Filename          = single_pulse_dec-5.jd
Author            = delta
Experiment        = single_pulse_dec
Sample_id         = MM-beC
Solvent           = CHLOROFORM-D
Creation_time     = 17-FEB-2012 17:23:34
Revision_time     = 17-FEB-2012 17:57:04
Current_time      = 17-FEB-2012 17:57:32

Comment           = single pulse decouple
Data_format       = 1D COMPLEX
Dim_size          = 26214
Dim_title         = 13C
Dim_units         = [ppm]
Dimensions        = X
Site              = ECA 500
Spectrometer      = JNM-ECA500

Field_strength    = 11.7473579[T] (500[MH
X_acq_duration    = 0.83361792[s]
X_domain          = 13C
X_freq            = 125.76529768[MHz]
X_offset          = 100[ppm]
X_points          = 32768
X_prescans        = 4
X_resolution      = 1.19959034[Hz]
X_sweep           = 39.3081761[kHz]
Irr_domain        = 1H
Irr_freq          = 500.15991521[MHz]
Irr_offset        = 5.0[ppm]
Clipped           = FALSE
Mod_return        = 1
Scans             = 202
Total_scans       = 202

X_90_width        = 10.6[us]
X_acq_time        = 0.83361792[s]
X_angle           = 30[deg]
X_atn             = 9.2[dB]
X_pulse           = 3.53333333[us]
Irr_atn_dec       = 20.22999[dB]
Irr_atn_noe       = 20.22999[dB]
Irr_noise         = WALTZ
Decoupling        = TRUE
Initial_wait      = 1[s]
Noe               = TRUE
Noe_time          = 2[s]
Recvr_gain        = 52
Relaxation_delay  = 2[s]
Repetition_time   = 2.83361792[s]
Temp_get          = 24.6[dC]
```

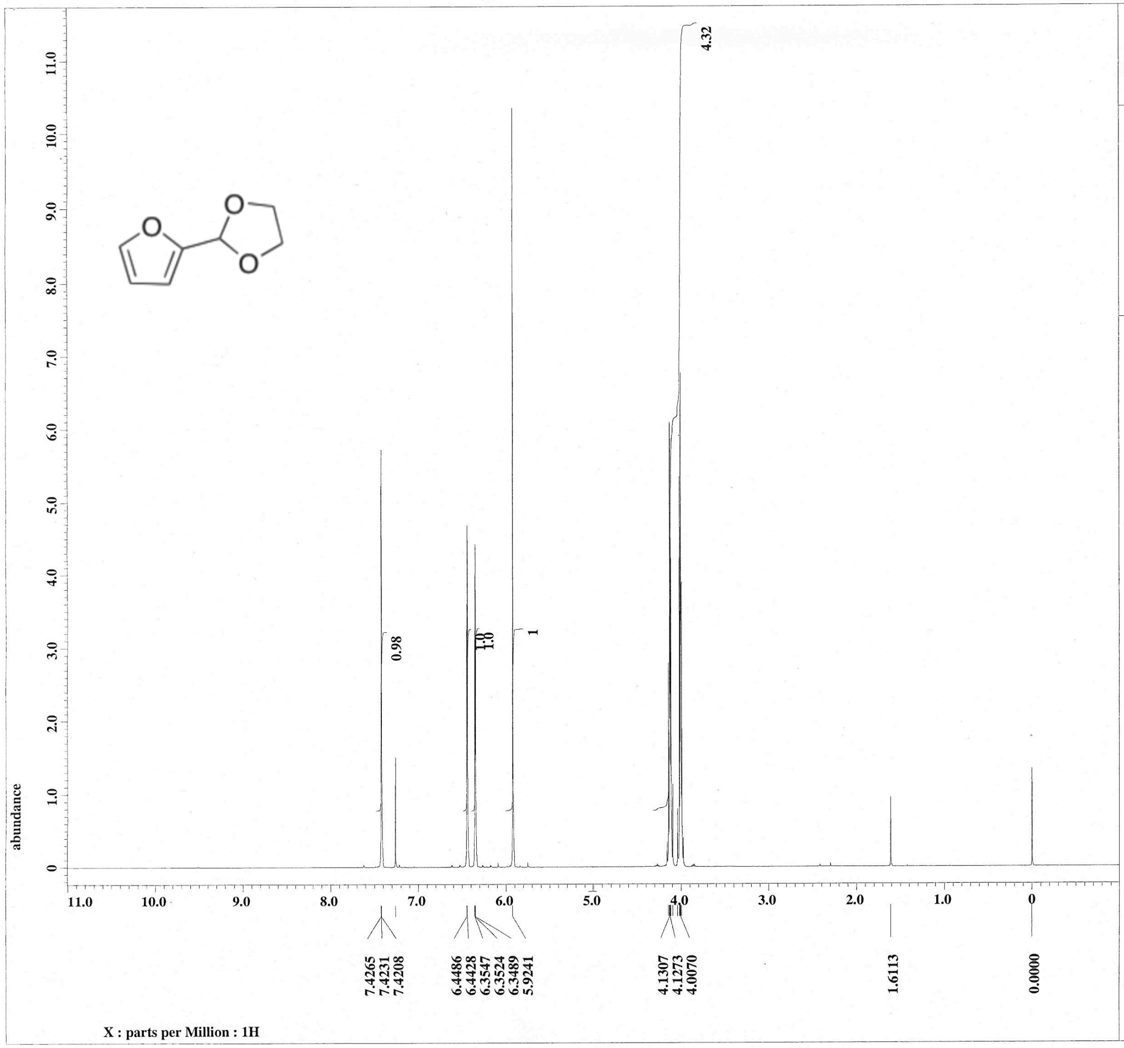


```
---- PROCESSING PARAMETERS ----
dc_balance : 0 : FALSE
sexp : 0.2[Hz] : 0.0[s]
trapezoid3 : 0[%] : 80[%] : 100[%]
zerofill : 1
fft : 1 : TRUE : TRUE
machinephase
ppm

Derived from: single_pulse-32.jdf

Filename          = single_pulse-35.jdf
Author            = delta
Experiment        = single_pulse.ex2
Sample_id         = 022712
Solvent           = CHLOROFORM-D
Creation_time     = 27-FEB-2012 18:10:06
Revision_time     = 27-FEB-2012 18:43:04
Current_time      = 27-FEB-2012 18:44:17

Comment           = single_pulse
Data_format       = 1D COMPLEX
Dim_size          = 13107
Dim_title         = 1H
Dim_units         = [ppm]
Dimensions        = X
Site              = ECA 500
Spectrometer      = JNM-ECA500

Field_strength    = 11.7473579[T] (500[MH
X_acq_duration    = 1.74587904[s]
X_domain          = 1H
X_freq            = 500.15991521[MHz]
X_offset          = 5.0[ppm]
X_points          = 16384
X_prescans        = 1
X_resolution      = 0.57277737[Hz]
X_sweep           = 9.38438438[kHz]
Irr_domain        = 1H
Irr_freq          = 500.15991521[MHz]
Irr_offset        = 5.0[ppm]
Tri_domain        = 1H
Tri_freq          = 500.15991521[MHz]
Tri_offset        = 5.0[ppm]
Clipped           = FALSE
Mod_return        = 1
Scans             = 8
Total_scans       = 8

X_90_width        = 14.2[us]
X_acq_time        = 1.74587904[s]
X_angle           = 45[deg]
X_atn             = 4[dB]
X_pulse           = 7.1[us]
Irr_mode          = Off
Tri_mode          = Off
Dante_presat      = FALSE
Initial_wait      = 1[s]
Recvr_gain        = 46
Relaxation_delay  = 5[s]
Repetition_time   = 6.74587904[s]
Temp_get          = 23.7[dC]
```

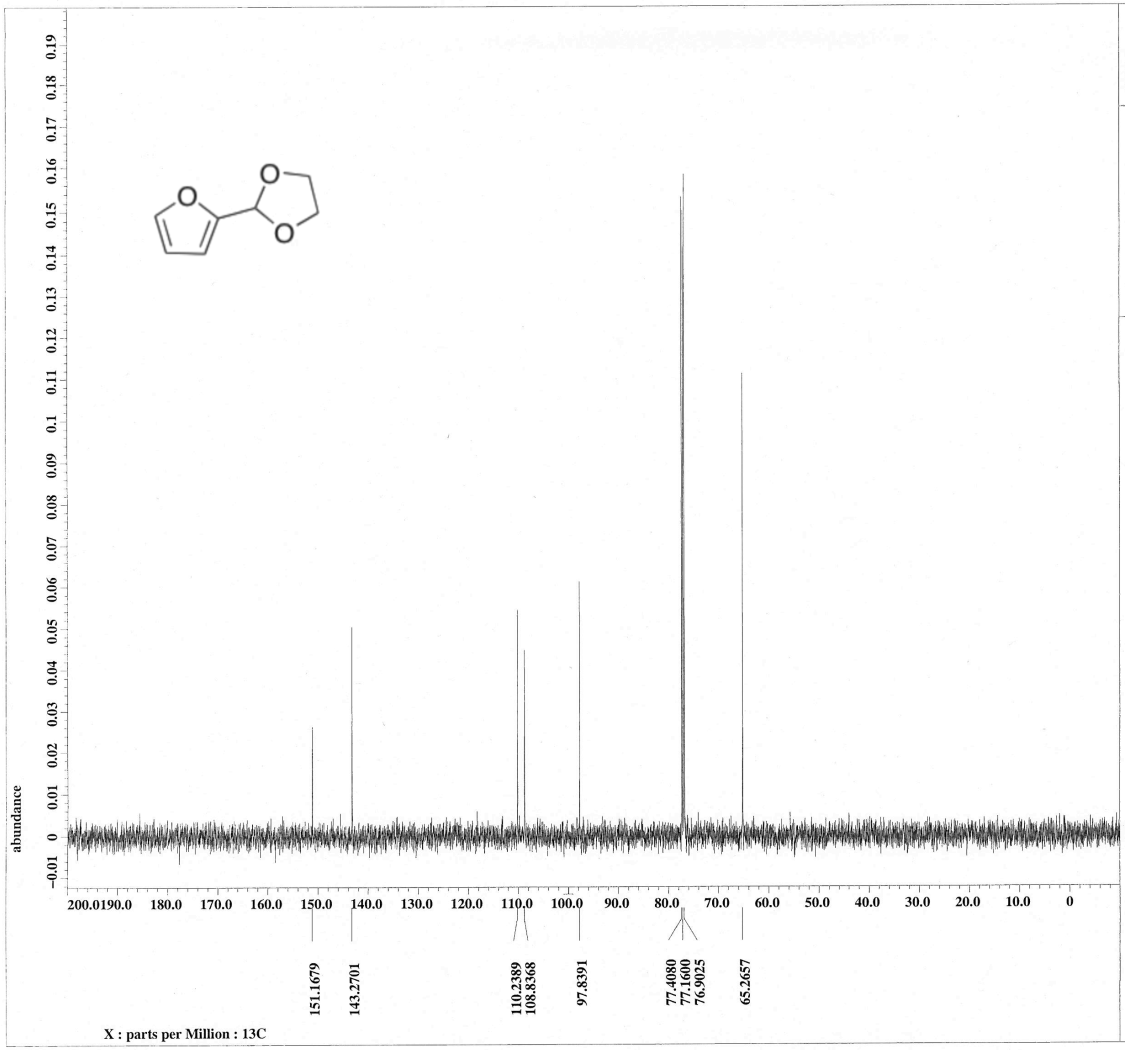


