

## Supporting Information

### DIASTEREOSELECTIVE SYNTHESIS OF 2,4-SUBSTITUTED TETRAHYDROQUINOLINES VIA Hf(OTf)<sub>4</sub>-CATALYZED SUBSTITUTION/CYCLIZATION OF 2-AMINOBENZYL ALCOHOLS WITH STYRENES

Masahiro Noji,\* Hiroto Kadowaki, Yuuki Kubota, Tomomi Yoshida, Noriko Saito,  
Subaru Yamaguchi, Ren Ohata, Keitaro Ishii, and Toshikatsu Takanami  
Department of Life and Pharmaceutical Sciences, Meiji Pharmaceutical University,  
2-522-1 Noshio, Kiyose, Tokyo 204-8588, Japan  
[mnoji@my-pharm.ac.jp](mailto:mnoji@my-pharm.ac.jp)

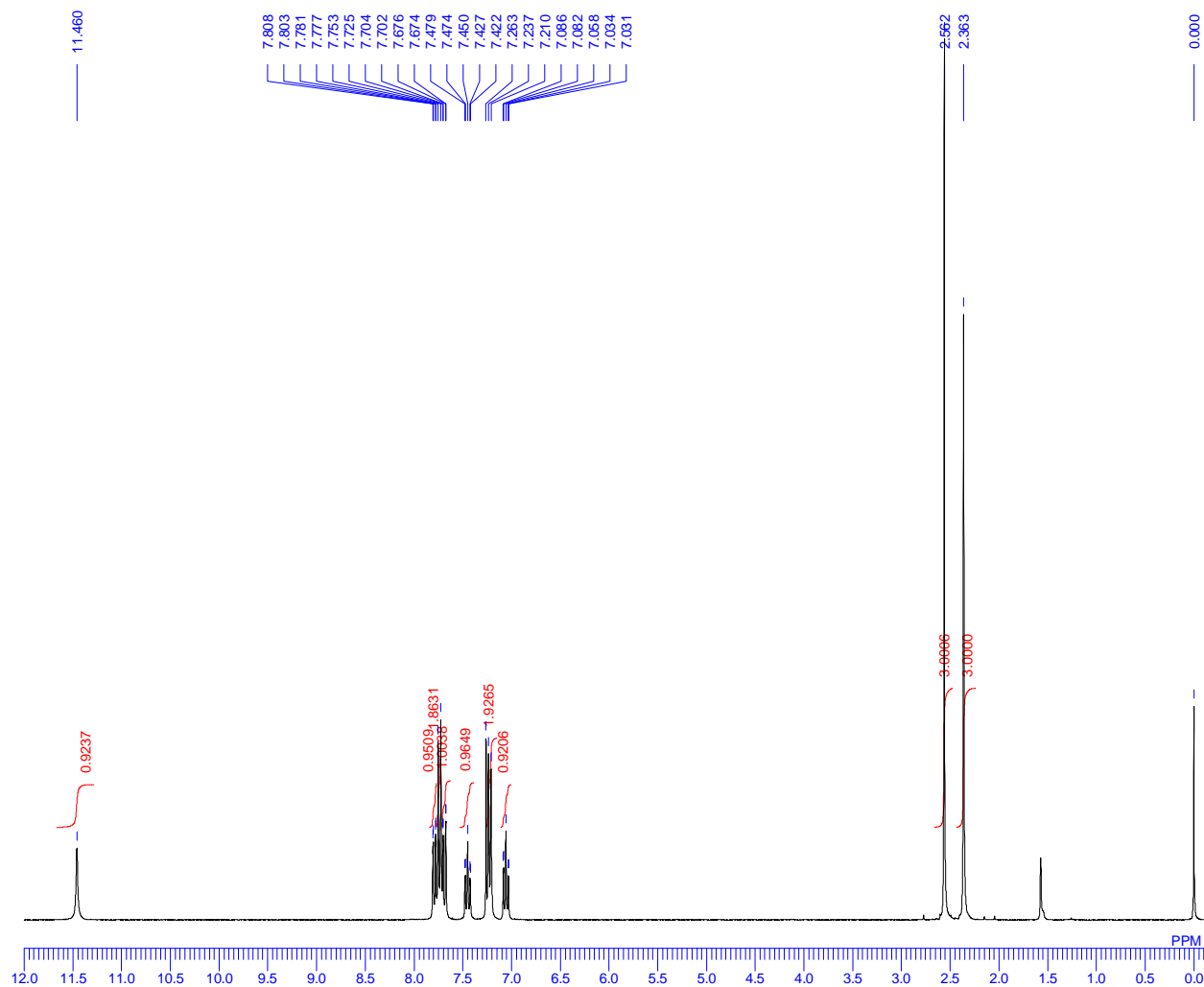
#### Table of Contents

<sup>1</sup> H and <sup>13</sup> C NMR charts of aminobenzyl alcohols <b>1a–1h</b>	S2
<sup>1</sup> H and <sup>13</sup> C NMR charts of tetrahydroquinolines <b>3aa–3ak-C</b>	S36
<sup>1</sup> H and <sup>13</sup> C NMR charts of ether <b>4</b> and dimethylindoline	S120
General Procedure for X-ray crystallographic Analysis	S126
Crystallographic data of <i>cis</i> - <b>3aa–3ak-C</b>	S126
References	S137

# <sup>1</sup>H NMR spectrum of 1a-1

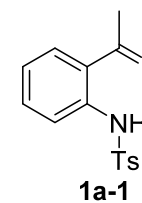
1a-1 (Ts-ketone)

C:\Users\NMR\NMRdata\NMR NOJI\NOJI Group\2009-KADOWAKI(HK)\NMR CE"\è\HK98 first.als



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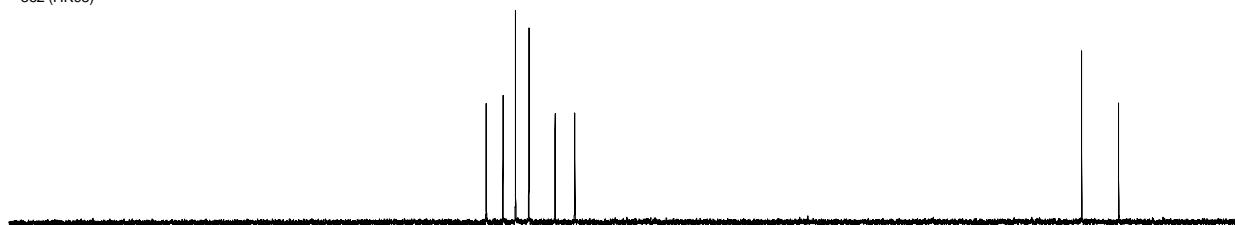
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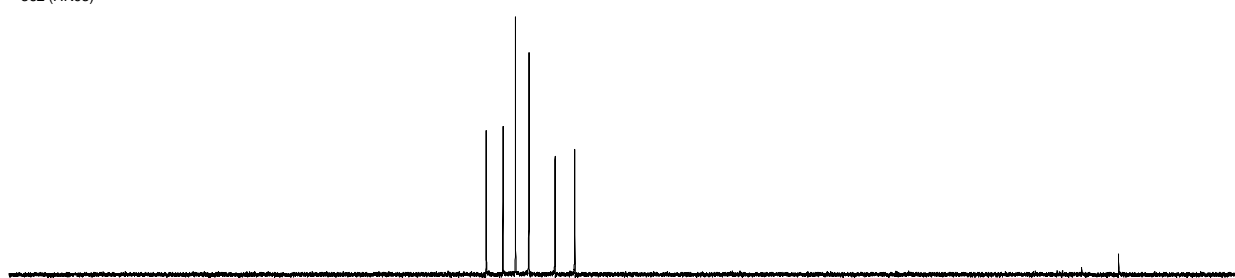
# <sup>13</sup>C NMR spectrum of 1a-1

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\1a-1 Ts-ketone (compound 862)\862 (HK98)2BCM\_E1\_FT.als

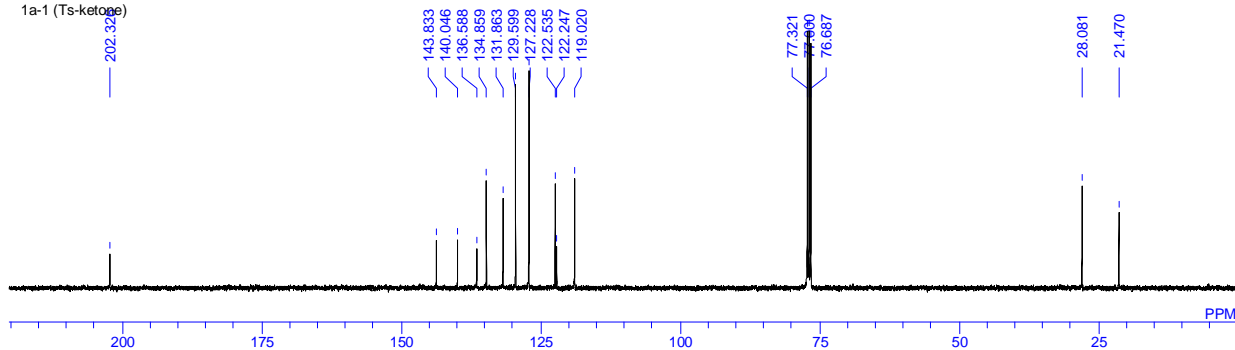
862 (HK98)



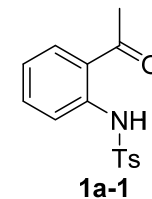
862 (HK98)



1a-1 (Ts-ketone)



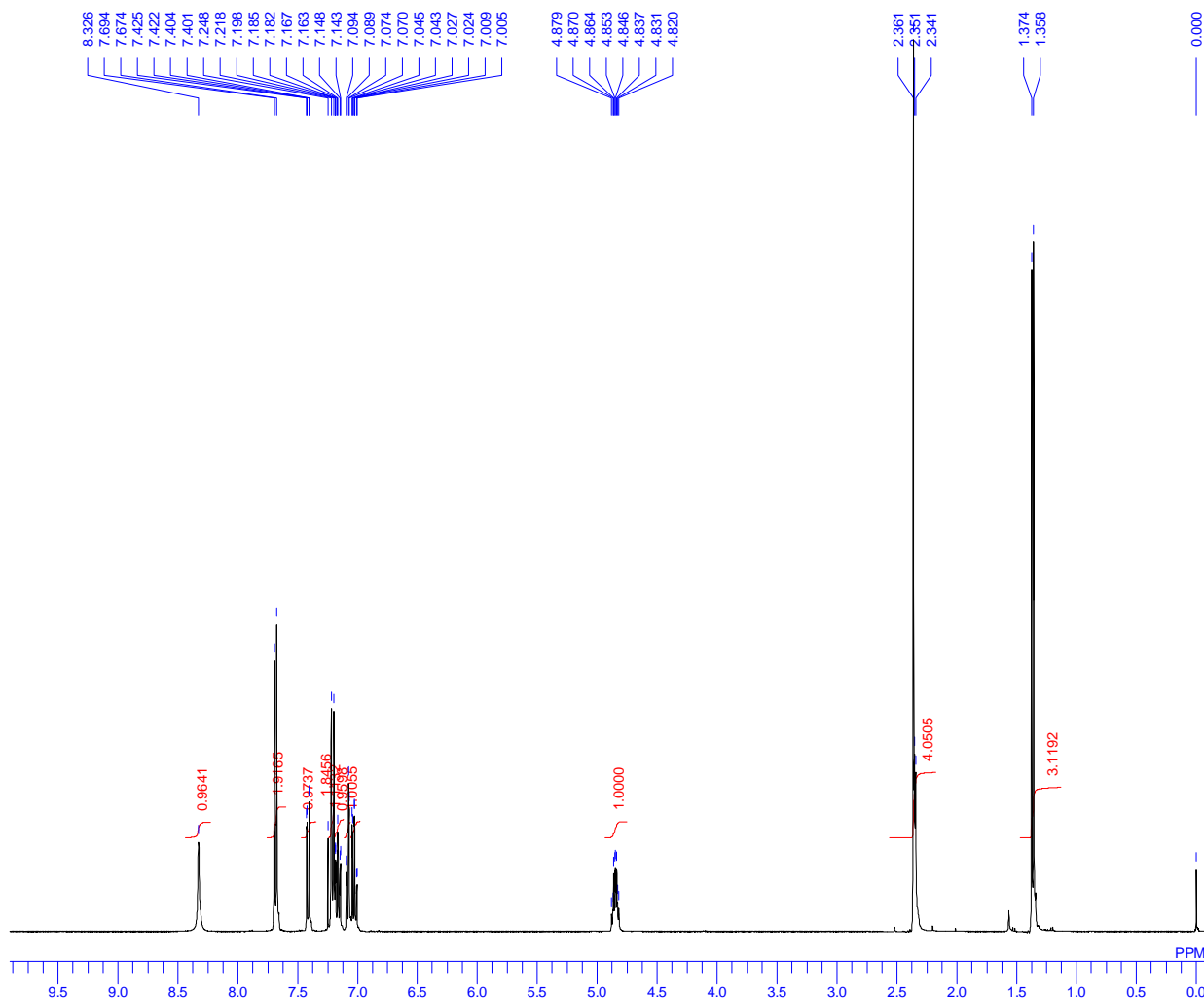
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FILDF	



# <sup>1</sup>H NMR spectrum of 1a

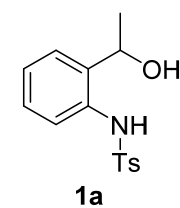
1a Ts-alc

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\1a Ts-alc compound780\780 (HK99)1NON\_E1\_FT.als



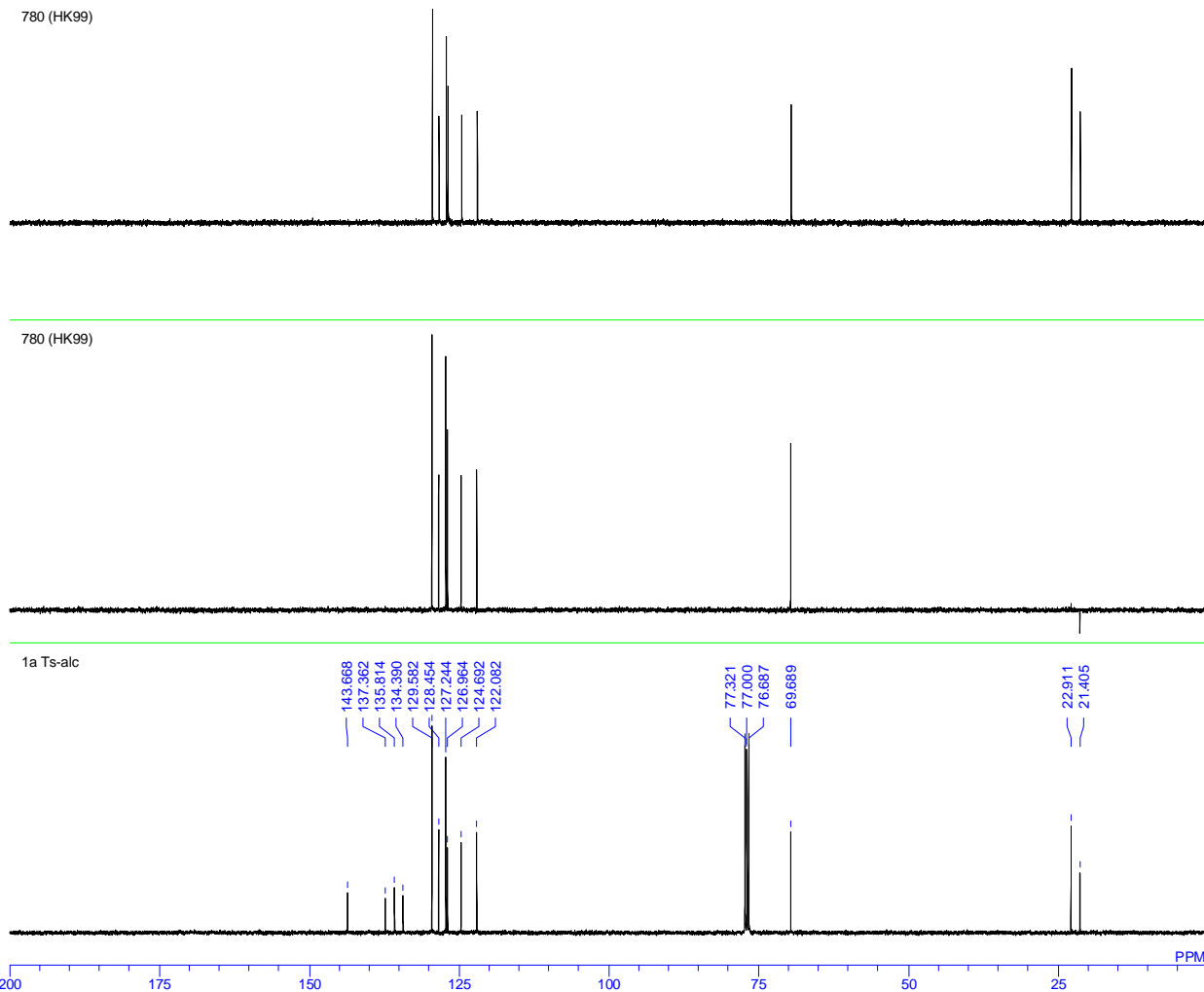
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EXPCM NON:Single.coupled:PW1_ACQTM_PD:1H,13C,1
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FILDF
    
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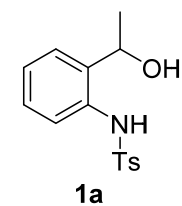


# <sup>13</sup>C NMR spectrum of 1a

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\1a Ts-alc compound\780\780 (HK99)2BCM\_E1\_FT.als



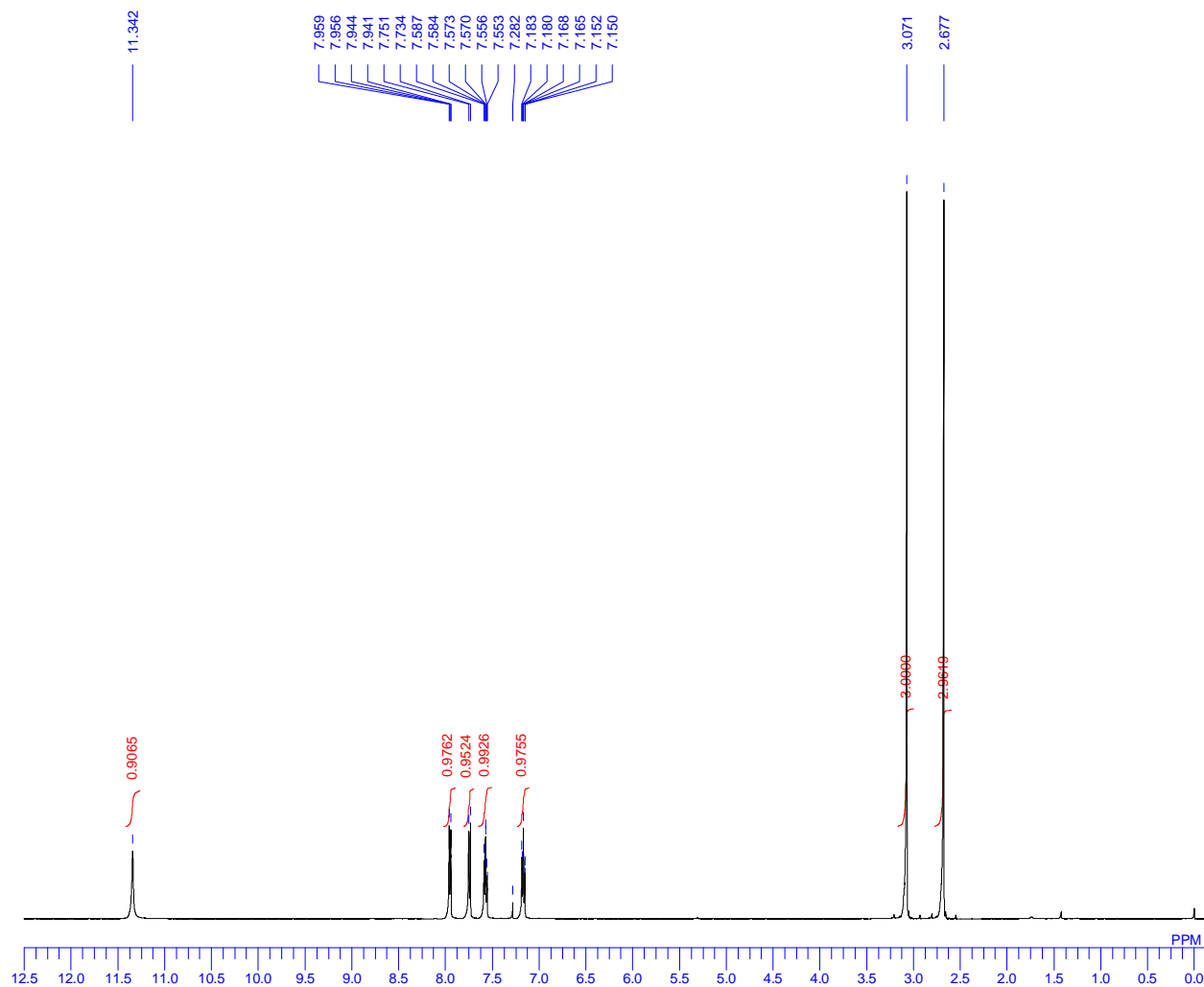
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FLT	13550 Hz
DELAY	14.76 usec
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PD	1.7920 sec
ADBIT	16
RGAIN	24
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T2	0.00
T3	90.00
T4	100.00
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IFR	399.65 MHz
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IRFIN	10500.00 Hz
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IRATN	511
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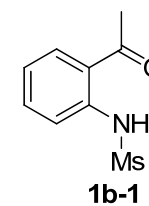
# <sup>1</sup>H NMR spectrum of 1b-1

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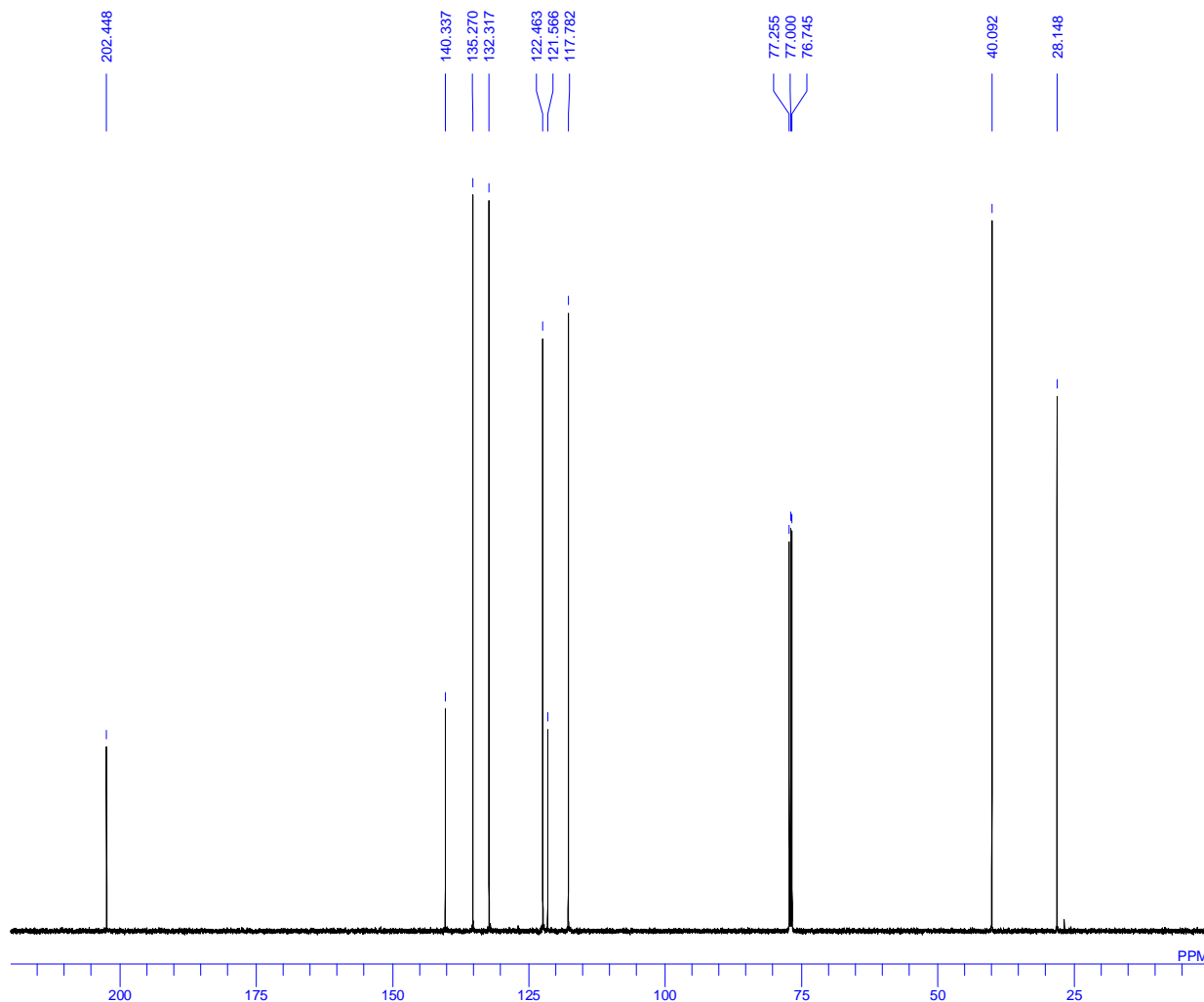
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EXPCM  
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FILDF



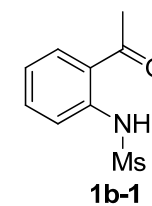
# <sup>13</sup>C NMR spectrum of 1b-1

1b-1 (Ms-ketone)

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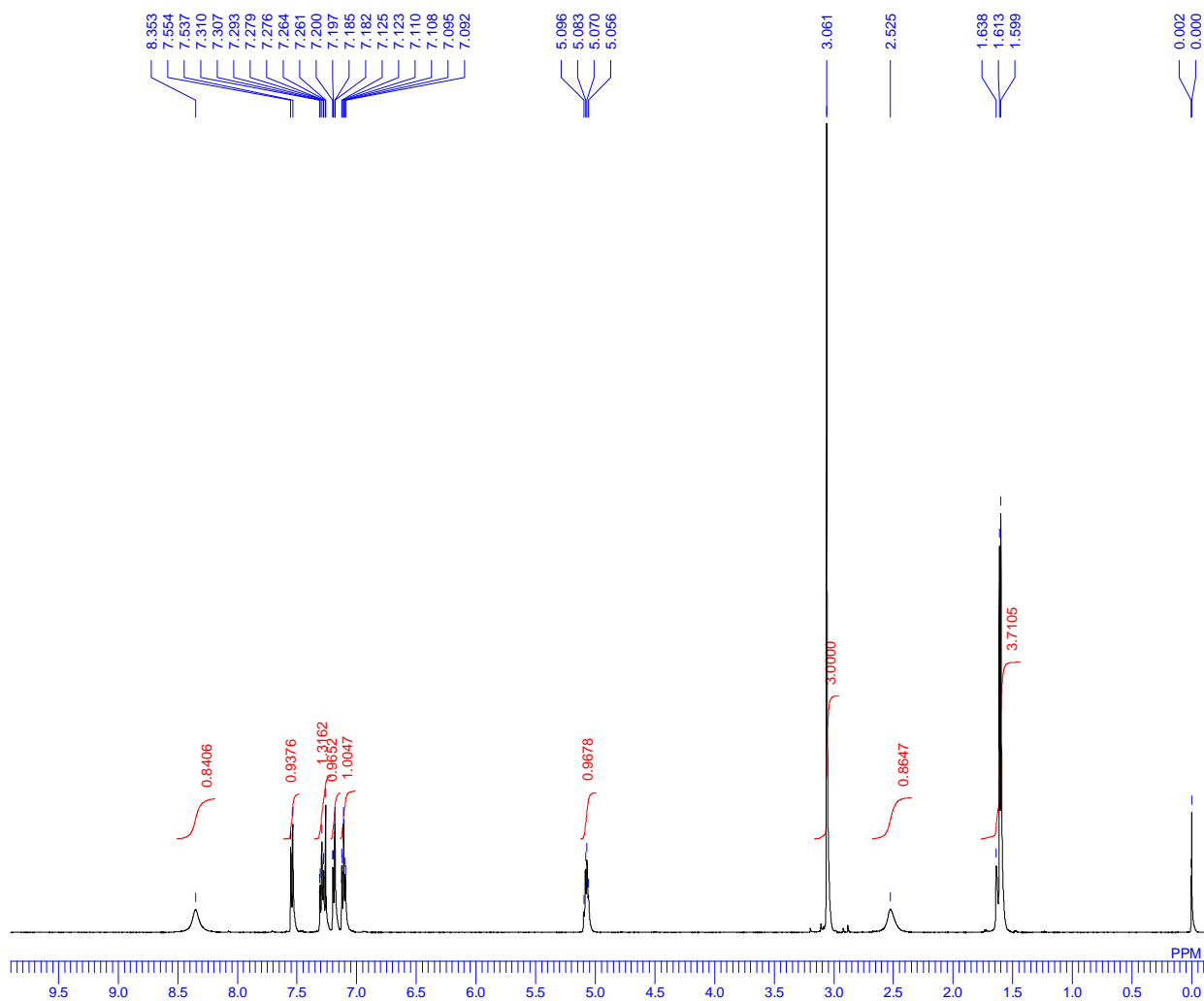
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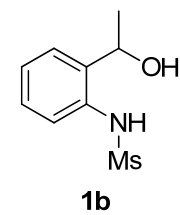
# <sup>1</sup>H NMR spectrum of 1b

1b (Ms-alc)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\1b Ms-Alc(HK120B)\Ms-Alc(HK120B)\_1HMs-Alc(HK120B)\_1H.als



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 PD 3.7232 sec  
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 RGAIN 21  
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 T2 0.00  
 T3 90.00  
 T4 100.00  
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 EXPCM  
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 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 7952  
 CSPED 11 Hz  
 FILDC  
 FILDF



# <sup>13</sup>C NMR spectrum of 1b

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\1b Ms-Alc(HK120B)\Ms-Alc(HK120B)\_DEPT.als

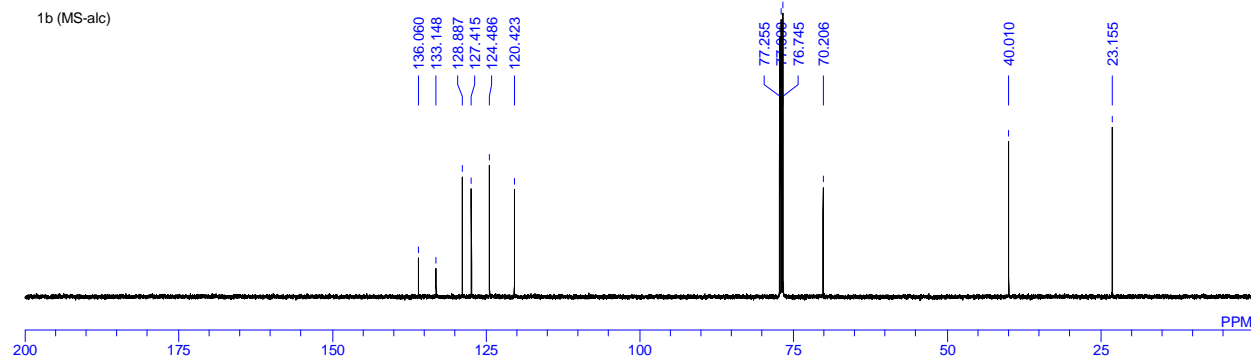
Ms-Alc(HK120B)



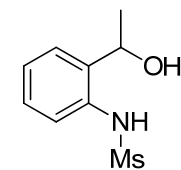
Ms-Alc(HK120B)



1b (MS-alc)



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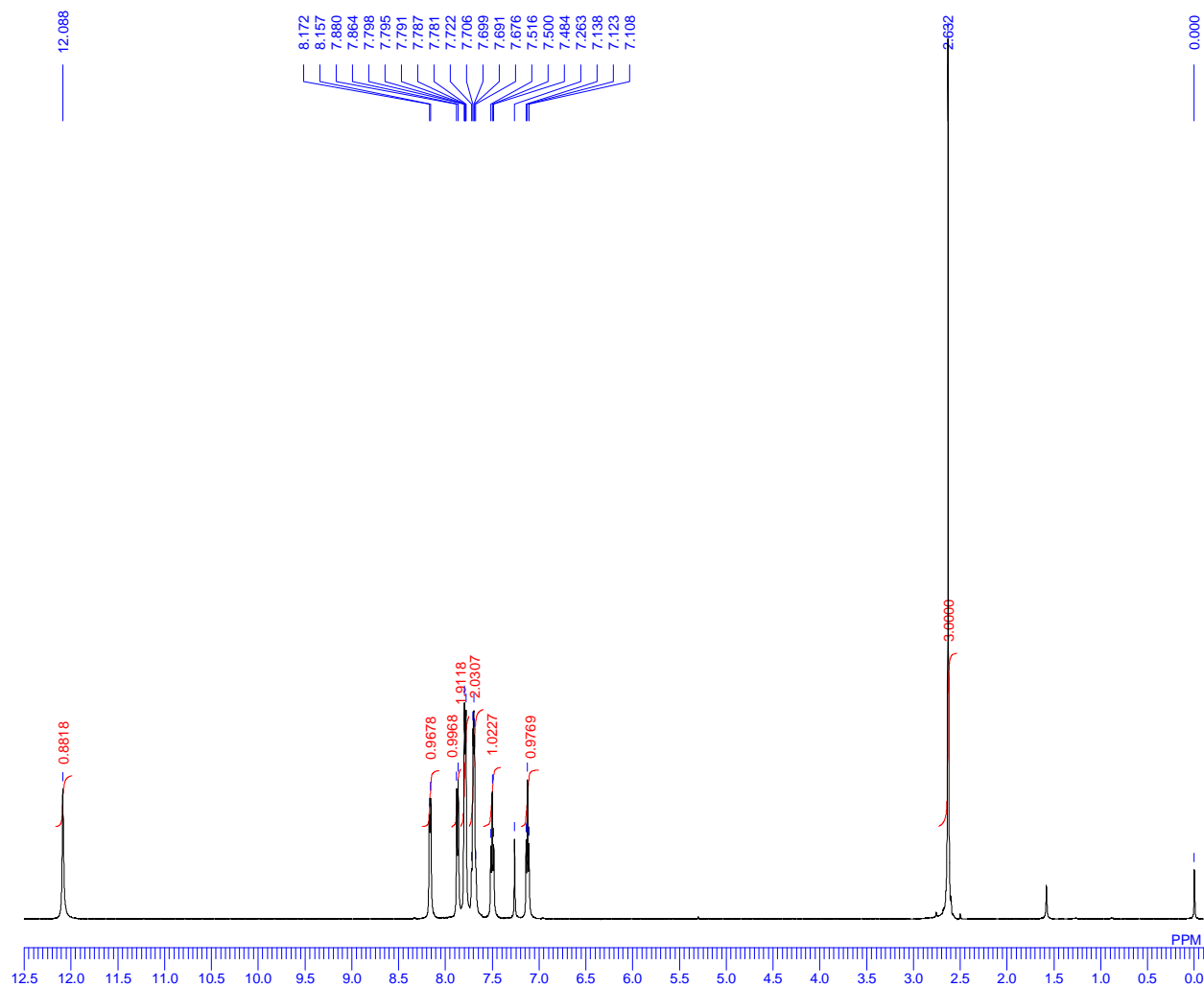


1b

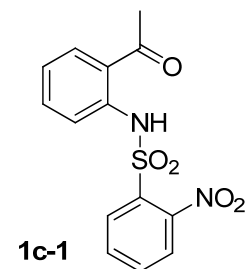
# <sup>1</sup>H NMR spectrum of 1c-1

1c-1 (Nos-ketone)

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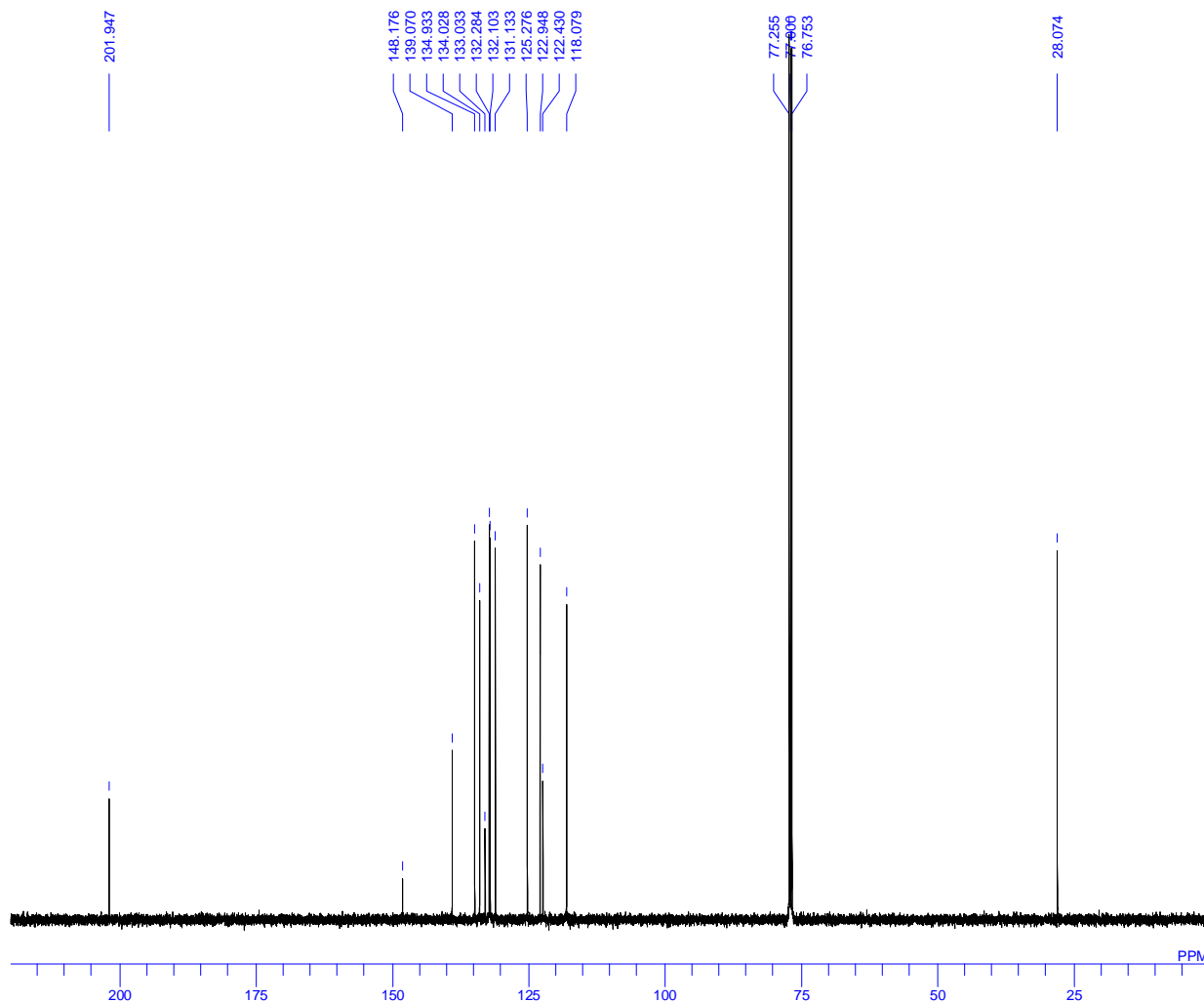
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T2 0.00  
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T4 100.00  
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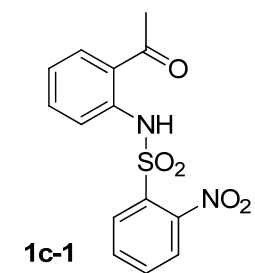
# <sup>13</sup>C NMR spectrum of 1c-1

1c-1 (Nos-ketone)

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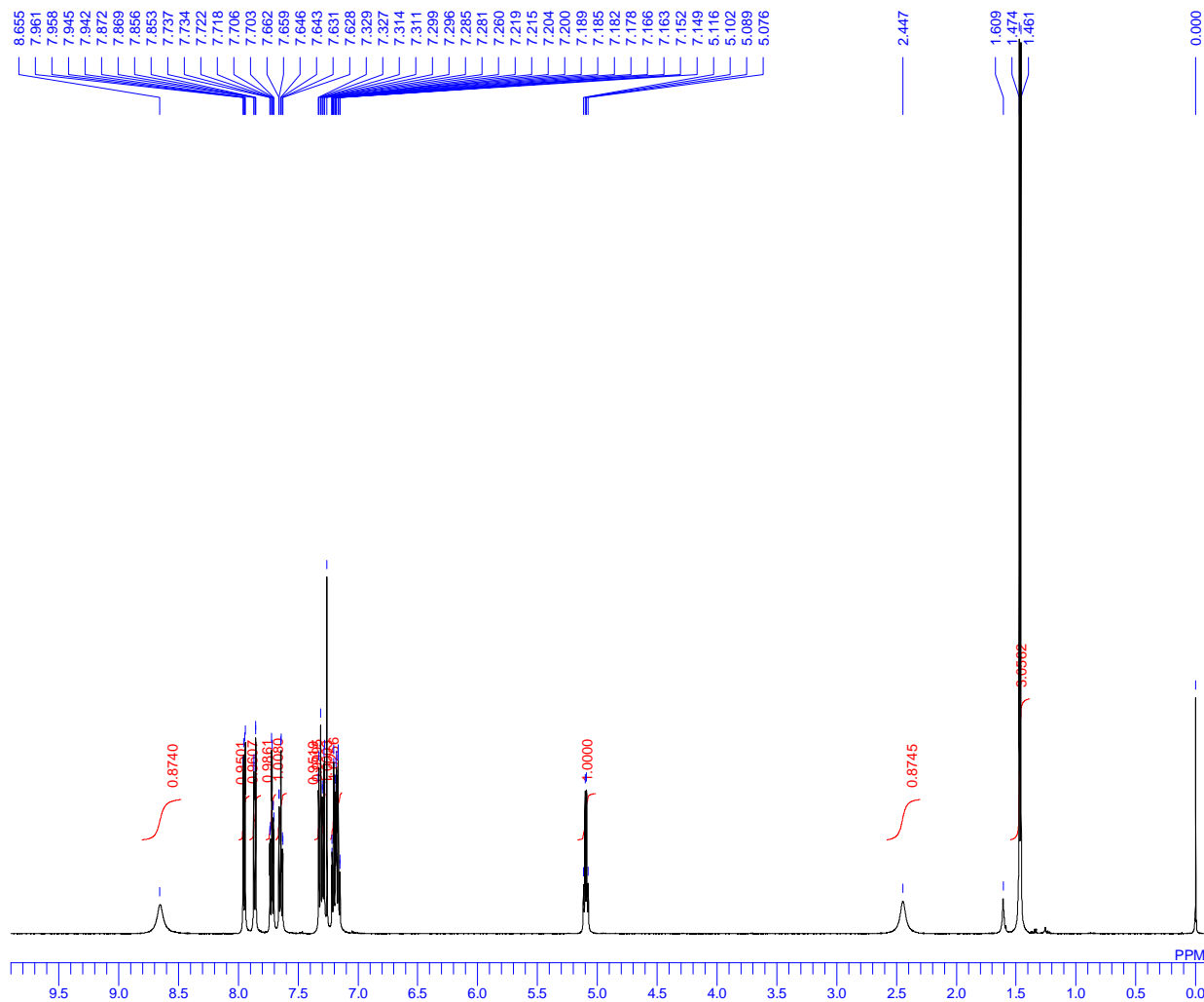
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FLT 16950 Hz  
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ACQTM 0.9667 sec  
PD 2.0333 sec  
ADBIT 16  
RGAIN 27  
BF 1.20 Hz  
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T2 0.00  
T3 90.00  
T4 100.00  
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EXPCM error\_expcm  
IRNUC 1H  
IFR 500.00 MHz  
IRSET 160.00 KHz  
IRFIN 2160.00 Hz  
IRRPW 0 usec  
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LKFIN 334.0 Hz  
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FILDF



# <sup>1</sup>H NMR spectrum of 1c

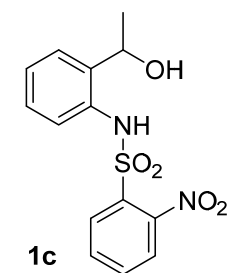
1c(NO2-alc, CR524-B2)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\1c-NO2-alc(CR524-B2)\CR524-B2\_1H\CR524-B2\_1H.als



Sat Nov 21 19:09:21 2015

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LKSIG	41056
CSPED	1 Hz
FILDC	
FILDF	



# <sup>13</sup>C NMR spectrum of 1c

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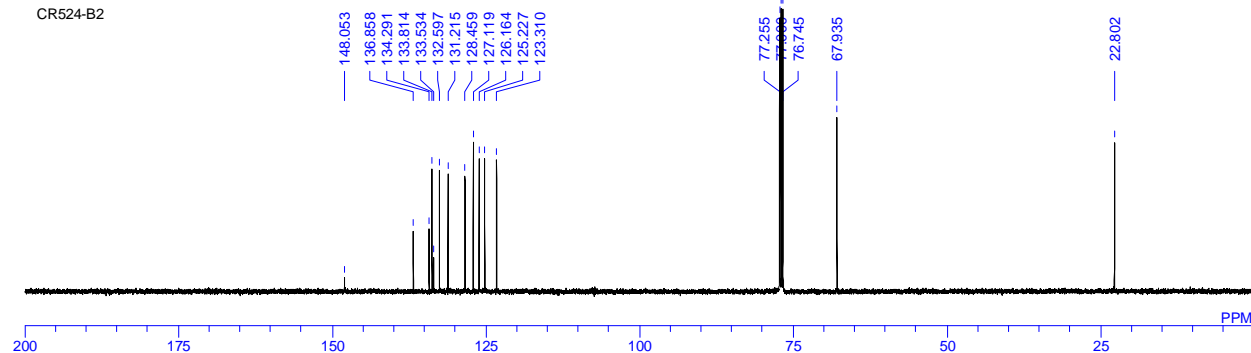
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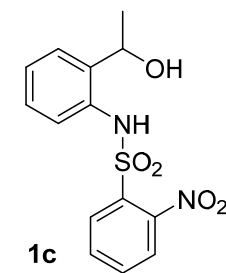
CR524-B2



CR524-B2



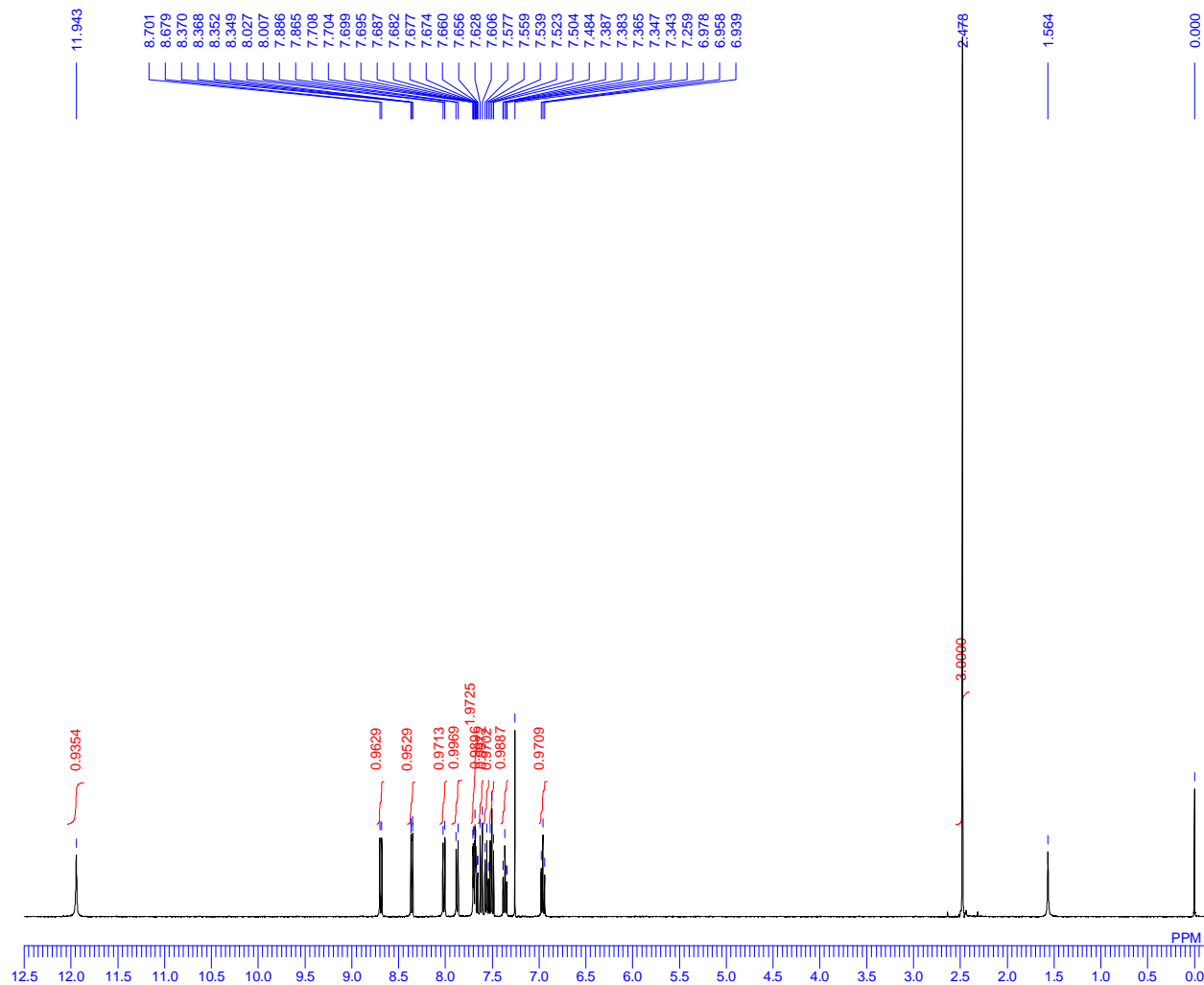
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 SPO 32768  
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 BF 0.01 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE CR524-B2\_DEPT.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG -1757540380  
 CSPED 10 Hz  
 FILDC  
 FILDF



# <sup>1</sup>H NMR spectrum of 1d-1

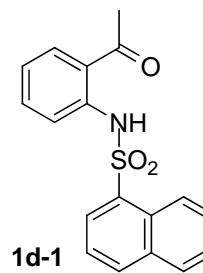
1d-1 (1-naph)

C:\Users\NMR\NMRdata\NMR NOJI\2013-SAITO(NS)\NS10\NS10-W1.als



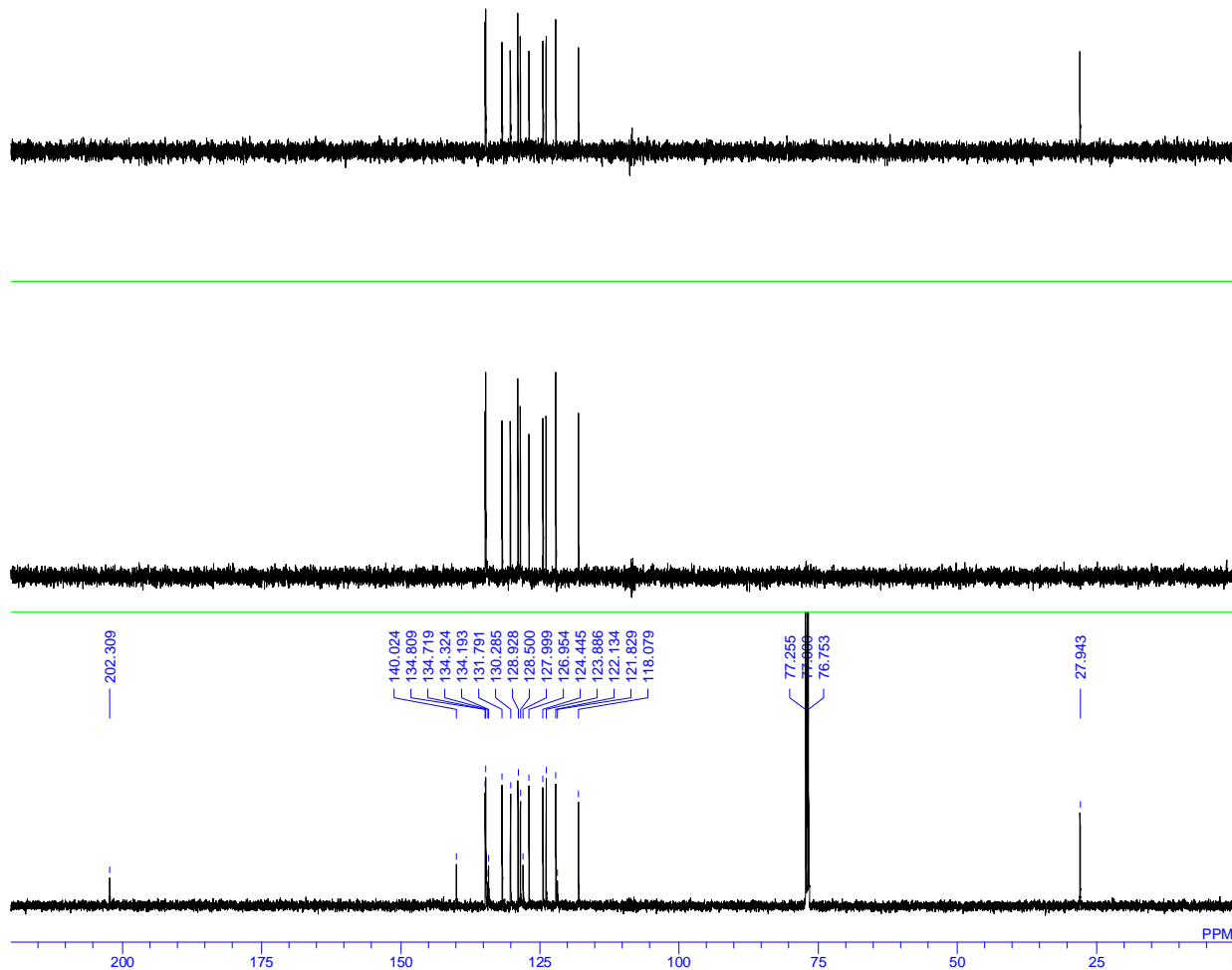
```

DATIM Sat Jun 15 13:47:56 2013
MENUF non
OBNUC 1H
OFR 399.65 MHz
OBSET 124.00 KHz
OBFIN 10500.00 Hz
PW1 5.80 usec
DEADT 72.10 usec
PREDL 0.20000 msec
IWT 1.0000 sec
POINT 16384
SPO 16384
TIMES 8
DUMMY 1
FREQU 7992.01 Hz
FLT 4000 Hz
DELAY 50.00 usec
ACQTM 2.0500 sec
PD 4.9500 sec
ADBIT 16
RGAIN 20
BF 0.12 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD NON
EXPCM NON:Single.coupled:PW1_ACQTM_PD:1H,13C,1
IRNUC 1H
IFR 399.65 MHz
IRSET 124.00 KHz
IRFIN 10500.00 Hz
IRRPW 50 usec
IRATN 511
DFILE NS10-W1.als
SF TH5FG2
LKSET 61.60 KHz
LKFIN 79.0 Hz
LKLEV 180
LGAIN 22
LKPHS 330
LKSIG 1224
CSPED 14 Hz
FILDC
FILDF
    
```



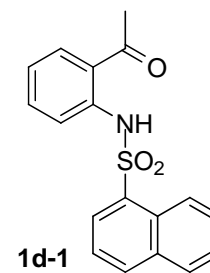
# <sup>13</sup>C NMR spectrum of 1d-1

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\1d-1 955(NS10W1)\955(NS10W1)\_DEPT.als



```

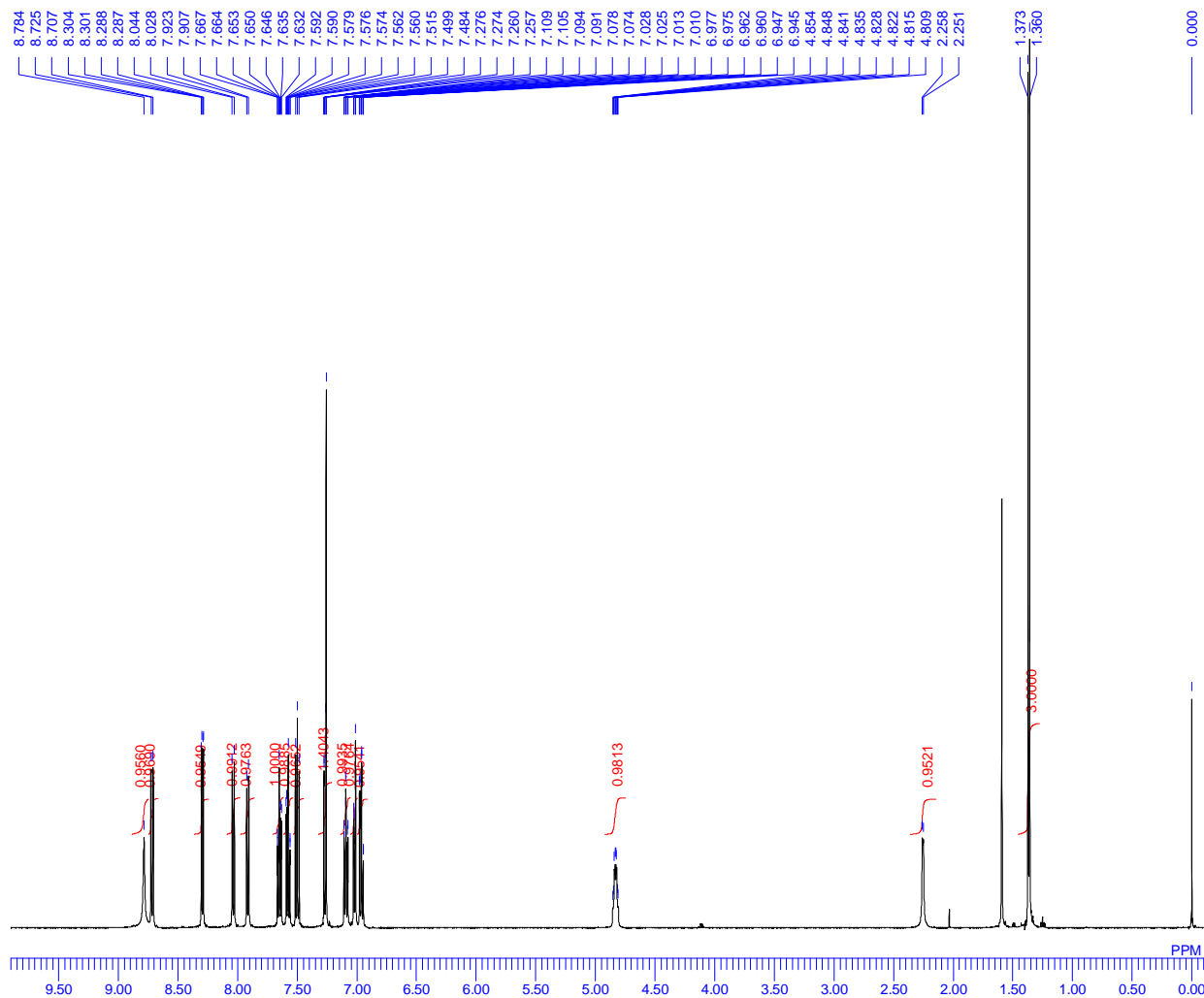
DATIM   Tue Jun 18 14:30:39 2013
MENUF
OBNUC   13C
OFR     125.65 MHz
OBSET   120.00 KHz
OBFIN   7958.00 Hz
PW1     8.50 usec
DEADT   10.00 usec
PREDL   10.00000 msec
IWT     0.0100 sec
POINT   32768
SPO     32768
TIMES   1024
DUMMY   1
FREQU   33898.30 Hz
FLT     16950 Hz
DELAY   11.80 usec
ACQTM   0.9667 sec
PD      2.0333 sec
ADBIT   16
RGAIN   27
BF      0.12 Hz
T1      0.00
T2      0.00
T3      90.00
T4      100.00
EXMOD   bcm
EXPCM   error_expcm
IRNUC   1H
IFR     500.00 MHz
IRSET   160.00 KHz
IRFIN   2160.00 Hz
IRRPW   0 usec
IRATN   511
DFILE   955(NS10W1)_DEPT.als
SF      th5.shm
LKSET   70.00 KHz
LKFIN   334.0 Hz
LKLEV   200
LGAIN   20
LKPHS   210
LKSIG   39029
CSPED   13 Hz
FILDC
FILDF
    
```



# <sup>1</sup>H NMR spectrum of 1d

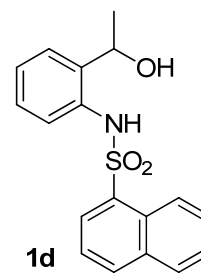
1d (1-naph)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\1d 956(NS11-col)\956(NS11-col)\_1H.als



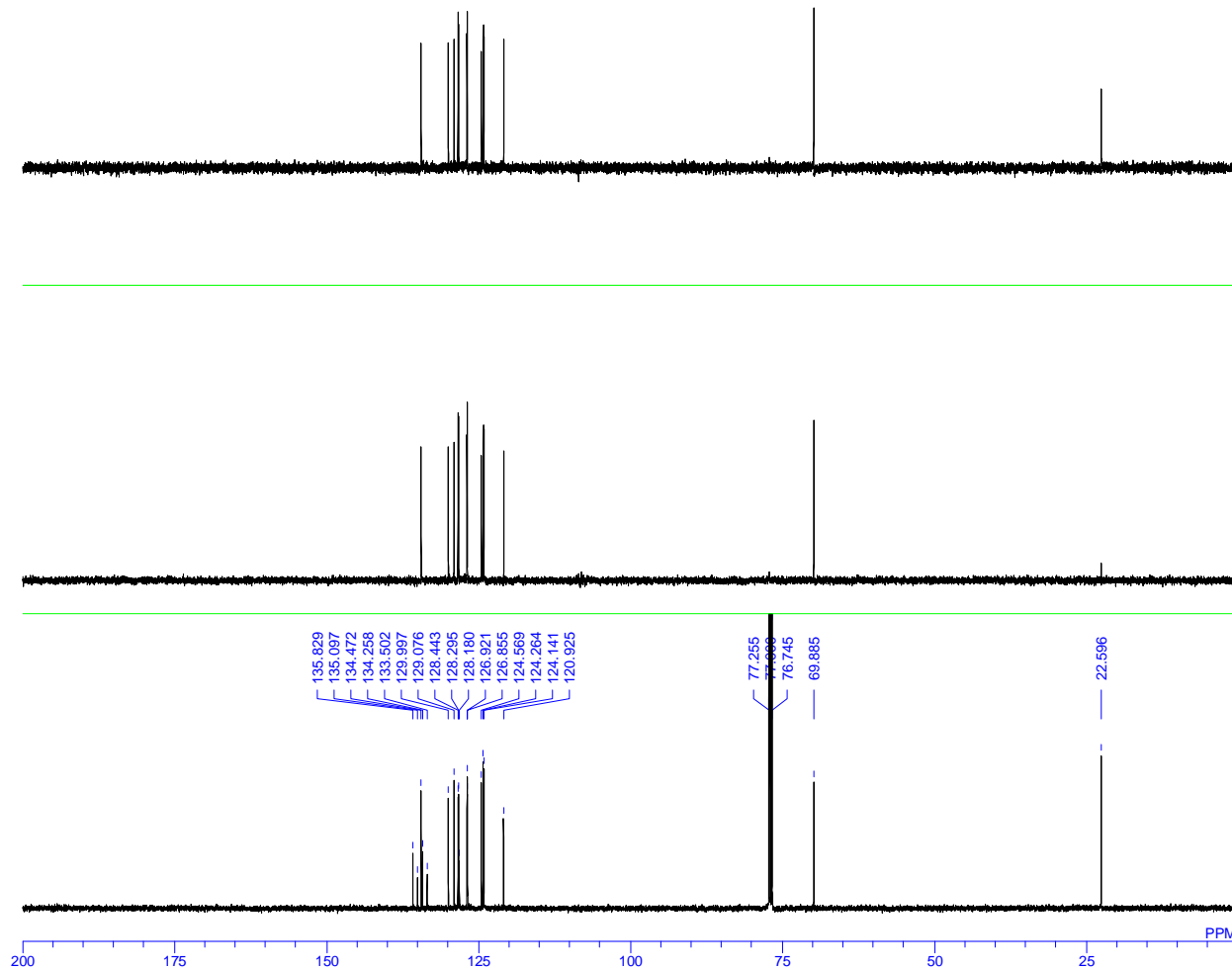
```

DATIM   Wed Jun 26 10:08:45 2013
MENUF
OBNUC   1H
OFR     500.00 MHz
OBSET   160.00 KHz
OBFIN   2160.00 Hz
PW1     7.50 usec
DEADT   56.25 usec
PREDL   10.00000 msec
IWT     0.0005 sec
POINT   32768
SPO     32768
TIMES   16
DUMMY   0
FREQU   10000.00 Hz
FLT     5000 Hz
DELAY   40.00 usec
ACQTM   3.2768 sec
PD      3.7232 sec
ADBIT   16
RGAIN   20
BF      1.20 Hz
T1      0.00
T2      0.00
T3      90.00
T4      100.00
EXMOD   non
EXPCM
IRNUC   1H
IFR     500.00 MHz
IRSET   160.00 KHz
IRFIN   2160.00 Hz
IRRPW   0 usec
IRATN   511
DFILE   956(NS11-col)_1H.als
SF      th5.shm
LKSET   70.00 KHz
LKFIN   334.0 Hz
LKLEV   200
LGAIN   20
LKPHS   210
LKSIG   20850
CSPED   13 Hz
FILDC
FILDF
    
```

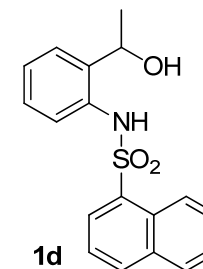


# <sup>13</sup>C NMR spectrum of 1d

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\1d 956(NS11-co)\956(NS11-co)\_DEPT.als



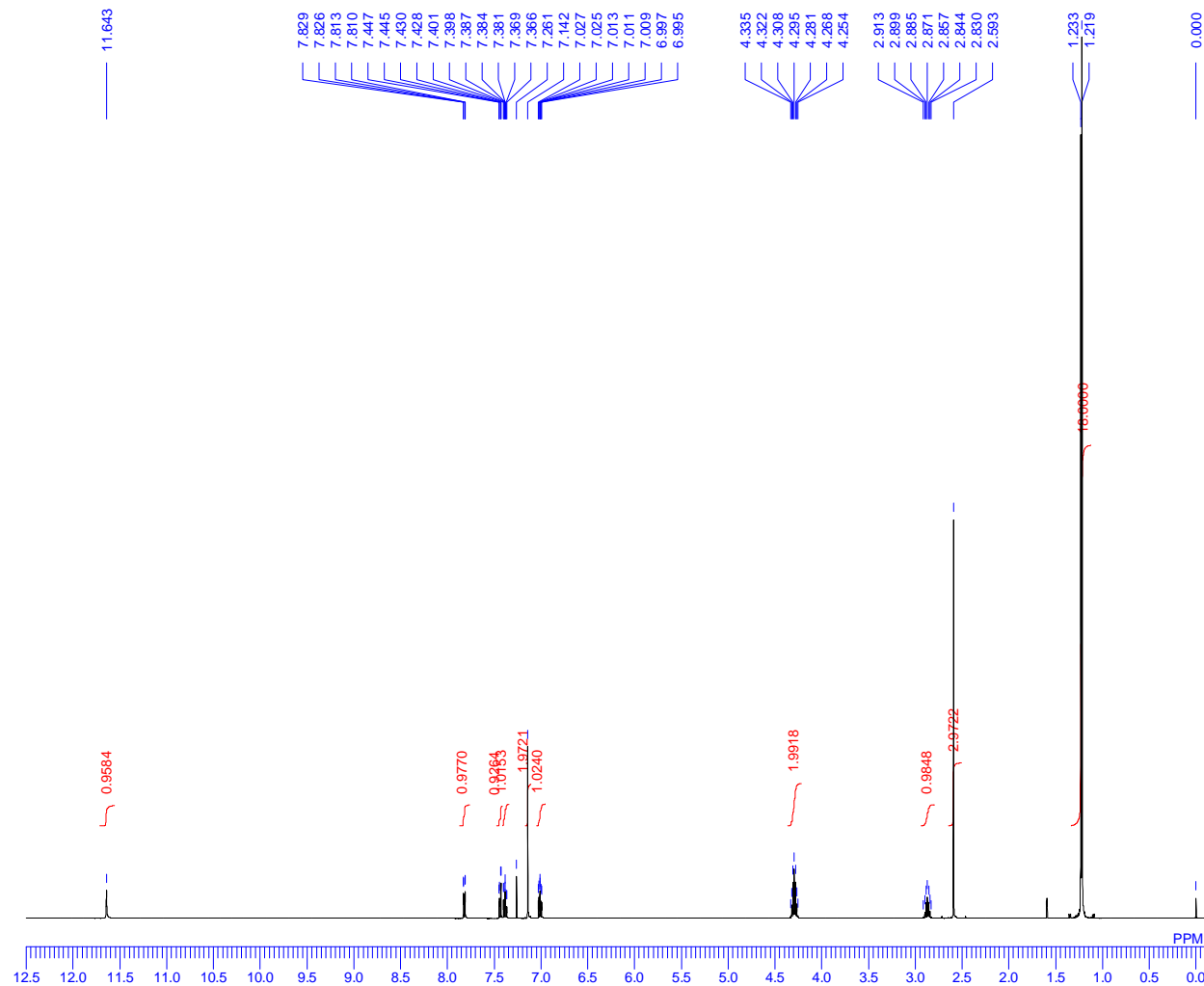
DATIM Wed Jun 26 11:01:18 2013  
 MENUF  
 OBNUC 13C  
 OFR 125.65 MHz  
 OBSET 120.00 KHz  
 OBFIN 7958.00 Hz  
 PW1 8.50 usec  
 DEADT 10.00 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 1024  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 27  
 BF 1.20 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE 956(NS11-co)\_DEPT.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 7331  
 CSPED 13 Hz  
 FILDF



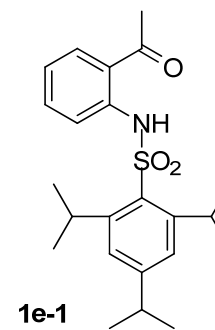
# <sup>1</sup>H NMR spectrum of 1e-1

1e-1 (trisyl-ketone)

C:\Users\NMR\NMRdata\NMR NOJ\Quinoline styrene\1e-1 trisyl 953(NS7-1st)\953(NS7-1st)\_1H.als

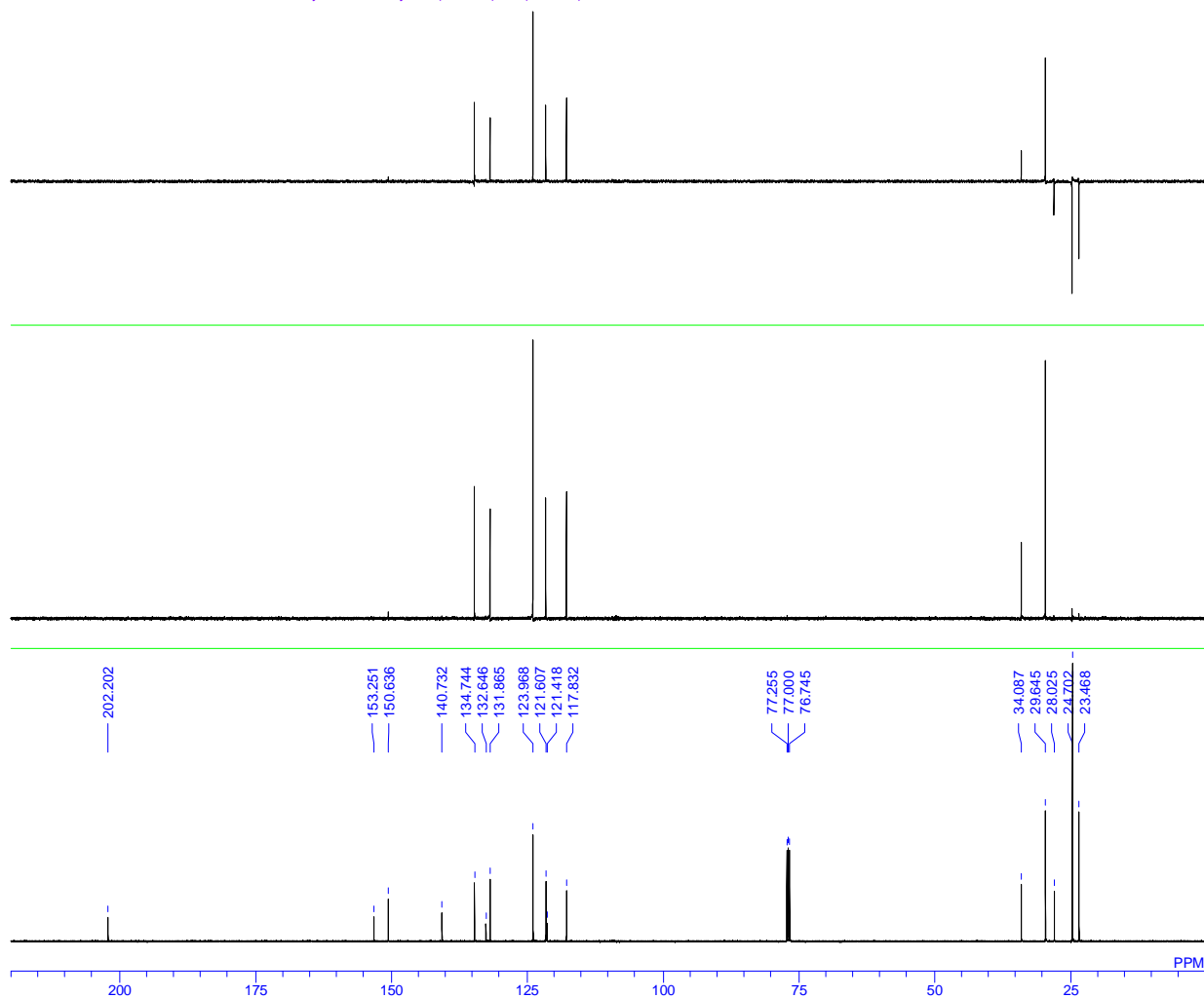


DATIM Wed Jun 5 15:30:22 2013  
 MENUF 1H  
 OBNUC 500.00 MHz  
 OFR 160.00 KHz  
 OBSET 2160.00 Hz  
 OBFIN 11.30 usec  
 PW1 54.35 usec  
 DEADT 10.00000 msec  
 PREDL 0.0005 sec  
 IWT 32768  
 POINT 32768  
 SPO 16  
 TIMES 0  
 DUMMY 10000.00 Hz  
 FREQU 5000 Hz  
 FLT 40.00 usec  
 DELAY 3.2768 sec  
 ACQTM 3.7232 sec  
 PD 16  
 ADBIT 15  
 RGAIN 0.12 Hz  
 BF 0.00  
 T1 0.00  
 T2 90.00  
 T3 100.00  
 T4 non  
 EXMOD 1H  
 IRNUC 500.00 MHz  
 IFR 160.00 KHz  
 IRSET 2160.00 Hz  
 IRFIN 0 usec  
 IRRPW 511  
 IRATN 953(NS7-1st)\_1H.als  
 DFILE th5.shm  
 SF 70.00 KHz  
 LKSET 334.0 Hz  
 LKFIN 200  
 LKLEV 20  
 LGAIN 210  
 LKPHS 9684  
 LKSIG 13 Hz  
 CSPED  
 FILDC  
 FILDF

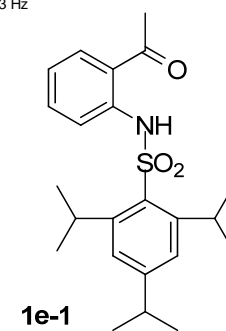


# <sup>13</sup>C NMR spectrum of 1e-1

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\1e-1 trisyl 953(NS7-1st)\953(NS7-1st)\_DEPT.als



