

Supporting Information File 2

for

Gold-catalyzed regioselective oxidation of terminal allenes: formation of α -methanesulfonyloxy methyl ketones

Yingdong Luo, Guozhu Zhang, Erik S. Hwang, Thomas A. Wilcoxon and Liming Zhang*

Address: Department of Chemistry and Biochemistry, University of California, Santa
Barbara, California, 93106, USA

Email: Liming Zhang- zhang@chem.ucsb.edu

* Corresponding author

NMR spectra of compounds

lyd-1-212-4

File: nmr400/Zhang/Yluo/lyd-1-212-4.fid

Pulse Sequence: s2pul1

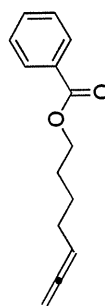
Solvent: cdcl3

Ambient temperature

Operator: Yluo

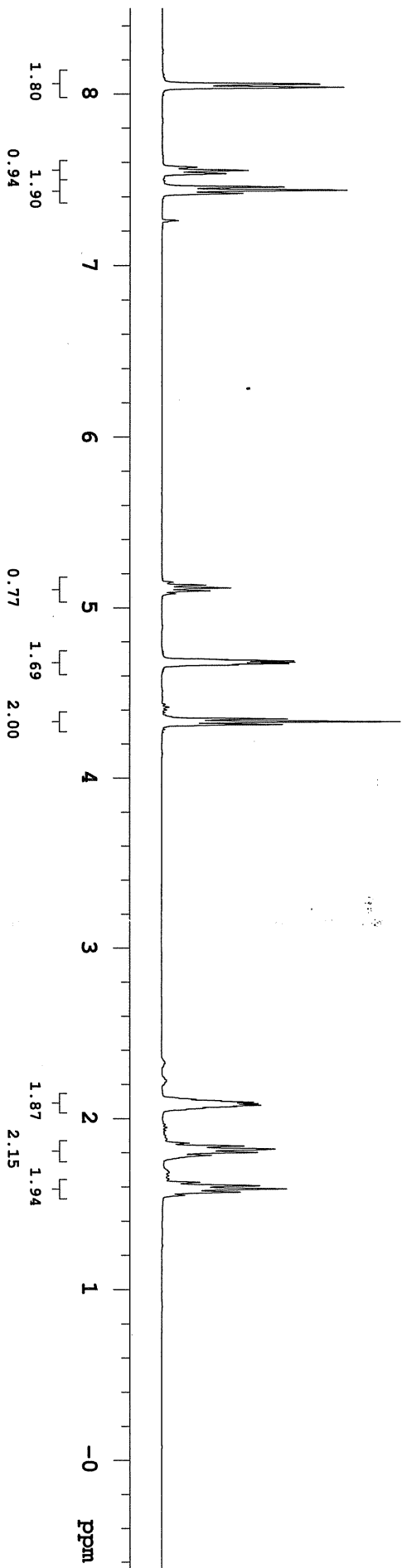
File: lyd-1-212-4

INOVA-500 "nmrserver"



1c

Relax. delay 4.800 sec
Pulse 75.0 degrees
Acq. time 2.500 sec
Width 8002.4 Hz
36 repetitions
OBSERVE H1, 399.9486723 MHz
DATA PROCESSING
Line broadening 0.2 Hz
FT size 65536
Total time 14 min, 39 sec



lyd-1-212-4-c

File: nmr400/Zhang/Yluc/lyd-1-212-4-c.fid

Pulse Sequence: s2pul1

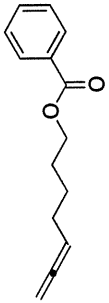
Solvent: cdcl3

Ambient temperature

Operator: yluc

File: lyd-1-212-4-c

INOVA-500 "nmrserver"



1c

Relax. delay 1.300 sec
Pulse 53.8 degrees
Acq. time 1.000 sec
Width 28040.7 Hz
116 repetitions
OBSERVE C13, 100.5671787 MHz
DECOUPLE H1, 399.9506784 MHz
Power 40 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 1.0 Hz
FT size 65536
Total time 6 hr, 24 min, 59 sec



1yd-1-212-C12

File: xp

Pulse Sequence: s2pu1

Solvent: cdcl3

Ambient temperature

Operator: Yluo

INOVA-500 "nmr500"

Relax. delay 4.800 sec

Pulse 74.9 degrees

Acq. time 2.500 sec

Width 8002.4 Hz

12 repetitions

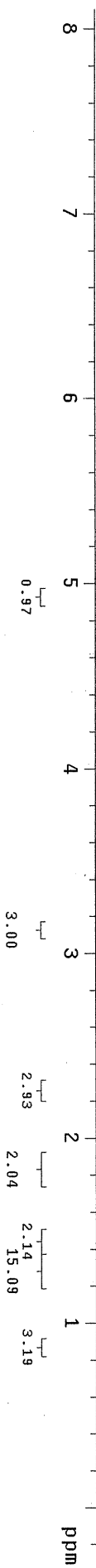
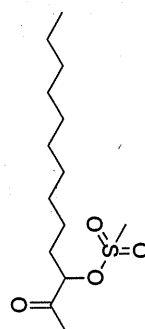
OBSERVE H1, 499.8560510 MHz

DATA PROCESSING

Line broadening 0.2 Hz

FT size 32768

Total time 14 min, 37 sec



lyd-1-212-C12-c

File: xp

Pulse Sequence: s2pu1

Solvent: cdcl3

Ambient temperature

Operator: yluo

INOVA-400 "nmr400"