```
---- PROCESSING PARAMETERS ----
dc_balance : 0 : FALSE
sexp : 2.0[Hz] : 0.0[s]
trapezoid3 : 0[%] : 80[%] : 100[%]
zerofill : 1
fft : 1 : TRUE : TRUE
machinephase
ppm

Derived from: single_pulse_dec-5.jdf
```

```
Filename          = single_pulse_dec-7.jd
Author            = delta
Experiment        = single_pulse_dec
Sample_id         = 022712C
Solvent           = CHLOROFORM-D
Creation_time     = 27-FEB-2012 19:31:18
Revision_time     = 27-FEB-2012 20:03:54
Current_time      = 27-FEB-2012 20:04:20

Comment           = single pulse decouple
Data_format       = 1D COMPLEX
Dim_size          = 26214
Dim_title         = 13C
Dim_units         = [ppm]
Dimensions        = X
Site              = ECA 500
Spectrometer      = JNM-ECA500

Field_strength    = 11.7473579[T] (500[MH
X_acq_duration    = 0.83361792[s]
X_domain          = 13C
X_freq            = 125.76529768[MHz]
X_offset          = 100[ppm]
X_points          = 32768
X_prescans        = 4
X_resolution      = 1.19959034[Hz]
X_sweep           = 39.3081761[kHz]
Irr_domain        = 1H
Irr_freq          = 500.15991521[MHz]
Irr_offset        = 5.0[ppm]
Clipped           = FALSE
Mod_return        = 1
Scans             = 203.0
Total_scans       = 203.0

X_90_width        = 10.6[us]
X_acq_time        = 0.83361792[s]
X_angle           = 30[deg]
X_atn             = 9.2[dB]
X_pulse           = 3.53333333[us]
Irr_atn_dec       = 20.22999[dB]
Irr_atn_noe       = 20.22999[dB]
Irr_noise         = WALTZ
Decoupling        = TRUE
Initial_wait      = 1[s]
Noe               = TRUE
Noe_time          = 2[s]
Recvr_gain        = 54
Relaxation_delay  = 2[s]
Repetition_time   = 2.83361792[s]
Temp_get          = 24.3[dC]
```

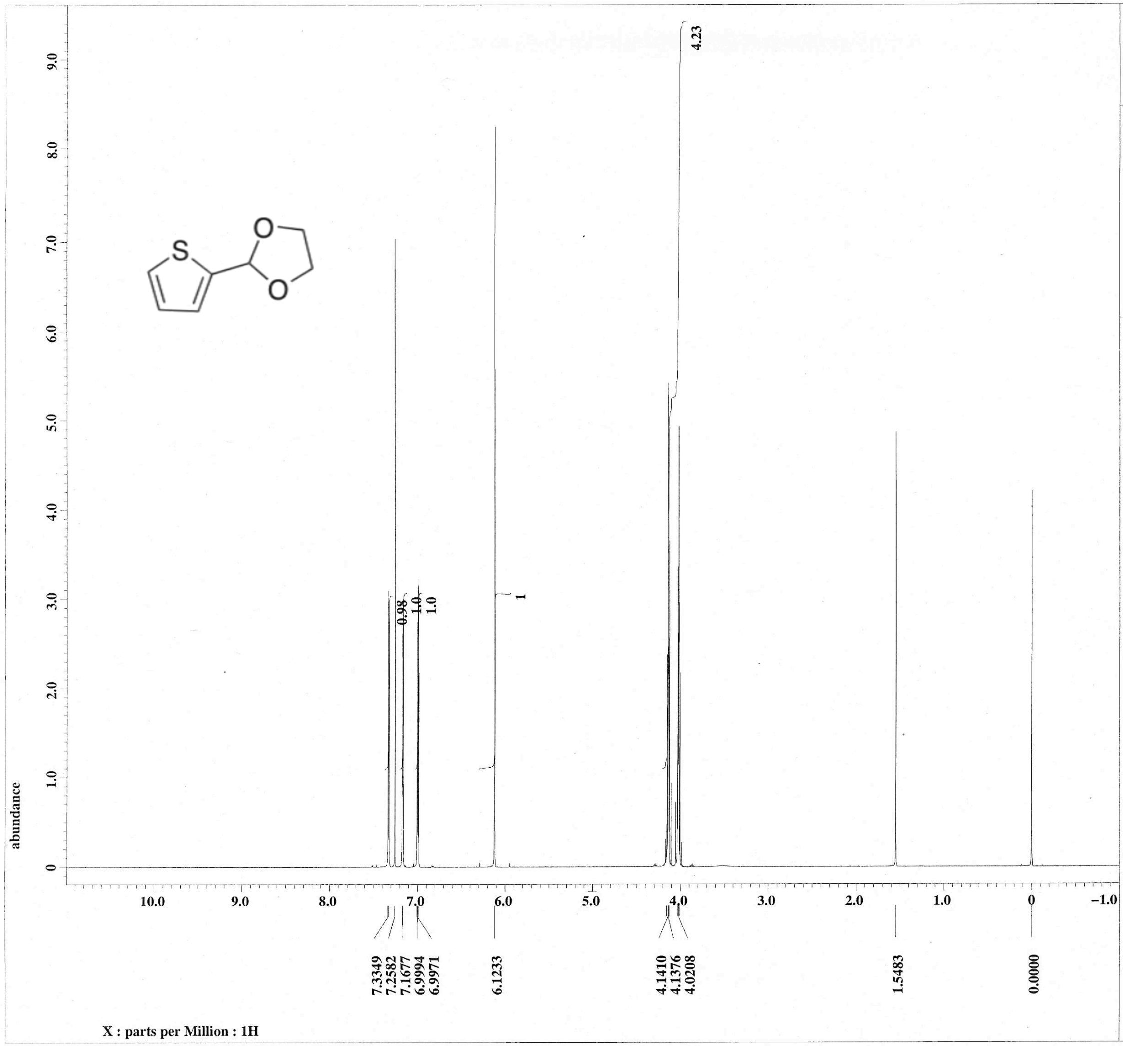


```
---- PROCESSING PARAMETERS ----
dc_balance : 0 : FALSE
sexp : 0.2[Hz] : 0.0[s]
trapezoid3 : 0[%] : 80[%] : 100[%]
zerofill : 1
fft : 1 : TRUE : TRUE
machinephase
ppm

Derived from: single_pulse-44.jdf

Filename          = single_pulse-47.jdf
Author            = delta
Experiment        = single_pulse.ex2
Sample_id         = 030312H
Solvent           = CHLOROFORM-D
Creation_time     =  3-MAR-2012 12:35:22
Revision_time     =  3-MAR-2012 13:08:56
Current_time      =  3-MAR-2012 13:09:29

Comment           = single_pulse
Data_format       = 1D COMPLEX
Dim_size          = 13107
Dim_title         = 1H
Dim_units         = [ppm]
Dimensions        = X
Site              = ECA 500
Spectrometer      = JNM-ECA500

Field_strength    = 11.7473579[T] (500[MH
X_acq_duration    = 1.74587904[s]
X_domain          = 1H
X_freq            = 500.15991521[MHz]
X_offset          = 5.0[ppm]
X_points          = 16384
X_prescans        = 1
X_resolution      = 0.57277737[Hz]
X_sweep           = 9.38438438[kHz]
Irr_domain        = 1H
Irr_freq          = 500.15991521[MHz]
Irr_offset        = 5.0[ppm]
Tri_domain        = 1H
Tri_freq          = 500.15991521[MHz]
Tri_offset        = 5.0[ppm]
Clipped           = FALSE
Mod_return        = 1
Scans             = 8
Total_scans       = 8