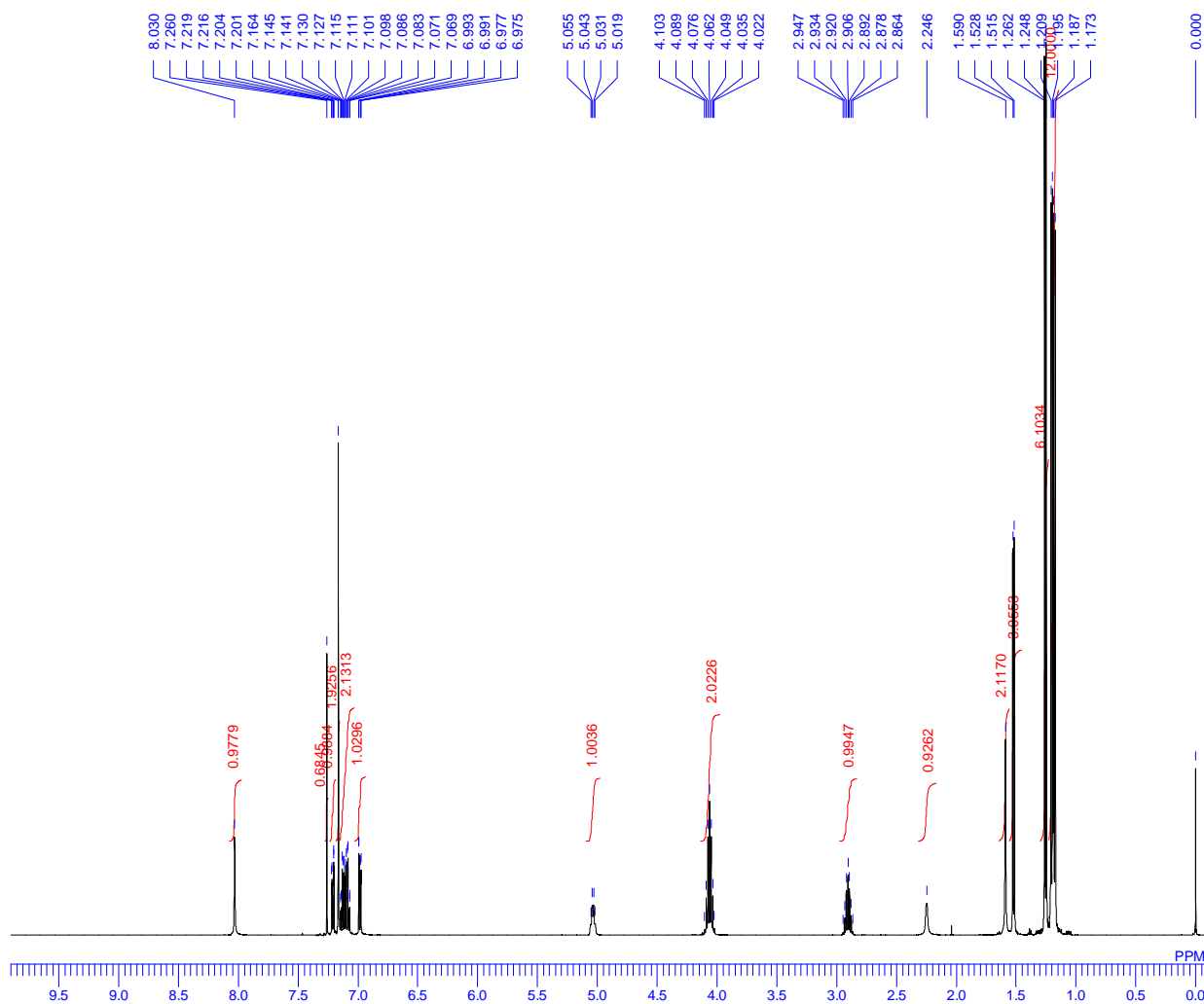
DATIM	Wed Jun 5 16:22:55 2013
MENUF	
OBNUC	13C
OFR	125.65 MHz
OBSET	120.00 KHz
OBFIN	7958.00 Hz
PW1	11.75 usec
DEADT	10.00 usec
PREDL	10.00000 msec
IWT	0.0100 sec
POINT	32768
SPO	32768
TIMES	1024
DUMMY	1
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	0.9667 sec
PD	2.0333 sec
ADBIT	16
RGAIN	28
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	error_expcm
IRNUC	1H
IFR	500.00 MHz
IRSET	160.00 KHz
IRFIN	2160.00 Hz
IRRPW	0 usec
IRATN	511
DFILE	953(NS7-1st)_DEPT.als
SF	th5.shm
LKSET	70.00 KHz
LKFIN	334.0 Hz
LKLEV	200
LGAIN	20
LKPHS	210
LKSIG	64188
CSPED	13 Hz
FILDC	
FILDF	



# <sup>1</sup>H NMR spectrum of 1e

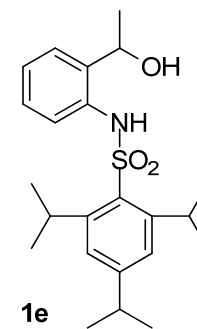
1e (trisyl-alc)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\1e trisyl-alc 954(NS9)\954(NS9)\_1H\954(NS9)\_1H.als



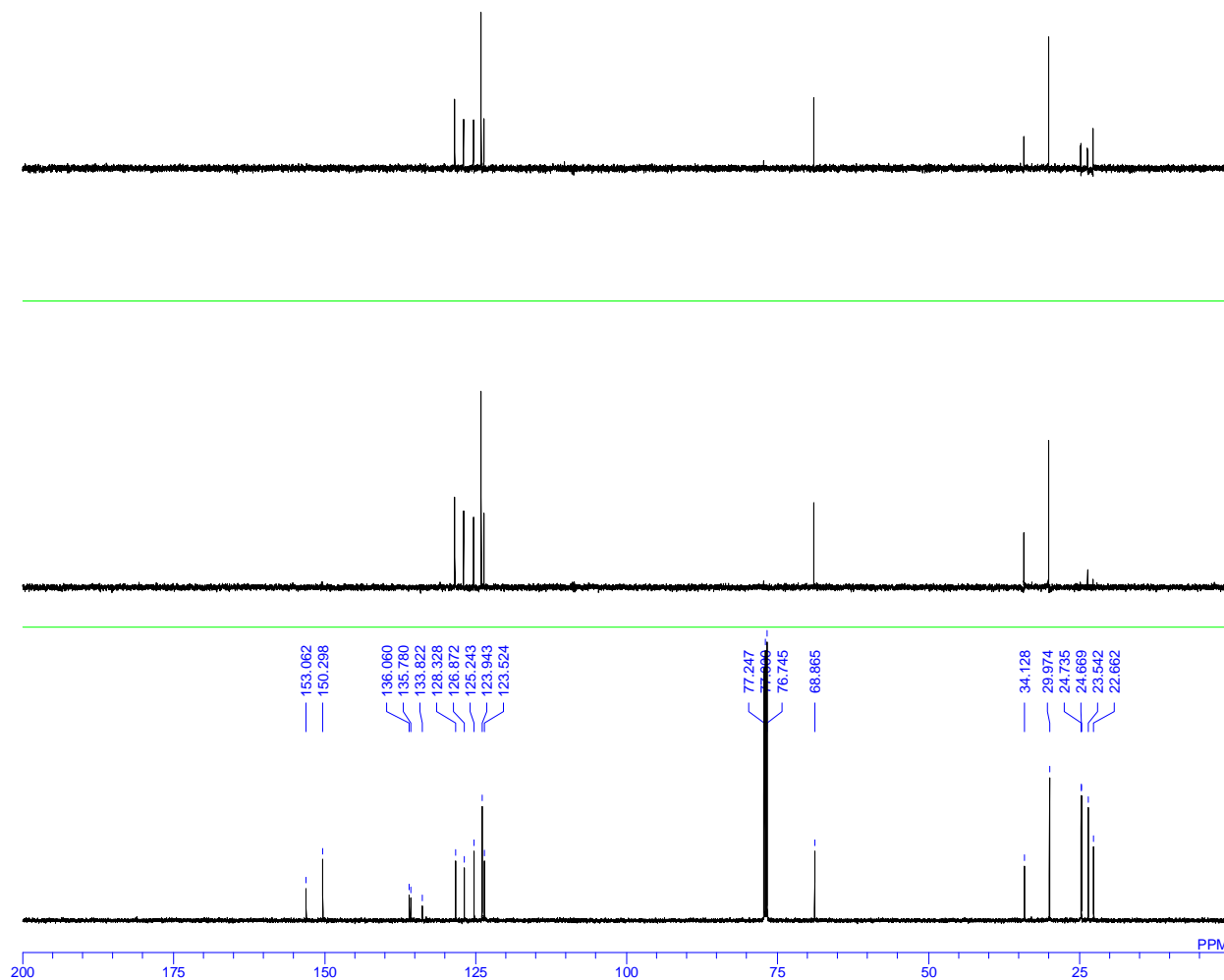
Sat Jun 15 11:31:58 2013

DATIM	Sat Jun 15 11:31:58 2013
MENUF	1H
OBNUC	500.00 MHz
OFR	160.00 KHz
OBSET	2160.00 Hz
OBFIN	7.50 usec
PW1	56.25 usec
DEADT	10.00000 msec
PREDL	0.0005 sec
IWT	32768
POINT	32768
SPO	16
TIMES	0
DUMMY	10000.00 Hz
FREQU	5000 Hz
FLT	40.00 usec
DELAY	3.2768 sec
ACQTM	3.7232 sec
PD	16
ADBIT	18
RGAIN	0.12 Hz
BF	0.00
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	1H
IRNUC	500.00 MHz
IFR	160.00 KHz
IRSET	2160.00 Hz
IRFIN	0 usec
IRRPV	511
IRATN	954(NS9)_1H.als
DFILE	th5.shm
SF	70.00 KHz
LKSET	334.0 Hz
LKFIN	200
LKLEV	20
LGAIN	210
LKPHS	58664
LKSIG	13 Hz
CSPED	
FILDC	
FILDF	



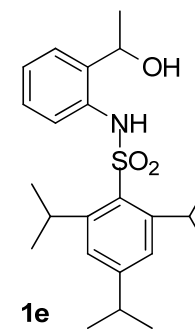
# <sup>13</sup>C NMR spectrum of 1e

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\1e trisyl-alc 954(NS9)\954(NS9)\_DEPT.als



```

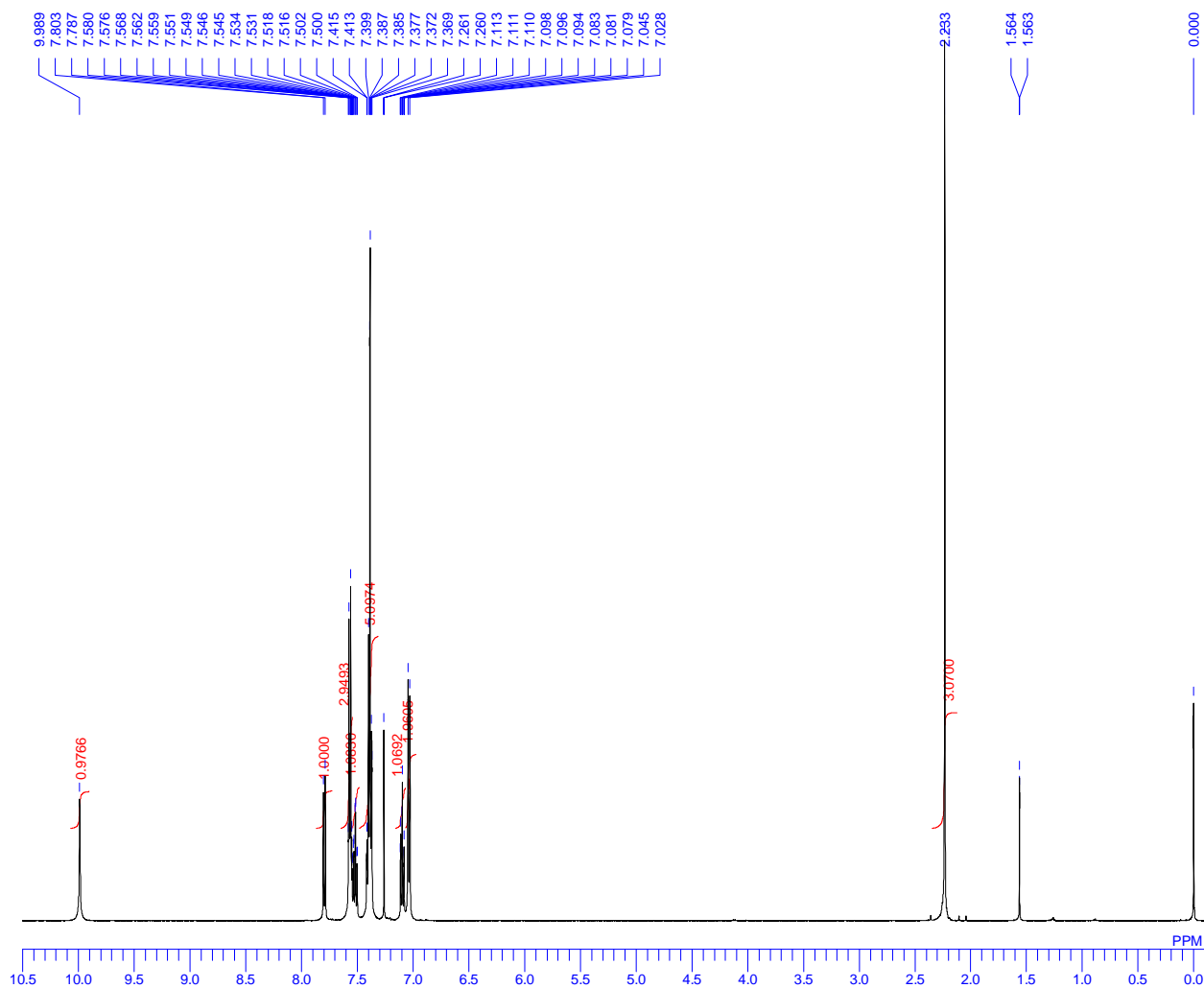
DATIM Sat Jun 15 12:24:28 2013
MENUF
OBNUC 13C
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OBSET 120.00 KHz
OBFIN 7958.00 Hz
PW1 8.50 usec
DEADT 10.00 usec
PREDL 10.00000 msec
IWT 0.0100 sec
POINT 32768
SPO 32768
TIMES 1024
DUMMY 1
FREQU 33898.30 Hz
FLT 16950 Hz
DELAY 11.80 usec
ACQTM 0.9667 sec
PD 2.0333 sec
ADBIT 16
RGAIN 27
BF 0.12 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD bcm
EXPCM error_expcm
IRNUC 1H
IFR 500.00 MHz
IRSET 160.00 KHz
IRFIN 2160.00 Hz
IRRPW 0 usec
IRATN 511
DFILE 954(NS9)_DEPT.als
SF th5.shm
LKSET 70.00 KHz
LKFIN 334.0 Hz
LKLEV 200
LGAIN 20
LKPHS 210
LKSIG 25292
CSPED 12 Hz
FILDC
FILDF
    
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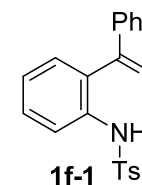
# <sup>1</sup>H NMR spectrum of 1f-1

1f-1(Ph-keotone)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\1f-1(Ph-keotone)\1f-1(Ph-keotone)\_1H.als



DATIM Mon Nov 23 18:19:37 2015  
 MENUF  
 OBNUC 1H  
 OFR 500.00 MHz  
 OBSSET 160.00 KHz  
 OBFIN 2160.00 Hz  
 PW1 5.00 usec  
 DEADT 57.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0005 sec  
 POINT 32768  
 SPO 32768  
 TIMES 16  
 DUMMY 0  
 FREQU 10000.00 Hz  
 FLT 5000 Hz  
 DELAY 40.00 usec  
 ACQTM 3.2768 sec  
 PD 3.7232 sec  
 ADBIT 16  
 RGAIN 19  
 BF 0.00 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD non  
 EXPCM  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE 1f-1(Ph-keotone)\_1H.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 314378939  
 CSPED 10 Hz  
 FILDC  
 FILDF



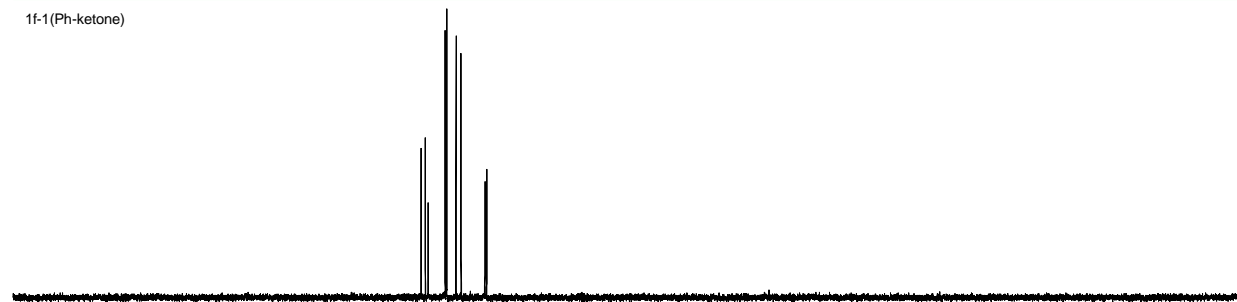
# <sup>13</sup>C NMR spectrum of 1f-1

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\1f-1(Ph-ketone)\1f-1(Ph-ketone)\_13C\1f-1(Ph-ketone)\_13C.als

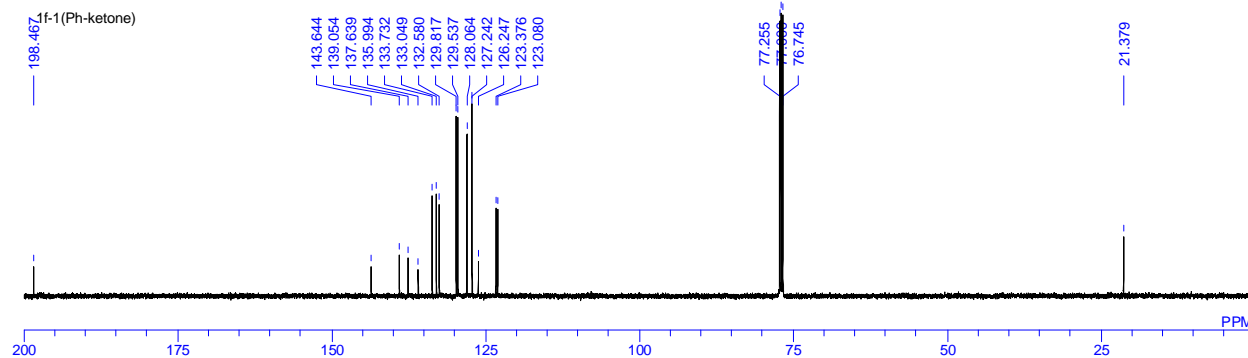
1f-1(Ph-ketone)



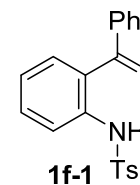
1f-1(Ph-ketone)



1f-1(Ph-ketone)



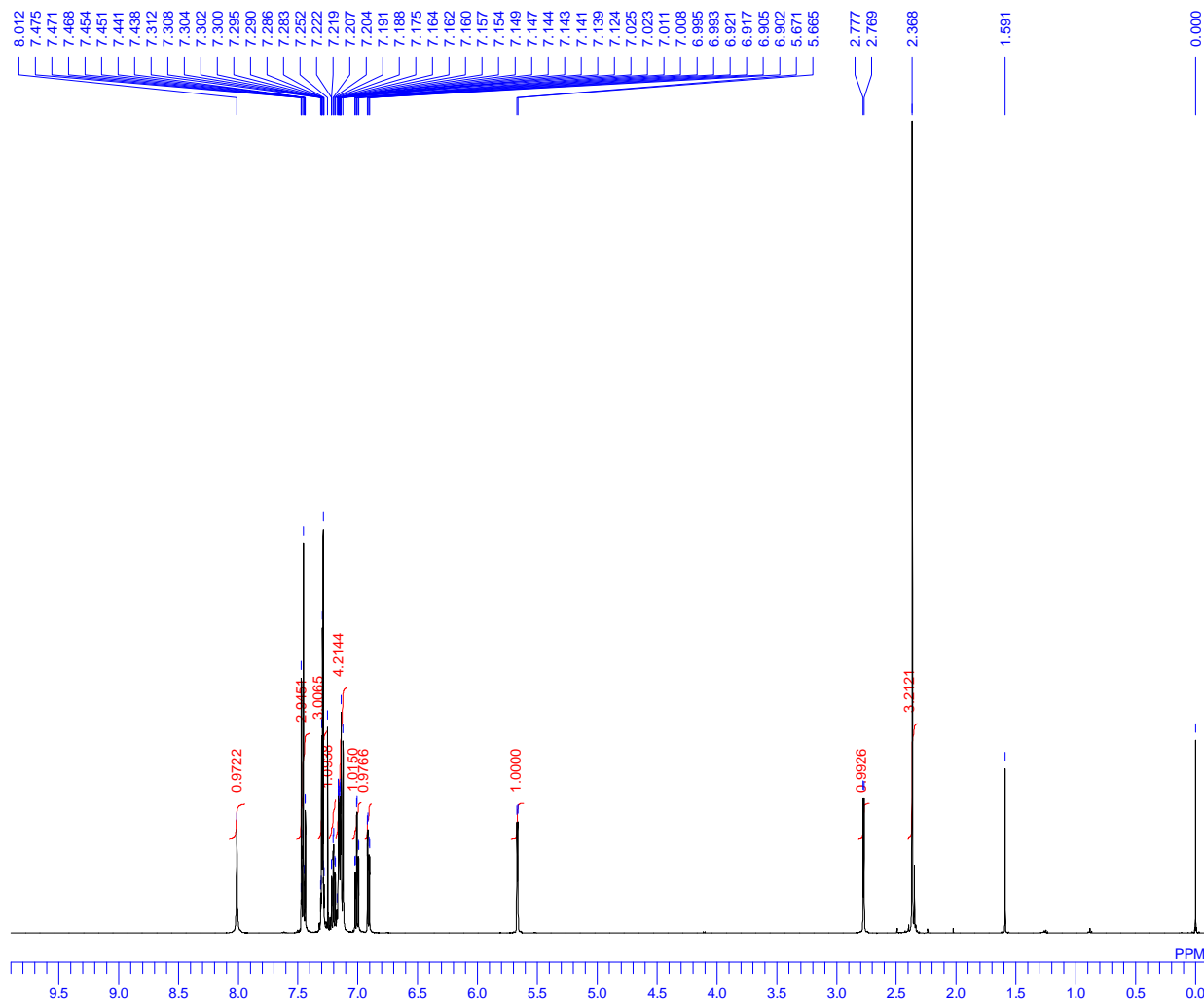
DATIM Mon Nov 23 19:12:05 2015  
 MENUF  
 OBNUC 13C  
 OFR 125.65 MHz  
 OBSET 120.00 KHz  
 OBFIN 7958.00 Hz  
 PW1 4.40 usec  
 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 1024  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 0.00 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE 1f-1(Ph-ketone)\_13C.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 1211945838  
 CSPED 12 Hz  
 FILDC  
 FILDF



# <sup>1</sup>H NMR spectrum of 1f

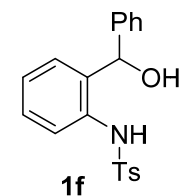
1f (Ph-alc)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\1f(Ph-alc)\1f(Ph-alc)\_1H\1f(Ph-alc)\_1H.als



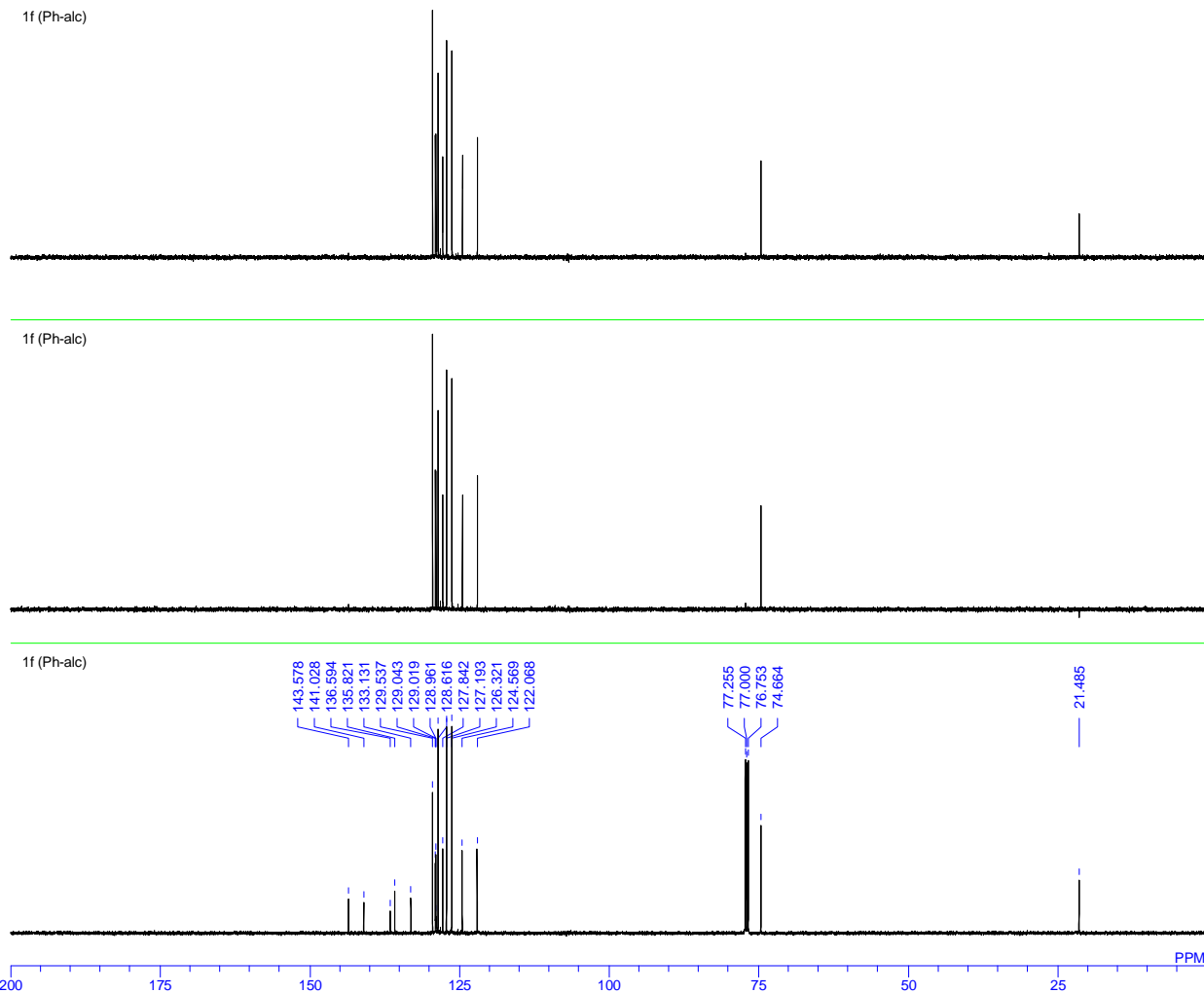
```

DATIM Sat Oct 10 19:34:18 2015
MENUF
OBNUC 1H
OFR 500.00 MHz
OBSET 160.00 KHz
OBFIN 2160.00 Hz
PW1 5.00 usec
DEADT 57.50 usec
PREDL 10.00000 msec
IWT 0.0005 sec
POINT 32768
SPO 32768
TIMES 16
DUMMY 0
FREQU 10000.00 Hz
FLT 5000 Hz
DELAY 40.00 usec
ACQTM 3.2768 sec
PD 3.7232 sec
ADBIT 16
RGAIN 19
BF 0.01 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD non
EXPCM
IRNUC 1H
IFR 500.00 MHz
IRSET 160.00 KHz
IRFIN 2160.00 Hz
IRRPW 0 usec
IRATN 511
DFILE 1f(Ph-alc)_1H.als
SF th5.shm
LKSET 70.00 KHz
LKFIN 334.0 Hz
LKLEV 200
LGAIN 20
LKPHS 210
LKSIG -1623479533
CSPED 14 Hz
FILDC
FILDF
    
```

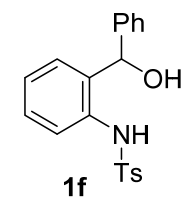


# <sup>13</sup>C NMR spectrum of **1f**

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\1f(Ph-alc)\a1f(Ph-alc)\_13C\1f(Ph-alc)\_13C.als



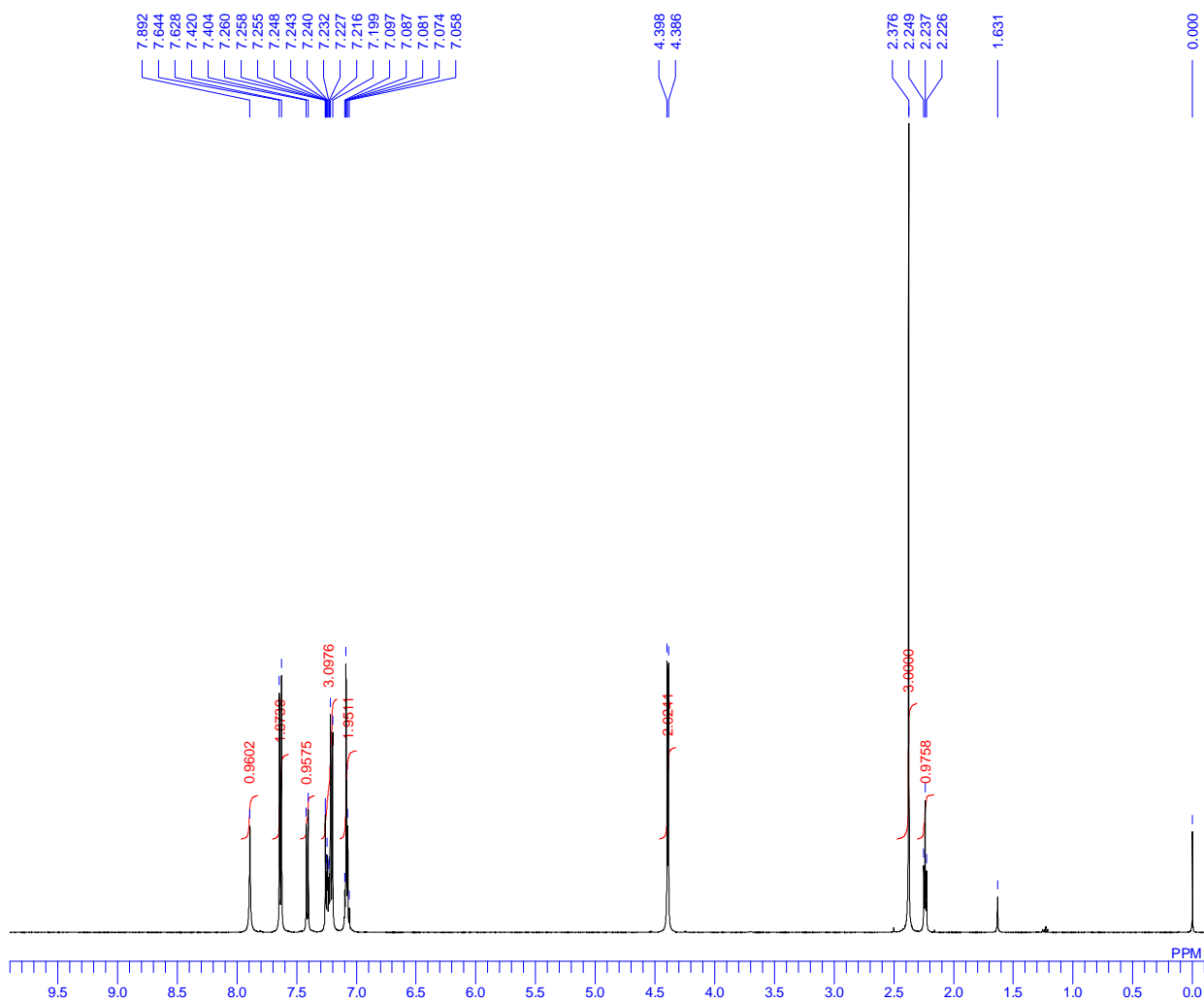
DATIM	Sat Oct 10 20:15:38 2015
MENUF	
OBNUC	13C
OFR	125.65 MHz
OBSET	120.00 KHz
OBFIN	7958.00 Hz
PW1	4.40 usec
DEADT	15.50 usec
PREDL	10.00000 msec
IWT	0.0100 sec
POINT	32768
SPO	32768
TIMES	800
DUMMY	1
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	0.9667 sec
PD	2.0333 sec
ADBIT	16
RGAIN	28
BF	0.01 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	error_expcm
IRNUC	1H
IFR	500.00 MHz
IRSET	160.00 KHz
IRFIN	2160.00 Hz
IRRPW	0 usec
IRATN	511
DFILE	a1f(Ph-alc)_13C.als
SF	th5.shm
LKSET	70.00 KHz
LKFIN	334.0 Hz
LKLEV	200
LGAIN	20
LKPHS	210
LKSIG	-776128229
CSPED	12 Hz
FILDC	
FILDF	



# <sup>1</sup>H NMR spectrum of 1g-1

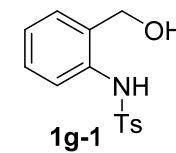
1g-1 (Ts-CH2OH)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\1g-1(Ts-CH2OH)\1g-1(Ts-CH2OH)\_1H.als



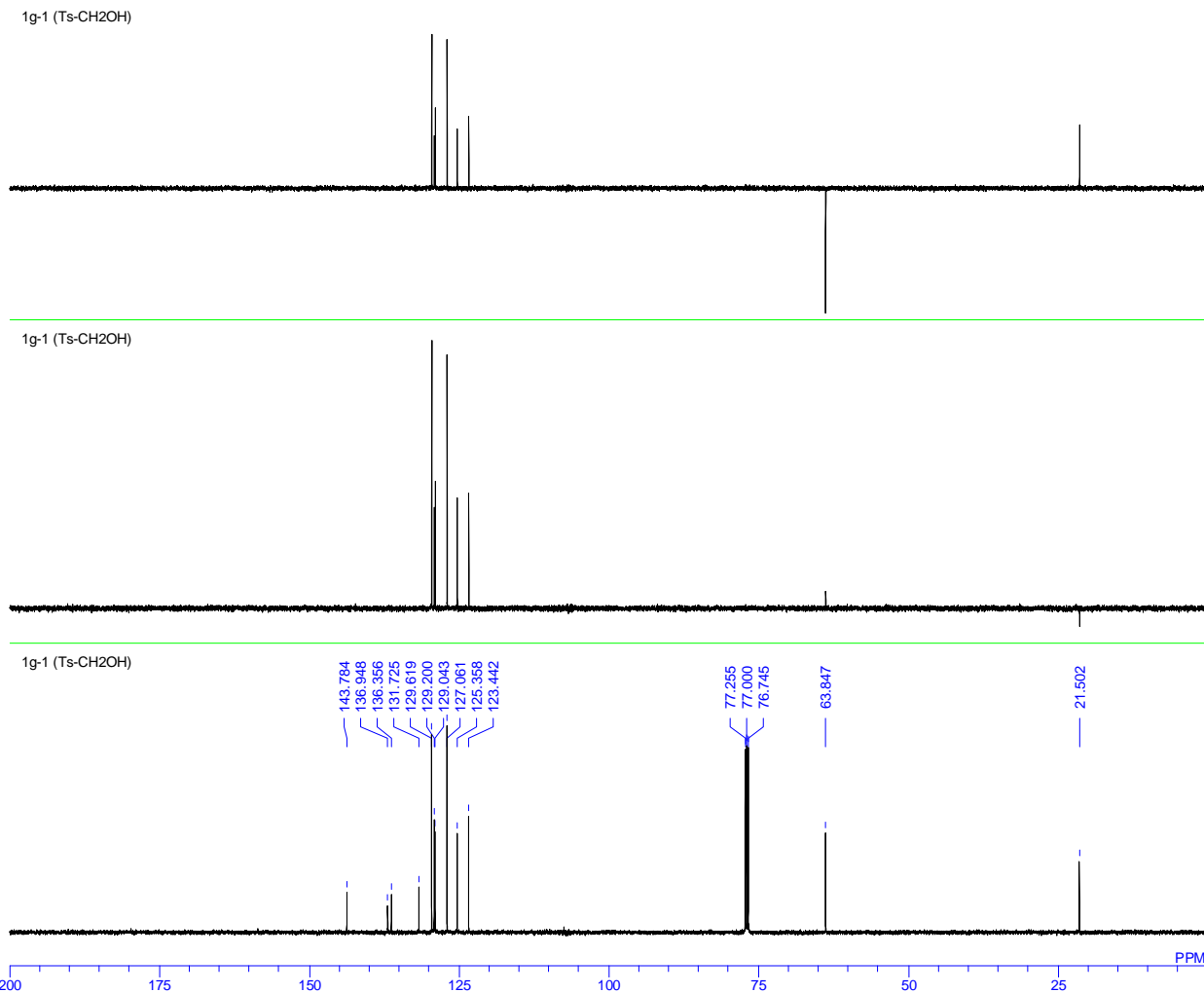
```

DATIM Wed Oct 14 18:33:09 2015
MENUF
OBNUC 1H
OFR 500.00 MHz
OBSET 160.00 KHz
OBFIN 2160.00 Hz
PW1 5.00 usec
DEADT 57.50 usec
PREDL 10.00000 msec
IWT 0.0005 sec
POINT 32768
SPO 32768
TIMES 16
DUMMY 0
FREQU 10000.00 Hz
FLT 5000 Hz
DELAY 40.00 usec
ACQTM 3.2768 sec
PD 3.7232 sec
ADBIT 16
RGAIN 19
BF 0.12 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD non
EXPCM
IRNUC 1H
IFR 500.00 MHz
IRSET 160.00 KHz
IRFIN 2160.00 Hz
IRRPW 0 usec
IRATN 511
DFILE 1g-1(Ts-CH2OH)_1H.als
SF th5.shm
LKSET 70.00 KHz
LKFIN 334.0 Hz
LKLEV 200
LGAIN 20
LKPHS 210
LKSIG -29596641
CSPED 10 Hz
FILDC
FILDF
    
```

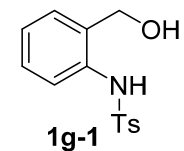


# <sup>13</sup>C NMR spectrum of 1g-1

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\1g-1(Ts-CH2OH)\1g-1(Ts-CH2OH)\_DEPT.als



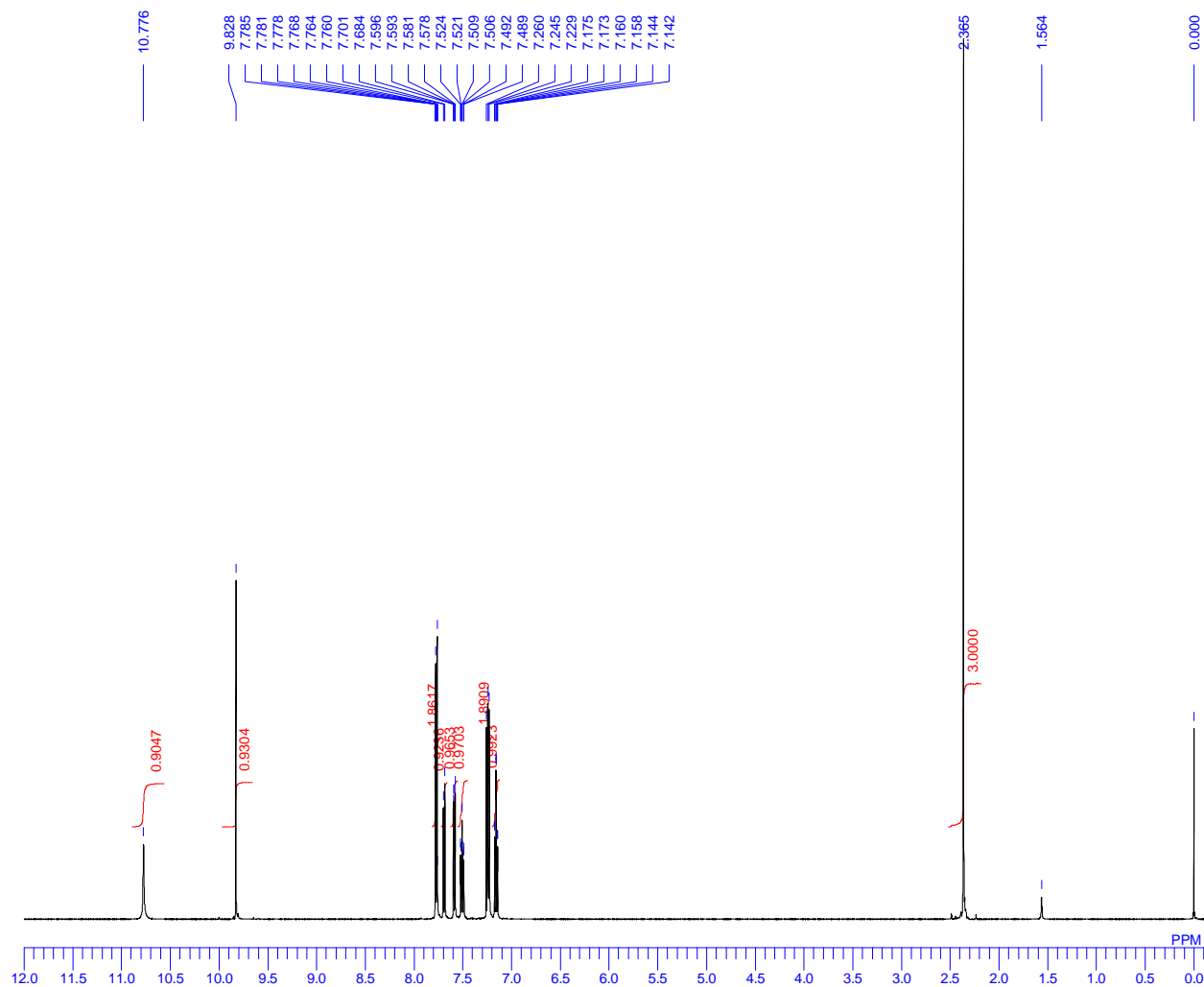
DATIM Wed Oct 14 19:14:28 2015  
 MENUF  
 OBNUC 13C  
 OFR 125.65 MHz  
 OBSET 120.00 KHz  
 OBFIN 7958.00 Hz  
 PW1 4.40 usec  
 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 800  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 0.12 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE 1g-1(Ts-CH2OH)\_DEPT.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG -1287805795  
 CSPED 12 Hz  
 FILDC  
 FILDF



# <sup>1</sup>H NMR spectrum of 1g-2

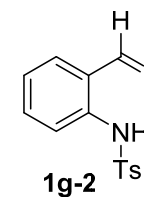
1g-2 (Ts-CHO)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\1g-2(Ts-CHO)\1g-2(Ts-CHO)\_1H\1g-2(Ts-CHO)\_1H.nmdata



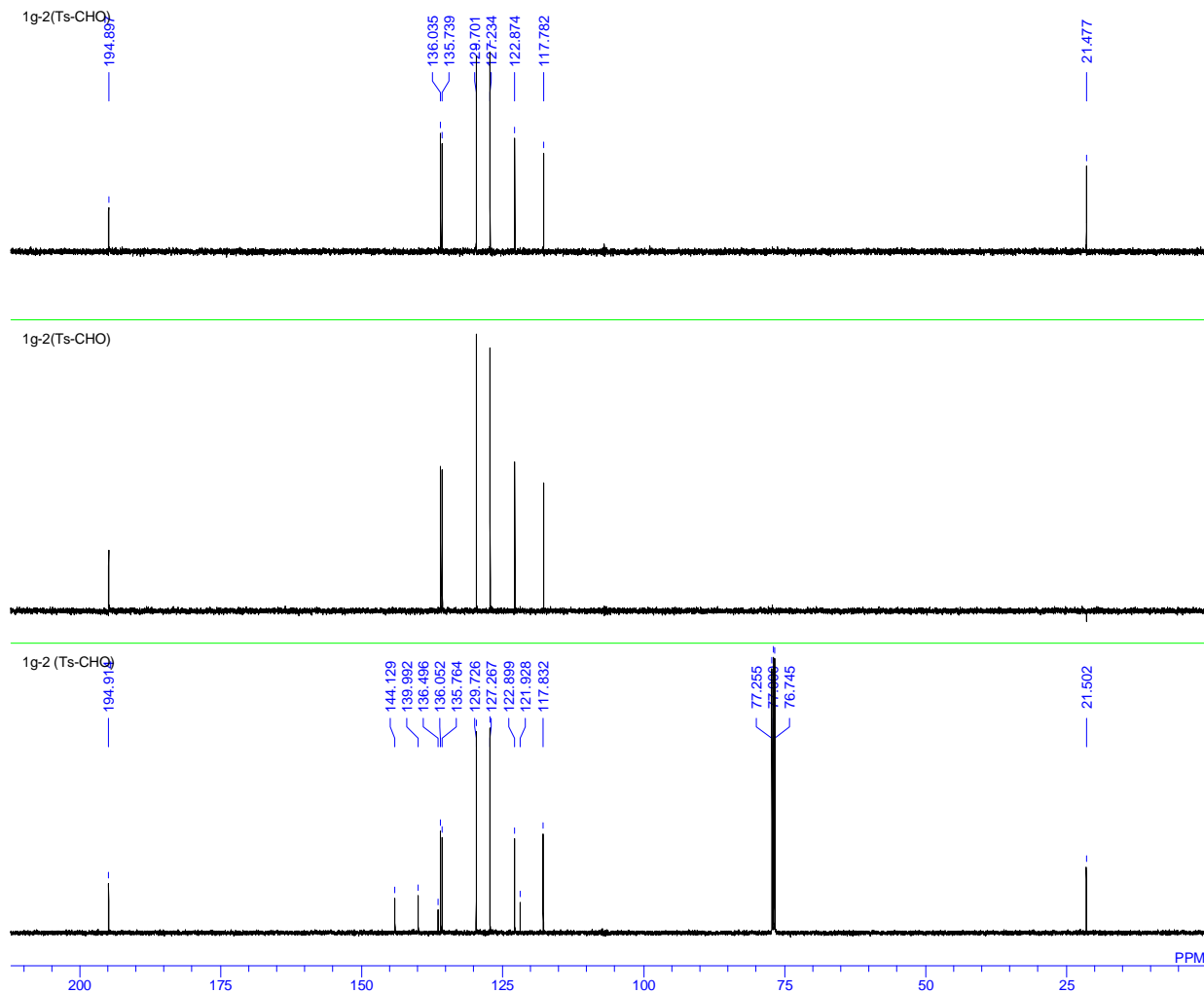
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DATIM Wed Oct 14 02:46:16 2015
MENUF
OBNUC 1H
OFR 500.00 MHz
OBSET 160.00 KHz
OBFIN 2160.00 Hz
PW1 5.00 usec
DEADT 57.50 usec
PREDL 10.00000 msec
IWT 0.0005 sec
POINT 32768
SPO 32768
TIMES 16
DUMMY 0
FREQU 10000.00 Hz
FLT 5000 Hz
DELAY 40.00 usec
ACQTM 3.2768 sec
PD 3.7232 sec
ADBIT 16
RGAIN 20
BF 0.12 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD non
EXPCM
IRNUC 1H
IFR 500.00 MHz
IRSET 160.00 KHz
IRFIN 2160.00 Hz
IRRPW 0 usec
IRATN 511
DFILE 1g-2(Ts-CHO)_1H.nmdata
SF th5.shm
LKSET 70.00 KHz
LKFIN 334.0 Hz
LKLEV 200
LGAIN 20
LKPHS 210
LKSIG 1698502743
CSPED 10 Hz
FILDC
FILDF
    
```

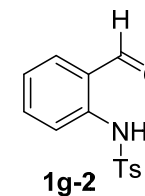


# <sup>13</sup>C NMR spectrum of 1g-2

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\1g-2(Ts-CHO)\1g-2(Ts-CHO)\_13C\1g-2(Ts-CHO)\_13C.als



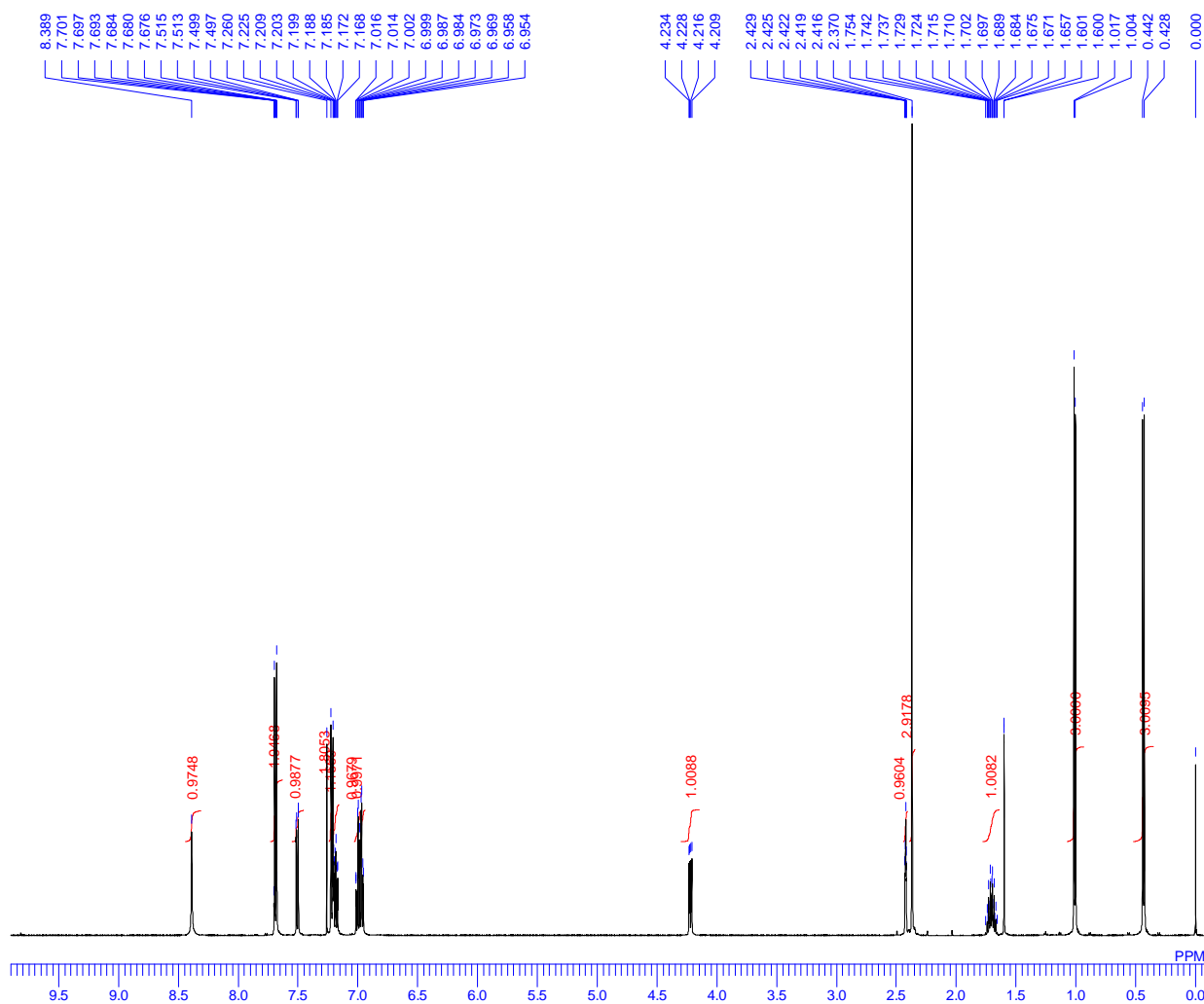
DATIM Wed Oct 14 03:27:35 2015  
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 OBNUC 13C  
 OFR 125.65 MHz  
 OBSET 120.00 KHz  
 OBFIN 7958.00 Hz  
 PW1 4.40 usec  
 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 800  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 0.12 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE 1g-2(Ts-CHO)\_13C.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG -2000761397  
 CSPED 10 Hz  
 FILDC  
 FILDF



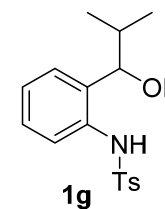
# <sup>1</sup>H NMR spectrum of 1g

1g (iPr-alc)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\1g iPr-alc NS41A\NS41A\_1H\NS41A\_1H.nmdata

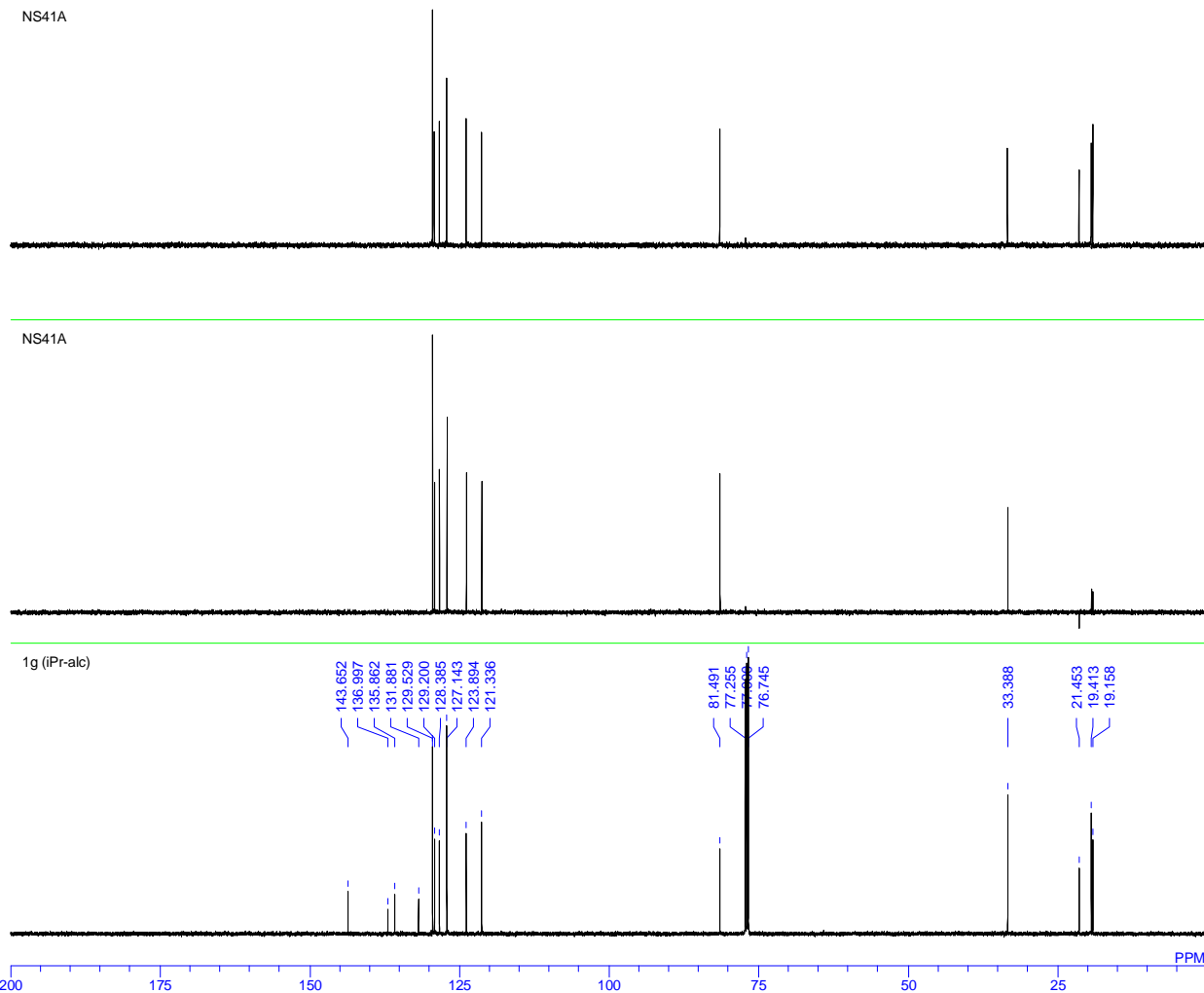


DATIM Mon Sep 15 17:20:24 2014  
 MENUF 1H  
 OBNUC 500.00 MHz  
 OFR 160.00 KHz  
 OBSET 2160.00 Hz  
 OBFIN 5.00 usec  
 PW1 57.50 usec  
 DEADT 10.00000 msec  
 PREDL 0.0005 sec  
 IWT 32768  
 POINT 32768  
 SPO 16  
 TIMES 0  
 DUMMY 10000.00 Hz  
 FREQU 5000 Hz  
 FLT 40.00 usec  
 DELAY 3.2768 sec  
 ACQTM 3.7232 sec  
 PD 16  
 ADBIT 18  
 RGAIN 0.09 Hz  
 BF 0.00  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD non  
 EXPCM 1H  
 IRNUC 500.00 MHz  
 IFR 160.00 KHz  
 IRSET 2160.00 Hz  
 IRFIN 0 usec  
 IRRPW 511  
 IRATN NS41A\_1H.nmdata  
 DFILE th5.shm  
 SF 70.00 KHz  
 LKSET 334.0 Hz  
 LKFIN 200  
 LKLEV 20  
 LGAIN 210  
 LKPHS 1010579503  
 LKSIG 13 Hz  
 CSPED  
 FILDC  
 FILDF

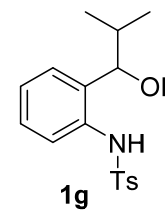


# <sup>13</sup>C NMR spectrum of 1g

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\1g iPr-alc NS41A\NS41-A\_13C\NS41-A\_13C.nmdata



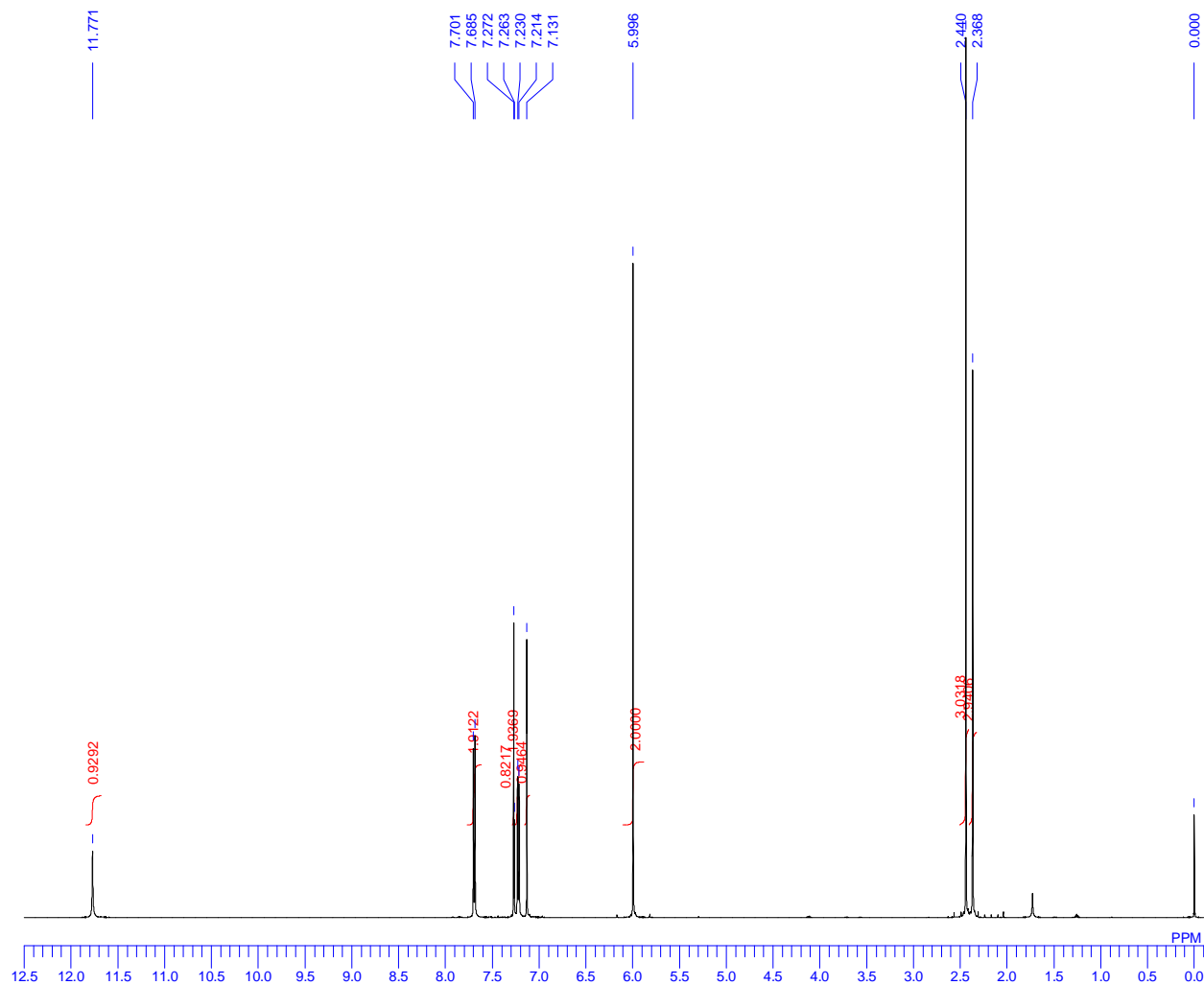
DATIM Mon Sep 15 18:13:01 2014  
 MENUF 13C  
 OBNUC 13C  
 OFR 125.65 MHz  
 OBSET 120.00 KHz  
 OBFIN 7958.00 Hz  
 PW1 4.40 usec  
 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 1024  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 0.09 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE NS41-A\_13C.nmdata  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 1019089845  
 CSPED 14 Hz  
 FILDC  
 FILDF



# <sup>1</sup>H NMR spectrum of 1h-1

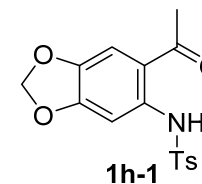
1h-1 (OCH2O-ketone)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\1h-1(OCH2O-ketone)\1h-1(OCH2O-ketone)\_1H\1h-1(OCH2O-ketone)\_1H.nmdata



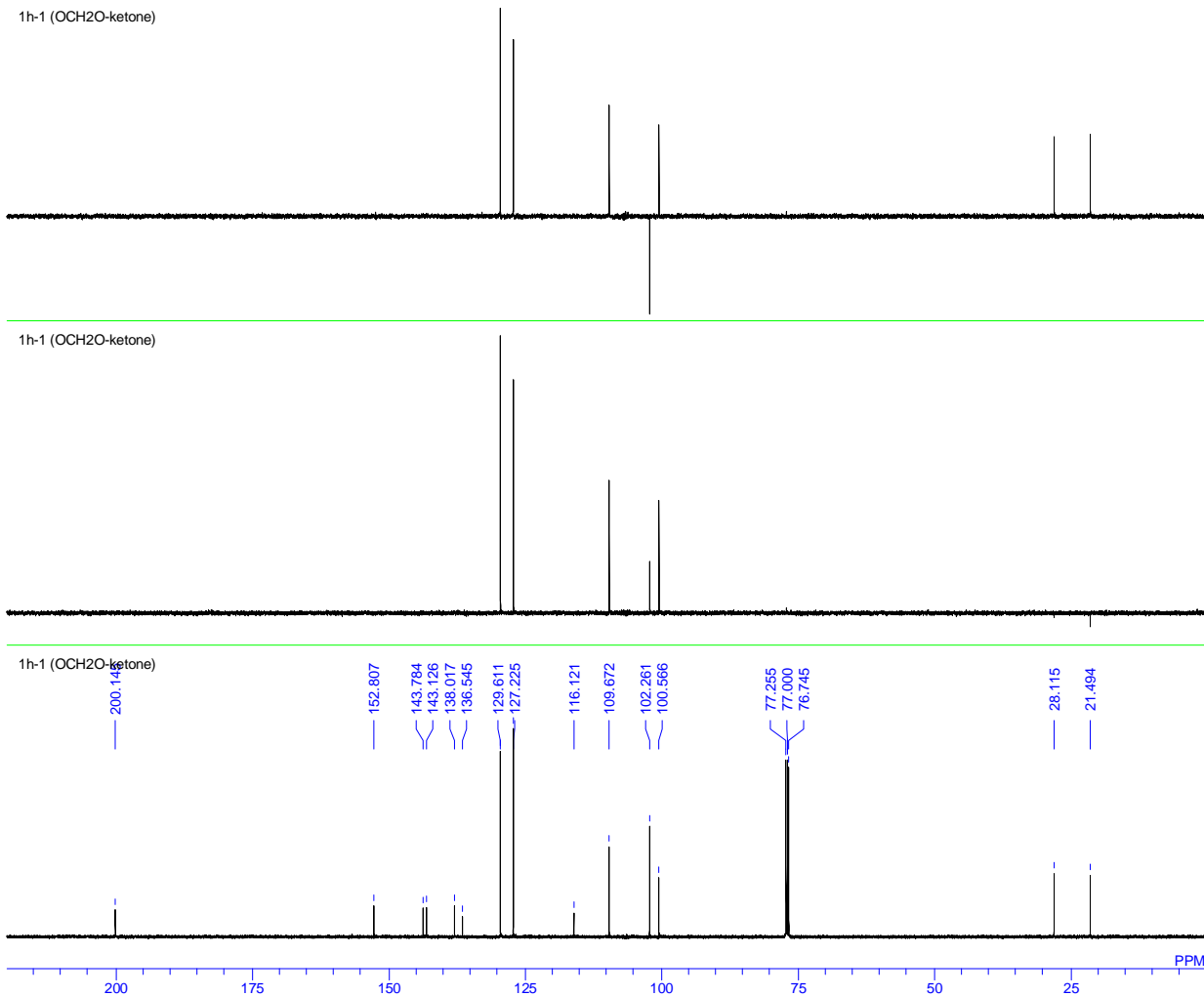
```

DATIM Mon Oct 12 20:14:04 2015
MENUF
OBNUC 1H
OFR 500.00 MHz
OBSET 160.00 KHz
OBFIN 2160.00 Hz
PW1 5.00 usec
DEADT 57.50 usec
PREDL 10.00000 msec
IWT 0.0005 sec
POINT 32768
SPO 32768
TIMES 16
DUMMY 0
FREQU 10000.00 Hz
FLT 5000 Hz
DELAY 40.00 usec
ACQTM 3.2768 sec
PD 3.7232 sec
ADBIT 16
RGAIN 20
BF 0.09 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD non
EXPCM
IRNUC 1H
IFR 500.00 MHz
IRSET 160.00 KHz
IRFIN 2160.00 Hz
IRRPW 0 usec
IRATN 511
DFILE 1h-1(OCH2O-ketone)_1H.nmdata
SF th5.shm
LKSET 70.00 KHz
LKFIN 334.0 Hz
LKLEV 200
LGAIN 20
LKPHS 210
LKSIG 826065910
CSPED 13 Hz
FILDC
FILDF
    
```

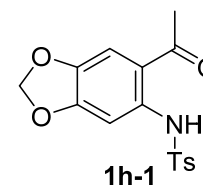


# <sup>13</sup>C NMR spectrum of 1h-1

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\1h-1(OCH2O-ketone)\1h-1(OCH2O-ketone)\_13C\1h-1(OCH2O-ketone)\_13C.als



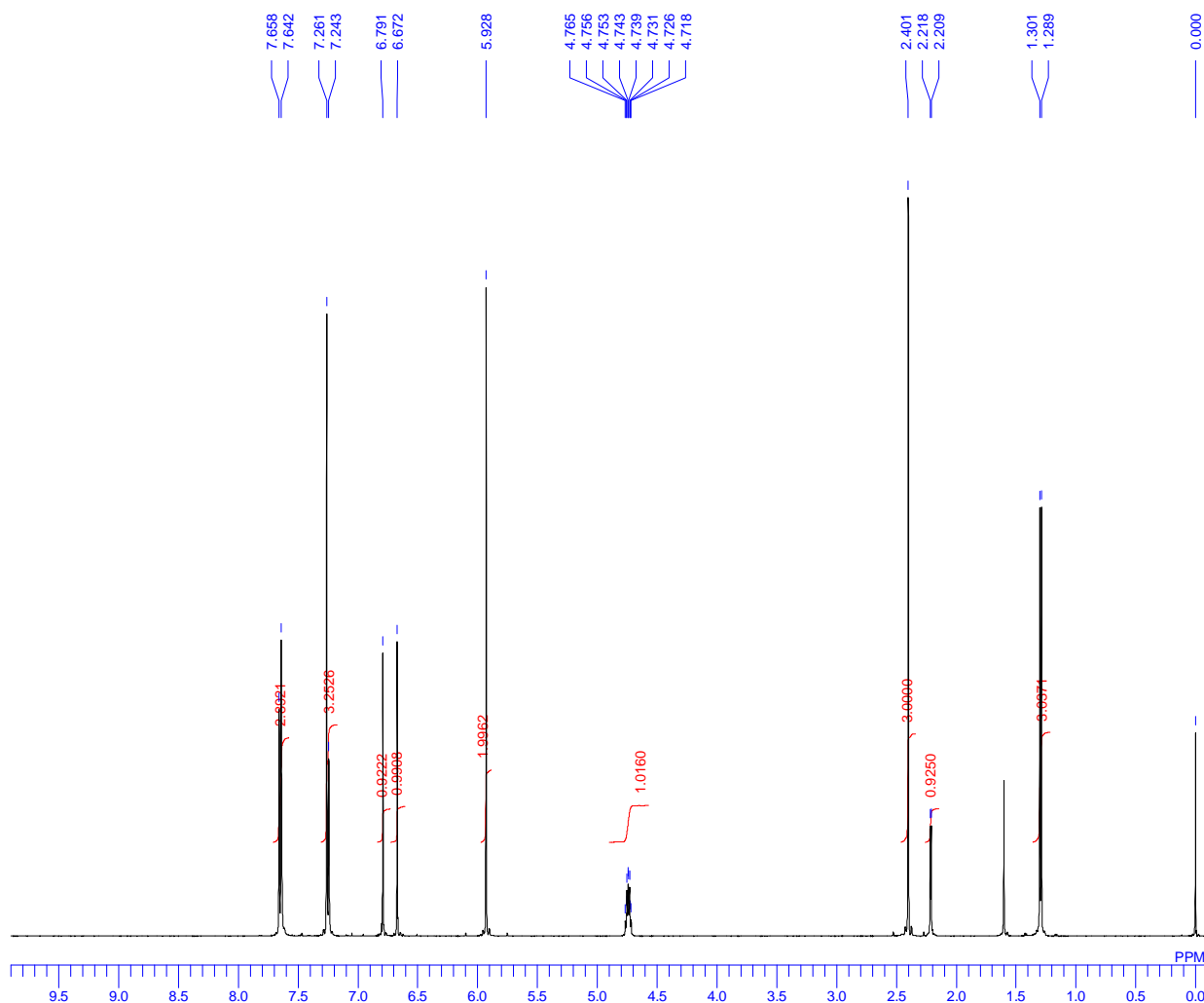
DATIM	Mon Oct 12 21:06:34 2015
MENUF	
OBNUC	13C
OFR	125.65 MHz
OBSET	120.00 KHz
OBFIN	7958.00 Hz
PW1	4.40 usec
DEADT	15.50 usec
PREDL	10.0000 msec
IWT	0.0100 sec
POINT	32768
SPO	32768
TIMES	1024
DUMMY	1
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	0.9667 sec
PD	2.0333 sec
ADBIT	16
RGAIN	28
BF	0.09 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	error_expcm
IRNUC	1H
IFR	500.00 MHz
IRSET	160.00 KHz
IRFIN	2160.00 Hz
IRRPW	0 usec
IRATN	511
DFILE	1h-1(OCH2O-ketone)_13C.als
SF	th5.shm
LKSET	70.00 KHz
LKFIN	334.0 Hz
LKLEV	200
LGAIN	20
LKPHS	210
LKSIG	-557921211
CSPED	13 Hz
FILDC	
FILDF	



# <sup>1</sup>H NMR spectrum of 1h

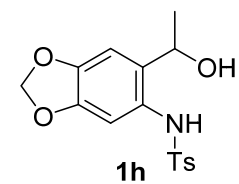
1h (OCH2O-alc)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\1h OCH2O-alc 831(YMT7)\831(YMT7)\_1H\831(YMT7)\_1H.nmdata



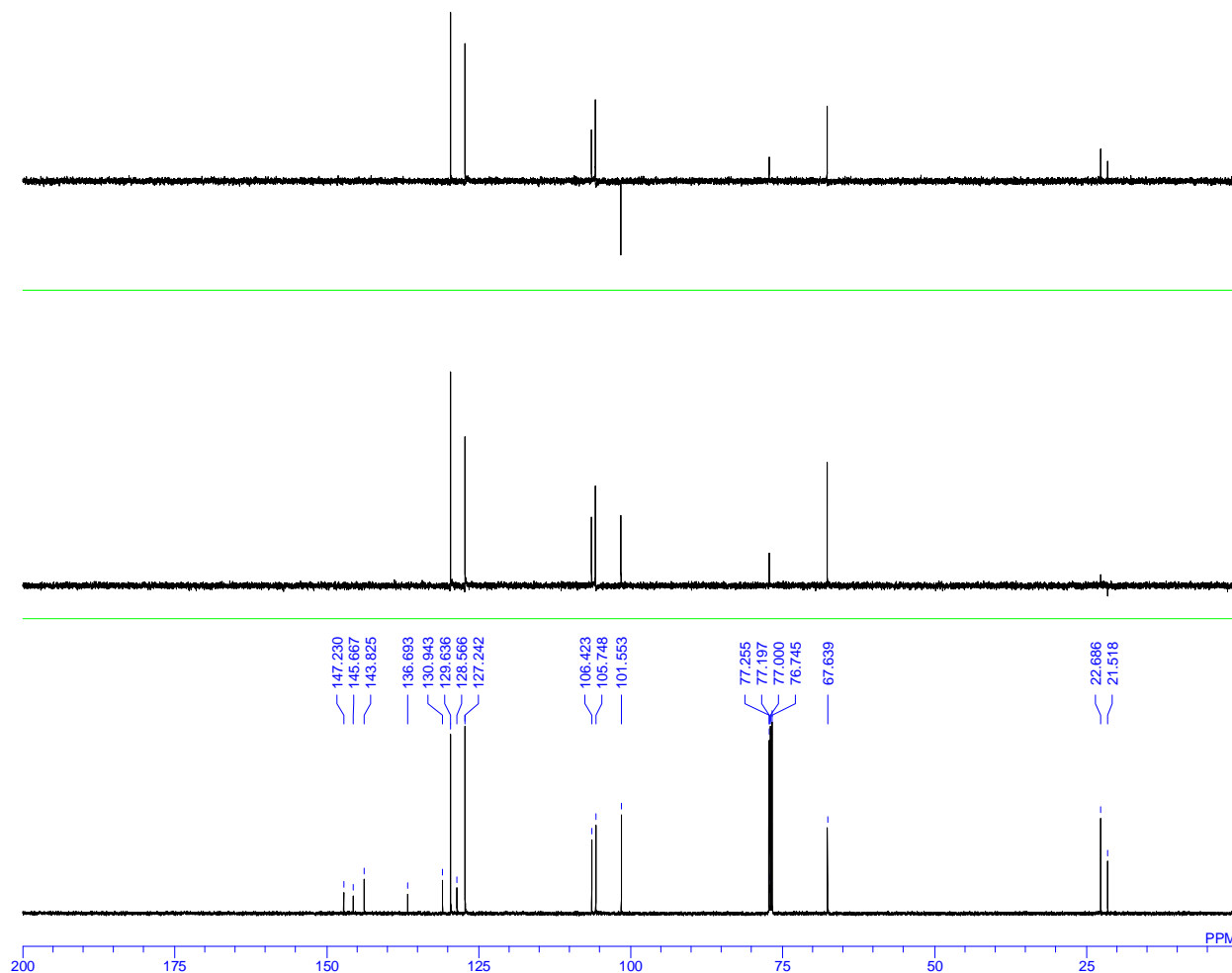
```

DATIM  Sun May 6 21:02:06 2012
MENUF  1H
OBNUC  1H
OFR    500.00 MHz
OBSET  160.00 KHz
OBFIN  2160.00 Hz
PW1    6.40 usec
DEADT  56.80 usec
PREDL  10.00000 msec
IWT    0.0005 sec
POINT  32768
SPO    32768
TIMES  16
DUMMY  0
FREQU  10000.00 Hz
FLT    5000 Hz
DELAY  40.00 usec
ACQTM  3.2768 sec
PD     3.7232 sec
ADBIT  16
RGAIN  20
BF     1.20 Hz
T1     0.00
T2     0.00
T3     90.00
T4     100.00
EXMOD  non
EXPCM  1H
IRNUC  1H
IFR    500.00 MHz
IRSET  160.00 KHz
IRFIN  2160.00 Hz
IRRPW  0 usec
IRATN  511
DFILE  831(YMT7)_1H.nmdata
SF     th5.shm
LKSET  70.00 KHz
LKFIN  334.0 Hz
LKLEV  200
LGAIN  20
LKPHS  210
LKSIG  -113442486
CSPED  14 Hz
FILDC  FILDF
    
```