Relax. delay 1.300 sec

Pulse 53.8 degrees

Acq. time 1.000 sec

Width 28040.7 Hz

188 repetitions

OBSERVE C13, 100.5671761 MHz

DECUPLE H1, 399.9506784 MHz

Power 40 db

continuously on

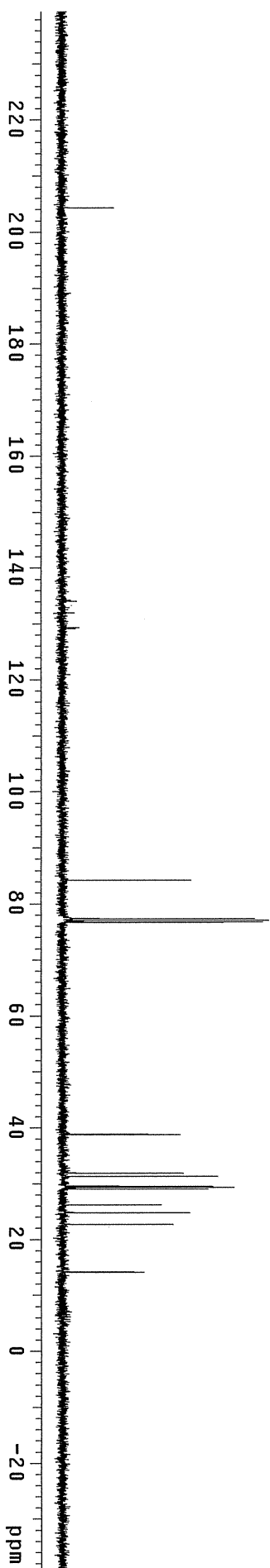
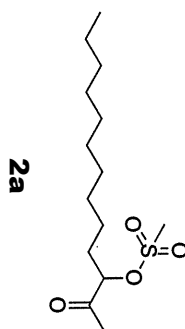
WALTZ-16 modulated

DATA PROCESSING

Line broadening 1.0 Hz

FT size 65536

Total time 7 hr, 41 min, 56 sec



lyd-1-204

File: nmr500/Zhang/Yluo/lyd-1-204.fid

Pulse Sequence: s2pul1

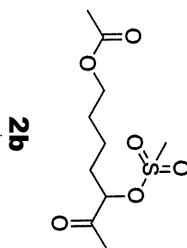
Solvent: cdcl3

Ambient temperature

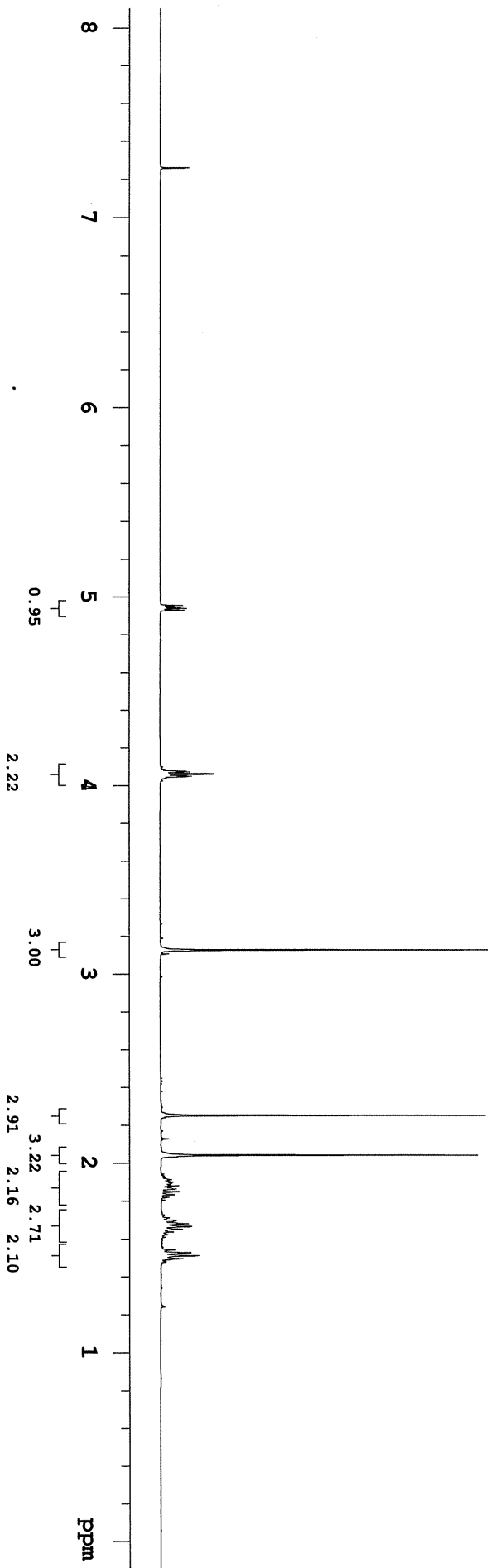
Operator: yluo

File: lyd-1-204

INOVA-500 "nmrserver"



Relax. delay 4.800 sec
Pulse 74.9 degrees
Acq. time 2.500 sec
Width 8002.4 Hz
8 repetitions
OBSERVE H1, 499.8560510 MHz
DATA PROCESSING
Line broadening 0.2 Hz
FT size 32768
Total time 0 min, 0 sec



lyd-1-204-c

File: mmr400/Zhang/Yluo/lyd-1-204-c.fid

Pulse Sequence: s2pul

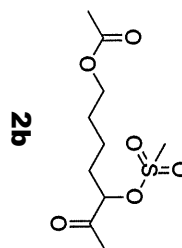
Solvent: cdcl3

Ambient temperature

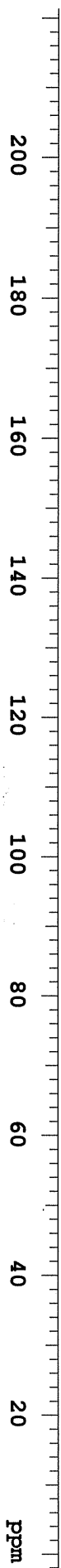
Operator: Yluo

File: lyd-1-204-c

INOVA-500 "nmrserver"



Relax. delay 1.300 sec
Pulse 53.8 degrees
Acq. time 1.000 sec
Width 28040.7 Hz
1012 repetitions
OBSERVE C13, 100.5671770 MHz
DECOUPLE H1, 399.9506784 MHz
Power 40 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 1.0 Hz
FT size 65536
Total time 6 hr, 24 min, 59 sec



lyd-1-206-1

File: nmr500/Zhang/y1uo/lyd-1-206-1.fid

Pulse Sequence: s2pul

Solvent: cdcl3

Ambient temperature

Operator: y1uo

File: lyd-1-206-1

INOVA-500 "nmrserver"