X_90_width        = 12.2[us]
X_acq_time        = 1.74587904[s]
X_angle           = 45[deg]
X_atn             = 3.8[dB]
X_pulse           = 6.1[us]
Irr_mode          = Off
Tri_mode          = Off
Dante_presat      = FALSE
Initial_wait      = 1[s]
Recvr_gain        = 38
Relaxation_delay  = 5[s]
Repetition_time   = 6.74587904[s]
Temp_get          = 24.2[dC]
```



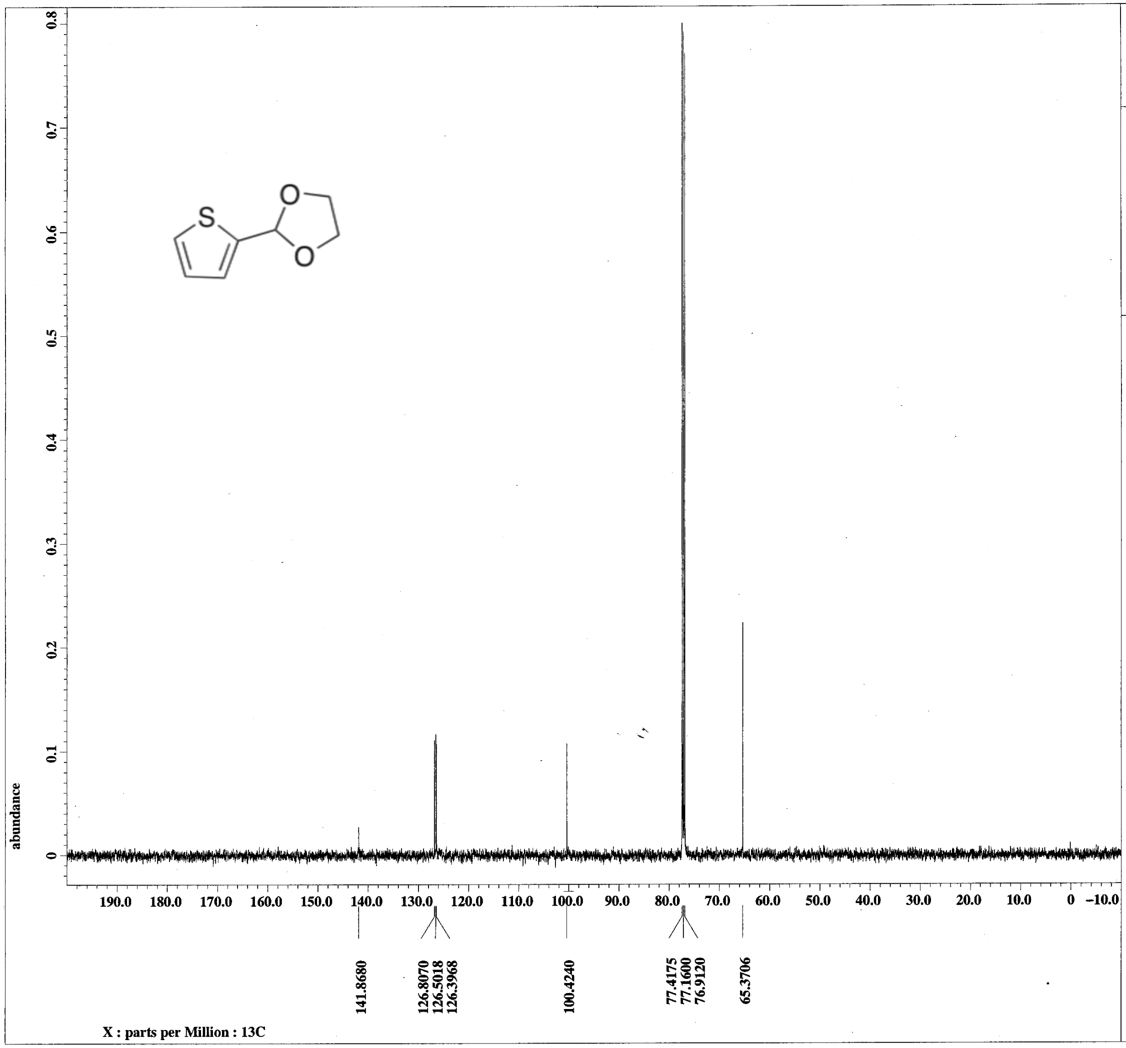
```
---- PROCESSING PARAMETERS ----
dc_balance : 0 : FALSE
sexp : 2.0[Hz] : 0.0[s]
trapezoid3 : 0[%] : 80[%] : 100[%]
zerofill : 1
fft : 1 : TRUE : TRUE
machinephase
ppm

Derived from: single_pulse_dec-10.jdf
```

```
Filename          = single_pulse_dec-12.j
Author            = delta
Experiment        = single_pulse_dec
Sample_id         = 030312C
Solvent           = CHLOROFORM-D
Creation_time     =  3-MAR-2012 12:42:07
Revision_time     =  3-MAR-2012 13:13:07
Current_time      =  3-MAR-2012 13:13:41

Comment           = single pulse decouple
Data_format       = 1D COMPLEX
Dim_size          = 26214
Dim_title         = 13C
Dim_units         = [ppm]
Dimensions        = X
Site              = ECA 500
Spectrometer      = JNM-ECA500

Field_strength    = 11.7473579[T] (500[MH
X_acq_duration    = 0.83361792[s]
X_domain          = 13C
X_freq            = 125.76529768[MHz]
X_offset          = 100[ppm]
X_points          = 32768
X_prescans        = 4
X_resolution      = 1.19959034[Hz]
X_sweep           = 39.3081761[kHz]
Irr_domain        = 1H
Irr_freq          = 500.15991521[MHz]
Irr_offset        = 5.0[ppm]
Clipped           = FALSE
Mod_return        = 1
Scans             = 109
Total_scans       = 109

X_90_width        = 9.56[us]
X_acq_time        = 0.83361792[s]
X_angle           = 30[deg]
X_atn             = 9.1[dB]
X_pulse           = 3.18666667[us]
Irr_atn_dec       = 21[dB]
Irr_atn_noe       = 21[dB]
Irr_noise         = WALTZ
Decoupling        = TRUE
Initial_wait      = 1[s]
Noe               = TRUE
Noe_time          = 2[s]
Recvr_gain        = 46
Relaxation_delay  = 2[s]
Repetition_time   = 2.83361792[s]
Temp_get          = 24.7[dC]
```



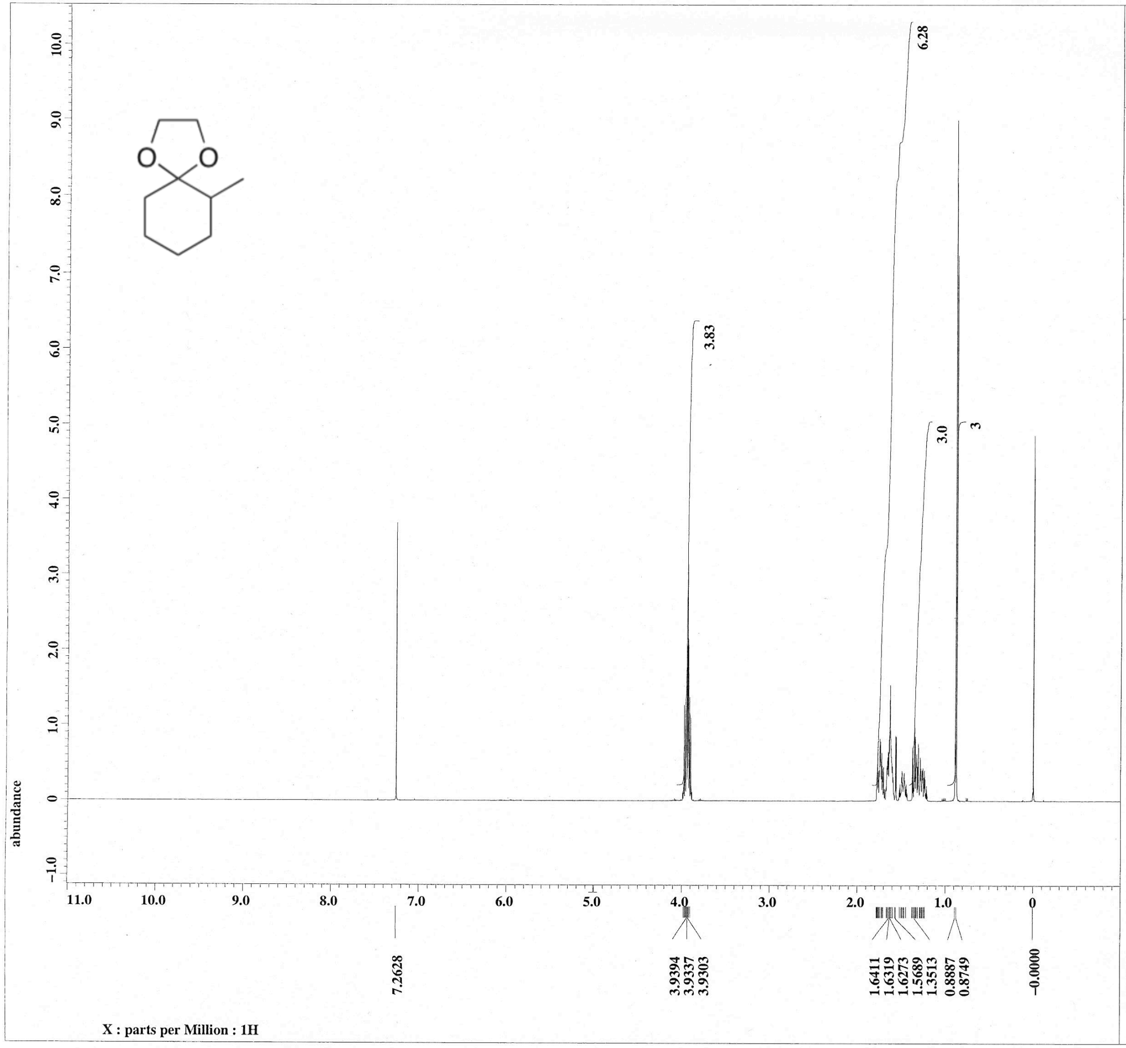
```
---- PROCESSING PARAMETERS ----
dc_balance : 0 : FALSE
sexp : 0.2[Hz] : 0.0[s]
trapezoid3 : 0[%] : 80[%] : 100[%]
zerofill : 1
fft : 1 : TRUE : TRUE
machinephase
ppm