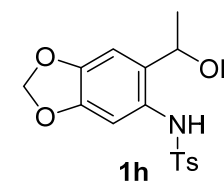
# <sup>13</sup>C NMR spectrum of 1h

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\1h OCH2O-alc 831(YMT7)\831(YMT7)\_DEPT.als



```

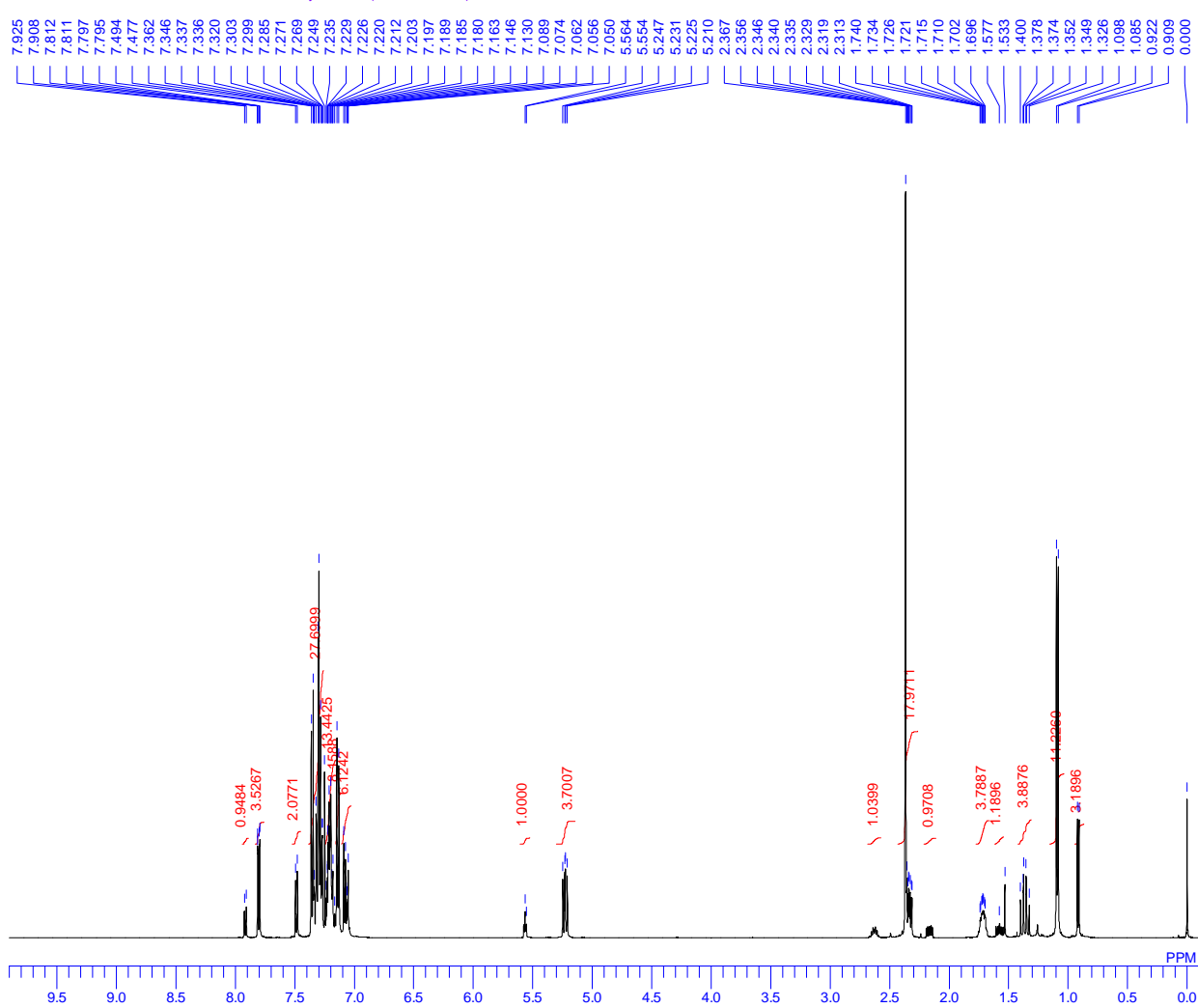
DATIM  Sun May 6 21:54:41 2012
MENUF
OBNUC  13C
OFR    125.65 MHz
OBSET  120.00 KHz
OBFIN  7958.00 Hz
PW1    5.40 usec
DEADT  10.00 usec
PREDL  10.00000 msec
IWT    0.0100 sec
POINT  32768
SPO    32768
TIMES  1024
DUMMY  1
FREQU  33898.30 Hz
FLT    16950 Hz
DELAY  11.80 usec
ACQTM  0.9667 sec
PD     2.0333 sec
ADBIT  16
RGAIN  28
BF     1.20 Hz
T1     0.00
T2     0.00
T3     90.00
T4     100.00
EXMOD  bcm
EXPCM  error_expcm
IRNUC  1H
IFR    500.00 MHz
IRSET  160.00 KHz
IRFIN  2160.00 Hz
IRRPW  0 usec
IRATN  511
DFILE  831(YMT7)_DEPT.als
SF     th5.shm
LKSET  70.00 KHz
LKFIN  334.0 Hz
LKLEV  200
LGAIN  20
LKPHS  210
LKSIG  10489
CSPED  13 Hz
FILDC  FILDF
    
```



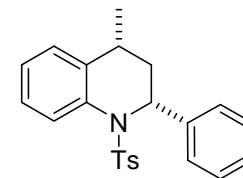
# <sup>1</sup>H NMR spectrum of diastereomixture-3aa (*cis*-major)

3aa-ds(CR522-AB)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3aa(CR522-AB\_1H).als

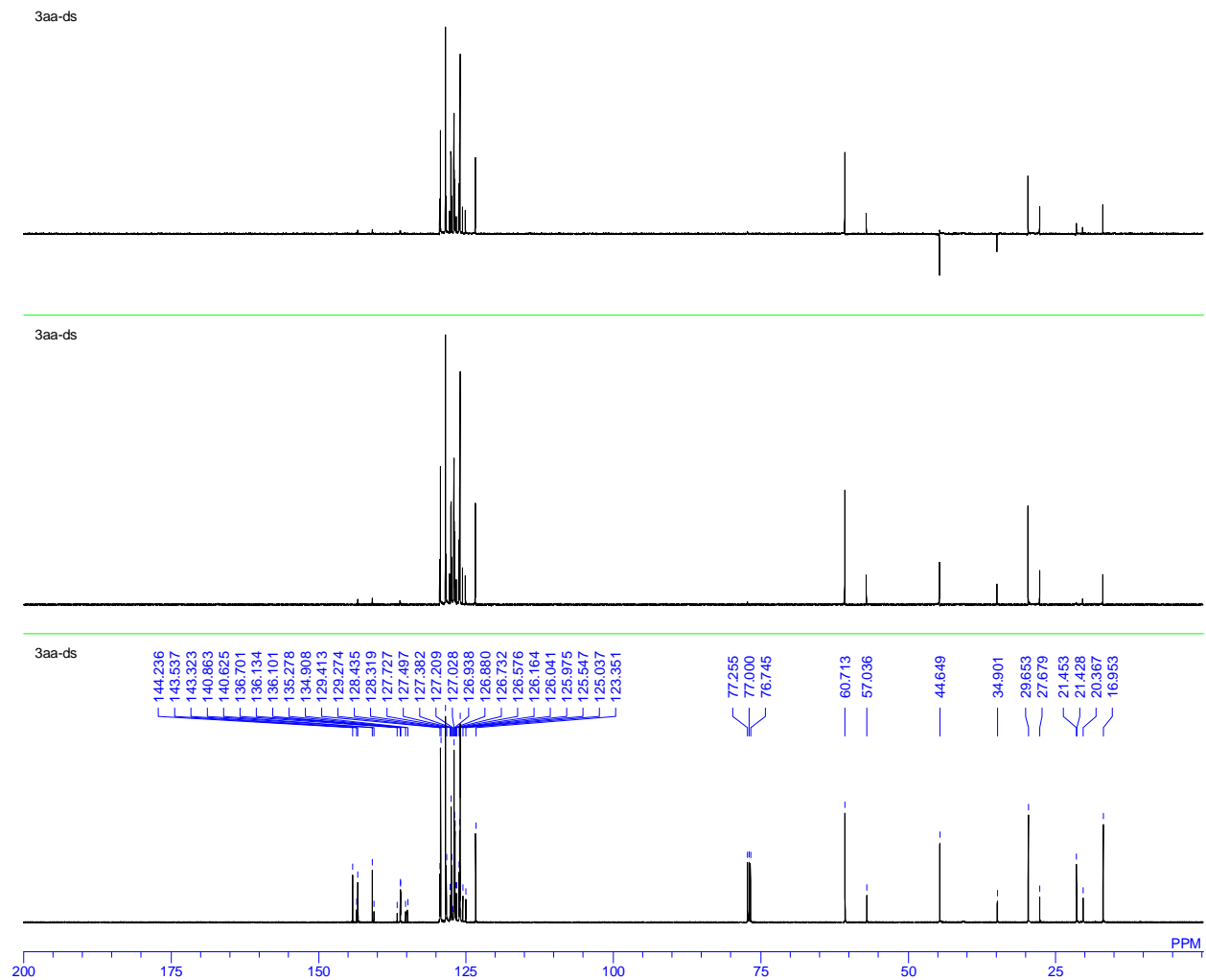


DATIM Fri Nov 20 23:32:23 2015  
 MENUF  
 OBNUC 1H  
 OFR 500.00 MHz  
 OBSBT 160.00 KHz  
 OBFIN 2160.00 Hz  
 PW1 5.00 usec  
 DEADT 57.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0005 sec  
 POINT 32768  
 SPO 32768  
 TIMES 16  
 DUMMY 0  
 FREQU 10000.00 Hz  
 FLT 5000 Hz  
 DELAY 40.00 usec  
 ACQTM 3.2768 sec  
 PD 3.7232 sec  
 ADBIT 16  
 RGAIN 17  
 BF 0.00 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD non  
 EXPCM  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE 3aa(CR522-AB\_1H).als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 1664871078  
 CSPED 13 Hz  
 FILDC  
 FILDF

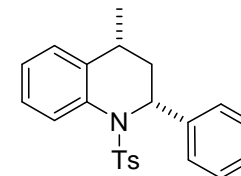


*cis*-3aa (major)

**<sup>1</sup>H NMR spectrum of diastereomixture-3aa (cis-major)**



DATIM Sat Nov 12 16:11:39 2011  
 MENUF  
 OBNUC 13C  
 OFR 125.65 MHz  
 OBSET 120.00 KHz  
 OBFIN 7958.00 Hz  
 PW1 5.40 usec  
 DEADT 10.00 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 2048  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 0.12 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE 784(MY2B)\_DEPT.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 9906  
 CSPED 12 Hz  
 FILDC  
 FILDF

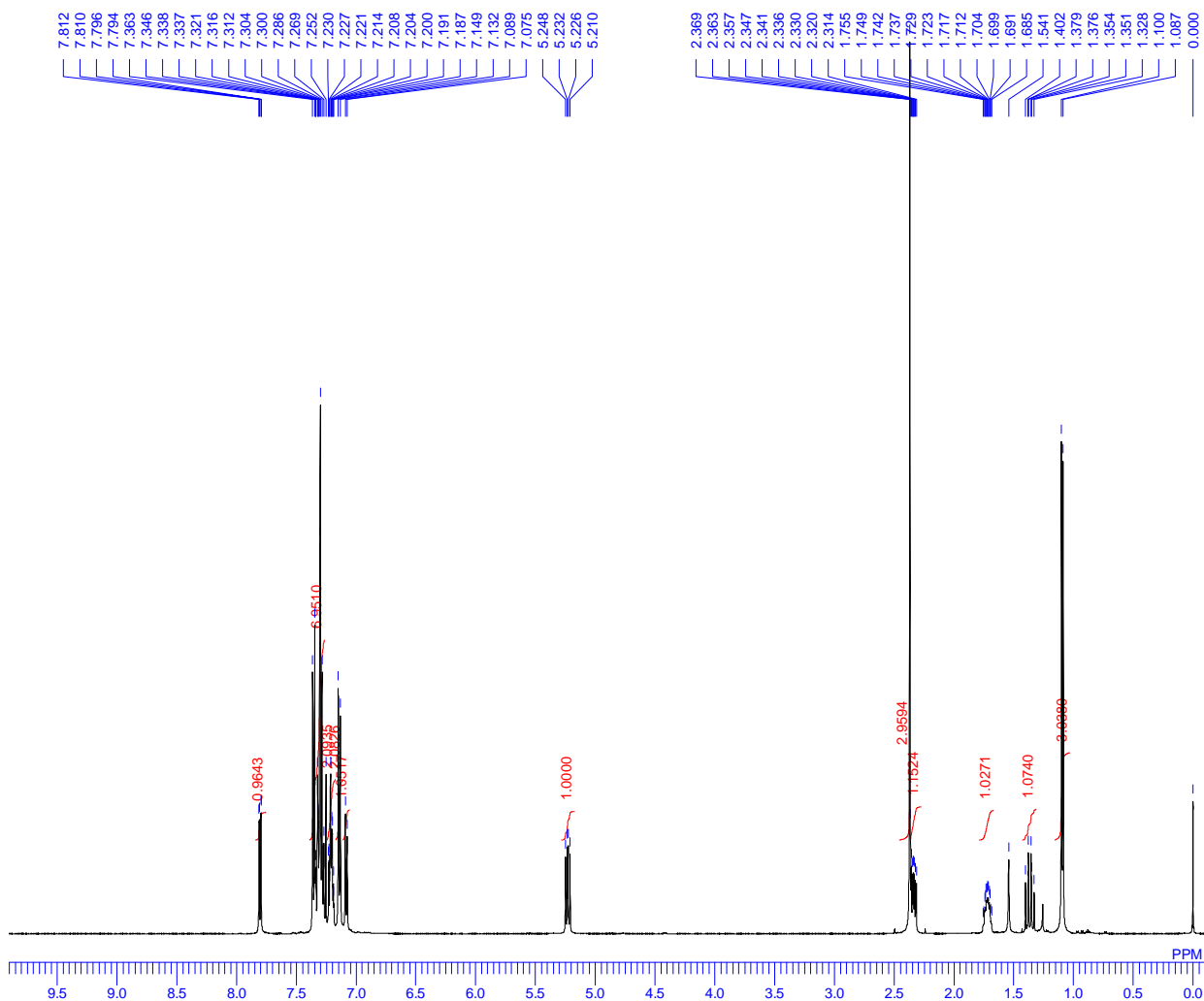


**cis-3aa (major)**

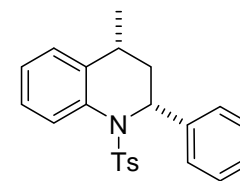
# <sup>1</sup>H NMR spectrum of *cis*-3aa (major)

3aa-major (CR521-B)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3aa-major(CR521-B)\3aa-major(CR521-B)\_1H.als



DATIM Sun Nov 8 05:46:21 2015  
 MENUF  
 OBNUC 1H  
 OFR 500.00 MHz  
 OBSET 160.00 KHz  
 OBFIN 2160.00 Hz  
 PW1 5.00 usec  
 DEADT 57.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0005 sec  
 POINT 32768  
 SPO 32768  
 TIMES 32  
 DUMMY 0  
 FREQU 10000.00 Hz  
 FLT 5000 Hz  
 DELAY 40.00 usec  
 ACQTM 3.2768 sec  
 PD 3.7232 sec  
 ADBIT 16  
 RGAIN 18  
 BF 0.09 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD non  
 EXPCM  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE 3aa-major(CR521-B)\_1H.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 1773947977  
 CSPED 13 Hz  
 FILDC  
 FILDF

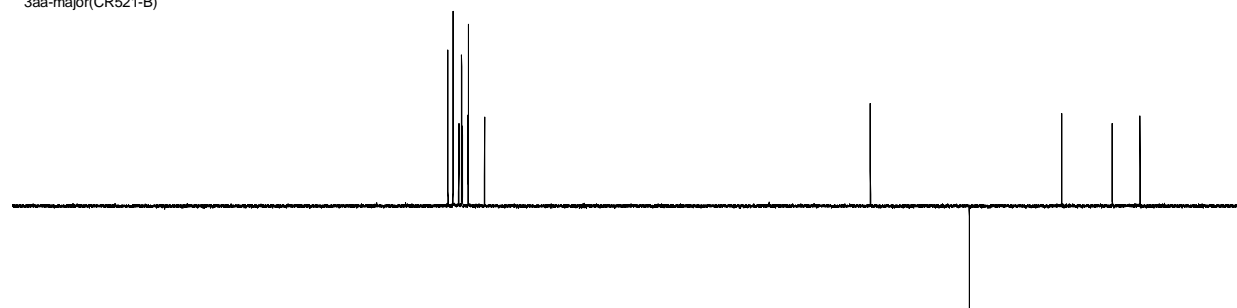


*cis*-3aa

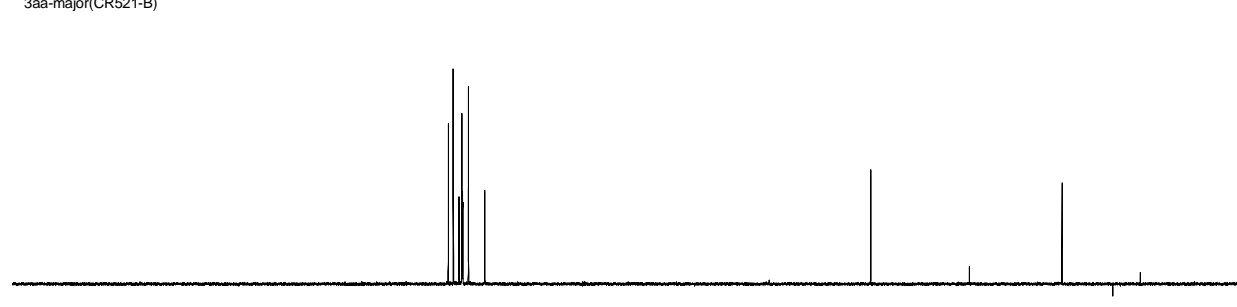
# <sup>13</sup>C NMR spectrum of *cis*-3aa (major)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3aa-major(CR521-B)\3aa-major(CR521-B)\_13C.als

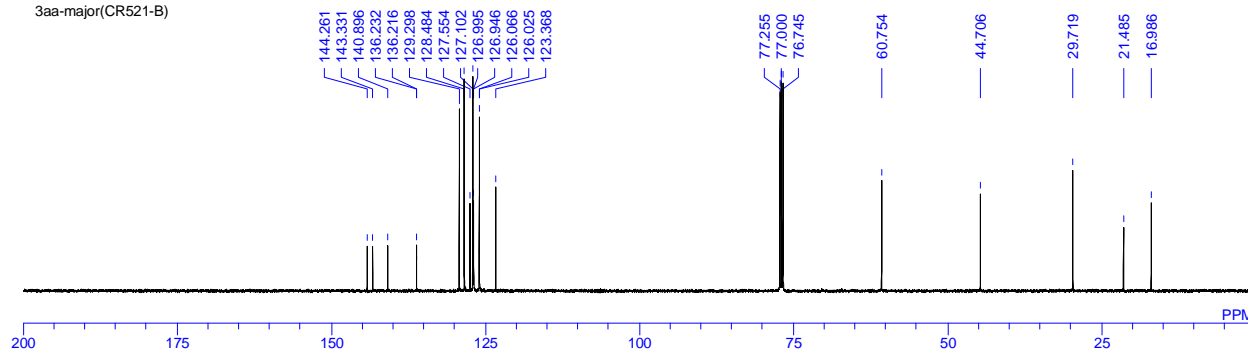
3aa-major(CR521-B)



3aa-major(CR521-B)

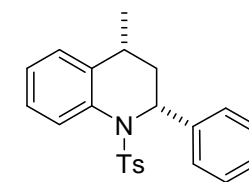


3aa-major(CR521-B)



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IWT 0.0100 sec
POINT 32768
SPO 32768
TIMES 2048
DUMMY 1
FREQU 33898.30 Hz
FLT 16950 Hz
DELAY 11.80 usec
ACQTM 0.9667 sec
PD 2.0333 sec
ADBIT 16
RGAIN 28
BF 0.09 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD bcm
EXPCM error_expcm
IRNUC 1H
IFR 500.00 MHz
IRSET 160.00 KHz
IRFIN 2160.00 Hz
IRRPW 0 usec
IRATN 511
DFILE 3aa-major(CR521-B)_13C.als
SF th5.shm
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FILDF
    
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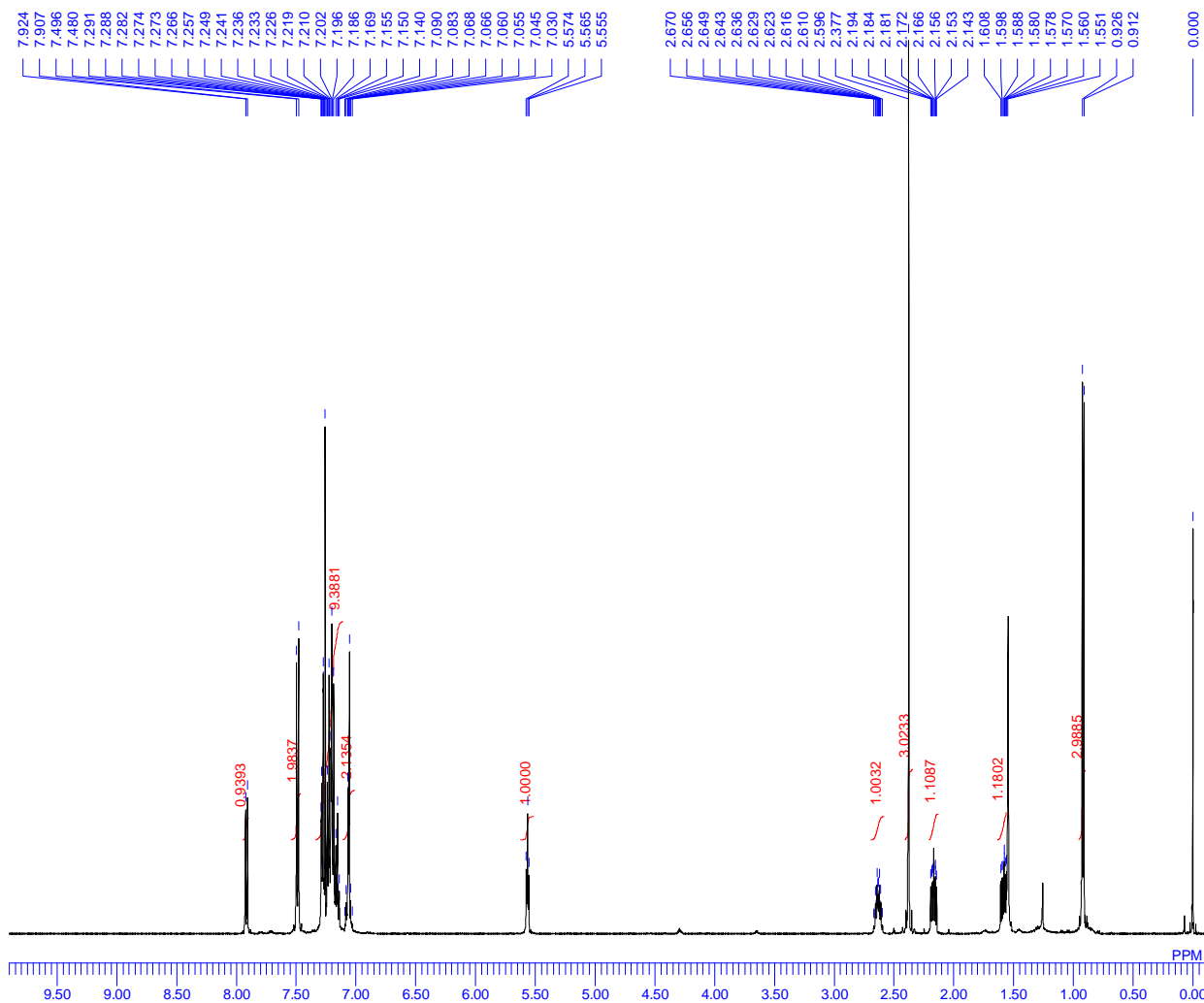


*cis*-3aa

# <sup>1</sup>H NMR spectrum of *trans*-3aa (minor)

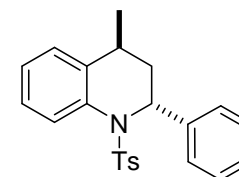
784anti(HK177A)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\styrene trans, minor 784anti(HK177A)\784anti(HK177A)\_1H\784anti(HK177A)\_1H.nmdata



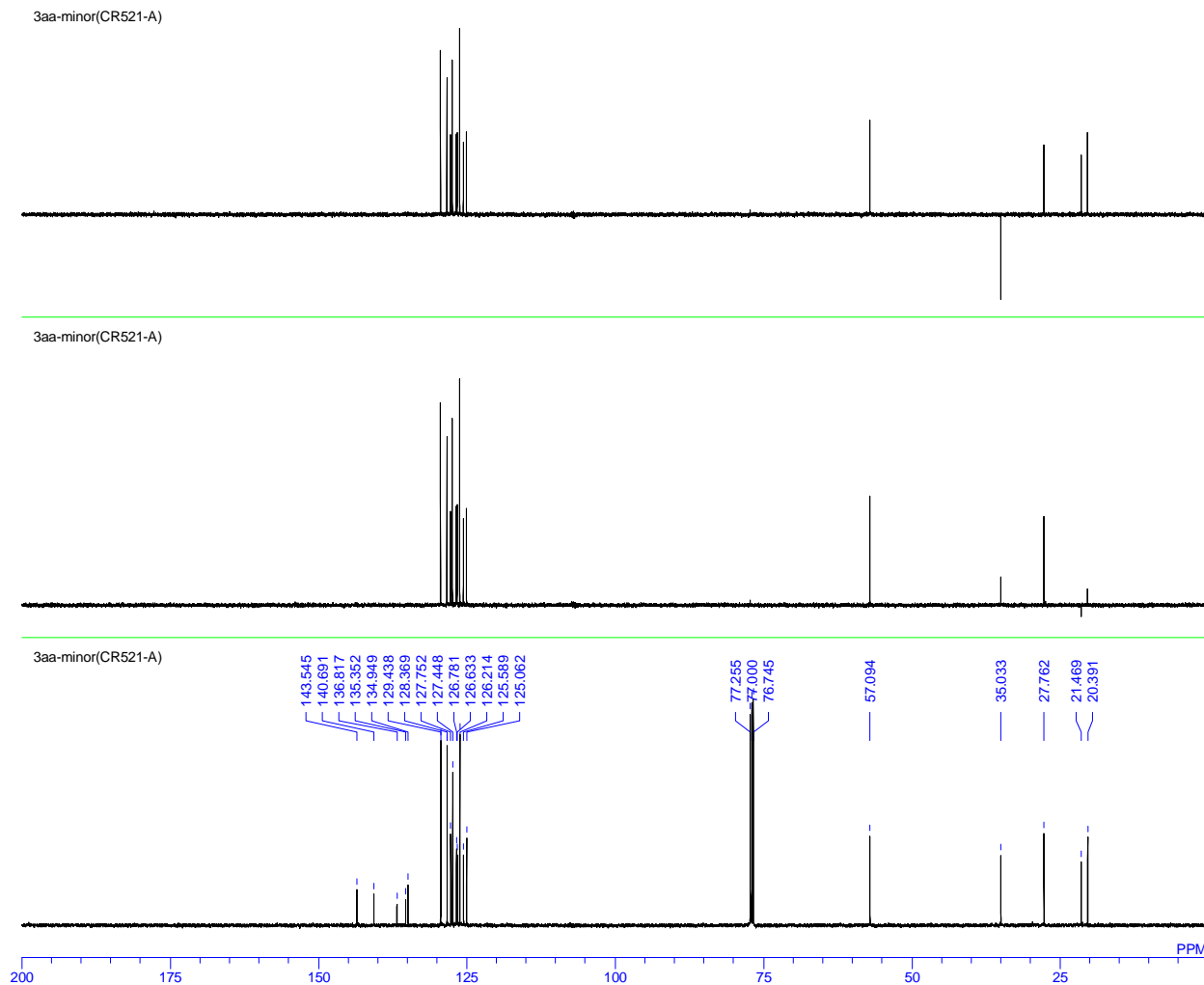
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OBFIN 2160.00 Hz
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DEADT 56.80 usec
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IWT 0.0005 sec
POINT 32768
SPO 32768
TIMES 16
DUMMY 0
FREQU 10000.00 Hz
FLT 5000 Hz
DELAY 40.00 usec
ACQTM 3.2768 sec
PD 3.7232 sec
ADBIT 16
RGAIN 21
BF 0.12 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD non
EXPCM
IRNUC 1H
IFR 500.00 MHz
IRSET 160.00 KHz
IRFIN 2160.00 Hz
IRRPW 0 usec
IRATN 511
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LKSET 70.00 KHz
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LKPHS 210
LKSIG 884632977
CSPED 11 Hz
FILDC
FILDF
    
```

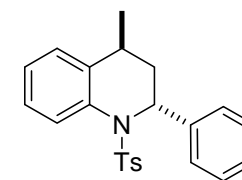


*trans*-3aa

**<sup>13</sup>C NMR spectrum of *trans*-3aa (minor)**



DATIM Sun Nov 8 18:03:18 2015  
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 OBFIN 7958.00 Hz  
 PW1 4.40 usec  
 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 1024  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 0.12 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE 3aa-minor(CR521-A)\_13C.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
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 FILDC  
 FILDF

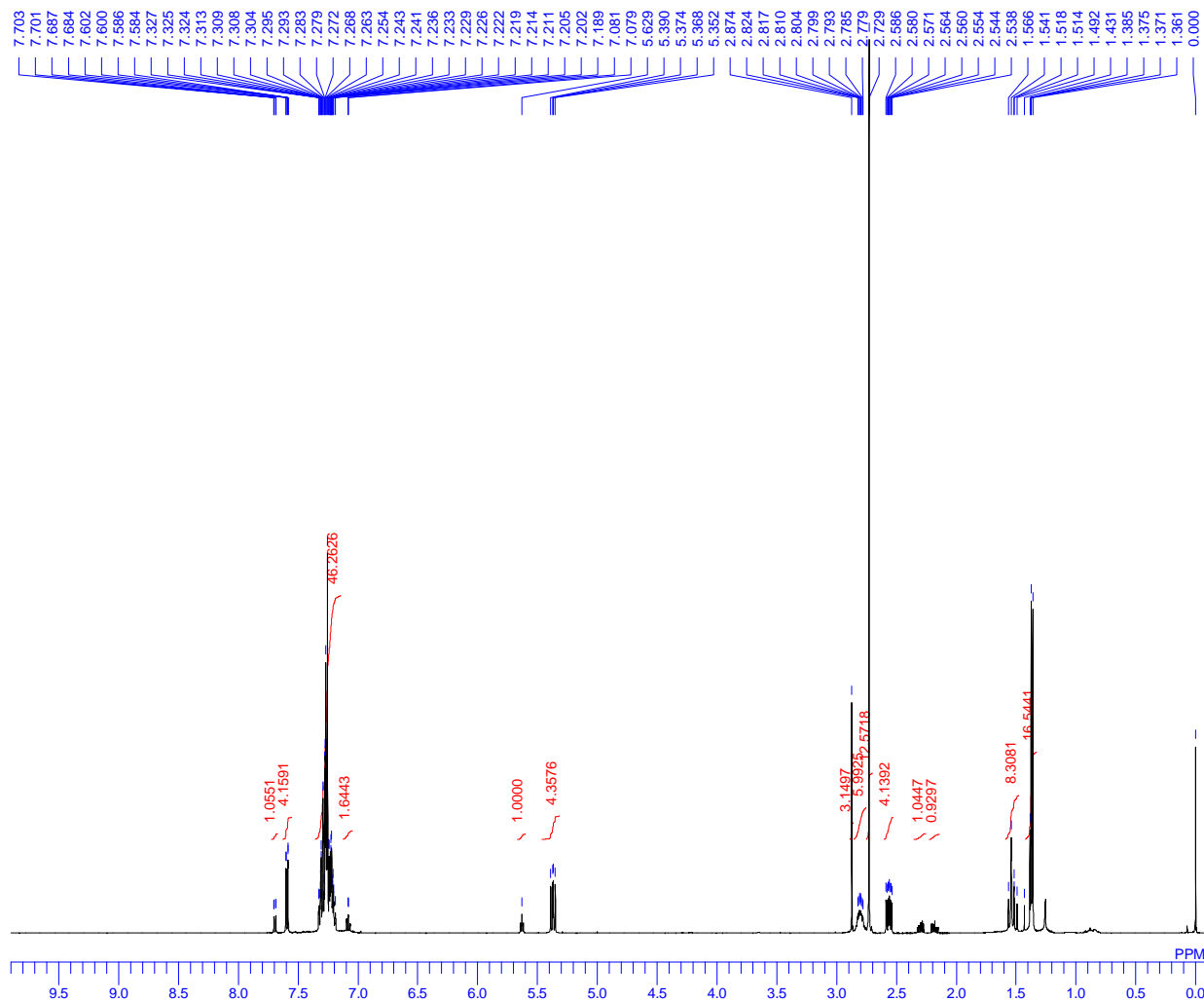


***trans*-3aa**

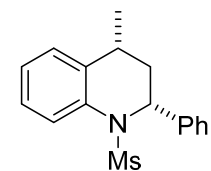
# <sup>1</sup>H NMR spectrum of diastereomixture-3ba (*cis*-major)

3ba(Ms-ds)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ba Ms-ds (CR516AB)\3ba(Ms-ds)\_1H.als



DATIM Fri Nov 6 23:35:10 2015  
 MENUF  
 OBNUC 1H  
 OFR 500.00 MHz  
 OBSET 160.00 KHz  
 OBFIN 2160.00 Hz  
 PW1 5.00 usec  
 DEADT 57.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0005 sec  
 POINT 32768  
 SPO 32768  
 TIMES 16  
 DUMMY 0  
 FREQU 10000.00 Hz  
 FLT 5000 Hz  
 DELAY 40.00 usec  
 ACQTM 3.2768 sec  
 PD 3.7232 sec  
 ADBIT 16  
 RGAIN 19  
 BF 0.09 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD non  
 EXPCM  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE 3ba(Ms-ds)\_1H.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG -944007979  
 CSPED 12 Hz  
 FILDC  
 FILDF

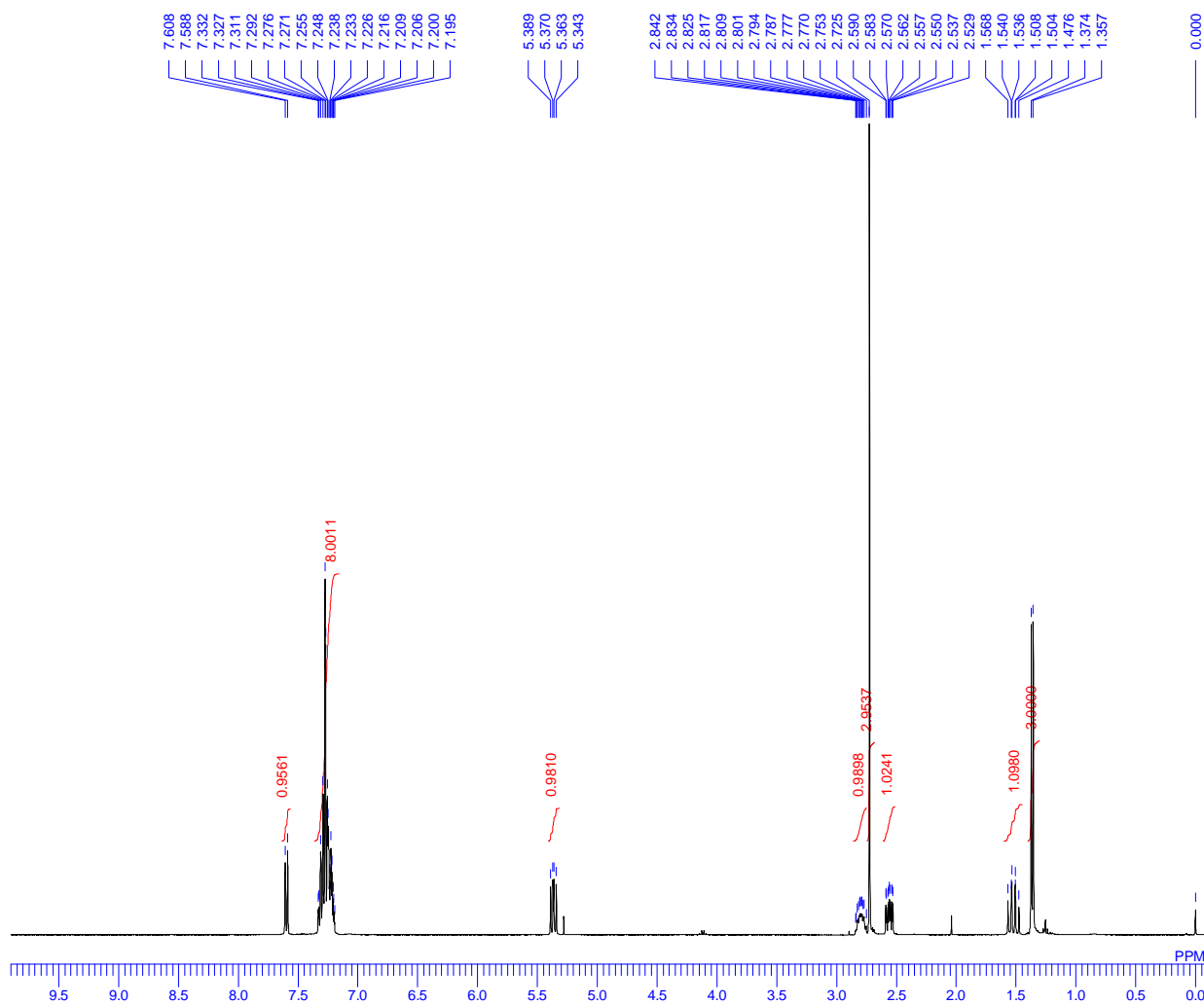


*cis*-3ba (major)

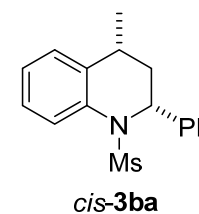
# <sup>1</sup>H NMR spectrum of *cis*-3ba (major)

*cis*-3ba (major)

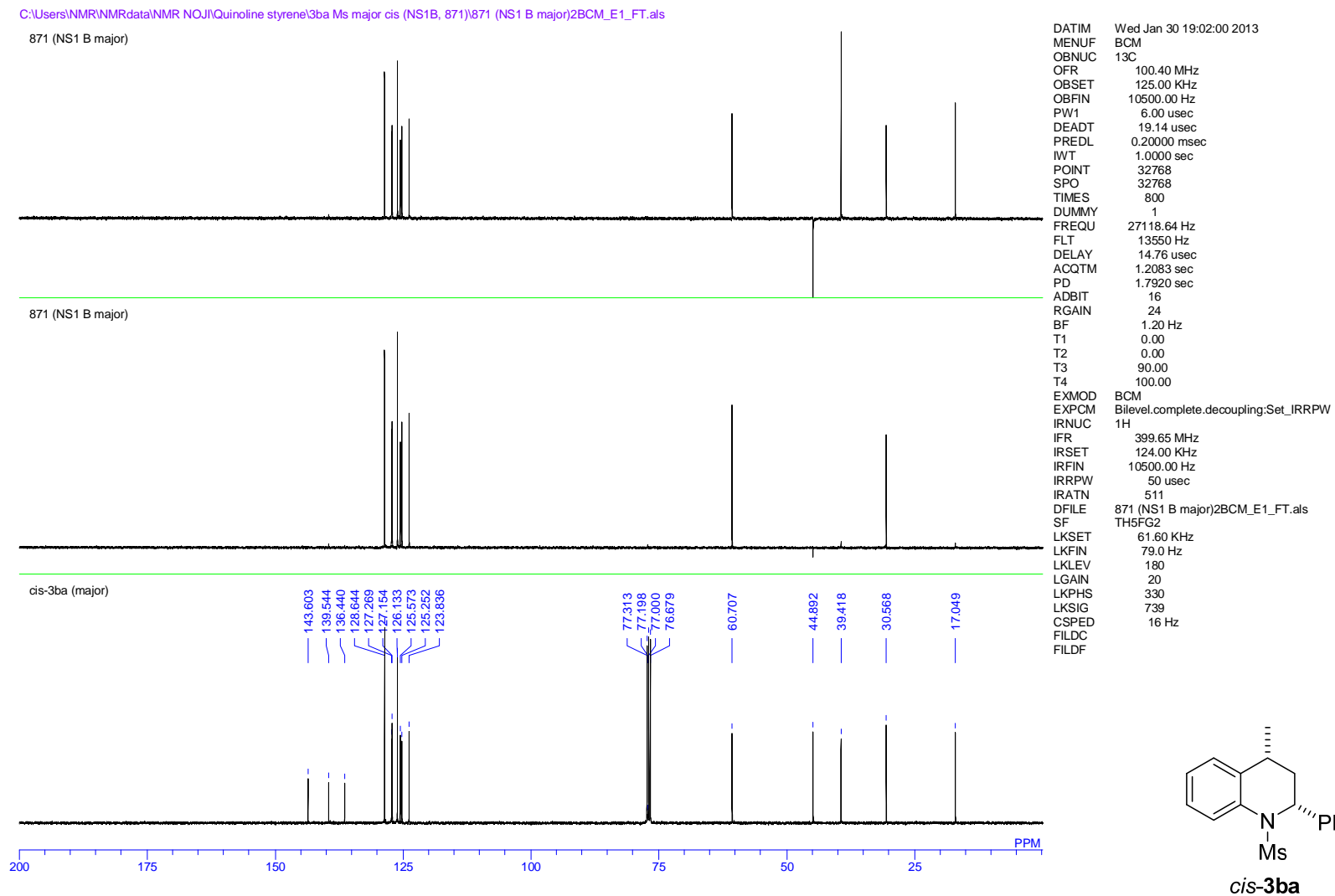
C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ba Ms major cis (NS1B, 871)\871 (NS1 B major)1NON\_E1\_FT.als



DATIM Wed Jan 30 18:21:32 2013  
MENUF NON  
OBNUC 1H  
OFR 399.65 MHz  
OBSET 124.00 KHz  
OBFIN 10500.00 Hz  
PW1 5.80 usec  
DEADT 72.10 usec  
PREDL 0.20000 msec  
IWT 1.0000 sec  
POINT 16384  
SPO 16384  
TIMES 16  
DUMMY 1  
FREQU 7992.01 Hz  
FLT 4000 Hz  
DELAY 50.00 usec  
ACQTM 2.0500 sec  
PD 4.9500 sec  
ADBIT 16  
RGAIN 11  
BF 0.12 Hz  
T1 0.00  
T2 0.00  
T3 90.00  
T4 100.00  
EXMOD NON  
EXPCM NON:Single.coupled:PW1\_ACQTM\_PD:1H,13C,1  
IRNUC 1H  
IFR 399.65 MHz  
IRSET 124.00 KHz  
IRFIN 10500.00 Hz  
IRRPW 50 usec  
IRATN 511  
DFILE 871 (NS1 B major)1NON\_E1\_FT.als  
SF TH5FG2  
LKSET 61.60 KHz  
LKFIN 79.0 Hz  
LKLEV 180  
LGAIN 20  
LKPHS 330  
LKSIG 736  
CSPED 12 Hz  
FILDC  
FILDF



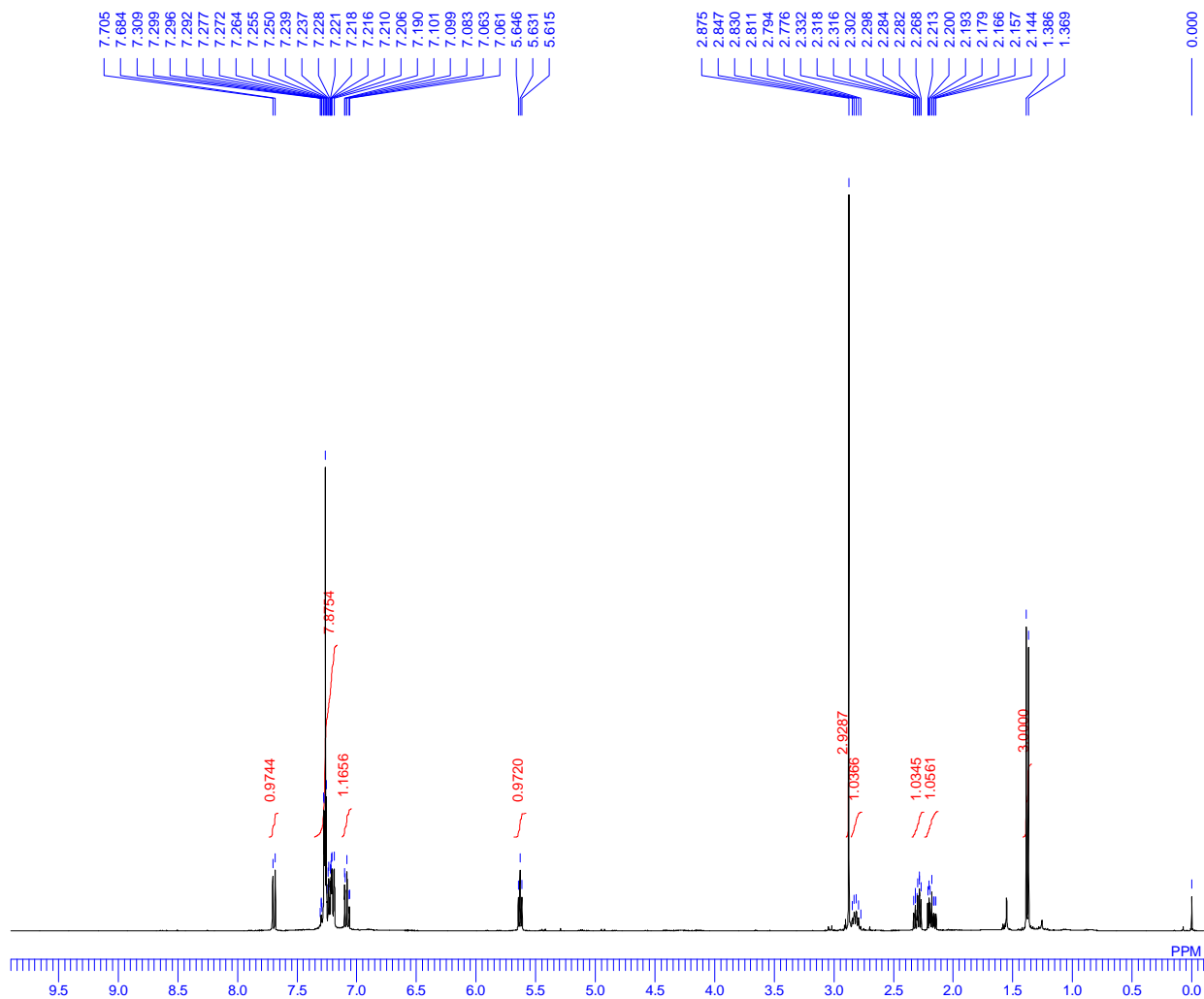
# <sup>13</sup>C NMR spectrum of *cis*-3ba (major)



# <sup>1</sup>H NMR spectrum of *trans*-3ba (minor)

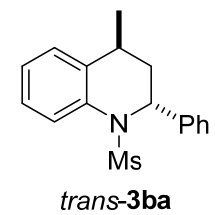
trans-3ba (minor)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ba Ms minor trans (NS1A, 871)\871(NS1 A minorj1NON\_E1\_FT.als



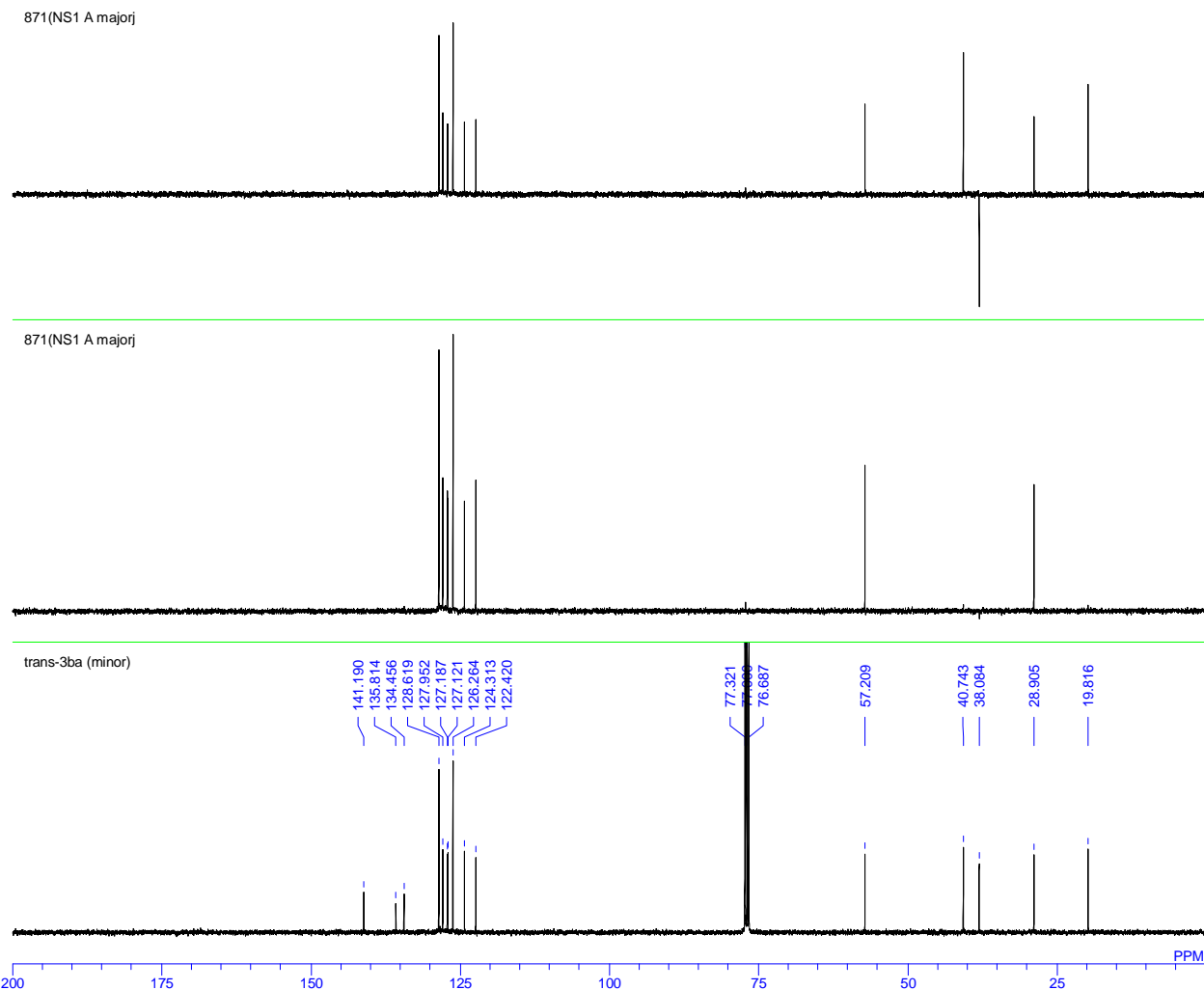
```

DATIM  Fri Feb 01 13:22:03 2013
MENUF  NON
OBNUC  1H
OFR    399.65 MHz
OBSET  124.00 KHz
OBFIN  10500.00 Hz
PW1    5.80 usec
DEADT  72.10 usec
PREDL  0.20000 msec
IWT    1.0000 sec
POINT  16384
SPO    16384
TIMES  16
DUMMY  1
FREQU  7992.01 Hz
FLT    4000 Hz
DELAY  50.00 usec
ACQTM  2.0500 sec
PD     4.9500 sec
ADBIT  16
RGAIN  16
BF     0.12 Hz
T1     0.00
T2     0.00
T3     90.00
T4     100.00
EXMOD  NON
EXPCM  NON:Single.coupled:PW1_ACQTM_PD:1H,13C,1
IRNUC  1H
IFR    399.65 MHz
IRSET  124.00 KHz
IRFIN  10500.00 Hz
IRRPW  50 usec
IRATN  511
DFILE  871(NS1 A minorj1NON_E1_FT.als
SF     TH5FG2
LKSET  61.60 KHz
LKFIN  79.0 Hz
LKLEV  180
LGAIN  19
LKPHS  330
LKSIG  660
CSPED  15 Hz
FILDC
FILDF
    
```

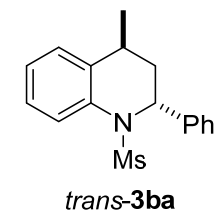


# <sup>13</sup>C NMR spectrum of *trans*-3ba (minor)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ba Ms minor trans (NS1A, 871)\871(NS1 A minor)2BCM\_E1\_FT.als



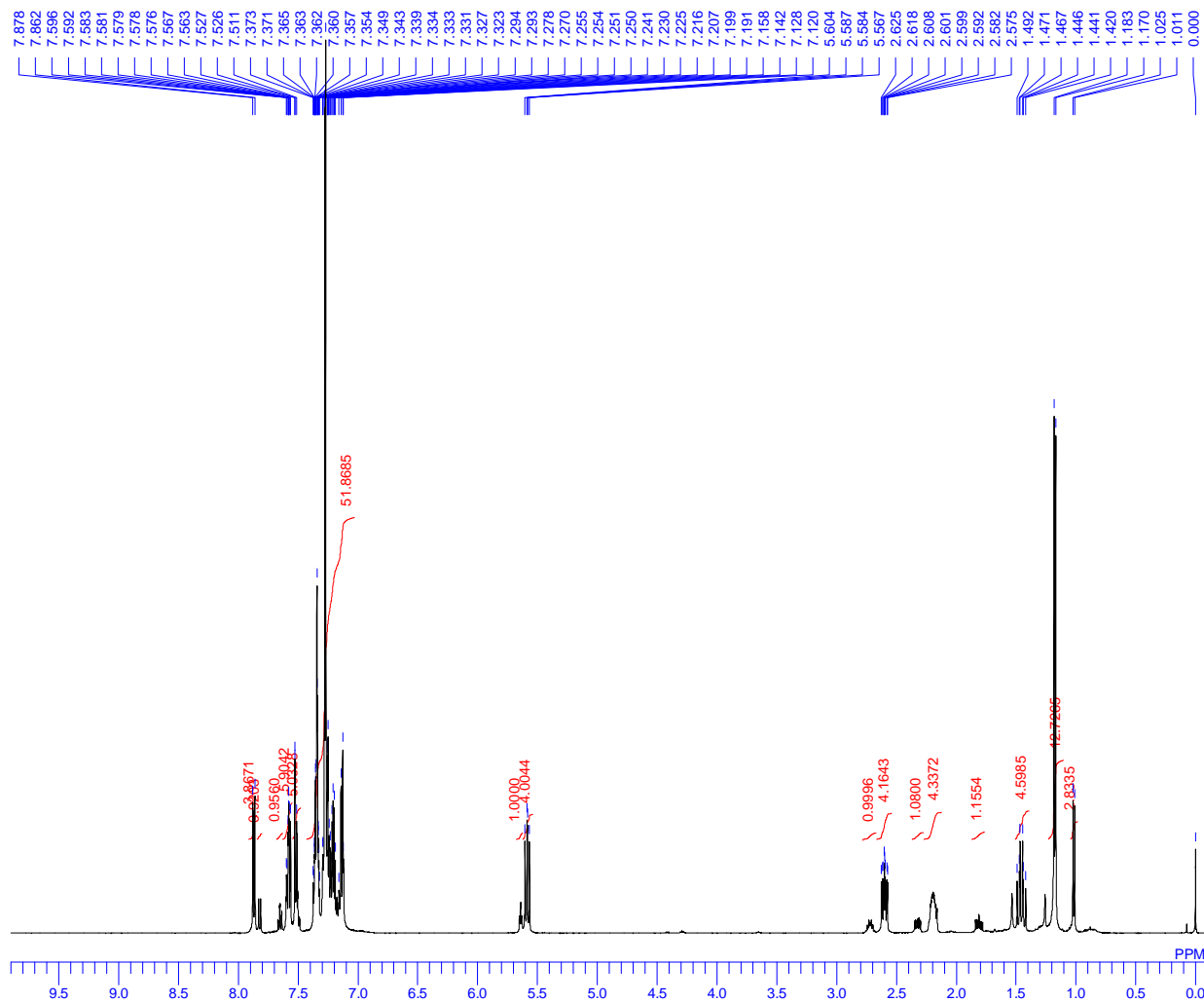
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 OBFIN 10500.00 Hz  
 PW1 6.00 usec  
 DEADT 19.14 usec  
 PREDL 0.20000 msec  
 IWT 1.0000 sec  
 POINT 32768  
 SPO 32768  
 TIMES 1024  
 DUMMY 1  
 FREQU 27118.64 Hz  
 FLT 13550 Hz  
 DELAY 14.76 usec  
 ACQTM 1.2083 sec  
 PD 1.7920 sec  
 ADBIT 16  
 RGAIN 25  
 BF 1.20 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD BCM  
 EXPCM Bilevel.complete.decoupling:Set\_IRRPW  
 IRNUC 1H  
 IFR 399.65 MHz  
 IRSET 124.00 KHz  
 IRFIN 10500.00 Hz  
 IRRPW 50 usec  
 IRATN 511  
 DFILE 871(NS1 A minor)2BCM\_E1\_FT.als  
 SF TH5FG2  
 LKSET 61.60 KHz  
 LKFIN 79.0 Hz  
 LKLEV 180  
 LGAIN 19  
 LKPHS 330  
 LKSIG 634  
 CSPED 15 Hz  
 FILDC  
 FILDF



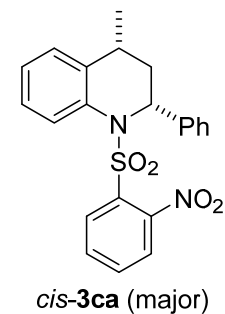
# <sup>1</sup>H NMR spectrum of diastereomixture-3ca (*cis*-major)

3ca-ds(CR527-ds2)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\CR527-ds(Ns-alc)\CR527-ds2\CR527-ds2\_1H\CR527-ds2\_1H.nmdata

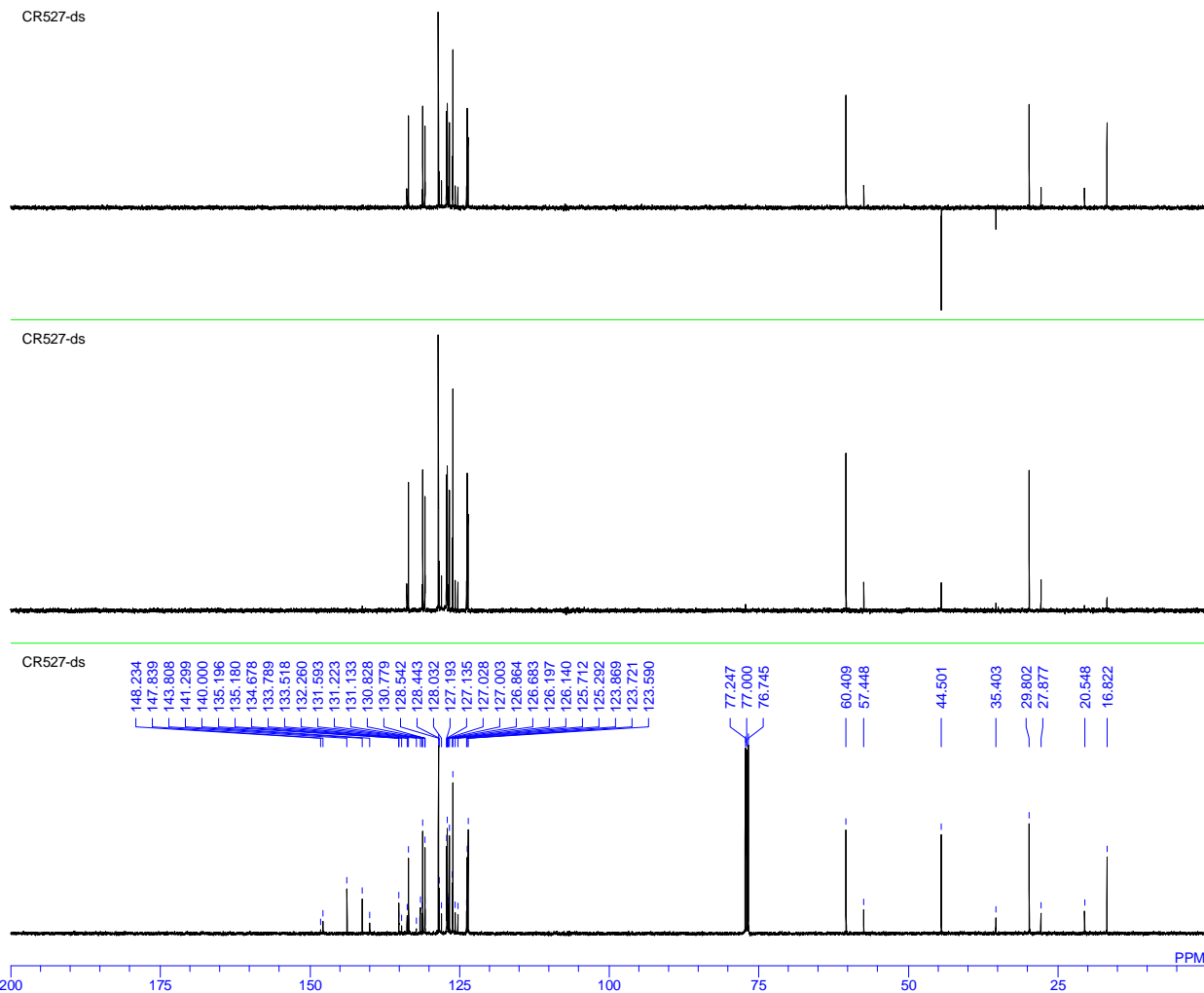


DATIM Tue Dec 15 22:11:30 2015  
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 OBNUC 500.00 MHz  
 OFR 160.00 KHz  
 OBSET 2160.00 Hz  
 OBFIN 5.00 usec  
 PW1 57.50 usec  
 DEADT 10.00000 msec  
 PREDL 0.0005 sec  
 IWT 32768  
 POINT 32768  
 SPO 16  
 TIMES 0  
 DUMMY 10000.00 Hz  
 FREQU 5000 Hz  
 FLT 40.00 usec  
 DELAY 3.2768 sec  
 ACQTM 3.7232 sec  
 PD 16  
 ADBIT 17  
 RGAIN 0.09 Hz  
 BF 0.00  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD non  
 EXPCM 1H  
 IRNUC 500.00 MHz  
 IFR 160.00 KHz  
 IRSET 2160.00 Hz  
 IRFIN 0 usec  
 IRRPW 511  
 IRATN CR527-ds2\_1H.nmdata  
 DFILE th5.shm  
 SF 70.00 KHz  
 LKSET 334.0 Hz  
 LKFIN 200  
 LKLEV 20  
 LGAIN 210  
 LKPHS -1480846509  
 LKSIG 11 Hz  
 CSPED  
 FILDC  
 FILDF

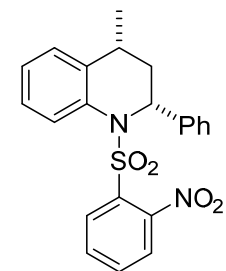


# <sup>13</sup>C NMR spectrum of diastereomixture-3ca (*cis*-major)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\CR527-ds(Ns-alc)\CR527-ds\_DEPT.als



DATIM	Tue Dec 15 20:25:52 2015
MENUF	
OBNUC	13C
OFR	125.65 MHz
OBSET	120.00 KHz
OBFIN	7958.00 Hz
PW1	4.40 usec
DEADT	15.50 usec
PREDL	10.00000 msec
IWT	0.0100 sec
POINT	32768
SPO	32768
TIMES	1024
DUMMY	1
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	0.9667 sec
PD	2.0333 sec
ADBIT	16
RGAIN	28
BF	0.09 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	error_expcm
IRNUC	1H
IFR	500.00 MHz
IRSET	160.00 KHz
IRFIN	2160.00 Hz
IRRPW	0 usec
IRATN	511
DFILE	CR527-ds_DEPT.als
SF	th5.shm
LKSET	70.00 KHz
LKFIN	334.0 Hz
LKLEV	200
LGAIN	20
LKPHS	210
LKSIG	4166
CSPED	13 Hz
FILDC	
FILDF	

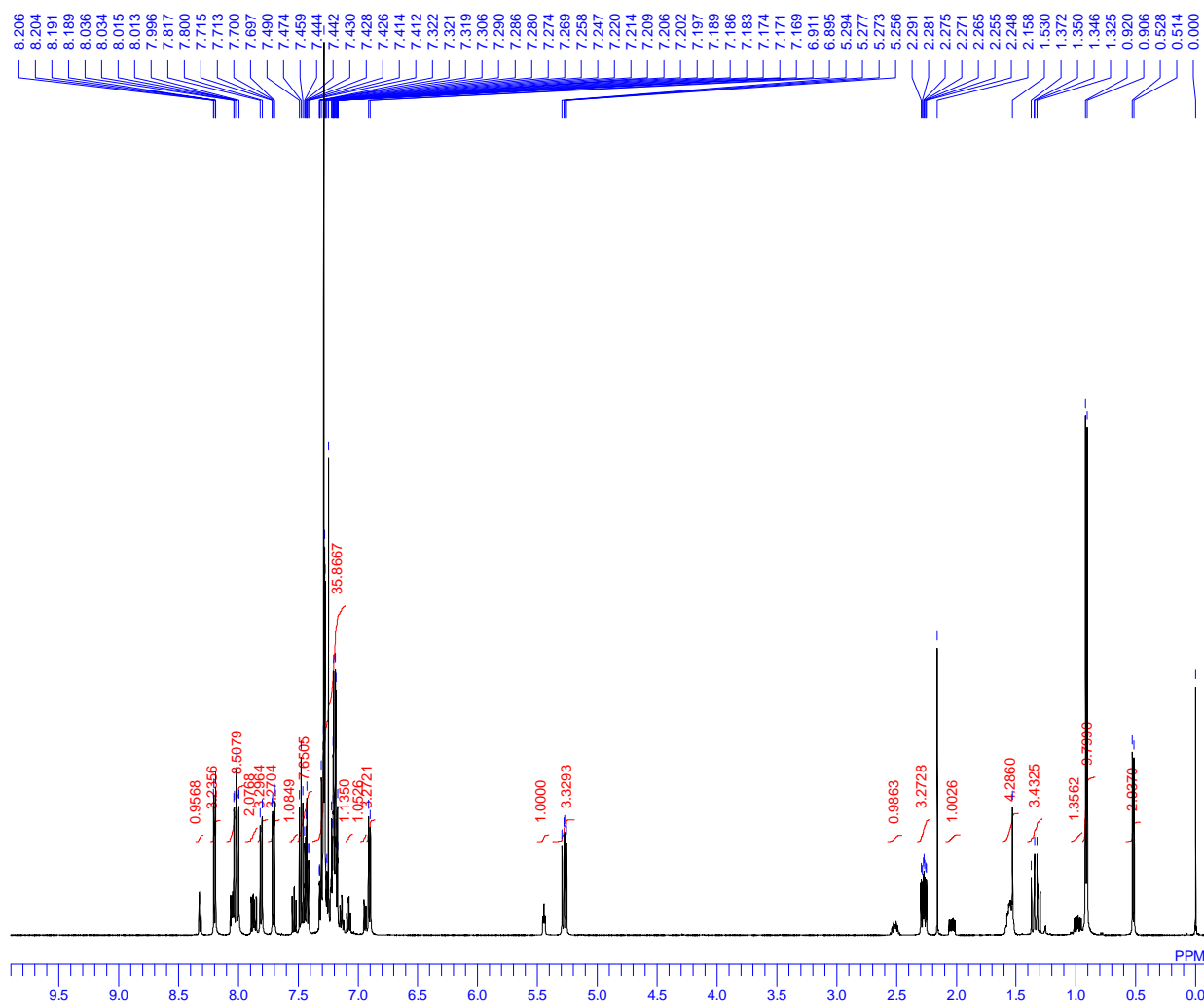


*cis*-3ca (major)

# <sup>1</sup>H NMR spectrum of diastereomixture-3da (*cis*-major)

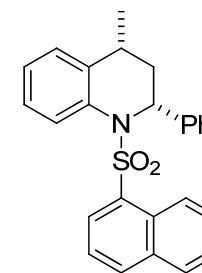
3da-ds(CR542)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3da-ds(CR542, Nas)\3da-ds(CR542)\_1H\3da-ds(CR542)\_1H.nmdata



```

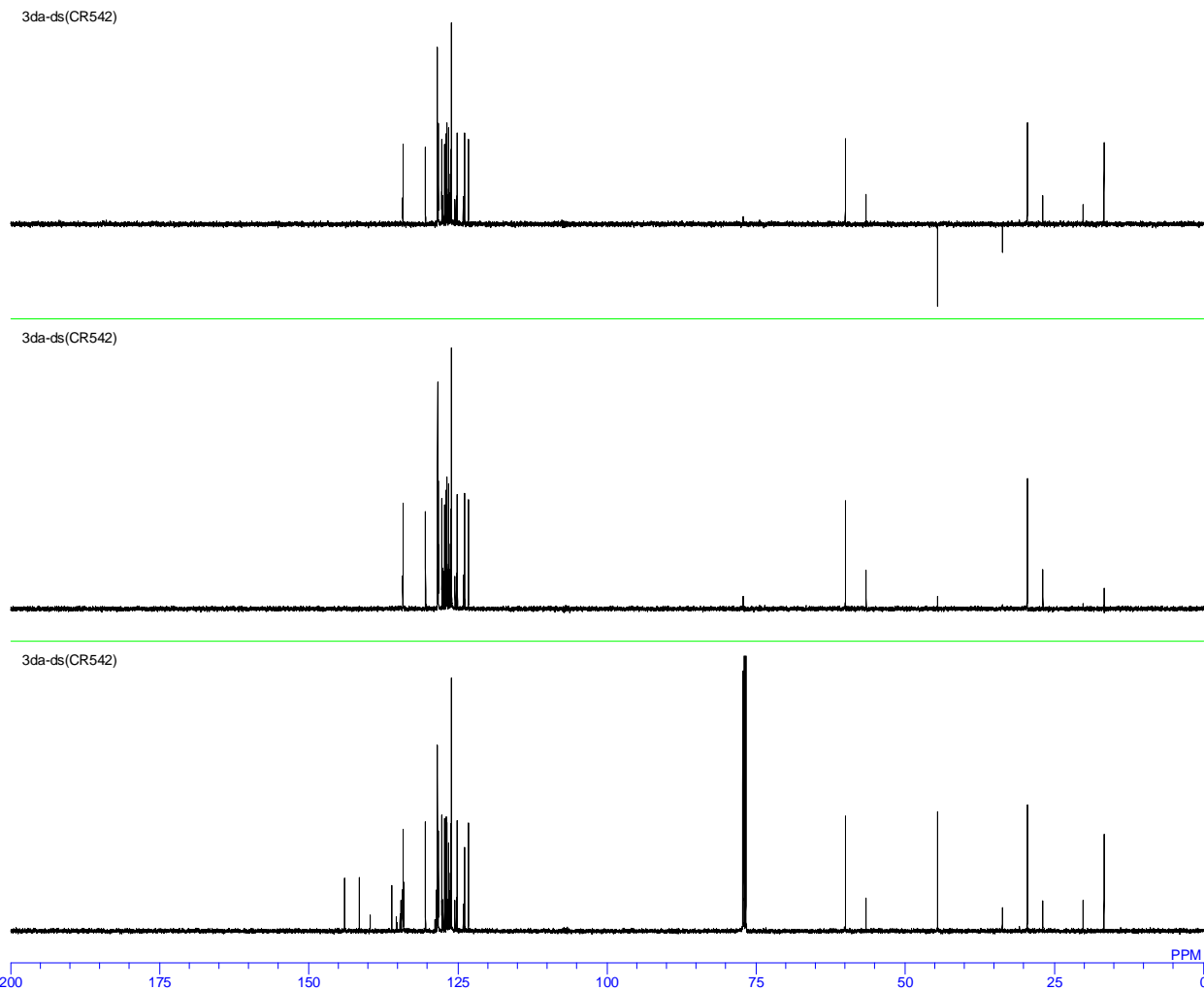
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OBSET      160.00 KHz
OBFIN      2160.00 Hz
PW1        5.00 usec
DEADT      57.50 usec
PREDL      10.00000 msec
IWT        0.0005 sec
POINT      32768
SPO        32768
TIMES      16
DUMMY      0
FREQU      10000.00 Hz
FLT        5000 Hz
DELAY      40.00 usec
ACQTM      3.2768 sec
PD         3.7232 sec
ADBIT      16
RGAIN      17
BF         0.12 Hz
T1         0.00
T2         0.00
T3         90.00
T4         100.00
EXMOD      non
EXPCM
IRNUC      1H
IFR        500.00 MHz
IRSET      160.00 KHz
IRFIN      2160.00 Hz
IRRPW      0 usec
IRATN      511
DFILE      3da-ds(CR542)_1H.nmdata
SF         th5.shm
LKSET      70.00 KHz
LKFIN      334.0 Hz
LKLEV      200
LGAIN      20
LKPHS      210
LKSIG      1044070204
CSPED      12 Hz
FILDC
FILDF
    
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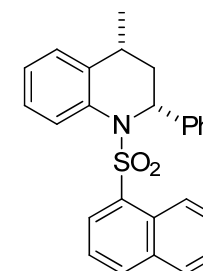
*cis*-3da (major)

# <sup>13</sup>C NMR spectrum of diastereomixture-3da (*cis*-major)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3da-ds(CR542, Nas)\3da-ds(CR542)\_13C\3da-ds(CR542)\_13C.als



DATIM Wed Jan 20 22:10:20 2016  
 MENUF  
 OBNUC 13C  
 OFR 125.65 MHz  
 OBSET 120.00 KHz  
 OBFIN 7958.00 Hz  
 PW1 4.40 usec  
 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 1024  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 0.12 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE 3da-ds(CR542)\_13C.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 792634726  
 CSPED 13 Hz  
 FILDC  
 FILDF

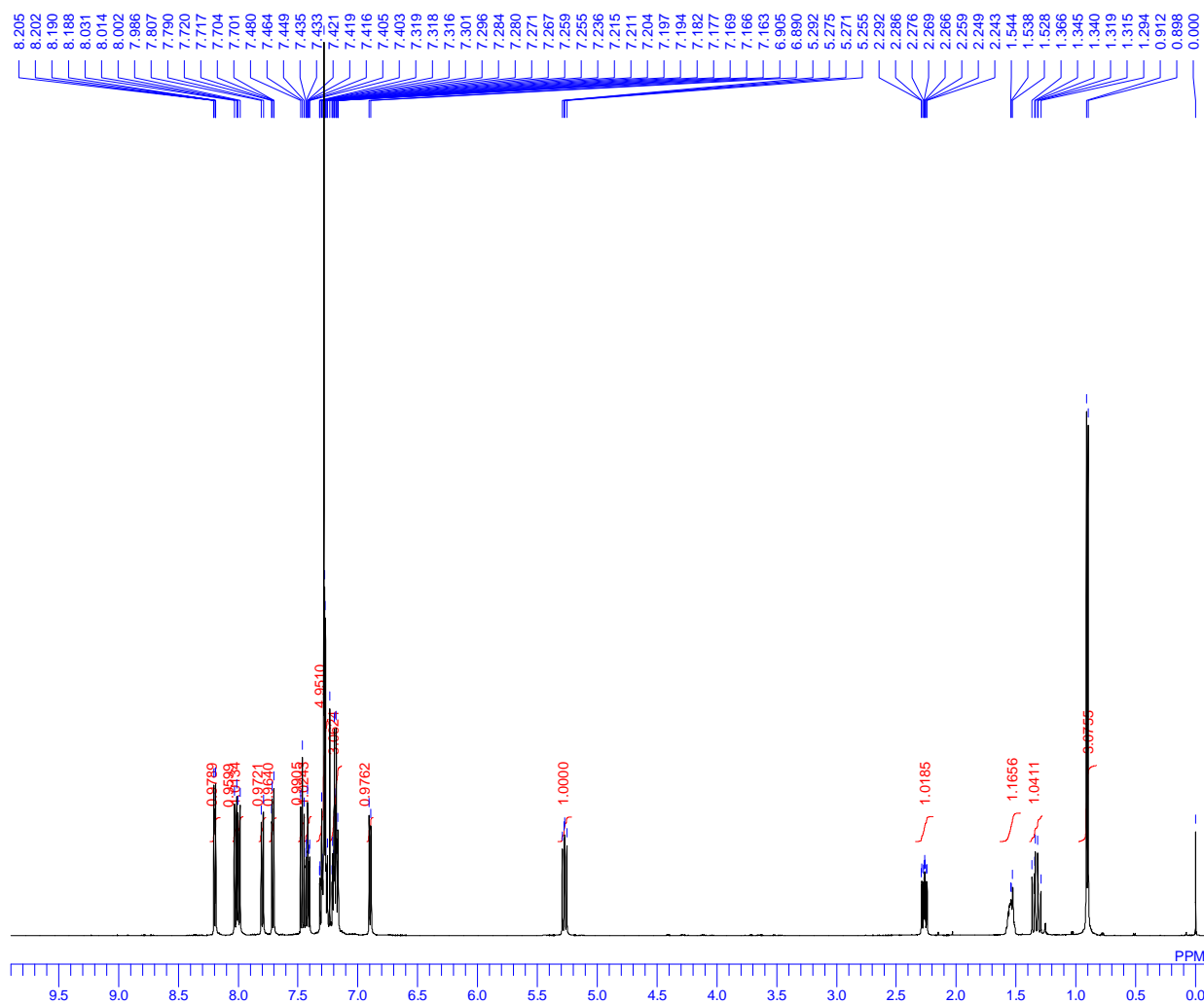


*cis*-3da (major)