Relax. delay 4.800 sec

Pulse 74.9 degrees

Acq. time 2.500 sec

Width 8002.4 Hz

12 repetitions

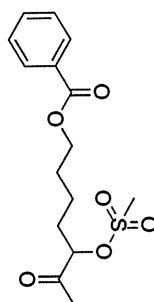
OBSERVE H1, 499.8560510 MHz

DATA PROCESSING

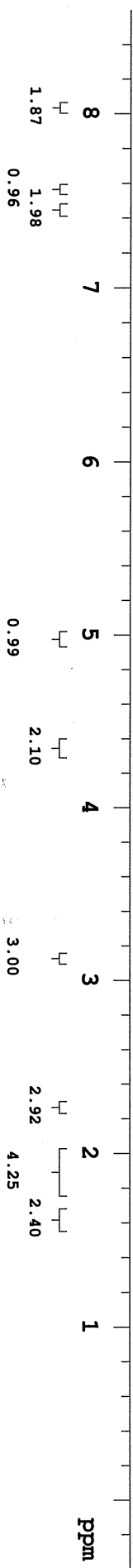
Line broadening 0.2 Hz

FW size 32768

Total time 0 min, 0 sec



2c



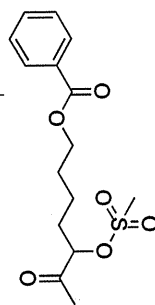
lyd-1-206-1-c

File: nmr400/Zhang/y1uo/lyd-1-206-1-c.fid

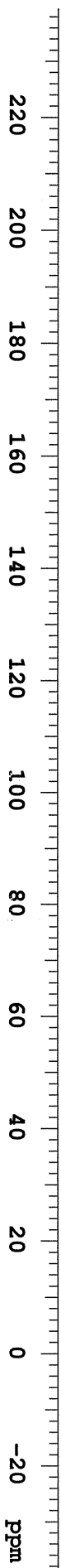
Pulse Sequence: s2pul1

Solvent: cdcl3
Ambient temperature
Operator: y1uo
File: lyd-1-206-1-c
INOVA-500 "nmrserver"

Relax. delay 1.300 sec
Pulse 53.8 degrees
Acq. time 1.000 sec
Width 28040.7 Hz
1024 repetitions
OBSERVE C13, 100.5671761 MHz
DECOUPLE H1, 399.9506784 MHz
Power 40 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 1.0 Hz
FT size 65536
Total time 7 hr, 41 min, 56 sec



2c



lyd-1-212-1

File: nmr400/Zhang/Yluo/lyd-1-212-1.fid

Pulse Sequence: s2pul

Solvent: cdcl3

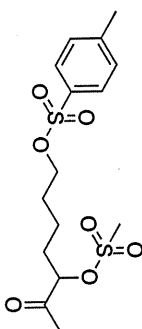
Ambient temperature

Operator: yluo

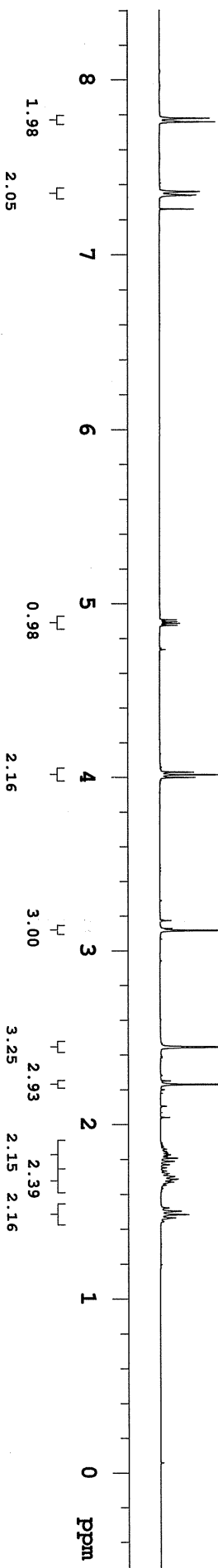
File: lyd-1-212-1

INOVA-500 "nmrserver"

2d



Relax. delay 4.800 sec
Pulse 75.0 degrees
Acq. time 2.500 sec
Width 8002.4 Hz
8 repetitions
OBSERVE H1, 399.9486723 MHz
DATA PROCESSING
Line broadening 0.2 Hz
FT size 65536
Total time 14 min, 39 sec



lyd-1-212-1-c

File: nmr400/Zhang/y1uo/lyd-1-212-1-c.fid

Pulse Sequence: s2pul

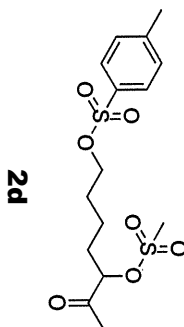
Solvent: cdc13

Ambient temperature

Operator: y1uo

File: lyd-1-212-1-c

INOVA-500 "mrserver"



2d

Relax. delay 1.300 sec

Pulse 53.8 degrees

Acq. time 1.000 sec

Width 28040.7 Hz

52 repetitions

OBSERVE C13, 100.5671796 MHz

DECOUPLE H1, 399.9506784 MHz

Power 40 dB

continuously on

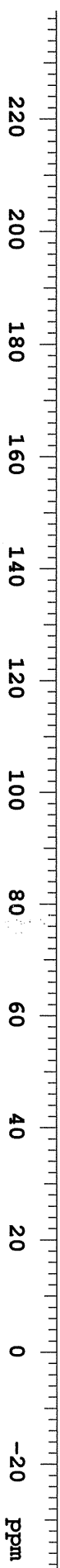
WALTZ-16 modulated

DATA PROCESSING

Line broadening 1.0 Hz

FT size 65536

Total time 7 hr, 41 min, 56 sec



Standard c13 run using gmp probe

File: nmr400/Zhang/Yluo/Yld-1-208-4.fid

Pulse Sequence: s2pul

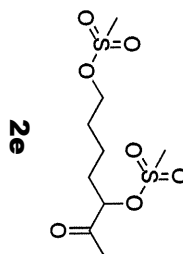
Solvent: cdcl3

Ambient temperature

Operator: Yluo

File: Yld-1-208-4

INOVA-500 "mrserver"