Derived from: single_pulse-43.jdf
```

```
Filename            = single_pulse-46.jdf
Author              = delta
Experiment          = single_pulse.ex2
Sample_id           = 030212H-1
Solvent             = CHLOROFORM-D
Creation_time       =  2-MAR-2012 15:05:59
Revision_time       =  2-MAR-2012 15:40:20
Current_time        =  2-MAR-2012 15:40:57

Comment             = single_pulse
Data_format         = 1D COMPLEX
Dim_size            = 13107
Dim_title           = 1H
Dim_units           = [ppm]
Dimensions          = X
Site                = ECA 500
Spectrometer        = JNM-ECA500

Field_strength      = 11.7473579[T] (500[MH
X_acq_duration      = 1.74587904[s]
X_domain            = 1H
X_freq              = 500.15991521[MHz]
X_offset            = 5.0[ppm]
X_points            = 16384
X_prescans          = 1
X_resolution        = 0.57277737[Hz]
X_sweep             = 9.38438438[kHz]
Irr_domain          = 1H
Irr_freq            = 500.15991521[MHz]
Irr_offset          = 5.0[ppm]
Tri_domain          = 1H
Tri_freq            = 500.15991521[MHz]
Tri_offset          = 5.0[ppm]
Clipped             = FALSE
Mod_return          = 1
Scans               = 8
Total_scans         = 8

X_90_width          = 12.2[us]
X_acq_time          = 1.74587904[s]
X_angle             = 45[deg]
X_atn               = 3.8[dB]
X_pulse             = 6.1[us]
Irr_mode            = Off
Tri_mode            = Off
Dante_presat        = FALSE
Initial_wait        = 1[s]
Recvr_gain          = 50
Relaxation_delay    = 5[s]
Repetition_time     = 6.74587904[s]
Temp_get            = 24.6[dC]
```



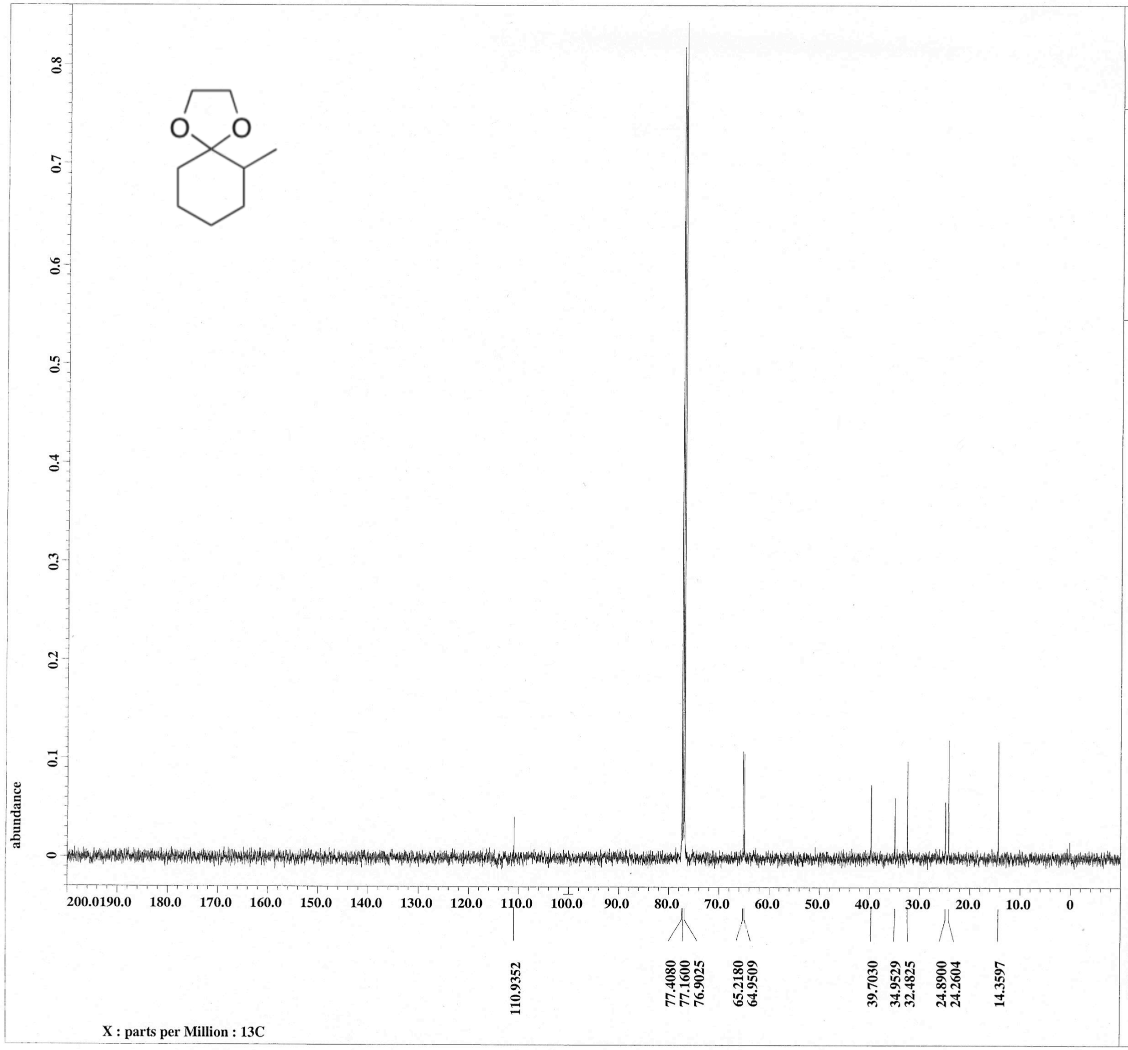
```
---- PROCESSING PARAMETERS ----
dc_balance : 0 : FALSE
sexp : 2.0[Hz] : 0.0[s]
trapezoid3 : 0[%] : 80[%] : 100[%]
zerofill : 1
fft : 1 : TRUE : TRUE
machinephase
ppm

Derived from: MM-thioalC-1.jdf
```

```
Filename           = MM-thioalC-3.jdf
Author             = delta
Experiment         = single_pulse_dec
Sample_id          = 030212C-1
Solvent            = CHLOROFORM-D
Creation_time      =  2-MAR-2012 15:18:48
Revision_time      =  2-MAR-2012 16:00:30
Current_time       =  2-MAR-2012 16:00:57

Comment            = single pulse decouple
Data_format        = 1D COMPLEX
Dim_size           = 26214
Dim_title          = 13C
Dim_units          = [ppm]
Dimensions         = X
Site               = ECA 500
Spectrometer       = JNM-ECA500

Field_strength     = 11.7473579[T] (500[MH
X_acq_duration     = 0.83361792[s]
X_domain           = 13C
X_freq             = 125.76529768[MHz]
X_offset           = 100[ppm]
X_points           = 32768
X_prescans         = 4
X_resolution       = 1.19959034[Hz]
X_sweep            = 39.3081761[kHz]
Irr_domain         = 1H
Irr_freq           = 500.15991521[MHz]
Irr_offset         = 5.0[ppm]
Clipped            = FALSE
Mod_return         = 1
Scans              = 230.0
Total_scans        = 230.0