# <sup>1</sup>H NMR spectrum of *cis*-3da (major)

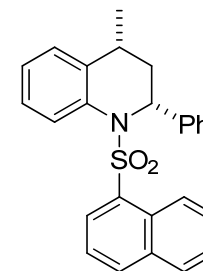
3da-major(Nas)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3da-major(CR541, Nas)\3da-major\_1H\3da-major\_1H.als



DATIM Wed Jan 20 18:59:27 2016

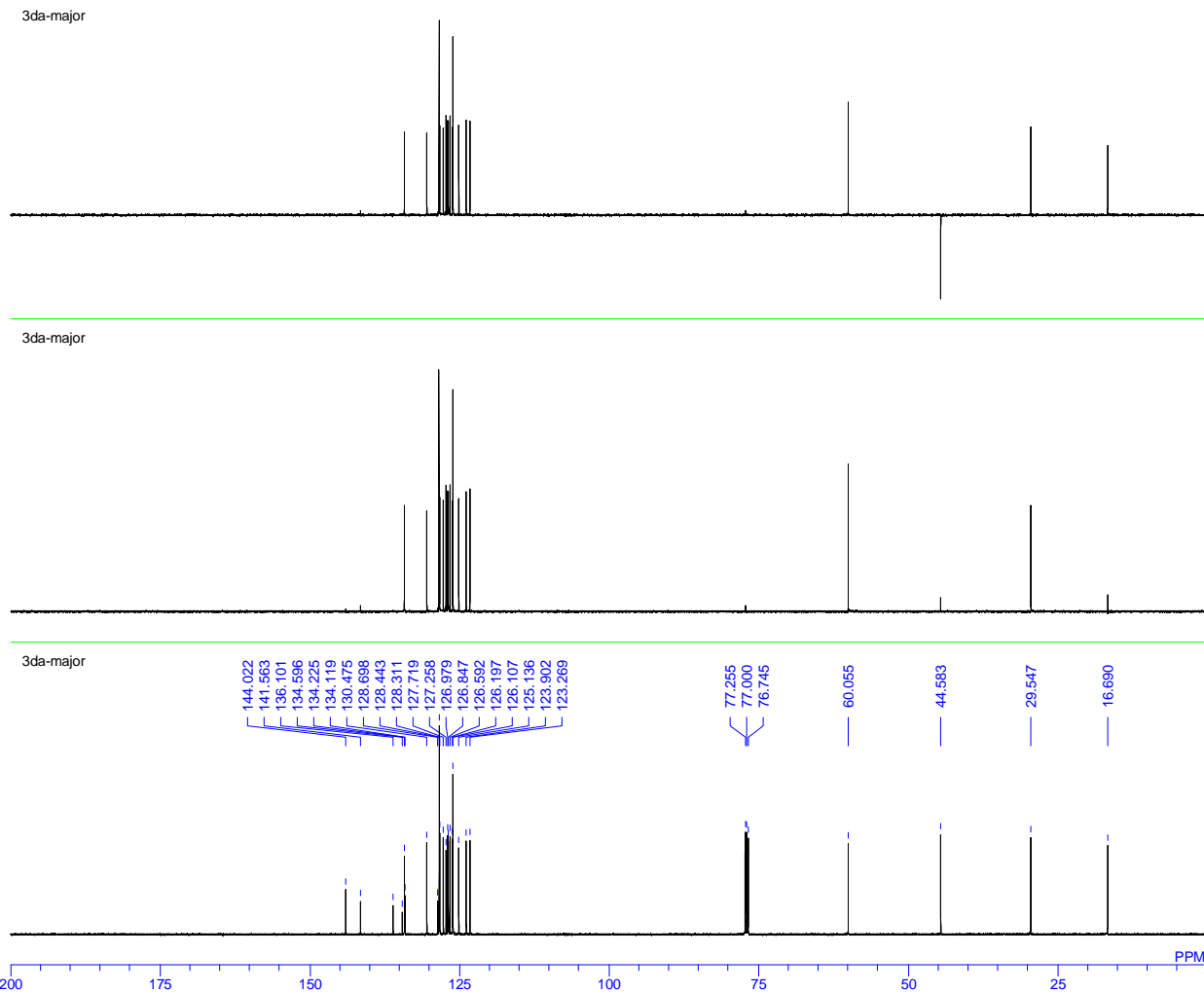
1H  
 OFR 500.00 MHz  
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 OBFIN 2160.00 Hz  
 PW1 5.00 usec  
 DEADT 57.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0005 sec  
 POINT 32768  
 SPO 32768  
 TIMES 16  
 DUMMY 0  
 FREQU 10000.00 Hz  
 FLT 5000 Hz  
 DELAY 40.00 usec  
 ACQTM 3.2768 sec  
 PD 3.7232 sec  
 ADBIT 16  
 RGAIN 14  
 BF 0.12 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD non  
 EXPCM  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE 3da-major\_1H.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 356258145  
 CSPED 13 Hz  
 FILDC  
 FILDF



*cis*-3da

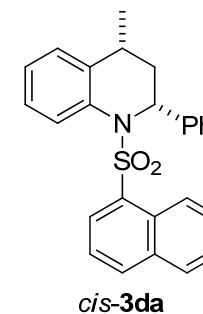
# <sup>13</sup>C NMR spectrum of *cis*-3da (major)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3da-major(CR541, Nas)\3da-major\_DEPT.als



```

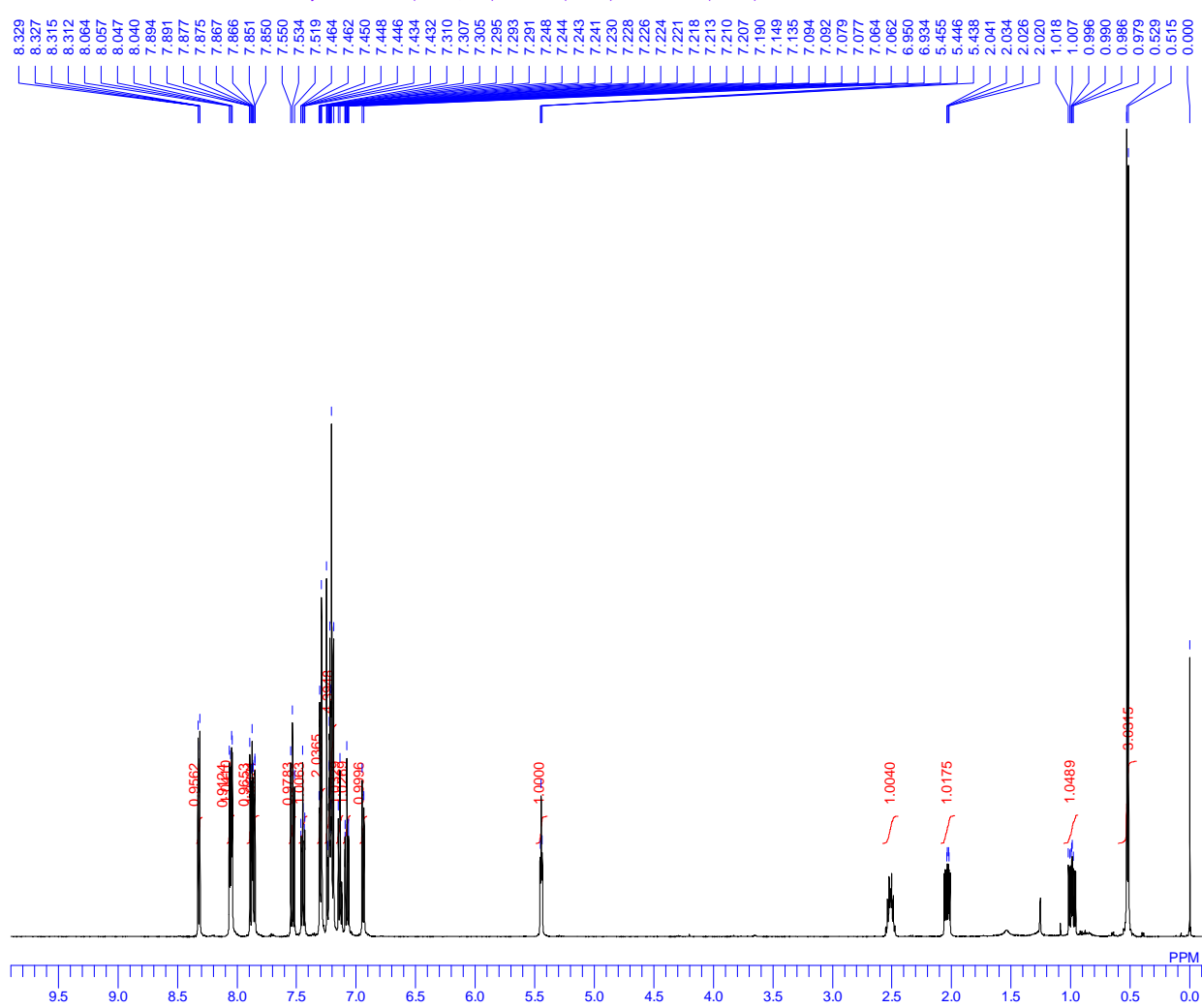
DATIM Wed Jan 20 19:52:00 2016
MENUF
OBNUC 13C
OFR 125.65 MHz
OBSET 120.00 KHz
OBFIN 7958.00 Hz
PW1 4.40 usec
DEADT 15.50 usec
PREDL 10.00000 msec
IWT 0.0100 sec
POINT 32768
SPO 32768
TIMES 1024
DUMMY 1
FREQU 33898.30 Hz
FLT 16950 Hz
DELAY 11.80 usec
ACQTM 0.9667 sec
PD 2.0333 sec
ADBIT 16
RGAIN 28
BF 0.12 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD bcm
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IRNUC 1H
IFR 500.00 MHz
IRSET 160.00 KHz
IRFIN 2160.00 Hz
IRRPW 0 usec
IRATN 511
DFILE 3da-major_DEPT.als
SF th5.shm
LKSET 70.00 KHz
LKFIN 334.0 Hz
LKLEV 200
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CSPED 11 Hz
FILDC
FILDF
    
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# <sup>1</sup>H NMR spectrum of *trans*-3da (minor)

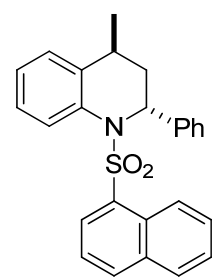
3da-minor(CR544)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3da-minor(CR544, Nas)\3da-minor(CR544)\_1H\3da-minor(CR544)\_1H.als



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DATIM Wed Jan 20 23:35:36 2016
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IWT 0.0005 sec
POINT 32768
SPO 32768
TIMES 16
DUMMY 0
FREQU 10000.00 Hz
FLT 5000 Hz
DELAY 40.00 usec
ACQTM 3.2768 sec
PD 3.7232 sec
ADBIT 16
RGAIN 18
BF 0.12 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
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EXPCM
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IFR 500.00 MHz
IRSET 160.00 KHz
IRFIN 2160.00 Hz
IRRPW 0 usec
IRATN 511
DFILE 3da-minor(CR544)_1H.als
SF th5.shm
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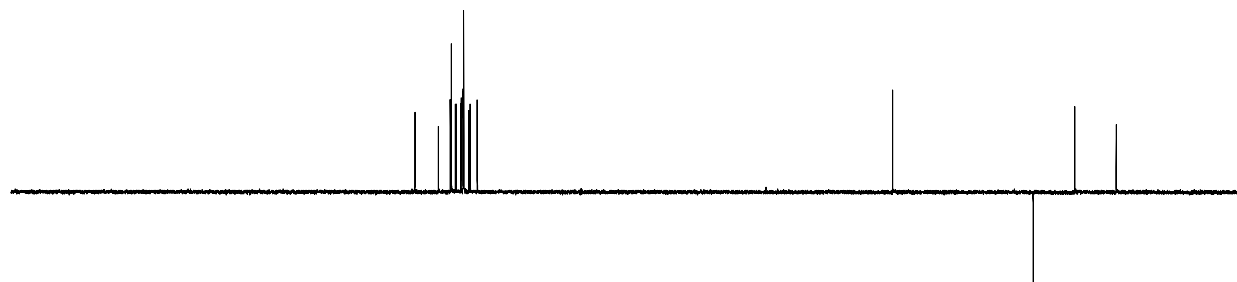


*trans*-3da

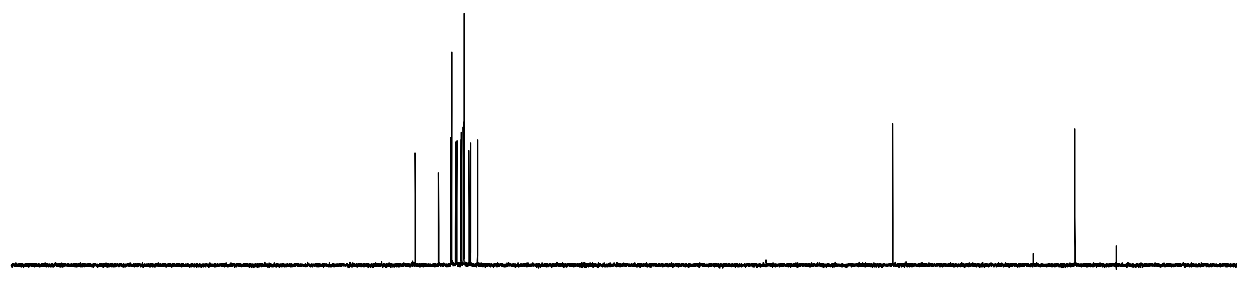
# <sup>13</sup>C NMR spectrum of *trans*-3da (minor)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3da-minor(CR544, Nas)\3da-minor(CR544)\_13C\3da-minor(CR544)\_13C.als

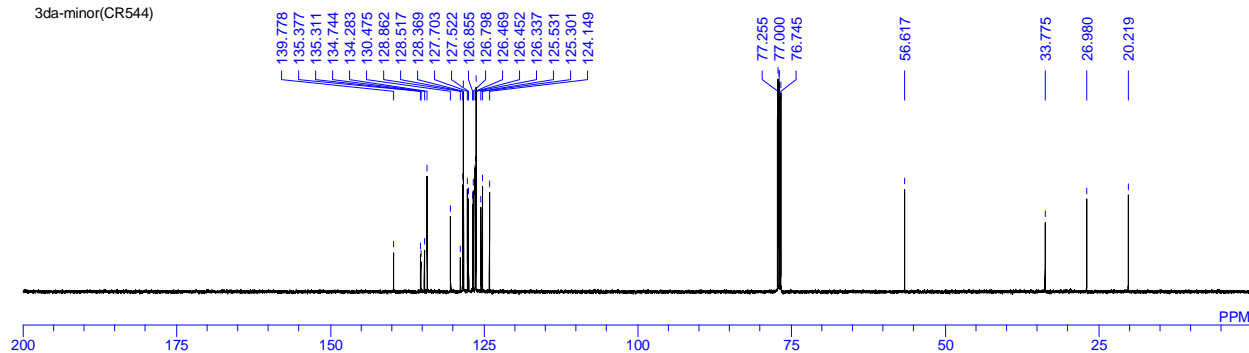
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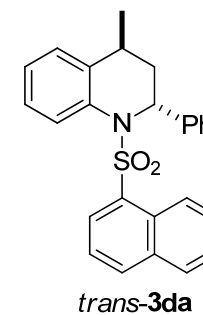
3da-minor(CR544)



3da-minor(CR544)



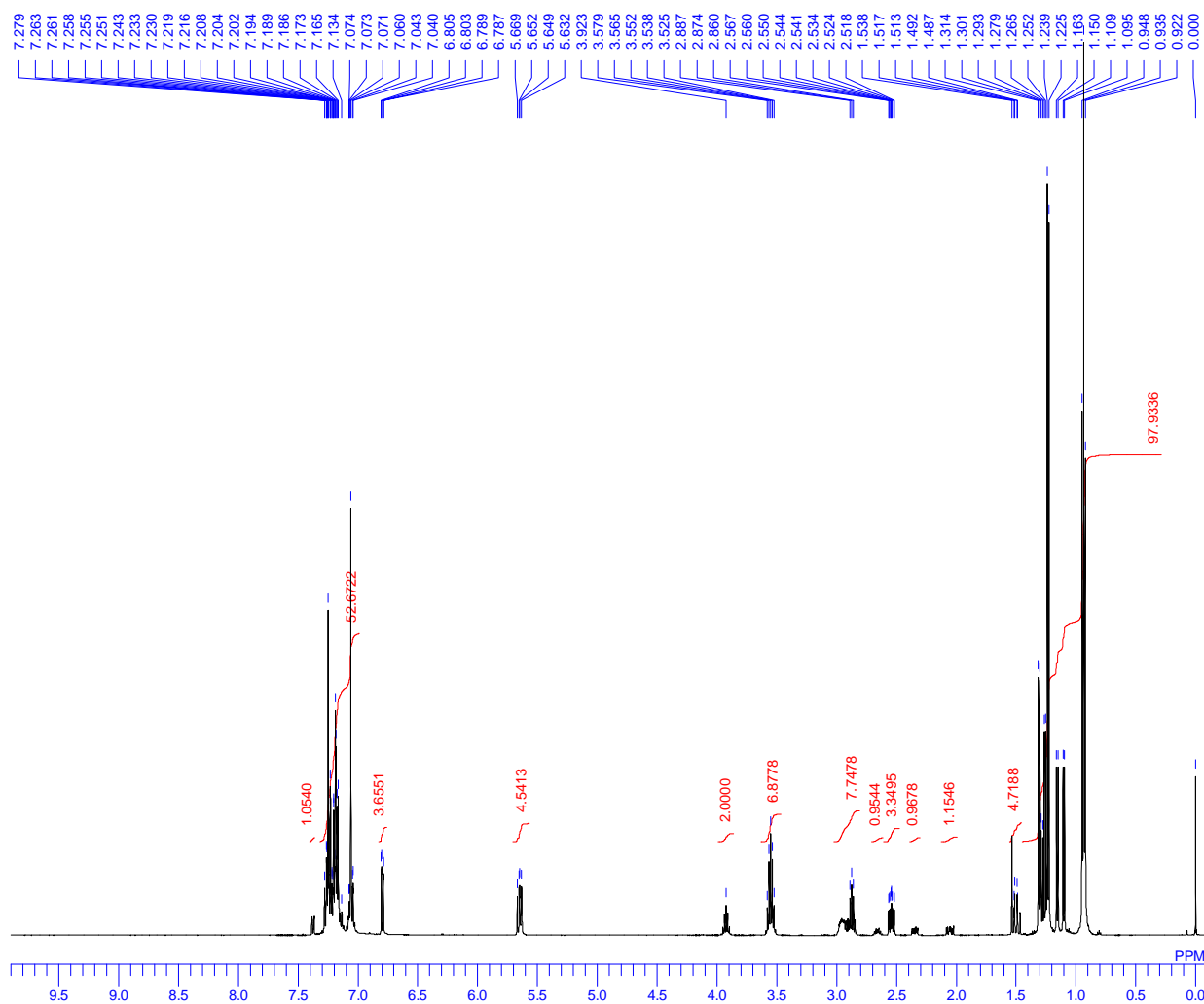
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 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 1024  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 0.12 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE 3da-minor(CR544)\_13C.als  
 SF th5.shm  
 LKSET 70.00 KHz  
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 CSPED 11 Hz  
 FILDC  
 FILDF



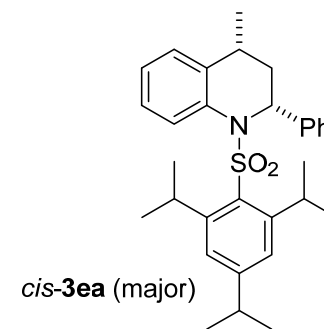
# <sup>1</sup>H NMR spectrum of diastereomixture-3ea (*cis*-major)

3ea-ds(CR546, trisyl)

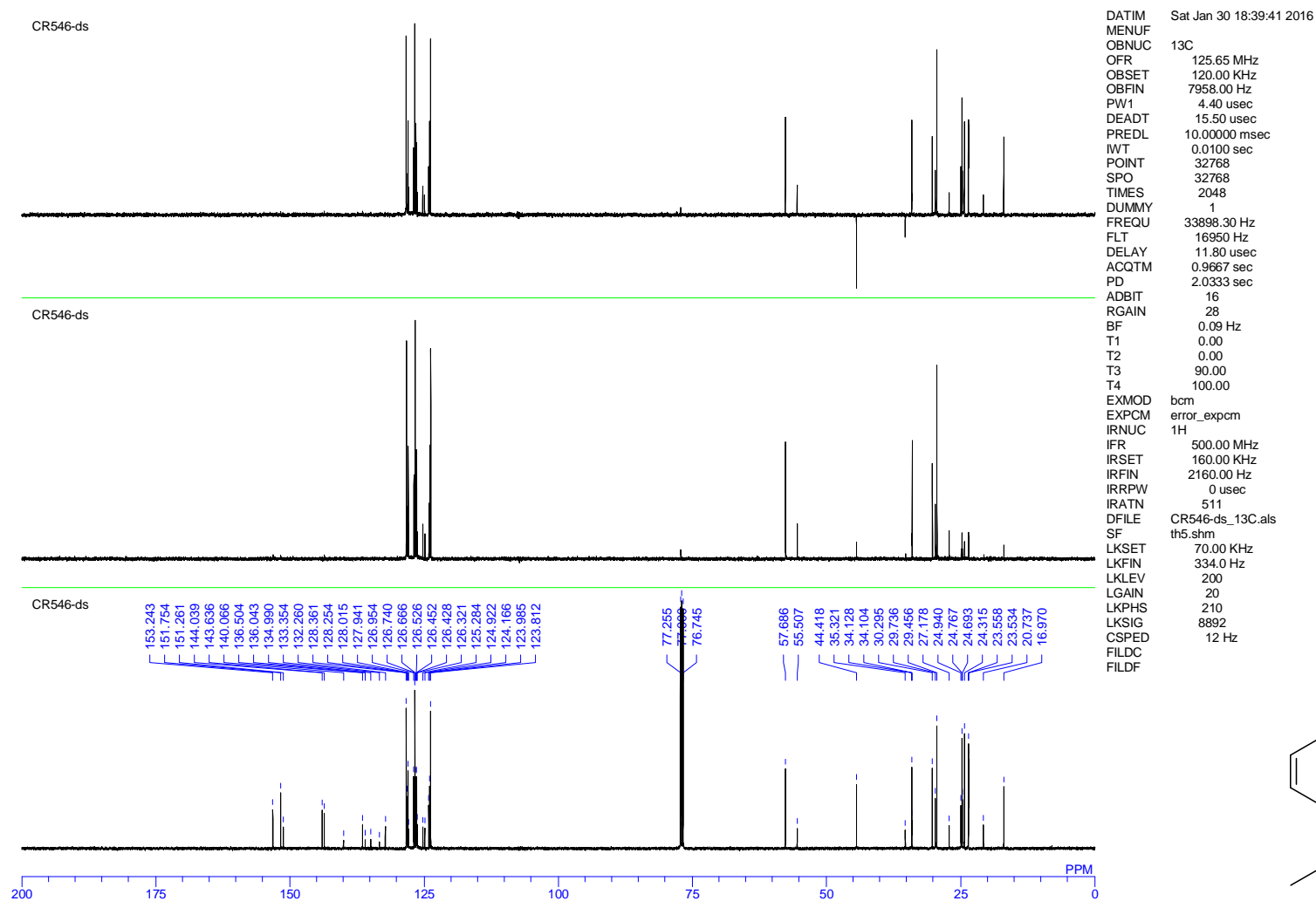
C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ea-ds (CR546, trisyl)\CR546-ds\_1H\CR546-ds\_1H.als



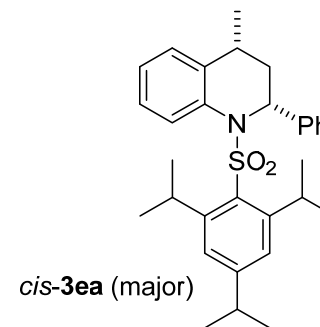
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 OBSET 2160.00 Hz  
 OBFIN 5.00 usec  
 PW1 57.50 usec  
 DEADT 10.00000 msec  
 PREDL 0.0005 sec  
 IWT 32768  
 POINT 32768  
 SPO 32  
 TIMES 0  
 DUMMY 10000.00 Hz  
 FREQU 5000 Hz  
 FLT 40.00 usec  
 DELAY 3.2768 sec  
 ACQTM 3.7232 sec  
 PD 16  
 ADBIT 17  
 RGAIN 0.09 Hz  
 BF 0.00  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD non  
 EXPCM 1H  
 IRNUC 500.00 MHz  
 IFR 160.00 KHz  
 IRSET 2160.00 Hz  
 IRFIN 0 usec  
 IRRPW 511  
 IRATN CR546-ds\_1H.als  
 DFILE th5.shm  
 SF 70.00 KHz  
 LKSET 334.0 Hz  
 LKFIN 200  
 LKLEV 20  
 LGAIN 210  
 LKPHS 64988  
 LKSIG 11 Hz  
 CSPED  
 FILDC  
 FILDF



<sup>13</sup>C NMR spectrum of diastereomixture-3ea (*cis*-major)



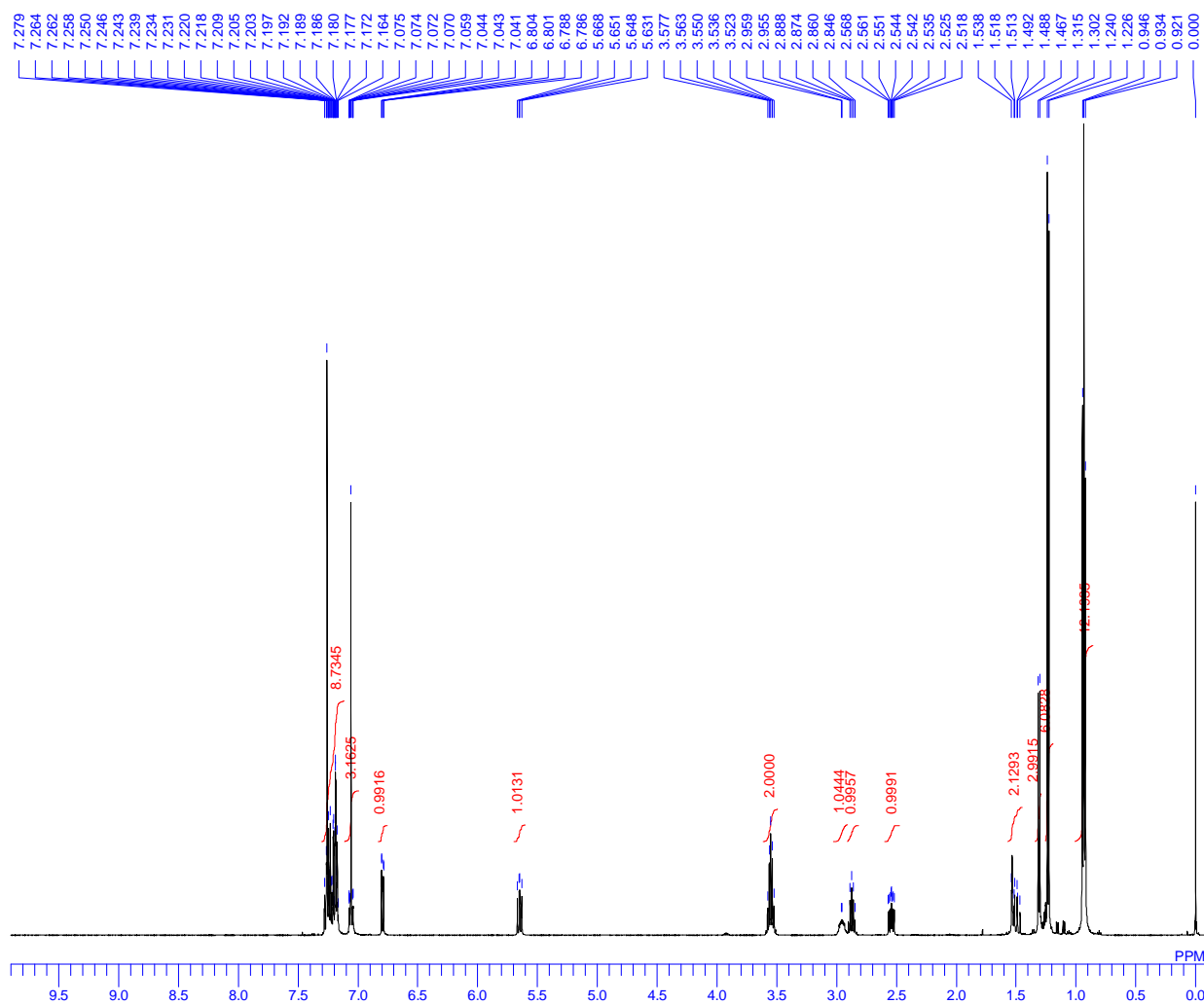
DATIM Sat Jan 30 18:39:41 2016  
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 OBSET 120.00 KHz  
 OBFIN 7958.00 Hz  
 PW1 4.40 usec  
 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 2048  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 0.09 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE CR546-ds\_13C.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 8892  
 CSPED 12 Hz  
 FILDF



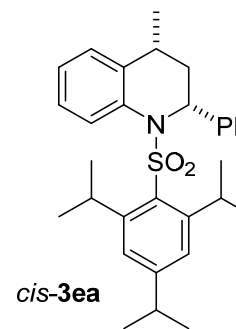
# <sup>1</sup>H NMR spectrum of *cis*-3ea (major)

3ea-major(NS12C3)

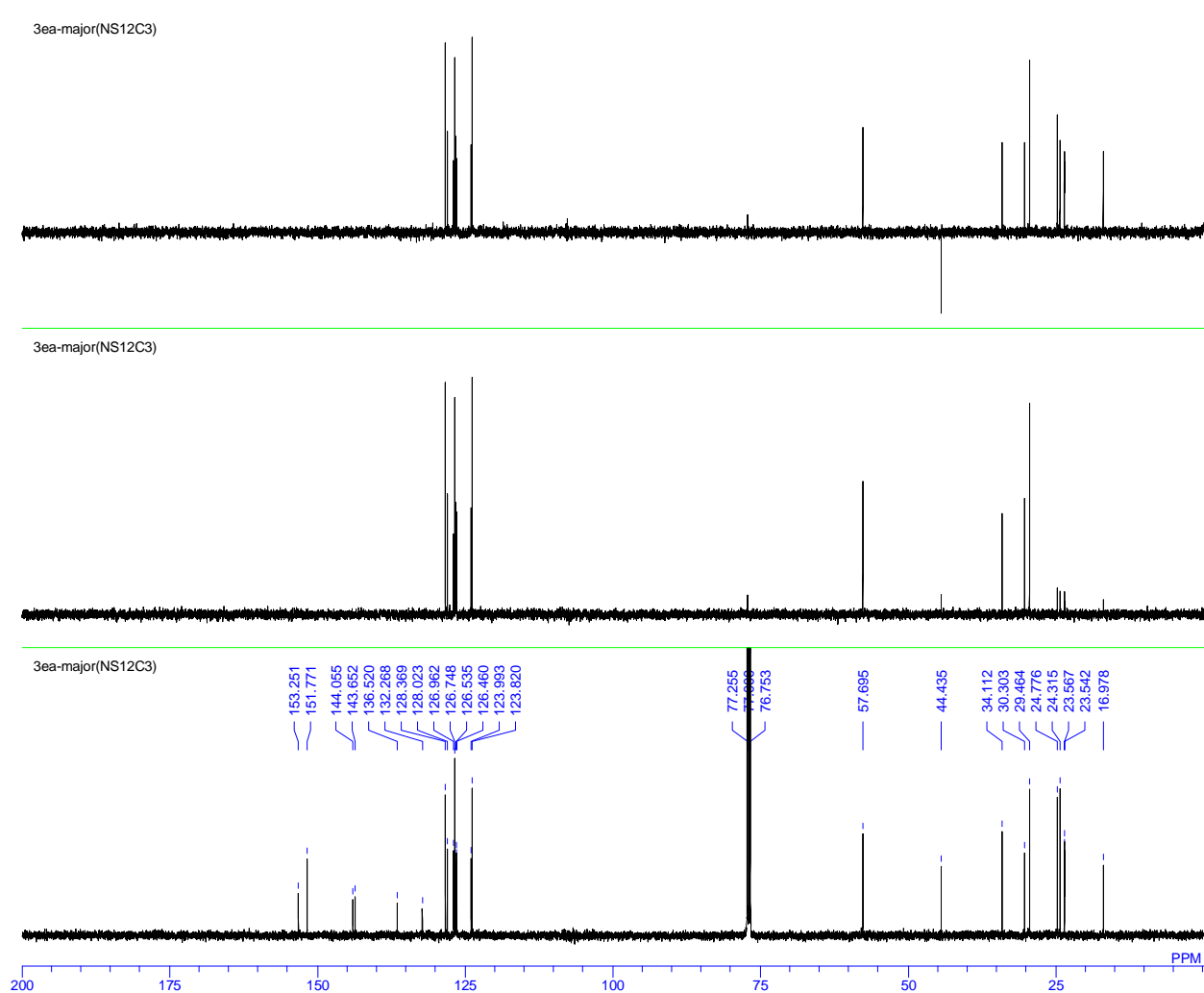
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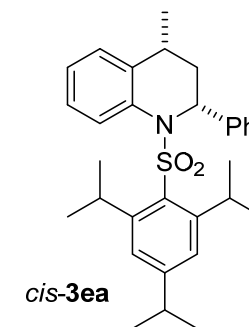
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 OBFIN 2160.00 Hz  
 PW1 5.00 usec  
 DEADT 57.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0005 sec  
 POINT 32768  
 SPO 32768  
 TIMES 32  
 DUMMY 0  
 FREQU 10000.00 Hz  
 FLT 5000 Hz  
 DELAY 40.00 usec  
 ACQTM 3.2768 sec  
 PD 3.7232 sec  
 ADBIT 16  
 RGAIN 22  
 BF 0.09 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD non  
 EXPCM  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE 3ea-major(NS12C3)\_1H.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
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 CSPED 19 Hz  
 FILDC  
 FILDF



# <sup>13</sup>C NMR spectrum of *cis*-3ea (major)



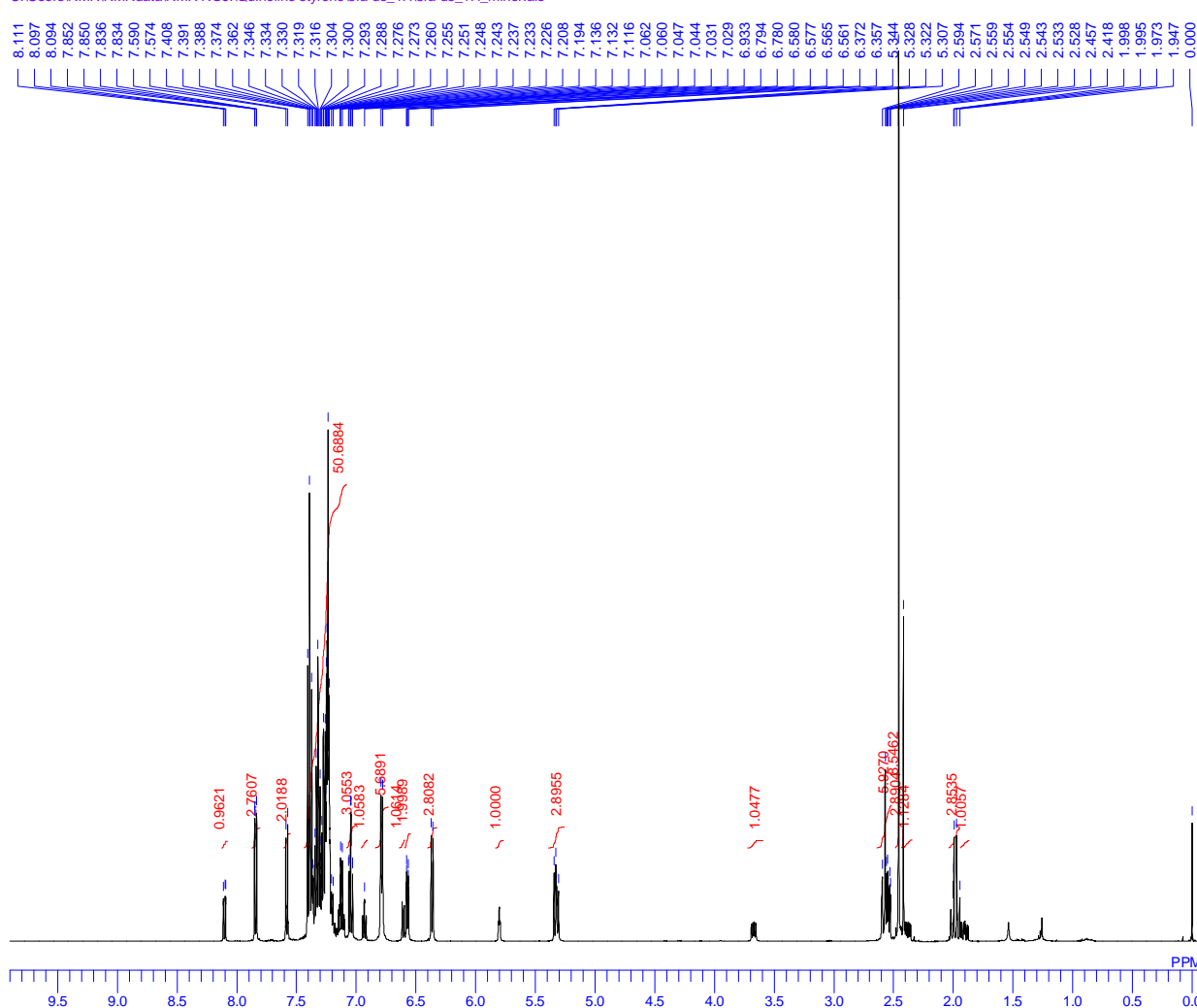
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 OBFIN 7958.00 Hz  
 PW1 4.40 usec  
 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 2048  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 1.20 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE 3ea-major(NS12C3)\_13C.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG -583127561  
 CSPED 11 Hz  
 FILDC



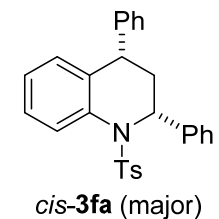
# <sup>1</sup>H NMR spectrum of diastereomixture-3fa (*cis*-major)

3fa-ds

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3fa-ds\_1H\3fa-ds\_1H\_minor.als

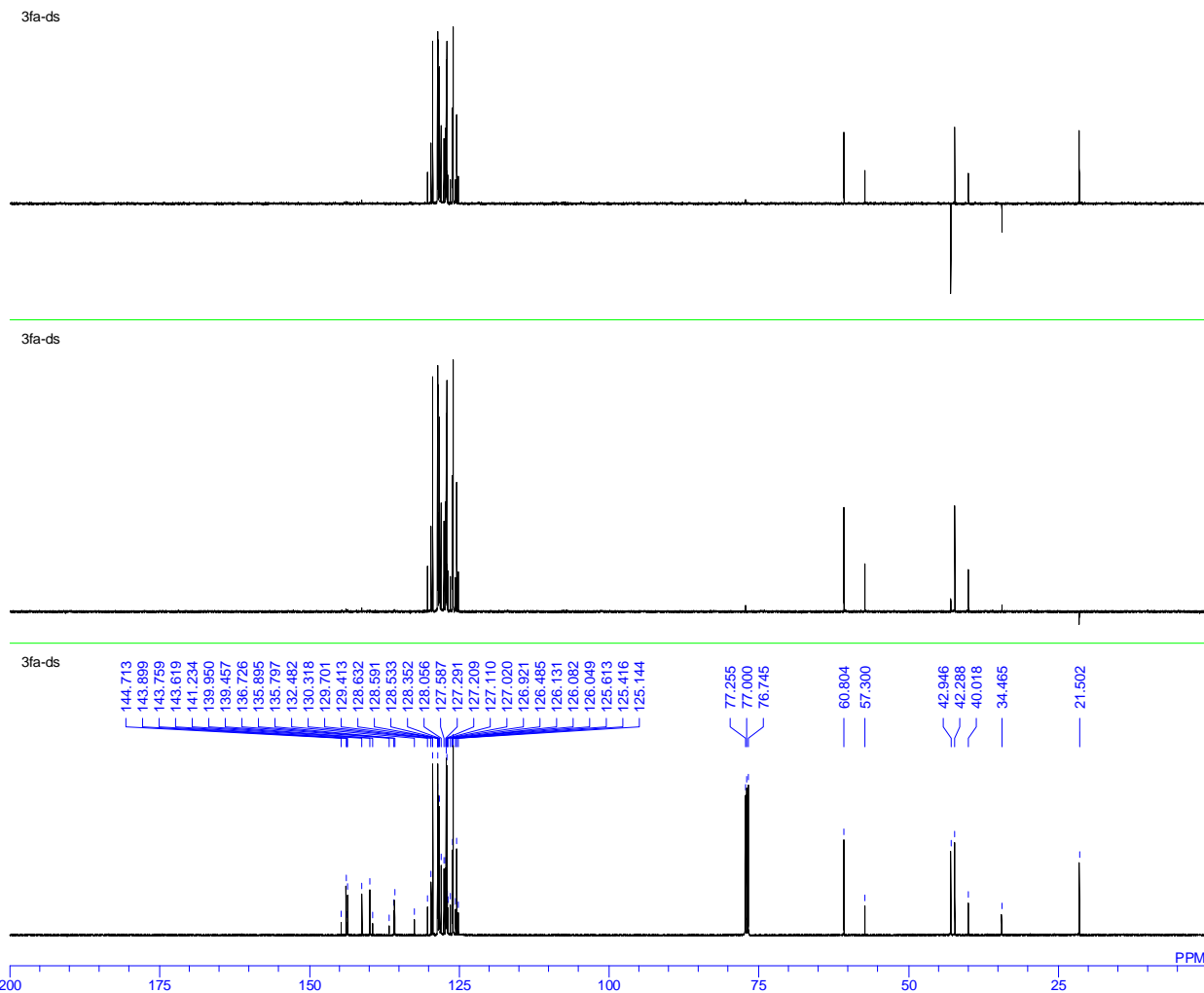


DATIM Mon Dec 28 21:01:59 2015  
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 OBFIN 2160.00 Hz  
 PW1 5.00 usec  
 DEADT 57.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0005 sec  
 POINT 32768  
 SPO 32768  
 TIMES 32  
 DUMMY 0  
 FREQU 10000.00 Hz  
 FLT 5000 Hz  
 DELAY 40.00 usec  
 ACQTM 3.2768 sec  
 PD 3.7232 sec  
 ADBIT 16  
 RGAIN 15  
 BF 0.09 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD non  
 EXPCM  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE 3fa-ds\_1H\_minor.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 29293  
 CSPED 11 Hz  
 FILDC  
 FILDF

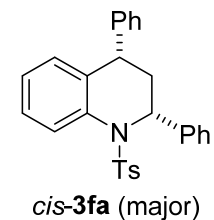


# <sup>13</sup>C NMR spectrum of diastereomixture-3fa (*cis*-major)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3fa-ds(CR529)\3fa-ds\_DEPT.als



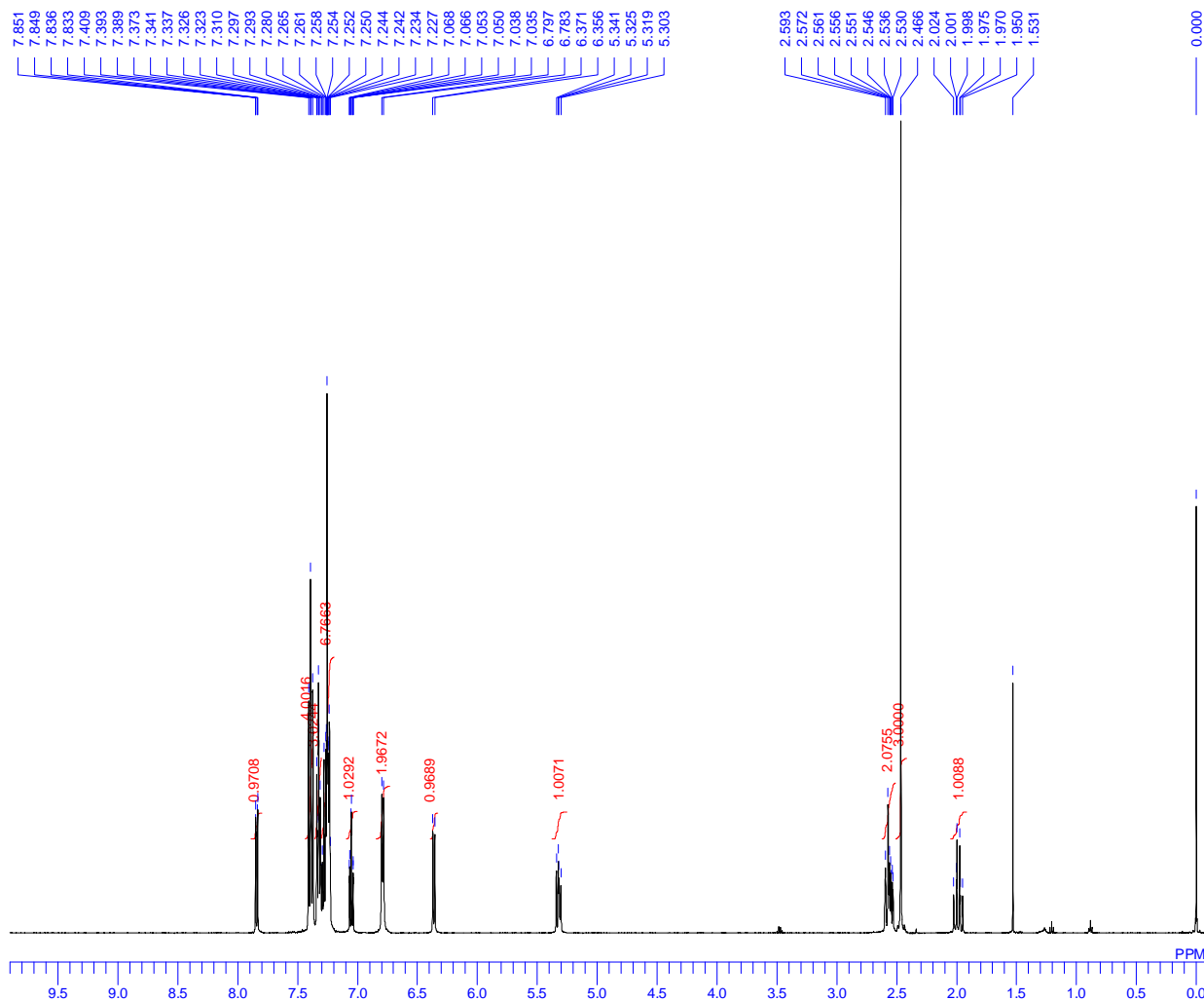
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 OBFIN 7958.00 Hz  
 PW1 4.40 usec  
 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 2048  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 0.09 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE 3fa-ds\_DEPT.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 41124  
 CSPED 11 Hz  
 FILDC  
 FILDF



# <sup>1</sup>H NMR spectrum of *cis*-3fa (major)

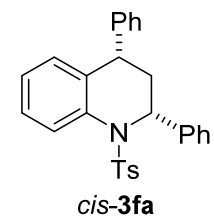
cis-3fa

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3fa cis (CR530-29)\cis-3fa\_1H.als



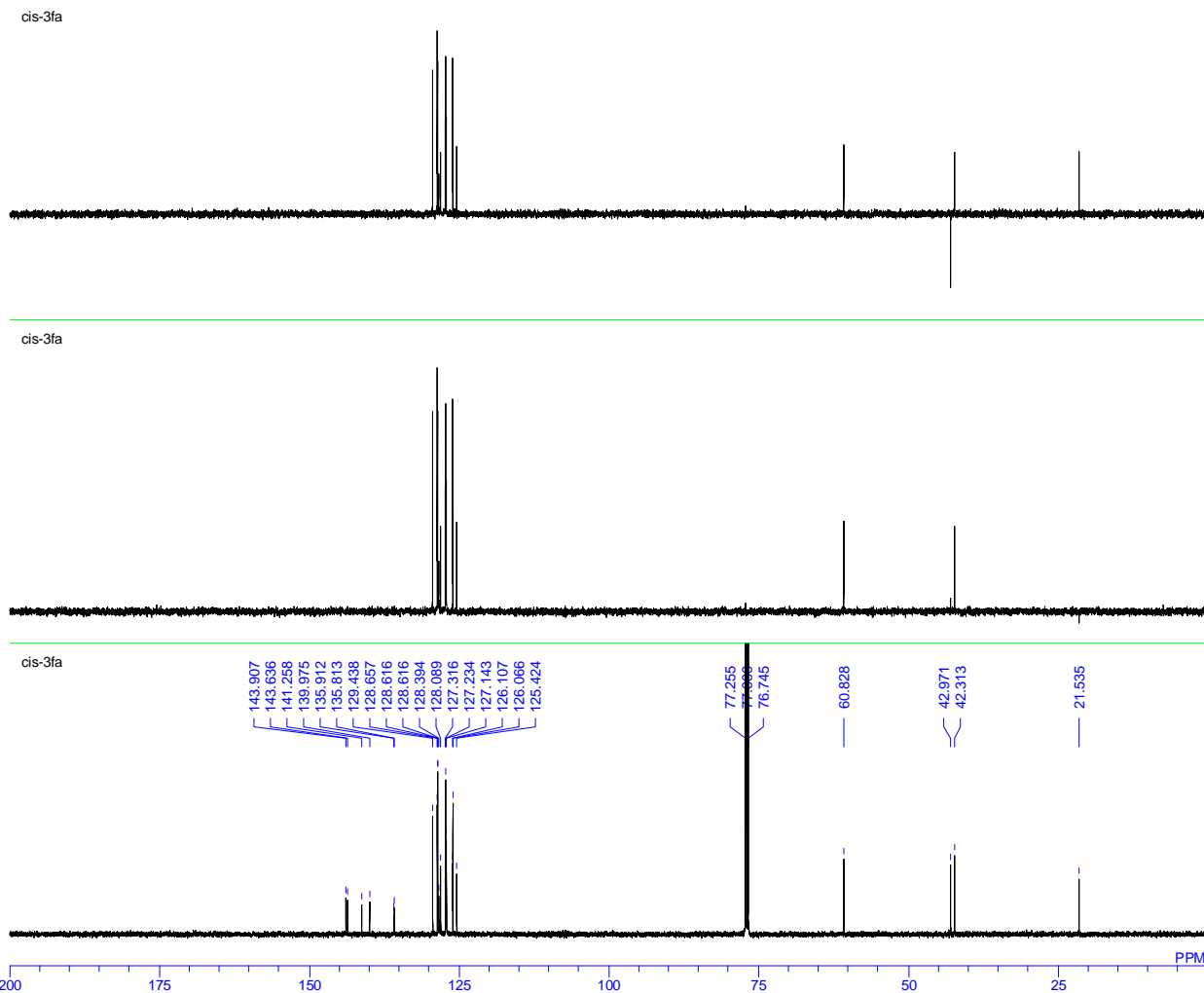
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POINT 32768
SPO 32768
TIMES 16
DUMMY 0
FREQU 10000.00 Hz
FLT 5000 Hz
DELAY 40.00 usec
ACQTM 3.2768 sec
PD 3.7232 sec
ADBIT 16
RGAIN 20
BF 0.09 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD non
EXPCM
IRNUC 1H
IFR 500.00 MHz
IRSET 160.00 KHz
IRFIN 2160.00 Hz
IRRPW 0 usec
IRATN 511
DFILE cis-3fa_1H.als
SF th5.shm
LKSET 70.00 KHz
LKFIN 334.0 Hz
LKLEV 200
LGAIN 20
LKPHS 210
LKSIG -725820079
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FILDC
FILDF
    
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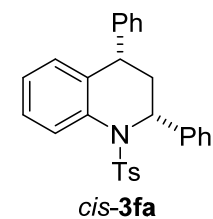


# <sup>13</sup>C NMR spectrum of *cis*-3fa (major)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3fa cis (CR530-29)\cis-3fa\_DEPT.als



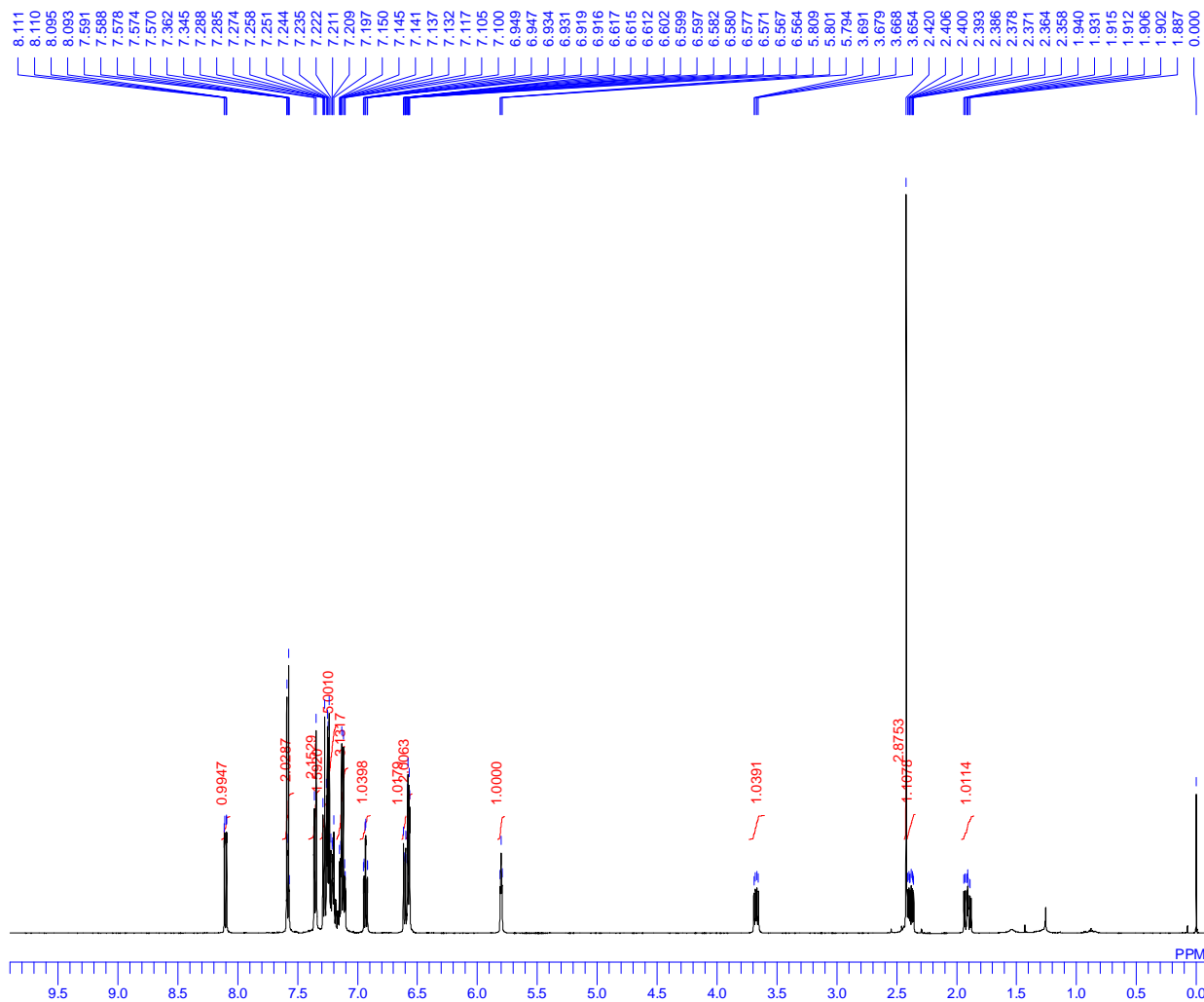
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OBFIN	7958.00 Hz
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DEADT	15.50 usec
PREDL	10.00000 msec
IWT	0.0100 sec
POINT	32768
SPO	32768
TIMES	1024
DUMMY	1
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	0.9667 sec
PD	2.0333 sec
ADBIT	16
RGAIN	28
BF	0.09 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	error_expcm
IRNUC	1H
IFR	500.00 MHz
IRSET	160.00 KHz
IRFIN	2160.00 Hz
IRRPW	0 usec
IRATN	511
DFILE	cis-3fa_DEPT.als
SF	th5.shm
LKSET	70.00 KHz
LKFIN	334.0 Hz
LKLEV	200
LGAIN	20
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LKSIG	486
CSPED	10 Hz
FILDC	
FILDF	



# <sup>1</sup>H NMR spectrum of *trans*-3fa (minor)

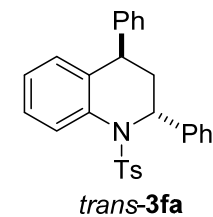
3fa-minor

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3fa-minor\2\3fa-minor\_1H\3fa-minor\_1H.als



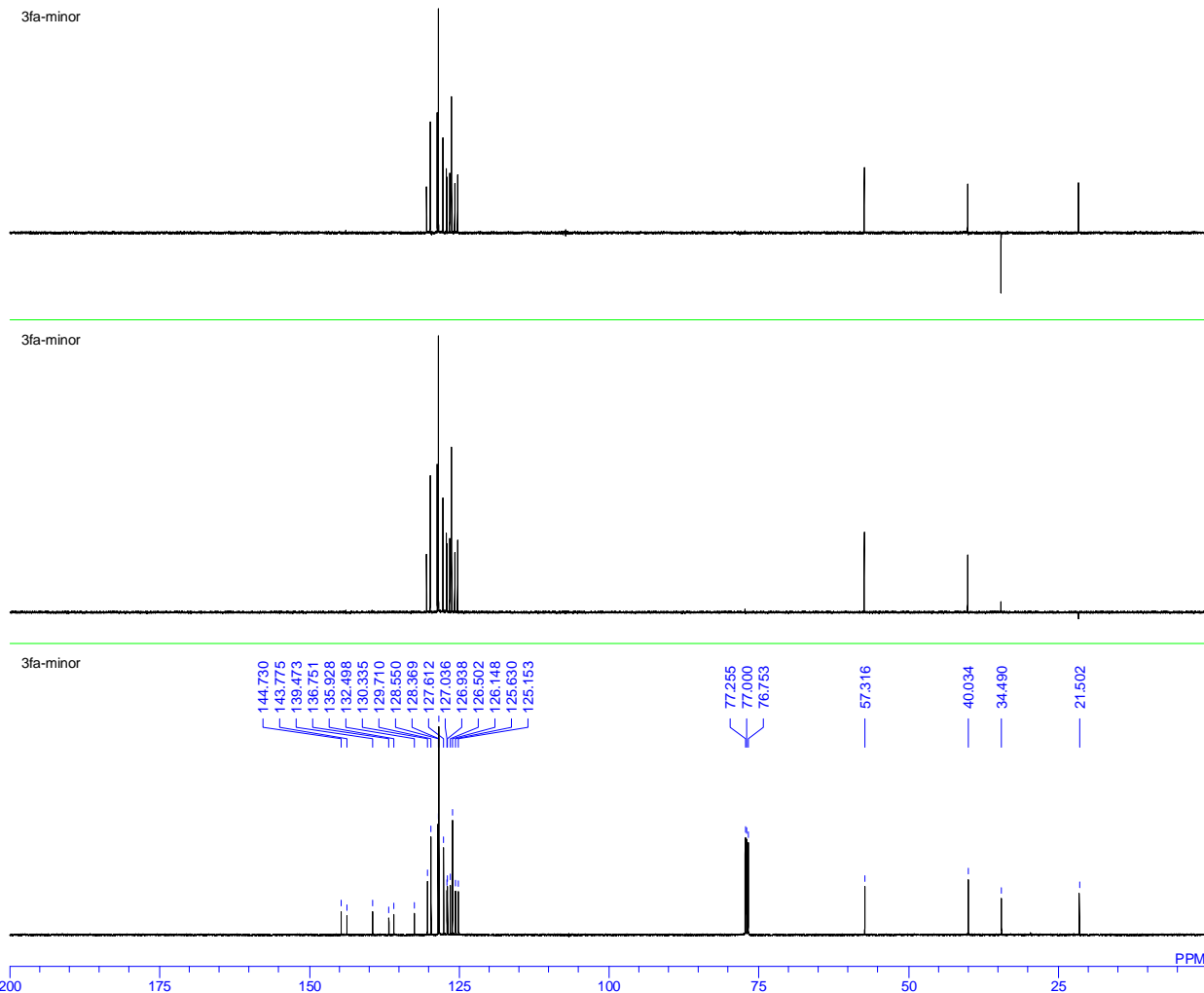
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DATIM Wed Dec 30 18:50:07 2015
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OBFIN 2160.00 Hz
PW1 5.00 usec
DEADT 57.50 usec
PREDL 10.00000 msec
IWT 0.0005 sec
POINT 32768
SPO 32768
TIMES 16
DUMMY 0
FREQU 10000.00 Hz
FLT 5000 Hz
DELAY 40.00 usec
ACQTM 3.2768 sec
PD 3.7232 sec
ADBIT 16
RGAIN 17
BF 0.09 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD non
EXPCM
IRNUC 1H
IFR 500.00 MHz
IRSET 160.00 KHz
IRFIN 2160.00 Hz
IRRPW 0 usec
IRATN 511
DFILE 3fa-minor_1H.als
SF th5.shm
LKSET 70.00 KHz
LKFIN 334.0 Hz
LKLEV 200
LGAIN 20
LKPHS 210
LKSIG -4488546
CSPED 10 Hz
FILDC
FILDF
    
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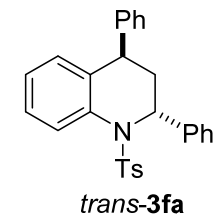


**<sup>13</sup>C NMR spectrum of *trans*-3fa (minor)**

C:\Users\NMR\NMRdata\NMR NOII\Quinoline styrene\3fa-minor\2\3fa-minor\_DEPT.als



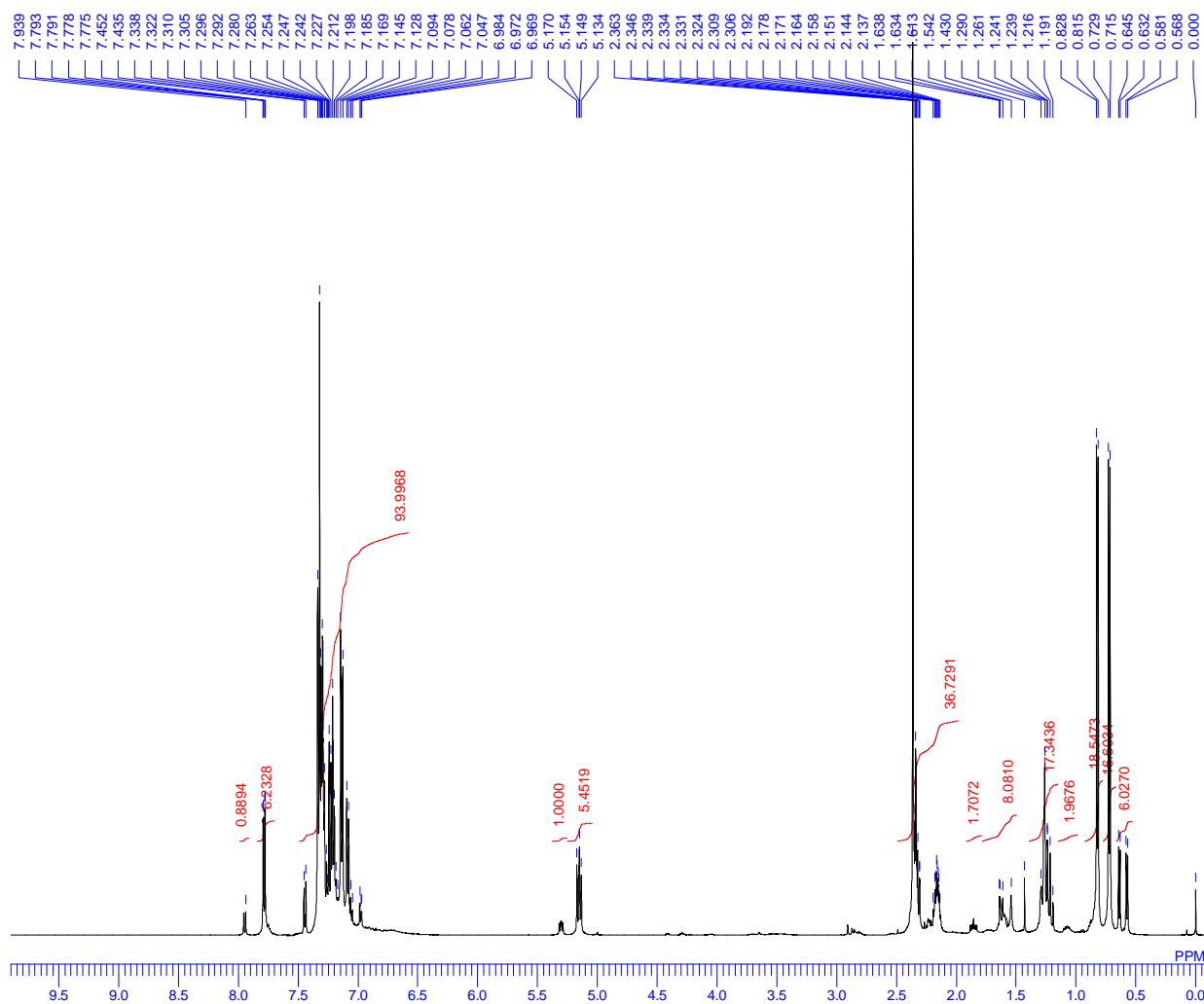
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OBSET	120.00 KHz
OBFIN	7958.00 Hz
PW1	4.40 usec
DEADT	15.50 usec
PREDL	10.00000 msec
IWT	0.0100 sec
POINT	32768
SPO	32768
TIMES	1024
DUMMY	1
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	0.9667 sec
PD	2.0333 sec
ADBIT	16
RGAIN	28
BF	1.20 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	error_expcm
IRNUC	1H
IFR	500.00 MHz
IRSET	160.00 KHz
IRFIN	2160.00 Hz
IRRPW	0 usec
IRATN	511
DFILE	3fa-minor_DEPT.als
SF	th5.shm
LKSET	70.00 KHz
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LKLEV	200
LGAIN	20
LKPHS	210
LKSIG	19564
CSPED	10 Hz
FILDC	
FILDF	



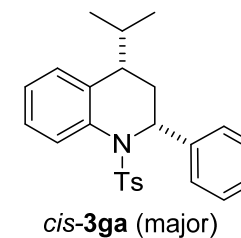
# <sup>1</sup>H NMR spectrum of diastereomixture-3ga (*cis*-major)

3ga-ds(CR548-BC)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ga-ds (CR548-BC, iPr)\CR548-BC\_1H.als



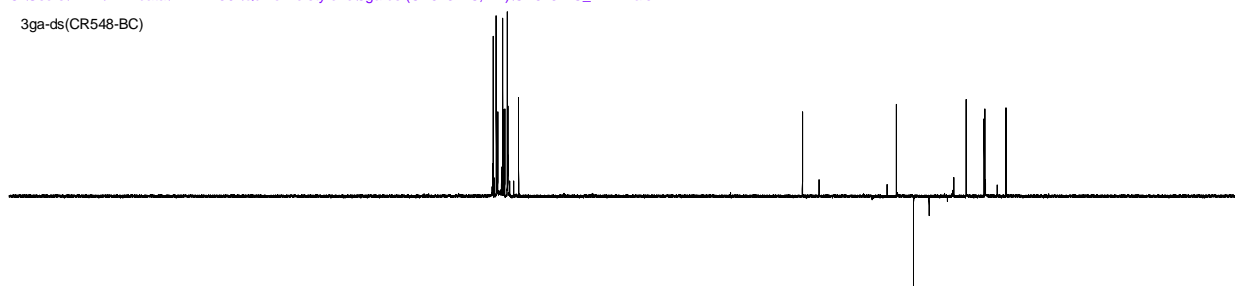
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 OFR 160.00 KHz  
 OBSET 2160.00 Hz  
 OBFIN 5.00 usec  
 PW1 57.50 usec  
 DEADT 10.0000 msec  
 PREDL 0.0005 sec  
 IWT 32768  
 POINT 32768  
 SPO 16  
 TIMES 0  
 DUMMY 10000.00 Hz  
 FREQU 5000 Hz  
 FLT 40.00 usec  
 DELAY 3.2768 sec  
 ACQTM 3.7232 sec  
 PD 16  
 ADBIT 15  
 RGAIN 1.20 Hz  
 BF 0.00  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD non  
 EXPCM 1H  
 IRNUC 500.00 MHz  
 IFR 160.00 KHz  
 IRSET 2160.00 Hz  
 IRFIN 0 usec  
 IRRPW 511  
 IRATN CR548-BC\_1H.als  
 DFILE th5.shm  
 SF 70.00 KHz  
 LKSET 334.0 Hz  
 LKFIN 200  
 LKLEV 20  
 LGAIN 210  
 LKPHS 36865  
 LKSIG 13 Hz  
 CSPED  
 FILDC  
 FILDF



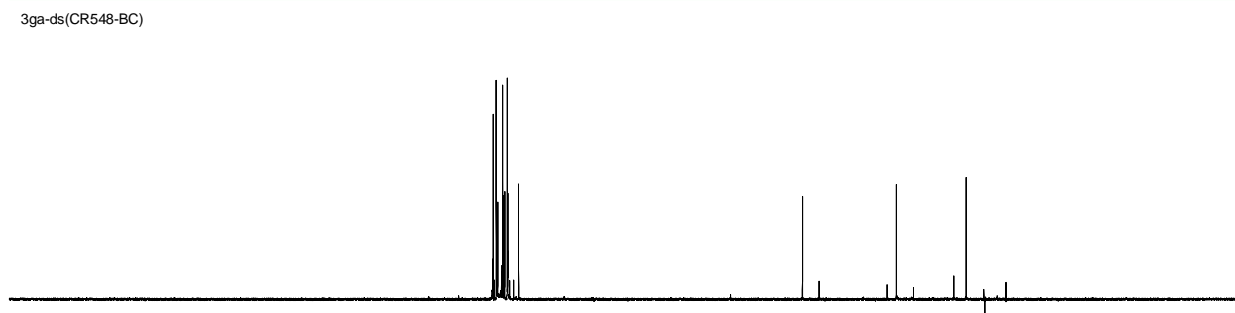
# <sup>13</sup>C NMR spectrum of diastereomixture-3ga (*cis*-major)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ga-ds (CR548-BC, iPr)\CR548-BC\_DEPT.als

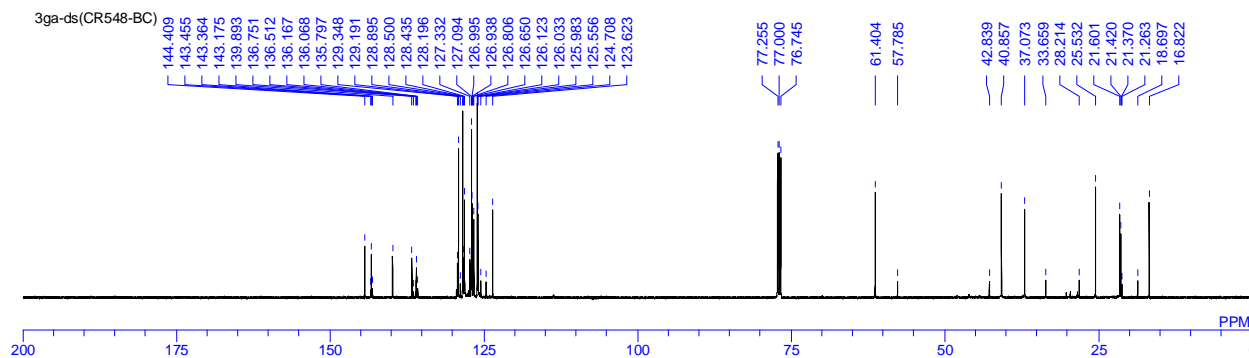
3ga-ds(CR548-BC)



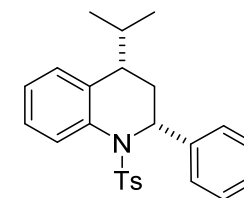
3ga-ds(CR548-BC)



3ga-ds(CR548-BC)



DATIM Mon Mar 14 21:23:31 2016  
 MENUF  
 OBNUC 13C  
 OFR 125.65 MHz  
 OBSET 120.00 KHz  
 OBFIN 7958.00 Hz  
 PW1 4.40 usec  
 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 2048  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 1.20 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE CR548-BC\_DEPT.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 8843  
 CSPED 11 Hz  
 FILDC  
 FILDF

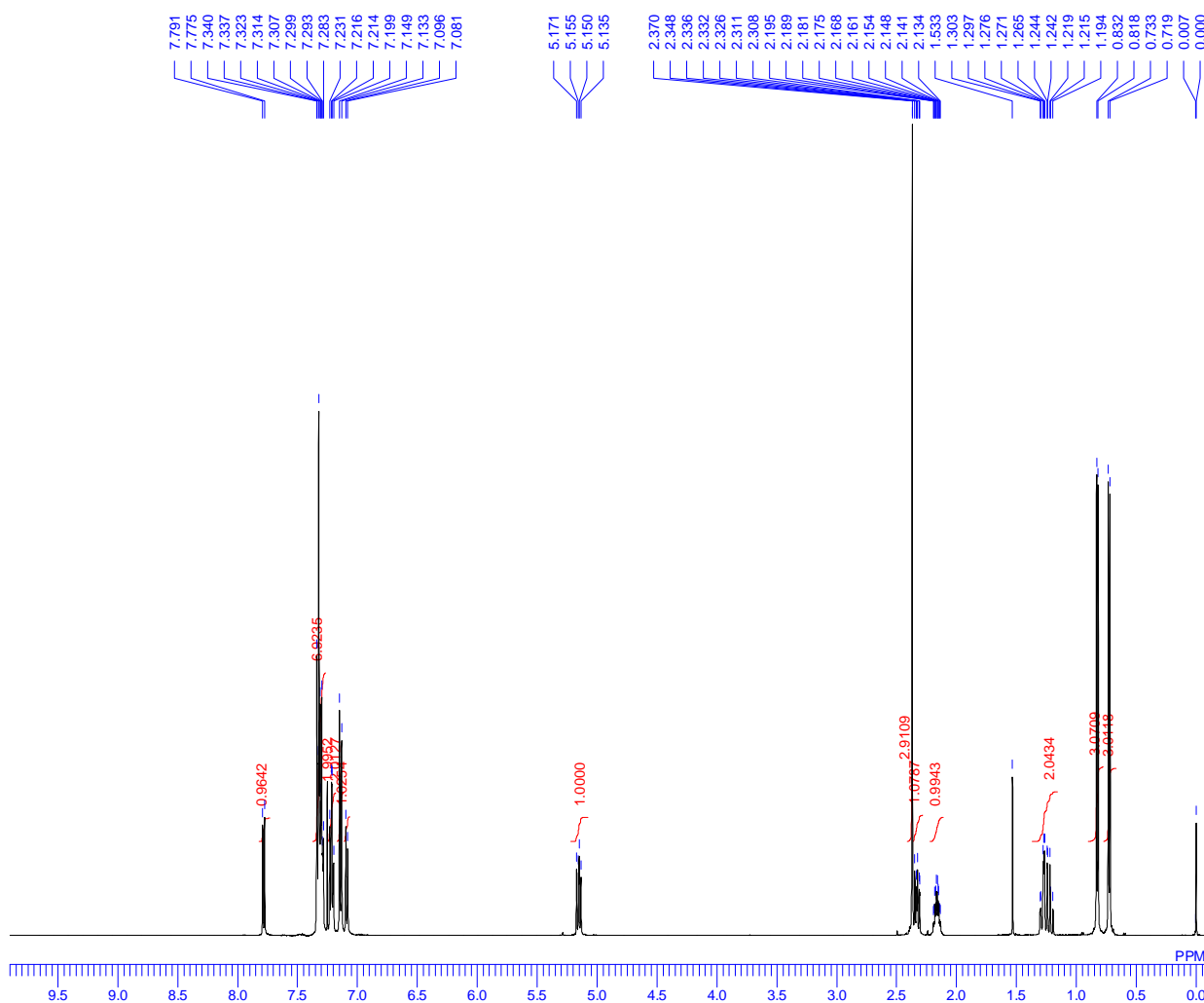


*cis*-3ga (major)

# <sup>1</sup>H NMR spectrum of *cis*-3ga (major)

3ga-major

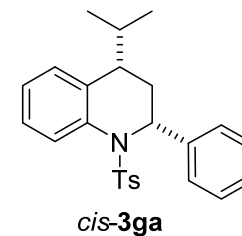
C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ga-major(NS, i-Pr)\3ga-major\_1H\3ga-major\_1H.als



DATIM Mon Feb 15 17:51:17 2016

1H

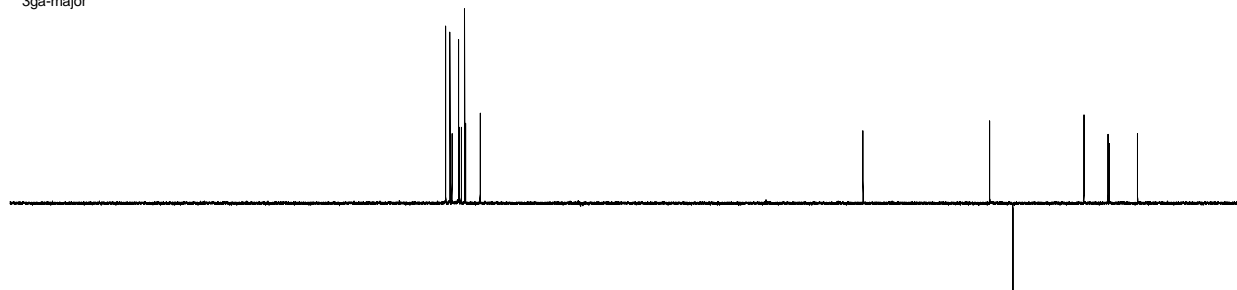
500.00 MHz  
160.00 KHz  
2160.00 Hz  
5.00 usec  
57.50 usec  
10.00000 msec  
0.0005 sec  
32768  
32768  
16  
0  
10000.00 Hz  
5000 Hz  
40.00 usec  
3.2768 sec  
3.7232 sec  
16  
19  
1.21 Hz  
0.00  
0.00  
70.00  
100.00  
non  
1H  
500.00 MHz  
160.00 KHz  
2160.00 Hz  
0 usec  
511  
3ga-major\_1H.als  
th5.shm  
70.00 KHz  
334.0 Hz  
200  
20  
210  
26881  
12 Hz



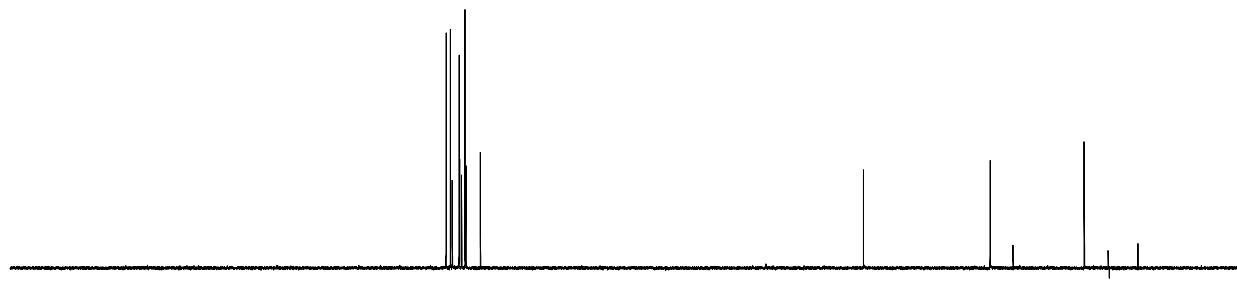
# <sup>13</sup>C NMR spectrum of *cis*-3ga (major)

C:\Users\NMR\NMRdata\NMR NOII\Quinoline styrene\3ga-major(NS, i-Pr)\3ga-major\_13C\3ga-major\_13C.als

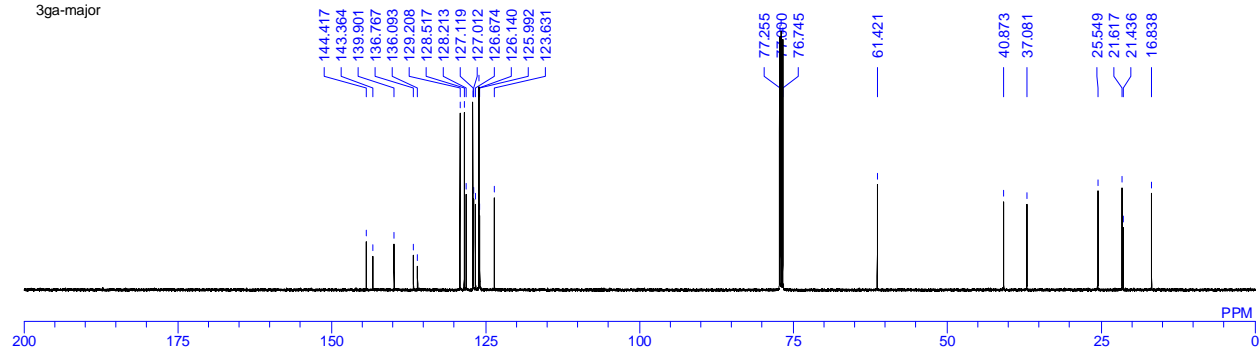
3ga-major



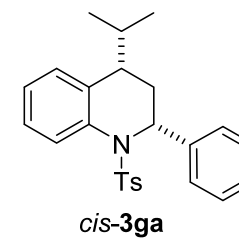
3ga-major



3ga-major



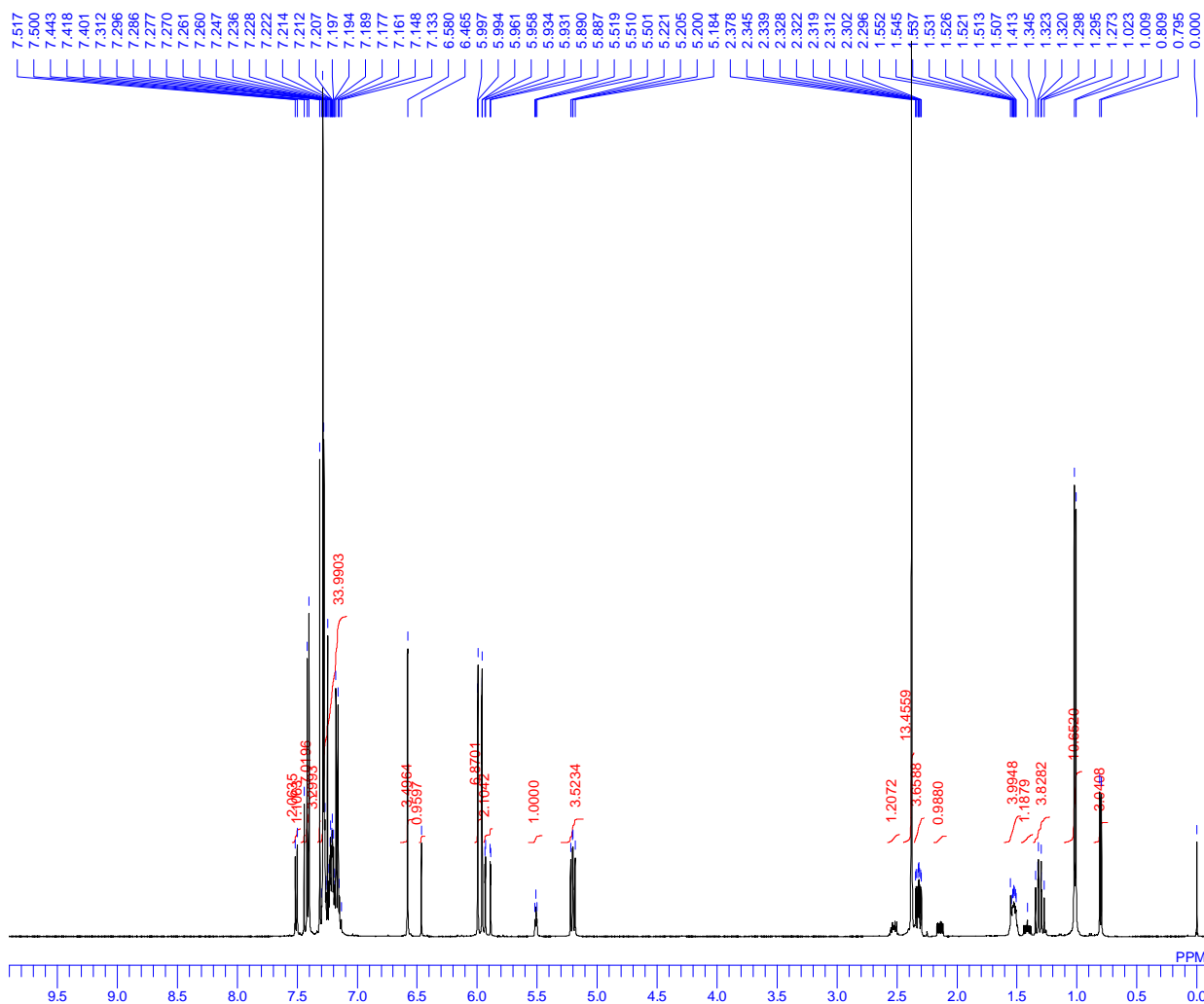
DATIM	Mon Feb 15 19:35:02 2016
MENUF	
OBNUC	13C
OFR	125.65 MHz
OBSET	120.00 KHz
OBFIN	7958.00 Hz
PW1	4.40 usec
DEADT	15.50 usec
PREDL	10.00000 msec
IWT	0.0100 sec
POINT	32768
SPO	32768
TIMES	2048
DUMMY	1
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	0.9667 sec
PD	2.0333 sec
ADBIT	16
RGAIN	28
BF	1.21 Hz
T1	0.00
T2	0.00
T3	70.00
T4	100.00
EXMOD	bcm
EXPCM	error_expcm
IRNUC	1H
IFR	500.00 MHz
IRSET	160.00 KHz
IRFIN	2160.00 Hz
IRRPW	0 usec
IRATN	511
DFILE	3ga-major_13C.als
SF	th5.shm
LKSET	70.00 KHz
LKFIN	334.0 Hz
LKLEV	200
LGAIN	20
LKPHS	210
LKSIG	37396
CSPED	12 Hz
FILDC	
FILDF	



# <sup>1</sup>H NMR spectrum of diastereomixture-3ha (*cis*-major)

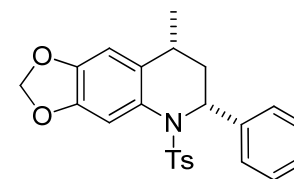
3ha-ds cis, major(CR538)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ha-ds (CR538-AB, OCH2O)\CR538-AB\_1H\CR538-AB\_1H.nmdata