Relax. delay 1.300 sec

Pulse 53.8 degrees

Acq. time 1.000 sec

Width 28040.7 Hz

1312 repetitions

OBSERVE C13, 100.5671752 MHz

DECOUPLE H1, 399.9506784 MHz

Power 40 dB

continuously on

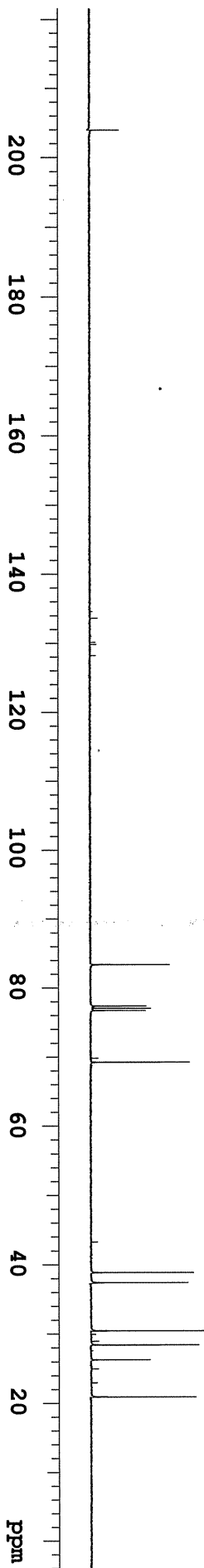
WALTZ-16 modulated

DATA PROCESSING

Line broadening 1.0 Hz

FW size 65536

Total time 6 hr, 24 min, 59 sec



lyd-1-208-4

File: nmr500/Zhang/Yluo/lyd-1-208-4.fid

Pulse Sequence: s2pul1

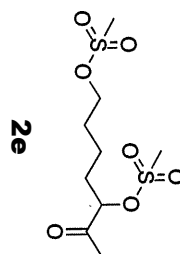
Solvent: cdcl3

Ambient temperature

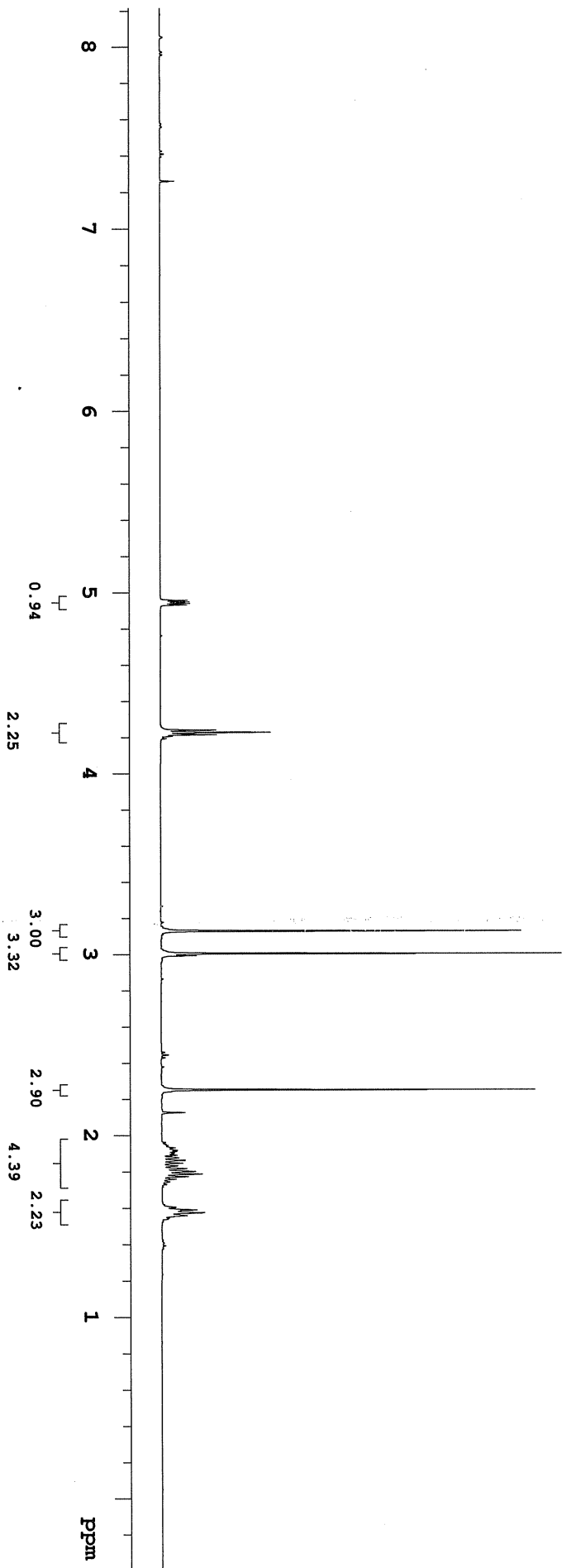
Operator: yluo

File: lyd-1-208-4

INOVA-500 "nmrserver"



Relax. delay 4.800 sec
Pulse 74.9 degrees
Acq. time 2.500 sec
Width 8002.4 Hz
16 repetitions
OBSERVE H1, 499.8560510 MHz
DATA PROCESSING
Line broadening 0.2 Hz
FT size 32768
Total time 0 min, 0 sec