X_90_width         = 9.56[us]
X_acq_time         = 0.83361792[s]
X_angle            = 30[deg]
X_atn              = 9.1[dB]
X_pulse            = 3.18666667[us]
Irr_atn_dec        = 21[dB]
Irr_atn_noe        = 21[dB]
Irr_noise          = WALTZ
Decoupling         = TRUE
Initial_wait       = 1[s]
Noe                = TRUE
Noe_time           = 2[s]
Recvr_gain         = 50
Relaxation_delay   = 2[s]
Repetition_time    = 2.83361792[s]
Temp_get           = 24.7[dC]
```

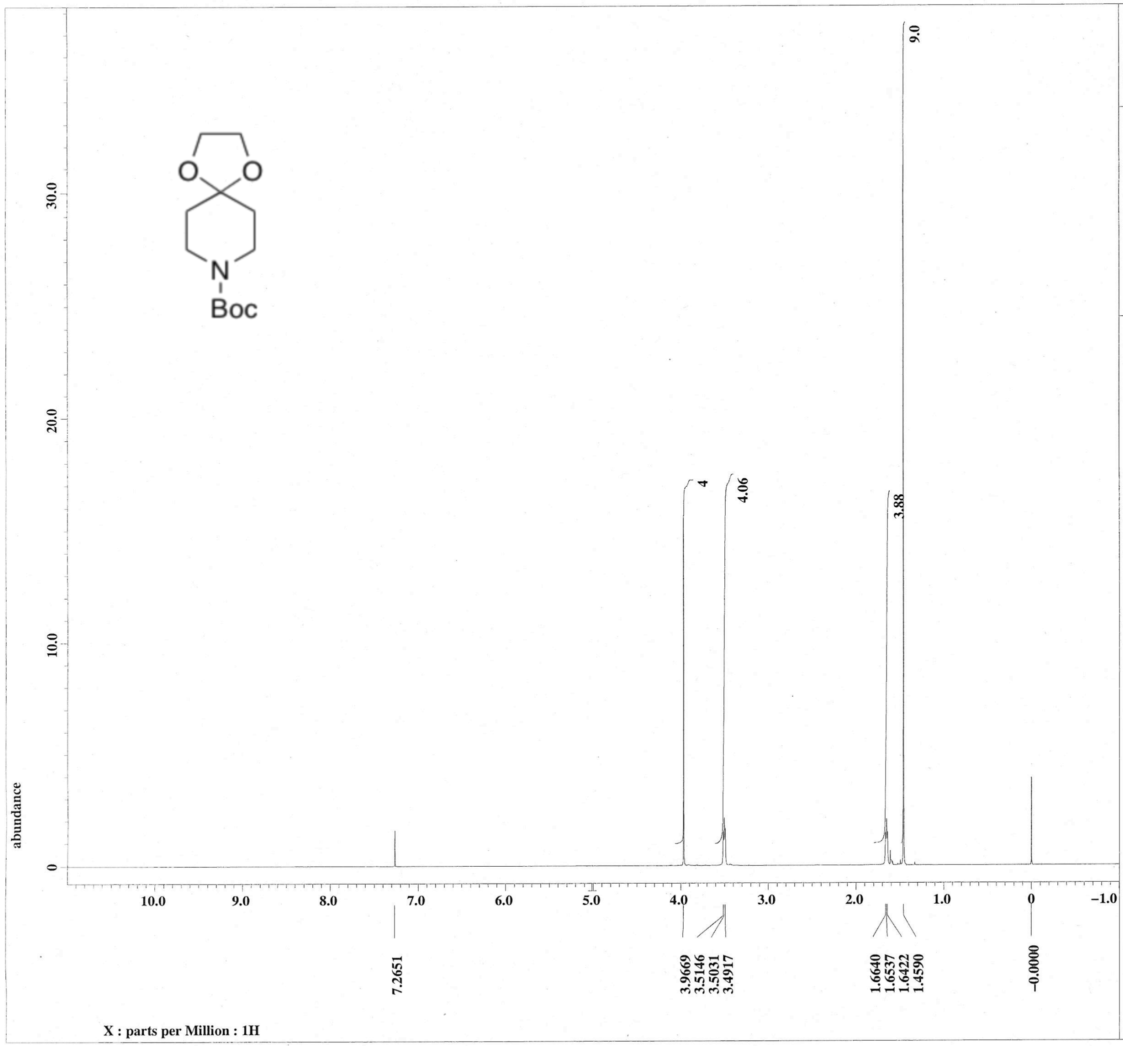


```
---- PROCESSING PARAMETERS ----
dc_balance : 0 : FALSE
sexp : 0.2[Hz] : 0.0[s]
trapezoid3 : 0[%] : 80[%] : 100[%]
zerofill : 1
fft : 1 : TRUE : TRUE
machinephase
ppm

Derived from: single_pulse-13.jdf
```

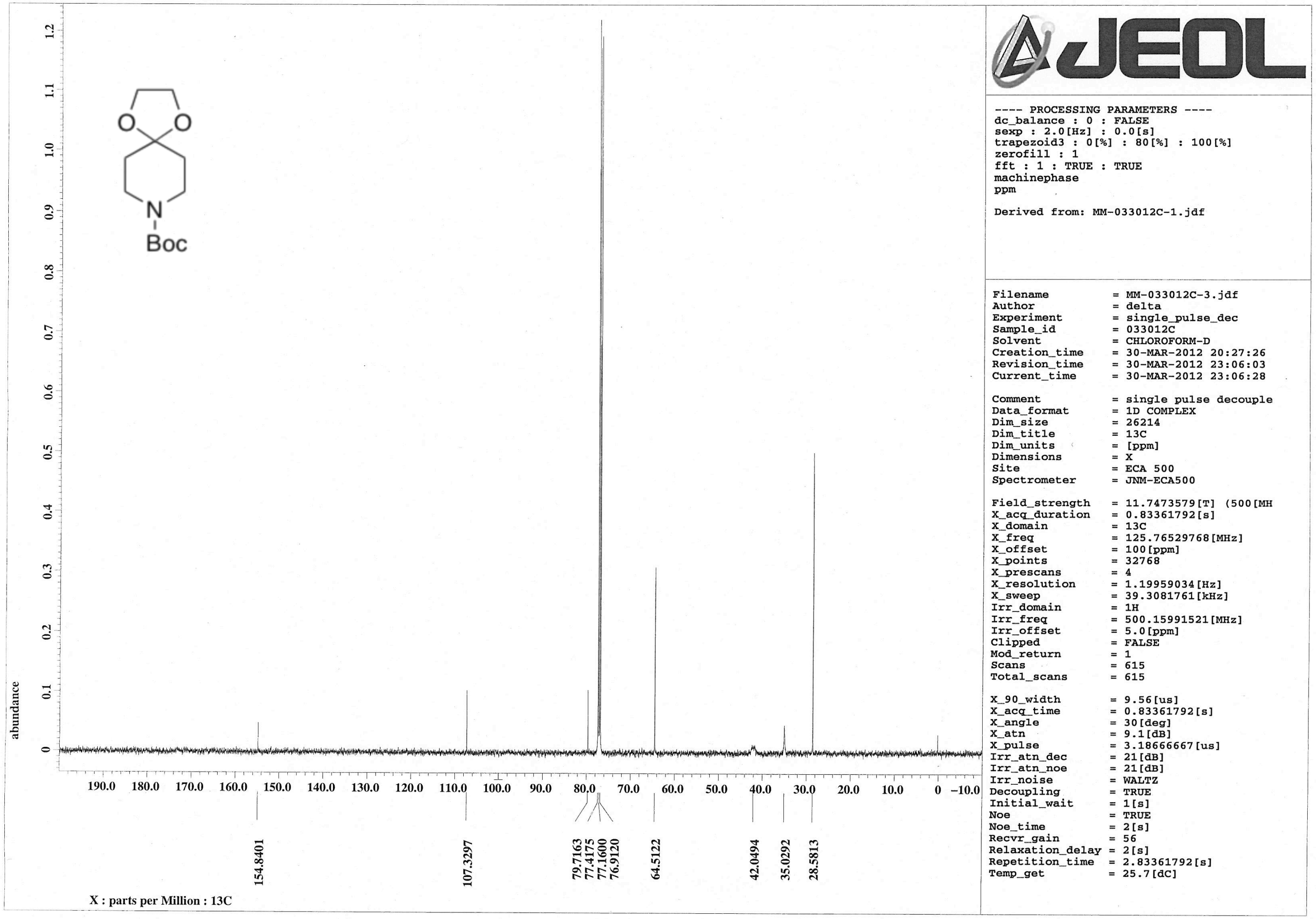
```
Filename          = single_pulse-16.jdf
Author            = delta
Experiment        = single_pulse.ex2
Sample_id         = MM-2Me
Solvent           = CHLOROFORM-D
Creation_time     = 18-FEB-2012 11:45:36
Revision_time     = 18-FEB-2012 12:27:01
Current_time      = 18-FEB-2012 12:28:52

Comment           = single_pulse
Data_format       = 1D COMPLEX
Dim_size          = 13107
Dim_title         = 1H
Dim_units         = [ppm]
Dimensions        = X
Site              = ECA 500
Spectrometer      = JNM-ECA500

Field_strength    = 11.7473579[T] (500[MH
X_acq_duration    = 1.74587904[s]
X_domain          = 1H
X_freq            = 500.15991521[MHz]
X_offset          = 5.0[ppm]
X_points          = 16384
X_prescans        = 1
X_resolution      = 0.57277737[Hz]
X_sweep           = 9.38438438[kHz]
Irr_domain        = 1H
Irr_freq          = 500.15991521[MHz]
Irr_offset        = 5.0[ppm]
Tri_domain        = 1H
Tri_freq          = 500.15991521[MHz]
Tri_offset        = 5.0[ppm]
Clipped           = FALSE
Mod_return        = 1
Scans             = 8
Total_scans       = 8