```

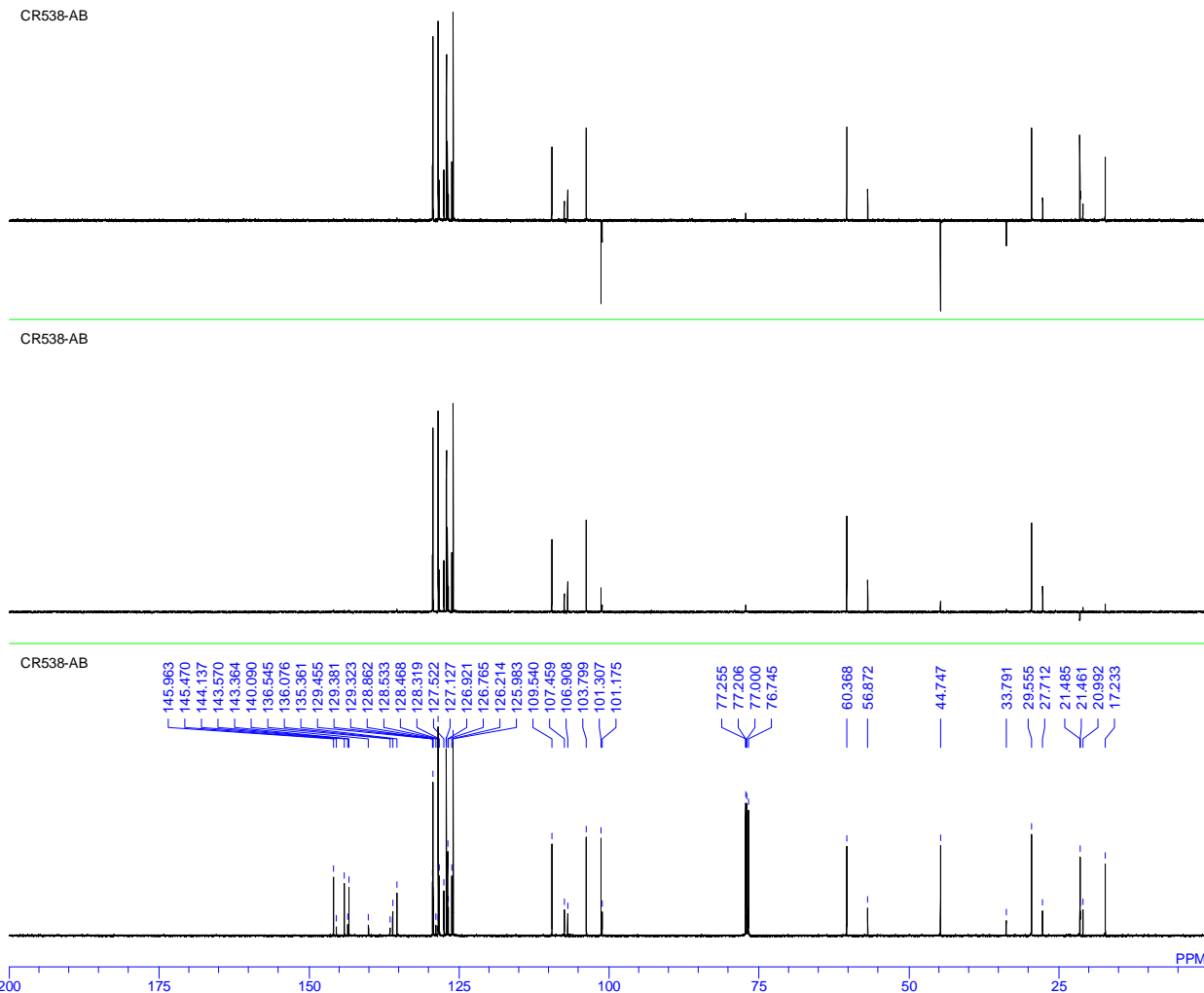
DATIM  Fri Jan 15 19:45:37 2016
MENUF
OBNUC  1H
OFR    500.00 MHz
OBSET  160.00 KHz
OBFIN  2160.00 Hz
PW1    5.00 usec
DEADT  57.50 usec
PREDL  10.00000 msec
IWT    0.0005 sec
POINT  32768
SPO    32768
TIMES  16
DUMMY  0
FREQU  10000.00 Hz
FLT    5000 Hz
DELAY  40.00 usec
ACQTM  3.2768 sec
PD     3.7232 sec
ADBIT  16
RGAIN  16
BF     1.20 Hz
T1     0.00
T2     0.00
T3     90.00
T4     100.00
EXMOD  non
EXPCM
IRNUC  1H
IFR    500.00 MHz
IRSET  160.00 KHz
IRFIN  2160.00 Hz
IRRPW  0 usec
IRATN  511
DFILE  CR538-AB_1H.nmdata
SF     th5.shm
LKSET  70.00 KHz
LKFIN  334.0 Hz
LKLEV  200
LGAIN  20
LKPHS  210
LKSIG  2126240721
CSPED  13 Hz
FILDC
FILDF
    
```



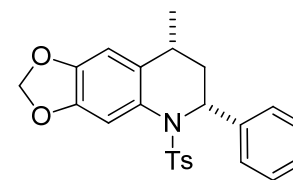
*cis*-3ha (major)

# <sup>13</sup>C NMR spectrum of diastereomixture-3ha (*cis*-major)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ha-ds (CR538-AB, OCH2O)\CR538-AB\_13C\CR538-AB\_13C.als



DATIM Fri Jan 15 20:38:08 2016  
 MENUF  
 OBNUC 13C  
 OFR 125.65 MHz  
 OBSET 120.00 KHz  
 OBFIN 7958.00 Hz  
 PW1 4.40 usec  
 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 1024  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 1.20 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE CR538-AB\_13C.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSG -599926122  
 CSPED 10 Hz  
 FILDC  
 FILDF

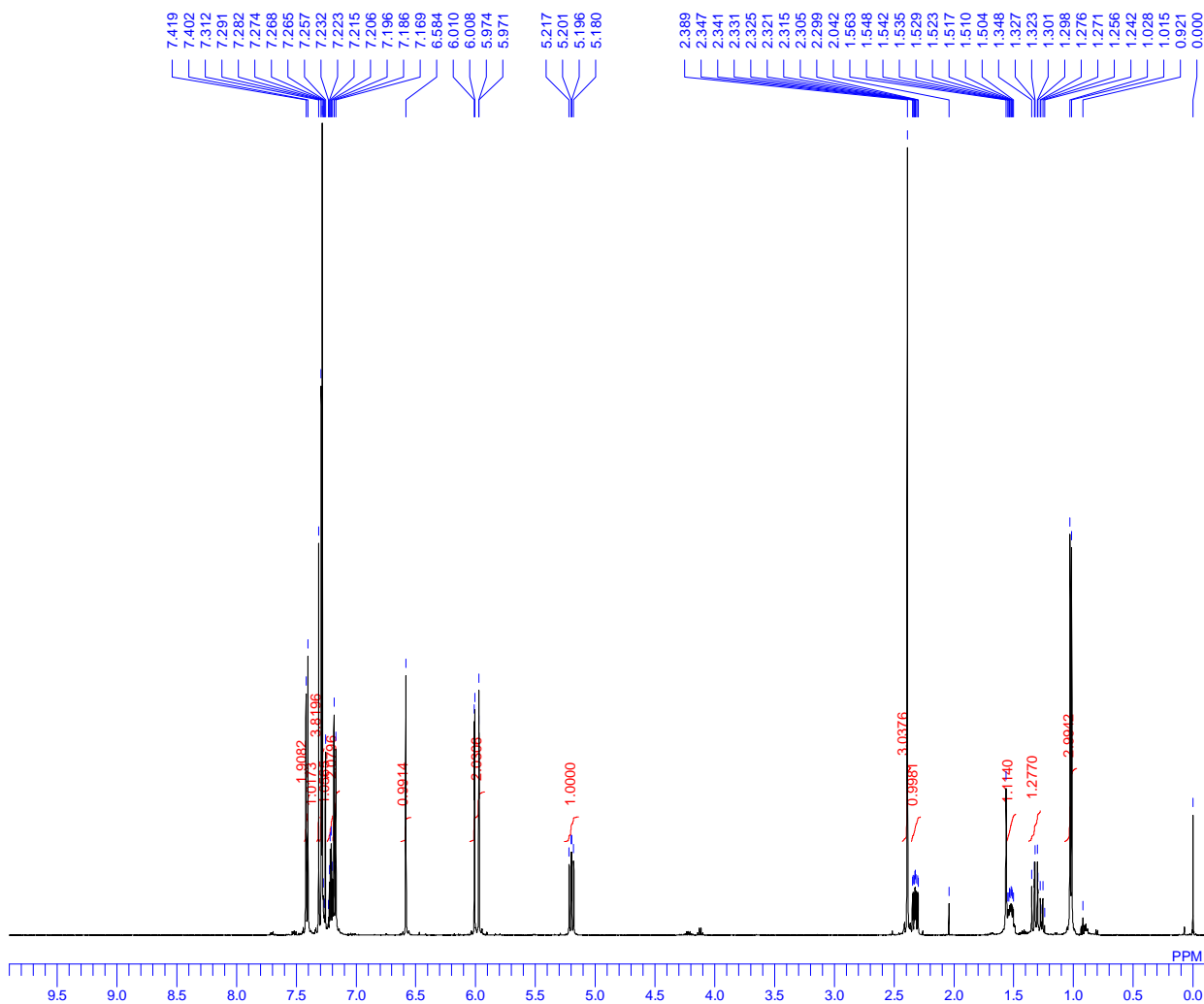


*cis*-3ha (major)

# <sup>1</sup>H NMR spectrum of *cis*-3ha (major)

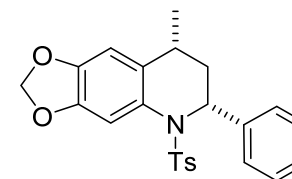
*cis*-3ha (methylenedioxy)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\OCH2O 3ha 843(YMT12major, cis)\*cis*-3ha (methylenedioxy)843(YMT12major)\_1H.als



```

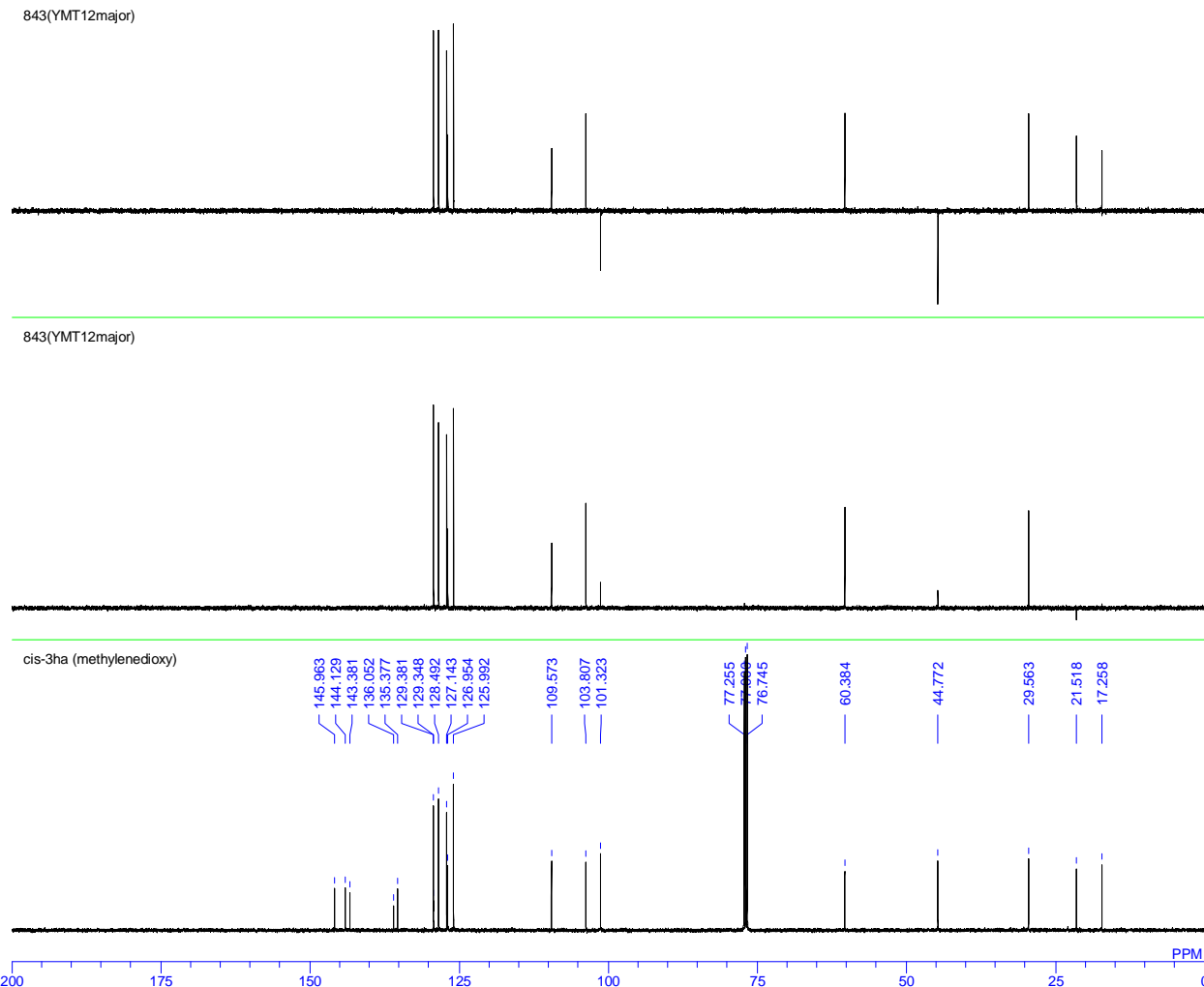
DATIM  Sun Jul 29 14:11:28 2012
MENUF
OBNUC  1H
OFR    500.00 MHz
OBSET  160.00 KHz
OBFIN  2160.00 Hz
PW1    6.40 usec
DEADT  56.80 usec
PREDL  10.00000 msec
IWT    0.0005 sec
POINT  32768
SPO    32768
TIMES  16
DUMMY  0
FREQU  10000.00 Hz
FLT    5000 Hz
DELAY  40.00 usec
ACQTM  3.2768 sec
PD     3.7232 sec
ADBIT  16
RGAIN  18
BF     0.09 Hz
T1     0.00
T2     0.00
T3     90.00
T4     100.00
EXMOD  non
EXPCM
IRNUC  1H
IFR    500.00 MHz
IRSET  160.00 KHz
IRFIN  2160.00 Hz
IRRPW  0 usec
IRATN  511
DFILE  cis-3ha (methylenedioxy)843(YMT12major)_1H.als
SF     th5.shm
LKSET  70.00 KHz
LKFIN  334.0 Hz
LKLEV  200
LGAIN  20
LKPHS  210
LKSIG  -608459268
CSPED  11 Hz
FILDC
FILDF
    
```



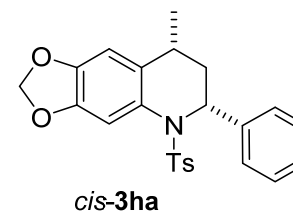
*cis*-3ha

# <sup>13</sup>C NMR spectrum of *cis*-3ha (major)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\OCH2O 3ha 843(YMT12major, cis)\843(YMT12major)\_13C\843(YMT12major)\_13C.als



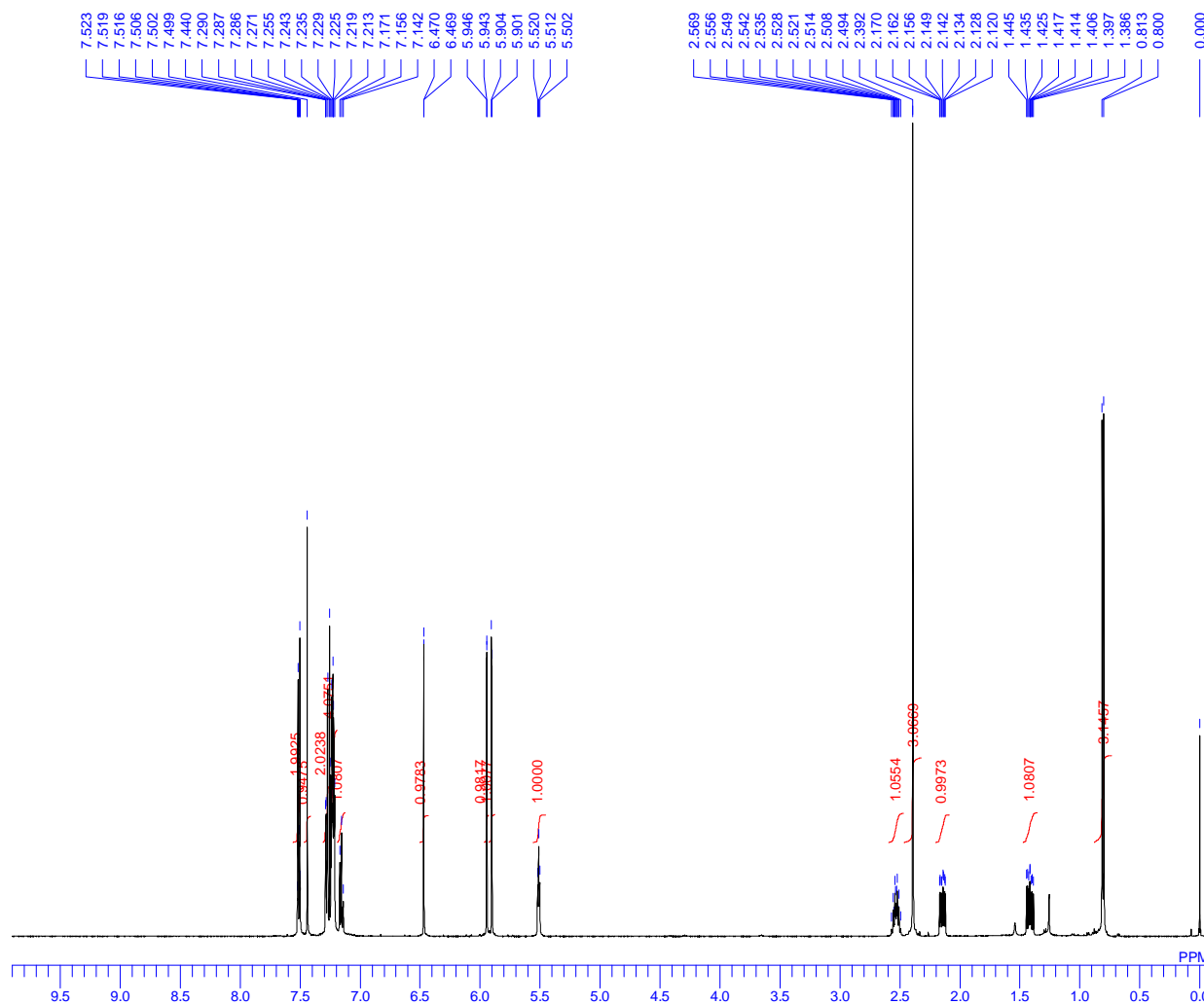
DATIM Sun Jul 29 15:03:52 2012  
 MENUF  
 OBNUC 13C  
 OFR 125.65 MHz  
 OBSET 120.00 KHz  
 OBFIN 7958.00 Hz  
 PW1 5.40 usec  
 DEADT 10.00 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 1024  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 27  
 BF 0.09 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE 843(YMT12major)\_13C.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 129864346  
 CSPED 12 Hz  
 FILDC  
 FILDF



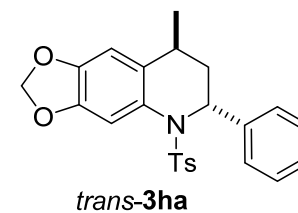
# <sup>1</sup>H NMR spectrum of *trans*-3ha (minor)

trans-3ha, minor (CR540)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ha-trans (CR540-minor, OCH2O)\CR540-minor\_1H\CR540-minor\_1H.als

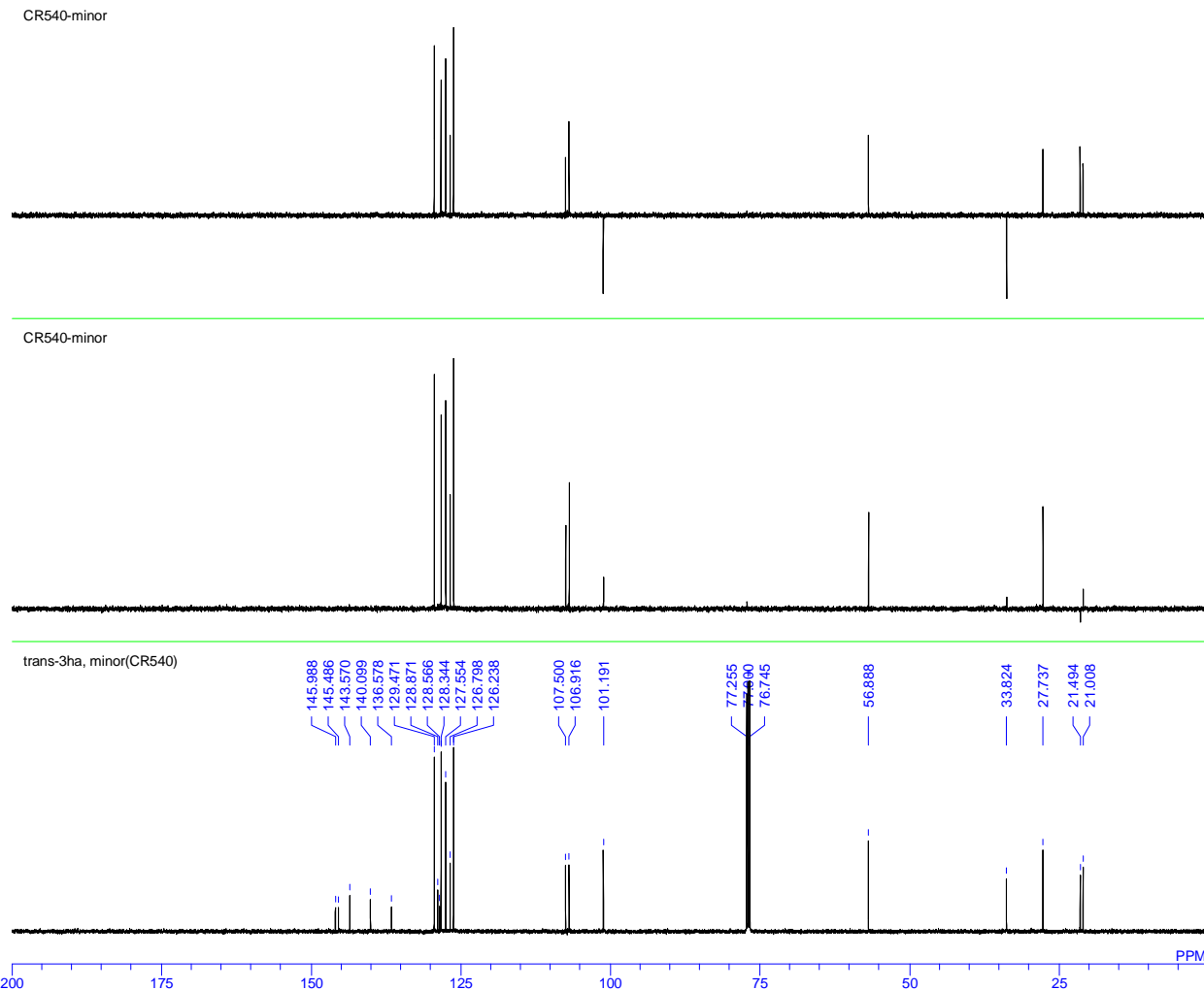


DATIM Fri Jan 15 22:06:07 2016  
 MENUF  
 OBNUC 1H  
 OFR 500.00 MHz  
 OBSET 160.00 KHz  
 OBFIN 2160.00 Hz  
 PW1 5.00 usec  
 DEADT 57.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0005 sec  
 POINT 32768  
 SPO 32768  
 TIMES 16  
 DUMMY 0  
 FREQU 10000.00 Hz  
 FLT 5000 Hz  
 DELAY 40.00 usec  
 ACQTM 3.2768 sec  
 PD 3.7232 sec  
 ADBIT 16  
 RGAIN 20  
 BF 1.20 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD non  
 EXPCM  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE CR540-minor\_1H.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 1883041686  
 CSPED 12 Hz  
 FILDC  
 FILDF



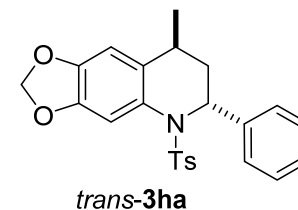
# <sup>13</sup>C NMR spectrum of *trans*-3ha (minor)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ha-trans (CR540-minor, OCH2O)\CR540-minor\_13C\CR540-minor\_13C.als



```

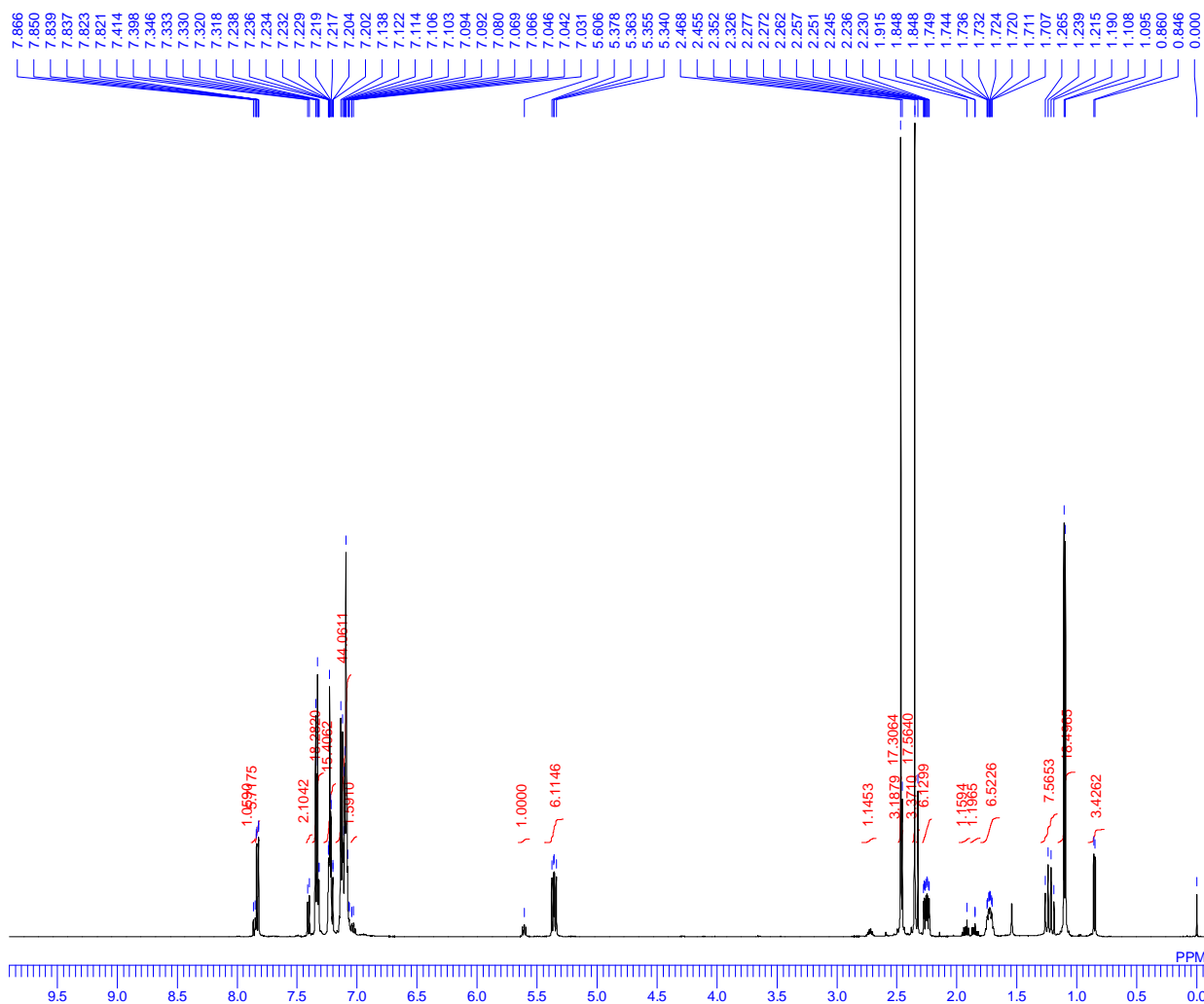
DATIM  Fri Jan 15 22:58:39 2016
MENUF
OBNUC  13C
OFR    125.65 MHz
OBSET  120.00 KHz
OBFIN  7958.00 Hz
PW1    4.40 usec
DEADT  15.50 usec
PREDL  10.00000 msec
IWT    0.0100 sec
POINT  32768
SPO    32768
TIMES  1024
DUMMY  1
FREQU  33898.30 Hz
FLT    16950 Hz
DELAY  11.80 usec
ACQTM  0.9667 sec
PD     2.0333 sec
ADBIT  16
RGAIN  28
BF     1.20 Hz
T1     0.00
T2     0.00
T3     90.00
T4     100.00
EXMOD  bcm
EXPCM  error_expcm
IRNUC  1H
IFR    500.00 MHz
IRSET  160.00 KHz
IRFIN  2160.00 Hz
IRRPW  0 usec
IRATN  511
DFILE  CR540-minor_13C.als
SF     th5.shm
LKSET  70.00 KHz
LKFIN  334.0 Hz
LKLEV  200
LGAIN  20
LKPHS  210
LKSIG  29274317
CSPED  13 Hz
FILDC
FILDF
    
```



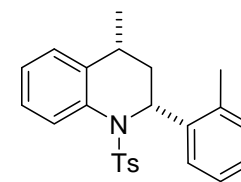
# <sup>1</sup>H NMR spectrum of diastereomixture-3ab (*cis*-major)

cis-3af (2-Me, ds-mix)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\2-Me-ds(CR511B)\CR511B(2-Me)\_1H\CR511B(2-Me)\_1H.als



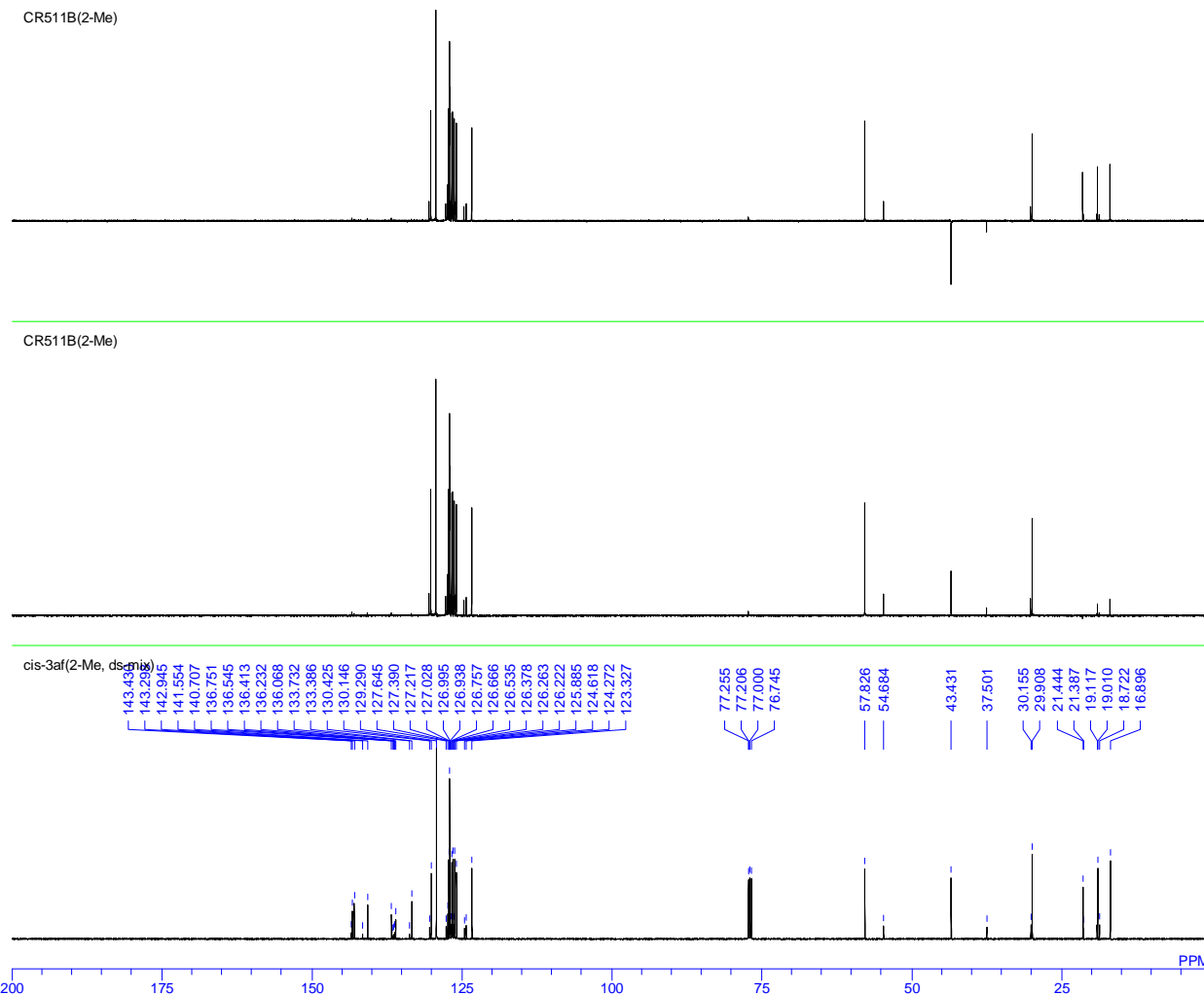
DATIM Tue Jul 7 20:07:56 2015  
 DF  
 COMNT cis-3af (2-Me, ds-mix)  
 OBNUC 1H  
 OFR 500.00 MHz  
 OBSET 160.00 KHz  
 OBFIN 2160.00 Hz  
 PW1 5.00 usec  
 PW2 20.00 usec  
 PW3 10.00 usec  
 P1 0.2500 msec  
 P2 0.2500 msec  
 P3 1.0000 msec  
 LOOP1 1  
 POINT 32768  
 SPO 32768  
 SCANS 16  
 DUMMY 0  
 FREQU 10000.00 Hz  
 ACQTM 3.2768 sec  
 PD 3.7232 sec  
 RGAIN 14  
 BF 0.12 Hz  
 EXMOD non  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 CSPED 14 Hz  
 CTEMP 28.1 c  
 XE 5001.83 Hz  
 XS -224.30 Hz



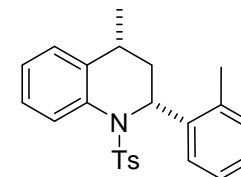
*cis*-3ab (major)

# <sup>13</sup>C NMR spectrum of diastereomixture-3ab (*cis*-major)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\2-Me-ds(CR511B)\CR511B(2-Me)\_DEPT.als



DATIM Tue Jul 7 21:00:28 2015  
DF  
COMNT cis-3af(2-Me, ds-mix)  
OBNUC 13C  
OFR 125.65 MHz  
OBSET 120.00 KHz  
OBFIN 7958.00 Hz  
PW1 4.40 usec  
PW2 50.00 usec  
PW3 12.00 usec  
P1 5660.0000 msec  
P2 0.2500 msec  
P3 1.0000 msec  
LOOP1 1  
POINT 32768  
SPO 32768  
SCANS 1024  
DUMMY 1  
FREQU 33898.30 Hz  
ACQTM 0.9667 sec  
PD 2.0333 sec  
RGAIN 28  
BF 0.12 Hz  
EXMOD bcm  
IRNUC 1H  
IFR 500.00 MHz  
IRSET 160.00 KHz  
IRFIN 2160.00 Hz  
IRRPW 0 usec  
IRATN 511  
CSPED 12 Hz  
CTEMP 29.8 c  
XE 25153.72 Hz  
XS 62.07 Hz

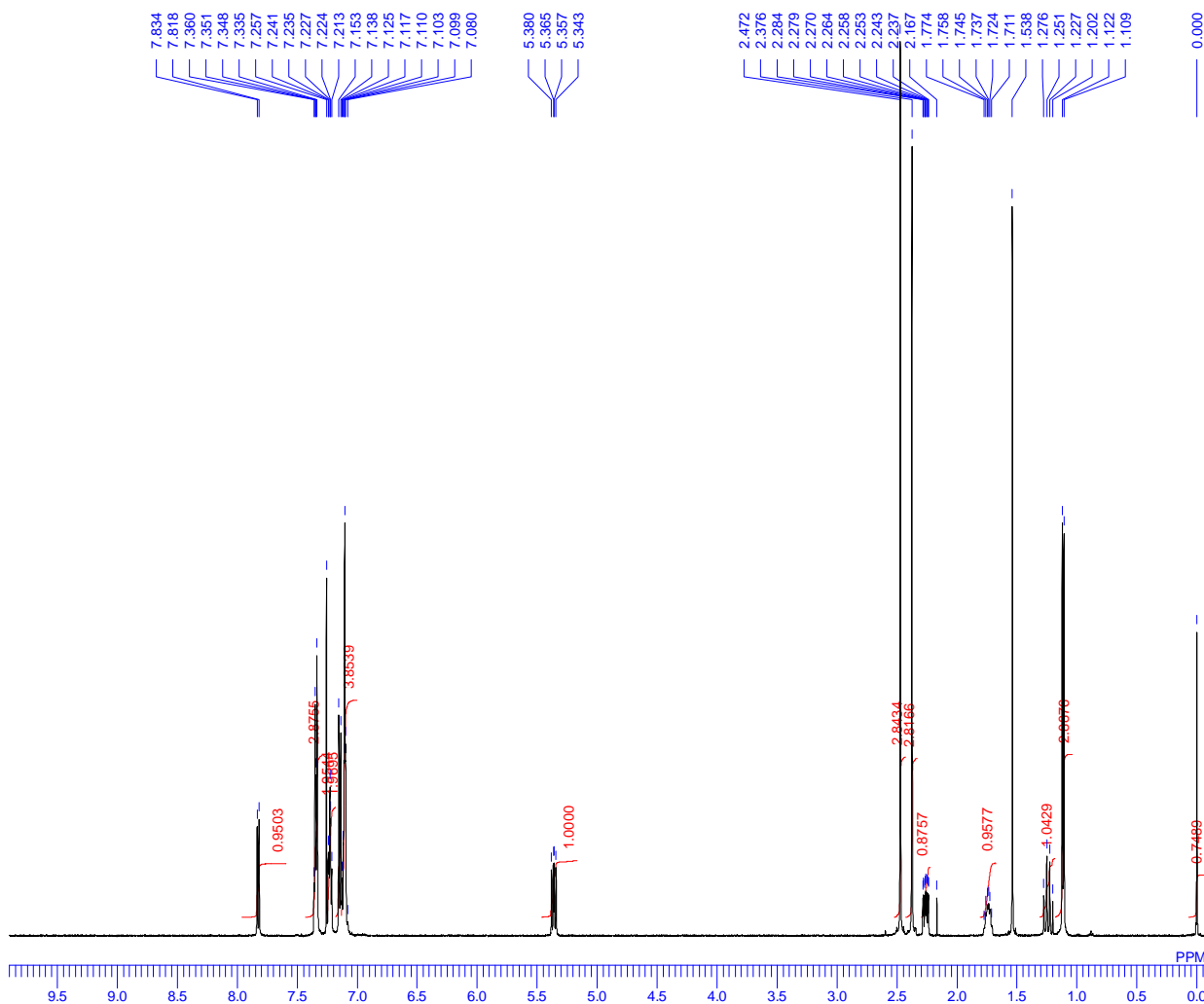


**cis-3ab** (major)

# <sup>1</sup>H NMR spectrum of *cis*-3ab (major)

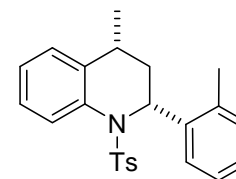
cis-3af(2-Me, major)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\cis-3af (2-Me, major)(RO3AB-CR4)\RO3AB-CR4\_1H.als



```

DATIM  Fri May 23 18:53:37 2014
MENUF
OBNUC  1H
OFR    500.00 MHz
OBSET  160.00 KHz
OBFIN  2160.00 Hz
PW1    5.00 usec
DEADT  57.50 usec
PREDL  10.00000 msec
IWT    0.0005 sec
POINT  32768
SPO    32768
TIMES  16
DUMMY  0
FREQU  10000.00 Hz
FLT    5000 Hz
DELAY  40.00 usec
ACQTM  3.2768 sec
PD     3.7232 sec
ADBIT  16
RGAIN  23
BF     1.20 Hz
T1     0.00
T2     0.00
T3     90.00
T4     100.00
EXMOD  non
EXPCM
IRNUC  1H
IFR    500.00 MHz
IRSET  160.00 KHz
IRFIN  2160.00 Hz
IRRPW  0 usec
IRATN  511
DFILE  RO3AB-CR4_1H.als
SF     th5.shm
LKSET  70.00 KHz
LKFIN  334.0 Hz
LKLEV  200
LGAIN  20
LKPHS  210
LKSIG  37466
CSPED  13 Hz
FILDC
FILDF
    
```



*cis*-3ab

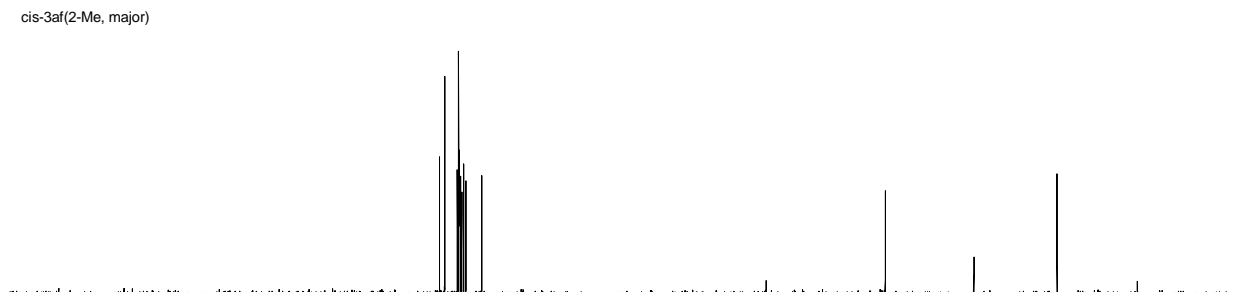
# <sup>13</sup>C NMR spectrum of *cis*-3ab (major)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\RO3AB-CR4\RO3AB-CR4\_DEPT.als

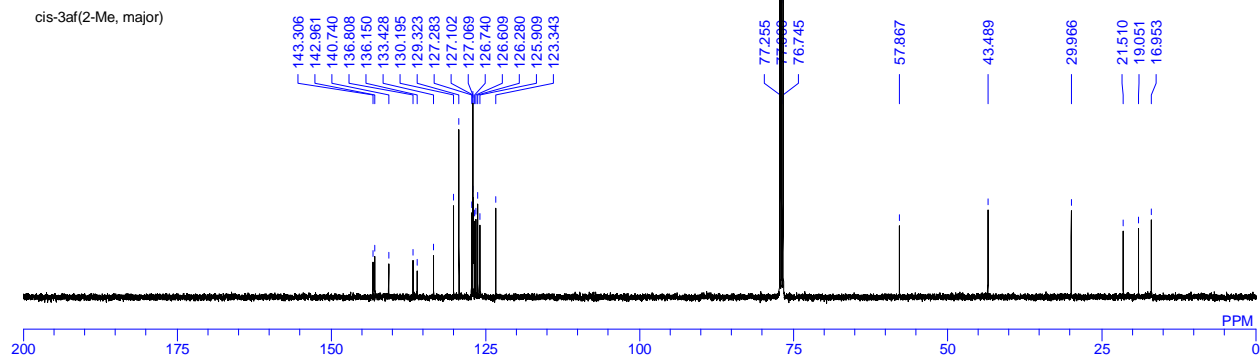
*cis*-3af(2-Me, major)



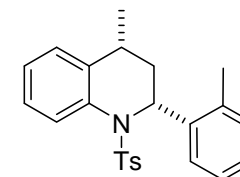
*cis*-3af(2-Me, major)



*cis*-3af(2-Me, major)



DATIM Fri May 23 20:37:22 2014  
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 OBSET 120.00 KHz  
 OBFIN 7958.00 Hz  
 PW1 4.40 usec  
 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 2048  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 1.20 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE RO3AB-CR4\_DEPT.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSG 9283  
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 FILDC  
 FILDF

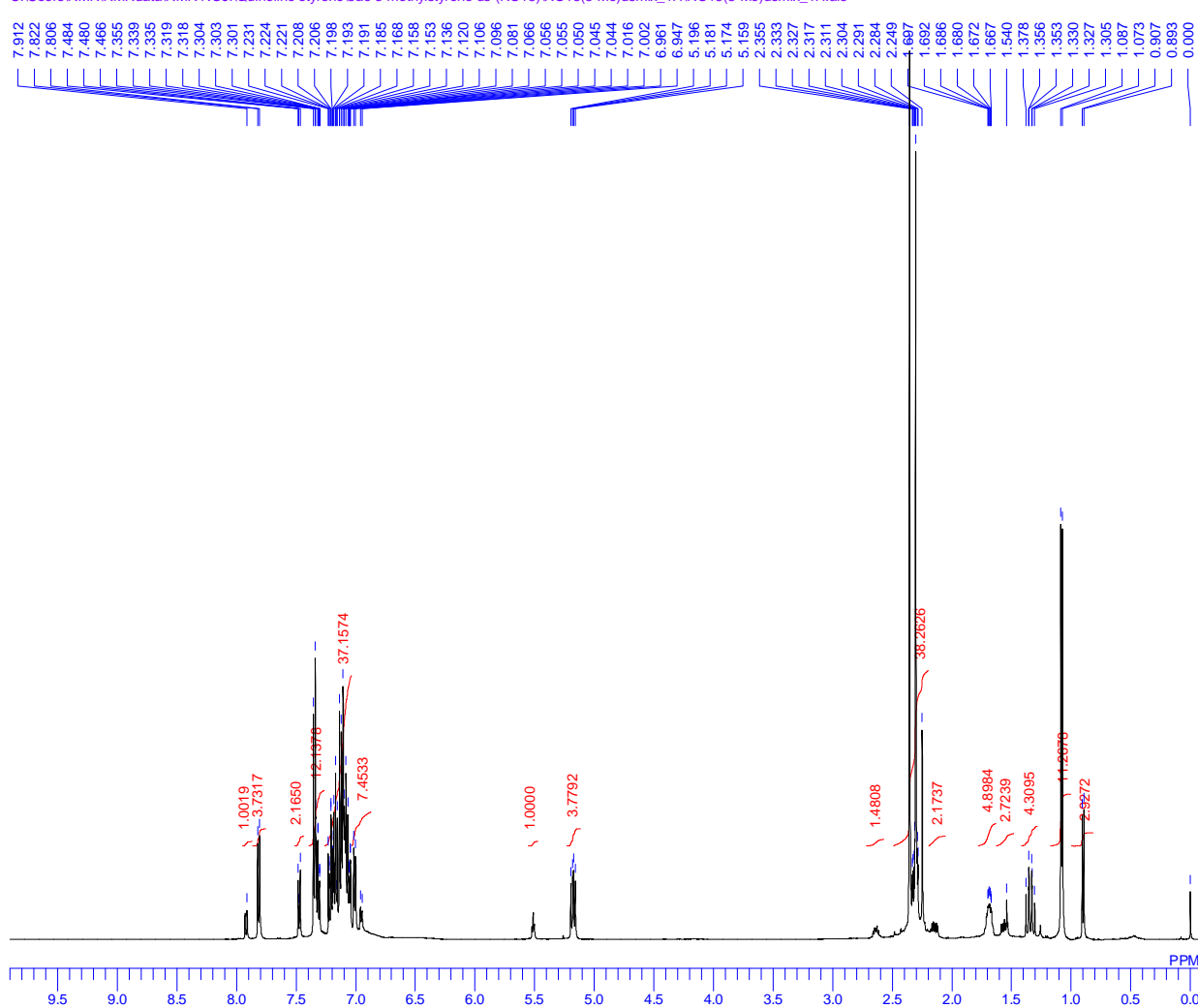


*cis*-3ab

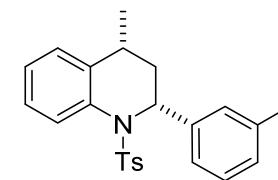
# <sup>1</sup>H NMR spectrum of diastereomixture-3ac (*cis*-major)

cis-3ae (3-Me, ds-mix)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ae 3-methylstyrene ds (RO15)\RO15(3-Me)dsmix\_1H\RO15(3-Me)dsmix\_1H.als



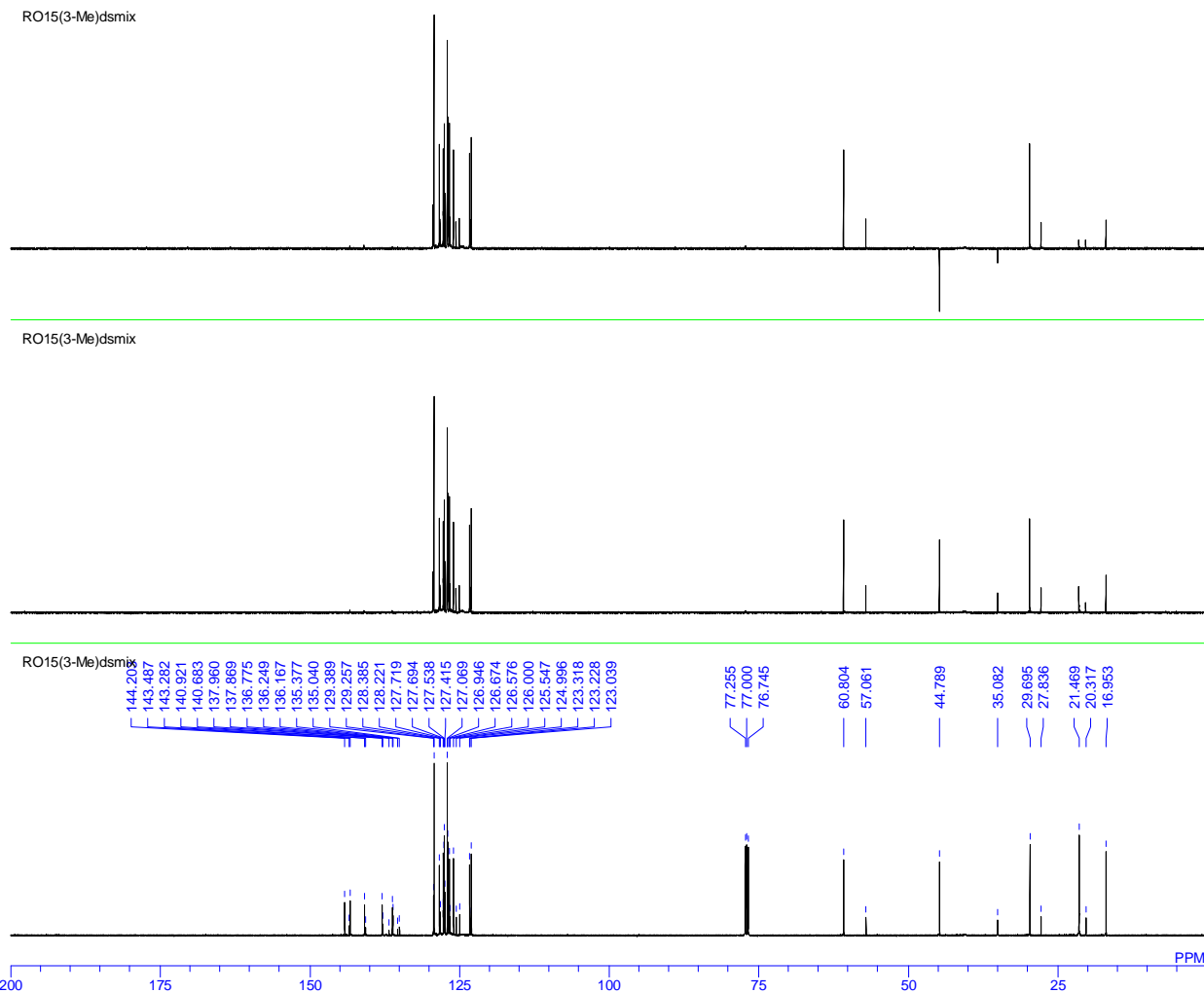
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 DEADT 57.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0005 sec  
 POINT 32768  
 SPO 32768  
 TIMES 16  
 DUMMY 0  
 FREQU 10000.00 Hz  
 FLT 5000 Hz  
 DELAY 40.00 usec  
 ACQTM 3.2768 sec  
 PD 3.7232 sec  
 ADBIT 16  
 RGAIN 15  
 BF 0.01 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD non  
 EXPCM  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE RO15(3-Me)dsmix\_1H.als  
 SF th5.shm  
 LKSET 70.00 KHz  
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 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 509  
 CSPED 14 Hz  
 FILDC  
 FILDF



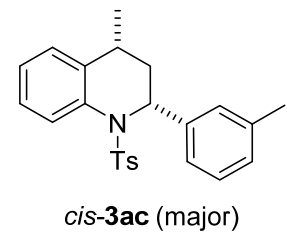
*cis*-3ac (major)

# <sup>13</sup>C NMR spectrum of diastereomixture-3ac (*cis*-major)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ad 4-Me major (YK3-6-All-col-cr)\YK3-6-All-col-cr\_dept\_135\RO15(3-Me)dsmix\_DEPT.als



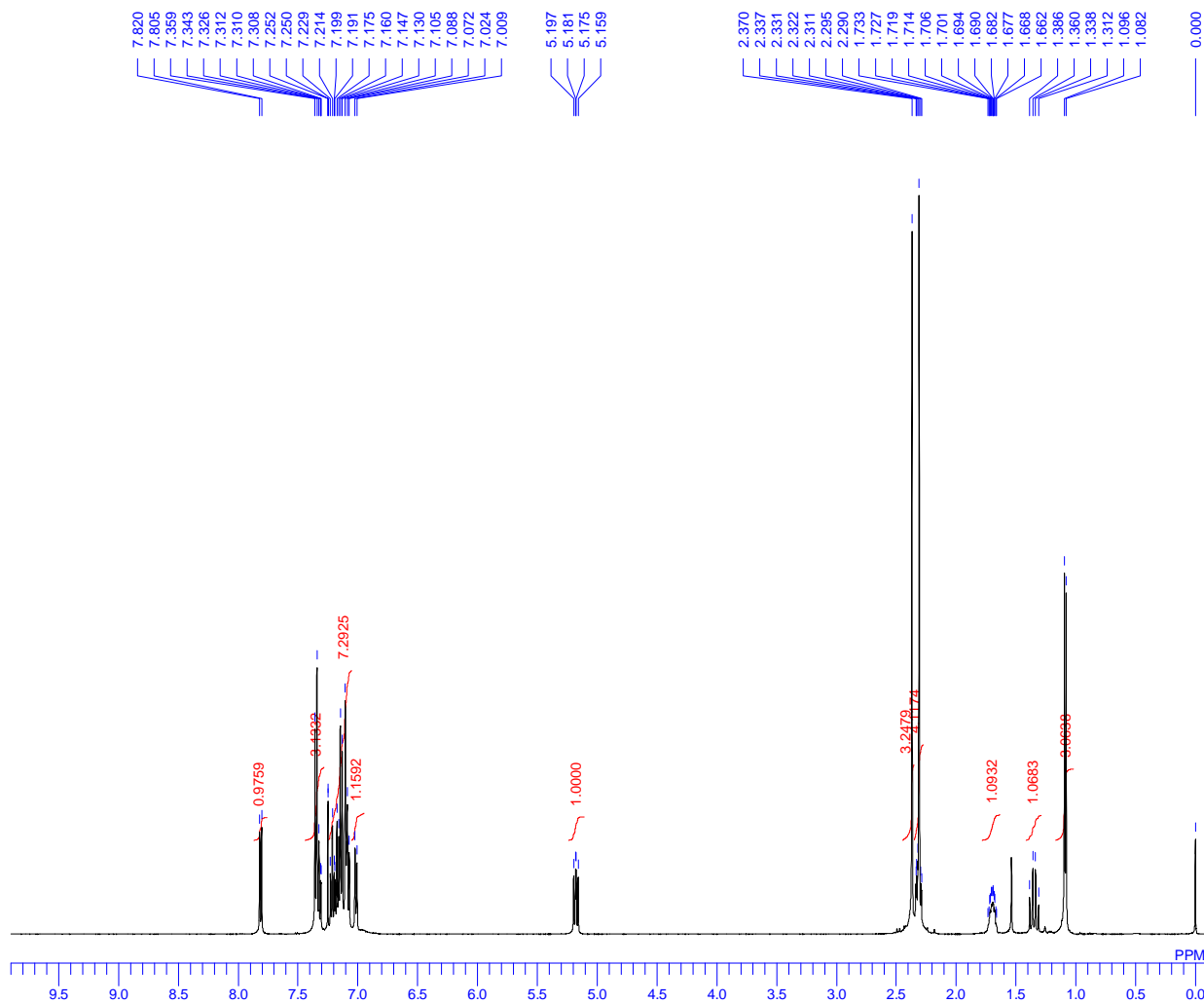
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 OFR 125.65 MHz  
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 OBFIN 7958.00 Hz  
 PW1 4.40 usec  
 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 1600  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 0.01 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE RO15(3-Me)dsmix\_DEPT.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 16764  
 CSPED 11 Hz  
 FILDC  
 FILDF



# <sup>1</sup>H NMR spectrum of *cis*-3ac (major)

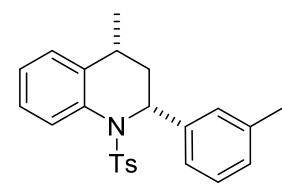
*cis*-3ae (3-Me, major)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ae cis-3-Me major CR514'-B\3ae-cis-major(CR514'-B)\_1H\3ae-cis-major(CR514'-B)\_1H.nmdata



```

DATIM Thu Oct 8 00:22:17 2015
MENUF
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OFR 500.00 MHz
OBSET 160.00 KHz
OBFIN 2160.00 Hz
PW1 5.00 usec
DEADT 57.50 usec
PREDL 10.00000 msec
IWT 0.0005 sec
POINT 32768
SPO 32768
TIMES 16
DUMMY 0
FREQU 10000.00 Hz
FLT 5000 Hz
DELAY 40.00 usec
ACQTM 3.2768 sec
PD 3.7232 sec
ADBIT 16
RGAIN 18
BF 0.09 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD non
EXPCM
IRNUC 1H
IFR 500.00 MHz
IRSET 160.00 KHz
IRFIN 2160.00 Hz
IRRPW 0 usec
IRATN 511
DFILE 3ae-cis-major(CR514'-B)_1H.nmdata
SF th5.shm
LKSET 70.00 KHz
LKFIN 334.0 Hz
LKLEV 200
LGAIN 20
LKPHS 210
LKSIG -180624876
CSPED 14 Hz
FILDC
FILDF
    
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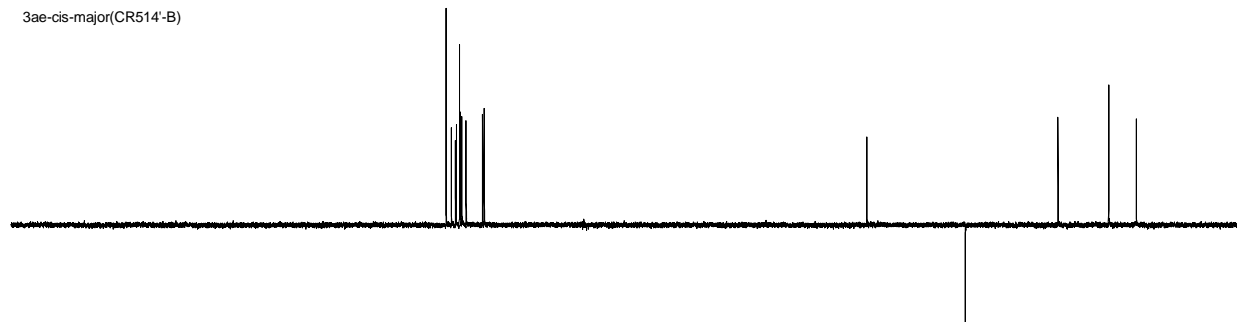


*cis*-3ac

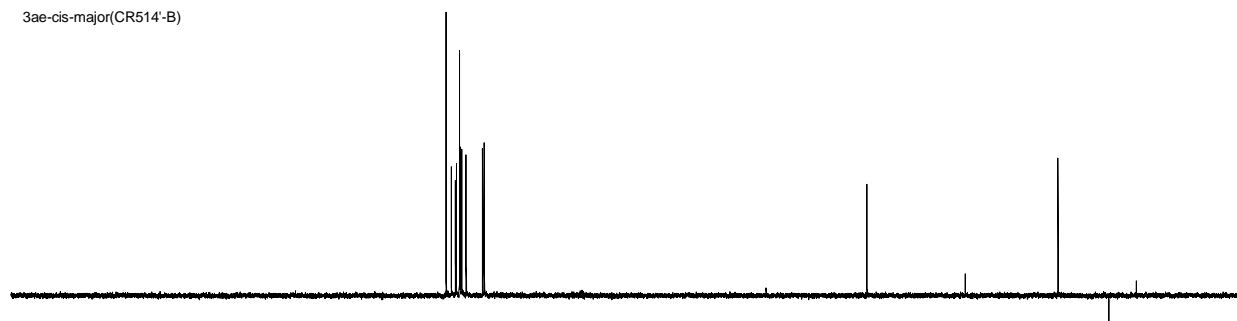
# <sup>13</sup>C NMR spectrum of *cis*-3ac (major)

C:\Users\NMR\NMRdata\NMR NOII\Quinoline styrene\3ae cis-3-Me major CR514'-B\3ae-cis-major(CR514'-B)\_DEPT.als

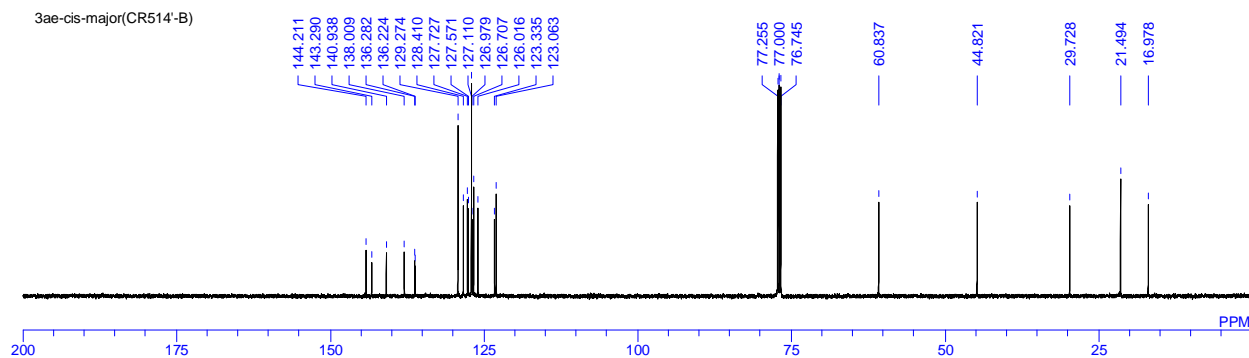
3ae-cis-major(CR514'-B)



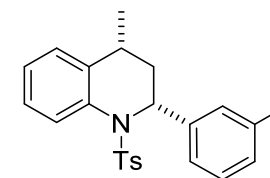
3ae-cis-major(CR514'-B)



3ae-cis-major(CR514'-B)



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 OBFIN 7958.00 Hz  
 PW1 4.40 usec  
 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 1024  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 0.09 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE 3ae-cis-major(CR514'-B)\_DEPT.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG -96584901  
 CSPED 11 Hz  
 FILDC  
 FILDF

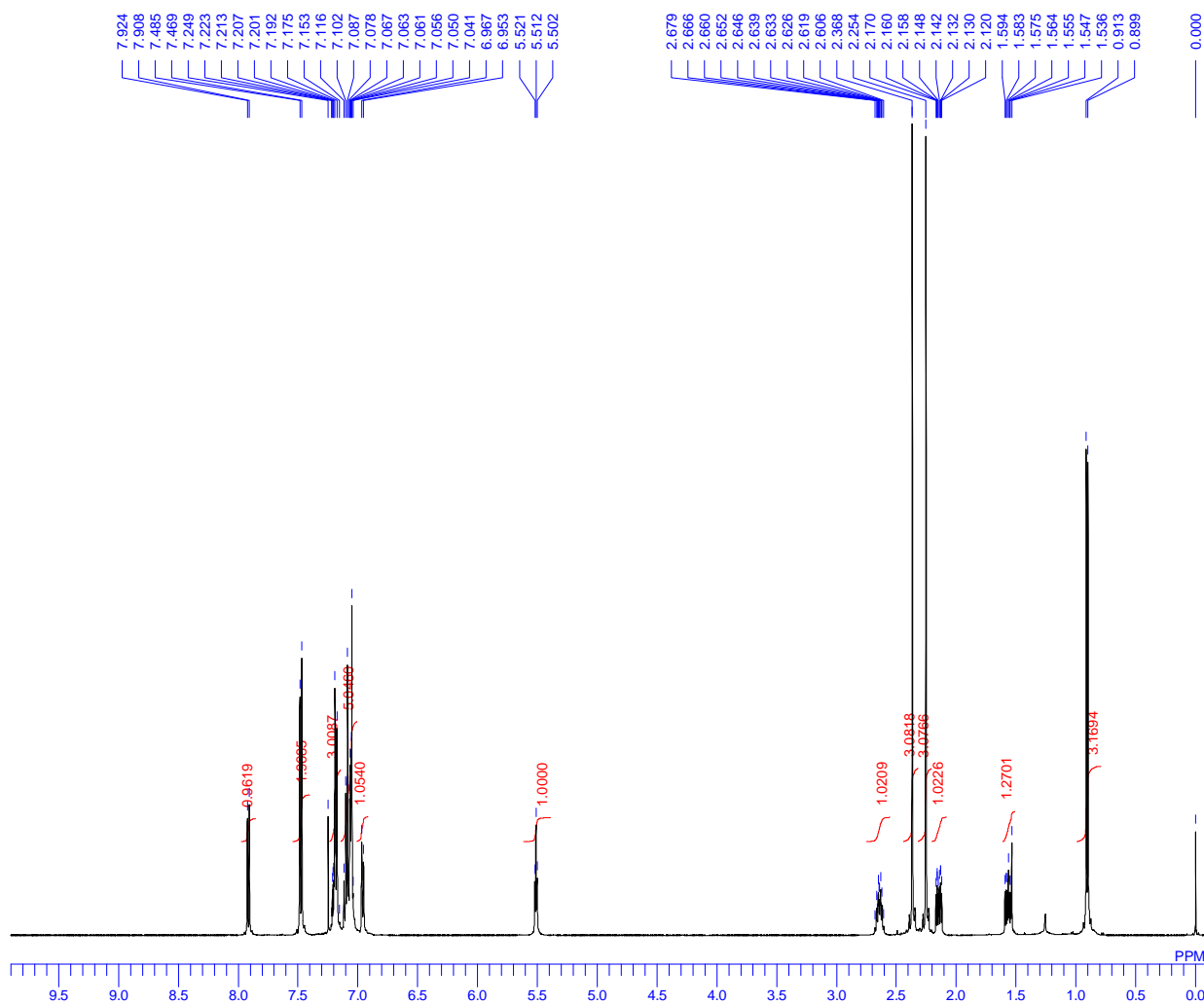


*cis*-3ac

# <sup>1</sup>H NMR spectrum of *trans*-3ac (minor)

CR514'-A(3-Me, minor)