lyd-1-206-2

File: nmr500/Zhang/y1uo/lyd-1-206-2.fid

Pulse Sequence: s2pul1

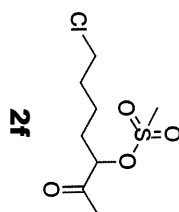
Solvent: cdcl3

Ambient temperature

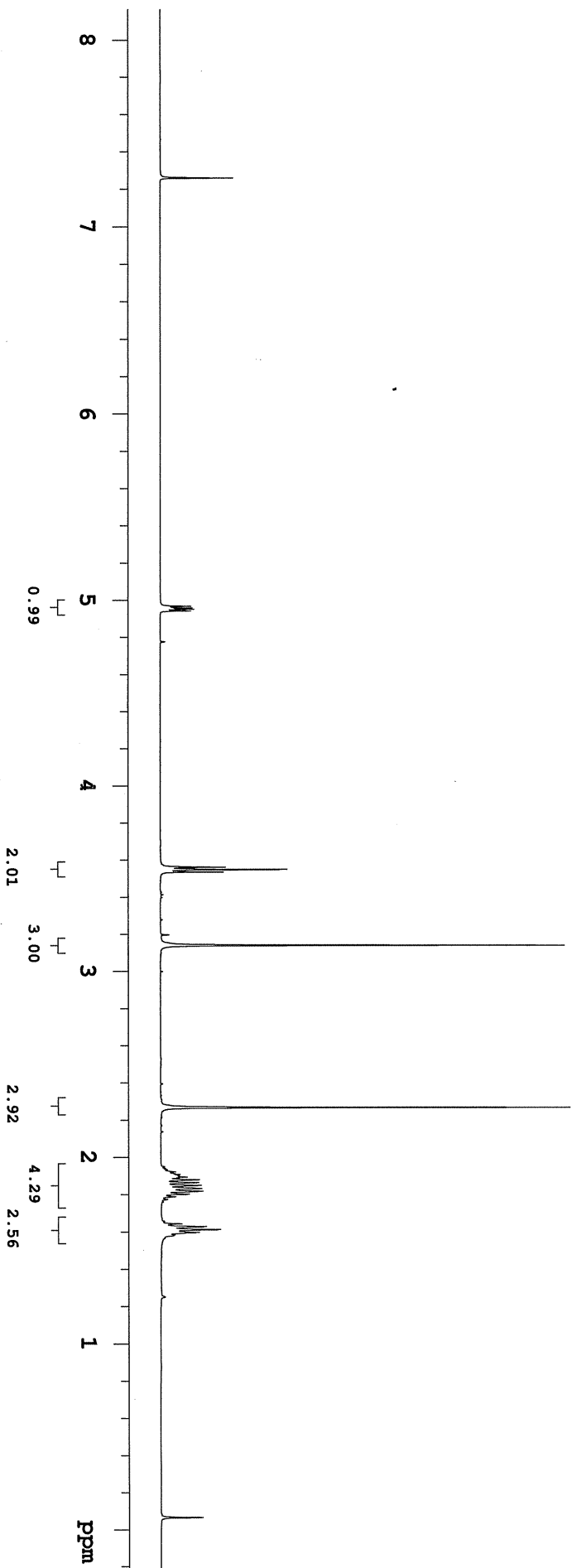
Operator: y1uo

File: lyd-1-206-2

INOVA-500 "nmrserver"



Relax. delay 4.800 sec
Pulse 74.9 degrees
Acq. time 2.500 sec
Width 8002.4 Hz
12 repetitions
OBSERVE H1, 499.8560510 MHz
DATA PROCESSING
Line broadening 0.2 Hz
FT size 32768
Total time 0 min, 0 sec



lyd-1-206-2-c

File: mmr400/Zhang/y1uo/lyd-1-206-2-c.fid

Pulse Sequence: s2pul

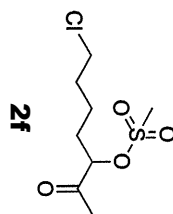
Solvent: cdc13

Ambient temperature

Operator: y1uo

File: lyd-1-206-2-c

INOVA-500 "mrsrverr"



Relax. delay 1.300 sec

Pulse 53.8 degrees

Acq. time 1.000 sec

Width 28040.7 Hz

1028 repetitions

OBSERVE C13, 100.5671761 MHz

DECOUPLE H1, 399.9506784 MHz

Power 40 dB

continuously on

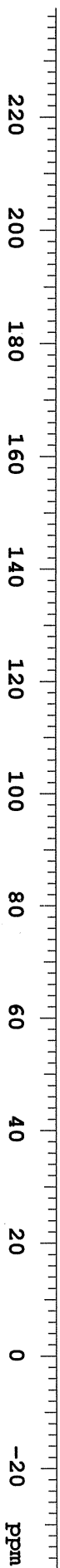
WALTZ-16 modulated

DATA PROCESSING

Line broadening 1.0 Hz

FT size 65536

Total time 46 min, 21 sec



lyd-1-206-3

File: nmr500/zhang/yliuo/lyd-1-206-3.fid

Pulse Sequence: s2pul

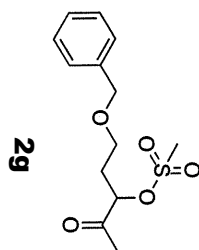
Solvent: cdcl3

Ambient temperature

Operator: yliuo

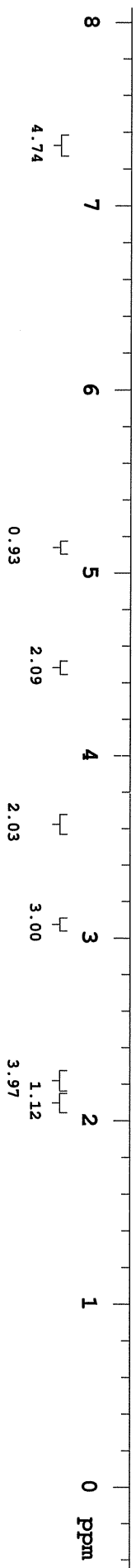
File: lyd-1-206-3

INOVA-500 "nmrserver"



2g

Relax. delay 4.800 sec
Pulse 74.9 degrees
Acq. time 2.500 sec
Width 8002.4 Hz
16 repetitions
OBSERVE H1, 499.8560510 MHz
DATA PROCESSING
Line broadening 0.2 Hz
Fw size 32768
Total time 0 min, 0 sec



lyd-1-206-3-c

File: nmr400/zhang/y1uo/lyd-1-206-3-c.fid

Pulse Sequence: s2pul

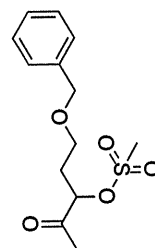
Solvent: cdcl3

Ambient temperature

Operator: y1uo

File: lyd-1-206-3-c

INOVA-500 "nmrserver"



