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## **Copper-catalyzed aerobic oxidative synthesis of $\alpha$ -ketoamides from methyl ketones, amines and NIS at room temperature**

Juan Zhang, Ying Wei, Shaoxia Lin, Fushun Liang,\* and Pengjun Liu\*

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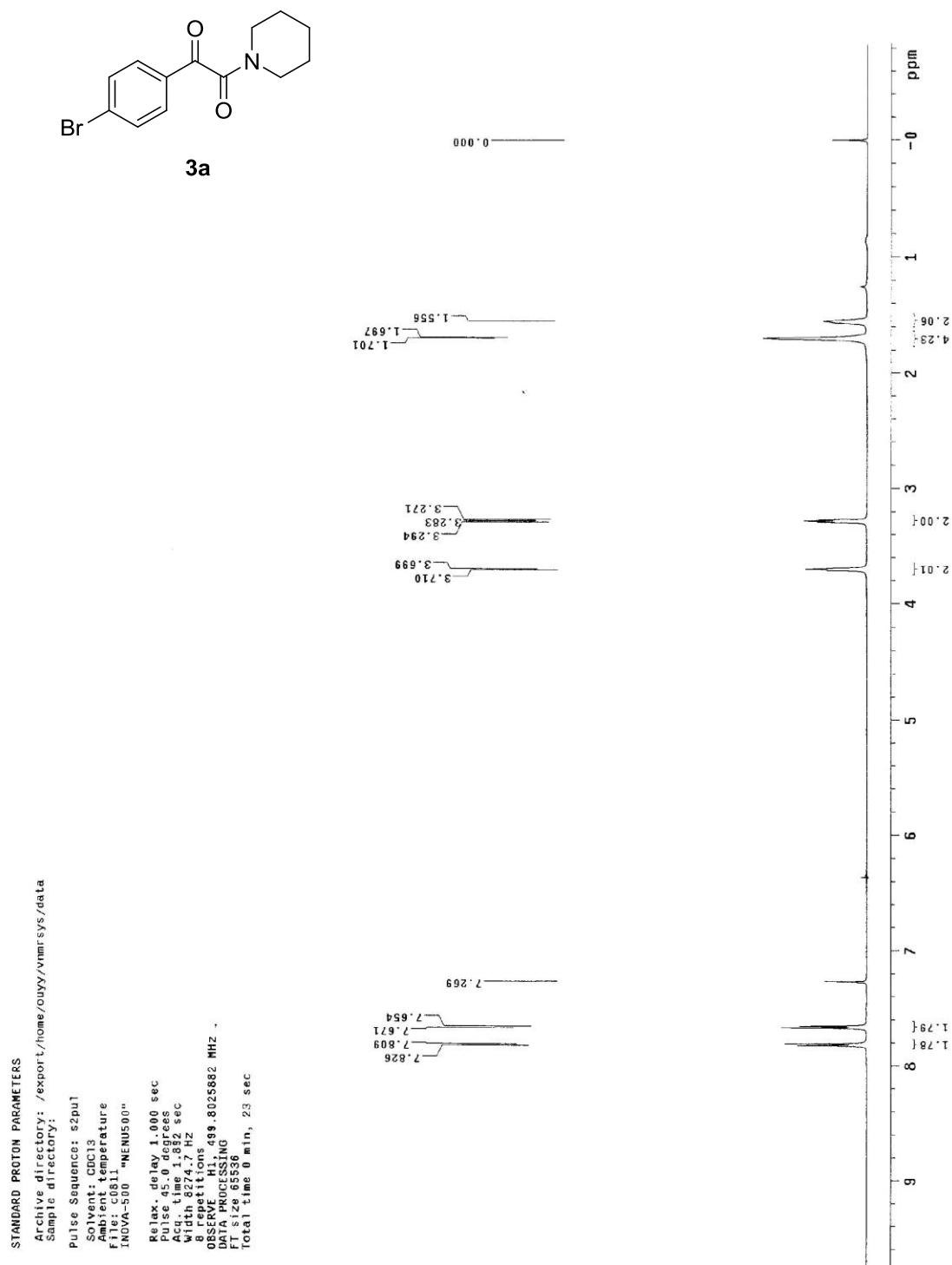
<sup>b</sup> *College of Chemistry and Chemical Engineering, Hainan Normal University, Haikou 571158, China*

*e-mail: [liupj12@126.com](mailto:liupj12@126.com).*

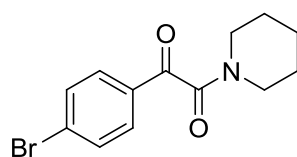
### *Table of Contents for Supporting Information*

Copies of  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra for compounds **3** and **4**.

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**3a**

STANDARD CARBON PARAMETERS

Archive directory: /export/home/ouyy/vnmr/sys/data

Sample directory:

Pulse Sequence: s2bu1

Solvent: cdcl3

Ambient temperature

Ref: cdcl3

INOVA-500

"NMR500"

Relax. delay 0.500 sec

Pulse 45.0 degrees

Acq. time 1.300 sec

Width 31421.8 Hz

132 repetitions

Observed F1 125.761 MHz

Observed F2 6754781 MHz

Decouple H1 495.805005 MHz

Power 42 dB

continuously on

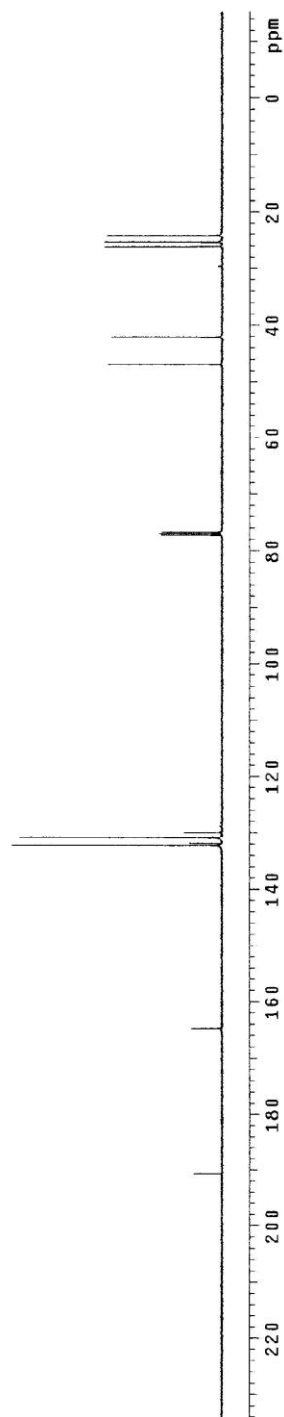
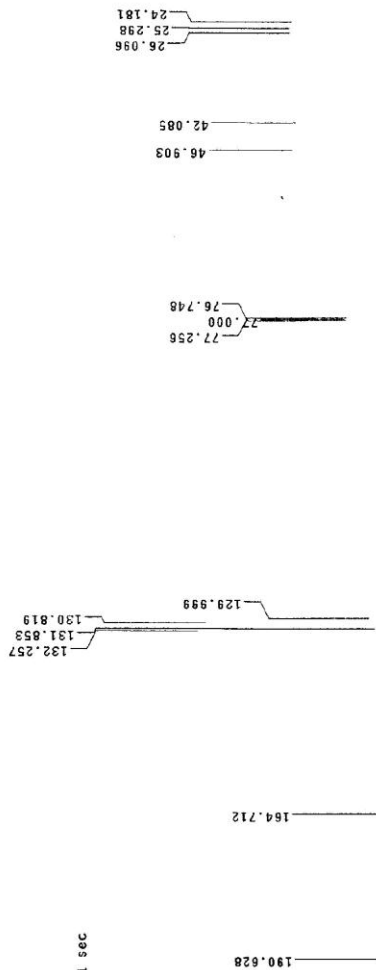
WALTZ-16 modulated

DATA PROCESSING

Line broadening 1.5 Hz

SI=31472

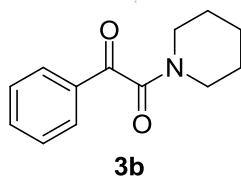
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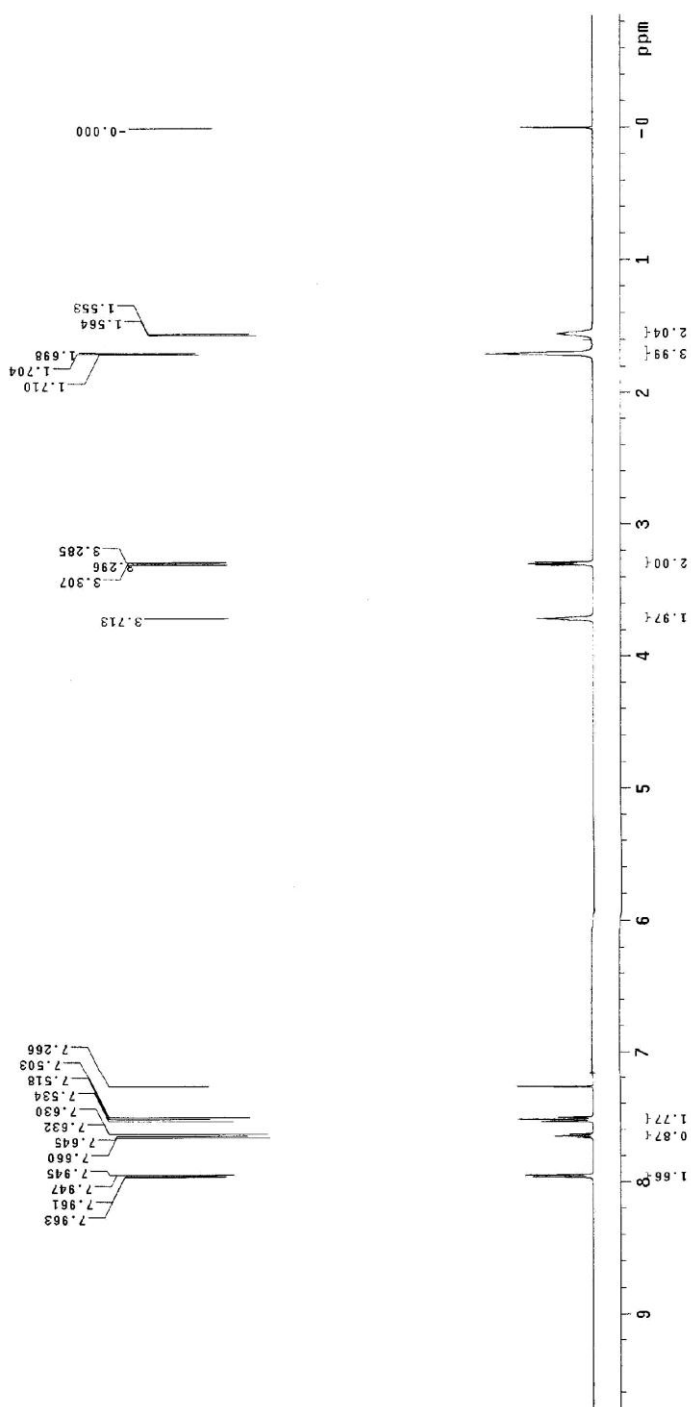
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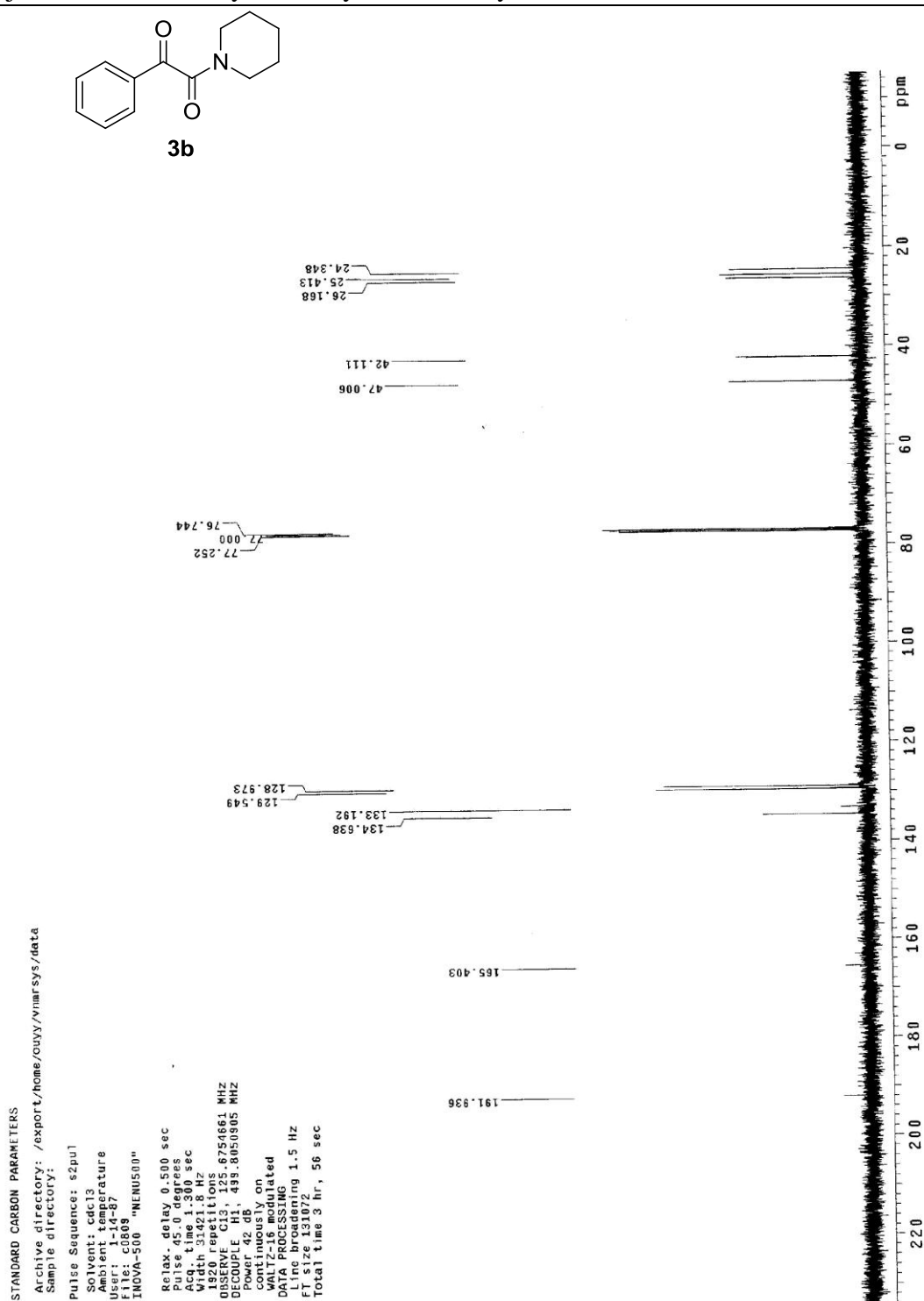
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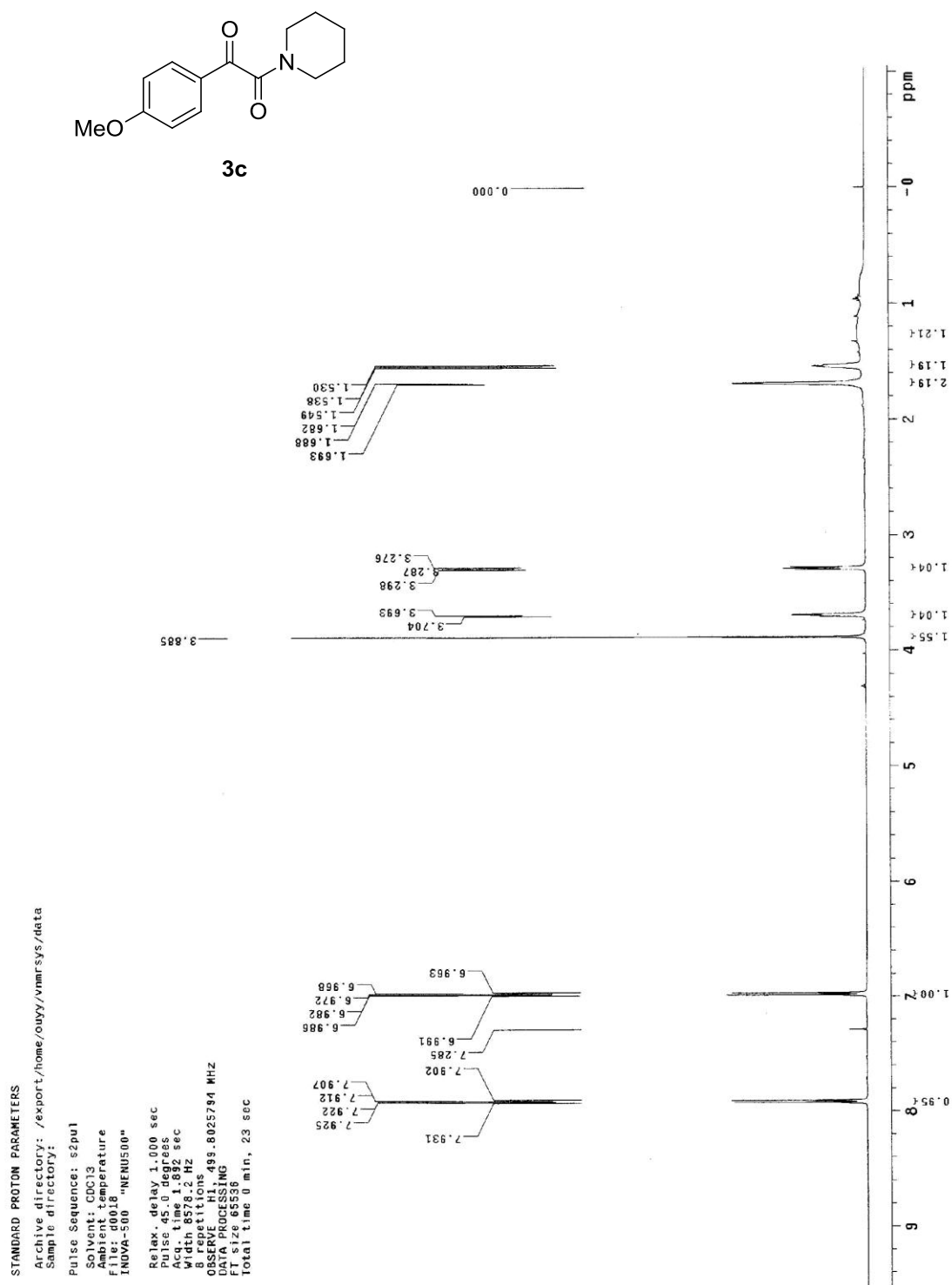
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Sample directory:  
Pulse Sequence: s2pu1  
Solvent: CDCl3  
Ambient temperature  
File: c0753  
INOVA-500 "NENUS00"  
Relax. delay 1.000 sec  
Pulse 45.0 degrees  
Acq. time 1.282 sec  
Pulse program: zgpg30  
F1: 499.8025894 MHz  
8 repetitions  
OBSERVE H1, 499.8025894 MHz  
DATA PROCESSING  
FT size 65536  
Total time 0 min, 23 sec



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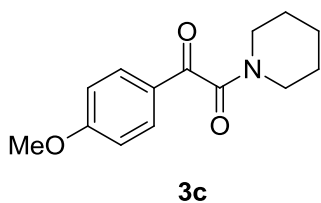