X_90_width        = 14.2[us]
X_acq_time        = 1.74587904[s]
X_angle           = 45[deg]
X_atn             = 4[dB]
X_pulse           = 7.1[us]
Irr_mode          = Off
Tri_mode          = Off
Dante_presat      = FALSE
Initial_wait      = 1[s]
Recvr_gain        = 46
Relaxation_delay  = 5[s]
Repetition_time   = 6.74587904[s]
Temp_get          = 23.5[dC]
```



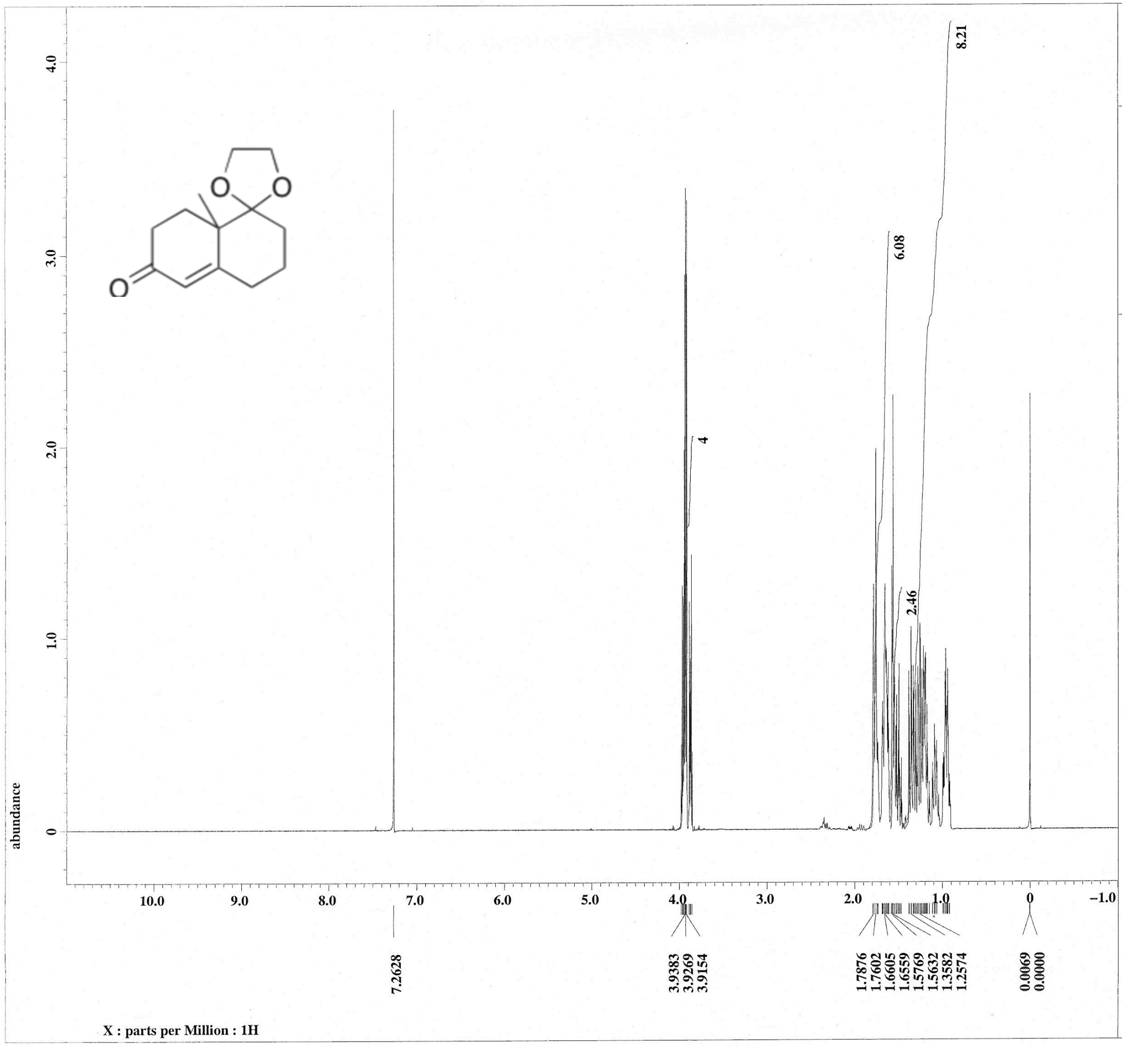
```
---- PROCESSING PARAMETERS ----
dc_balance : 0 : FALSE
sexp : 2.0[Hz] : 0.0[s]
trapezoid3 : 0[%] : 80[%] : 100[%]
zerofill : 1
fft : 1 : TRUE : TRUE
machinephase
ppm

Derived from: single_pulse_dec-3.jdf

Filename          = single_pulse_dec-5.jd
Author            = delta
Experiment        = single_pulse_dec
Sample_id         = MM-2MeC
Solvent           = CHLOROFORM-D
Creation_time     = 18-FEB-2012 12:14:11
Revision_time     = 18-FEB-2012 12:46:11
Current_time      = 18-FEB-2012 12:47:28

Comment           = single pulse decouple
Data_format       = 1D COMPLEX
Dim_size          = 26214
Dim_title         = 13C
Dim_units         = [ppm]
Dimensions        = X
Site              = ECA 500
Spectrometer      = JNM-ECA500

Field_strength    = 11.7473579[T] (500[MH
X_acq_duration    = 0.83361792[s]
X_domain          = 13C
X_freq            = 125.76529768[MHz]
X_offset          = 100[ppm]
X_points          = 32768
X_prescans        = 4
X_resolution      = 1.19959034[Hz]
X_sweep           = 39.3081761[kHz]
Irr_domain        = 1H
Irr_freq          = 500.15991521[MHz]
Irr_offset        = 5.0[ppm]
Clipped           = FALSE
Mod_return        = 1
Scans             = 259
Total_scans       = 259

X_90_width        = 10.6[us]
X_acq_time        = 0.83361792[s]
X_angle           = 30[deg]
X_atn             = 9.2[dB]
X_pulse           = 3.53333333[us]
Irr_atn_dec       = 20.22999[dB]
Irr_atn_noe       = 20.22999[dB]
Irr_noise         = WALTZ
Decoupling        = TRUE
Initial_wait      = 1[s]
Noe               = TRUE
Noe_time          = 2[s]
Recvr_gain        = 52
Relaxation_delay  = 2[s]
Repetition_time   = 2.83361792[s]
Temp_get          = 24.1[dC]
```



```
---- PROCESSING PARAMETERS ----
dc_balance : 0 : FALSE
sexp : 0.2[Hz] : 0.0[s]
trapezoid3 : 0[%] : 80[%] : 100[%]
zerofill : 1
fft : 1 : TRUE : TRUE
machinephase
ppm

Derived from: MM-033012H-1.jdf

Filename          = MM-033012H-2.jdf
Author            = delta
Experiment        = single_pulse.ex2
Sample_id         = 033012H
Solvent           = CHLOROFORM-D
Creation_time     = 30-MAR-2012 19:49:40
Revision_time     = 30-MAR-2012 23:07:50
Current_time      = 30-MAR-2012 23:08:20

Comment           = single_pulse
Data_format       = 1D COMPLEX
Dim_size          = 13107
Dim_title         = 1H
Dim_units         = [ppm]
Dimensions        = X
Site              = ECA 500
Spectrometer      = JNM-ECA500

Field_strength    = 11.7473579[T] (500[MH
X_acq_duration    = 1.74587904[s]
X_domain          = 1H
X_freq            = 500.15991521[MHz]
X_offset          = 5.0[ppm]
X_points          = 16384
X_prescans        = 1
X_resolution      = 0.57277737[Hz]
X_sweep           = 9.38438438[kHz]
Irr_domain        = 1H
Irr_freq          = 500.15991521[MHz]
Irr_offset        = 5.0[ppm]
Tri_domain        = 1H
Tri_freq          = 500.15991521[MHz]
Tri_offset        = 5.0[ppm]
Clipped           = FALSE
Mod_return        = 1
Scans             = 8
Total_scans       = 8

X_90_width        = 12.2[us]
X_acq_time        = 1.74587904[s]
X_angle           = 45[deg]
X_atn             = 3.8[dB]
X_pulse           = 6.1[us]
Irr_mode          = Off
Tri_mode          = Off
Dante_presat      = FALSE
Initial_wait      = 1[s]
Recvr_gain        = 42
Relaxation_delay  = 5[s]
Repetition_time   = 6.74587904[s]
Temp_get          = 25.3[dC]
```

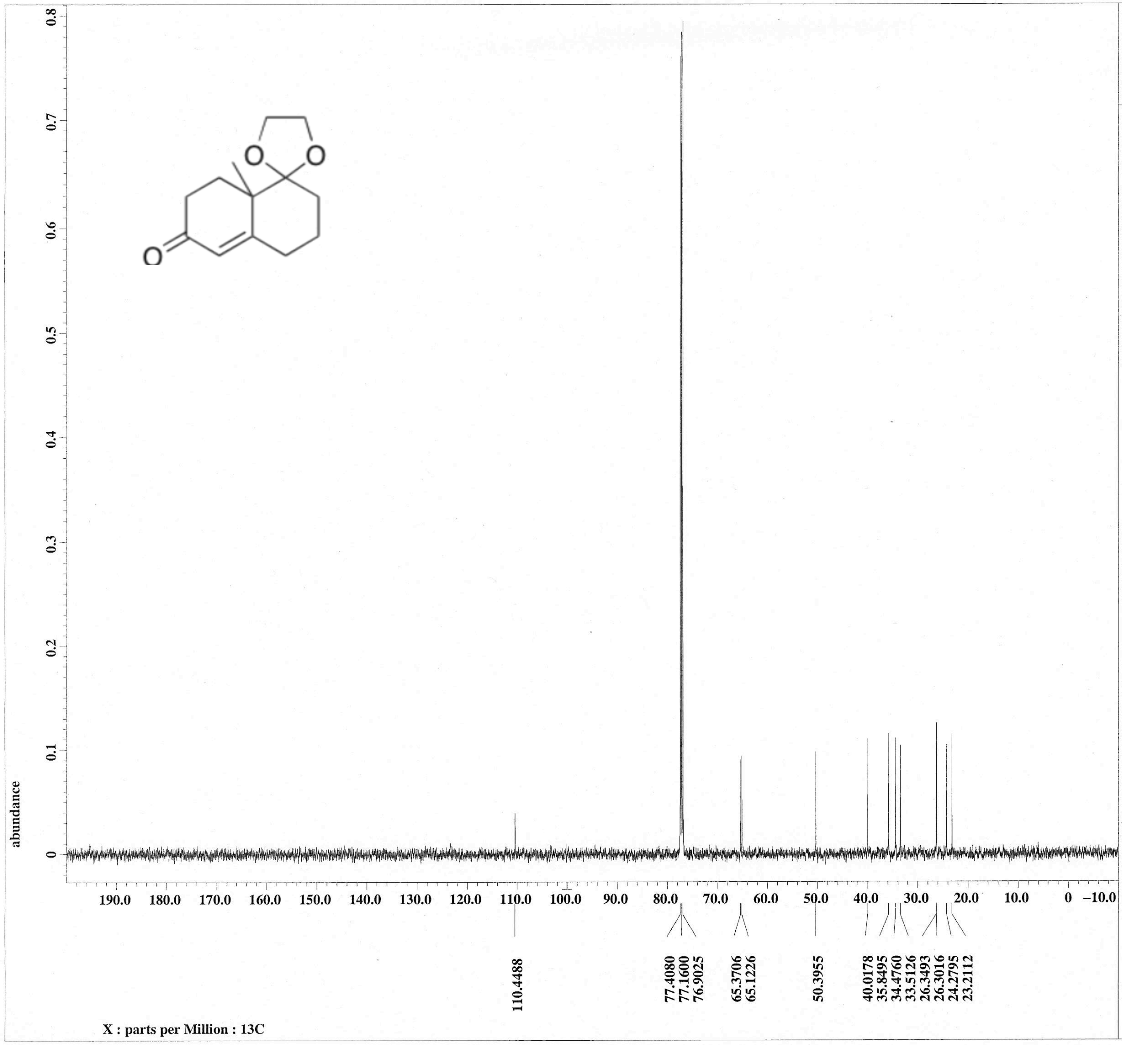