2g

Relax. delay 1.300 sec
Pulse 53.8 degrees
Acq. time 1.000 sec
Width 28040.7 Hz
756 repetitions
OBSERVE C13, 100.5671770 MHz
DECOUPLE H1, 399.9506784 MHz
Power 40 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 1.0 Hz
F1 size 65536
Total time 7 hr, 41 min, 56 sec



lyd-1-208-1

File: nmr500/Zhang/Yluc/lyd-1-208-1.fid

Pulse Sequence: s2pul1

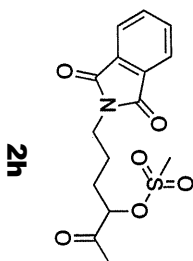
Solvent: cdcl3

Ambient temperature

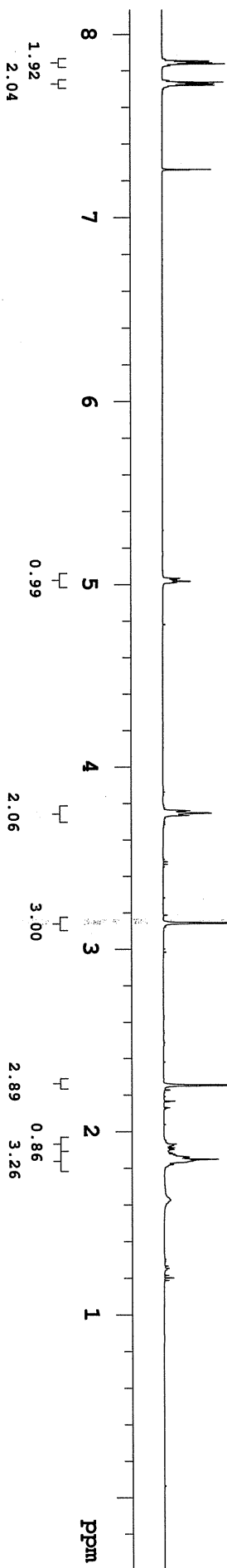
Operator: Yluc

File: lyd-1-208-1

INOVA-500 "nmrserver"



Relax. delay 4.800 sec
Pulse 74.9 degrees
Acq. time 2.500 sec
Width 8002.4 Hz
12 repetitions
OBSERVE H1, 499.8560510 MHz
DATA PROCESSING
Line broadening 0.2 Hz
FW size 32768
Total time 0 min, 0 sec



lyd-1-208-1-c

File: mmr400/Zhang/Yluo/lyd-1-208-1-c.fid

Pulse Sequence: s2pul

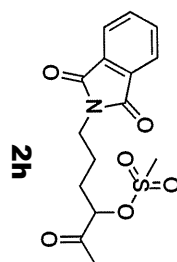
Solvent: cdcl3

Ambient temperature

Operator: Yluo

File: lyd-1-208-1-c

INOVA-500 "nmrserver"



Relax. delay 1.300 sec

Pulse 53.8 degrees

Acq. time 1.000 sec

Width 28040.7 Hz

704 repetitions

OBSERVE C13, 100.5671761 MHz

DECOUPLE H1, 399.9506784 MHz

Power 40 dB

continuously on

WALTZ-16 modulated

DATA PROCESSING

Line broadening 1.0 Hz

FT size 65536

Total time 6 hr, 24 min, 59 sec



lyd-1-206-4

File: nmr500/Zhang/y1uo/lyd-1-206-4.fid

Pulse Sequence: s2pul

Solvent: cdcl3

Ambient temperature

Operator: y1uo

File: lyd-1-206-4

INOVA-500 "nmrserver"

Relax. delay 4.800 sec

Pulse 74.9 degrees

Acq. time 2.500 sec

Width 8002.4 Hz

16 repetitions

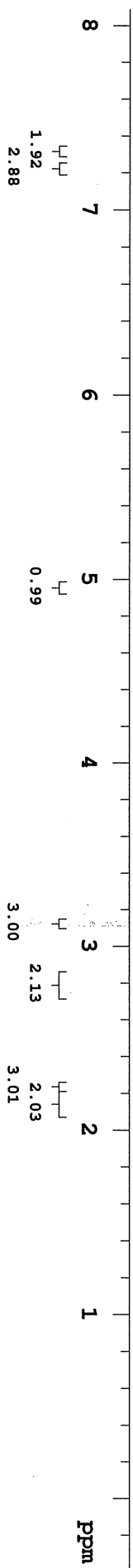
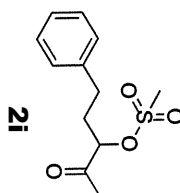
OBSERVE H1, 499.8560505 MHz

DATA PROCESSING

Line broadening 0.2 Hz

FW size 32768

Total time 0 min, 0 sec



lyd-1-206-4-c

File: nmr400/Zhang/y1uo/lyd-1-206-4-c.fid

Pulse Sequence: s2pul1

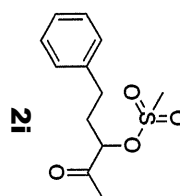
Solvent: cdd13

Ambient temperature

Operator: y1uo

File: lyd-1-206-4-c

INOVA-500 "nmrserver"



Relax. delay 1.300 sec

Pulse 53.8 degrees

Acq. time 1.000 sec

Width 28040.7 Hz

1164 repetitions

OBSERVE C13, 100.5671761 MHz

DECOUPLE H1, 399.9506784 MHz

Power 40 dB

continuously on

WALTZ-16 modulated

DATA PROCESSING

Line broadening 1.0 Hz

FT size 65536

Total time 7 hr, 41 min, 56 sec

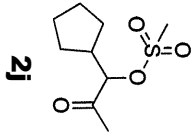


lyd-1-208-3

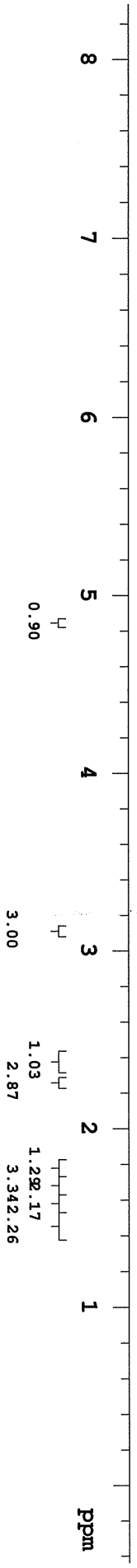
File: nmr500/Zhang/Yluo/lyd-1-208-3.fid

Pulse Sequence: s2pul

Solvent: cdcl3
Ambient temperature
Operator: Yluo
File: lyd-1-208-3
INOVA-500 "nmrserver"