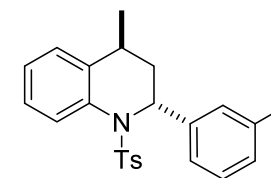
C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ae trans 3-Me minor (CR514'-A)\CR514'-A(3-Me,minor)\_1H\CR514'-A(3-Me,minor)\_1H.als



Sat Oct 10 17:47:30 2015

```

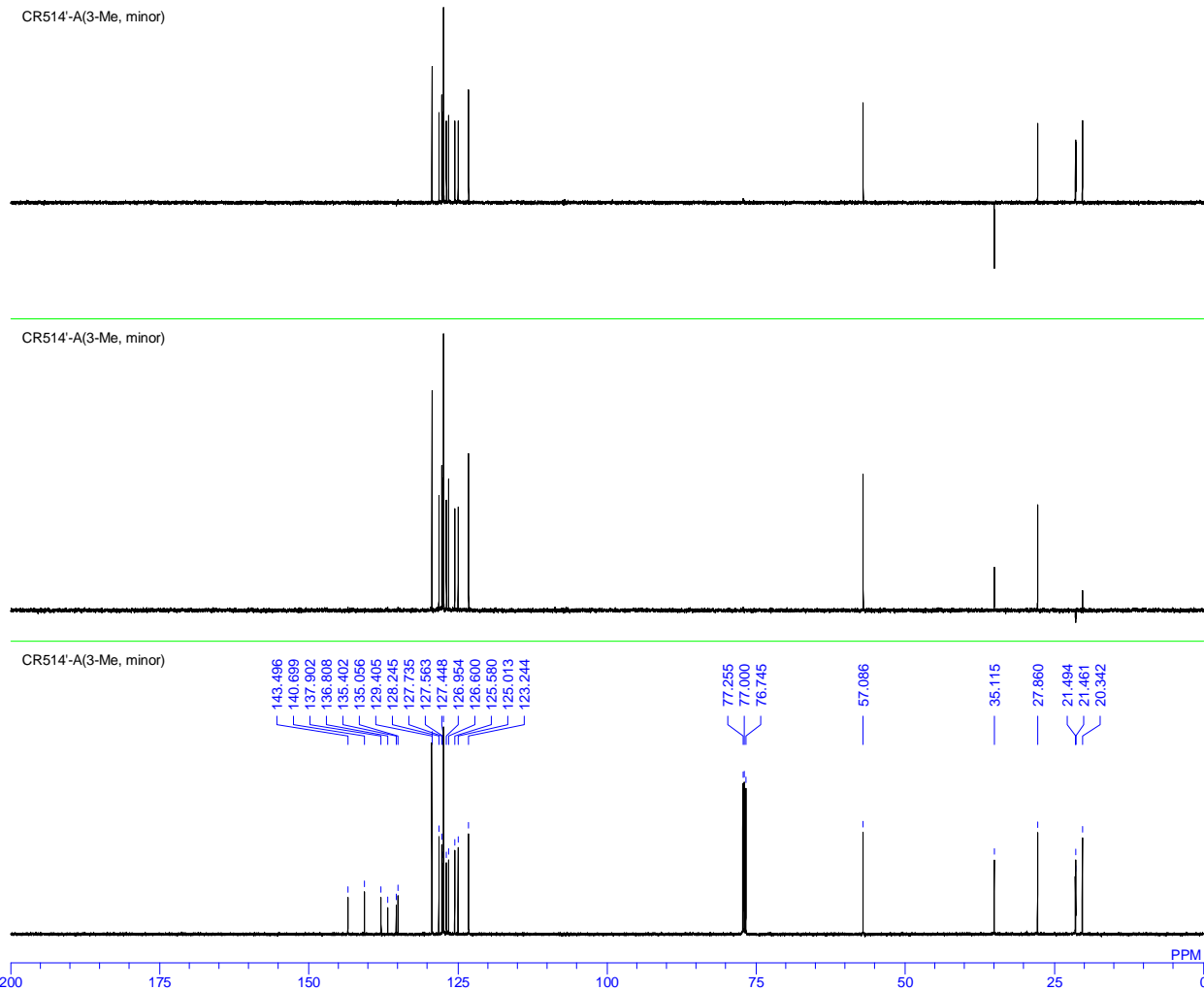
DATIM
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OBSET 160.00 KHz
OBFIN 2160.00 Hz
PW1 5.00 usec
DEADT 57.50 usec
PREDL 10.00000 msec
IWT 0.0005 sec
POINT 32768
SPO 32768
TIMES 16
DUMMY 0
FREQU 10000.00 Hz
FLT 5000 Hz
DELAY 40.00 usec
ACQTM 3.2768 sec
PD 3.7232 sec
ADBIT 16
RGAIN 18
BF 0.01 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD non
EXPCM
IRNUC 1H
IFR 500.00 MHz
IRSET 160.00 KHz
IRFIN 2160.00 Hz
IRRPW 0 usec
IRATN 511
DFILE CR514'-A(3-Me,minor)_1H.als
SF th5.shm
LKSET 70.00 KHz
LKFIN 334.0 Hz
LKLEV 200
LGAIN 20
LKPHS 210
LKSIG 32733
CSPED 11 Hz
FILDC
FILDF
    
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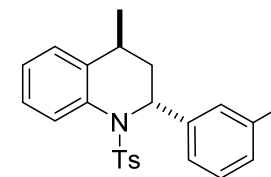
*trans*-3ac

# <sup>13</sup>C NMR spectrum of *trans*-3ac (minor)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ae trans 3-Me minor (CR514'-A)\CR514'-A(3-Me,minor)\_13C\CR514'-A(3-Me,minor)\_13C.als



DATIM Sat Oct 10 18:28:49 2015  
 MENUF 13C  
 OBNUC 13C  
 OFR 125.65 MHz  
 OBSET 120.00 KHz  
 OBFIN 7958.00 Hz  
 PW1 4.40 usec  
 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 800  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 0.01 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE CR514'-A(3-Me,minor)\_13C.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
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 FILDC  
 FILDF

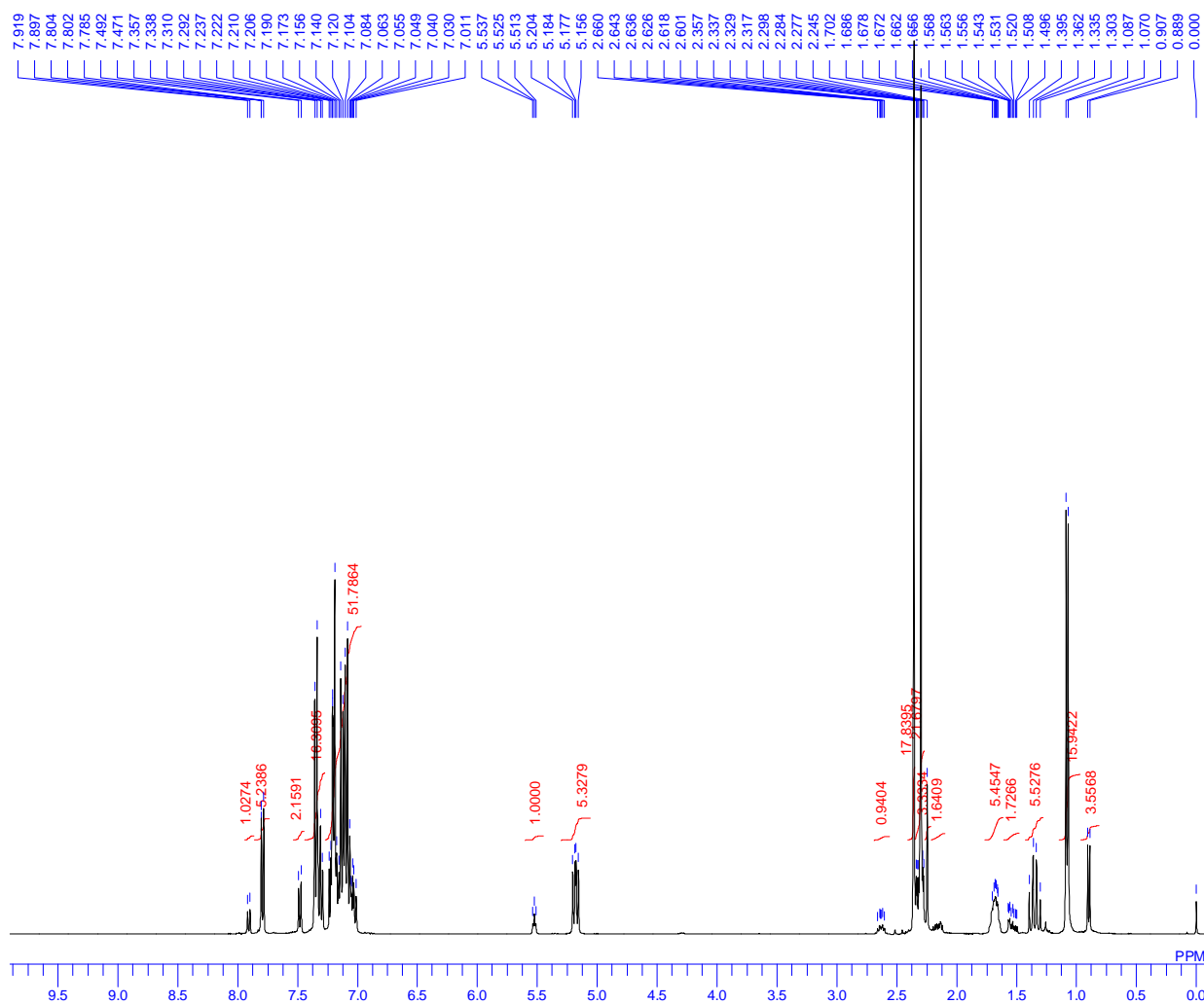


*trans*-3ac

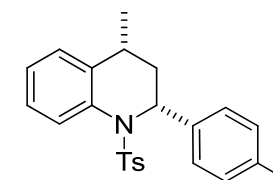
# <sup>1</sup>H NMR spectrum of diastereomixture-3ad (*cis*-major)

cis-3ad (4-Me-styrene, ds)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ad 4-Me ds (HK222columnBB)\863 (HK222 columnBB)1NON\_E1\_FT.als



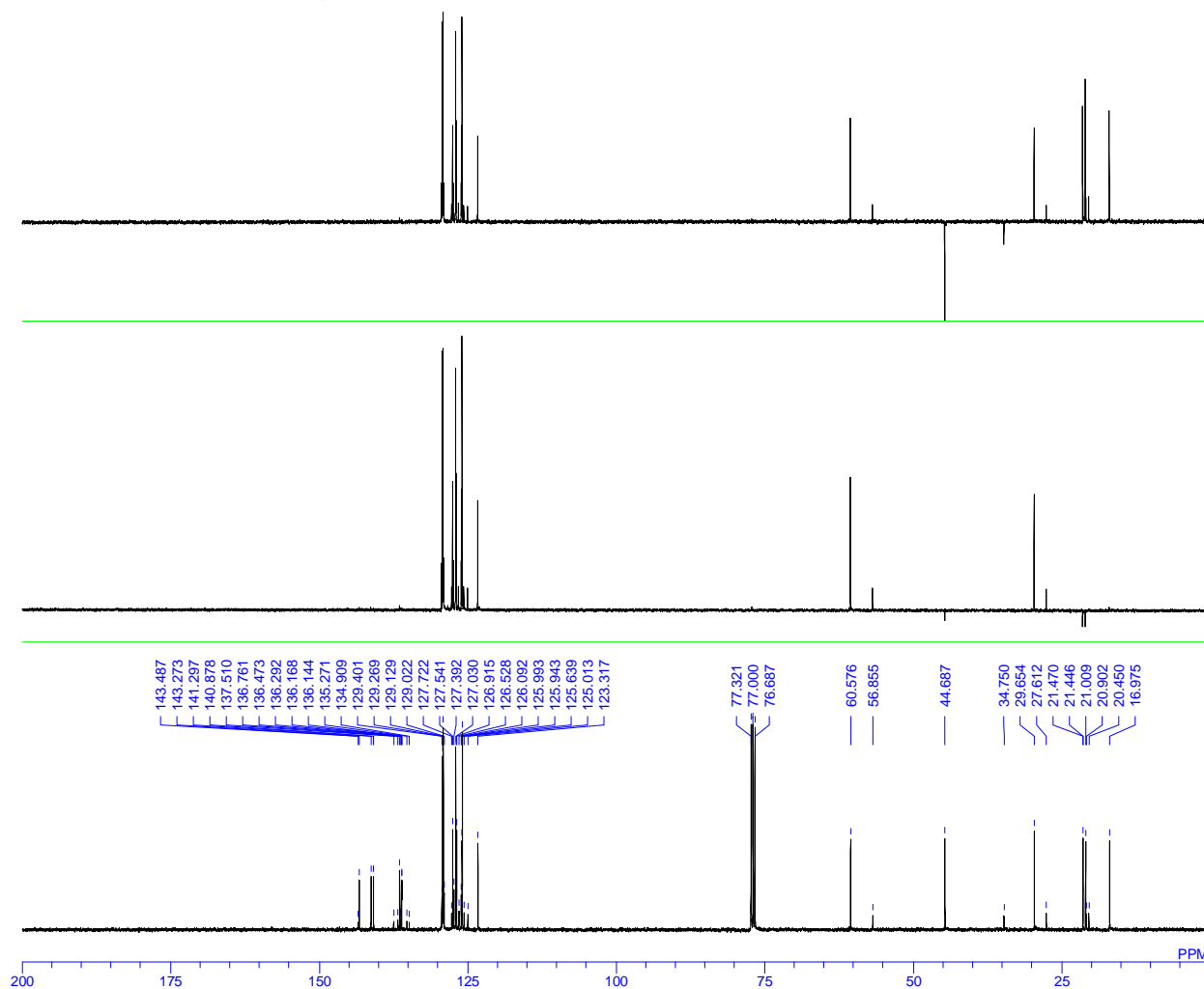
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OBFIN	10500.00 Hz
PW1	5.80 usec
DEADT	72.10 usec
PREDL	0.20000 msec
IWT	1.0000 sec
POINT	16384
SPO	16384
TIMES	16
DUMMY	1
FREQU	7992.01 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	2.0500 sec
PD	4.9500 sec
ADBIT	16
RGAIN	12
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	NON
EXPCM	NON:Single.coupled:PW1_ACQTM_PD:1H,13C,1
IRNUC	1H
IFR	399.65 MHz
IRSET	124.00 KHz
IRFIN	10500.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	863 (HK222 columnBB)1NON_E1_FT.als
SF	TH5FG2
LKSET	61.60 KHz
LKFIN	79.0 Hz
LKLEV	180
LGAIN	20
LKPHS	330
LKSIG	587
CSPED	15 Hz
FILDC	
FILDF	



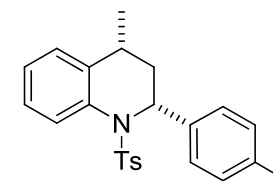
*cis*-3ad (major)

**<sup>13</sup>C NMR spectrum of diastereomixture-3ad (*cis*-major)**

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ad 4-Me ds (HK222columnBB)\863 (HK222 columnBB)2BCM\_E1\_FT.als



DATIM Fri Jan 11 11:44:41 2013  
 MENUF BCM  
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 OFR 100.40 MHz  
 OBSET 125.00 KHz  
 OBFIN 10500.00 Hz  
 PW1 6.00 usec  
 DEADT 19.14 usec  
 PREDL 0.20000 msec  
 IWT 1.0000 sec  
 POINT 32768  
 SPO 32768  
 TIMES 800  
 DUMMY 1  
 FREQU 27118.64 Hz  
 FLT 13550 Hz  
 DELAY 14.76 usec  
 ACQTM 1.2083 sec  
 PD 1.7920 sec  
 ADBIT 16  
 RGAIN 25  
 BF 1.20 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD BCM  
 EXPCM Bilevel.complete.decoupling:Set\_IRRPW  
 IRNUC 1H  
 IFR 399.65 MHz  
 IRSET 124.00 KHz  
 IRFIN 10500.00 Hz  
 IRRPW 50 usec  
 IRATN 511  
 DFILE 863 (HK222 columnBB)2BCM\_E1\_FT.als  
 SF TH5FG2  
 LKSET 61.60 KHz  
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 CSPED 19 Hz  
 FILDF

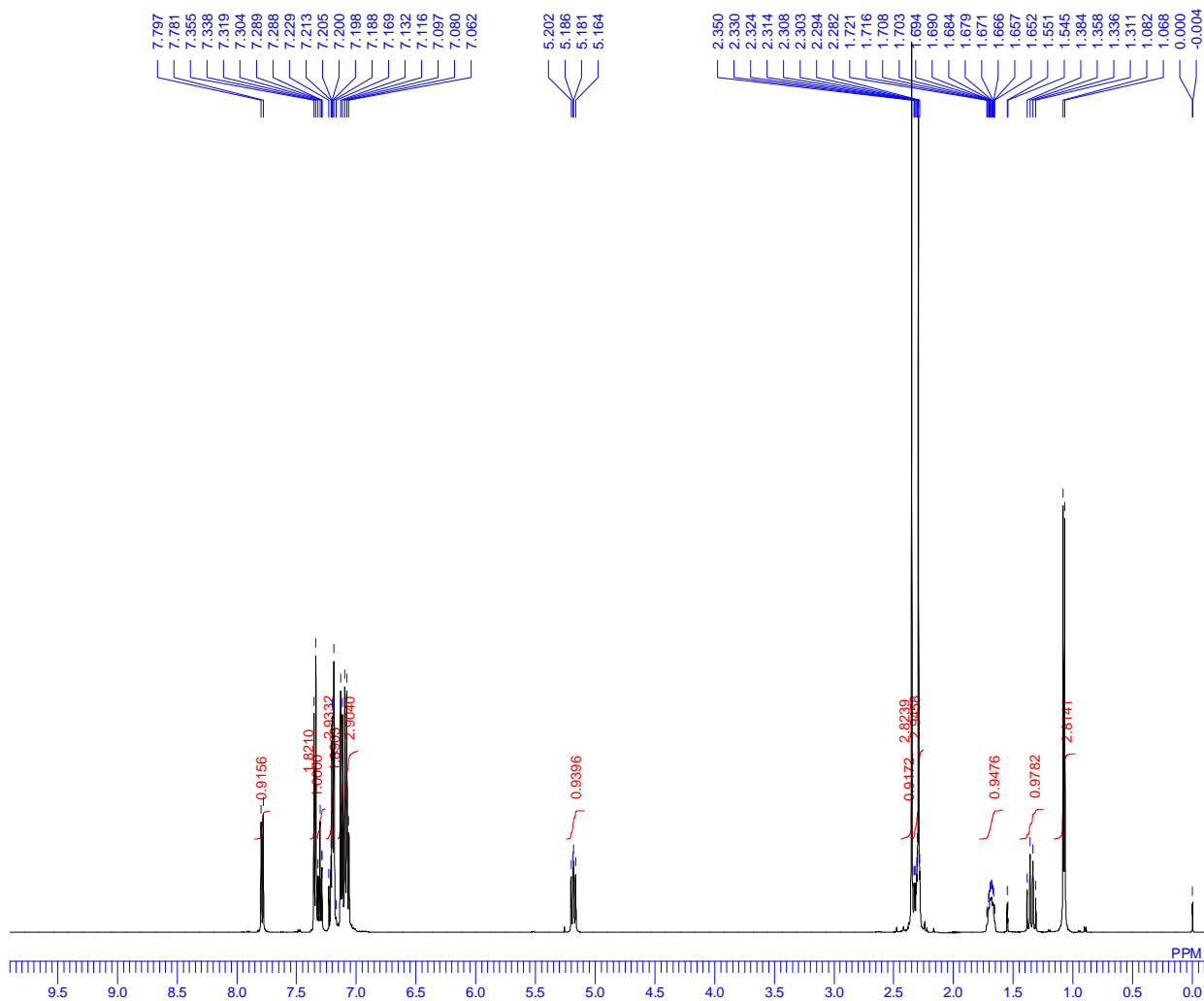


*cis*-3ad (major)

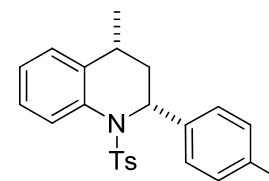
# <sup>1</sup>H NMR spectrum of *cis*-3ad (major)

*cis*-3ad (4-Me, major)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ad YK3-6-All-col-cr\YK3-6-All-col-cr\_1H.als



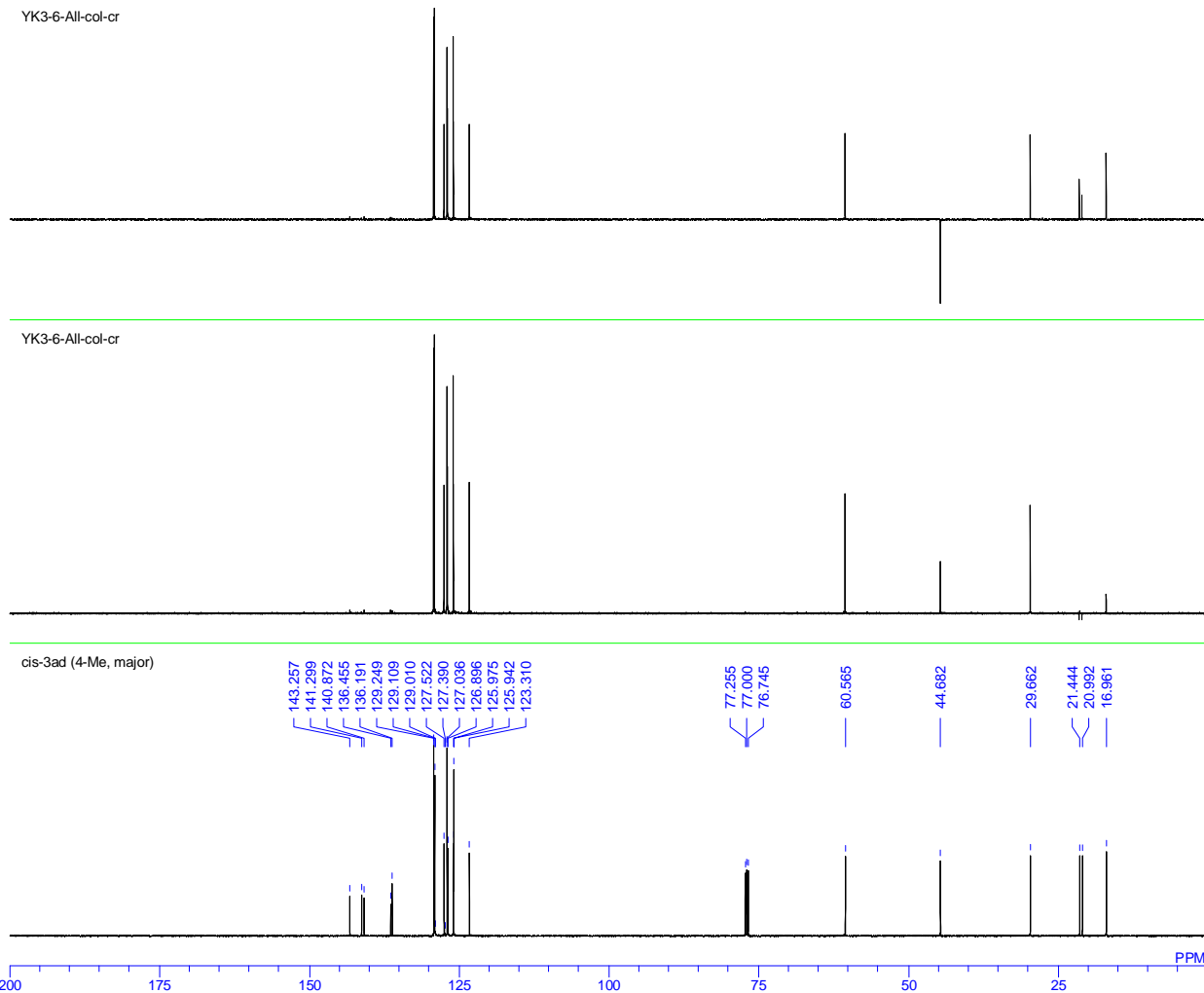
DATIM Sun Apr 13 23:08:21 2014  
 MENUF  
 OBNUC 1H  
 OFR 500.00 MHz  
 OBSET 160.00 KHz  
 OBFIN 2160.00 Hz  
 PW1 5.00 usec  
 DEADT 57.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0005 sec  
 POINT 32768  
 SPO 32768  
 TIMES 16  
 DUMMY 0  
 FREQU 10000.00 Hz  
 FLT 5000 Hz  
 DELAY 40.00 usec  
 ACQTM 3.2768 sec  
 PD 3.7232 sec  
 ADBIT 16  
 RGAIN 14  
 BF 0.09 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD non  
 EXPCM  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE YK3-6-All-col-cr\_1H.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 31116  
 CSPED 15 Hz  
 FILDC  
 FILDF



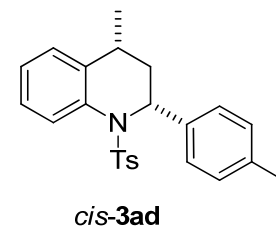
*cis*-3ad

# <sup>13</sup>C NMR spectrum of *cis*-3ad (major)

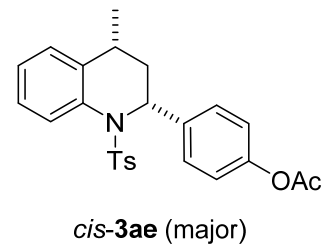
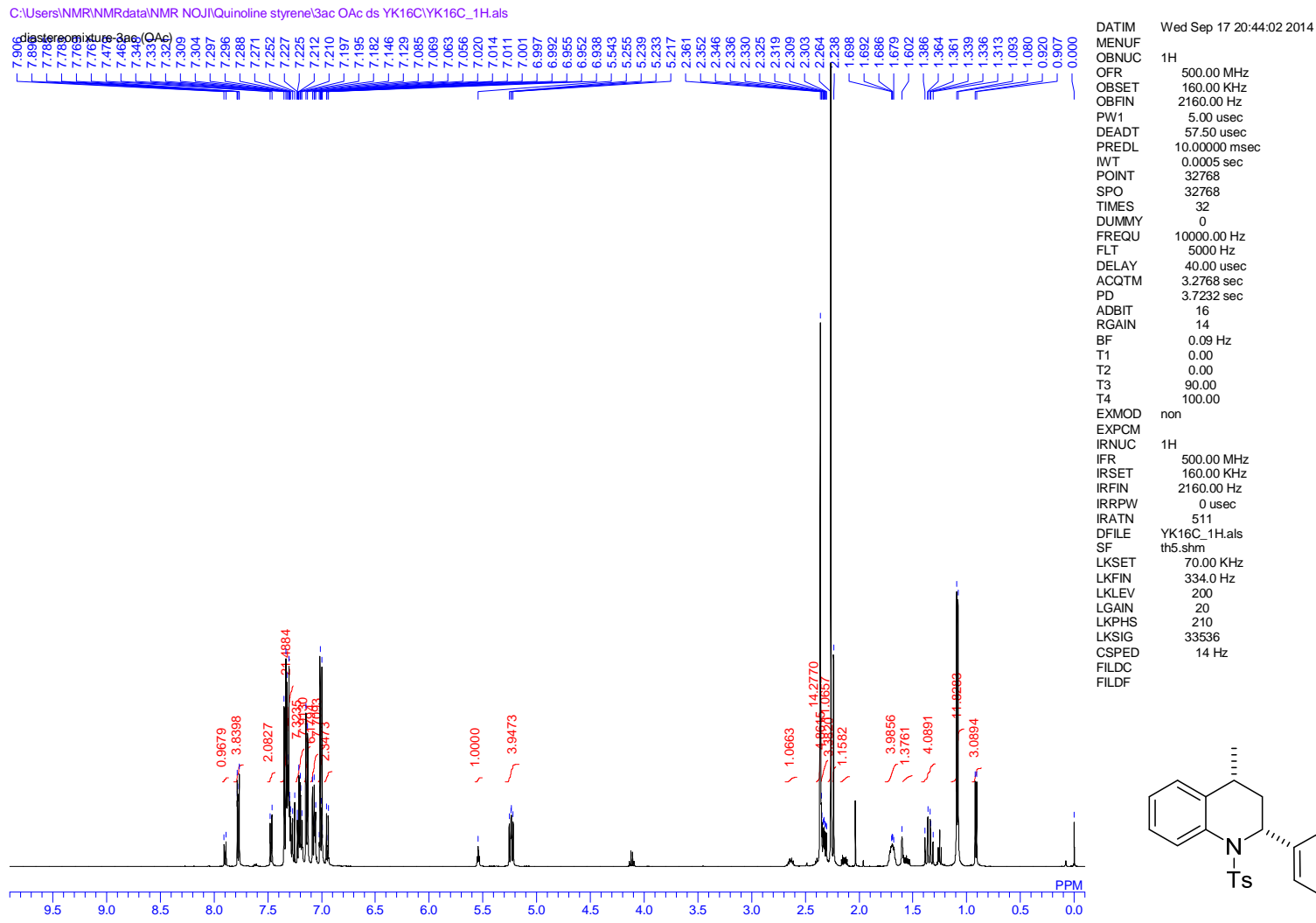
C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ad YK3-6-All-col-cr\YK3-6-All-col-cr\_1DEPT.als



DATIM	Mon Apr 14 00:00:52 2014
MENUP	
OBNUC	13C
OFR	125.65 MHz
OBSET	120.00 KHz
OBFIN	7958.00 Hz
PW1	4.40 usec
DEADT	15.50 usec
PREDL	10.00000 msec
IWT	0.0100 sec
POINT	32768
SPO	32768
TIMES	1024
DUMMY	1
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	0.9667 sec
PD	2.0333 sec
ADBIT	16
RGAIN	27
BF	0.09 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	error_expcm
IRNUC	1H
IFR	500.00 MHz
IRSET	160.00 KHz
IRFIN	2160.00 Hz
IRRPW	0 usec
IRATN	511
DFILE	YK3-6-All-col-cr_1DEPT.als
SF	th5.shm
LKSET	70.00 KHz
LKFIN	334.0 Hz
LKLEV	200
LGAIN	20
LKPHS	210
LKSIG	60838
CSPED	11 Hz
FILDC	
FILDF	



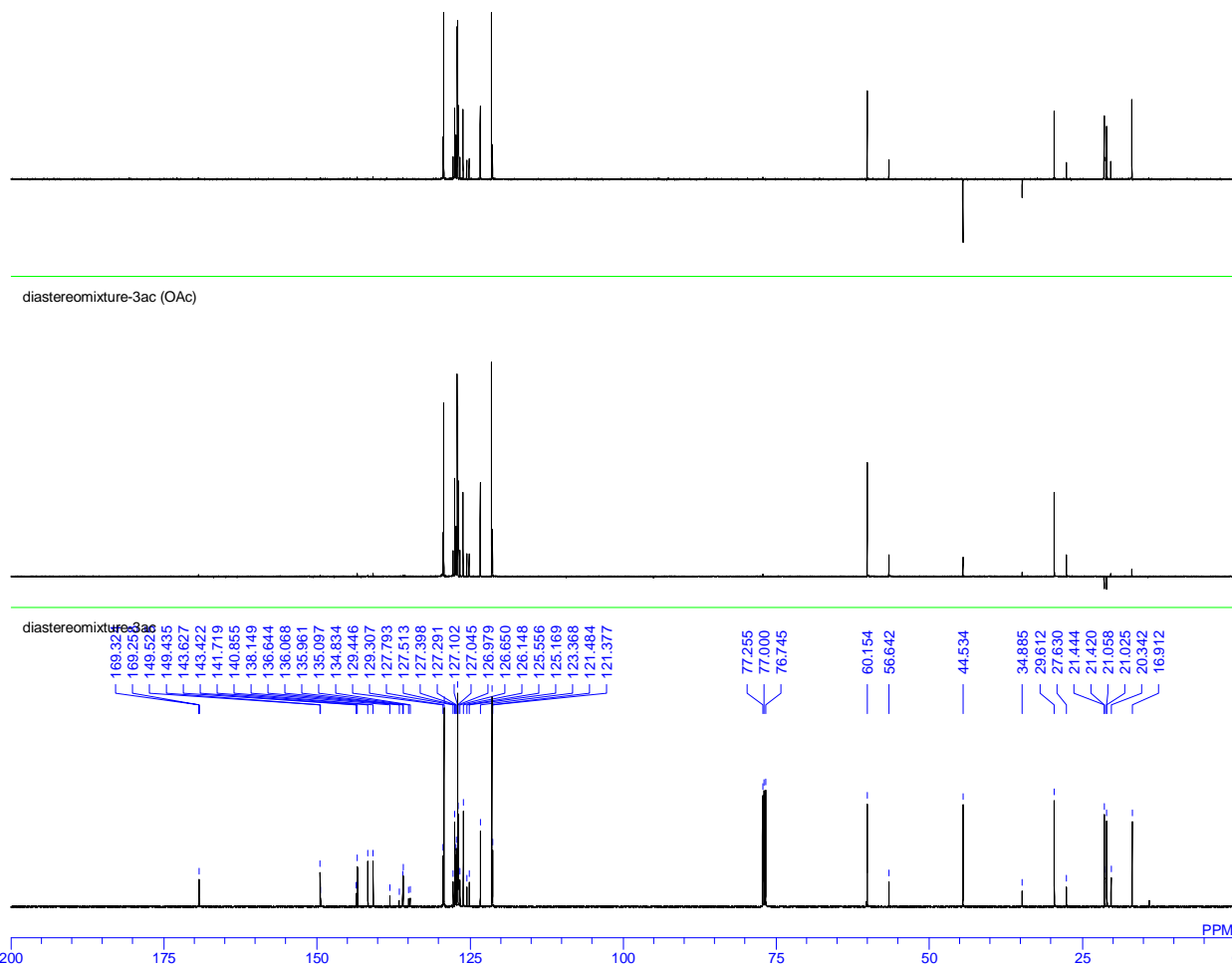
# <sup>1</sup>H NMR spectrum of diastereomixture-3ae (*cis*-major)



# <sup>13</sup>C NMR spectrum of diastereomixture-3ae (*cis*-major)

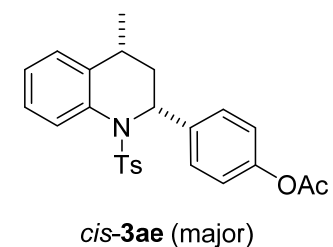
C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ac ds OAc (YK16C)\YK16C\_DEPT.als

YK16C



```

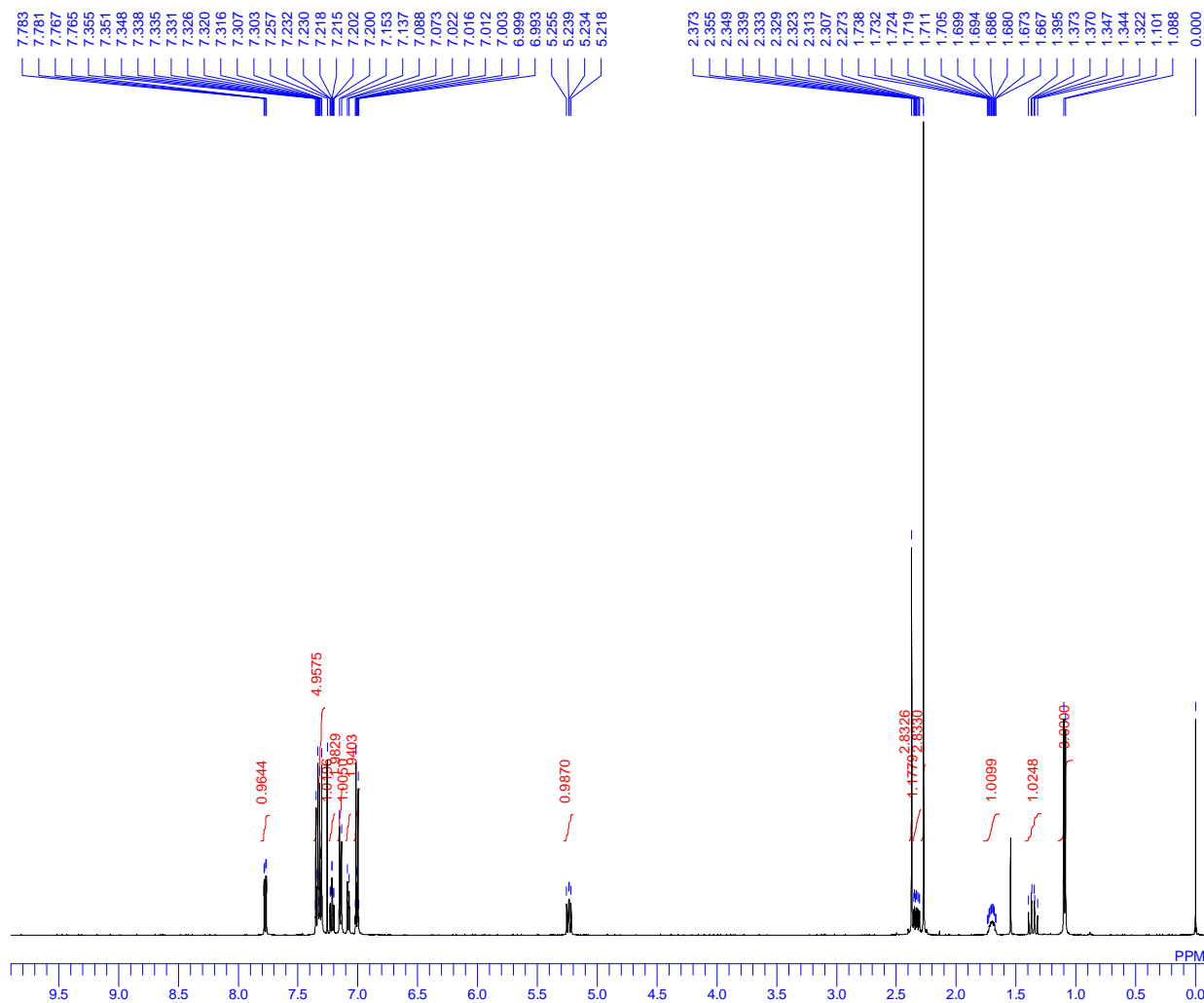
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MENUP
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OBSET   120.00 KHz
OBFIN   7958.00 Hz
PW1     4.40 usec
DEADT   15.50 usec
PREDL   10.00000 msec
IWT     0.0100 sec
POINT   32768
SPO     32768
TIMES   2048
DUMMY   1
FREQU   33898.30 Hz
FLT     16950 Hz
DELAY   11.80 usec
ACQTM   0.9667 sec
PD      2.0333 sec
ADBIT   16
RGAIN   28
BF      0.09 Hz
T1      0.00
T2      0.00
T3      90.00
T4      100.00
EXMOD   bcm
EXPCM   error_expcm
IRNUC   1H
IFR     500.00 MHz
IRSET   160.00 KHz
IRFIN   2160.00 Hz
IRRPW   0 usec
IRATN   511
DFILE   YK16C_DEPT.als
SF      th5.shm
LKSET   70.00 KHz
LKFIN   334.0 Hz
LKLEV   200
LGAIN   20
LKPHS   210
LKSIG   56418
CSPED   14 Hz
FILDC
FILDF
    
```



# <sup>1</sup>H NMR spectrum of *cis*-3ae (major)

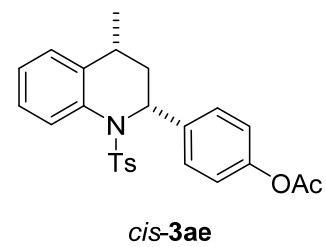
3ac (OAc, major)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ac OAc cis major YK16CCr\3ac(YK16CCr)\_1H\3ac(YK16CCr)\_1H.nmdata



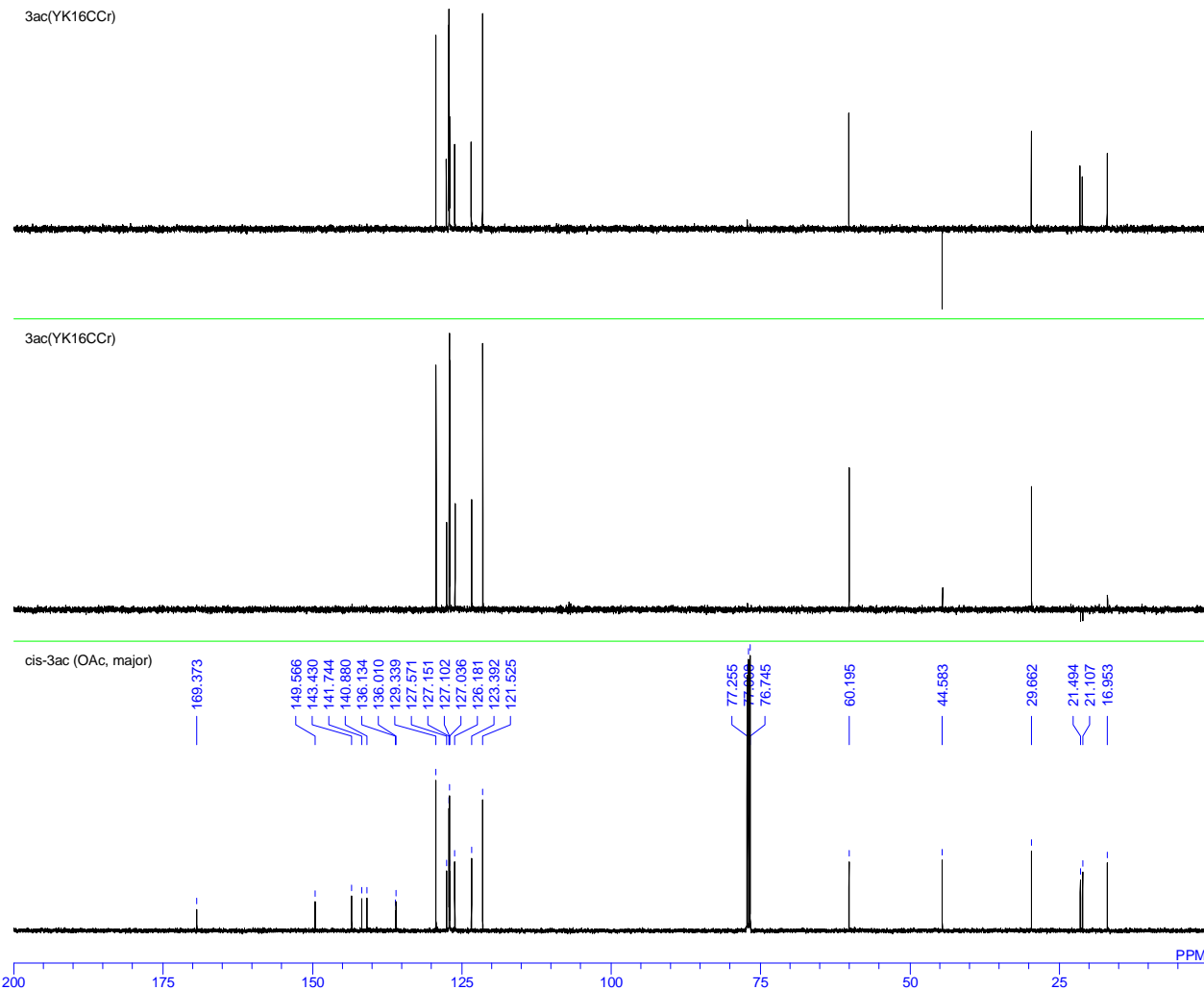
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DATIM Mon Oct 5 17:59:13 2015
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OFR 160.00 KHz
OBSET 2160.00 Hz
OBFIN 5.00 usec
PW1 57.50 usec
DEADT 10.0000 msec
PREDL 0.0005 sec
IWT 32768
POINT 32768
SPO 16
TIMES 0
DUMMY 10000.00 Hz
FREQU 5000 Hz
FLT 40.00 usec
DELAY 3.2768 sec
ACQTM 3.7232 sec
PD 16
ADBIT 21
RGAIN 0.09 Hz
BF 0.00
T1 0.00
T2 90.00
T3 100.00
T4 non
EXMOD 1H
EXPCM 500.00 MHz
IRNUC 160.00 KHz
IFR 2160.00 Hz
IRSET 0 usec
IRFIN 511
IRRPW 3ac(YK16CCr)_1H.nmdata
IRATN th5.shm
DFILE 70.00 KHz
SF 334.0 Hz
LKSET 200
LKFIN 20
LKLEV 210
LGAIN -2051267496
LKPHS 13 Hz
LKSIG CSPED
FILDC 13 Hz
FILDF
    
```

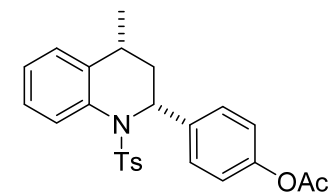


# <sup>13</sup>C NMR spectrum of *cis*-3ae (major)

C:\Users\NMR\NMRdata\NMR NOJ\Quinoline styrene\3ac OAc cis major YK16CCr\3ac(YK16CCr)\_13C\3ac(YK16CCr)\_13C.als



DATIM Mon Oct 5 18:51:44 2015  
 MENUF  
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 OFR 125.65 MHz  
 OBSET 120.00 KHz  
 OBFIN 7958.00 Hz  
 PW1 4.40 usec  
 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 1024  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 0.09 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE 3ac(YK16CCr)\_13C.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG -281069051  
 CSPED 12 Hz  
 FILDC  
 FILDF

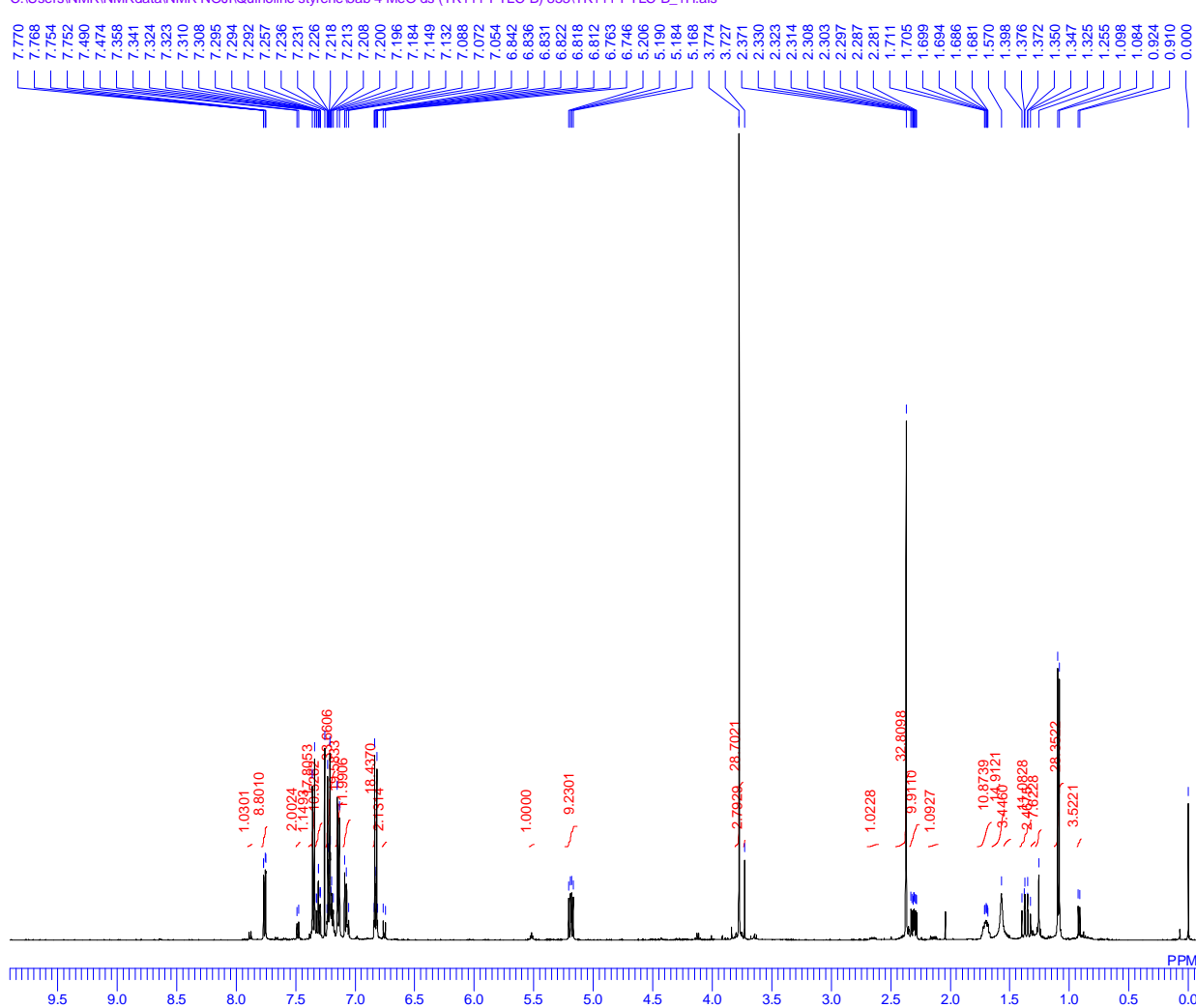


*cis*-3ae

# <sup>1</sup>H NMR spectrum of diastereomixture-3af (*cis*-major)

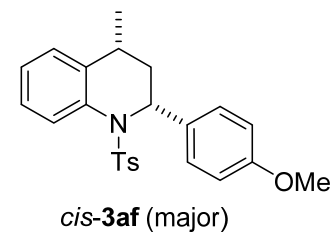
cis-3ab (4-MeO, ds-mix)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ab 4-MeO ds (YK111-PTLC-B) 853\YK111-PTLC-B\_1H.als



Sun Aug 30 01:58:13 2015

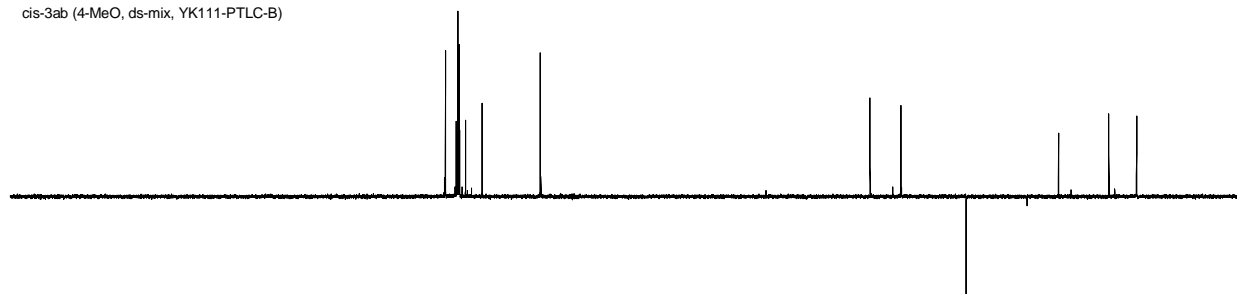
DATIM	Sun Aug 30 01:58:13 2015
MENUF	1H
OBNUC	500.00 MHz
OFR	160.00 KHz
OBSET	2160.00 Hz
OBFIN	5.00 usec
PW1	57.50 usec
DEADT	10.00000 msec
PREDL	0.0005 sec
IWT	32768
POINT	32768
SPO	32
TIMES	0
DUMMY	10000.00 Hz
FREQU	5000 Hz
FLT	40.00 usec
DELAY	3.2768 sec
ACQTM	3.7232 sec
PD	16
ADBIT	20
RGAIN	0.30 Hz
BF	0.00
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	1H
IRNUC	500.00 MHz
IFR	160.00 KHz
IRSET	2160.00 Hz
IRFIN	0 usec
IRRPW	511
IRATN	YK111-PTLC-B_1H.als
DFILE	th5.shm
SF	70.00 KHz
LKSET	334.0 Hz
LKFIN	200
LKLEV	20
LGAIN	210
LKPHS	43103
LKSIG	11 Hz
CSPED	
FILDC	
FILDF	



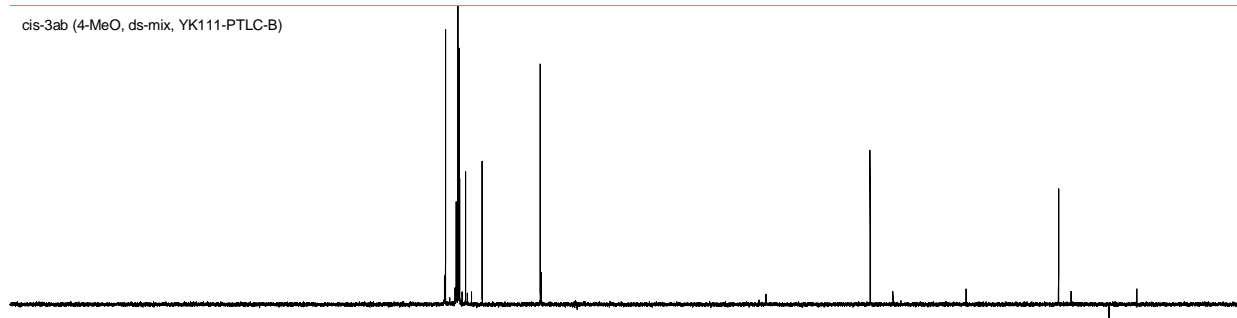
# <sup>13</sup>C NMR spectrum of diastereomixture-3af (*cis*-major)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ab 4-MeO ds (YK111-PTLC-B) 853\YK111-PTLC-B\_DEPT.als

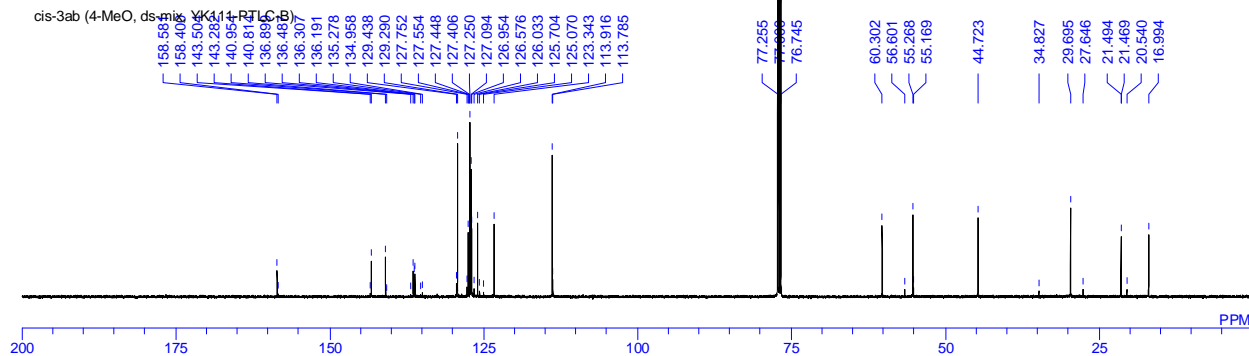
cis-3ab (4-MeO, ds-mix, YK111-PTLC-B)



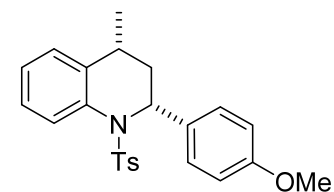
cis-3ab (4-MeO, ds-mix, YK111-PTLC-B)



cis-3ab (4-MeO, ds-mix, YK111-PTLC-B)



DATIM Sun Aug 30 05:24:15 2015  
 MENUF  
 OBNUC 13C  
 OFR 125.65 MHz  
 OBSET 120.00 KHz  
 OBFIN 7958.00 Hz  
 PW1 4.40 usec  
 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 4096  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 0.30 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE YK111-PTLC-B\_DEPT.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 21913  
 CSPED 12 Hz  
 FILDC  
 FILDF

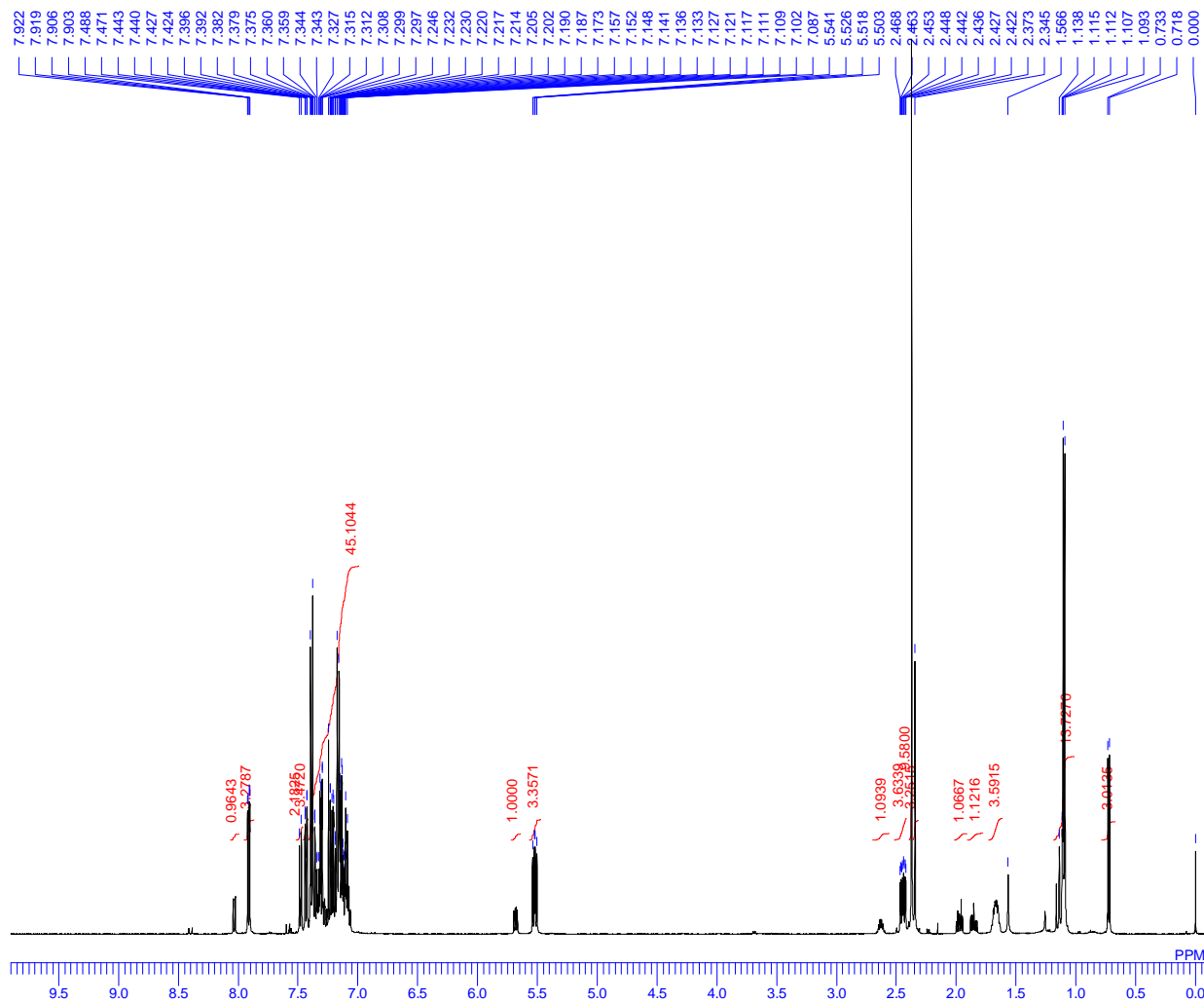


*cis*-3af (major)

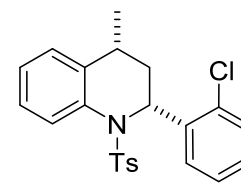
# <sup>1</sup>H NMR spectrum of diastereomixture-3ag (*cis*-major)

CR510B(2-Cl)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\2-Cl-ds(CR510B)\_OK\CR510B(2-Cl)\_1H.als

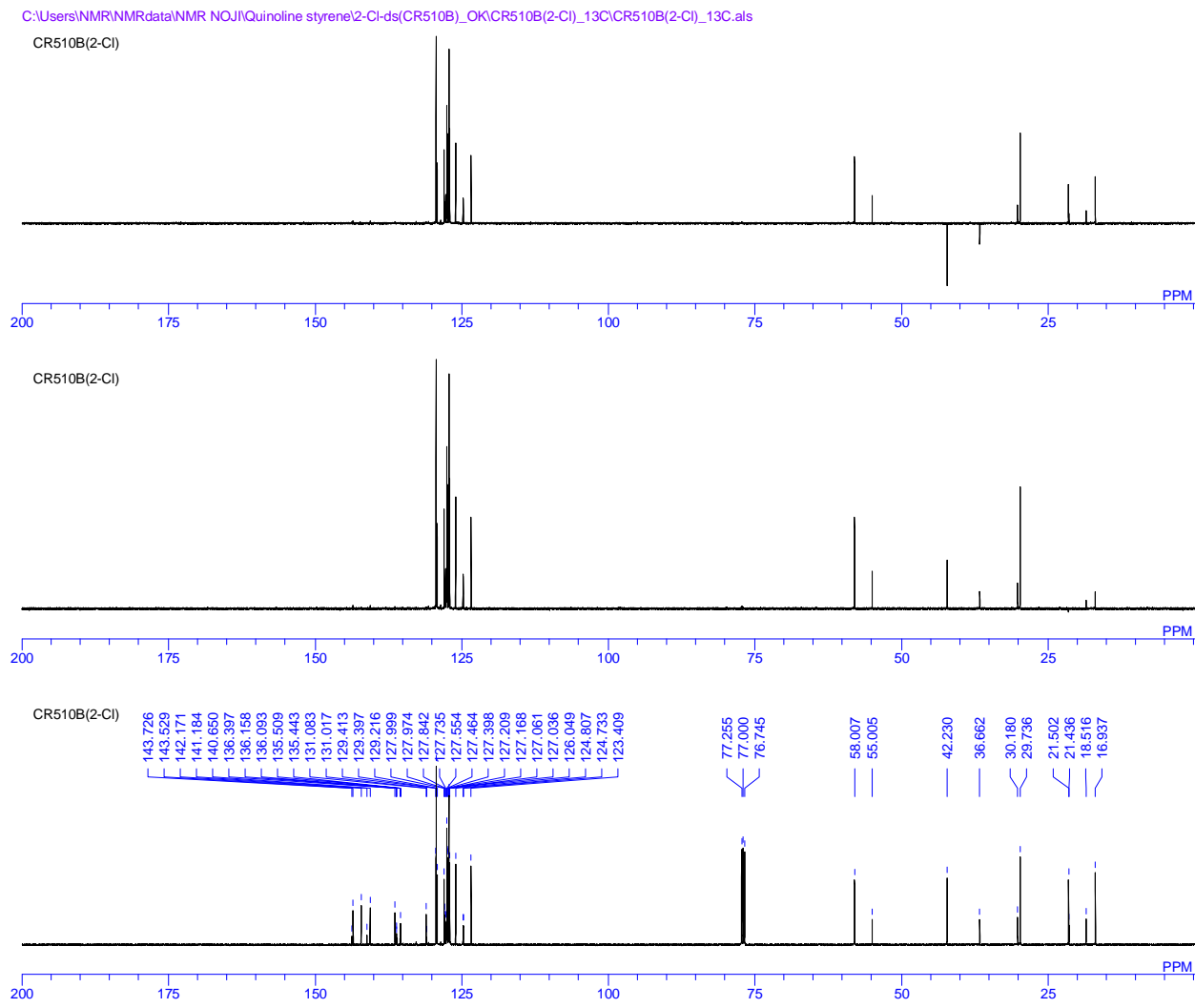


DATIM Tue Jul 7 22:18:16 2015  
 MENUF 1H  
 OBNUC 500.00 MHz  
 OFR 160.00 KHz  
 OBSET 2160.00 Hz  
 OBFIN 5.00 usec  
 PW1 57.50 usec  
 DEADT 10.00000 msec  
 PREDL 0.0005 sec  
 IWT 32768  
 POINT 32768  
 SPO 16  
 TIMES 0  
 DUMMY 10000.00 Hz  
 FREQU 5000 Hz  
 FLT 40.00 usec  
 DELAY 3.2768 sec  
 ACQTM 3.7232 sec  
 PD 16  
 ADBIT 17  
 RGAIN 0.09 Hz  
 BF 0.00  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD non  
 EXPCM 1H  
 IRNUC 500.00 MHz  
 IFR 160.00 KHz  
 IRSET 2160.00 Hz  
 IRFIN 0 usec  
 IRRPW 511  
 IRATN CR510B(2-Cl)\_1H.als  
 DFILE th5.shm  
 SF 70.00 KHz  
 LKSET 334.0 Hz  
 LKFIN 200  
 LKLEV 20  
 LGAIN 210  
 LKPHS 34925  
 LKSIG 11 Hz  
 CSPED  
 FILDC  
 FILDF

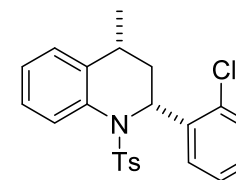


*cis*-3ag (major)

**<sup>13</sup>C NMR spectrum of diastereomixture-3ag (*cis*-major)**



DATIM Tue Jul 7 23:10:54 2015  
 MENUF  
 OBNUC 13C  
 OFR 125.65 MHz  
 OBSET 120.00 KHz  
 OBFIN 7958.00 Hz  
 PW1 4.40 usec  
 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 1024  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 0.09 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE CR510B(2-Cl)\_13C.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 50011  
 CSPED 10 Hz  
 FILDC  
 FILDF

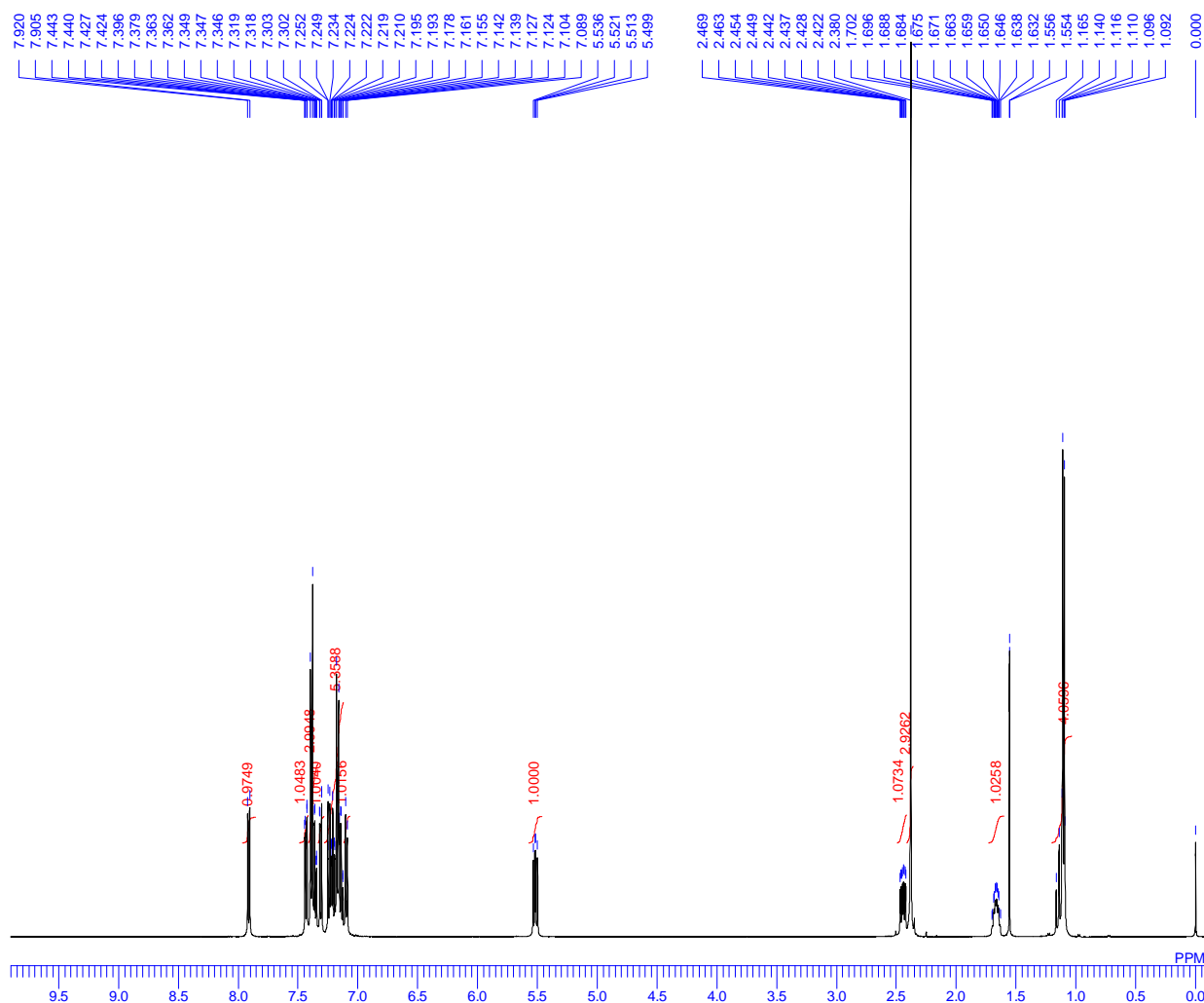


***cis*-3ag (major)**

# <sup>1</sup>H NMR spectrum of *cis*-3ag (major)

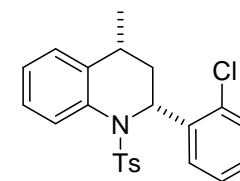
cis-3ai(2-Cl, major)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\2-Cl-major(RO5AB-bc-cr)\_OK\cis-3ai(2-Cl, major)(RO5AB-bc-cr\_1H).als



```

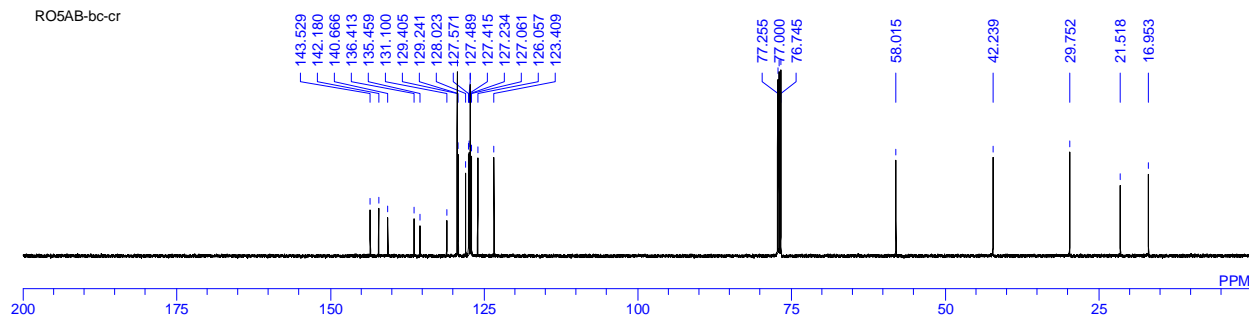
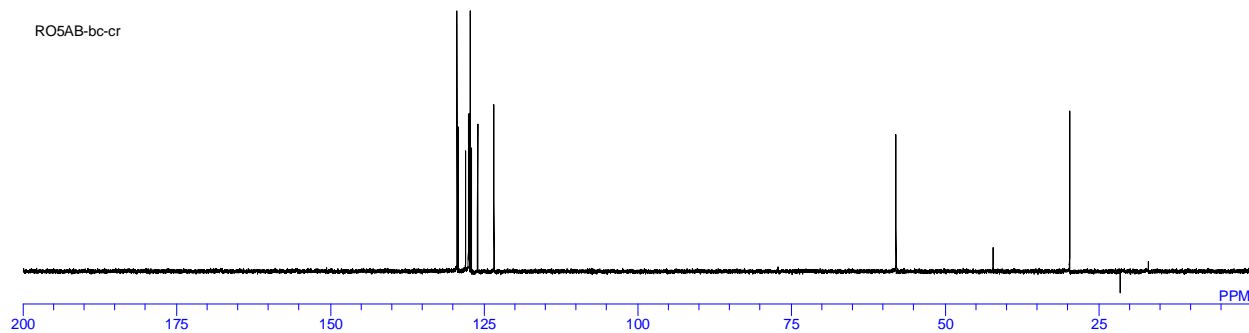
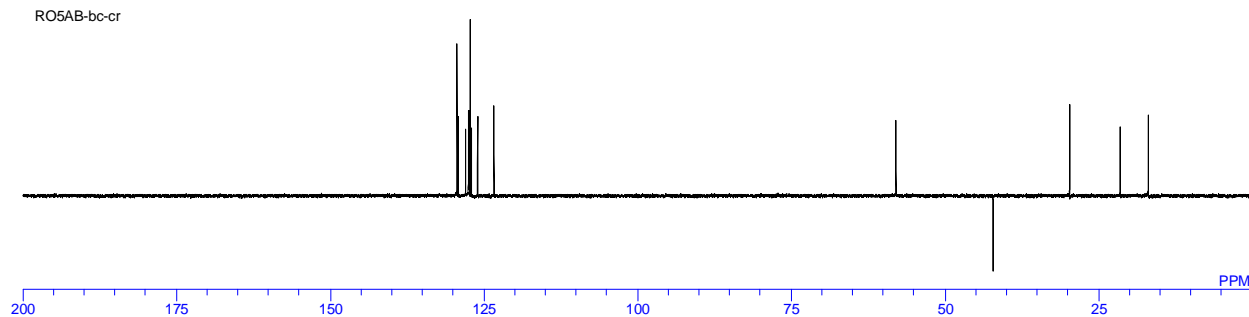
DATIM      Sun Jun 29 21:54:04 2014
MENUF      1H
OBNUC      1H
OFR        500.00 MHz
OBSET      160.00 KHz
OBFIN      2160.00 Hz
PW1        5.00 usec
DEADT      57.50 usec
PREDL      10.00000 msec
IWT        0.0005 sec
POINT      32768
SPO        32768
TIMES      16
DUMMY      0
FREQU      10000.00 Hz
FLT        5000 Hz
DELAY      40.00 usec
ACQTM      3.2768 sec
PD         3.7232 sec
ADBIT      16
RGAIN      17
BF         0.09 Hz
T1         0.00
T2         0.00
T3         90.00
T4         100.00
EXMOD      non
EXPCM
IRNUC      1H
IFR        500.00 MHz
IRSET      160.00 KHz
IRFIN      2160.00 Hz
IRRPW      0 usec
IRATN      511
DFILE      cis-3ai(2-Cl, major)(RO5AB-bc-cr_1H).als
SF         th5.shm
LKSET      70.00 KHz
LKFIN      334.0 Hz
LKLEV      200
LGAIN      20
LKPHS      210
LKSIG      -272912512
CSPED      11 Hz
FILDC
FILDF
    
```



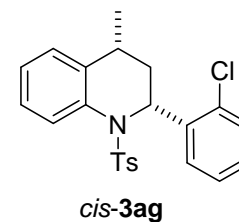
*cis*-3ag

# <sup>13</sup>C NMR spectrum of *cis*-3ag (major)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\2-Cl-major(RO5AB-bc-cr)\_OKIRO5AB-bc-cr\_13C\RO5AB-bc-cr\_13C.als