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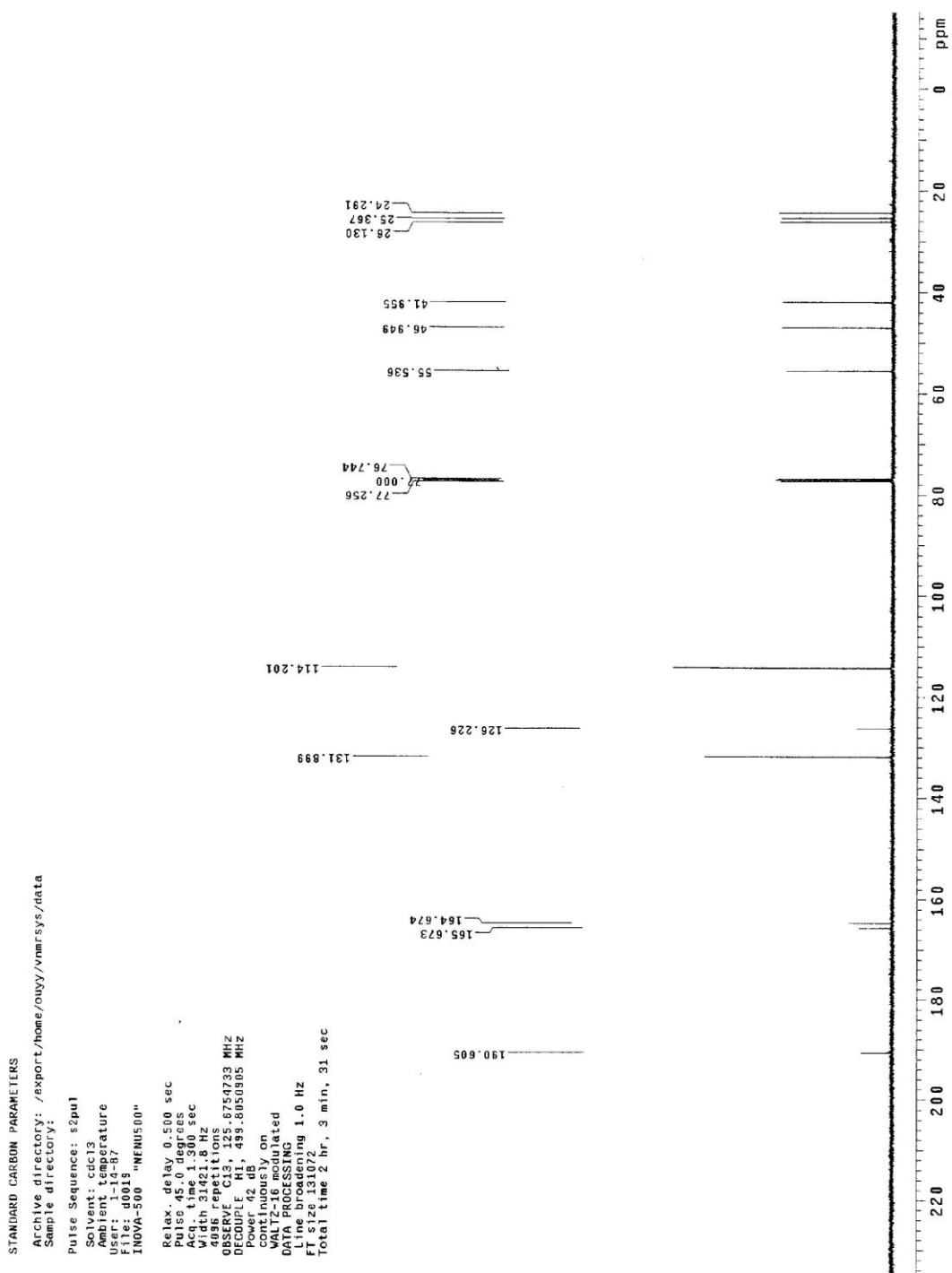
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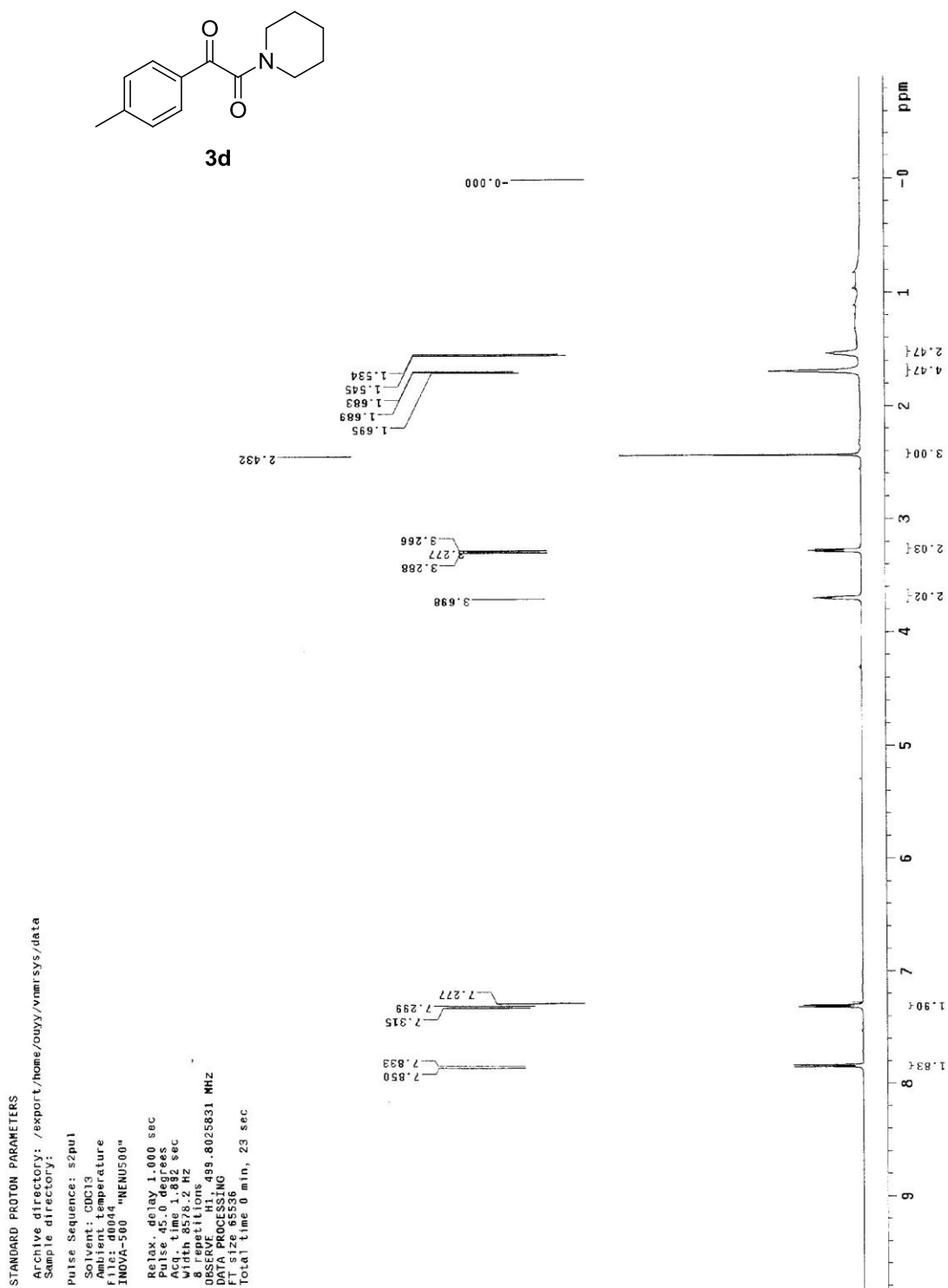




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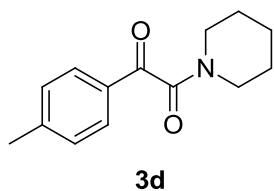


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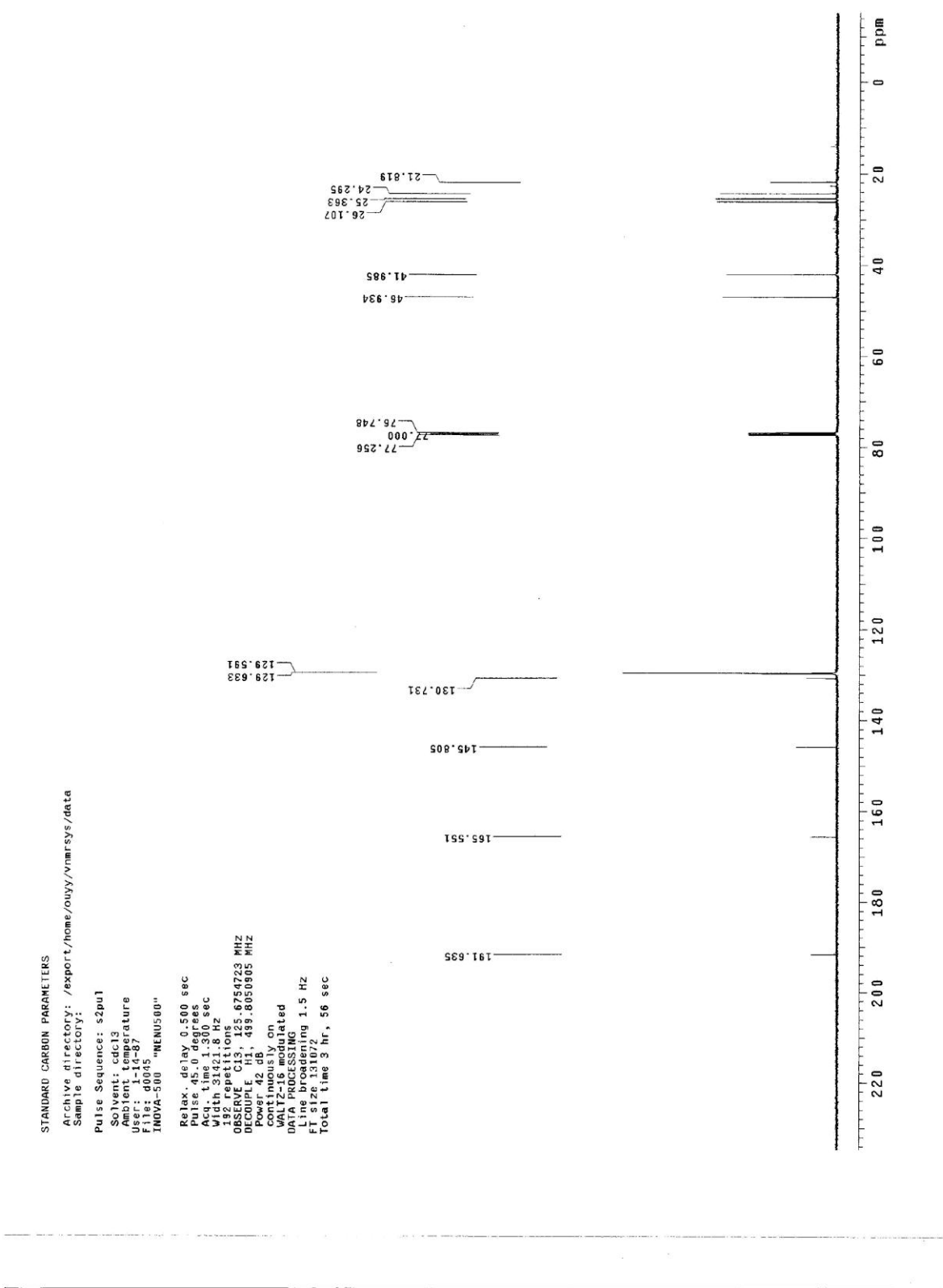


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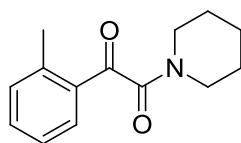
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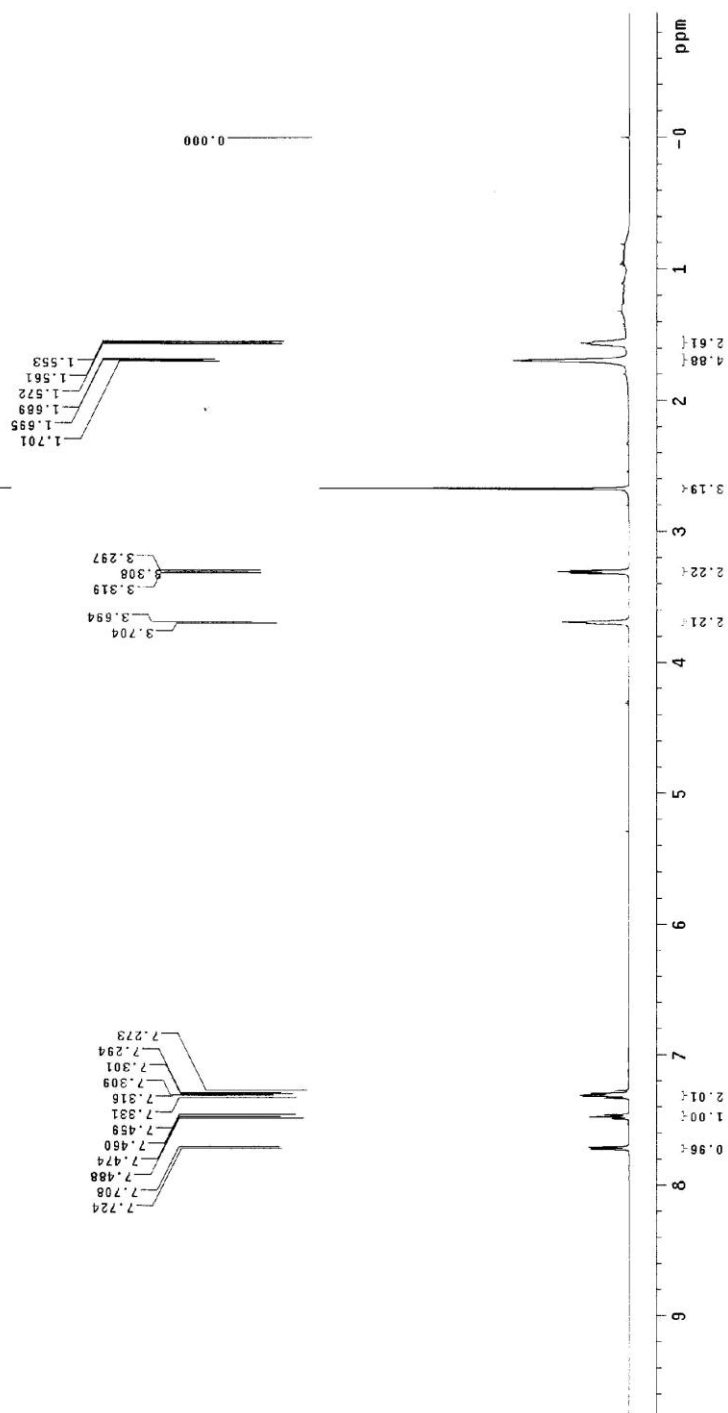


**3e**

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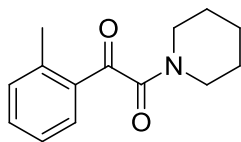
Pulse Sequence: s2pul  
Solvent: CDCl<sub>3</sub>  
Ambient temperature  
File: d0041  
INOVA-500 "MENU500"

Relax. delay 1.000 sec  
Pulse 45.0 degrees  
Acq. time 1.882 sec  
Wdth 8878.2 Hz  
8 repetitions  
OBSERVE H1, 499.8025857 MHz  
DATA PROCESSING  
FT size 65536  
Total time 0 min, 23 sec



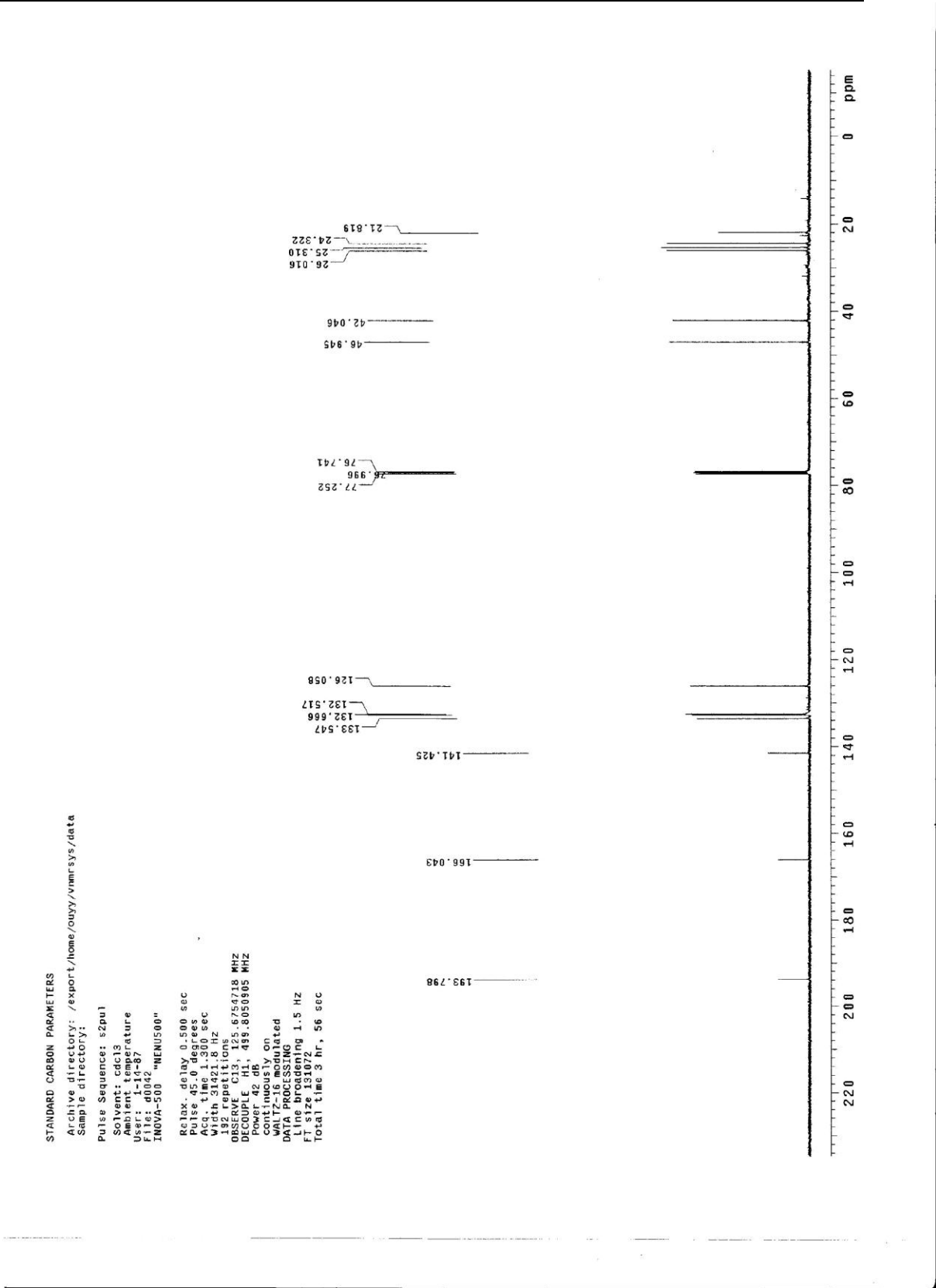
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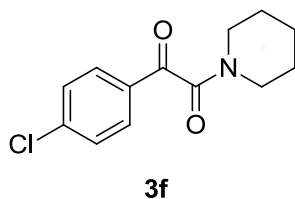


**3e**

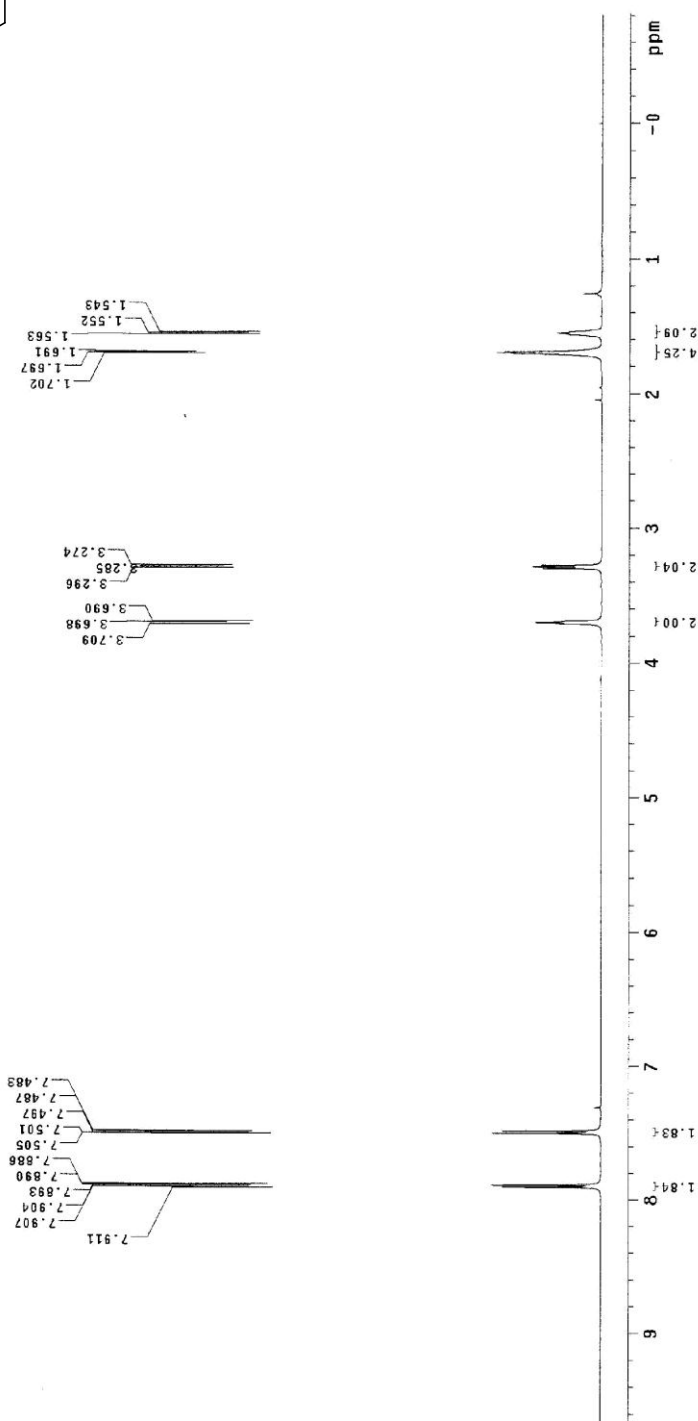
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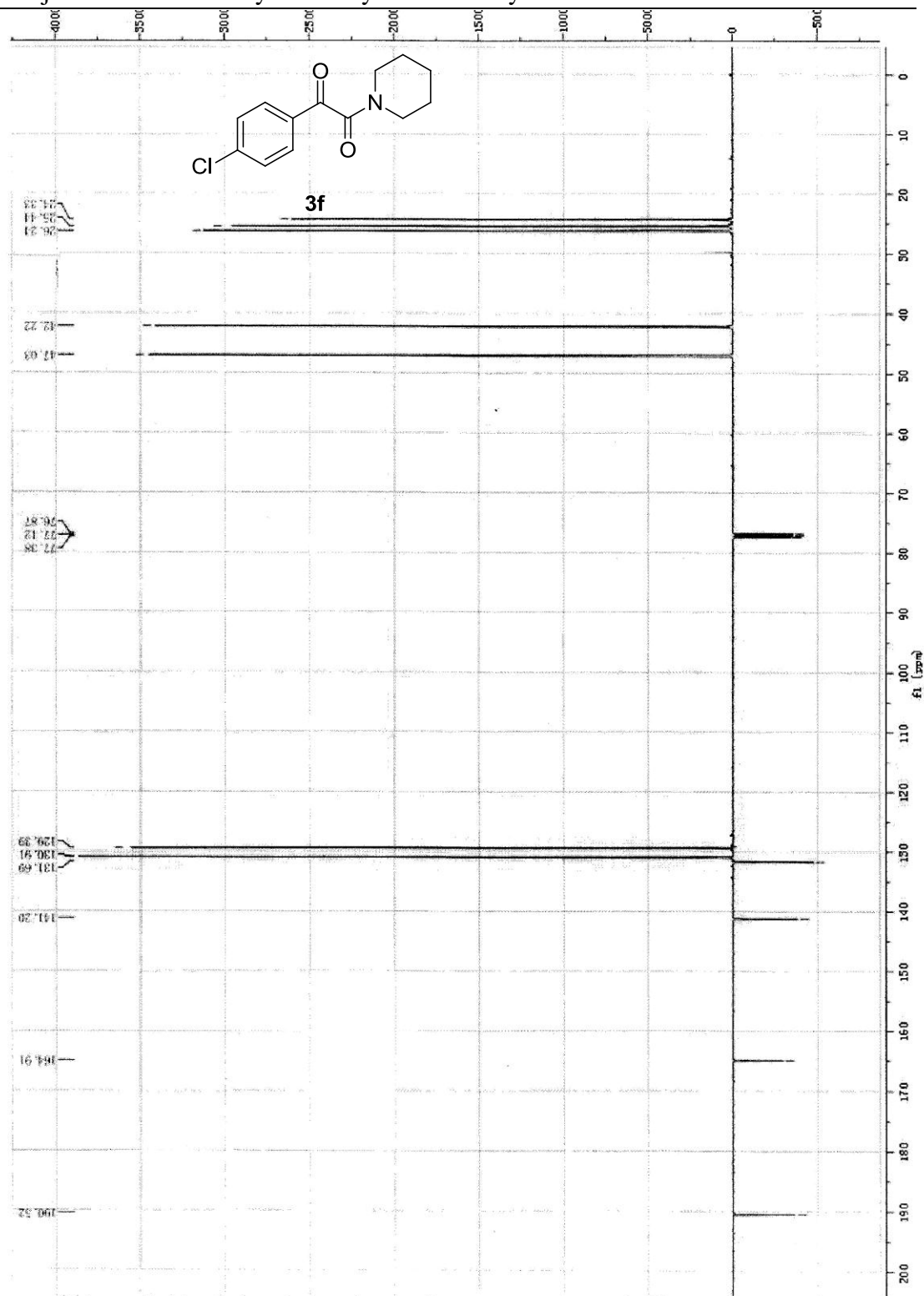