Relax. delay 4.800 sec
Pulse 74.9 degrees
Acq. time 2.500 sec
Width 8002.4 Hz
28 repetitions
OBSERVE H1, 499.8560510 MHz
DATA PROCESSING
Line broadening 0.2 Hz
FT size 32768
Total time 0 min, 0 sec



lyd-1-208-3-c

File: nmr400/Zhang/yjwo/lyd-1-208-3-c.fid

Pulse Sequence: s2pul1

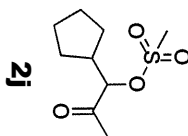
Solvent: cdcl3

Ambient temperature

Operator: yjwo

File: lyd-1-208-3-c

INOVA-500 "nmrserver"



Relax. delay 1.300 sec

Pulse 53.8 degrees

Acq. time 1.000 sec

Width 28040.7 Hz

976 repetitions

OBSERVE C13, 100.5671753 MHz

DECOUPLE H1, 399.9506784 MHz

Power 40 dB

continuously on

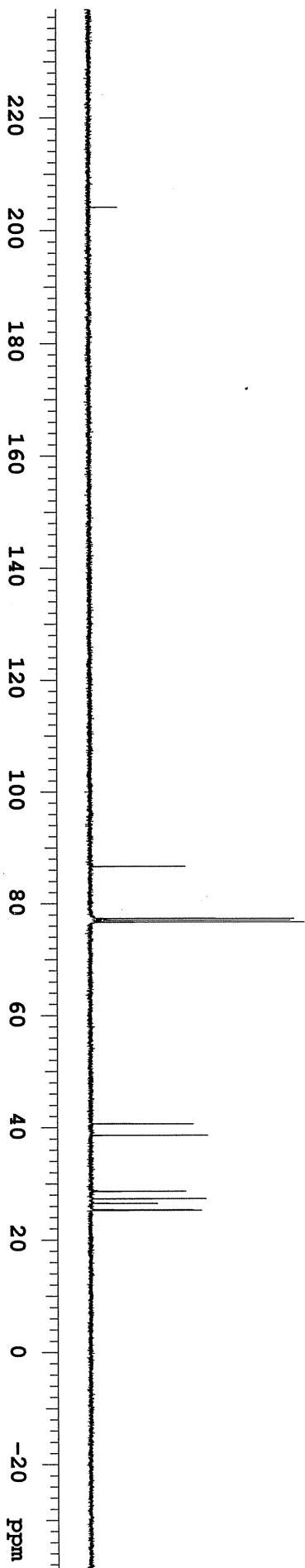
WALTZ-16 modulated

DATA PROCESSING

Line broadening 1.0 Hz

FW size 65536

Total time 6 hr, 24 min, 59 sec



lyd-1-207-3

File: nmr500/Zhang/Yluo/lyd-1-207-3.fid

Pulse Sequence: s2pul1

Solvent: cdcl3

Ambient temperature

Operator: yluo

File: lyd-1-207-3

INOVA-500 "mrserver"

Relax. delay 4.800 sec

Pulse 74.9 degrees

Acq. time 2.500 sec

Width 8002.4 Hz

12 repetitions

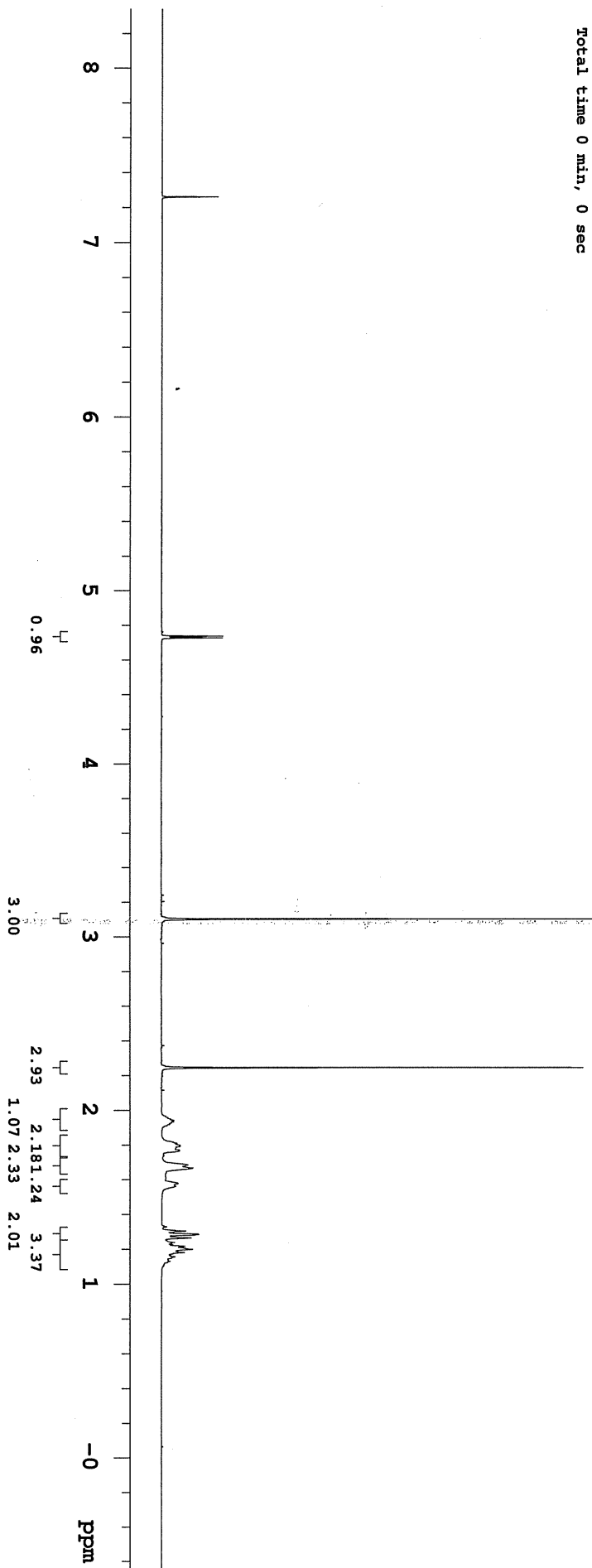
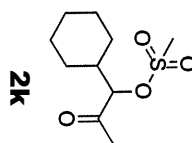
OBSERVE H1, 499.8560510 MHz