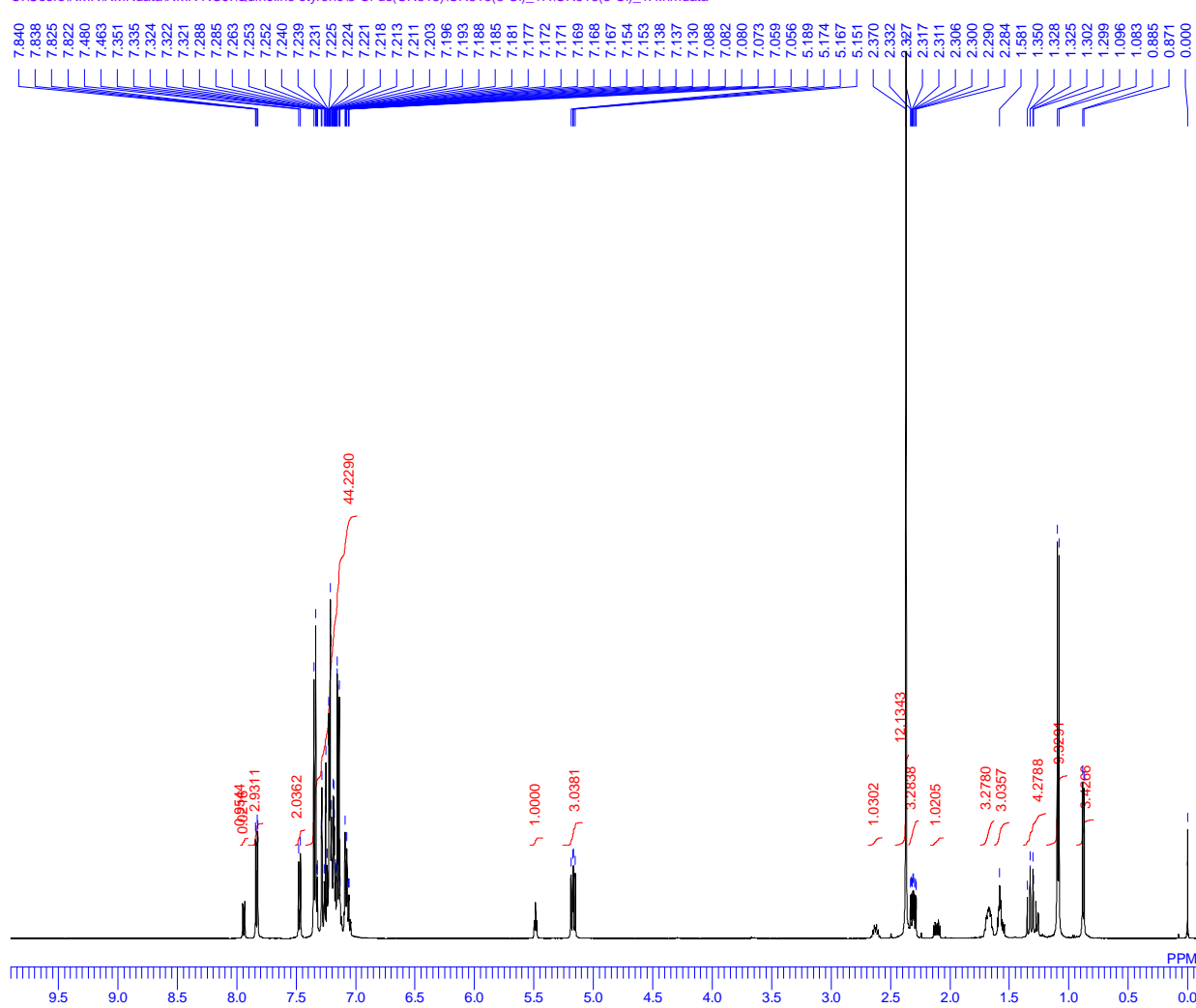
DATIM Sun Jun 29 22:46:38 2014  
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 OBNUC 13C  
 OFR 125.65 MHz  
 OBSET 120.00 KHz  
 OBFIN 7958.00 Hz  
 PW1 4.40 usec  
 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 1024  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 0.09 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE RO5AB-bc-cr\_13C.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG -457269566  
 CSPED 11 Hz  
 FILDC  
 FILDF



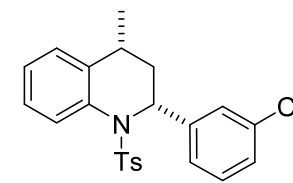
# <sup>1</sup>H NMR spectrum of diastereomixture-3ah (*cis*-major)

cis-3ah (3-Cl, ds-mix)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3-Cl-ds(CR515)\CR515(3-Cl)\_1HCR515(3-Cl)\_1H.nmdata



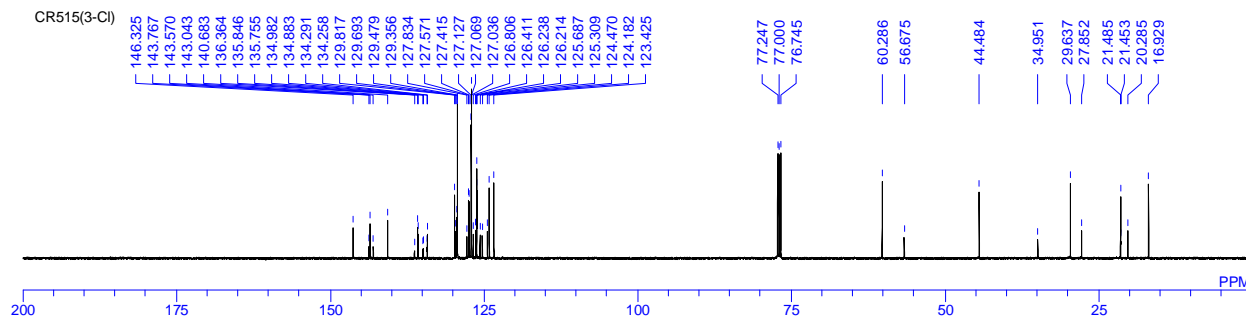
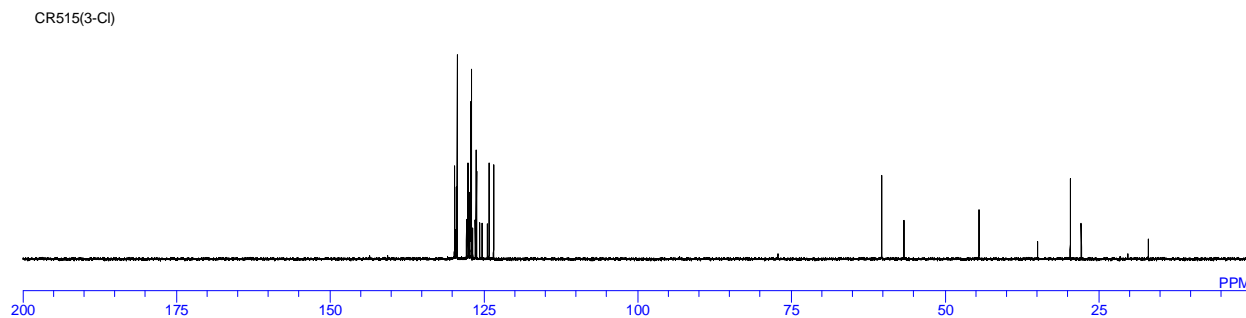
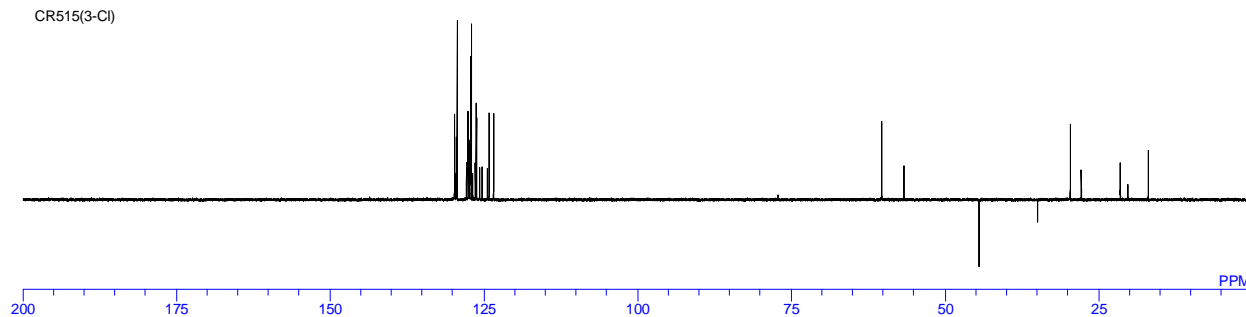
DATIM Sat Jul 18 19:07:20 2015  
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 OFR 500.00 MHz  
 OBSET 160.00 KHz  
 OBFIN 2160.00 Hz  
 PW1 5.00 usec  
 DEADT 57.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0005 sec  
 POINT 32768  
 SPO 32768  
 TIMES 16  
 DUMMY 0  
 FREQU 10000.00 Hz  
 FLT 5000 Hz  
 DELAY 40.00 usec  
 ACQTM 3.2768 sec  
 PD 3.7232 sec  
 ADBIT 16  
 RGAIN 17  
 BF 0.09 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD non  
 EXPCM 1H  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE CR515(3-Cl)\_1H.nmdata  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG -1229183320  
 CSPED 11 Hz  
 FILDC  
 FILDF



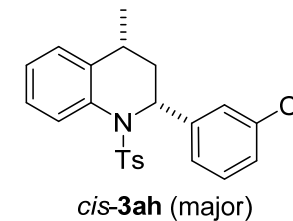
*cis*-3ah (major)

# <sup>13</sup>C NMR spectrum of diastereomixture-3ah (*cis*-major)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3-Cl-ds(CR515)\CR515(3-CI)\_13C\CR515(3-CI)\_13C.als



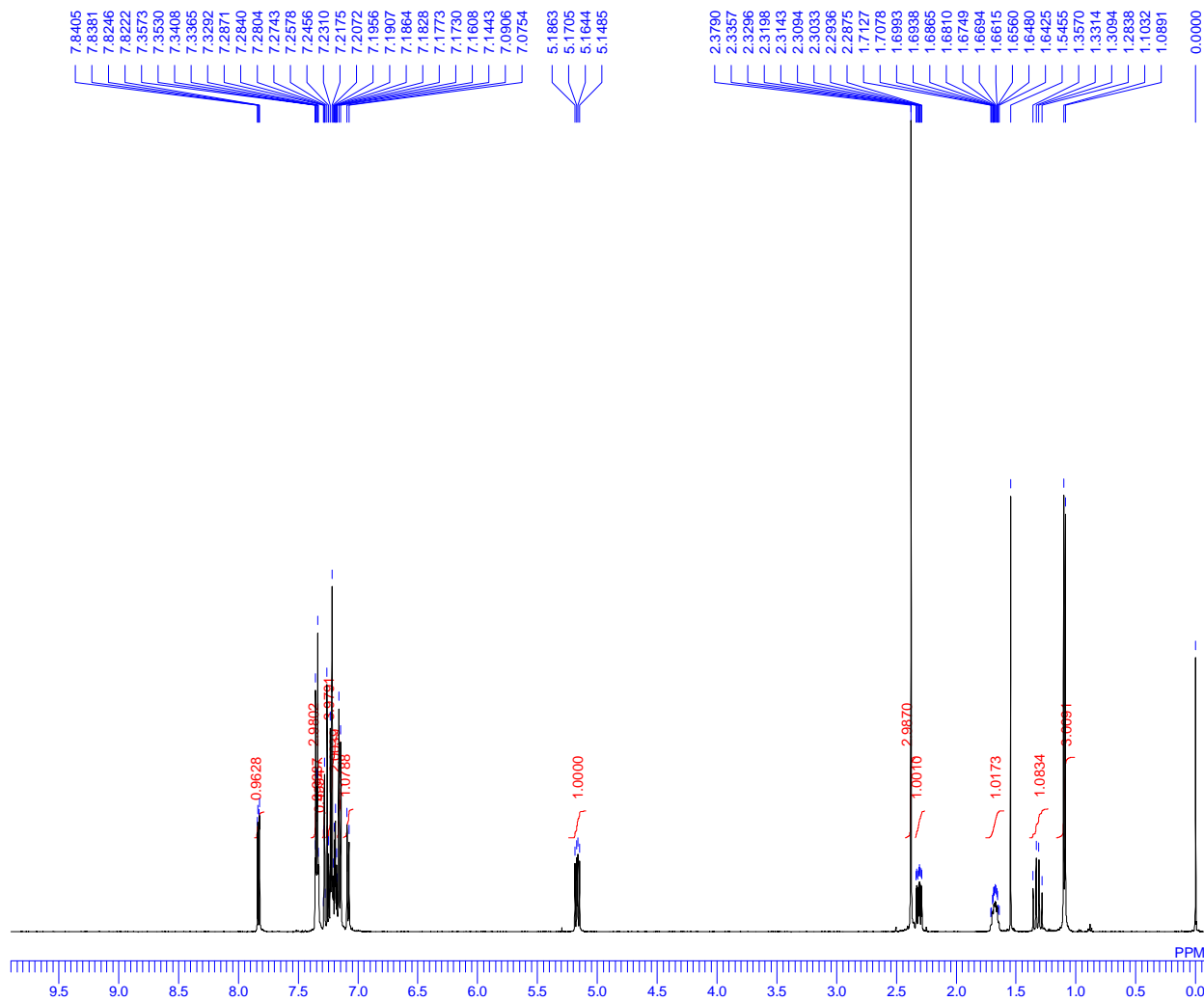
DATIM Sat Jul 18 19:59:48 2015  
 MENUF  
 OBNUC 13C  
 OFR 125.65 MHz  
 OBSET 120.00 KHz  
 OBFIN 7958.00 Hz  
 PW1 4.40 usec  
 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 1024  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 27  
 BF 0.09 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE CR515(3-CI)\_13C.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG -901893360  
 CSPED 11 Hz  
 FILDC  
 FILDF



# <sup>1</sup>H NMR spectrum of *cis*-3ah (major)

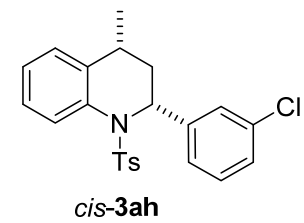
*cis*-3ah(3-Cl, major)

C:\Users\NMR\NMRdata\NMR NOJ\Quinoline styrene\3-Cl-major(YK9-10-All-Col-CB-CR)\cis-3ah(3-Cl, major).als



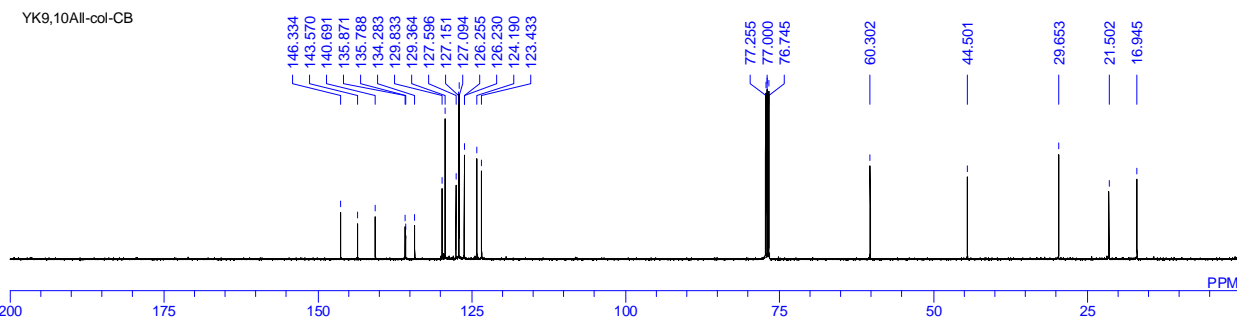
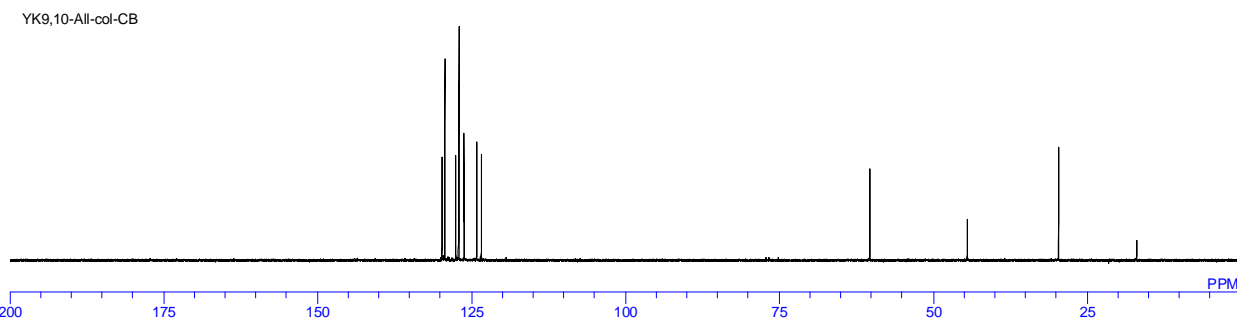
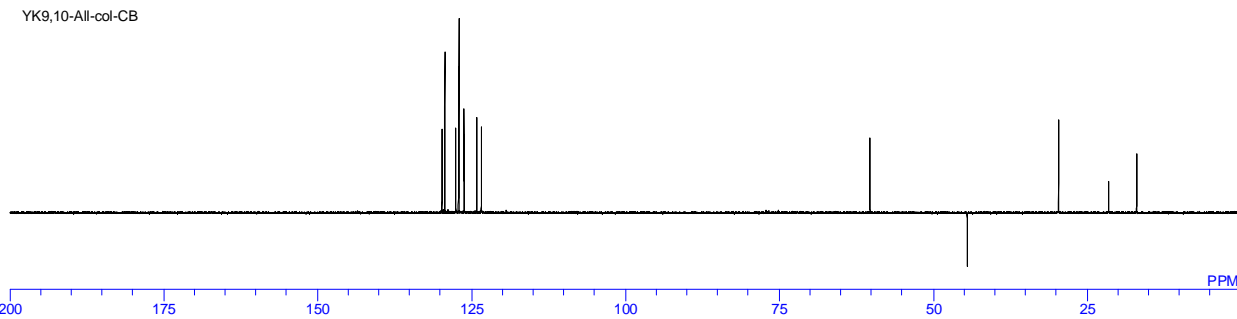
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DATIM Tue May 27 01:25:05 2014
MENUMF
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OBFIN 2160.00 Hz
PW1 5.00 usec
DEADT 57.50 usec
PREDL 10.00000 msec
IWT 0.00005 sec
POINT 32768
SPO 32768
TIMES 16
DUMMY 0
FREQU 10000.00 Hz
FLT 5000 Hz
DELAY 40.00 usec
ACQTM 3.2768 sec
PD 3.7232 sec
ADBIT 16
RGAIN 21
BF 0.09 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD non
EXPCM
IRNUC 1H
IFR 500.00 MHz
IRSET 160.00 KHz
IRFIN 2160.00 Hz
IRRPW 0 usec
IRATN 511
DFILE cis-3ah(3-Cl, major).als
SF th5.shm
LKSET 70.00 KHz
LKFIN 334.0 Hz
LKLEV 200
LGAIN 20
LKPHS 210
LKSIG 61176
CSPED 11 Hz
FILDC
FILDF
    
```

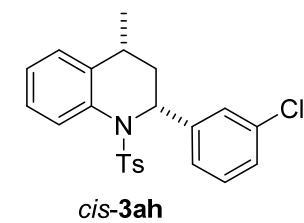


# <sup>13</sup>C NMR spectrum of *cis*-3ah (major)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3-Cl-major(YK9,10All-ColCB)\YK9,10All-col-CB\_DEPT.als



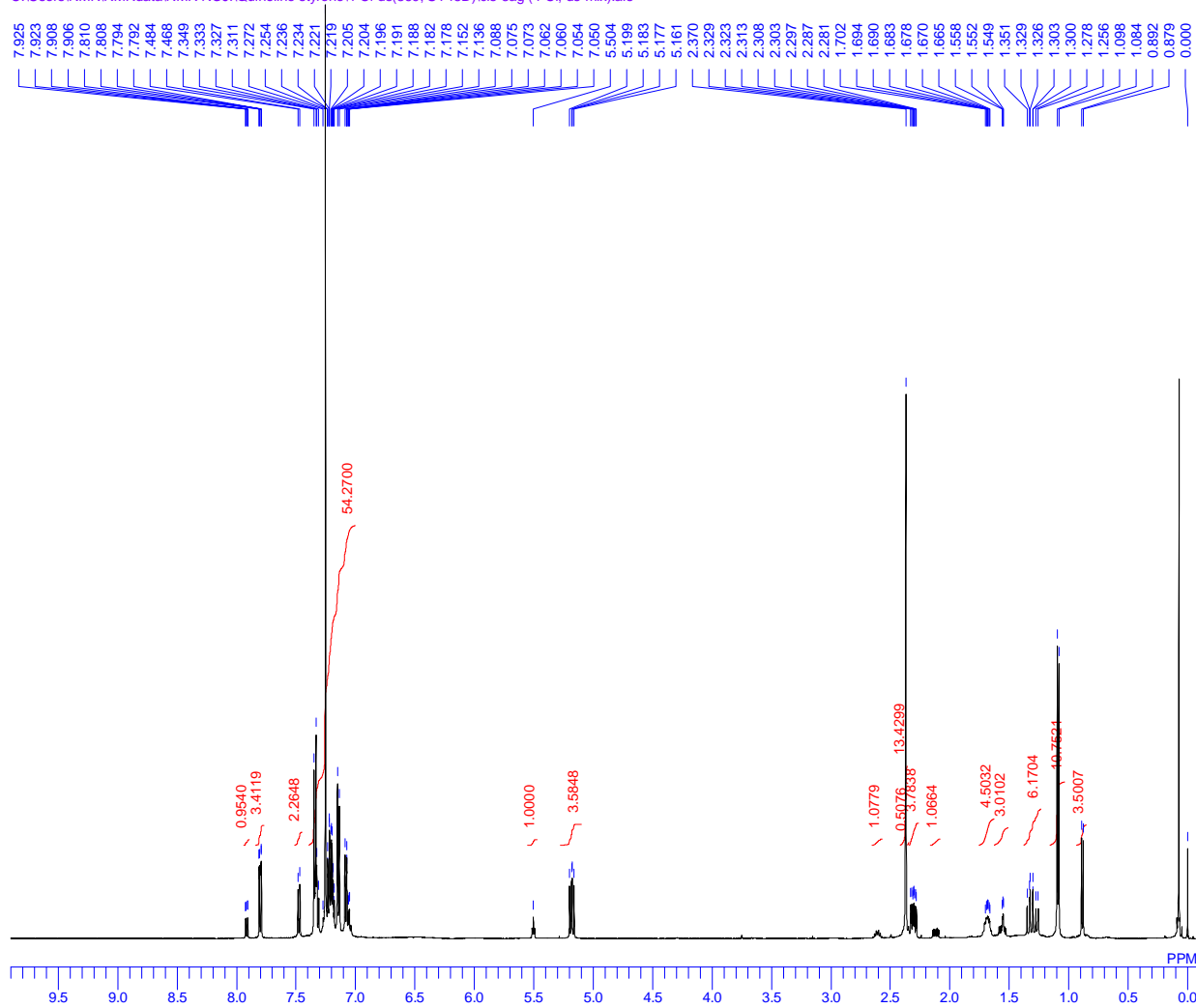
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 OBFIN 7958.00 Hz  
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 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 2048  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 0.01 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE YK9,10All-col-CB\_DEPT.als  
 SF th5.shm  
 LKSET 70.00 KHz  
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 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 45193  
 CSPED 12 Hz  
 FILDC  
 FILDF



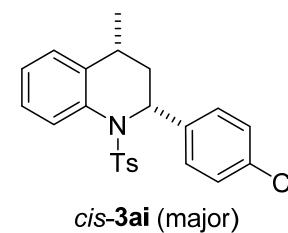
# <sup>1</sup>H NMR spectrum of diastereomixture-3ai (*cis*-major)

cis-3ag (4-Cl, ds-mix)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\4-Cl-ds(869, SY45D)\cis-3ag (4-Cl, ds-mix).als

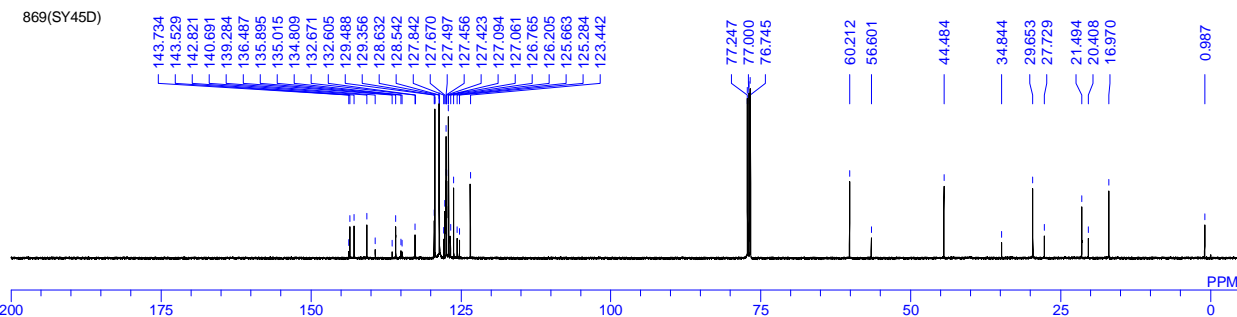
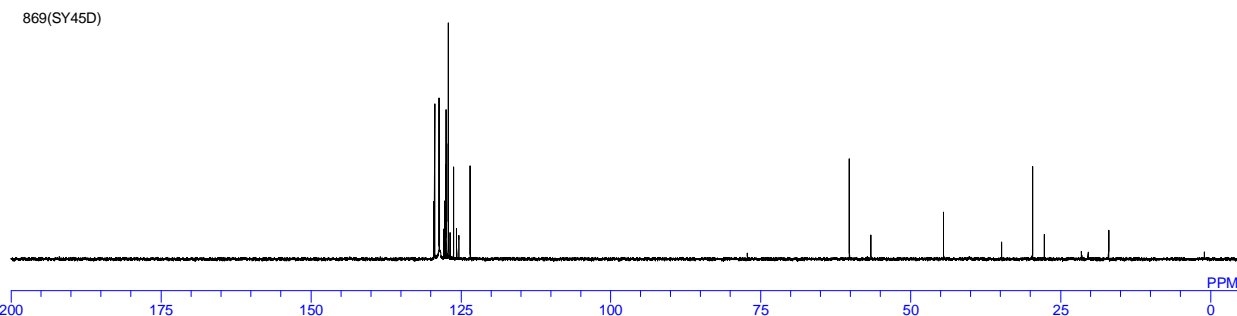
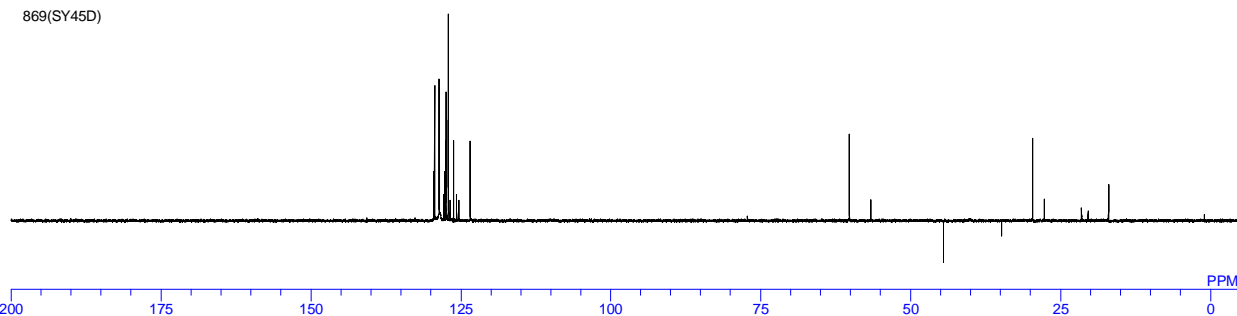


DATIM Tue Dec 30 00:28:01 2014  
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 OFR 500.00 MHz  
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 OBFIN 2160.00 Hz  
 PW1 5.00 usec  
 DEATD 57.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0005 sec  
 POINT 32768  
 SPO 32768  
 TIMES 16  
 DUMMY 0  
 FREQU 10000.00 Hz  
 FLT 5000 Hz  
 DELAY 40.00 usec  
 ACQTM 3.2768 sec  
 PD 3.7232 sec  
 ADBIT 16  
 RGAIN 17  
 BF 0.01 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD non  
 EXPCM 1H  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE cis-3ag (4-Cl, ds-mix).als  
 SF th5.shm  
 LKSET 70.00 KHz  
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 FILDC  
 FILDF



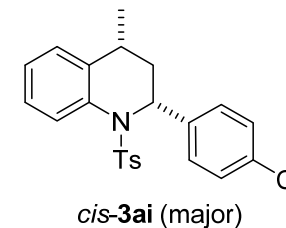
# <sup>13</sup>C NMR spectrum of diastereomixture-3ai (*cis*-major)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\4-Cl-ds(869, SY45D)\869(SY45D)\_DEPT.als



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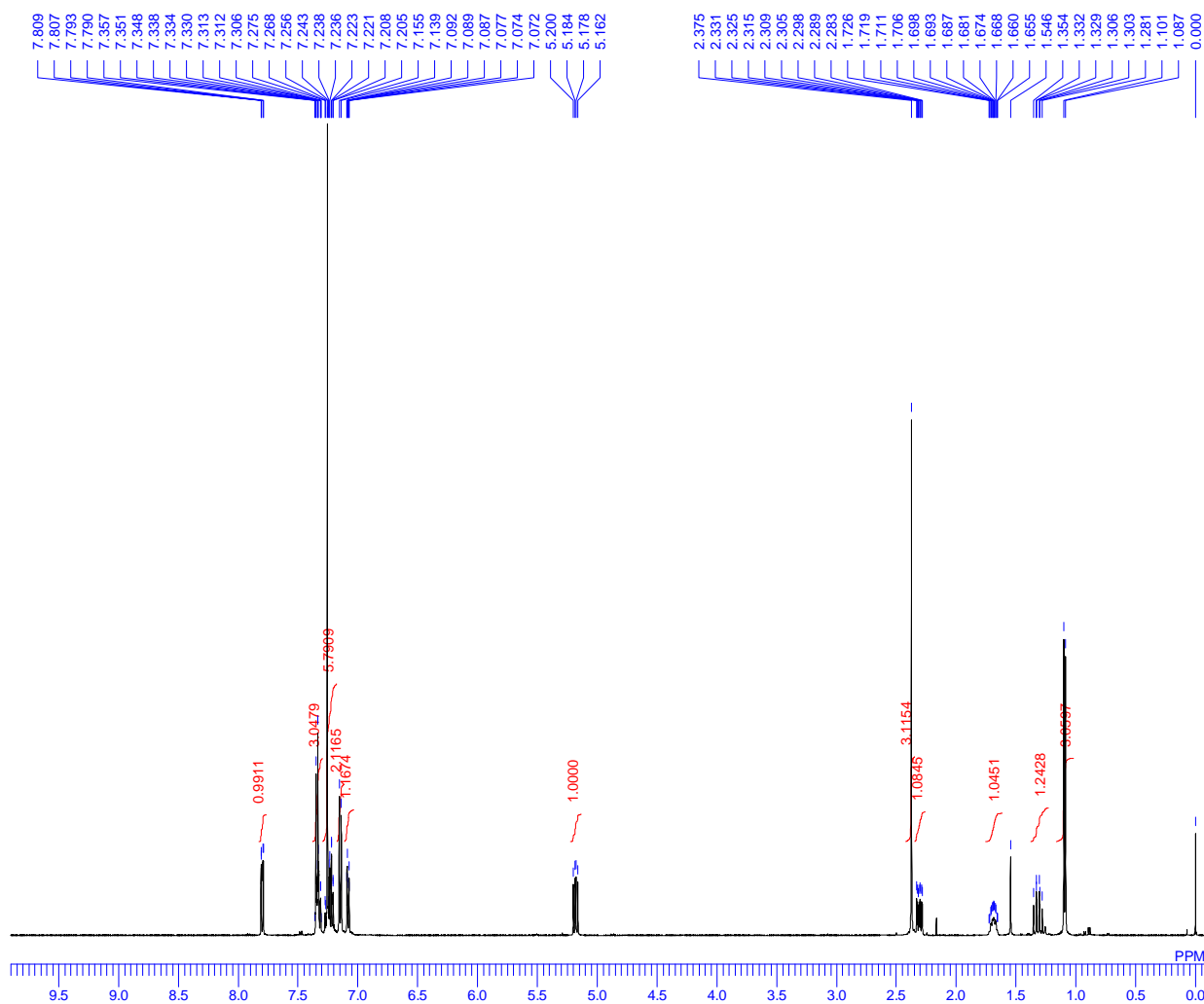
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DEADT 15.50 usec
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IWT 0.0100 sec
POINT 32768
SPO 32768
TIMES 1600
DUMMY 1
FREQU 33898.30 Hz
FLT 16950 Hz
DELAY 11.80 usec
ACQTM 0.9667 sec
PD 2.0333 sec
ADBIT 16
RGAIN 28
BF 0.01 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD bcm
EXPCM error_expcm
IRNUC 1H
IFR 500.00 MHz
IRSET 160.00 KHz
IRFIN 2160.00 Hz
IRRPW 0 usec
IRATN 511
DFILE 869(SY45D)_DEPT.als
SF th5.shm
LKSET 70.00 KHz
LKFIN 334.0 Hz
LKLEV 200
LGAIN 20
LKPHS 210
LKSIG 44792
CSPED 14 Hz
FILDC
FILDF
    
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# <sup>1</sup>H NMR spectrum of *cis*-3ai (major)

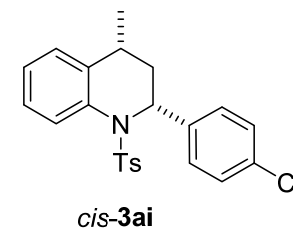
*cis*-3ag (4-Cl, major)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\4-Cl-major(SY45-2)\SY45-2\_1H\SY45-2\_1H.als



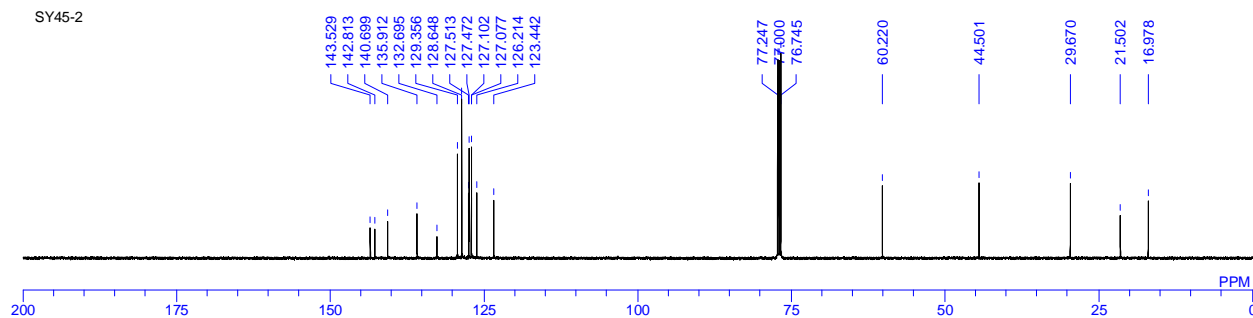
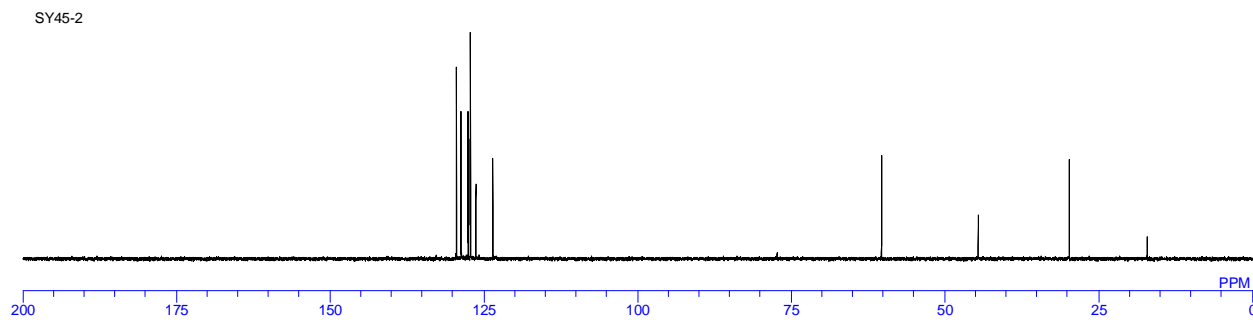
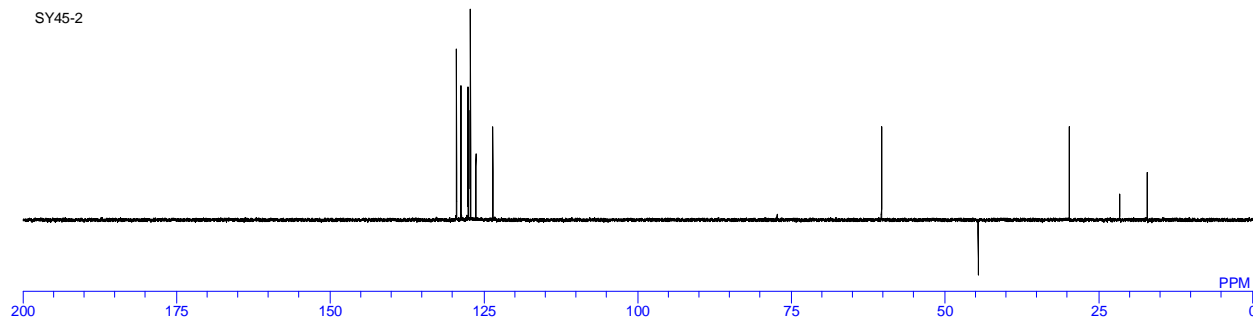
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DATIM Sat Jan 10 02:01:21 2015
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OBFIN 2160.00 Hz
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DEADT 57.50 usec
PREDL 10.00000 msec
IWT 0.0005 sec
POINT 32768
SPO 32768
TIMES 16
DUMMY 0
FREQU 10000.00 Hz
FLT 5000 Hz
DELAY 40.00 usec
ACQTM 3.2768 sec
PD 3.7232 sec
ADBIT 16
RGAIN 20
BF 0.09 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD non
EXPCM
IRNUC 1H
IFR 500.00 MHz
IRSET 160.00 KHz
IRFIN 2160.00 Hz
IRRPW 0 usec
IRATN 511
DFILE SY45-2_1H.als
SF th5.shm
LKSET 70.00 KHz
LKFIN 334.0 Hz
LKLEV 200
LGAIN 20
LKPHS 210
LKSIG 53110
CSPED 12 Hz
FILDC
FILDF
    
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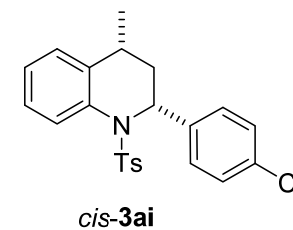


# <sup>13</sup>C NMR spectrum of *cis*-3ai (major)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\4-Cl-major(SY45-2)\SY45-2\_DEPT.als



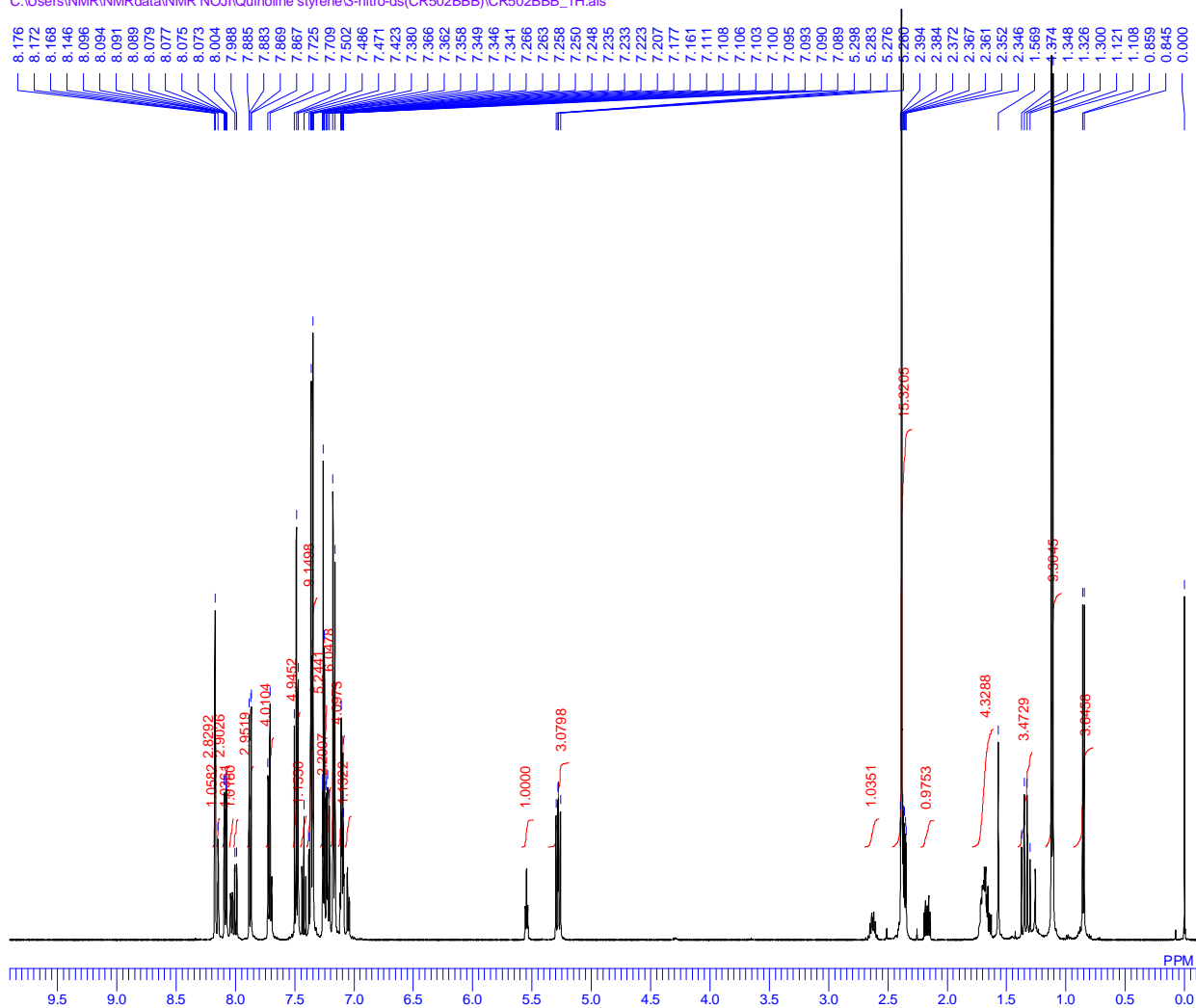
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 OBFIN 7958.00 Hz  
 PW1 4.40 usec  
 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 1600  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 0.09 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE SY45-2\_DEPT.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 32151  
 CSPED 11 Hz  
 FILDC  
 FILDF



# <sup>1</sup>H NMR spectrum of diastereomixture-3aj (*cis*-major)

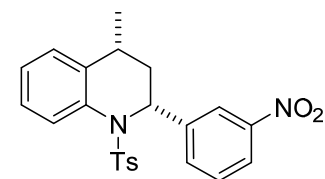
diastereomixture-3aj

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3-nitro-ds(CR502BBB)\CR502BBB\_1H.als



Sun Jul 5 17:26:29 2015

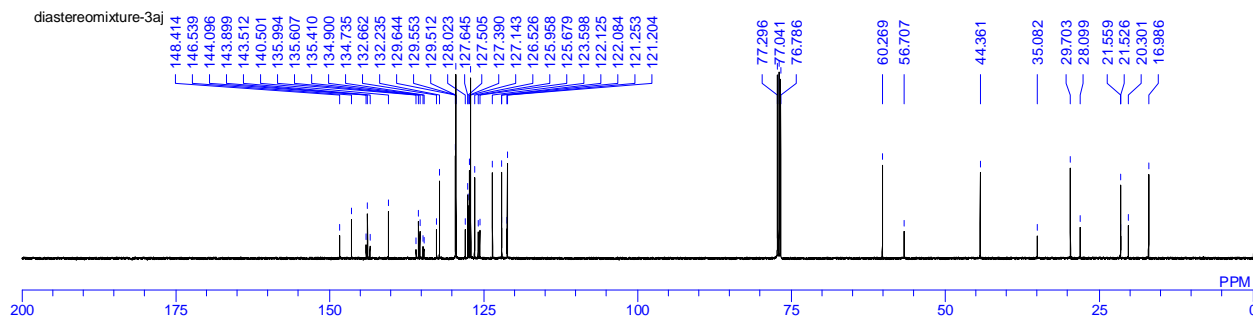
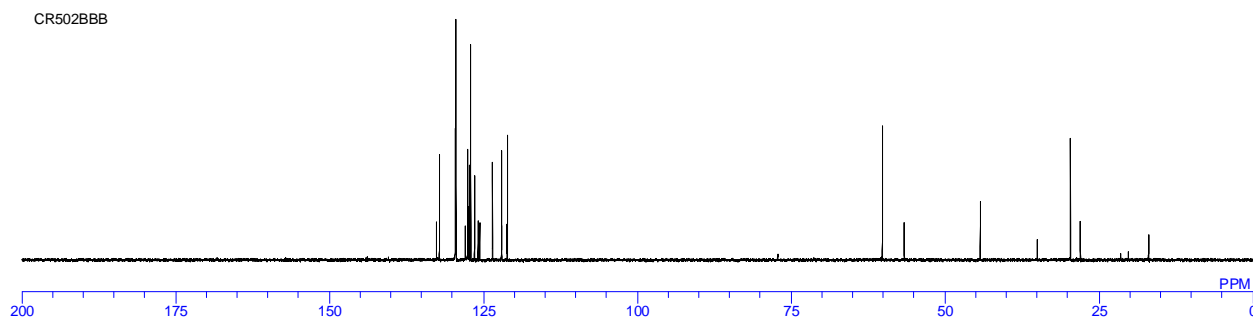
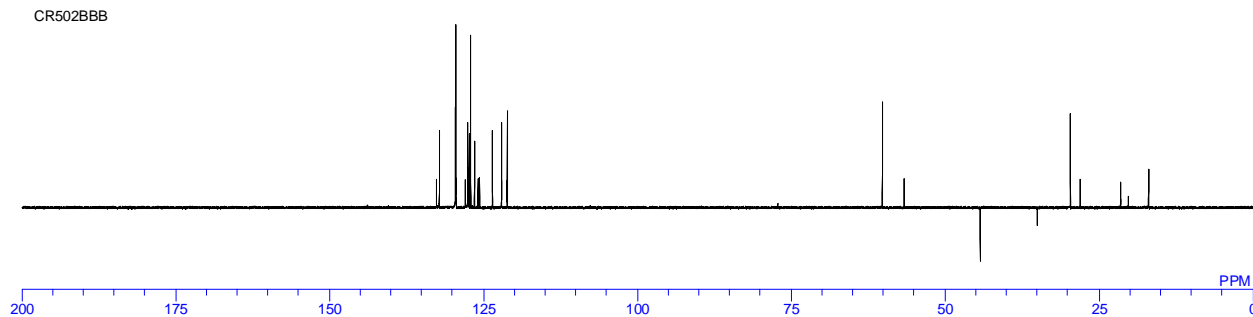
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OBSET	160.00 KHz
OBFIN	2160.00 Hz
PW1	5.00 usec
DEADT	57.50 usec
PREDL	10.00000 msec
IWT	0.0005 sec
POINT	32768
SPO	32768
TIMES	16
DUMMY	0
FREQU	10000.00 Hz
FLT	5000 Hz
DELAY	40.00 usec
ACQTM	3.2768 sec
PD	3.7232 sec
ADBIT	16
RGAIN	19
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	
IRNUC	1H
IFR	500.00 MHz
IRSET	160.00 KHz
IRFIN	2160.00 Hz
IRRPW	0 usec
IRATN	511
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SF	th5.shm
LKSET	70.00 KHz
LKFIN	334.0 Hz
LKLEV	200
LGAIN	20
LKPHS	210
LKSIG	64279
CSPED	13 Hz
FILDC	
FILDF	



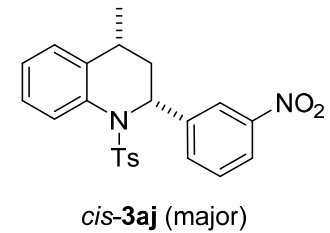
*cis*-3aj (major)

**<sup>13</sup>C NMR spectrum of diastereomixture-3aj (*cis*-major)**

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3-nitro-ds(CR502BBB)\CR502BBB\_DEPT.als



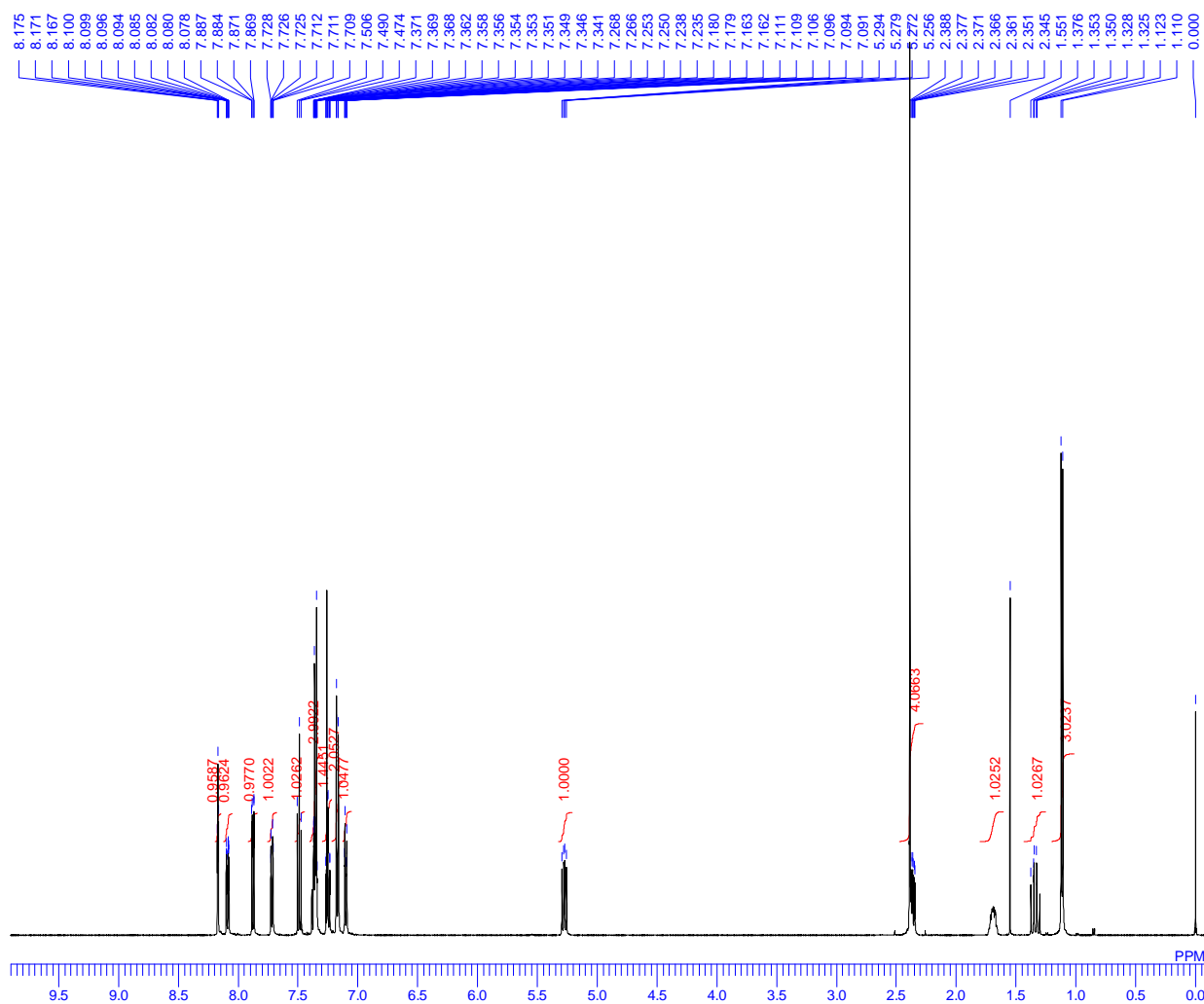
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 OBFIN 7958.00 Hz  
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 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 2048  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 0.12 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
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 FILDC  
 FILDF



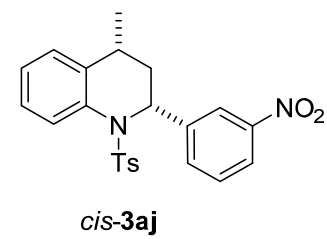
# <sup>1</sup>H NMR spectrum of *cis*-3aj (major)

*cis*-3aj (3-nitro, major)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3-nitro-major(CR494crrc)\CR494crrc-3-nitro-major\_1H\CR494crrc-3-nitro-major\_1H.als



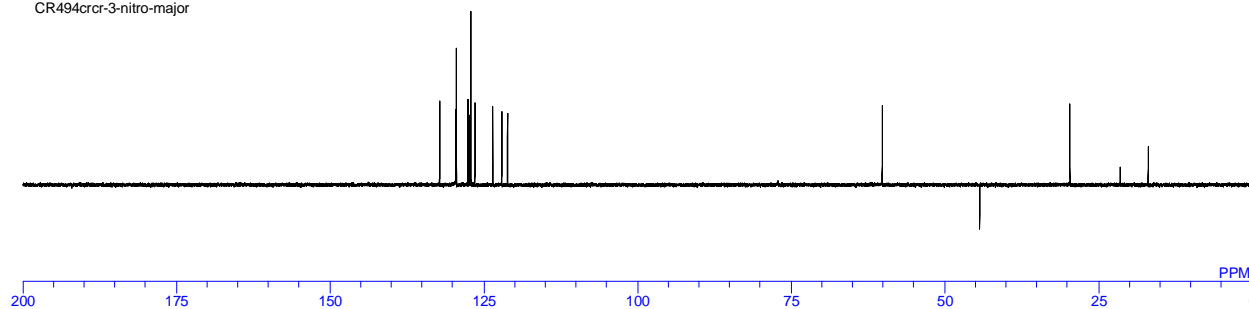
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 OBSET 2160.00 Hz  
 OBFIN 5.00 usec  
 PW1 57.50 usec  
 DEADT 10.00000 msec  
 PREDL 0.0005 sec  
 IWT 32768  
 POINT 32768  
 SPO 16  
 TIMES 0  
 DUMMY 10000.00 Hz  
 FREQU 5000 Hz  
 FLT 40.00 usec  
 DELAY 3.2768 sec  
 ACQTM 3.7232 sec  
 PD 16  
 ADBIT 20  
 RGAIN 0.12 Hz  
 BF 0.00  
 T1 0.00  
 T2 90.00  
 T3 100.00  
 T4 non  
 EXMOD 1H  
 EXPCM 500.00 MHz  
 IRNUC 160.00 KHz  
 IFR 2160.00 Hz  
 IRSET 0 usec  
 IRFIN 511  
 IRRPW CR494crrc-3-nitro-major\_1H.als  
 IRATN th5.shm  
 DFILE 70.00 KHz  
 SF 334.0 Hz  
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 LKSIG  
 CSPED  
 FILDC  
 FILDF



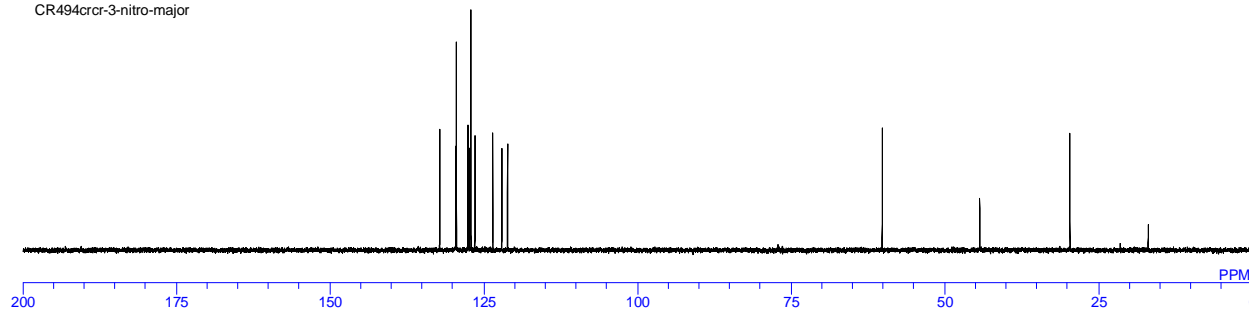
# <sup>13</sup>C NMR spectrum of *cis*-3aj (major)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3-nitro-major(CR494crrc)\CR494crrc-3-nitro-major\_DEPT.als

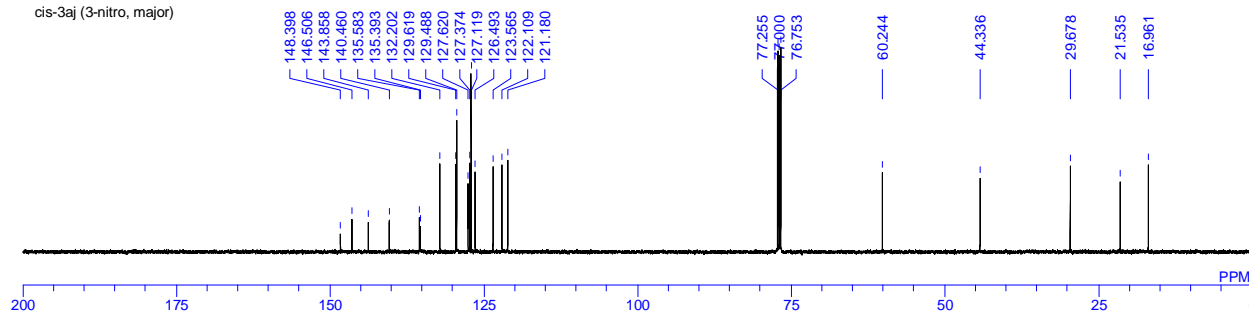
CR494crrc-3-nitro-major



CR494crrc-3-nitro-major



*cis*-3aj (3-nitro, major)



DATIM Mon Jul 6 03:22:27 2015

MENUF 13C

OBNUC 13C

OFR 125.65 MHz

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OBFIN 7958.00 Hz

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DEADT 15.50 usec

PREDL 10.00000 msec

IWT 0.0100 sec

POINT 32768

SPO 32768

TIMES 1024

DUMMY 1

FREQU 33898.30 Hz

FLT 16950 Hz

DELAY 11.80 usec

ACQTM 0.9667 sec

PD 2.0333 sec

ADBIT 16

RGAIN 28

BF 0.12 Hz

T1 0.00

T2 0.00

T3 90.00

T4 100.00

EXMOD bcm

EXPCM error\_expcm

IRNUC 1H

IFR 500.00 MHz

IRSET 160.00 KHz

IRFIN 2160.00 Hz

IRRPW 0 usec

IRATN 511

DFILE CR494crrc-3-nitro-major\_DEPT.als

SF th5.shm

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LKFIN 334.0 Hz

LKLEV 200

LGAIN 20

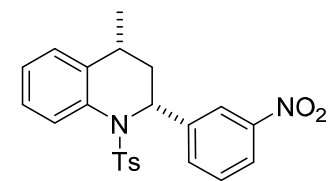
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FILDC

FILDF

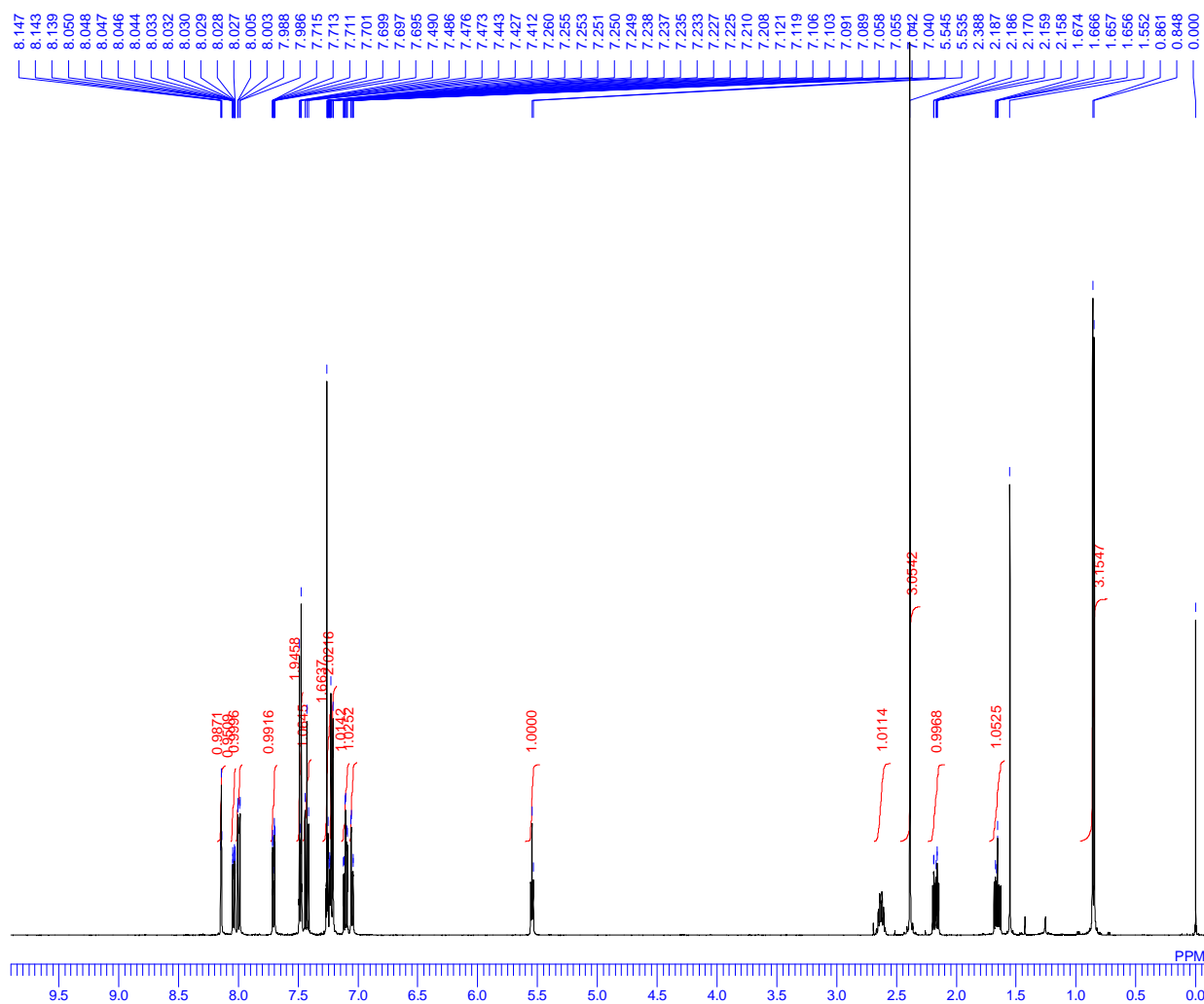


*cis*-3aj

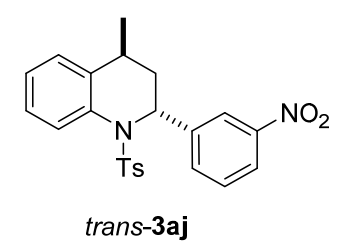
# <sup>1</sup>H NMR spectrum of *trans*-3aj (minor)

trans-3aj (3-nitro, minor)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3-nitro-minor(CR494-all-17)\CR494-all-17(3-nitro-minor)\_1H\CR494-all-17(3-nitro-minor)\_1H.als

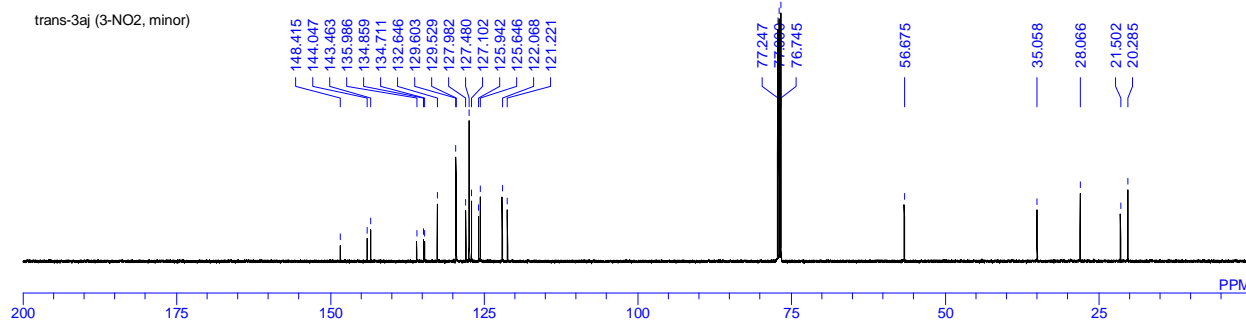
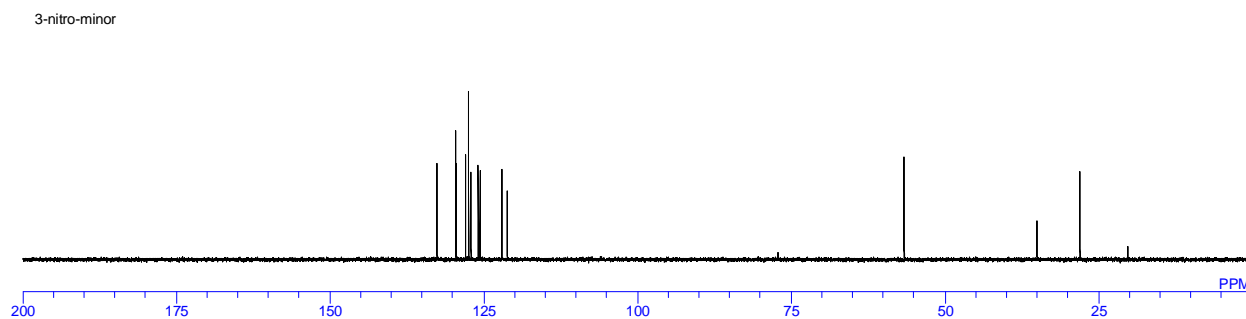
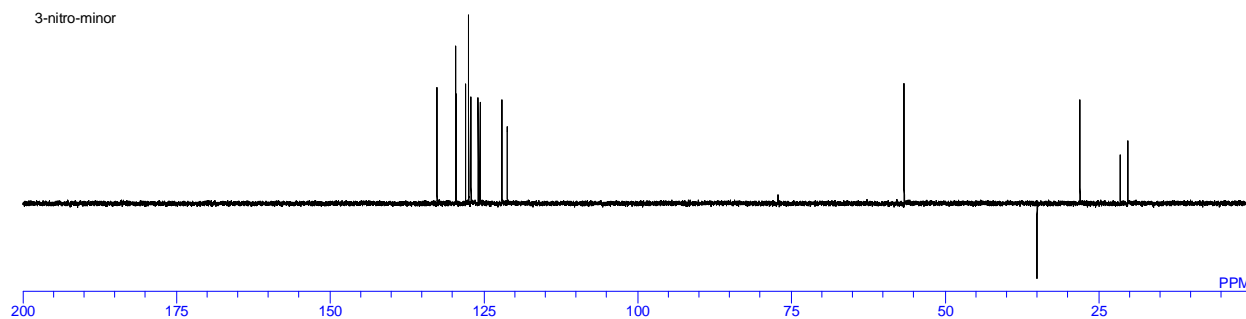


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 PREDL 0.0005 sec  
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 SPO 32768  
 TIMES 32  
 DUMMY 0  
 FREQU 10000.00 Hz  
 FLT 5000 Hz  
 DELAY 40.00 usec  
 ACQTM 3.2768 sec  
 PD 3.7232 sec  
 ADBIT 16  
 RGAIN 21  
 BF 0.12 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD non  
 EXPCM 1H  
 IRNUC 500.00 MHz  
 IFR 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
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 SF th5.shm  
 LKSET 70.00 KHz  
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 FILDF

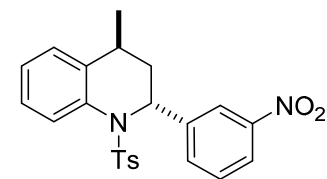


# <sup>13</sup>C NMR spectrum of *trans*-3aj (minor)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3-nitro-minor(CR494-all-17)\3-nitro-minor\_DEPT.als



DATIM Mon Jul 6 06:28:12 2015  
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 OFR 125.65 MHz  
 OBSET 120.00 KHz  
 OBFIN 7958.00 Hz  
 PW1 4.40 usec  
 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 2048  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 0.12 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE 3-nitro-minor\_DEPT.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 39450  
 CSPED 13 Hz  
 FILDC  
 FILDF



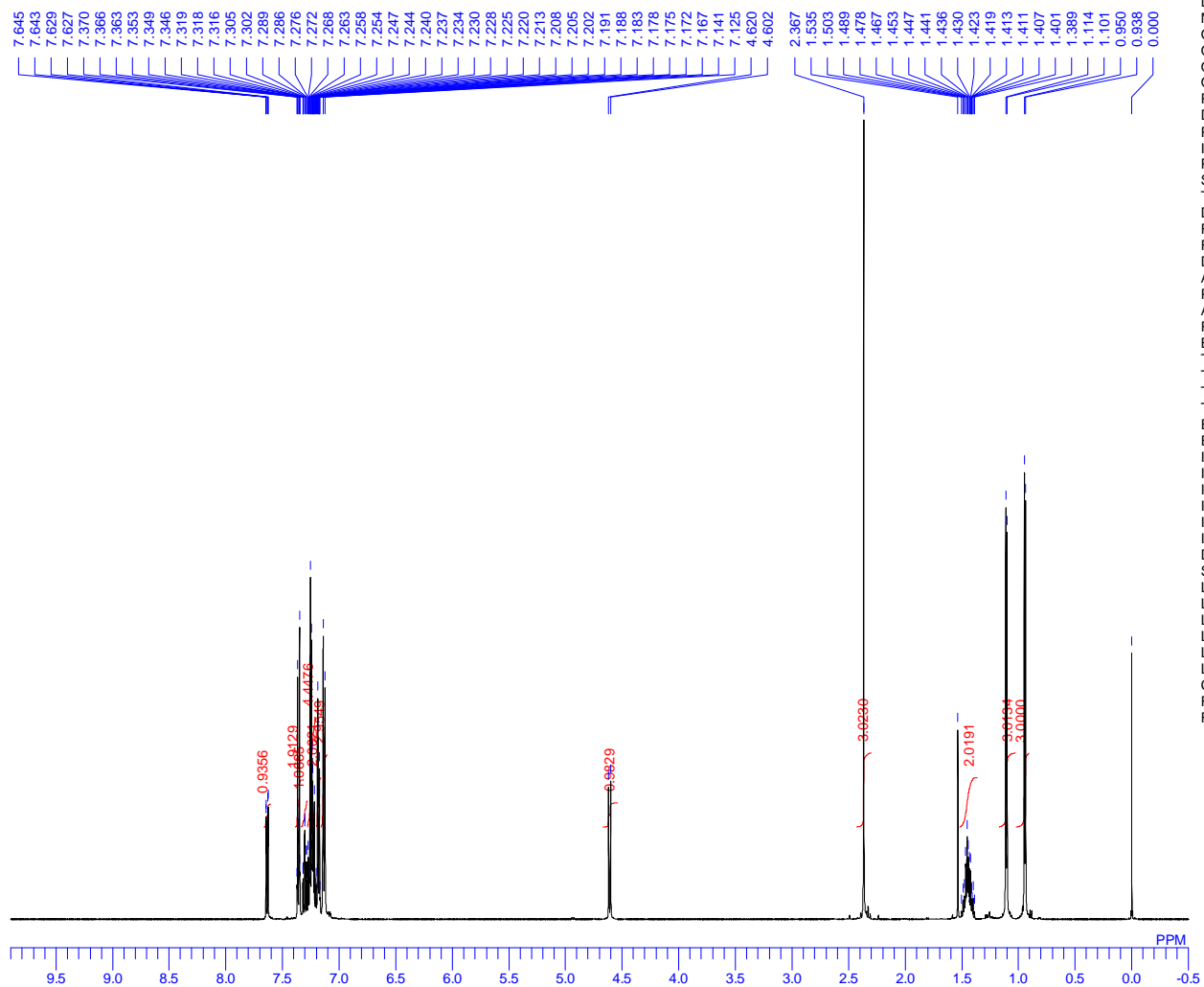
*trans*-3aj



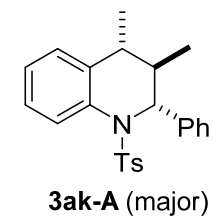
# <sup>1</sup>H NMR spectrum of 3ak-A

3ak-A (cis-Me-styrene)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ak-A cis-Me-styrene CR519-col\CICR519-C\_1H\CR519-C\_1H.nmdata



DATIM Mon Oct 5 22:57:42 2015  
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DEADT 57.50 usec  
PREDL 10.00000 msec  
IWT 0.0005 sec  
POINT 32768  
SPO 32768  
TIMES 16  
DUMMY 0  
FREQU 10000.00 Hz  
FLT 5000 Hz  
DELAY 40.00 usec  
ACQTM 3.2768 sec  
PD 3.7232 sec  
ADBIT 16  
RGAIN 19  
BF 0.09 Hz  
T1 0.00  
T2 0.00  
T3 90.00  
T4 100.00  
EXMOD non  
EXPCM 1H  
IRNUC 1H  
IFR 500.00 MHz  
IRSET 160.00 KHz  
IRFIN 2160.00 Hz  
IRRPW 0 usec  
IRATN 511  
DFILE CR519-C\_1H.nmdata  
SF th5.shm  
LKSET 70.00 KHz  
LKFIN 334.0 Hz  
LKLEV 200  
LGAIN 20  
LKPHS 210  
LKSIG -88284379  
CSPED 13 Hz  
FILDC  
FILDF



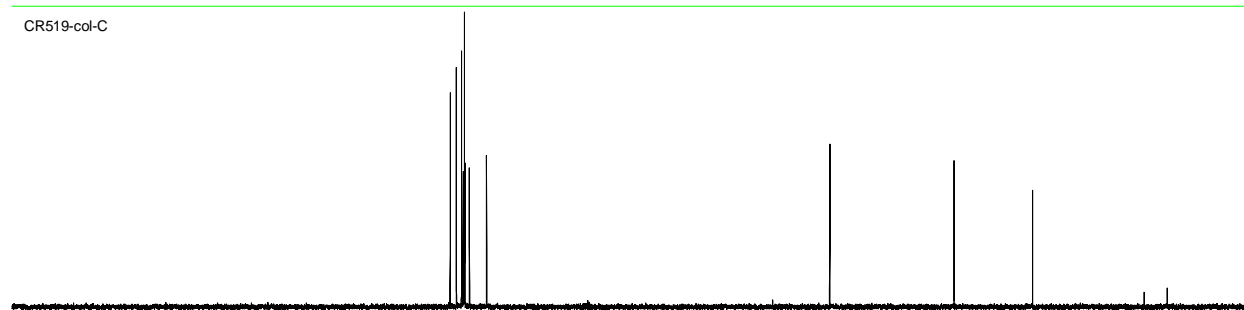
# <sup>13</sup>C NMR spectrum of 3ak-A

C:\Users\NMR\NMRdata\NMR NOJ\Quinoline styrene\3ak-A cis-Me-styrene CR519-col C\CR519-C\_13C\CR519-C\_13C.als

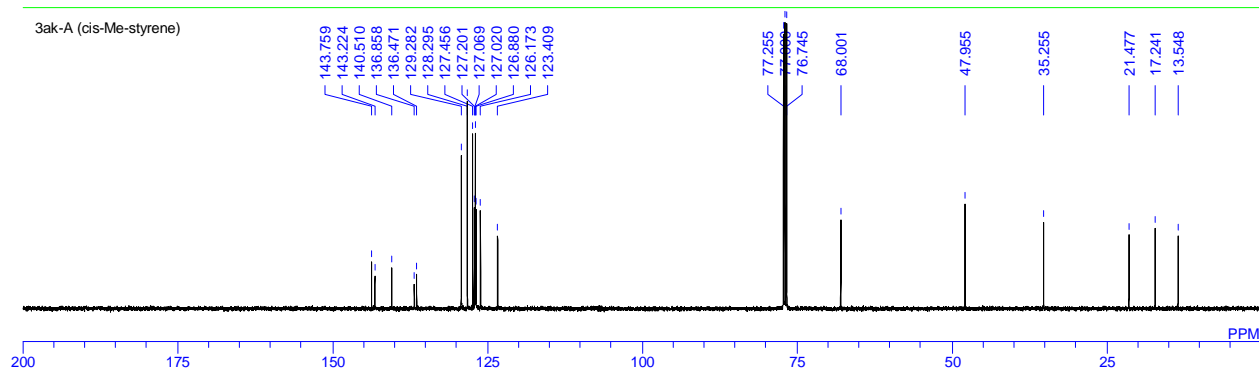
CR519-col-C



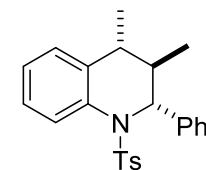
CR519-col-C



3ak-A (cis-Me-styrene)



DATIM Mon Oct 5 23:50:13 2015  
 MENUF  
 OBNUC 13C  
 OFR 125.65 MHz  
 OBSET 120.00 KHz  
 OBFIN 7958.00 Hz  
 PW1 4.40 usec  
 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 1024  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 0.09 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE CR519-C\_13C.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 264087868  
 CSPED 12 Hz  
 FILDC  
 FILDF

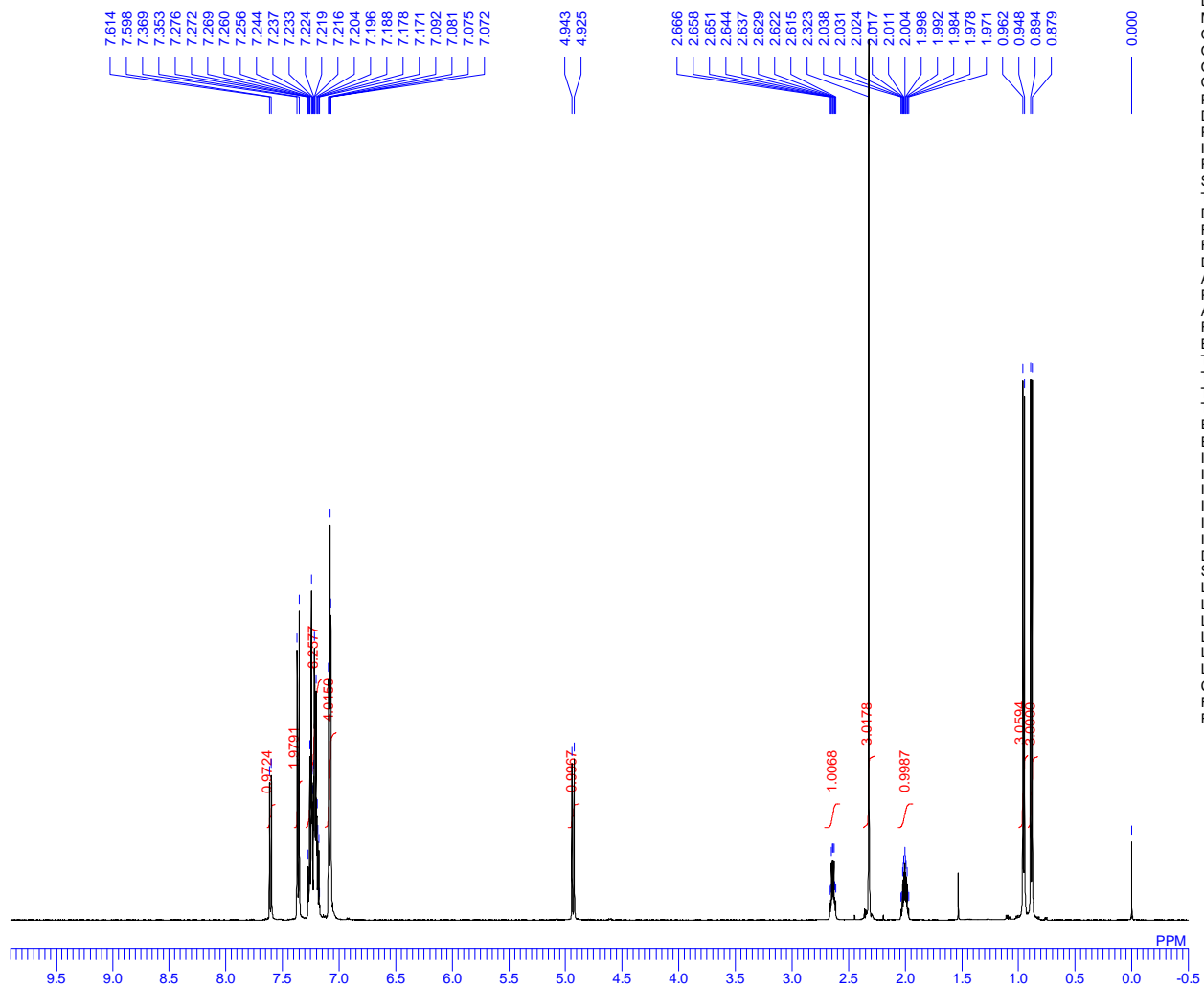


3ak-A (major)

# <sup>1</sup>H NMR spectrum of 3ak-B

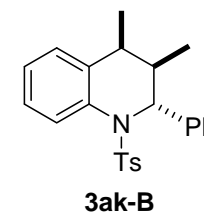
3ak-B (trans-Me-styrene)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ak-B trans-Me-styrene major B(YK7-crystal)\819(YK7-crystal)\_1H\819(YK7-crystal)\_1H.als



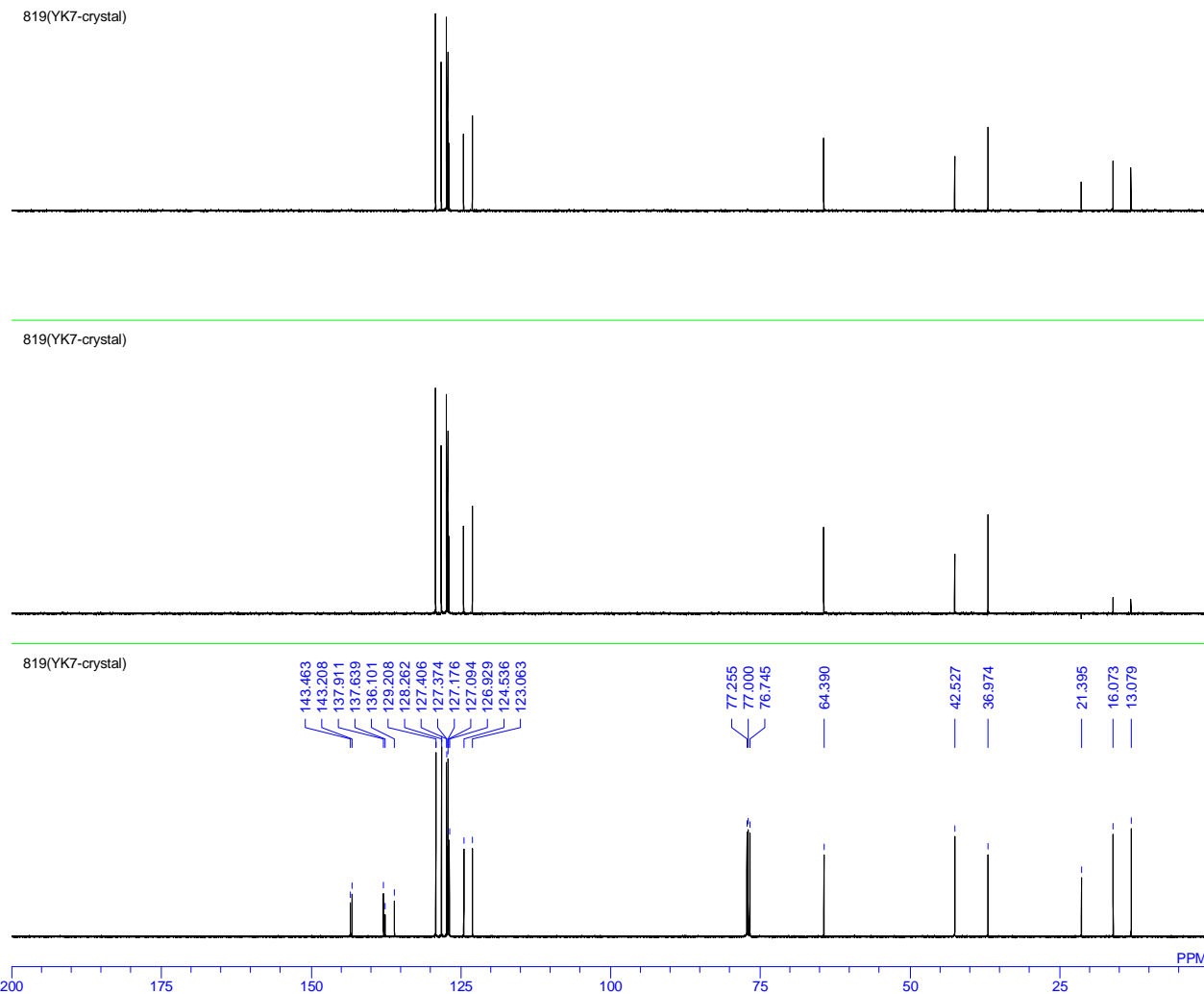
```