STANDARD PROTON PARAMETERS  
Archive directory: /export/home/ouvy/vnmr/sys/data  
Sample directory:  
Pulse Sequence: s2pul  
Solvent: CDCl<sub>3</sub>  
Pulse program: zgpg30  
F1: 101.254 MHz  
INSTR: spect  
Relax. delay: 1.000 sec  
Pulse: 45.0 degrees  
Acq. time: 1.882 sec  
Width: 9201.7 Hz  
Spectrum: 1  
Repetitions: 199.8025677 MHz  
Observed: 101.254 MHz  
DATA PROCESSING  
FT size: 55336  
Total time: 0 min, 23 sec

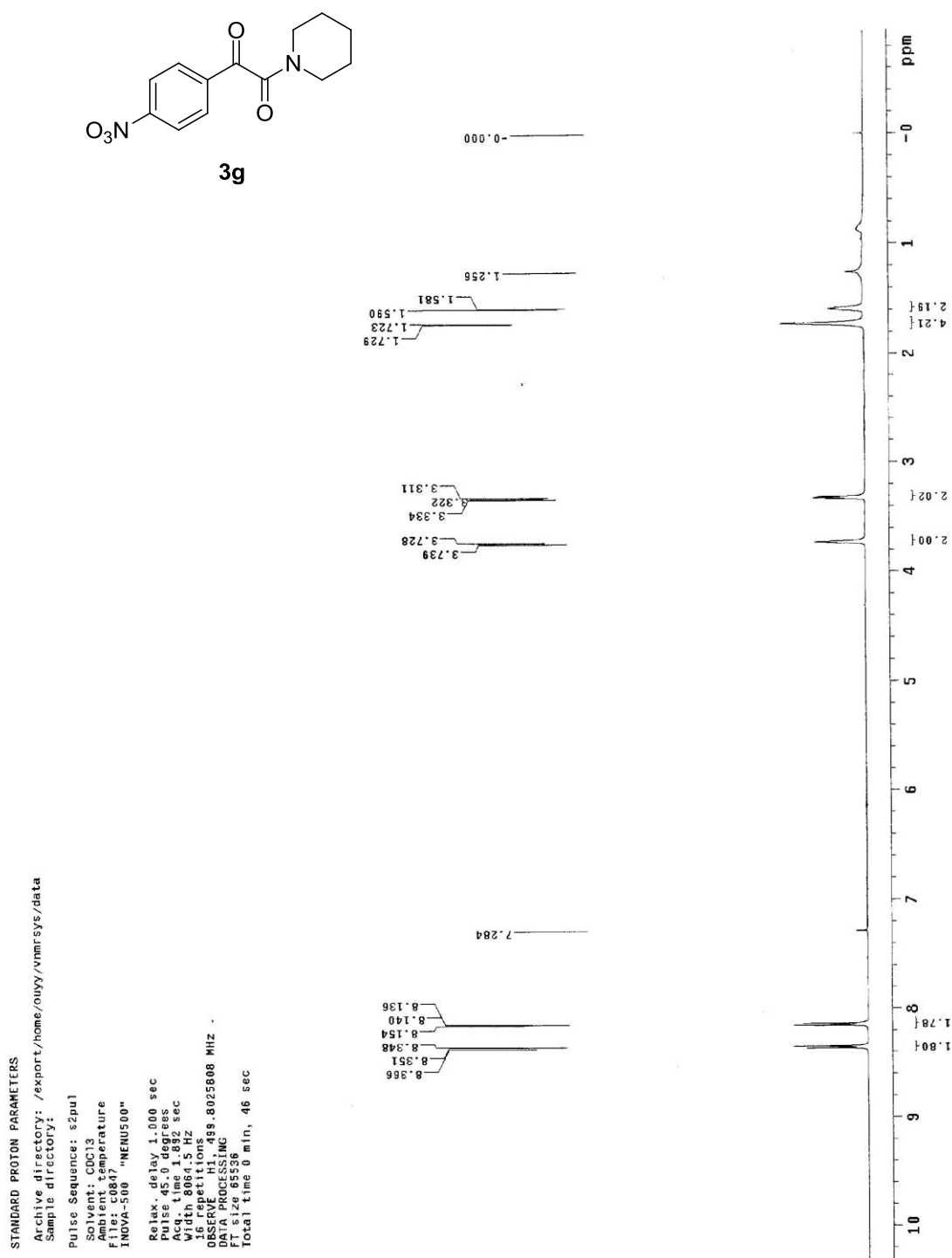




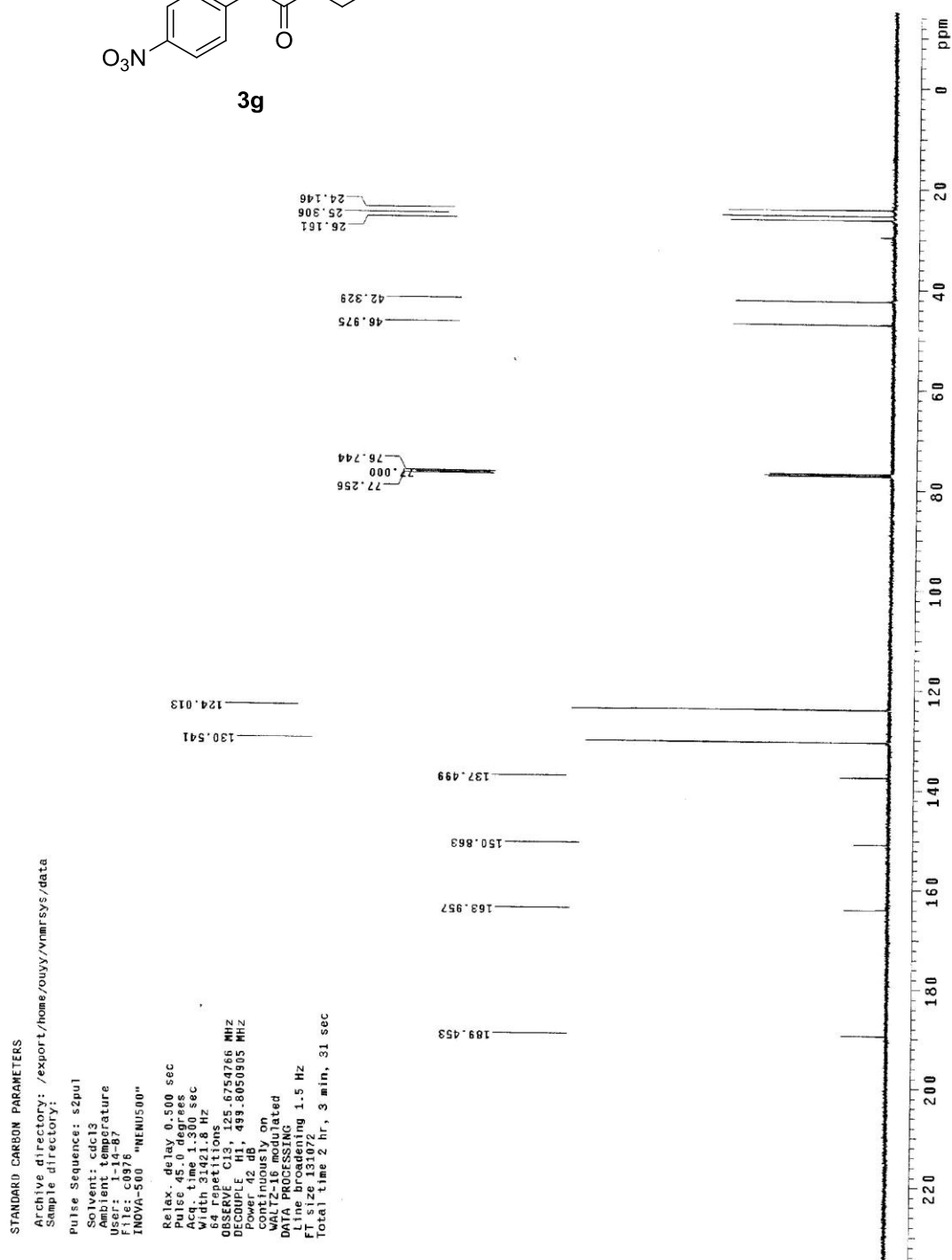
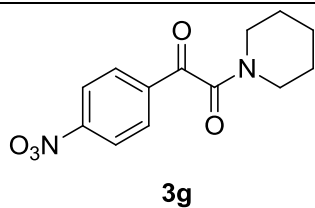
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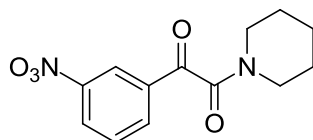
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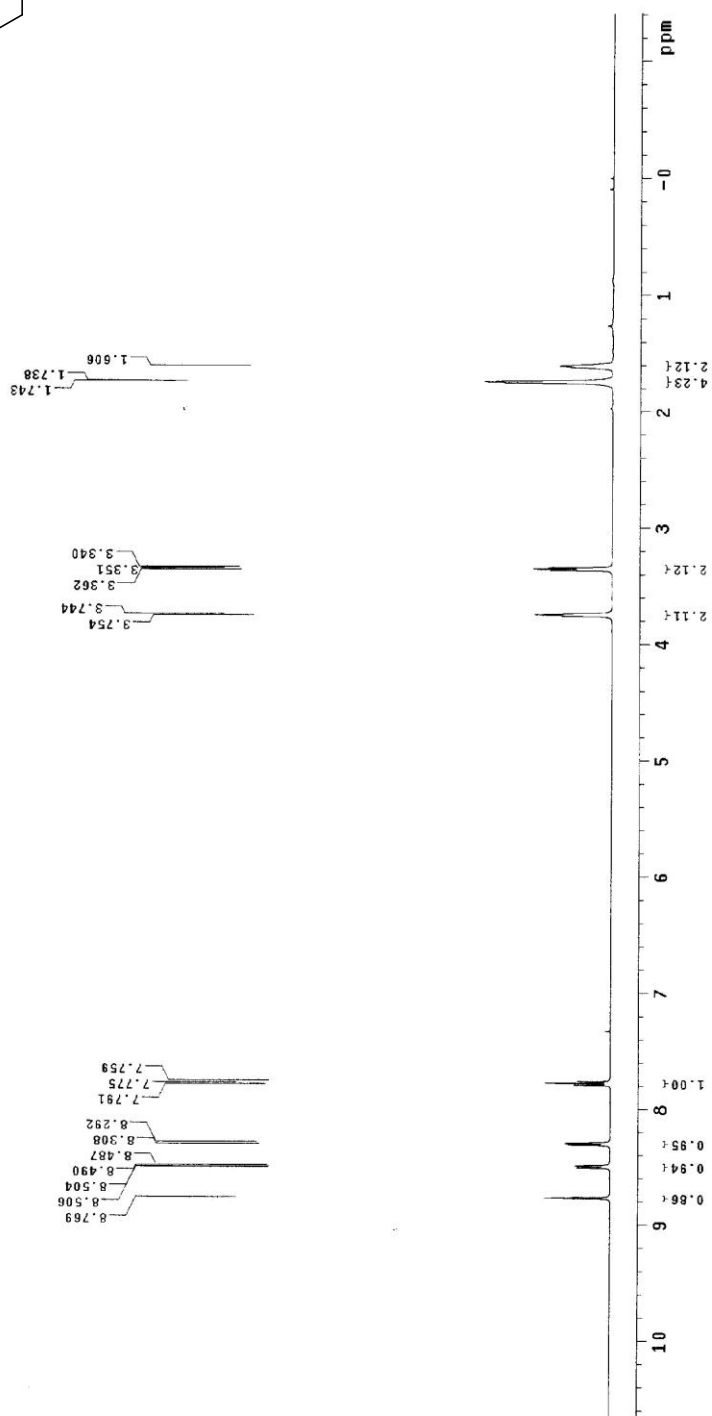


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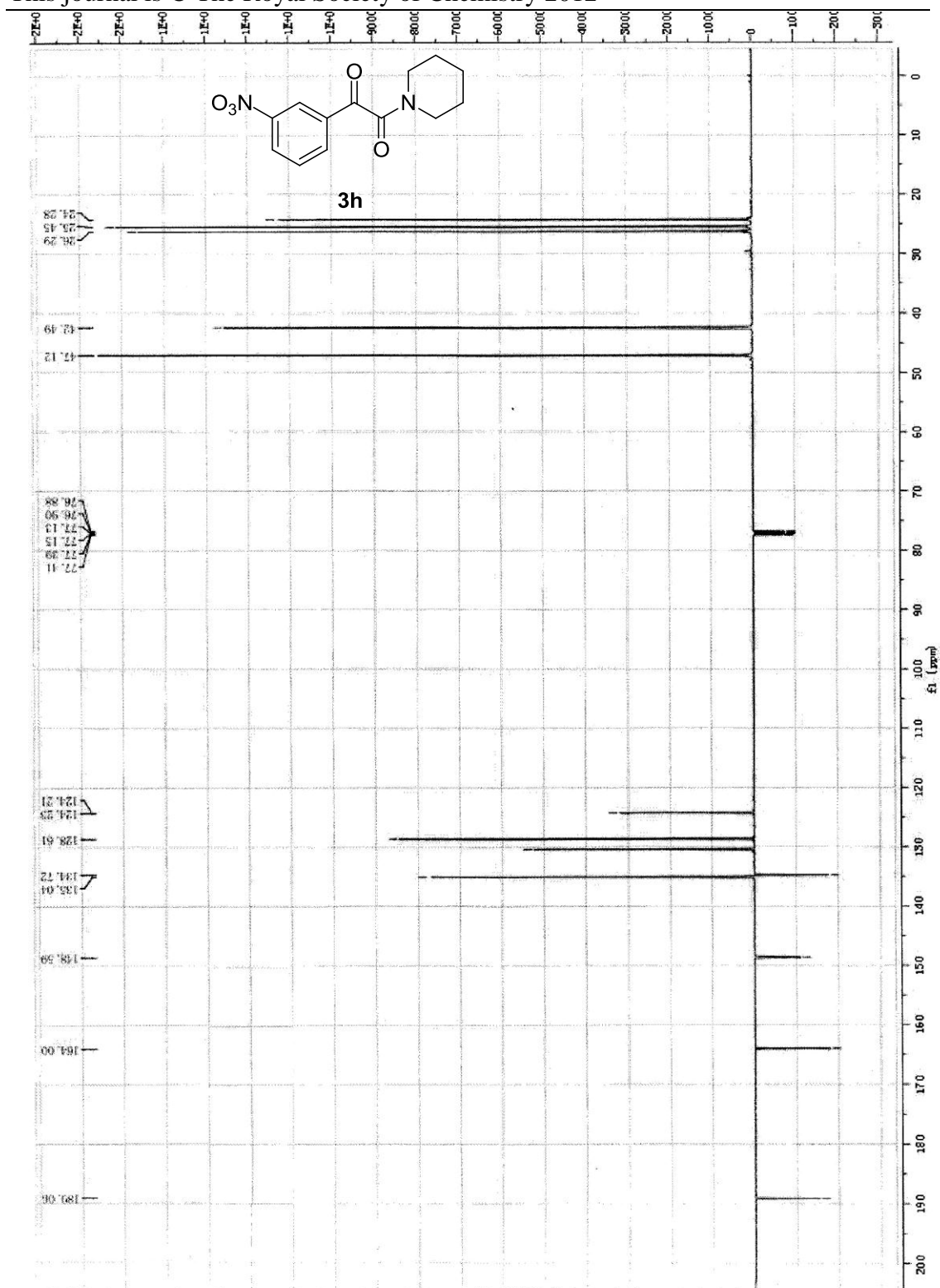


**3h**

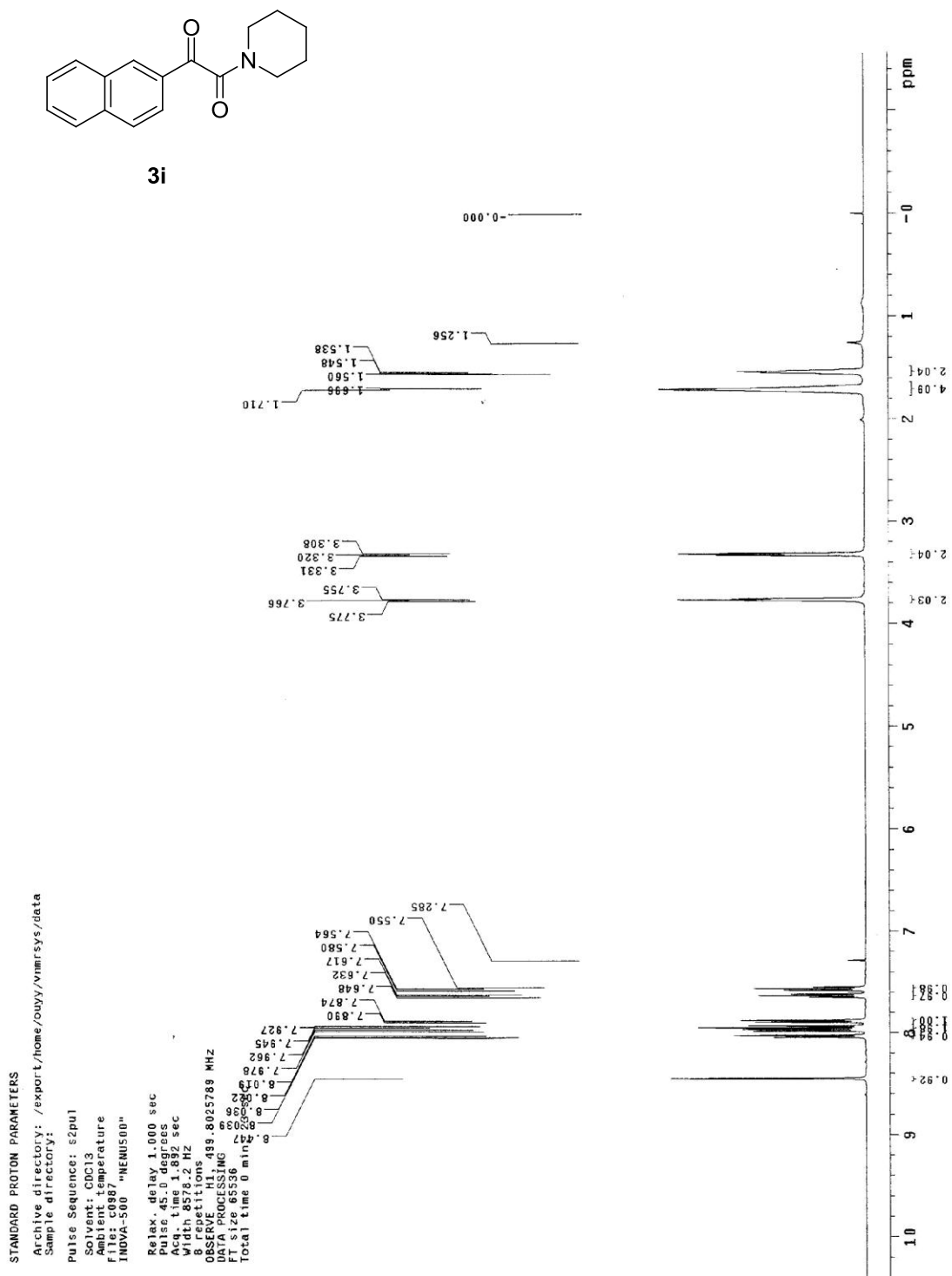
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Sample directory:  
Pulse Sequence: szpul  
Solvent: CDCl3  
Ambient temperature  
File: d0234  
INOVA-500 "HREUS00"  
Relax. delay 1.000 sec  
Pulse 45.0 degrees  
Acq. time 1.582 sec  
Wb. 800.131 MHz  
8 repetitions  
OBSERVE H1, 499.8025570 MHz  
DATA PROCESSING  
FT size 65536  
Total time 0 min, 23 sec