```
---- PROCESSING PARAMETERS ----
dc_balance : 0 : FALSE
sexp : 2.0[Hz] : 0.0[s]
trapezoid3 : 0[%] : 80[%] : 100[%]
zerofill : 1
fft : 1 : TRUE : TRUE
machinephase
ppm

Derived from: MM-033012C-1.jdf

Filename          = MM-033012C-3.jdf
Author            = delta
Experiment        = single_pulse_dec
Sample_id         = 033012C
Solvent           = CHLOROFORM-D
Creation_time     = 30-MAR-2012 20:27:26
Revision_time     = 30-MAR-2012 23:06:03
Current_time      = 30-MAR-2012 23:06:28

Comment           = single pulse decouple
Data_format       = 1D COMPLEX
Dim_size          = 26214
Dim_title         = 13C
Dim_units         = [ppm]
Dimensions        = X
Site              = ECA 500
Spectrometer      = JNM-ECA500

Field_strength    = 11.7473579[T] (500[MH
X_acq_duration    = 0.83361792[s]
X_domain          = 13C
X_freq            = 125.76529768[MHz]
X_offset          = 100[ppm]
X_points          = 32768
X_prescans        = 4
X_resolution      = 1.19959034[Hz]
X_sweep           = 39.3081761[kHz]
Irr_domain        = 1H
Irr_freq          = 500.15991521[MHz]
Irr_offset        = 5.0[ppm]
Clipped           = FALSE
Mod_return        = 1
Scans             = 615
Total_scans       = 615

X_90_width        = 9.56[us]
X_acq_time        = 0.83361792[s]
X_angle           = 30[deg]
X_atn             = 9.1[dB]
X_pulse           = 3.18666667[us]
Irr_atn_dec       = 21[dB]
Irr_atn_noe       = 21[dB]
Irr_noise         = WALTZ
Decoupling        = TRUE
Initial_wait      = 1[s]
Noe               = TRUE
Noe_time          = 2[s]
Recvr_gain        = 56
Relaxation_delay  = 2[s]
Repetition_time   = 2.83361792[s]
Temp_get          = 25.7[dC]
```



```
---- PROCESSING PARAMETERS ----
dc_balance : 0 : FALSE
sexp : 0.2[Hz] : 0.0[s]
trapezoid3 : 0[%] : 80[%] : 100[%]
zerofill : 1
fft : 1 : TRUE : TRUE
machinephase
ppm
base_correct : None : 0 : Smooth

Derived from: single_pulse-46.jdf
```

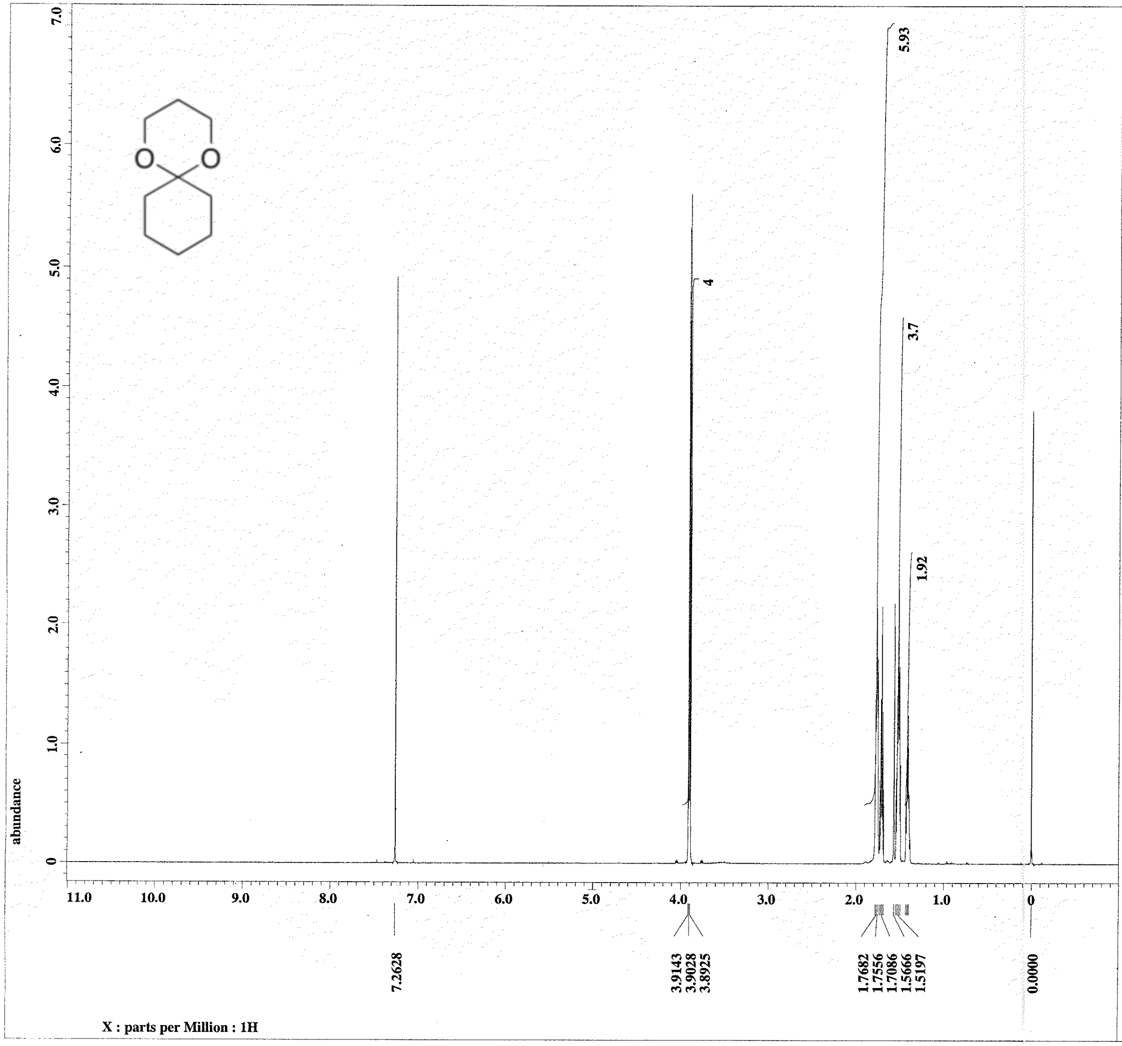
```
Filename           = single_pulse-50.jdf
Author             = delta
Experiment         = single_pulse.ex2
Sample_id          = 030712H
Solvent            = CHLOROFORM-D
Creation_time      =  7-MAR-2012 15:54:38
Revision_time      =  7-MAR-2012 16:35:52
Current_time       =  7-MAR-2012 16:38:07

Comment            = single_pulse
Data_format        = 1D REAL
Dim_size           = 13107
Dim_title          = 1H
Dim_units          = [ppm]
Dimensions         = X
Site               = ECA 500
Spectrometer       = JNM-ECA500

Field_strength     = 11.7473579[T] (500[MH
X_acq_duration     = 1.74587904[s]
X_domain           = 1H
X_freq             = 500.15991521[MHz]
X_offset           = 5.0[ppm]
X_points           = 16384
X_prescans         = 1
X_resolution       = 0.57277737[Hz]
X_sweep            = 9.38438438[kHz]
Irr_domain         = 1H
Irr_freq           = 500.15991521[MHz]
Irr_offset         = 5.0[ppm]
Tri_domain         = 1H
Tri_freq           = 500.15991521[MHz]
Tri_offset         = 5.0[ppm]
Clipped            = FALSE
Mod_return         = 1
Scans              = 8
Total_scans        = 8