DATIM Tue Apr 1 00:27:13 2014
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OBNUC 500.00 MHz
OFR 160.00 KHz
OBSET 2160.00 Hz
OBFIN 5.00 usec
PW1 57.50 usec
DEADT 10.00000 msec
PREDL 0.0005 sec
IWT 32768
POINT 32768
SPO 16
TIMES 0
DUMMY 10000.00 Hz
FREQU 5000 Hz
FLT 40.00 usec
DELAY 3.2768 sec
ACQTM 3.7232 sec
PD 16
ADBIT 16
RGAIN 0.09 Hz
BF 0.00
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD non
EXPCM 1H
IRNUC 500.00 MHz
IFR 160.00 KHz
IRSET 2160.00 Hz
IRFIN 0 usec
IRRPW 511
IRATN 819(YK7-crystal)_1H.als
DFILE th5.shm
SF 70.00 KHz
LKSET 334.0 Hz
LKFIN 200
LKLEV 20
LGAIN 210
LKPHS 13277
LKSIG 11 Hz
CSPED
FILDC
FILDF
    
```

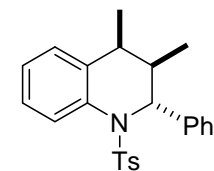


# <sup>13</sup>C NMR spectrum of 3ak-B

C:\Users\NMR\NMRdata\NMR NOUI\Quinoline styrene\3ak-B trans-Me-styrene major B(YK7-crystal)\819(YK7-crystal)\_DEPT.als



DATIM Tue Apr 1 01:08:37 2014  
 MENUF  
 OBNUC 13C  
 OFR 125.65 MHz  
 OBSET 120.00 KHz  
 OBFIN 7958.00 Hz  
 PW1 4.40 usec  
 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 800  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 0.09 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE 819(YK7-crystal)\_DEPT.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 39820  
 CSPED 11 Hz  
 FILDC  
 FILDF

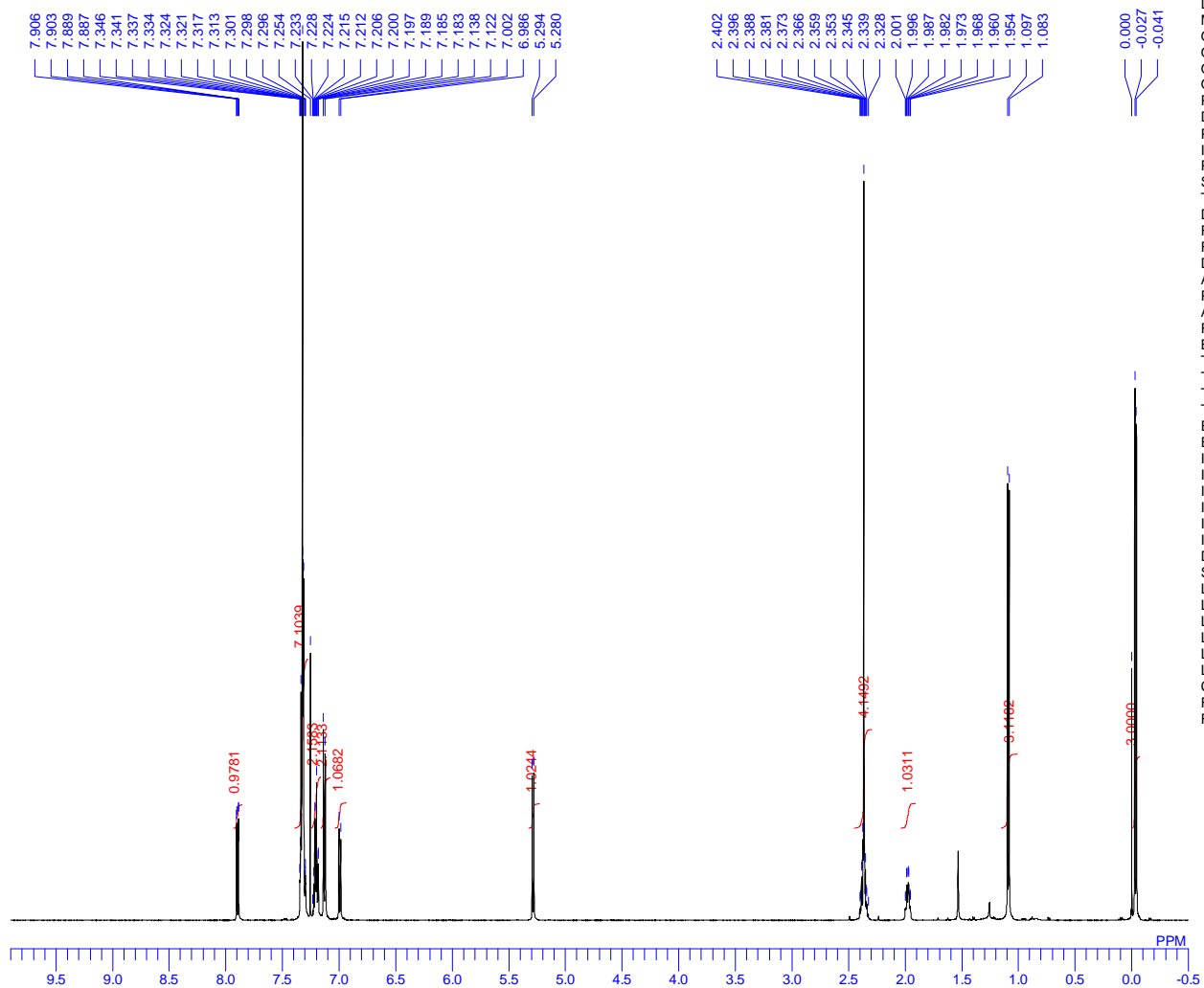


**3ak-B**

# <sup>1</sup>H NMR spectrum of 3ak-C

3ak-C (cis-Me-styrene)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ak-C cis-Me-styrene CR519-col-D=NMR-C\CR519-D\_1H\CR519-D\_1H.nmdata



DATIM Mon Oct 5 20:44:20 2015

MENUP 1H

OBNUC 500.00 MHz

OFR 160.00 KHz

OBSET 2160.00 Hz

OBFIN 5.00 usec

PW1 57.50 usec

DEADT 10.00000 msec

PREDL 0.0005 sec

IWT 32768

POINT 32768

SPO 16

TIMES 0

DUMMY 10000.00 Hz

FREQU 5000 Hz

FLT 40.00 usec

DELAY 3.2768 sec

ACQTM 3.7232 sec

PD 16

ADBIT 19

RGAIN 0.09 Hz

BF 0.00

T1 0.00

T2 0.00

T3 90.00

T4 100.00

EXMOD non

EXPCM 1H

IRNUC 500.00 MHz

IFR 160.00 KHz

IRSET 2160.00 Hz

IRFIN 0 usec

IRRPW 511

IRATN CR519-D\_1H.nmdata

DFILE th5.shm

SF 70.00 KHz

LKSET 334.0 Hz

LKFIN 200

LKLEV 20

LGAIN 210

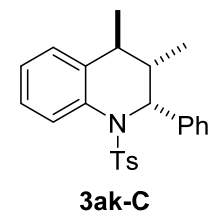
LKPHS 1840955736

LKSIG 9 Hz

CSPED

FILDC

FILDF



# <sup>13</sup>C NMR spectrum of 3ak-C

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ak-C cis-Me-styrene CR519-col-D=NMR-C\CR519-D\_DEPT.als

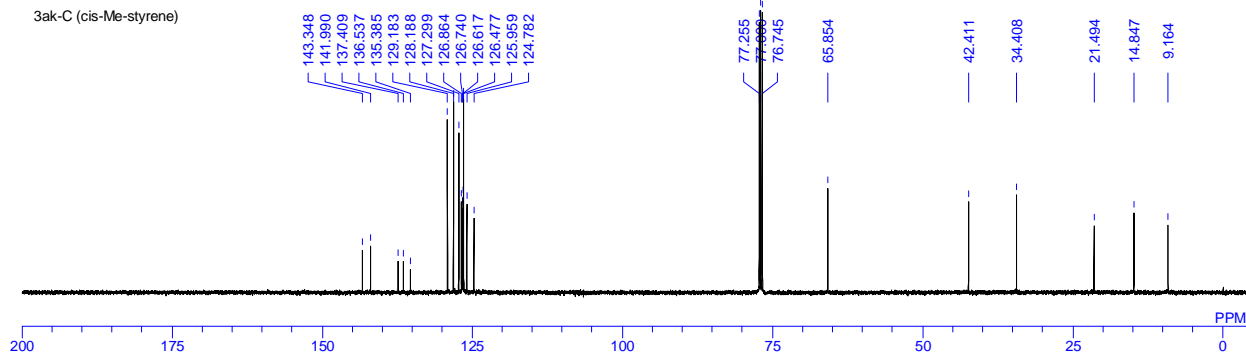
CR519-col-D



CR519-col-D

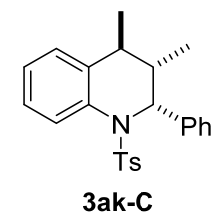


3ak-C (cis-Me-styrene)



```

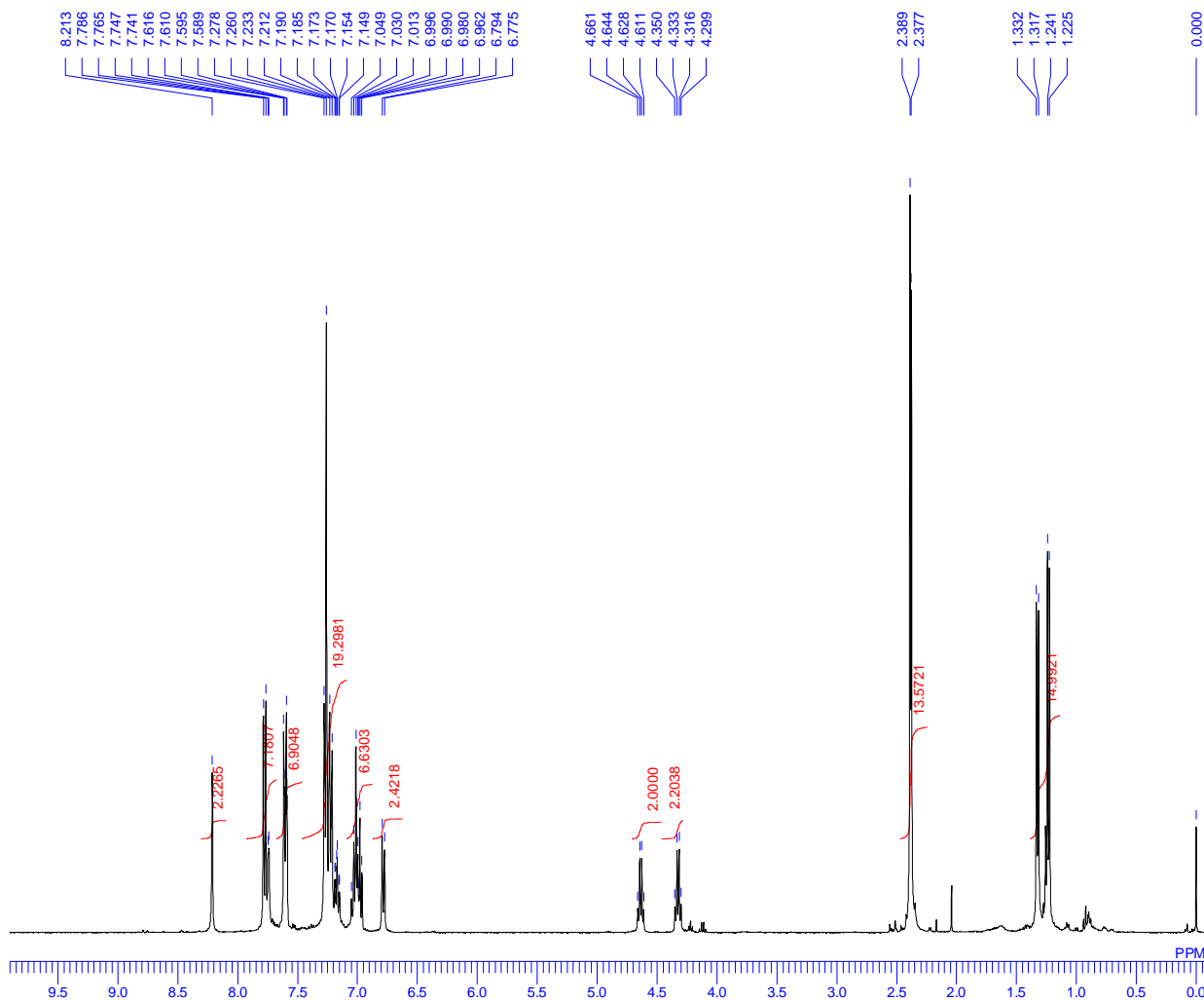
DATIM Mon Oct 5 21:36:58 2015
MENUF
OBNUC 13C
OFR 125.65 MHz
OBSET 120.00 KHz
OBFIN 7958.00 Hz
PW1 4.40 usec
DEADT 15.50 usec
PREDL 10.00000 msec
IWT 0.0100 sec
POINT 32768
SPO 32768
TIMES 1024
DUMMY 1
FREQU 33898.30 Hz
FLT 16950 Hz
DELAY 11.80 usec
ACQTM 0.9667 sec
PD 2.0333 sec
ADBIT 16
RGAIN 28
BF 0.09 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD bcm
EXPCM error_expcm
IRNUC 1H
IFR 500.00 MHz
IRSET 160.00 KHz
IRFIN 2160.00 Hz
IRRPW 0 usec
IRATN 511
DFILE CR519-D_DEPT.als
SF th5.shm
LKSET 70.00 KHz
LKFIN 334.0 Hz
LKLEV 200
LGAIN 20
LKPHS 210
LKSIG 2126368407
CSPED 12 Hz
FILDC
FILDF
    
```



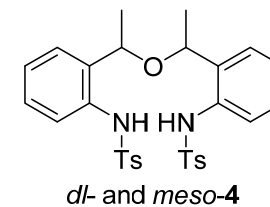
# <sup>1</sup>H NMR spectrum of 4, diastereomixture

ether4 ds

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene4 ether compound 873\873 (HK100)1NON\_E1\_FT.als

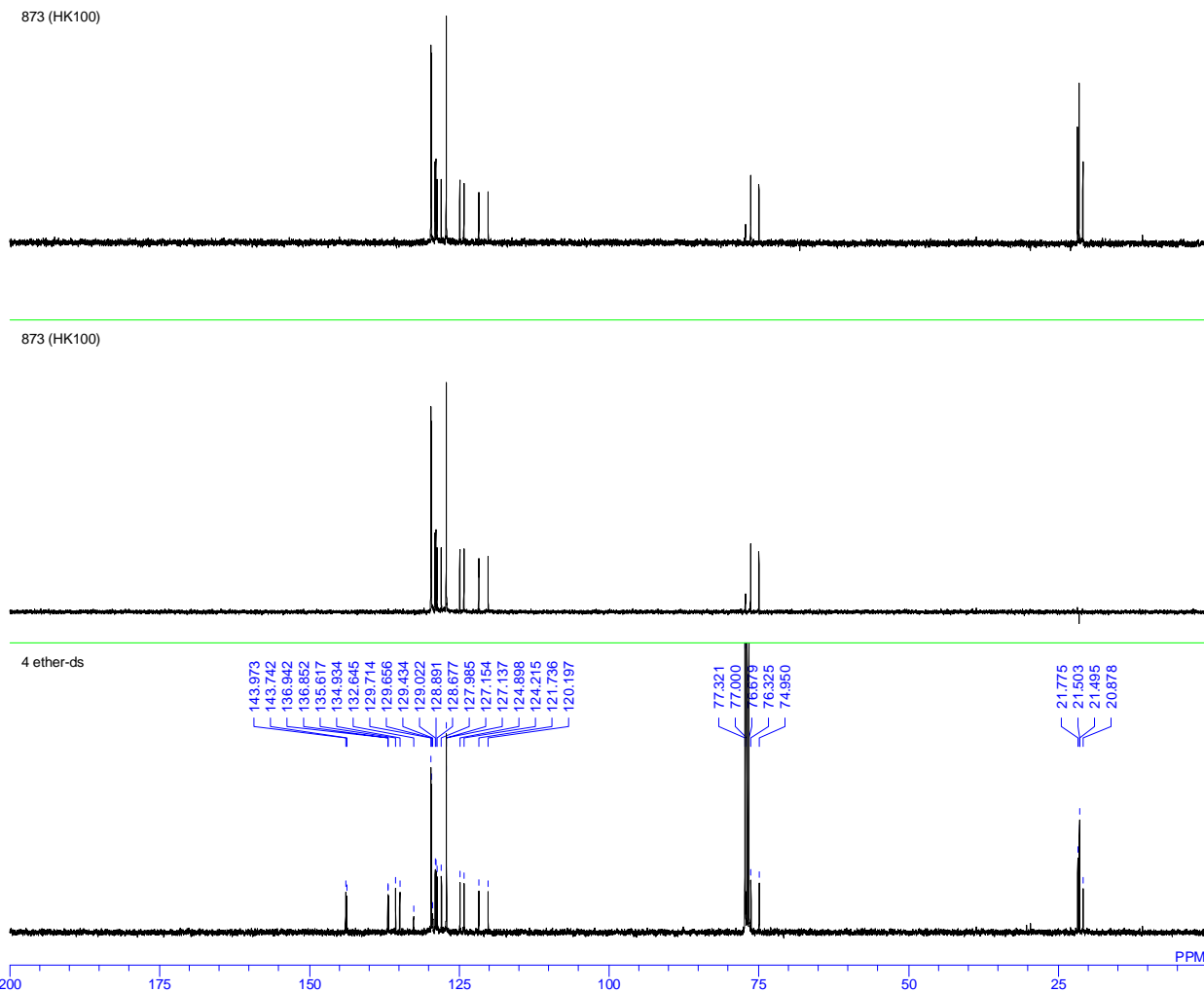


DATIM	Thu Jan 31 17:05:52 2013
MENUP	NON
OBNUC	1H
OFR	399.65 MHz
OBSET	124.00 KHz
OBFIN	10500.00 Hz
PW1	5.80 usec
DEADT	72.10 usec
PREDL	0.20000 msec
IWT	1.0000 sec
POINT	16384
SPO	16384
TIMES	16
DUMMY	1
FREQU	7992.01 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	2.0500 sec
PD	4.9500 sec
ADBIT	16
RGAIN	14
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	NON
EXPCM	NON:Single.coupled:PW1_ACQTM_PD:1H,13C,1
IRNUC	1H
IFR	399.65 MHz
IRSET	124.00 KHz
IRFIN	10500.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	873 (HK100)1NON_E1_FT.als
SF	TH5FG2
LKSET	61.60 KHz
LKFIN	79.0 Hz
LKLEV	180
LGAIN	20
LKPHS	330
LKSIG	656
CSPED	15 Hz
FILDC	
FILDF	

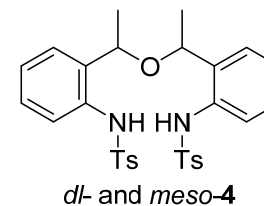


# <sup>13</sup>C NMR spectrum of 4, diastereomixture

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\4 ether compound 873\873 (HK100)2BCM\_E1\_FT\_13C.als



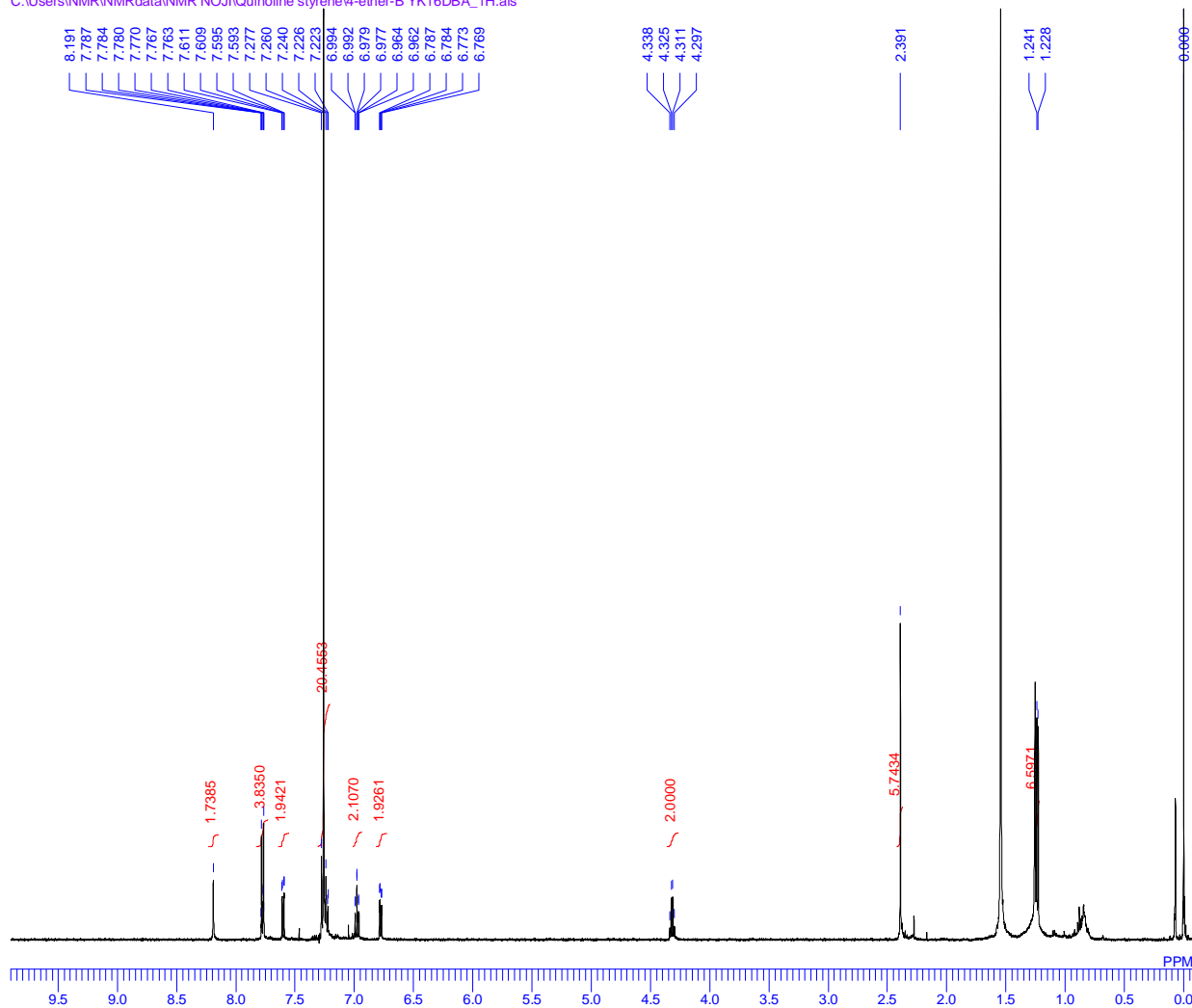
DATIM	Thu Jan 31 17:46:21 2013
MENUP	BCM
OBNUC	13C
OFR	100.40 MHz
OBSET	125.00 KHz
OBFIN	10500.00 Hz
PW1	6.00 usec
DEADT	19.14 usec
PREDL	0.20000 msec
IWT	1.0000 sec
POINT	32768
SPO	32768
TIMES	800
DUMMY	1
FREQU	27118.64 Hz
FLT	13550 Hz
DELAY	14.76 usec
ACQTM	1.2083 sec
PD	1.7920 sec
ADBIT	16
RGAIN	24
BF	1.20 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	BCM
EXPCM	Bilevel.complete.decoupling;Set_IRRPW
IRNUC	1H
IFR	399.65 MHz
IRSET	124.00 KHz
IRFIN	10500.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	873 (HK100)2BCM_E1_FT_13C.als
SF	TH5FG2
LKSET	61.60 KHz
LKFIN	79.0 Hz
LKLEV	180
LGAIN	20
LKPHS	330
LKSIG	650
CSPED	16 Hz
FILDC	
FILDF	



# <sup>1</sup>H NMR spectrum of 4, major

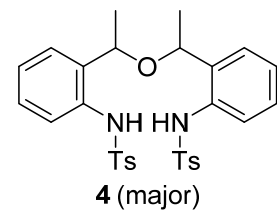
ether 4, major

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\4-ether-B YK16DBA\_1H.als

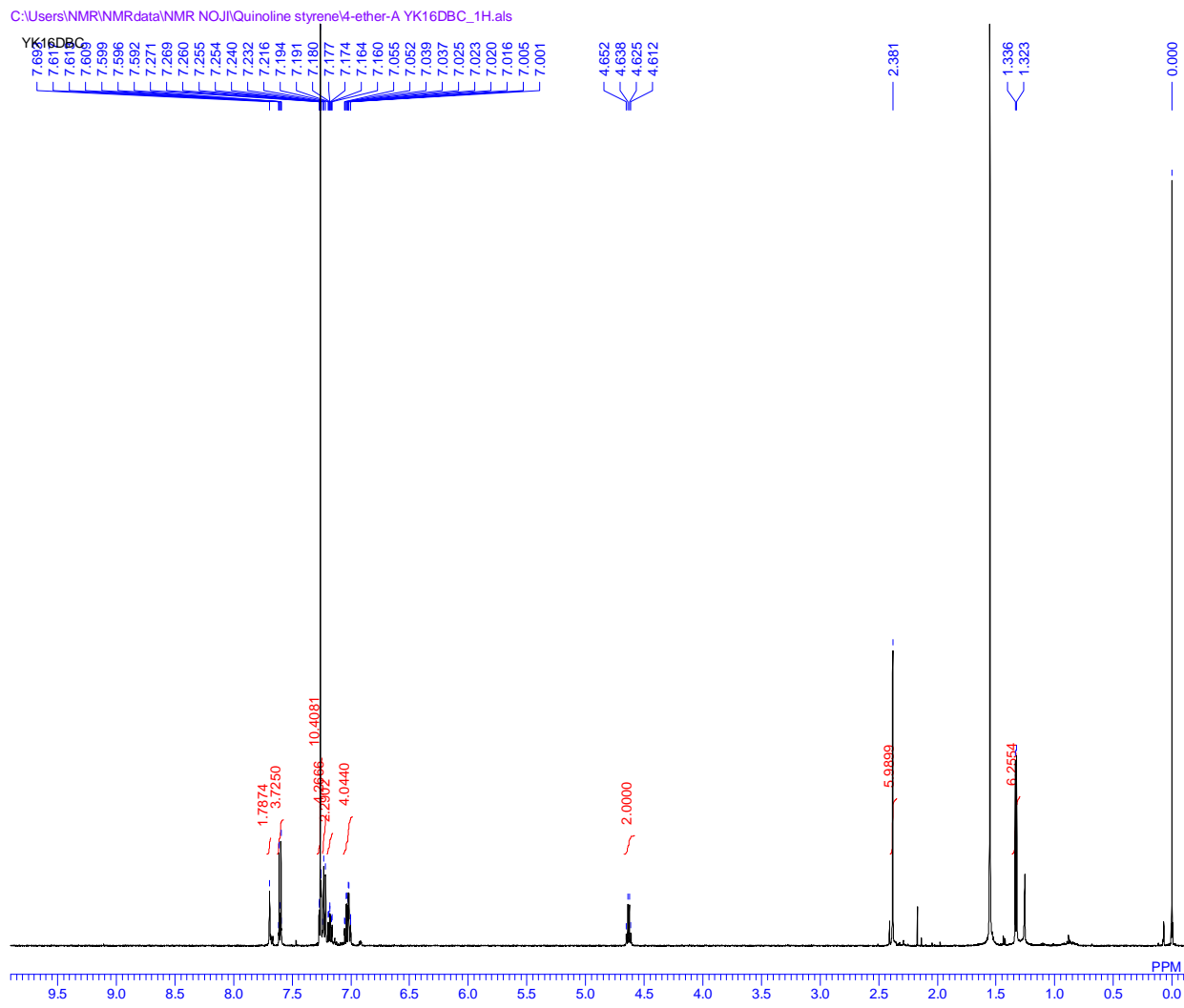


```

DATIM Tue Sep 23 20:49:39 2014
MENUF
OBNUC 1H
OFR 500.00 MHz
OBSET 160.00 KHz
OBFIN 2160.00 Hz
PW1 5.00 usec
DEADT 57.50 usec
PREDL 10.00000 msec
IWT 0.00005 sec
POINT 32768
SPO 32768
TIMES 16
DUMMY 0
FREQU 10000.00 Hz
FLT 5000 Hz
DELAY 40.00 usec
ACQTM 3.2768 sec
PD 3.7232 sec
ADBIT 16
RGAIN 25
BF 1.20 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD non
EXPCM
IRNUC 1H
IFR 500.00 MHz
IRSET 160.00 KHz
IRFIN 2160.00 Hz
IRRPW 0 usec
IRATN 511
DFILE 4-ether-B YK16DBA_1H.als
SF th5.shm
LKSET 70.00 KHz
LKFIN 334.0 Hz
LKLEV 200
LGAIN 20
LKPHS 210
LKSIG 21342
CSPED 9 Hz
FILDC
FILDF
    
```

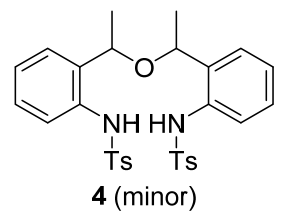


# <sup>1</sup>H NMR spectrum of 4, major



```

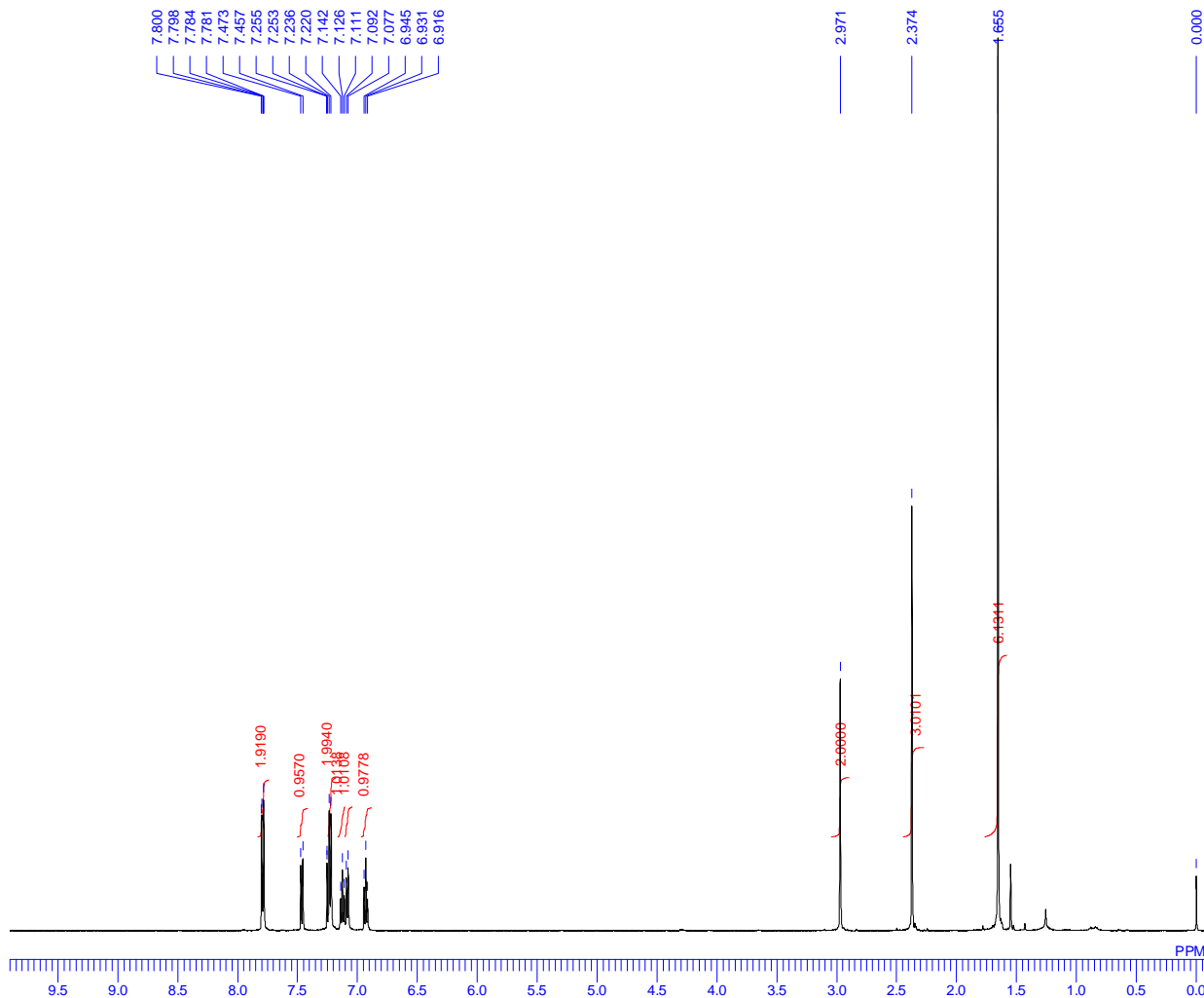
DATIM Tue Sep 23 02:56:18 2014
MENUF
OBNUC 1H
OFR 500.00 MHz
OBSET 160.00 KHz
OBFIN 2160.00 Hz
PW1 5.00 usec
DEADT 57.50 usec
PREDL 10.00000 msec
IWT 0.0005 sec
POINT 32768
SPO 32768
TIMES 16
DUMMY 0
FREQU 10000.00 Hz
FLT 5000 Hz
DELAY 40.00 usec
ACQTM 3.2768 sec
PD 3.7232 sec
ADBIT 16
RGAIN 24
BF 1.20 Hz
T1 0.00
T2 0.00
T3 90.00
T4 100.00
EXMOD non
EXPCM
IRNUC 1H
IFR 500.00 MHz
IRSET 160.00 KHz
IRFIN 2160.00 Hz
IRRPW 0 usec
IRATN 511
DFILE 4-ether-A YK16DBC_1H.als
SF th5.shm
LKSET 70.00 KHz
LKFIN 334.0 Hz
LKLEV 200
LGAIN 20
LKPHS 210
LKSIG 62367
CSPED 12 Hz
FILDC
FILDF
    
```



# <sup>1</sup>H NMR spectrum of 2,2-Dimethyl-1-tosylindoline

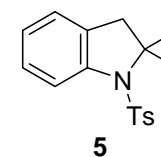
indoline(CR548-A)

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ga-indo CR548-A2\CR548-A\_1H.als



```

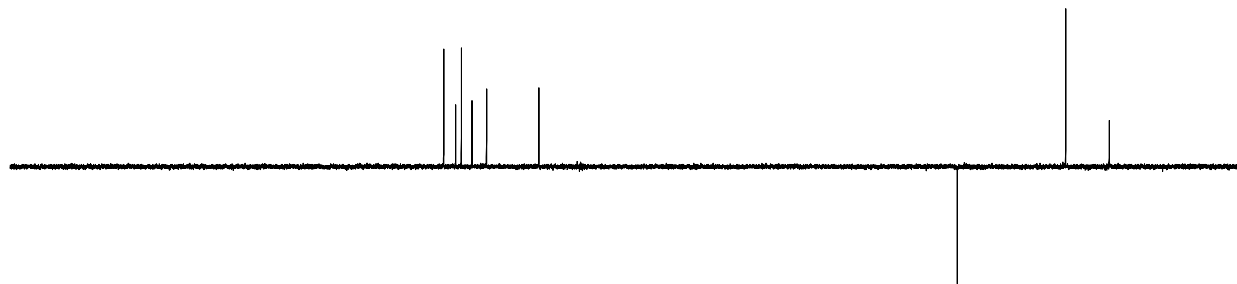
DATIM   Wed Feb 17 00:59:16 2016
MENUF
OBNUC   1H
OFR     500.00 MHz
OBSET   160.00 KHz
OBFIN   2160.00 Hz
PW1     5.00 usec
DEADT   57.50 usec
PREDL   10.00000 msec
IWT     0.0005 sec
POINT   32768
SPO     32768
TIMES   8
DUMMY   0
FREQU   10000.00 Hz
FLT     5000 Hz
DELAY   40.00 usec
ACQTM   3.2768 sec
PD      3.7232 sec
ADBIT   16
RGAIN   20
BF      0.09 Hz
T1      0.00
T2      0.00
T3      90.00
T4      100.00
EXMOD   non
EXPCM
IRNUC   1H
IFR     500.00 MHz
IRSET   160.00 KHz
IRFIN   2160.00 Hz
IRRPW   0 usec
IRATN   511
DFILE   CR548-A_1H.als
SF      th5.shm
LKSET   70.00 KHz
LKFIN   334.0 Hz
LKLEV   200
LGAIN   20
LKPHS   210
LKSIG   33331
CSPED   10 Hz
FILDC
FILDF
    
```



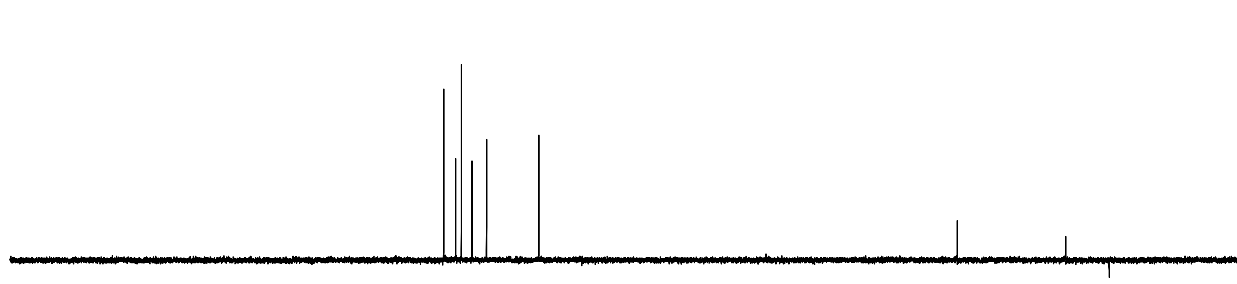
# <sup>13</sup>C NMR spectrum of 2,2-Dimethyl-1-tosylindoline

C:\Users\NMR\NMRdata\NMR NOJI\Quinoline styrene\3ga-indo CR548-A2\CR548-A\_DEPT.als

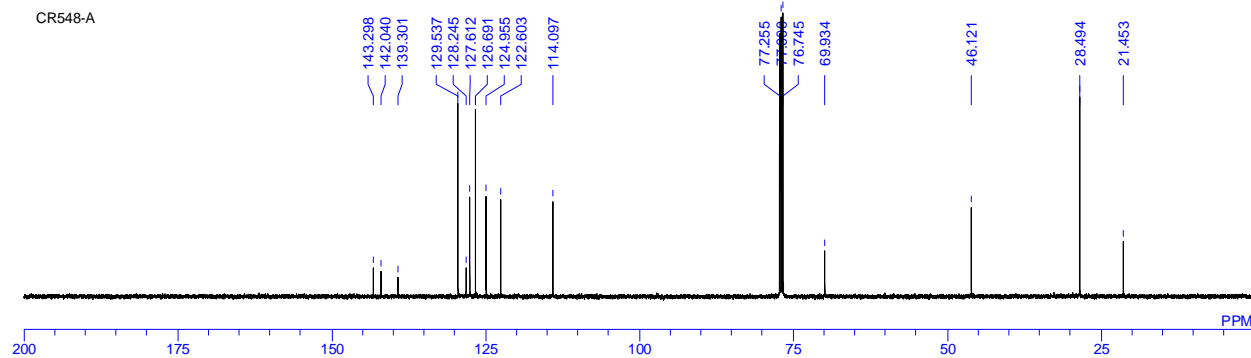
CR548-A



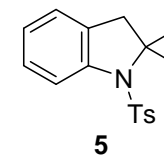
CR548-A



CR548-A



DATIM Wed Feb 17 01:51:54 2016  
 MENUF 13C  
 OBNUC 13C  
 OFR 125.65 MHz  
 OBSET 120.00 KHz  
 OBFIN 7958.00 Hz  
 PW1 4.40 usec  
 DEADT 15.50 usec  
 PREDL 10.00000 msec  
 IWT 0.0100 sec  
 POINT 32768  
 SPO 32768  
 TIMES 1024  
 DUMMY 1  
 FREQU 33898.30 Hz  
 FLT 16950 Hz  
 DELAY 11.80 usec  
 ACQTM 0.9667 sec  
 PD 2.0333 sec  
 ADBIT 16  
 RGAIN 28  
 BF 0.09 Hz  
 T1 0.00  
 T2 0.00  
 T3 90.00  
 T4 100.00  
 EXMOD bcm  
 EXPCM error\_expcm  
 IRNUC 1H  
 IFR 500.00 MHz  
 IRSET 160.00 KHz  
 IRFIN 2160.00 Hz  
 IRRPW 0 usec  
 IRATN 511  
 DFILE CR548-A\_DEPT.als  
 SF th5.shm  
 LKSET 70.00 KHz  
 LKFIN 334.0 Hz  
 LKLEV 200  
 LGAIN 20  
 LKPHS 210  
 LKSIG 5746  
 CSPED 13 Hz  
 FILDC  
 FILDF

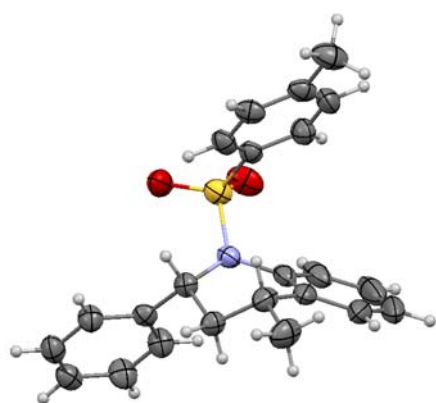


## X-ray crystallographic Analysis

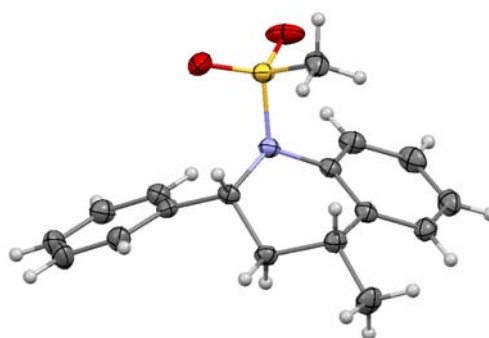
Single crystals of tetrahydroquinolines **3** were mounted on a MicroMount® or MicroMesh® polyimide tip with a paraffin oil. All measurements were made on a Rigaku R-Axis RAPID imaging plate diffractometer using filtered Cu-K $\alpha$  radiation. The data were corrected for Lorentz and polarization effects and numerical absorption. The structures were solved by direct methods<sup>1</sup> and expanded using Fourier techniques. The non-hydrogen atoms were refined anisotropically. Hydrogen atoms of **2a** and **2b** were refined using the riding model. All calculations were performed using the CrystalStructure<sup>2</sup> crystallographic software package except for refinement, which was performed using SHELXL 2014.<sup>3</sup>

**Table S1.** Experimental Data for the X-ray Crystallography of *cis-3aa*, *cis-3ba*, *cis-3da*, *cis-3fa*

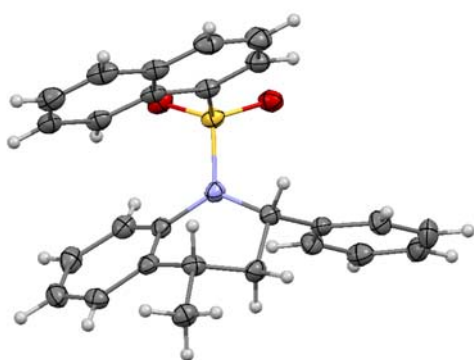
parameter	<i>cis-3aa</i>	<i>cis-3ba</i>	<i>cis-3da</i>	<i>cis-3fa</i>
formula	C <sub>46</sub> H <sub>46</sub> N <sub>2</sub> O <sub>4</sub> S <sub>2</sub>	C <sub>46</sub> H <sub>46</sub> N <sub>2</sub> O <sub>4</sub> S <sub>2</sub>	C <sub>26</sub> H <sub>23</sub> NO <sub>2</sub> S	C <sub>28</sub> H <sub>25</sub> NO <sub>2</sub> S
Mw	644.77	301.40	413.53	439.57
crystal size/mm	0.230 x 0.210 x 0.210	0.270 X 0.230 X 0.140	0.285 X 0.203 X 0.188	0.226 X 0.176 X 0.102
crystal system	triclinic	monoclinic	orthorhombic	triclinic
<i>a</i> /Å	13.4592(4)	9.31361(17)	10.76106(19)	10.7020(2)
<i>b</i> /Å	13.7532(4)	17.0717(3)	12.6449(2)	10.8460(2)
<i>c</i> /Å	13.8380(3)	10.31691(19)	15.1251(3)	10.8473(2)
<i>a</i> /deg	60.5530(13)	90	90	61.637(4)
<i>β</i> /deg	66.5791(14)	111.3479(8)	90	87.161(6)
<i>γ</i> /deg	71.0600(15)	90	90	86.133(6)
<i>V</i> /Å <sup>3</sup>	2019.90(10)	1527.83(5)	2058.11(6)	1105.20(6)
space group	<i>P</i> -1 (#2)	<i>P</i> 2 <sub>1</sub> / <i>n</i> (#14)	<i>P</i> 2 <sub>1</sub> 2 <sub>1</sub> 2 <sub>1</sub> (#19)	<i>P</i> -1 (#2)
<i>Z</i>	2	4	4	2
<i>g</i> /cm	1.241	1.310	1.334	1.321
$\mu$ (Cu K $\alpha$ )/cm <sup>-1</sup>	15.515	19.092	15.751	14.994
<i>T</i> /K	113	93	93	93
no. of measured reflections	21597	27343	23345	13011
no. of unique reflections	7203	2796	3646	3949
<i>R</i> <sub>int</sub>	0.0984	0.0396	0.0225	0.0264
goodness of fit	0.974	1.063	1.062	1.049
<i>R</i> <sub>1</sub>	0.0606	0.0353	0.0285	0.0361
<i>wR</i> <sub>2</sub>	0.1422	0.0952	0.0779	0.0935
Flack parameter	-	-	0.028(5)	-
Structure solv	SIR2008	SIR2008	SIR2011	SIR92
Refinement	SHELXL 2014/7	SHELXL 2014/7	SHELXL 2014/7	SHELXL 2014/7
CCDC Number	CCDC 1503781	CCDC 1503788	CCDC 1503797	CCDC 1503786



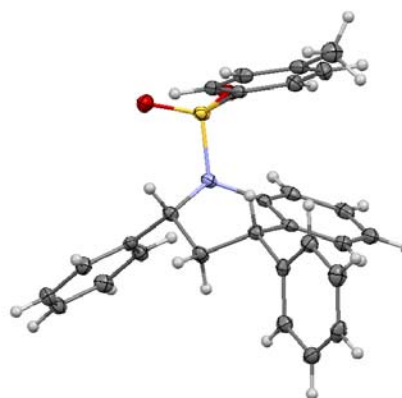
(a) *cis*-3aa



(b) *cis*-3ba



(c) *cis*-3da

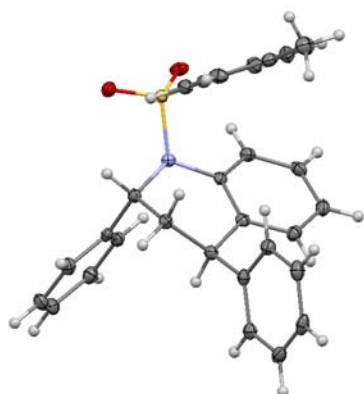


(d) *cis*-3fa

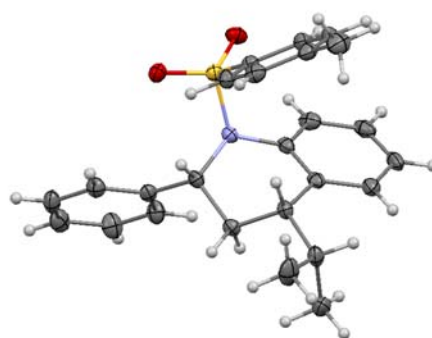
**Figure S1.** Crystal structure of (a) *cis*-3aa, (b) *cis*-3ba, (c) *cis*-3da, (d) *cis*-3fa; atomic thermal ellipsoids are drawn at the 50% probability level for non-hydrogen atoms.

**Table S2.** Experimental Data for the X-ray Crystallography of *trans-3fa*, *cis-3ga*, *cis-3ha*, *trans-3ha*

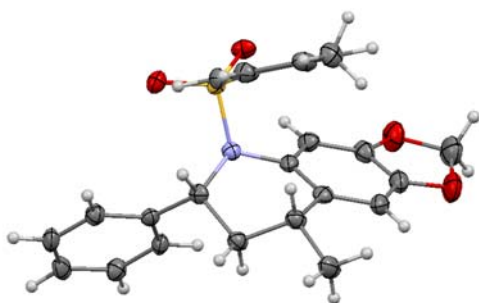
parameter	<i>trans-3fa</i>	<i>cis-3ga</i>	<i>cis-3ha</i>	<i>trans-3ha</i>
formula	C <sub>28</sub> H <sub>25</sub> NO <sub>2</sub> S	C <sub>50</sub> H <sub>54</sub> N <sub>2</sub> O <sub>4</sub> S <sub>2</sub>	C <sub>24</sub> H <sub>23</sub> NO <sub>4</sub> S	C <sub>24</sub> H <sub>23</sub> NO <sub>4</sub> S
Mw	439.57	811.11	421.51	421.51
crystal size/mm	0.254 X 0.210 X 0.046	0.315 X 0.179 X 0.120	0.270 X 0.230 X 0.120	0.270 X 0.240 X 0.083
crystal system	triclinic	triclinic	monoclinic	monoclinic
<i>a</i> /Å	10.44551(19)	10.38081(19)	10.1672(2)	25.9376(7)
<i>b</i> /Å	10.56013(19)	14.6860(3)	17.7370(4)	10.5259(3)
<i>c</i> /Å	10.9713(2)	15.5780(3)	11.8622(3)	15.1628(6)
<i>α</i> /deg	87.346(6)	81.5557(11)	90	90
<i>β</i> /deg	65.296(5)	88.3312(11)	93.7758(16)	96.397(2)
<i>γ</i> /deg	85.087(6)	67.6755(10)	90	90
<i>V</i> /Å <sup>3</sup>	1095.33(5)	2172.17(7)	2134.54(9)	4113.9(2)
space group	<i>P</i> -1 (#2)	<i>P</i> -1 (#2)	<i>P</i> 2 <sub>1</sub> / <i>n</i> (#14)	<i>C</i> <sub>2</sub> / <i>c</i> (#15)
<i>Z</i>	2	2	4	8
<i>g</i> /cm	1.333	1.240	1.312	1.361
<i>μ</i> (Cu <i>Kα</i> )/cm <sup>-1</sup>	15.129	14.763	15.995	16.598
<i>T</i> /K	93	93	93	93
no. of measured reflections	17943	23339	21717	20876
no. of unique reflections	3914	7797	3857	3774
<i>R</i> <sub>int</sub>	0.0223	0.0599	0.0893	0.1309
goodness of fit	1.053	1.049	1.193	1.035
<i>R</i> <sub>1</sub>	0.0396	0.0493	0.0627	0.0746
<i>wR</i> <sub>2</sub>	0.1046	0.1432	0.1494	0.1658
Structure solv	SIR2011	SIR2008	SIR2008	SIR2008
Refinement	SHELXL 2014/7	SHELXL 2014/7	SHELXL 2014/7	SHELXL 2014/7
CCDC Number	CCDC 1503787	CCDC 1503792	CCDC 1503790	CCDC 1503791



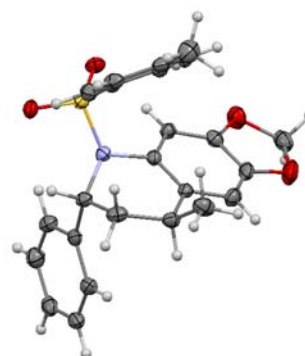
(a) *trans*-3fa



(b) *cis*-3ga



(c) *cis*-3ha

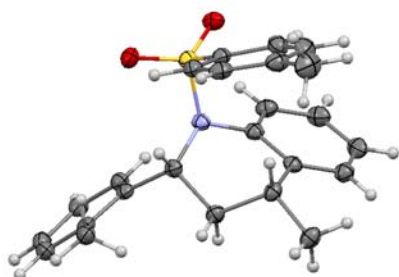


(d) *trans*-3ha

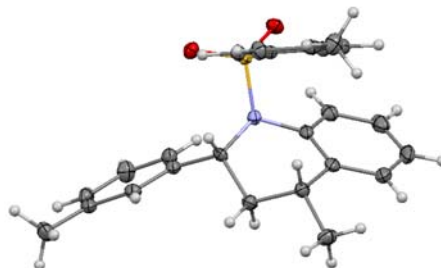
**Figure S2.** Crystal structure of (a) *trans*-3fa, (b) *cis*-3ga, (c) *cis*-3ha, (d) *trans*-3ha; atomic thermal ellipsoids are drawn at the 50% probability level for non-hydrogen atoms.

**Table S3.** Experimental Data for the X-ray Crystallography of *cis-3ac*, *cis-3ad*, *cis-3ae*, *trans-3ae*

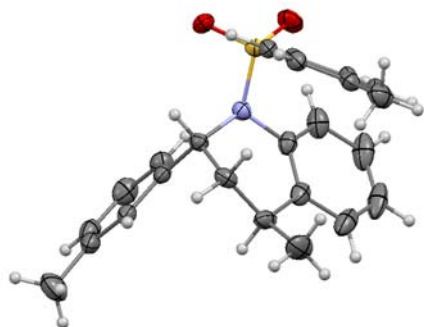
parameter	<i>cis-3ab</i>	<i>cis-3ac</i>	<i>trans-3ac</i>	<i>cis-3ad</i>
formula	C <sub>24</sub> H <sub>25</sub> NO <sub>2</sub> S	C <sub>24</sub> H <sub>25</sub> NO <sub>2</sub> S	C <sub>24</sub> H <sub>25</sub> NO <sub>2</sub> S	C <sub>48</sub> H <sub>50</sub> N <sub>2</sub> O <sub>4</sub> S <sub>2</sub>
Mw	391.53	391.53	391.53	783.05
crystal size/mm	0.241 X 0.171 X 0.124	0.312 X 0.109 X 0.024	0.215 X 0.206 X 0.111	0.269 X 0.241 X 0.165
crystal system	triclinic	monoclinic	monoclinic	triclinic
<i>a</i> /Å	8.05213(15)	19.8146(4)	13.8968(6)	12.4194(2)
<i>b</i> /Å	11.1171(2)	11.0383(2)	7.9542(3)	12.6505(2)
<i>c</i> /Å	11.9245(2)	11.3171(2)	18.7882(7)	15.0345(3)
<i>α</i> /deg	100.4325(10)	90	90	69.9775(9)
<i>β</i> /deg	92.1642(10)	125.947(9)	94.222(7)	83.3540(9)
<i>γ</i> /deg	102.6609(10)	90	90	70.5639(9)
<i>V</i> /Å <sup>3</sup>	1020.93(3)	2003.9(2)	2071.16(14)	2092.85(7)
space group	<i>P</i> -1 (#2)	<i>Cc</i> (#9)	<i>P</i> 2 <sub>1</sub> / <i>c</i> (#14)	<i>P</i> -1 (#2)
<i>Z</i>	2	4	4	2
<i>g</i> /cm	1.274	1.298	1.256	1.243
<i>μ</i> (Cu <i>Kα</i> )/cm <sup>-1</sup>	15.526	15.821	15.307	15.148
<i>T</i> /K	93	93	93	93
no. of measured reflections	17595	11294	22597	22333
no. of unique reflections	3682	3294	3719	7480
<i>R</i> <sub>int</sub>	0.0693	0.0257	0.0308	0.0605
goodness of fit	0.976	1.057	1.193	1.174
<i>R</i> <sub>1</sub>	0.0490	0.0333	0.0466	0.0548
<i>wR</i> <sub>2</sub>	0.1369	0.0888	0.1303	0.1416
<i>Flack parameter</i>	-	0.034(6)	-	-
Structure solv	SIR2008	SIR2011	SIR2011	SIR2008
Refinement	SHELXL 2014/7	SHELXL 2014/7	SHELXL 2014/7	SHELXL 2014/7
CCDC Number	CCDC 1503782	CCDC 1503777	CCDC 1503780	CCDC 1503779



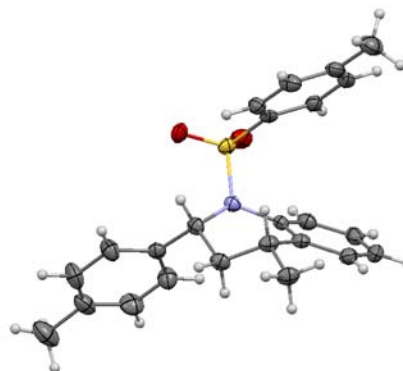
(a) *cis*-3ab



(b) *cis*-3ac



(c) *trans*-3ac

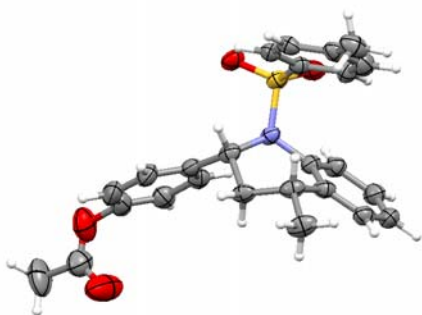


(d) *cis*-3ad

**Figure S3.** Crystal structure of (a) *cis*-3ab, (b) *cis*-3ac, (c) *trans*-3ac, (d) *cis*-3ad; atomic thermal ellipsoids are drawn at the 50% probability level for non-hydrogen atoms.

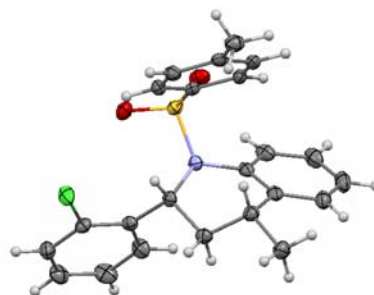
**Table S4.** Experimental Data for the X-ray Crystallography of *cis-3af*, *cis-3ag*, *cis-3ah*, *cis-3ai*

parameter	<i>cis-3ae</i>	<i>cis-3ag</i>	<i>cis-3ah</i>	<i>cis-3ai</i>
formula	C <sub>50</sub> H <sub>50</sub> N <sub>2</sub> O <sub>8</sub> S <sub>2</sub>	C <sub>46</sub> H <sub>44</sub> N <sub>2</sub> O <sub>4</sub> S <sub>2</sub> Cl <sub>2</sub>	C <sub>23</sub> H <sub>22</sub> NO <sub>2</sub> SCl	C <sub>46</sub> H <sub>44</sub> N <sub>2</sub> O <sub>4</sub> S <sub>2</sub> Cl <sub>2</sub>
Mw	871.07	823.89	411.95	823.89
crystal size/mm	0.261 X 0.189 X 0.070	0.273 X 0.253 X 0.182	0.322 X 0.176 X 0.11	0.209 X 0.203 X 0.058
crystal system	triclinic	monoclinic	monoclinic	triclinic
<i>a</i> /Å	9.1775(2)	9.44882(17)	10.8276(2)	12.8311(2)
<i>b</i> /Å	13.7711(3)	13.9220(3)	9.64645(19)	13.4491(3)
<i>c</i> /Å	18.9720(4)	30.4243(6)	19.2261(4)	13.7483(3)
<i>α</i> /deg	68.731(5)	90	90	64.3587(8)
<i>β</i> /deg	88.243(6)	95.2278(7)	92.599(7)	85.9065(8)
<i>γ</i> /deg	87.680(6)	90	90	77.6964(9)
<i>V</i> /Å <sup>3</sup>	2232.27(11)	3985.56(12)	2006.07(7)	2089.15(7)
space group	<i>P</i> -1 (#2)	<i>P</i> 2 <sub>1</sub> / <i>c</i> (#14)	<i>P</i> 2 <sub>1</sub> / <i>c</i> (#14)	<i>P</i> -1 (#2)
<i>Z</i>	2	4	4	2
<i>g</i> /cm	1.296	1.373	1.364	1.310
<i>μ</i> (Cu <i>Kα</i> )/cm <sup>-1</sup>	15.458	28.249	28.062	26.946
<i>T</i> /K	93	93	93	173
no. of measured reflections	26289	44335	22671	23497
no. of unique reflections	7995	7300	3658	7404
<i>R</i> <sub>int</sub>	0.1109	0.0444	0.0237	0.0427
goodness of fit	1.099	1.108	1.104	1.085
<i>R</i> <sub>1</sub>	0.0737	0.0454	0.0316	0.0415
<i>wR</i> <sub>2</sub>	0.2346	0.1185	0.0843	0.1200
Structure solv	SIR2011	SIR2008	SIR2008	SIR2008
Refinement	SHELXL 2014/7	SHELXL 2014/7	SHELXL 2014/7	SHELXL 2014/7
CCDC Number	CCDC 1503778	CCDC 1503794	CCDC 1503793	CCDC 1503796

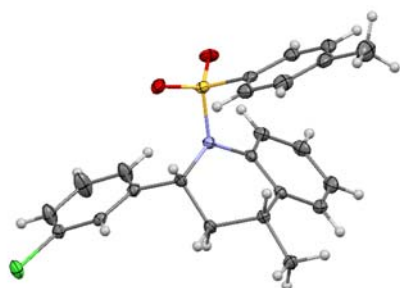


(a) *cis-3ae*

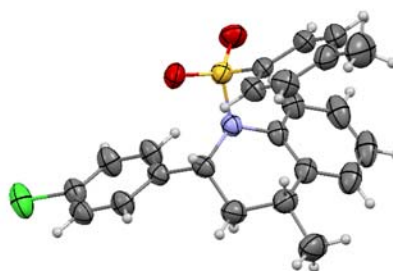
Disordered acetoxy group was omitted for clarity.



(b) *cis-3ag*



(c) *cis-3ah*

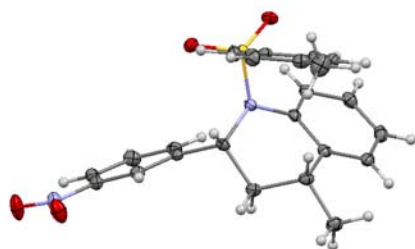


(d) *cis-3ai*

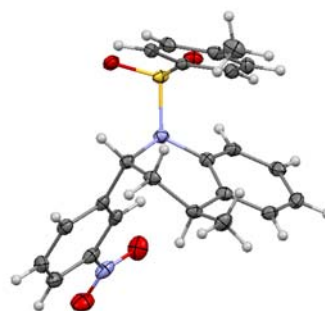
**Figure S4.** Crystal structure of (a) *cis-3ae*, (b) *cis-3ag*, (c) *cis-3ah*, (d) *cis-3ai*; atomic thermal ellipsoids are drawn at the 50% probability level for non-hydrogen atoms.

**Table S5.** Experimental Data for the X-ray Crystallography of *cis-3aj*, *trans-3aj*, **3ak-A**, **3ak-B**

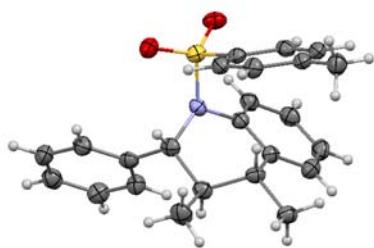
parameter	<i>cis-3aj</i>	<i>trans-3aj</i>	<b>3ak-A</b>	<b>3ak-B</b>
formula	C <sub>23</sub> H <sub>22</sub> N <sub>2</sub> O <sub>4</sub> S	C <sub>23</sub> H <sub>22</sub> N <sub>2</sub> O <sub>4</sub> S	C <sub>48</sub> H <sub>50</sub> N <sub>2</sub> O <sub>4</sub> S <sub>2</sub>	C <sub>24</sub> H <sub>25</sub> NO <sub>2</sub> S
Mw	422.50	422.50	783.05	391.53
crystal size/mm	0.356 X 0.217 X 0.130	0.191 X 0.182 X 0.080	0.229 X 0.201 X 0.170	0.318 X 0.307 X 0.125
crystal system	triclinic	monoclinic	monoclinic	monoclinic
<i>a</i> /Å	7.58966(19)	12.0068(3)	9.8930(2)	9.54275(17)
<i>b</i> /Å	11.1047(3)	8.16703(18)	7.98805(16)	12.8177(2)
<i>c</i> /Å	11.8359(3)	20.4719(5)	25.8524(6)	16.5996(3)
<i>α</i> /deg	95.725(7)	90	90	90
<i>β</i> /deg	90.396(6)	97.127(7)	95.040(7)	90.4922(7)
<i>γ</i> /deg	90.747(6)	90	90	90
<i>V</i> /Å <sup>3</sup>	992.44(4)	1991.97(8)	2035.12(8)	2030.33(6)
space group	<i>P</i> -1 (#2)	<i>P</i> 2 <sub>1</sub> / <i>c</i> (#14)	<i>Pc</i> (#7)	<i>P</i> 2 <sub>1</sub> / <i>n</i> (#14)
<i>Z</i>	2	4	2	4
<i>g</i> /cm	1.414	1.409	1.278	1.281
<i>μ</i> (Cu <i>Kα</i> )/cm <sup>-1</sup>	17.367	17.305	15.578	15.615
<i>T</i> /K	93	93	93	93
no. of measured reflections	10831	21794	22397	20899
no. of unique reflections	3456	3632	6861	3722
<i>R</i> <sub>int</sub>	0.0294	0.0349	0.0570	0.0754
goodness of fit	1.093	1.185	1.101	1.050
<i>R</i> <sub>1</sub>	0.0403	0.0682	0.0402	0.0504
<i>wR</i> <sub>2</sub>	0.1084	0.0707	0.1042	0.1190
Structure solv	SIR2011	SIR2011	SIR2011	SIR2008
Refinement	SHELXL 2014/7	SHELXL 2014/7	SHELXL 2014/7	SHELXL 2014/7
CCDC Number	CCDC 1503795	CCDC 1503789	CCDC 1503783	CCDC 1503784



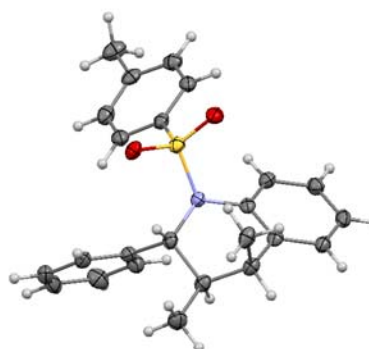
(a) *cis*-3aj



(b) *trans*-3aj



(c) 3ak-A

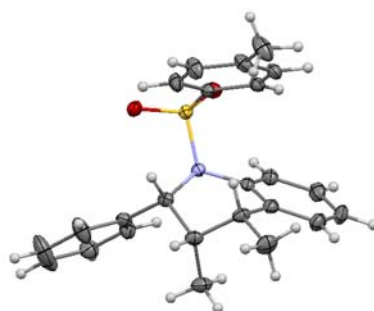


(d) 3ak-B

**Figure S5.** Crystal structure of (a) *cis*-3aj, (b) *trans*-3aj, (c) 3ak-A, (d) 3ak-B; atomic thermal ellipsoids are drawn at the 50% probability level for non-hydrogen atoms.

**Table S6.** Experimental Data for the X-ray Crystallography of **3ak-C**

parameter	<b>3ak-C</b>
formula	C <sub>24</sub> H <sub>25</sub> NO <sub>2</sub> S
Mw	391.53
crystal size/mm	0.300 X 0.235 X 0.142
crystal system	monoclinic
<i>a</i> /Å	9.1686(2)
<i>b</i> /Å	11.1342(3)
<i>c</i> /Å	20.5060(5)
<i>a</i> /deg	90
<i>β</i> /deg	100.270(7)
<i>γ</i> /deg	90
<i>V</i> /Å <sup>3</sup>	2059.82(9)
space group	<i>P</i> 2 <sub>1</sub> / <i>c</i> (#14)
<i>Z</i>	4
g/cm	1.262
$\mu$ (Cu <i>Kα</i> )/cm <sup>-1</sup>	15.391
<i>T</i> /K	93
no. of measured reflections	22264
no. of unique reflections	3717
<i>R</i> <sub>int</sub>	0.0282
goodness of fit	1.080
<i>R</i> <sub>1</sub>	0.0404
<i>wR</i> <sub>2</sub>	0.1147
Structure solv	SIR2011
Refinement	SHELXL 2014/7
CCDC Number	CCDC 1503785



(b) **3ak-C**

**Figure S6.** Crystal structure of **3ak-C**; atomic thermal ellipsoids are drawn at the 50% probability level for non-hydrogen atoms.

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## References

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