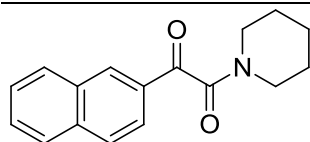
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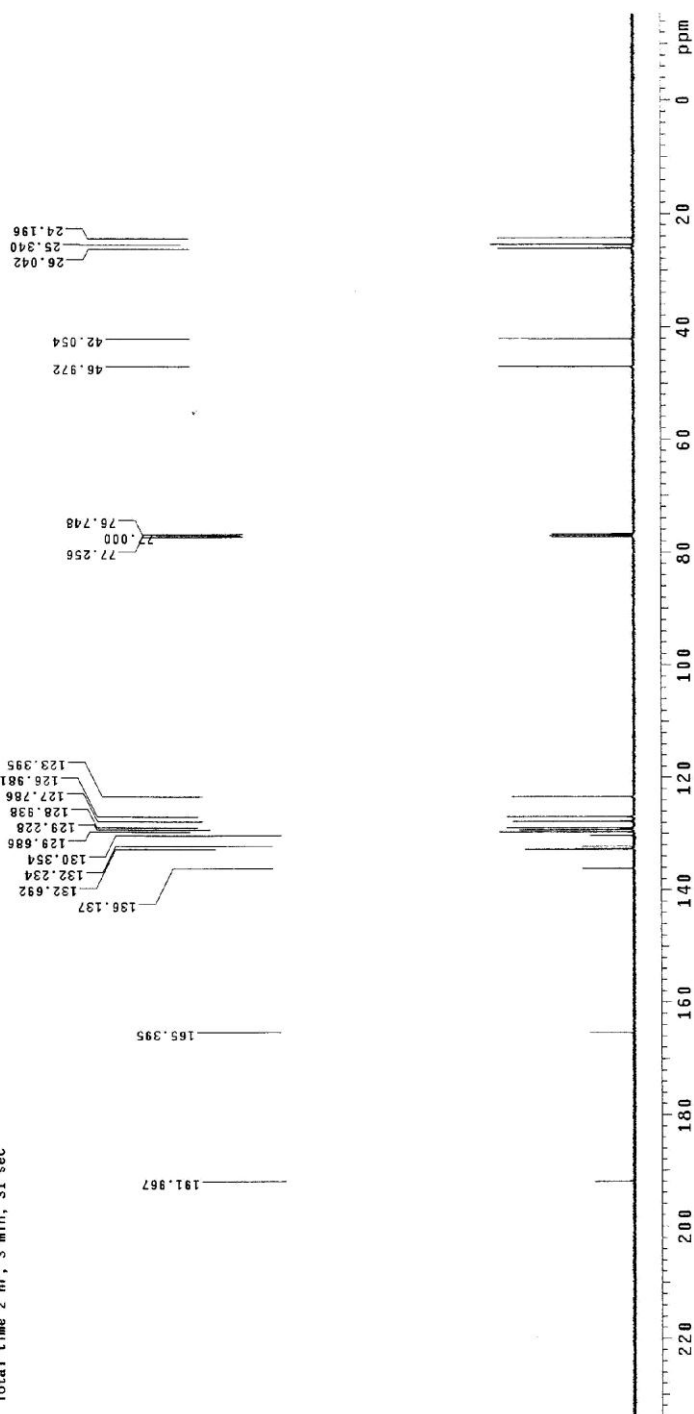


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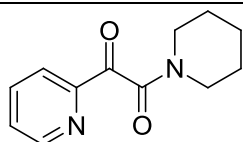
3i

STANDARD CARBON PARAMETERS  
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Sample directory:  
Pulse Sequence: szpul  
Solvent: cdcl3  
Ambient temperature  
User: j-14-87  
File: c0988  
INNOVA-500 "NMR500"  
Relax. delay 0.500 sec  
Pulse 45.0 degrees  
Acq. time 2.500 sec  
Width 31421.8 Hz  
64 repetitions  
OBSERVE C13, 125.6754838 MHz  
DECOUPLE H1, 498.8050905 MHz  
Power 42 dB  
Continuously on  
WALTZ16 selected  
DATA PROCESSING  
Line broadening 1.0 Hz  
FT size 131072  
Total time 2 hr, 3 min, 31 sec

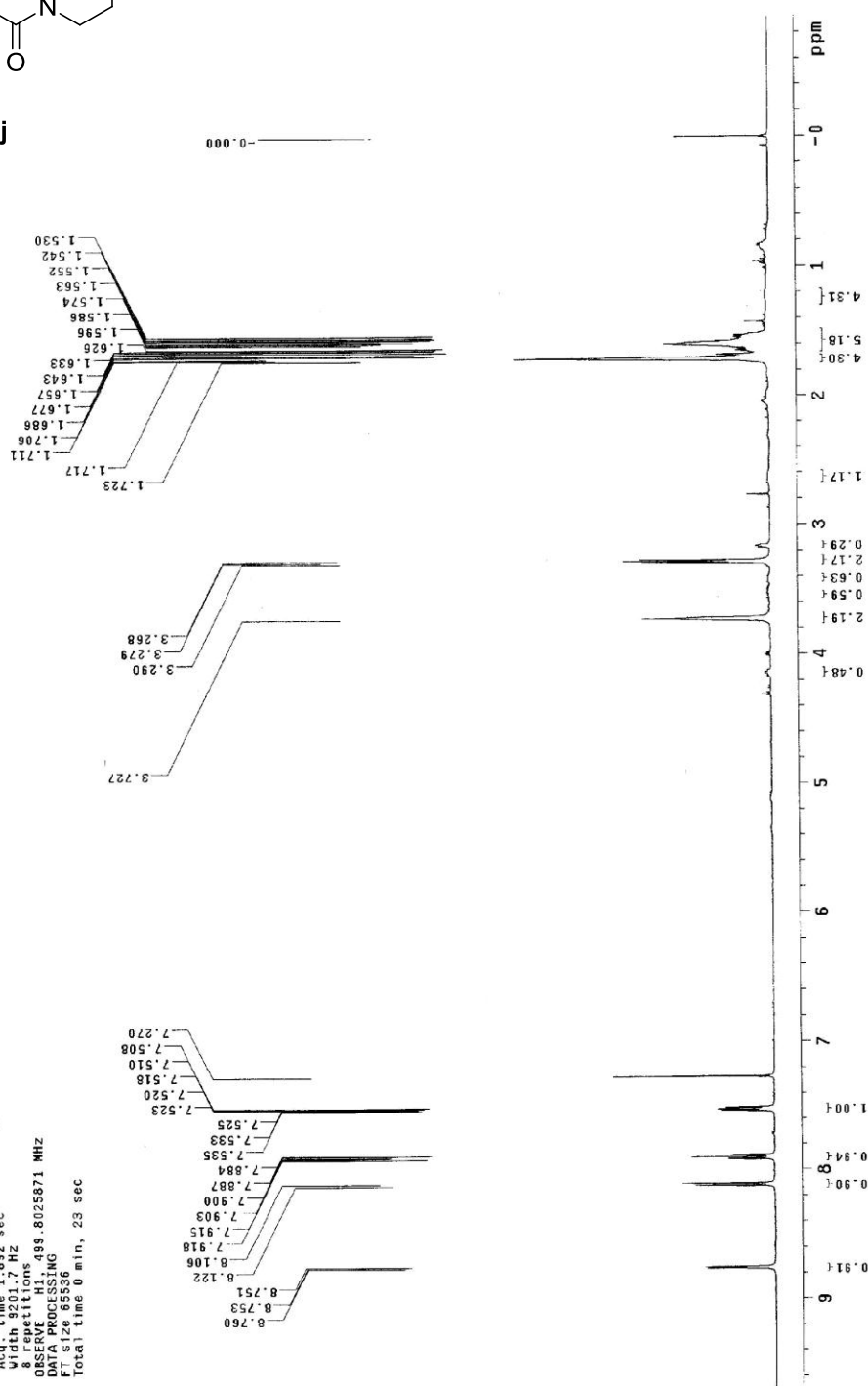




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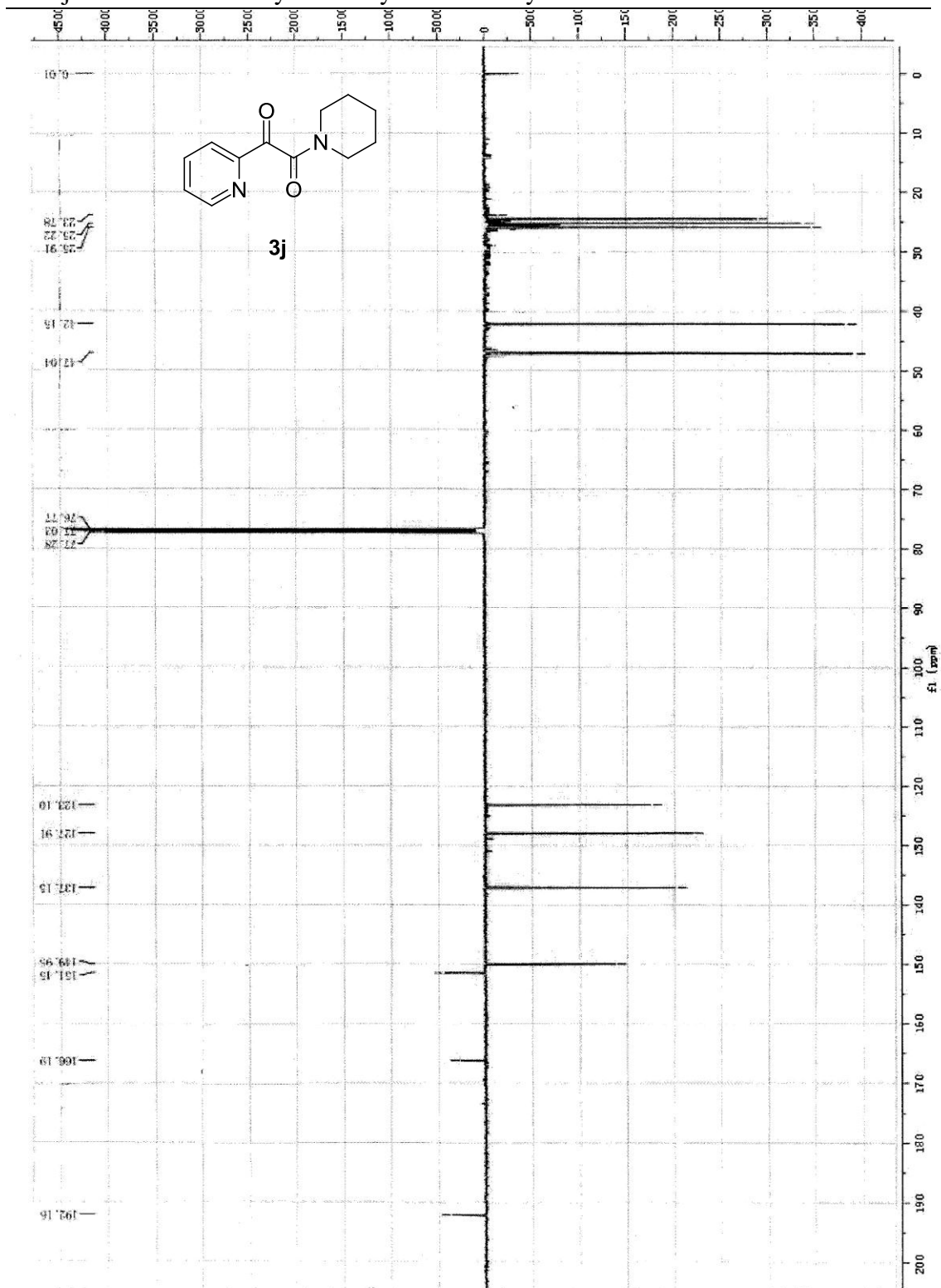
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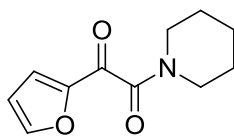
STANDARD PROTON PARAMETERS  
Archive directory: /export/home/buuy/vnmrSYS/data  
Sample directory:  
Pulse Sequence: s2pul  
Solvent: CDCl3  
Pulse program: zgpg30  
F1: 100.626 MHz  
INSTRUMENT: INOVA-500 "MENU500"  
Relax. delay: 1.000 sec  
Pulse: 45.0 degrees  
Acq. time: 1.882 sec  
Width: 9201.7 Hz  
Repetitions: 499  
OBSERVED F1: 499.8025871 MHz  
DATA PROCESSING  
FT size: 65536  
Total time: 0 min, 23 sec



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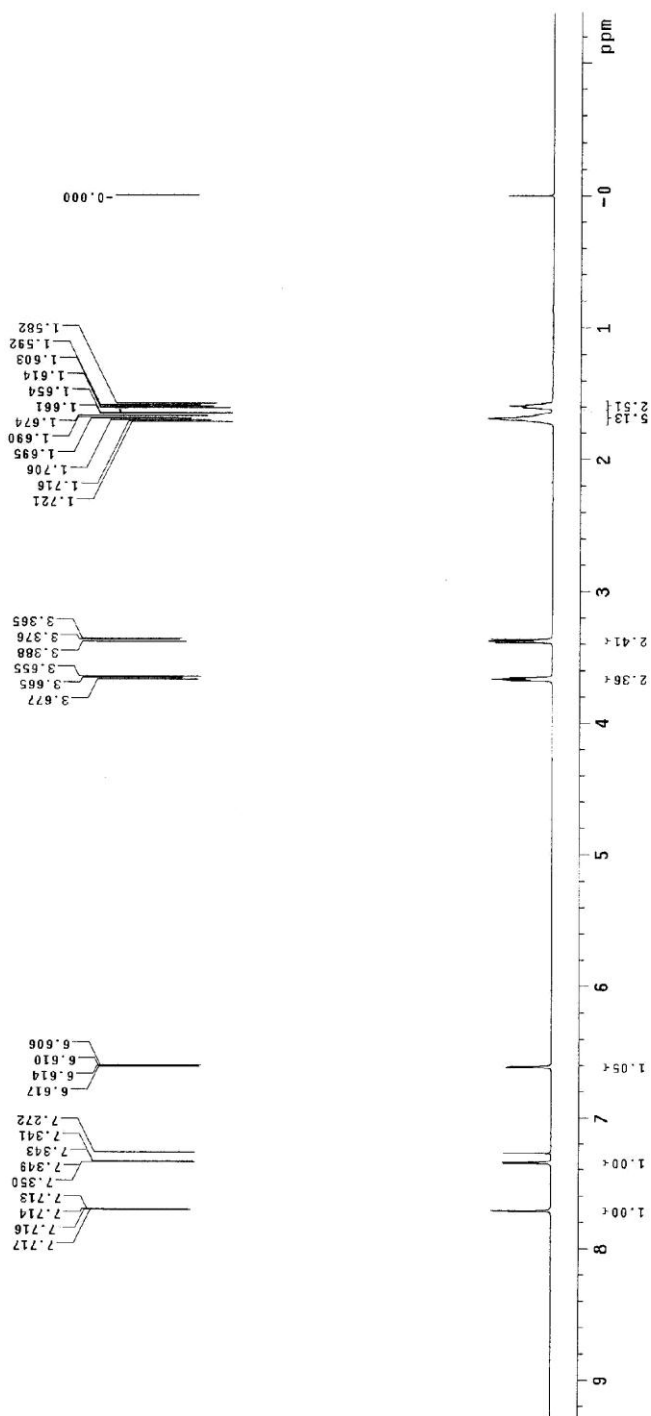


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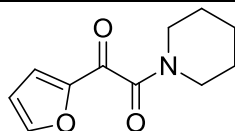


**3k**

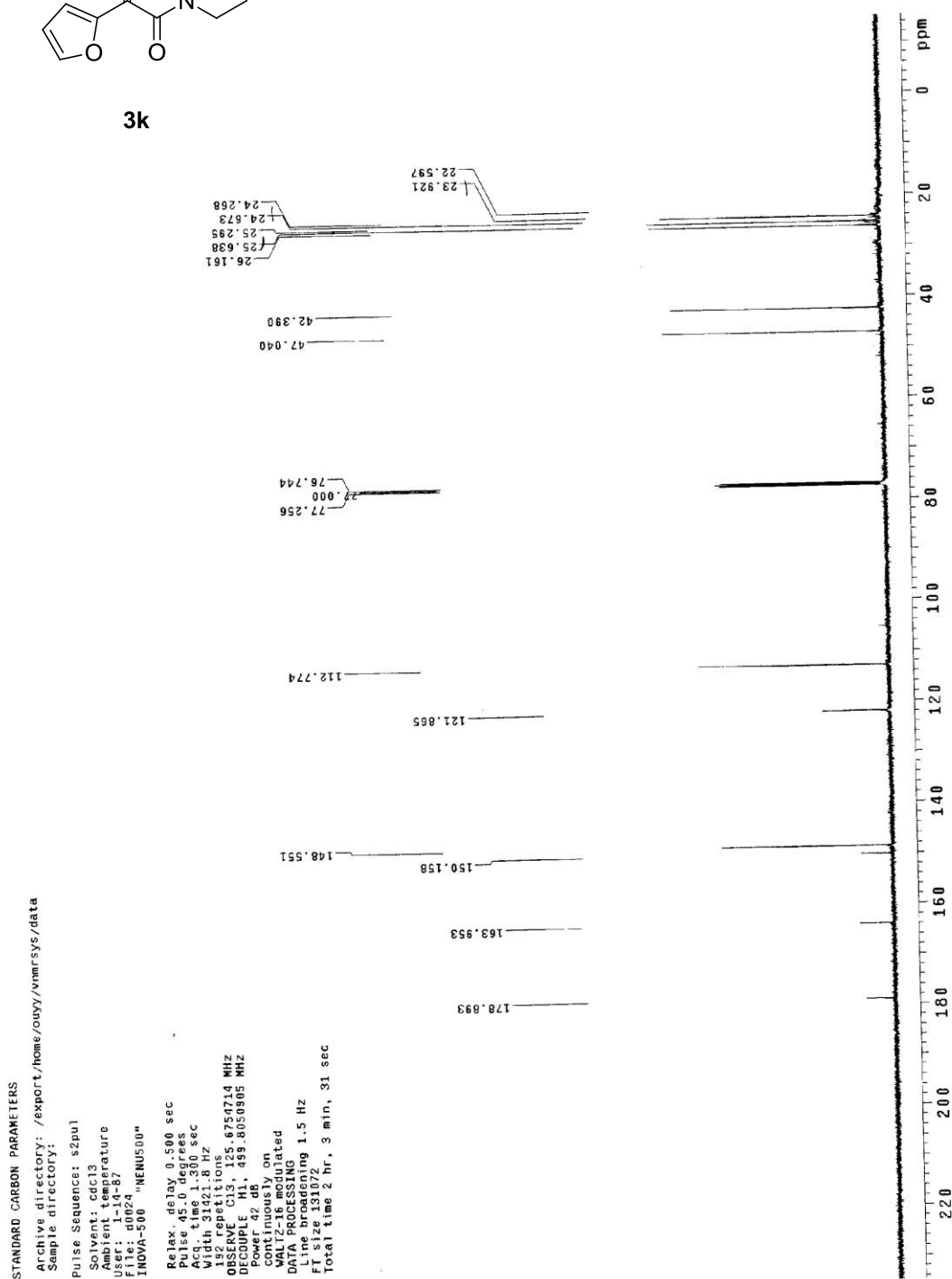
STANDARD PROTON PARAMETERS  
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Sample directory:  
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Solvent: CDCl<sub>3</sub>  
Pulse program: zgpg30  
File: 00116  
INVOA-500 "HNU500"  
Relax. delay 1.000 sec  
Pulse 45.0 degrees  
Acq. time 1.882 sec  
Width 889.9 Hz  
F2 500.136 MHz  
Observations 499.8025856 MHz  
SOLVENT PEAKS  
DATA PROCESSING  
FT size 65536  
Total time 0 min, 23 sec



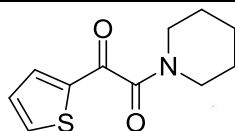
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3k