X_90_width         = 12.2[us]
X_acq_time         = 1.74587904[s]
X_angle            = 45[deg]
X_atn              = 3.8[dB]
X_pulse            = 6.1[us]
Irr_mode           = Off
Tri_mode           = Off
Dante_presat       = FALSE
Initial_wait       = 1[s]
Recvr_gain         = 50
Relaxation_delay   = 5[s]
Repetition_time    = 6.74587904[s]
Temp_get           = 23.8[dC]
```



JEOL

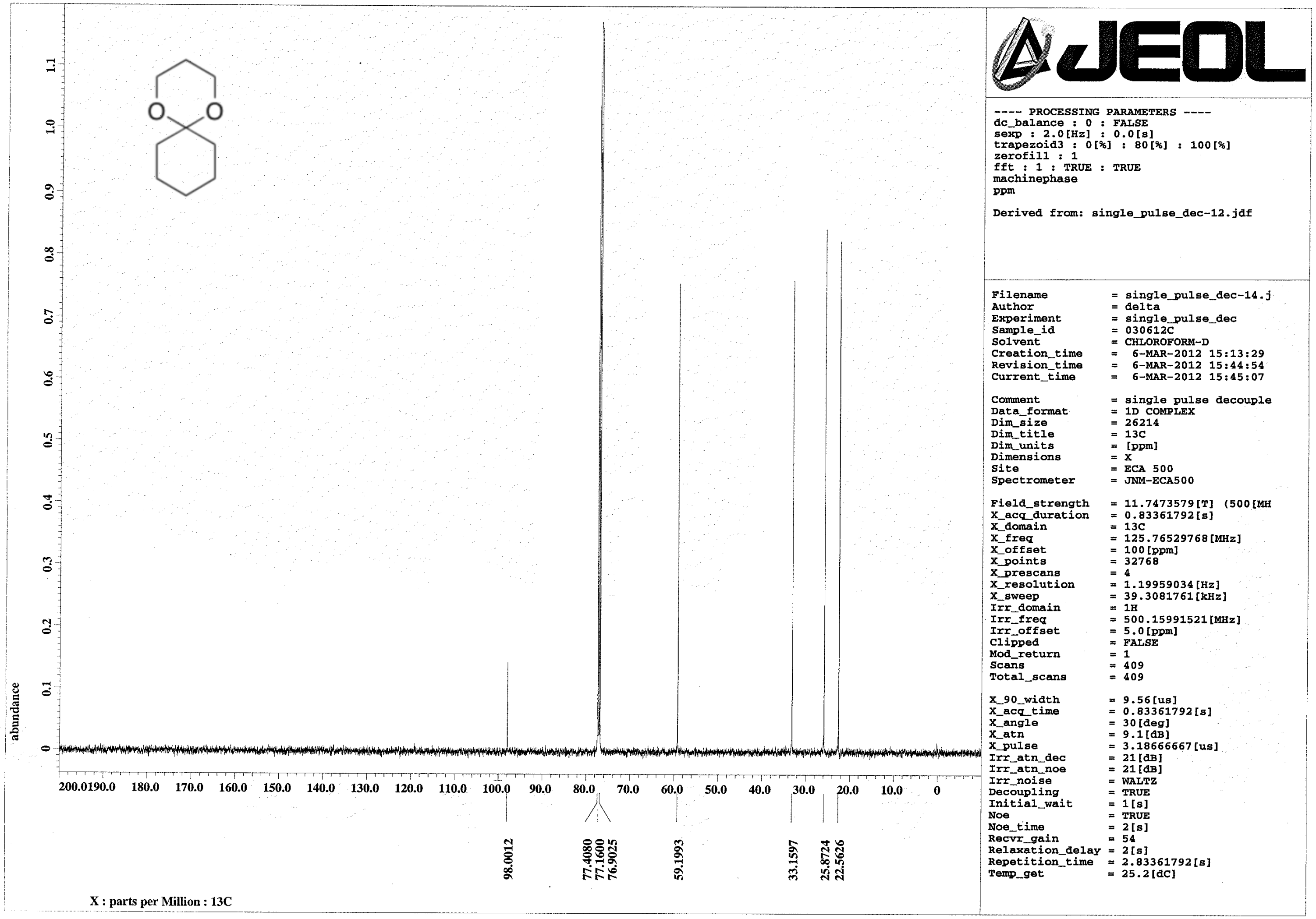
```
---- PROCESSING PARAMETERS ----
dc_balance : 0 : FALSE
sexp : 2.0[Hz] : 0.0[s]
trapezoid3 : 0[%] : 80[%] : 100[%]
zerofill : 1
fft : 1 : TRUE : TRUE
machinephase
ppm

Derived from: single_pulse_dec-13.jdf
```

```
Filename          = single_pulse_dec-15.j
Author            = delta
Experiment        = single_pulse_dec
Sample_id         = 030712C
Solvent           = CHLOROFORM-D
Creation_time     =  7-MAR-2012 16:17:51
Revision_time     =  7-MAR-2012 16:49:08
Current_time      =  7-MAR-2012 16:49:33

Comment           = single pulse decouple
Data_format       = 1D COMPLEX
Dim_size          = 26214
Dim_title         = 13C
Dim_units         = [ppm]
Dimensions        = X
Site              = ECA 500
Spectrometer      = JNM-ECA500

Field_strength    = 11.7473579[T] (500[MH
X_acq_duration    = 0.83361792[s]
X_domain          = 13C
X_freq            = 125.76529768[MHz]
X_offset          = 100[ppm]
X_points          = 32768
X_prescans        = 4
X_resolution      = 1.19959034[Hz]
X_sweep           = 39.3081761[kHz]
Irr_domain        = 1H
Irr_freq          = 500.15991521[MHz]
Irr_offset        = 5.0[ppm]
Clipped           = FALSE
Mod_return        = 1
Scans             = 214
Total_scans       = 214

X_90_width        = 9.56[us]
X_acq_time        = 0.83361792[s]
X_angle           = 30[deg]
X_atn             = 9.1[dB]
X_pulse           = 3.18666667[us]
Irr_atn_dec       = 21[dB]
Irr_atn_noe       = 21[dB]
Irr_noise         = WALTZ
Decoupling        = TRUE
Initial_wait      = 1[s]
Noe               = TRUE
Noe_time          = 2[s]
Recvr_gain        = 50
Relaxation_delay  = 2[s]
Repetition_time   = 2.83361792[s]
Temp_get          = 24.4[dC]
```



```
---- PROCESSING PARAMETERS ----
dc_balance : 0 : FALSE
sexp : 0.2[Hz] : 0.0[s]
trapezoid3 : 0[%] : 80[%] : 100[%]
zerofill : 1
fft : 1 : TRUE : TRUE
machinephase
ppm

Derived from: MM030612H-1.jdf
```

```
Filename          = MM030612H-3.jdf
Author            = delta
Experiment        = single_pulse.ex2
Sample_id         = 031205H
Solvent           = CHLOROFORM-D
Creation_time     =  6-MAR-2012 13:53:16
Revision_time     =  6-MAR-2012 15:21:55
Current_time      =  6-MAR-2012 15:22:18

Comment           = single_pulse
Data_format       = 1D COMPLEX
Dim_size          = 13107
Dim_title         = 1H
Dim_units         = [ppm]
Dimensions        = X
Site              = ECA 500
Spectrtometer     = JNM-ECA500

Field_strength    = 11.7473579[T] (500[MH
X_acq_duration    = 1.74587904[s]
X_domain          = 1H
X_freq            = 500.15991521[MHz]
X_offset          = 5.0[ppm]
X_points          = 16384
X_prescans        = 1
X_resolution      = 0.57277737[Hz]
X_sweep           = 9.38438438[kHz]
Irr_domain        = 1H
Irr_freq          = 500.15991521[MHz]
Irr_offset        = 5.0[ppm]
Tri_domain        = 1H
Tri_freq          = 500.15991521[MHz]
Tri_offset        = 5.0[ppm]
Clipped           = FALSE
Mod_return        = 1
Scans             = 8
Total_scans       = 8

X_90_width        = 12.2[us]
X_acq_time        = 1.74587904[s]
X_angle           = 45[deg]
X_atn             = 3.8[dB]
X_pulse           = 6.1[us]
Irr_mode          = Off
Tri_mode          = Off
Dante_presat      = FALSE
Initial_wait      = 1[s]
Recvr_gain        = 46
Relaxation_delay  = 5[s]
Repetition_time   = 6.74587904[s]
Temp_get          = 24.1[dC]
```



```
---- PROCESSING PARAMETERS ----
dc_balance : 0 : FALSE
sexp : 2.0[Hz] : 0.0[s]
trapezoid3 : 0[%] : 80[%] : 100[%]
zerofill : 1
fft : 1 : TRUE : TRUE
machinephase
ppm

Derived from: single_pulse_dec-12.jdf
```

```
Filename          = single_pulse_dec-14.j
Author            = delta
Experiment        = single_pulse_dec
Sample_id         = 030612C
Solvent           = CHLOROFORM-D
Creation_time     =  6-MAR-2012 15:13:29
Revision_time     =  6-MAR-2012 15:44:54
Current_time      =  6-MAR-2012 15:45:07

Comment           = single pulse decouple
Data_format       = 1D COMPLEX
Dim_size          = 26214
Dim_title         = 13C
Dim_units         = [ppm]
Dimensions        = X
Site              = ECA 500
Spectrometer      = JNM-ECA500

Field_strength    = 11.7473579[T] (500[MH
X_acq_duration    = 0.83361792[s]
X_domain          = 13C
X_freq            = 125.76529768[MHz]
X_offset          = 100[ppm]
X_points          = 32768
X_prescans        = 4
X_resolution      = 1.19959034[Hz]
X_sweep           = 39.3081761[kHz]
Irr_domain        = 1H
Irr_freq          = 500.15991521[MHz]
Irr_offset        = 5.0[ppm]
Clipped           = FALSE
Mod_return        = 1
Scans             = 409
Total_scans       = 409

X_90_width        = 9.56[us]
X_acq_time        = 0.83361792[s]
X_angle           = 30[deg]
X_atn             = 9.1[dB]
X_pulse           = 3.18666667[us]
Irr_atn_dec       = 21[dB]
Irr_atn_noe       = 21[dB]
Irr_noise         = WALTZ
Decoupling        = TRUE
Initial_wait      = 1[s]
Noe               = TRUE
Noe_time          = 2[s]
Recvr_gain        = 54
Relaxation_delay  = 2[s]
Repetition_time   = 2.83361792[s]
Temp_get          = 25.2[dC]
```