DATA PROCESSING

Line broadening 0.2 Hz

FT size 32768

Total time 0 min, 0 sec



lyd-1-207-3--c

File: mmr400/Zhang/y1uo/lyd-1-207-3-c.fid

Pulse Sequence: s2pul

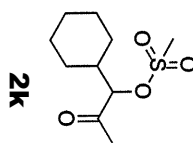
Solvent: cdc13

Ambient temperature

Operator: y1uo

File: lyd-1-207-3-c

INOVA-500 "nmrserver"



Relax. delay 1.300 sec

Pulse 53.8 degrees

Acq. time 1.000 sec

Width 28040.7 Hz

948 repetitions

OBSERVE C13, 100.5671761 MHz

DECOUPLE H1, 399.9506784 MHz

Power 40 dB

continuously on

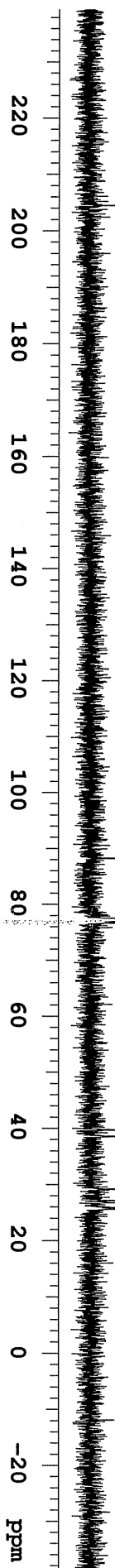
WALTZ-16 modulated

DATA PROCESSING

Line broadening 1.0 Hz

FT size 65536

Total time 7 hr, 41 min, 56 sec



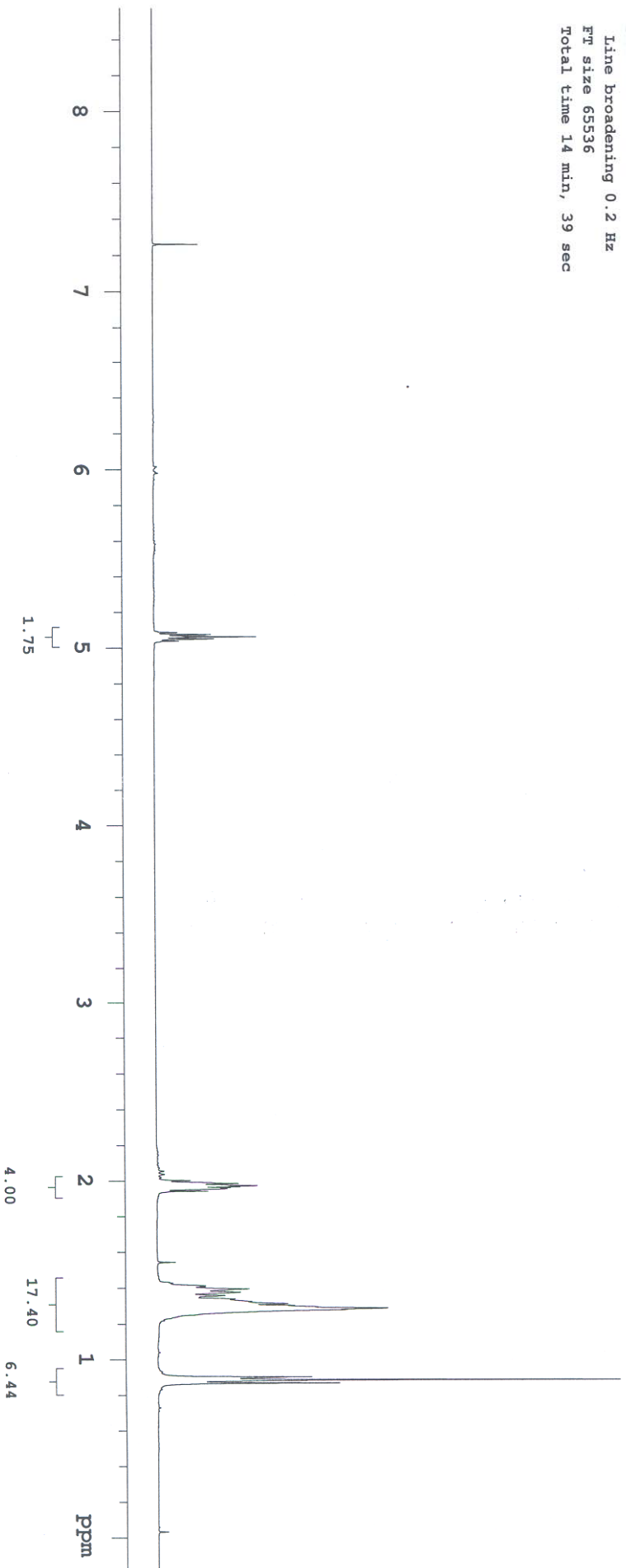
lyd-1-228-0309

File: nmr400/Zhang/y1uo/lyd-1-228-0309.fid

Pulse Sequence: s2pul

Solvent: cdcl3
Ambient temperature
Operator: y1uo
File: lyd-1-228-0309
INOVA-500 "nmrserver"

Relax. delay 4.800 sec
Pulse 75.0 degrees
Acq. time 2.500 sec
Width 8002.4 Hz
8 repetitions
OBSERVE H1, 399.9486723 MHz
DATA PROCESSING
Line broadening 0.2 Hz
FT size 65536
Total time 14 min, 39 sec



lyd-1-228-C

File: nmr400/Zhang/Yluc/lyd-1-228-C.fid

Pulse Sequence: s2pul

Solvent: cdcl3
Ambient temperature
Operator: Yluc
File: lyd-1-228-C
INOVA-500 "nmrserver"



Relax. delay 1.300 sec
Pulse 53.8 degrees
Acq. time 1.000 sec
Width 28040.7 Hz
24 repetitions
OBSERVE C13, 100.5671736 MHz
DECOUPLE H1, 399.9506784 MHz
Power 40 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 1.0 Hz
FT size 65536
Total time 6 hr, 24 min, 59 sec