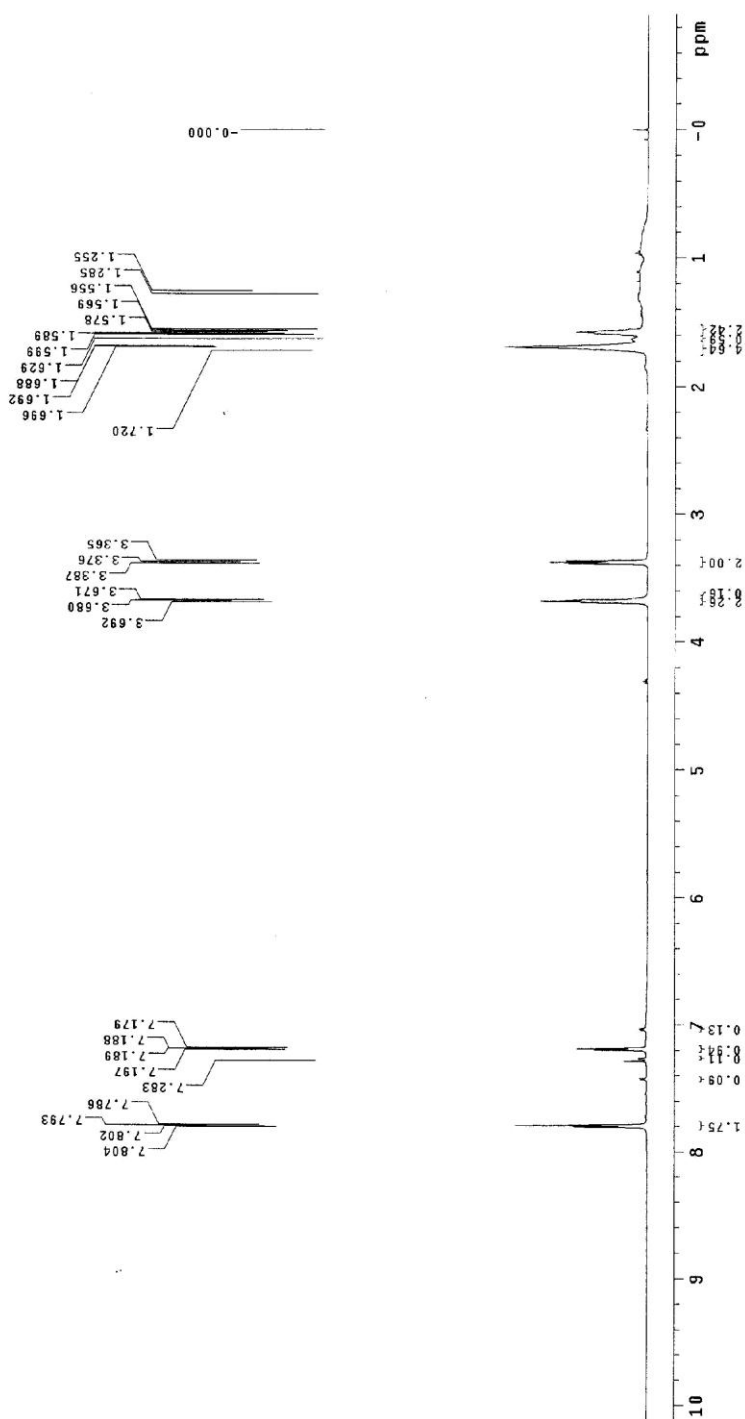


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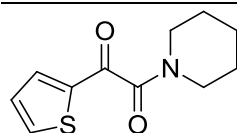


3I

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Sample directory:  
Pulse Sequence: s2pul  
Solvent: CDCl3  
Ambient temperature  
File: d0001  
INNOVA-500 "MREUS00"  
Relax. delay 1.000 sec  
Pulse 45.0 degrees  
Acq. time 2.000 sec  
Width 8578.2 Hz  
8 repetitions  
OBSERVE H1, 498.8025804 MHz  
DATA PROCESSING  
F1 size 65536  
Total time 0 min, 23 sec

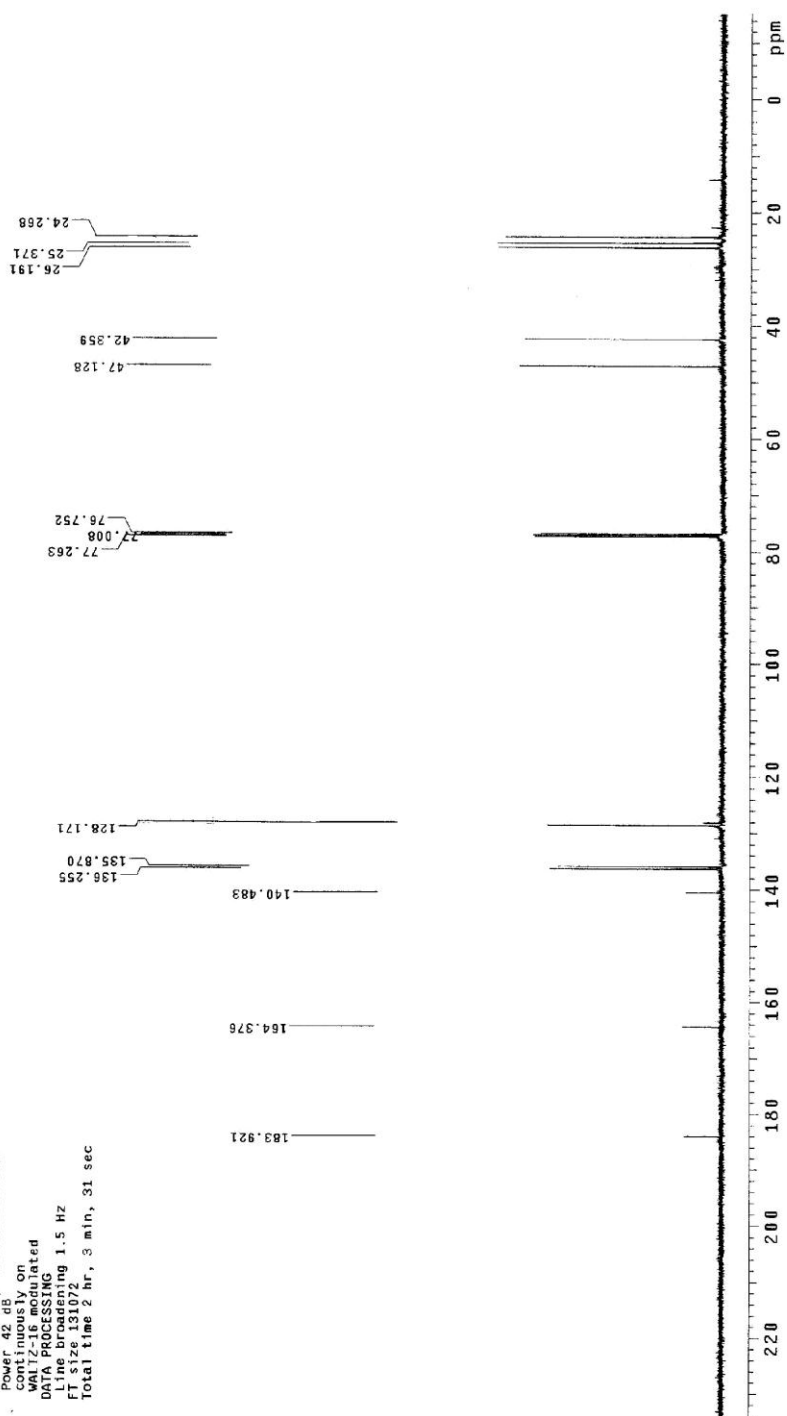


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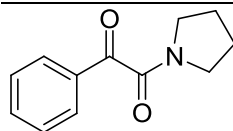


3I

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Sample directory:  
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Solvent: cdcl3  
Ambient temperature  
User: jk  
File: d0002  
INNOVA-500 "MENU500"  
Relax. delay 0.500 sec  
Pulse 45.0 degrees  
Acq. time 1.300 sec  
Width 31421.8 Hz  
V1 frequency 125.76254733 MHz  
OBSERVE C13 125.76254733 MHz  
DECOUPLE H1 499.8050805 MHz  
Power 42 dB  
continuously on  
WALTZ-16 modulated  
DATA PROCESSING  
Time taken for 1.5 Hz  
FT size 131072  
Total time 2 hr, 3 min, 31 sec

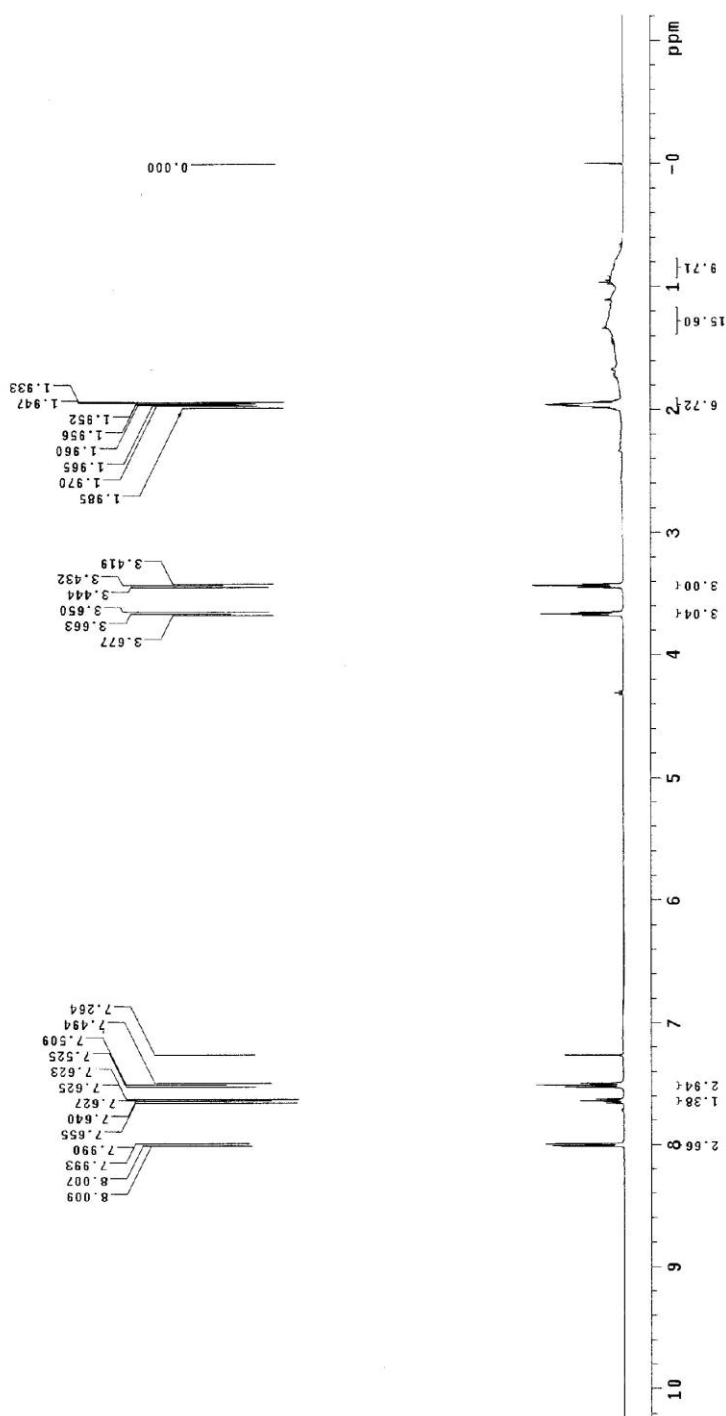


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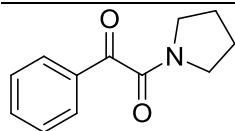


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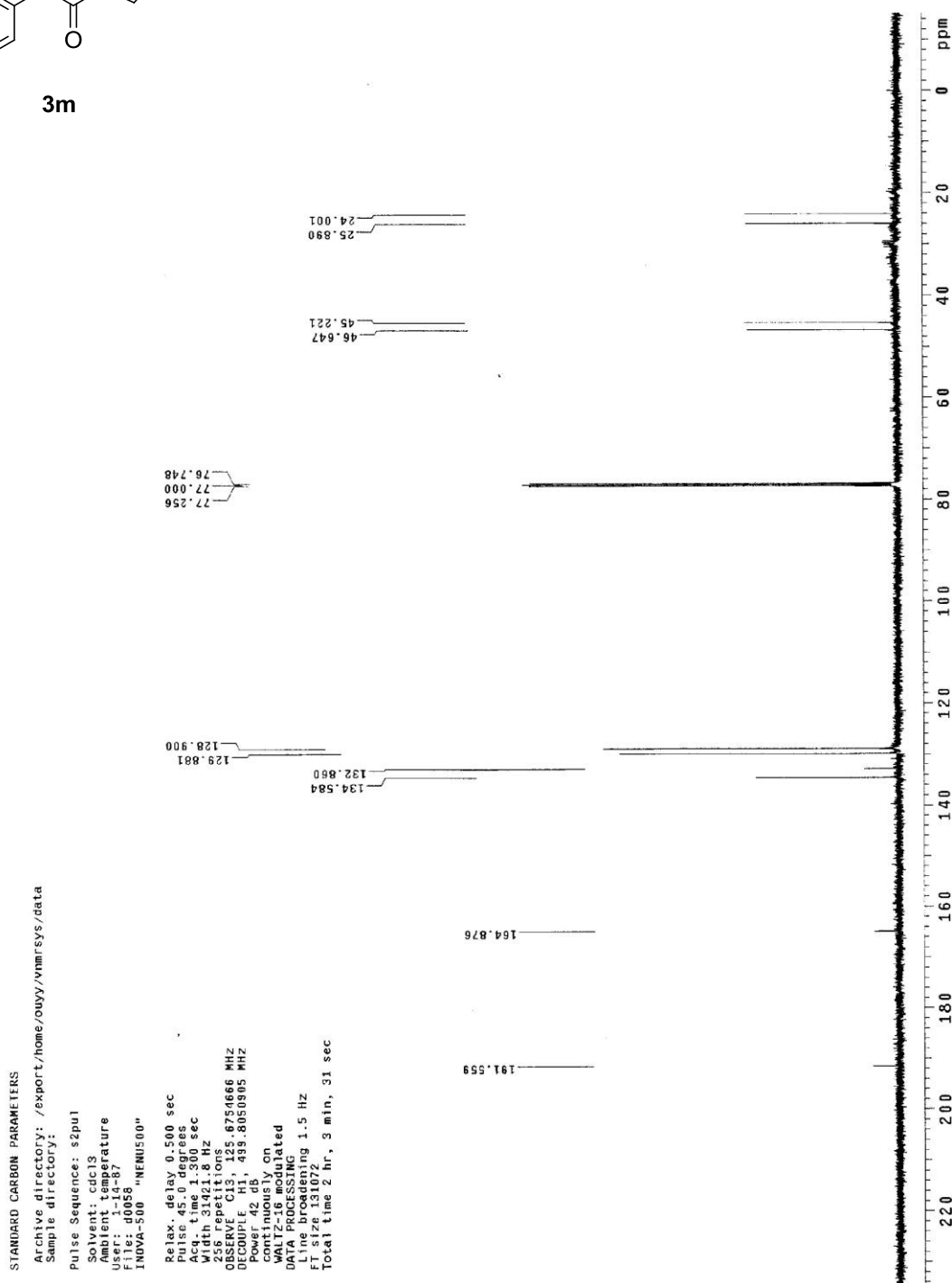
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Sample directory:  
Pulse Sequence: s2pul1  
Solvent: CDCl3  
Acq. temperature: 300.2 K  
File: d0057  
INOVIA-S00 "MENU500"  
Relax. delay 1.000 sec  
Pulse 45.0 degrees  
Acq. time 1.882 sec  
Width 8578.2 Hz  
Spectrum 1  
F2 499.8025899 MHz  
OBSERVE H1  
DATA PROCESSING  
FT size 65536  
Total time 0 min, 23 sec



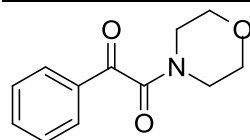
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3m

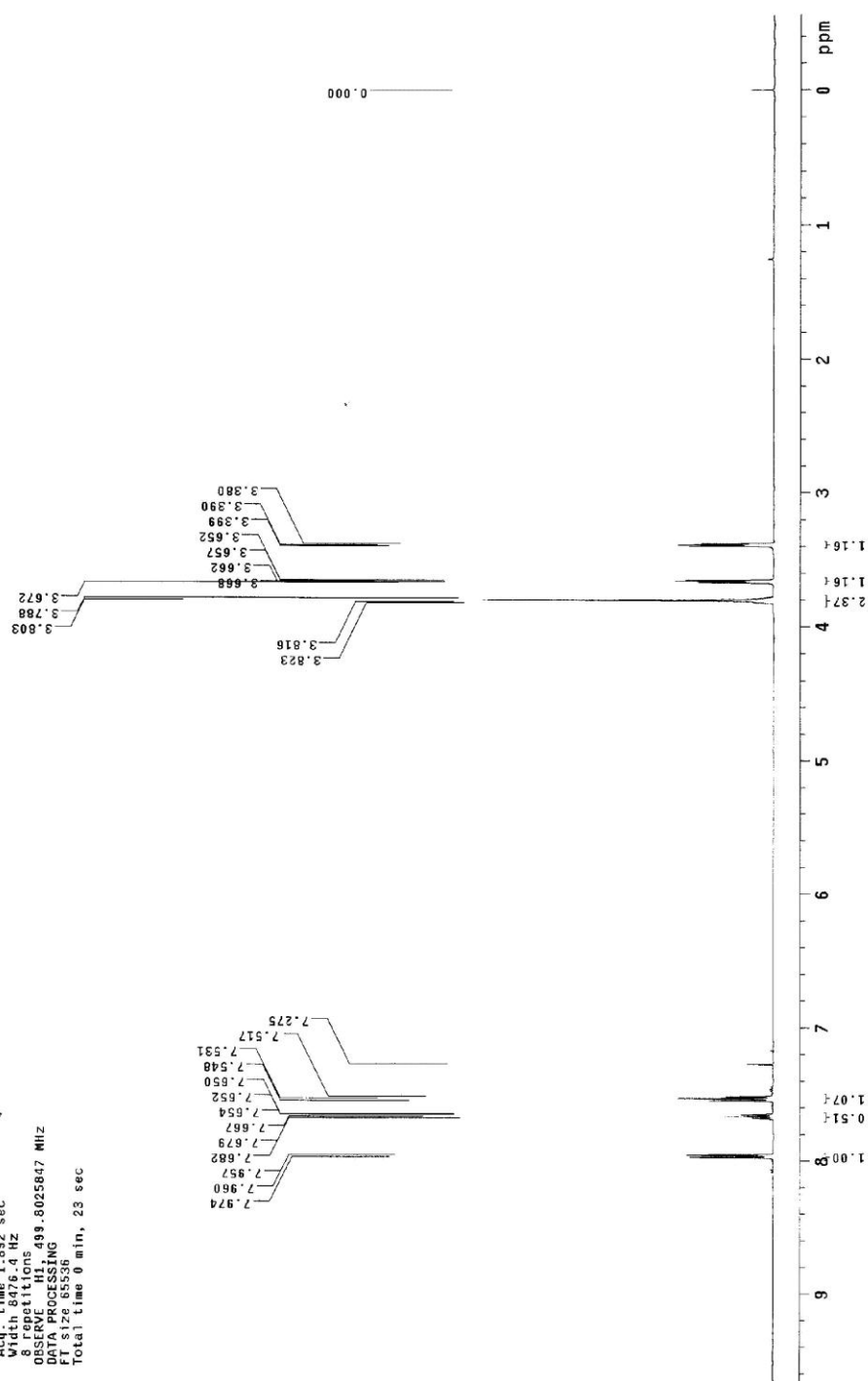


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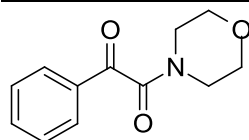
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STANDARD PROTON PARAMETERS  
Archive directory: /export/home/ouy/vnmrsys/data  
Sample directory:  
Pulse Sequence: s2pul  
Solvent: CDCl3  
Ambient temperature  
File: c0759  
INOVA-500 "NMR500"  
Relax. delay 1.000 sec  
Pulse 45.0 degrees  
Acq. time 1.592 sec  
Width 8076.400 Hz  
8 repetitions  
OBSERVE H1, 499.8025847 MHz  
DATA PROCESSING  
FT size 65536  
Total time 0 min, 23 sec



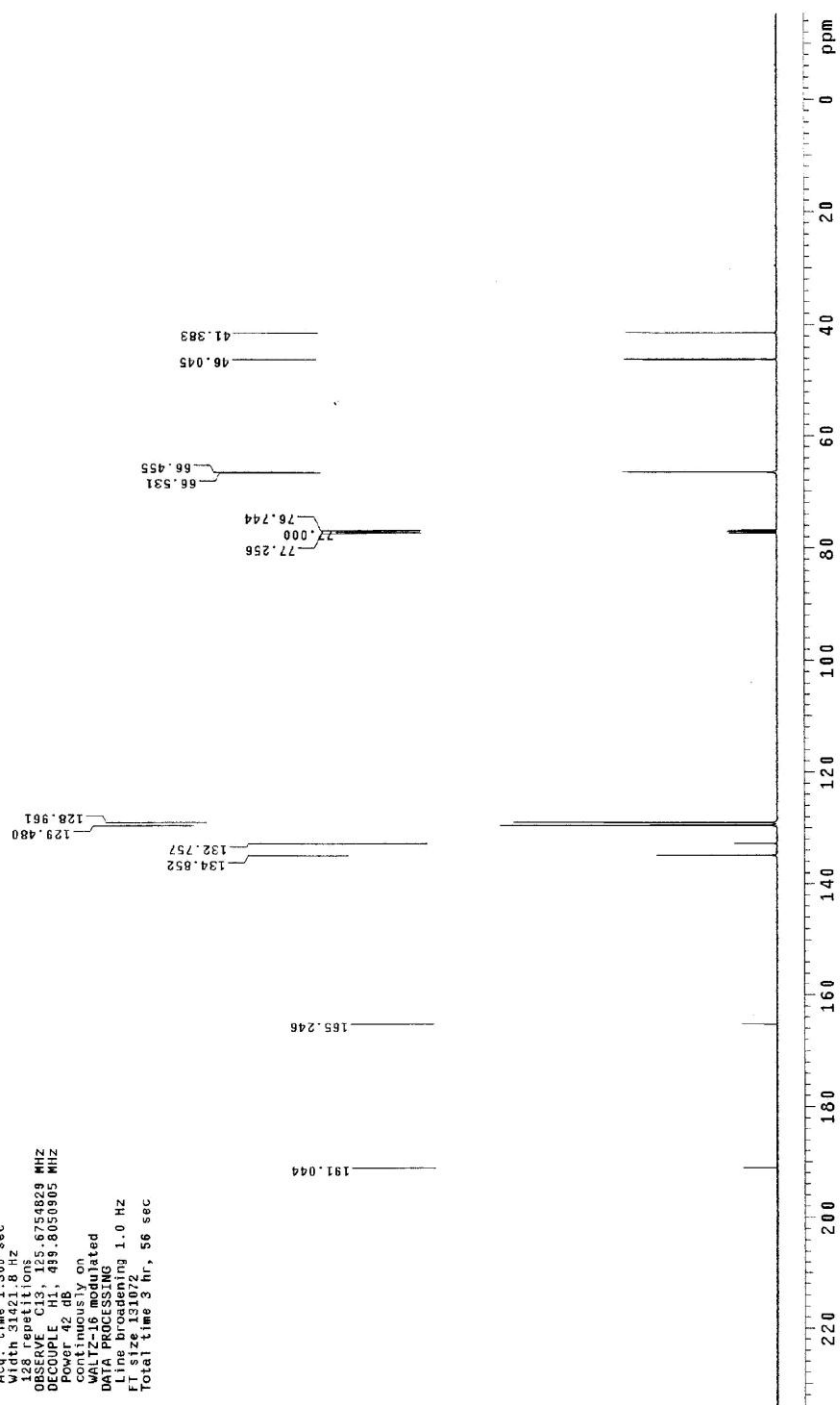


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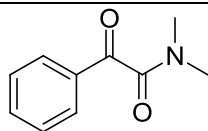


**3n**

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Sample directory:  
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Solvent: cdcl3  
Acquisition temperature: 300 K  
User: c0985  
File: c0985  
INOVA-500 "NENU500"  
Relax. delay 0.500 sec  
Pulse 45.0 degrees  
Acq. time 1.300 sec  
Width 5121.00 Hz  
128000000  
OBSERVE C13, 125.6754829 MHz  
DECOUPLE H1, 499.8050905 MHz  
Power 42 dB  
continuously on  
WALTZ16 irradiated  
Data processing  
Line broadening 1.0 Hz  
FT size 131072  
Total time 3 hr, 56 sec

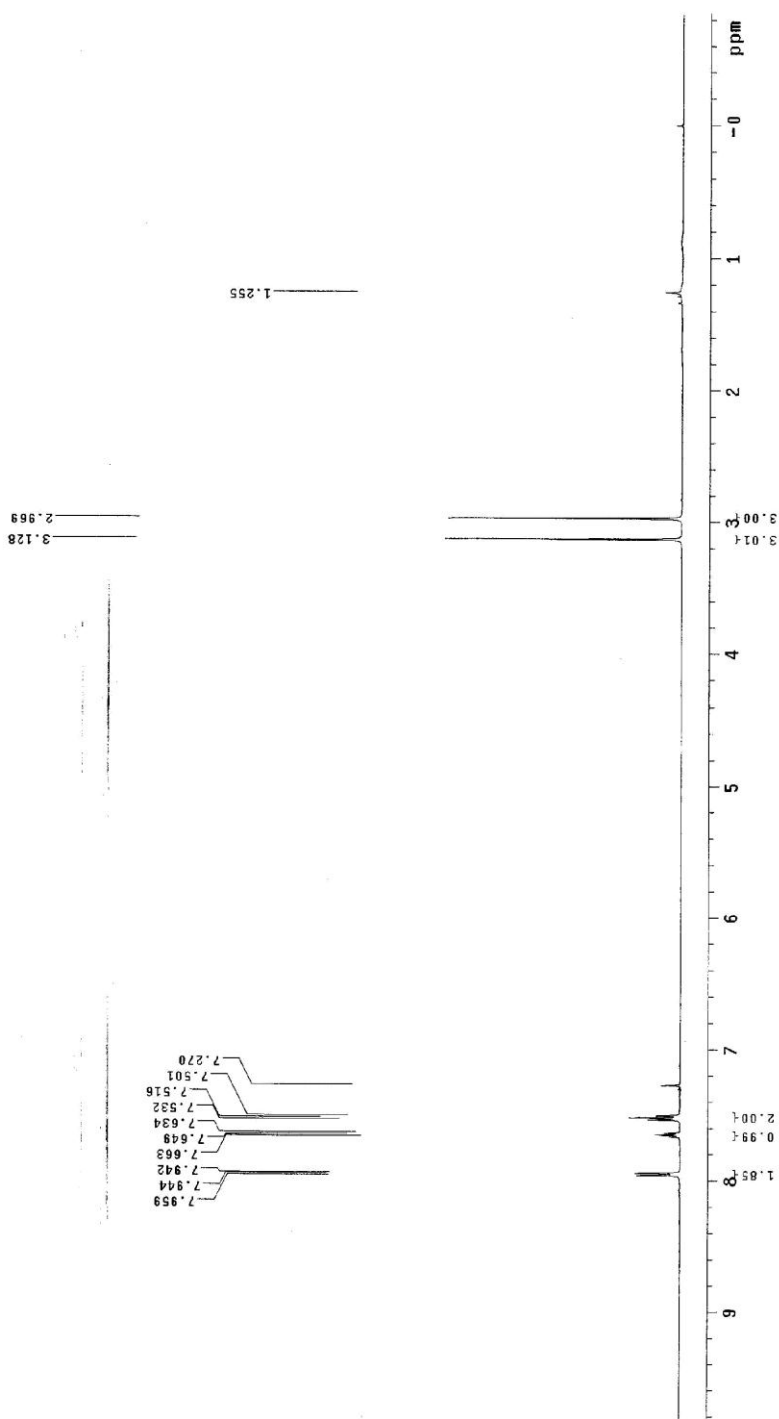


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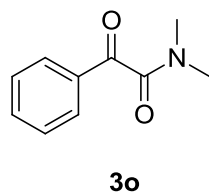


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STANDARD PROTON PARAMETERS  
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Sample directory: /export/home/ouxy/vimarsys/data  
Pulse Sequence: s2pul  
Solvent: CDCl3  
Ambient temperature  
File: c0720  
INNOVA-500 "HRENU500"  
Relax. delay 1.000 sec  
Pulse 45.0 degrees  
Acq. time 1.000 sec  
Width 9158.6 MHz  
8 repetitions  
OBSERVE H1, 499.8025868 MHz  
DATA PROCESSING  
F1 size 65536  
Total time 0 min, 23 sec



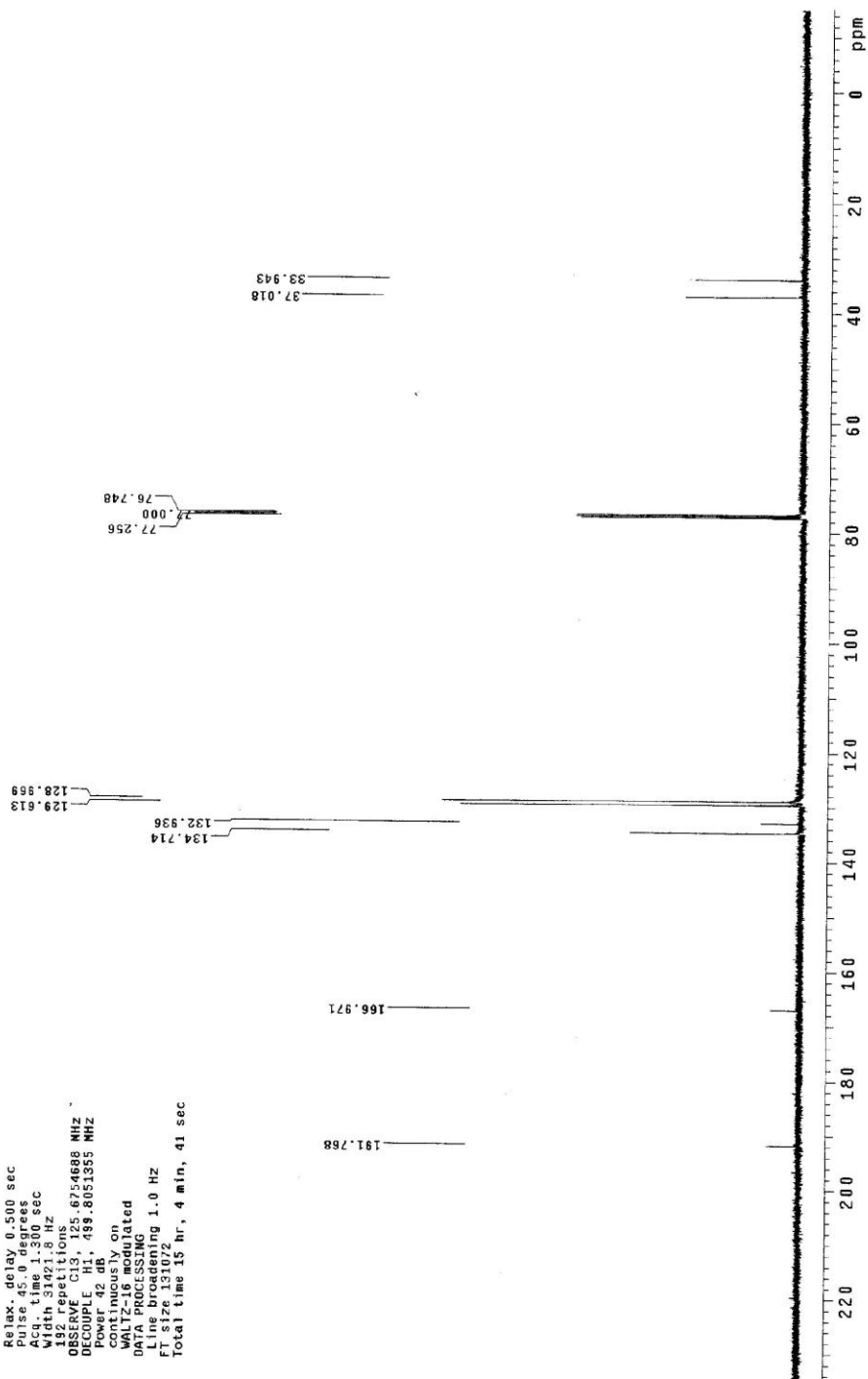
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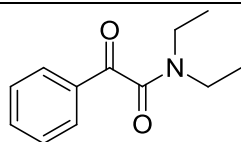
STANDARD CARBON PARAMETERS  
Archive directory: /export/home/ouyy/vnmr/sys/data  
Sample directory:

Pulse Sequence: s2pul  
Solvent: c6d6  
Ambient temperature  
User: 1-14-87  
File: c0854  
INOVA-500 "NENU500"

Relax. delay 0.500 sec  
Pulse delay 1.000 sec  
Acq. time 1.300 sec  
Width 31421.8 Hz  
192 repetitions  
OBSERVE C13, 125.6754688 MHz  
DECOUPLE H1, 499.8051355 MHz  
Pulse program  
continuous IV on  
WALTZ-16 modulated  
DATA PROCESSING  
Line broadening 1.0 Hz  
FT size 131072  
Total time 15 hr, 4 min, 41 sec

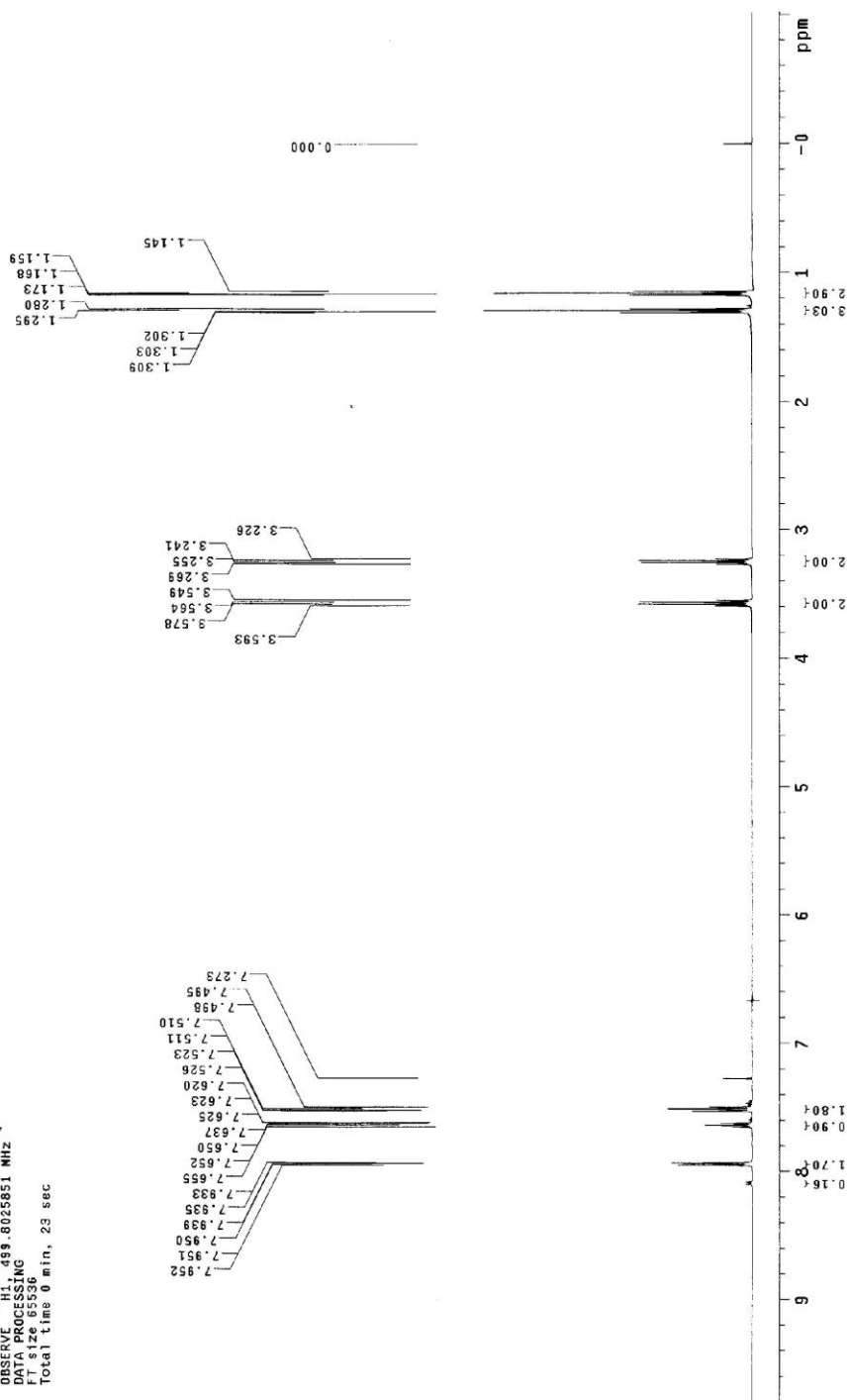


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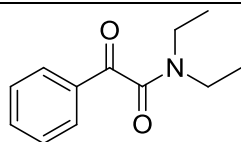


3p

STANDARD PROTON PARAMETERS  
Archive directory: /export/home/ouyy/vmr/sys/data  
Sample directory:  
Pulse Sequence: szpu1  
Solvent: CDCl3  
Ambient temperature  
File: c0750  
INNOVA-500 "MNU500"  
Relax. delay 1.000 sec  
Acq. time 0.000 sec  
Acq. time 1.000 sec  
Width 8357.7 Hz  
8 repetitions  
OBSERVE H1, 499.8025851 MHz  
DATA PROCESSING  
File size 85536  
Total time 0 min, 23 sec

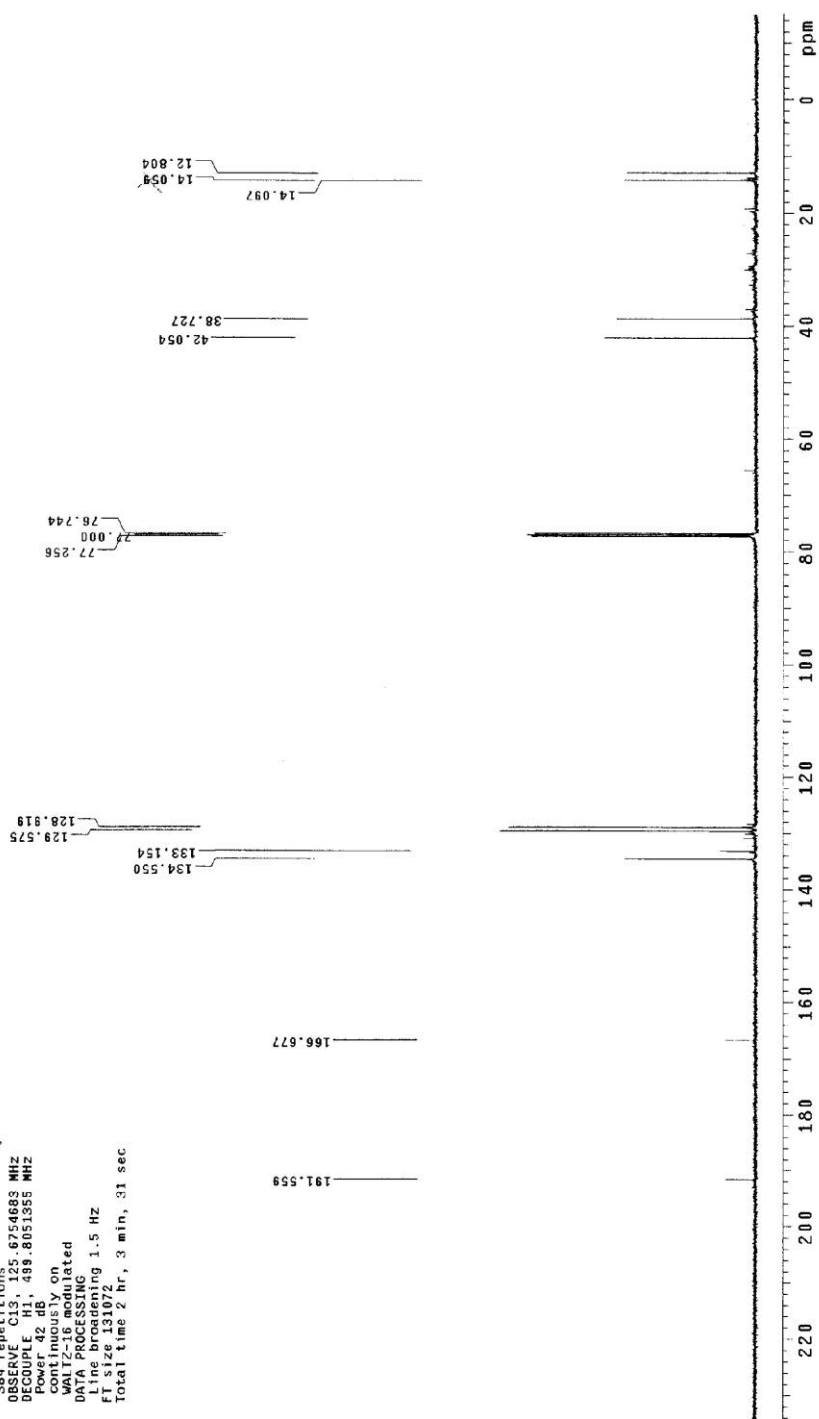


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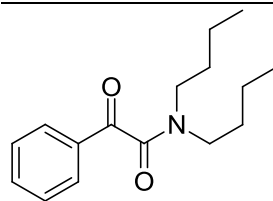


3p

STANDARD CARBON PARAMETERS  
Archive directory: /export/home/ouyy/vnmr/sys/data  
Sample directory:  
Pulse Sequence: s2pul  
Solvent: cdd6  
Ambient temperature  
User: ouyy  
File: c0334  
INOVA-500 "NMRUS00"  
Relax. delay 0.500 sec  
Pulse 45.0 degrees  
Acq. time 1.300 sec  
Width 31421.8 Hz  
Sweep rate 125.6754683 MHz  
Observed C13, 125.6754683 MHz  
Decouple H1, 499.8051355 MHz  
Power 42 dB  
continuously on  
WALTZ-16 modulated  
DATA PROCESSING  
F1 size 131072  
F2 size 131072  
Total time 2 hr, 3 min, 31 sec

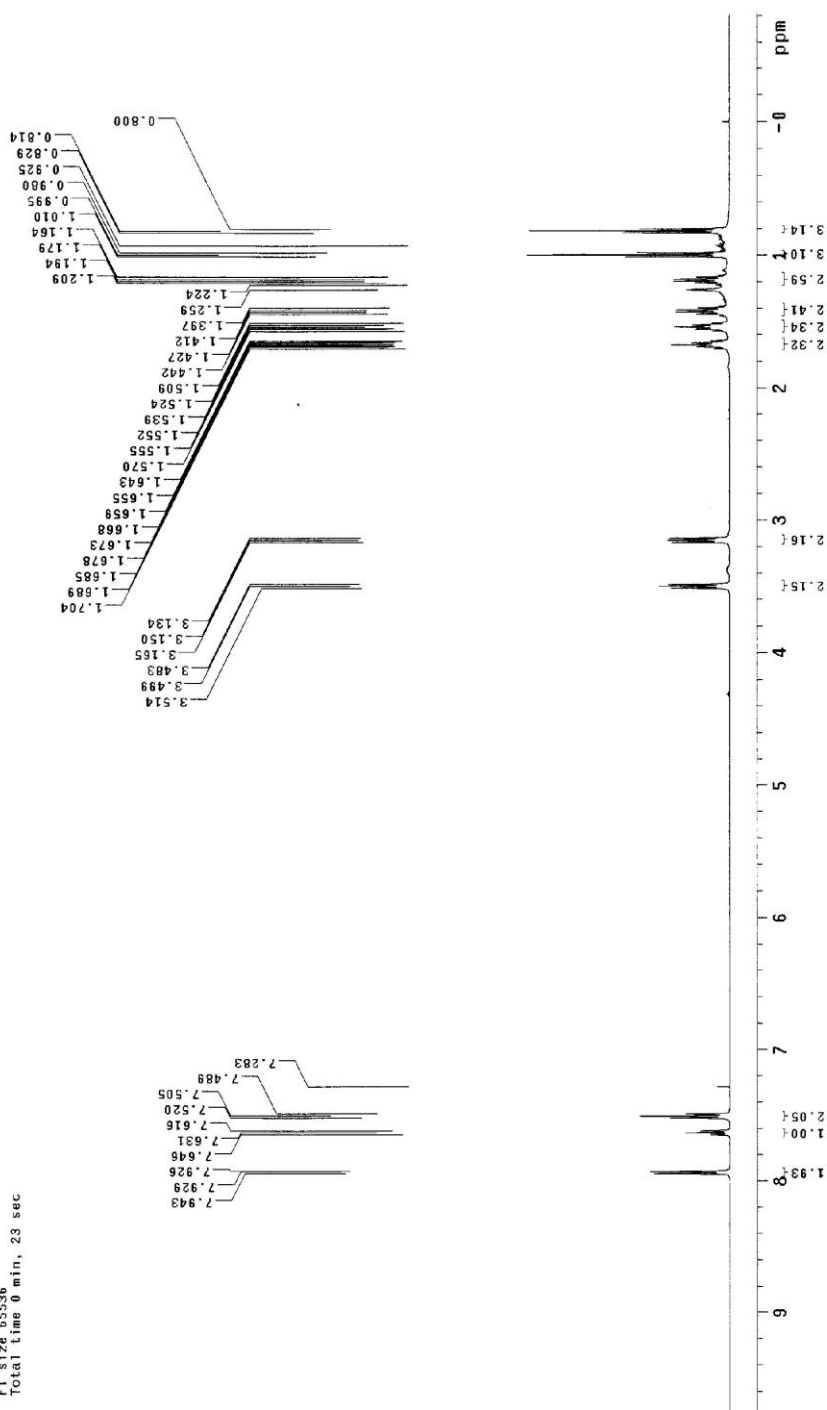


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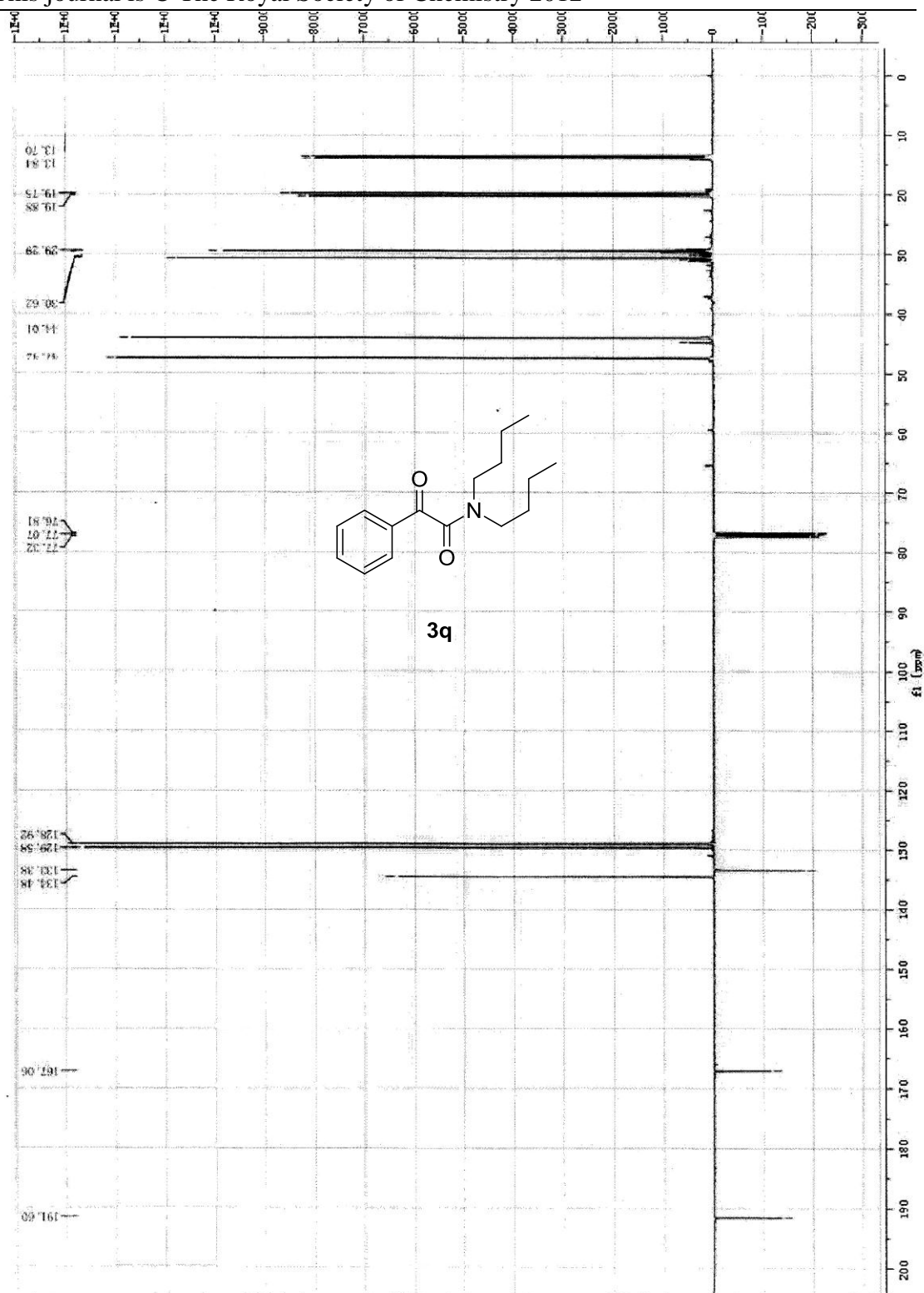


**3q**

STANDARD PROTON PARAMETERS  
Archive directory: /export/home/ouxy/vnmrsys/data  
Sample directory:  
Pulse Sequence: s2pu1  
Solvent: CDCl3  
Ambient temperature  
F1 size 65536  
INOVA-500 "NMRUS00"  
Relax. delay 1.000 sec  
Pulse 45.0 degrees  
Acq. time 1.892 sec  
Width 3201.7 Hz  
8 repetitions  
OBSERVED F1 499.8025800 MHz  
DATA PROCESSING  
F1 size 65536  
Total time 0 min, 23 sec



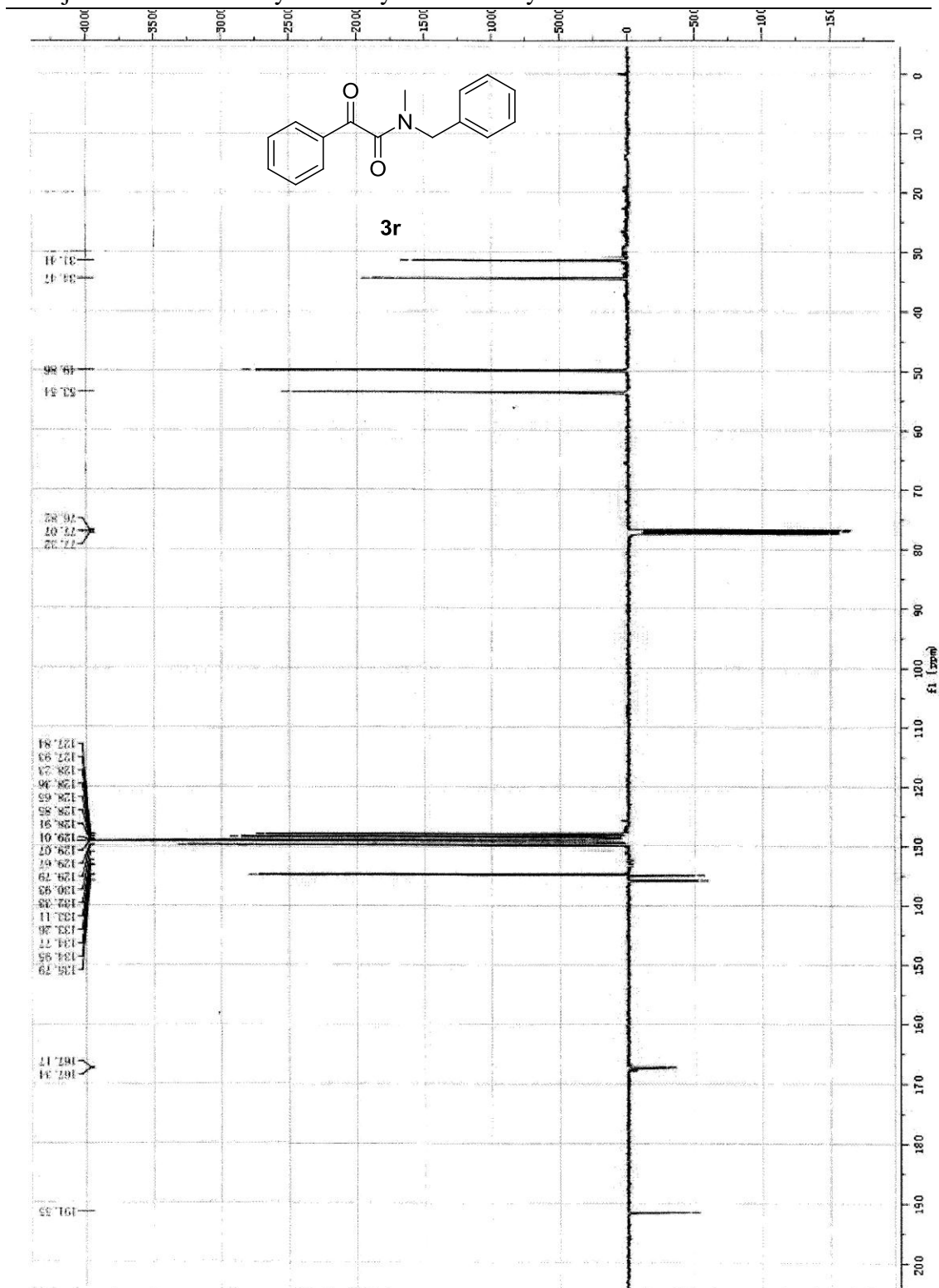
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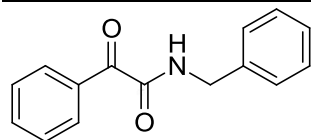


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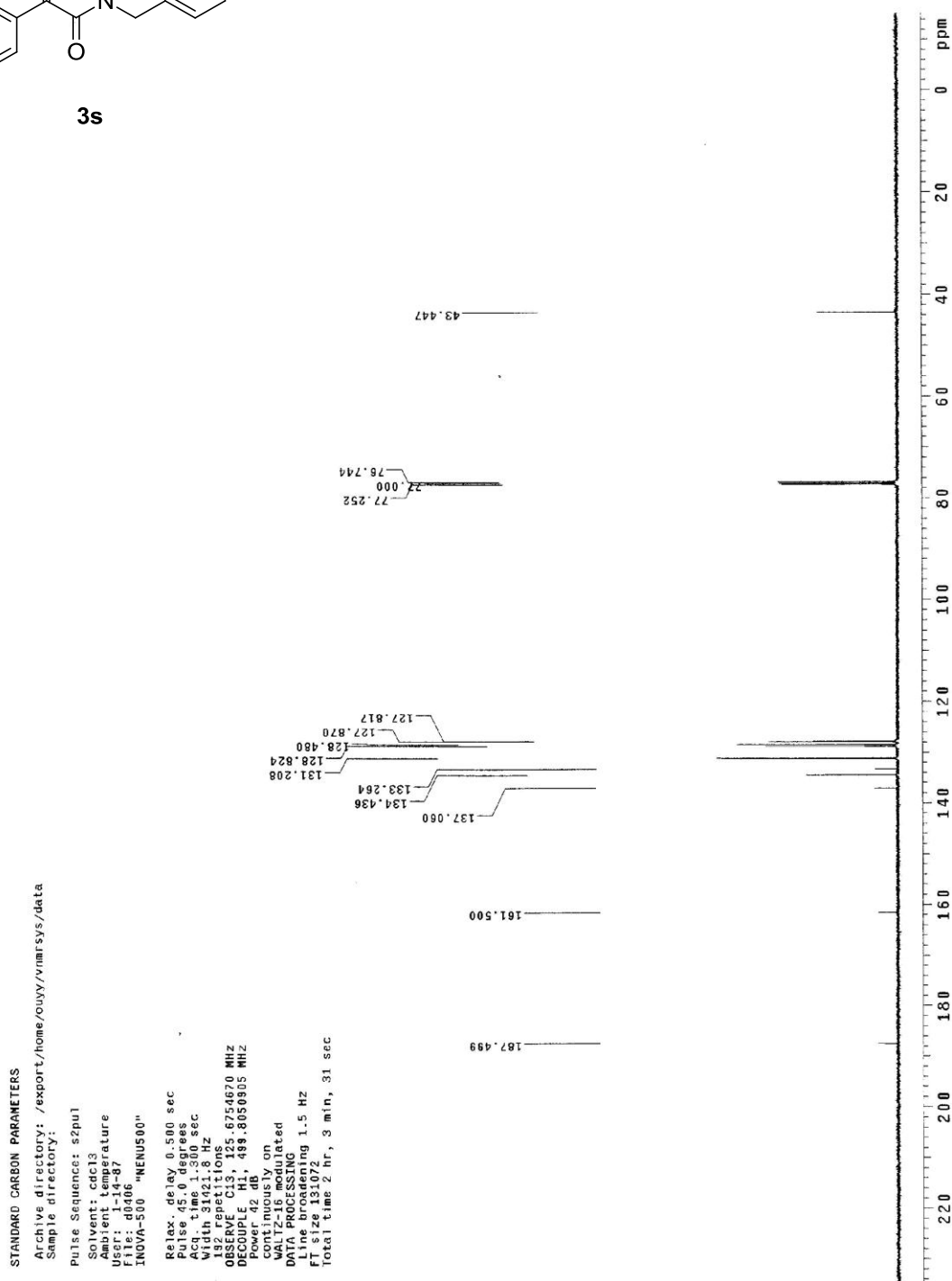




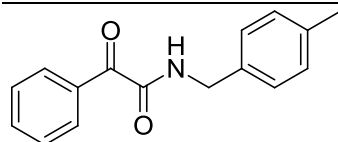
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**3s**

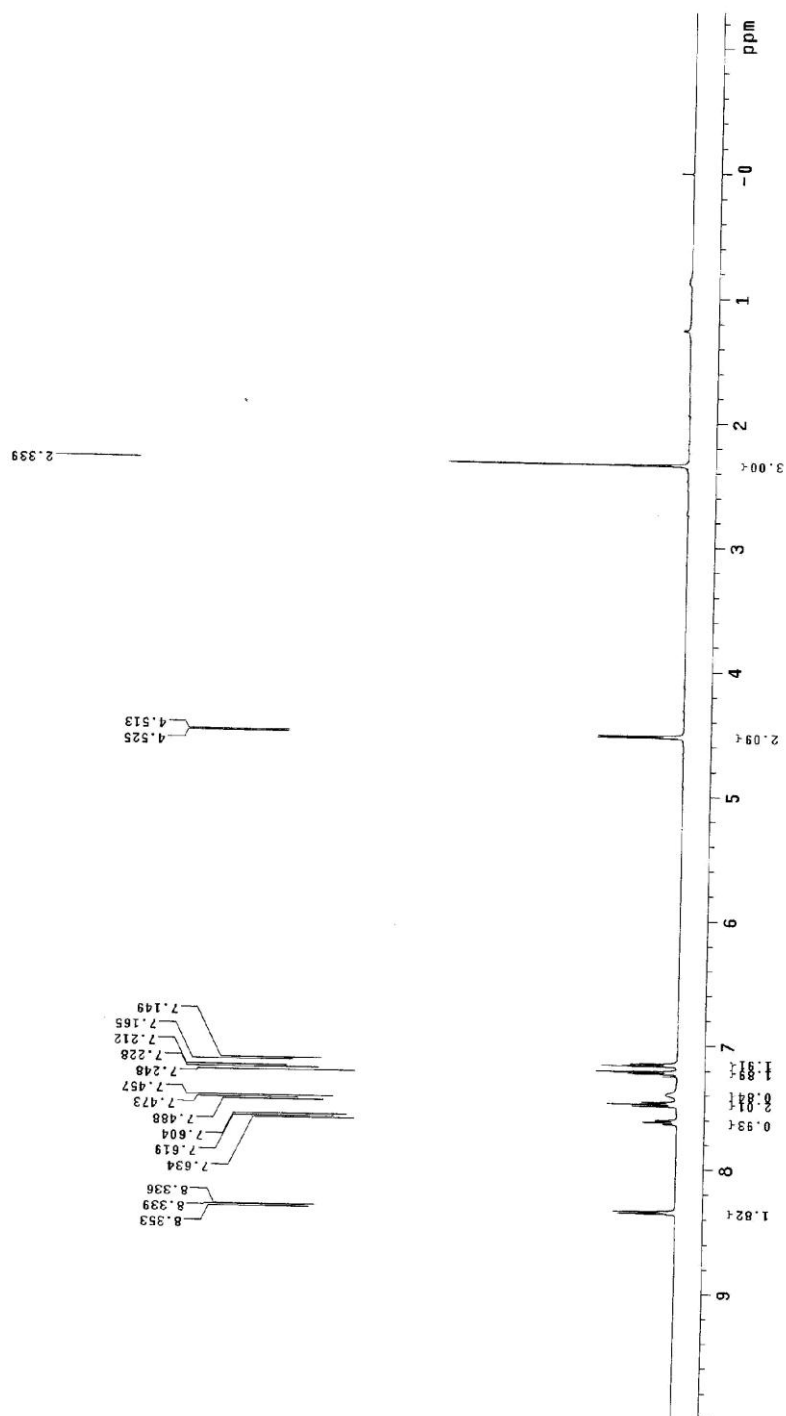


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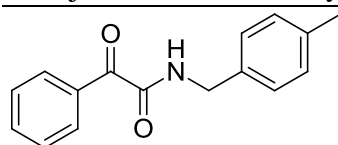


**3t**

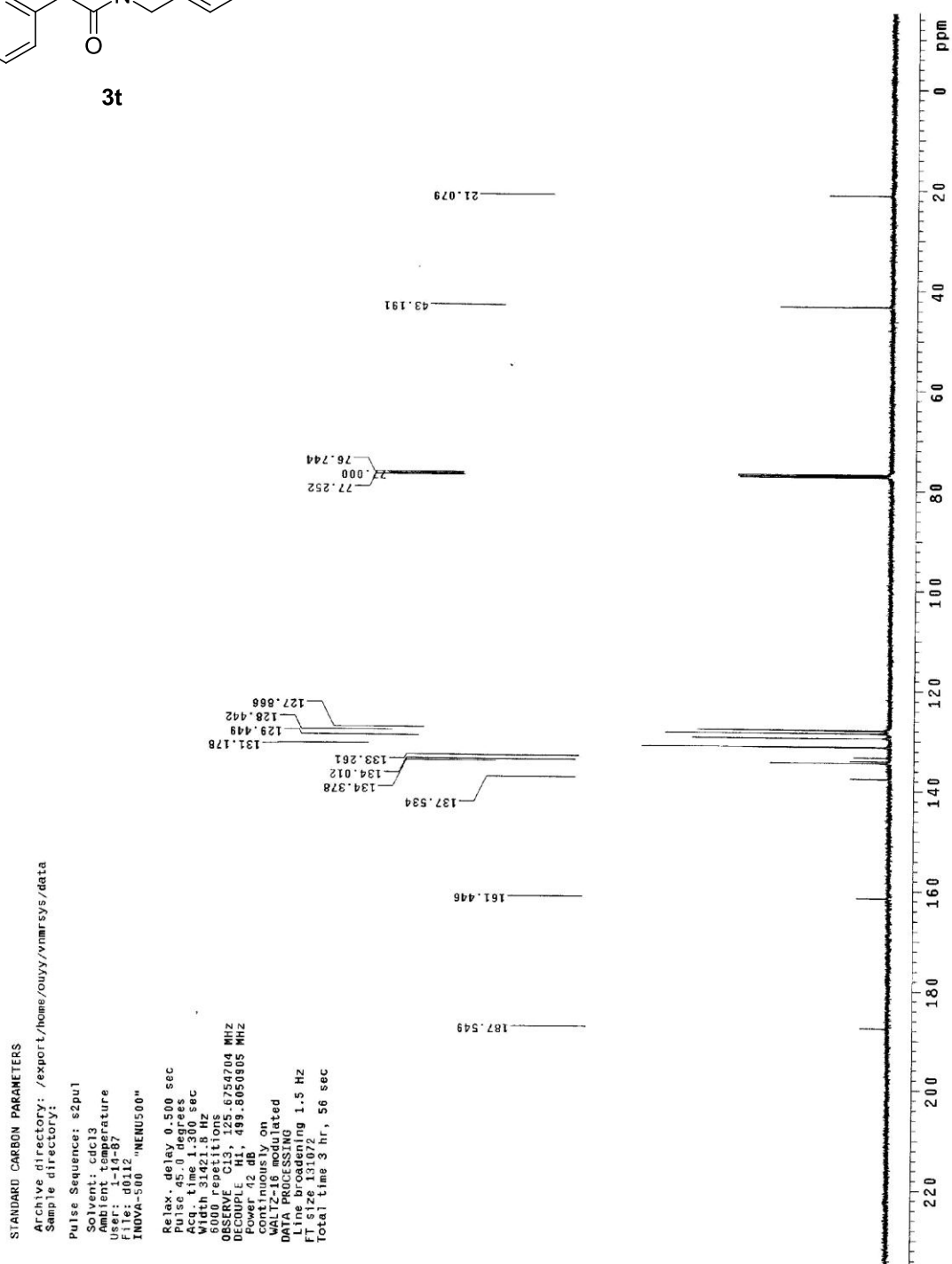
STANDARD PROTON PARAMETERS  
Archive directory: /export/home/ouyy/vnmr/sys/data  
Sample directory:  
Pulse Sequence: s2pul  
Solvent: CDCl<sub>3</sub>  
Ambient temperature  
File: e0111  
INOVA-500 "NENU500"  
Relax. delay 1.000 sec  
Pulse 45.0 degrees  
Acq. time 1.892 sec  
F1 499.8025974 MHz  
F2 100.6261250 MHz  
8 FID 100.6261250 MHz  
OBSERVE H1  
DATA PROCESSING  
F1 size 65536  
Total time 0 min, 23 sec



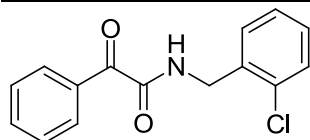
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**3t**



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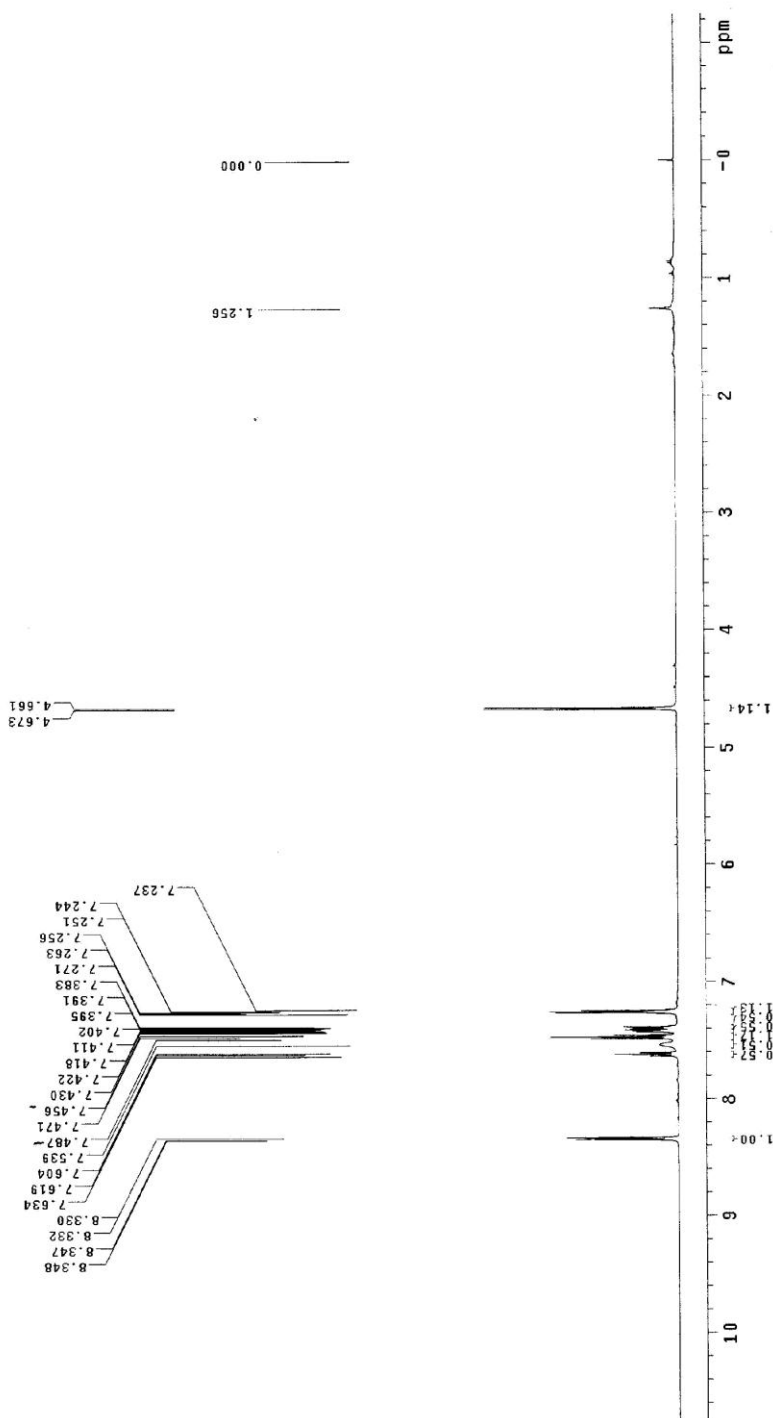


**3u**

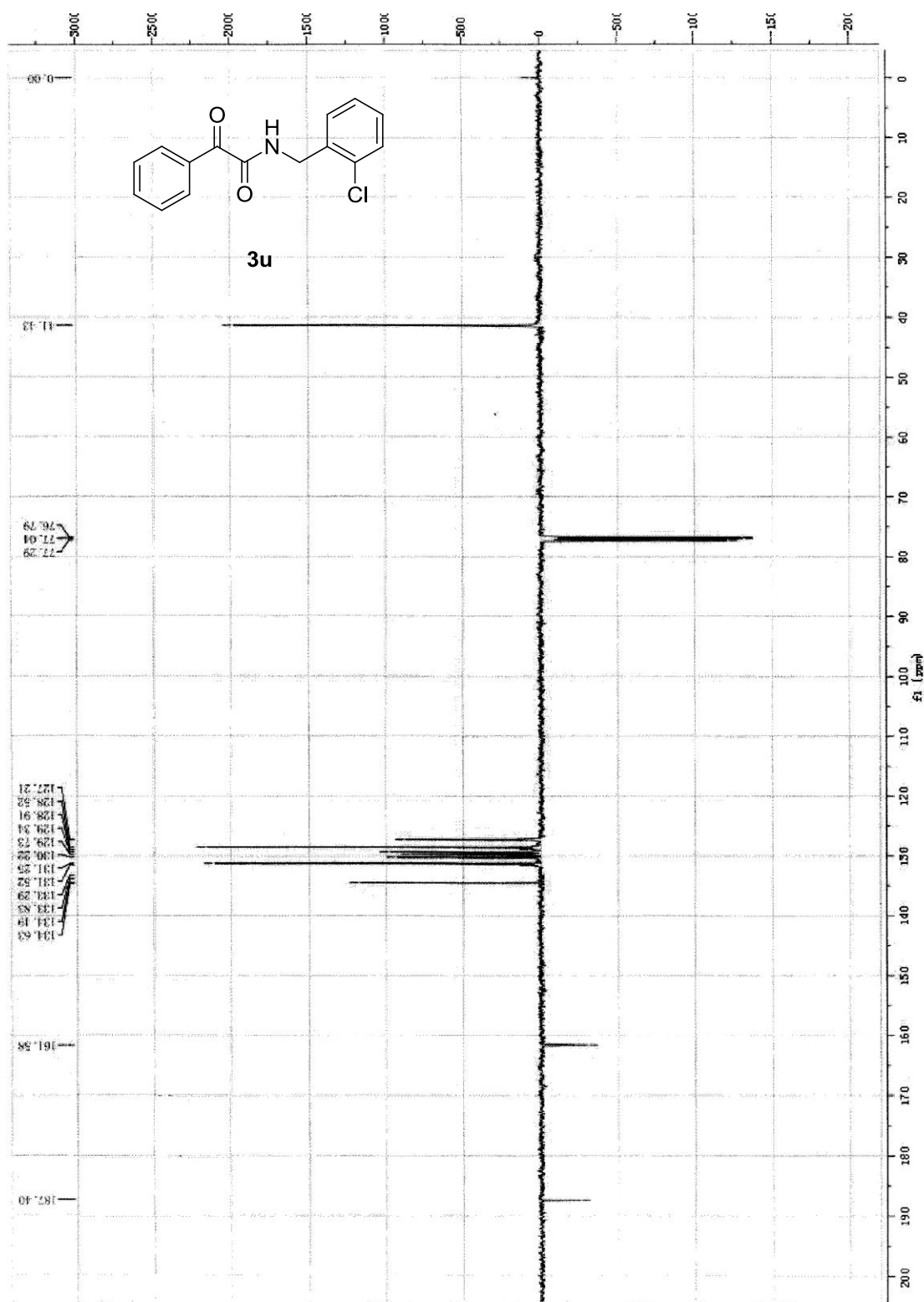
STANDARD PROTON PARAMETERS  
Archive directory: /export/home/ouyy/vnmrsys/data  
Sample directory:

Pulse Sequence: szpul  
Solvent: CDCl<sub>3</sub>  
Ambient temperature  
File: 00430  
INOVA-500 "NMR500"

Relax. delay 1.000 sec  
Pulse 45.0 degrees  
CDCl<sub>3</sub> 1.000 sec  
Width 917.5 MHz  
8 repetitions  
OBSERVE H1, 499.8025931 MHz  
DATA PROCESSING  
FT size 65536  
Total time 0 min, 23 sec



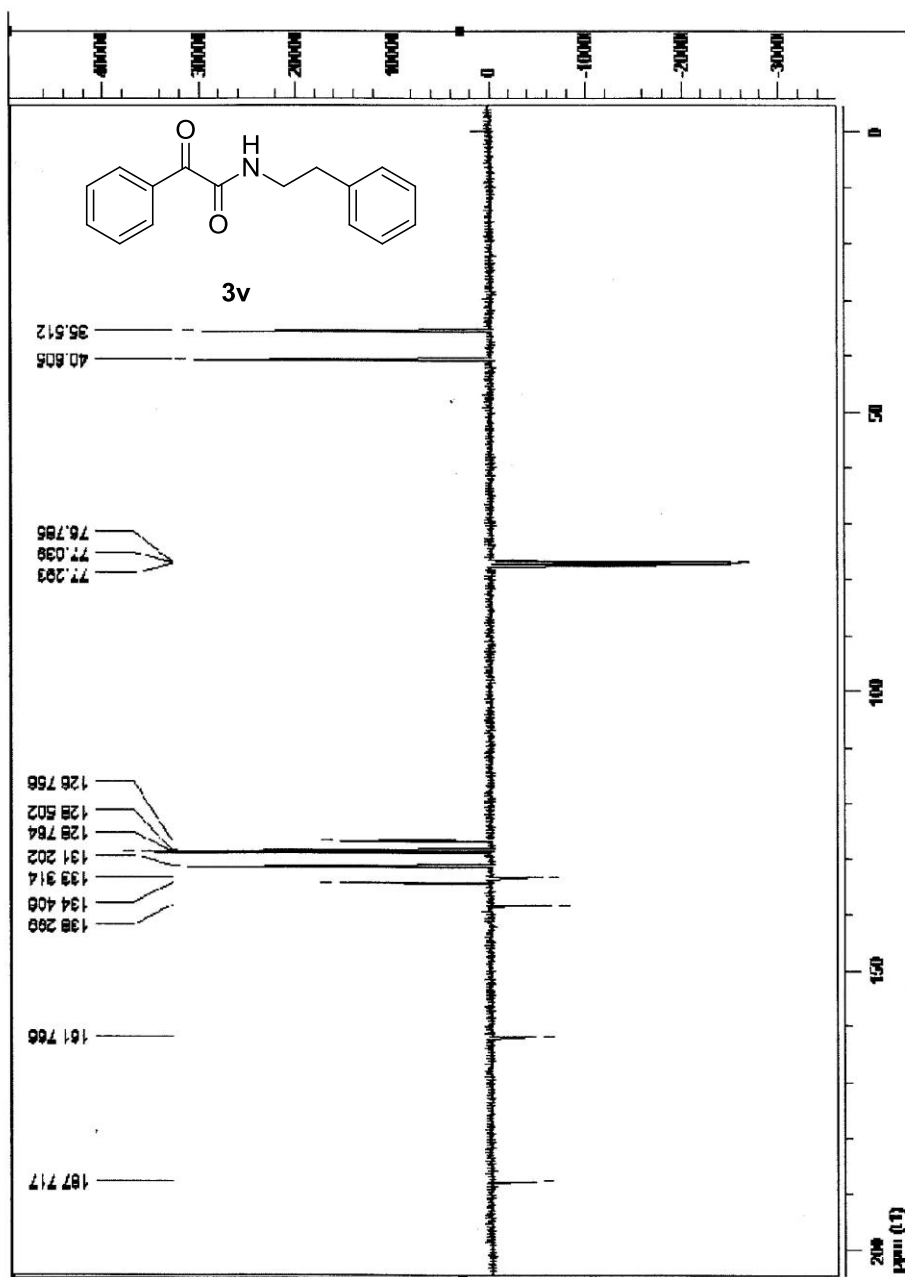
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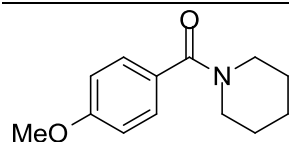




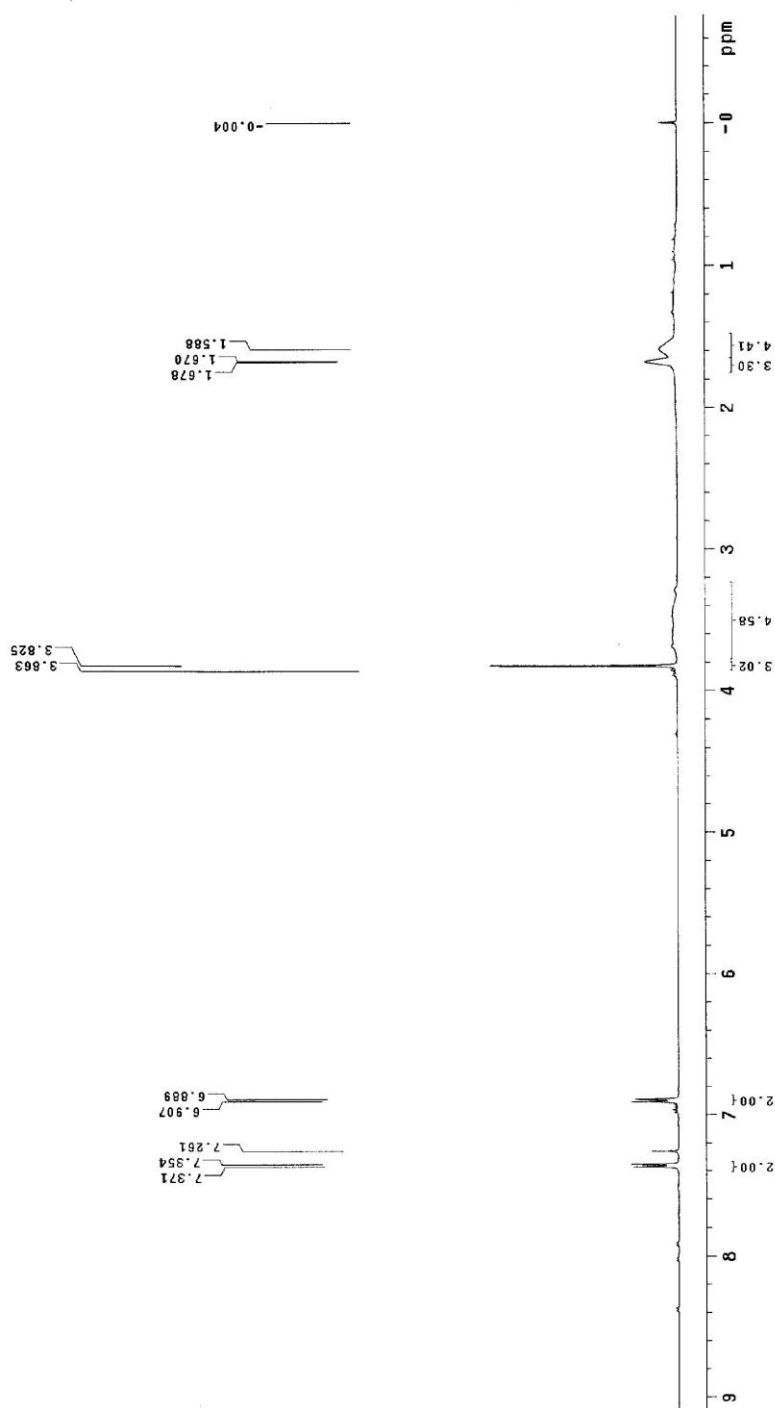
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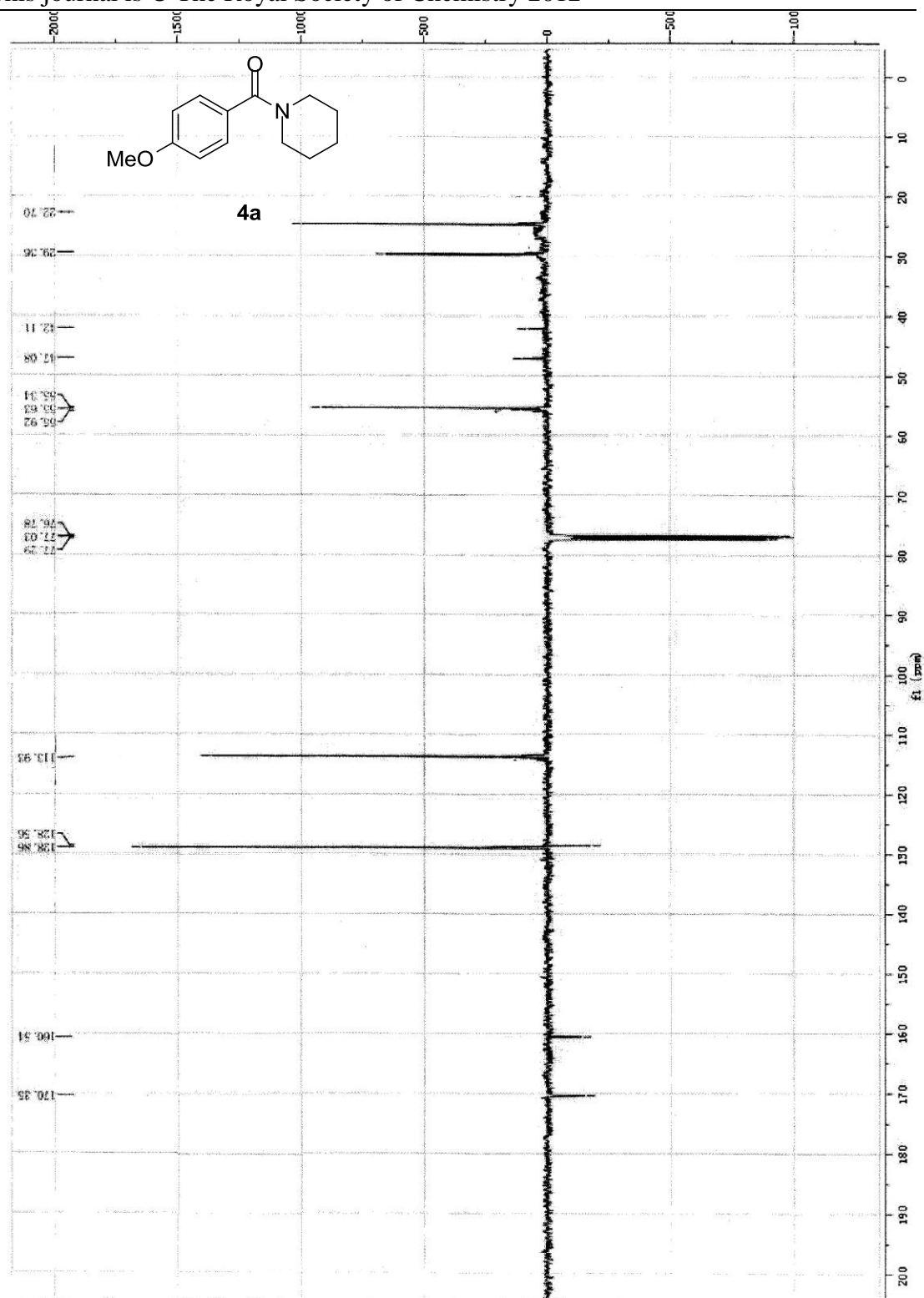


**4a**



STANDARD PROTON PARAMETERS  
Archive directory: /export/home/ouy/vmarsys/data  
Sample directory:  
Pulse Sequence: s2pul  
Solvent: CDCl3  
Ambient temperature  
File: d0458  
INOVA-500 "NMR500"  
Relax. delay 1.000 sec  
Pulse 45.0 degrees  
Acq. time 1.882 sec  
Frequency 125.759 MHz  
B1 (offset) 1.000  
OBSERVE H1 499.8025817 MHz  
DATA PROCESSING  
FT size 65536  
Total time 0 min, 23 sec

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