

Supporting Information

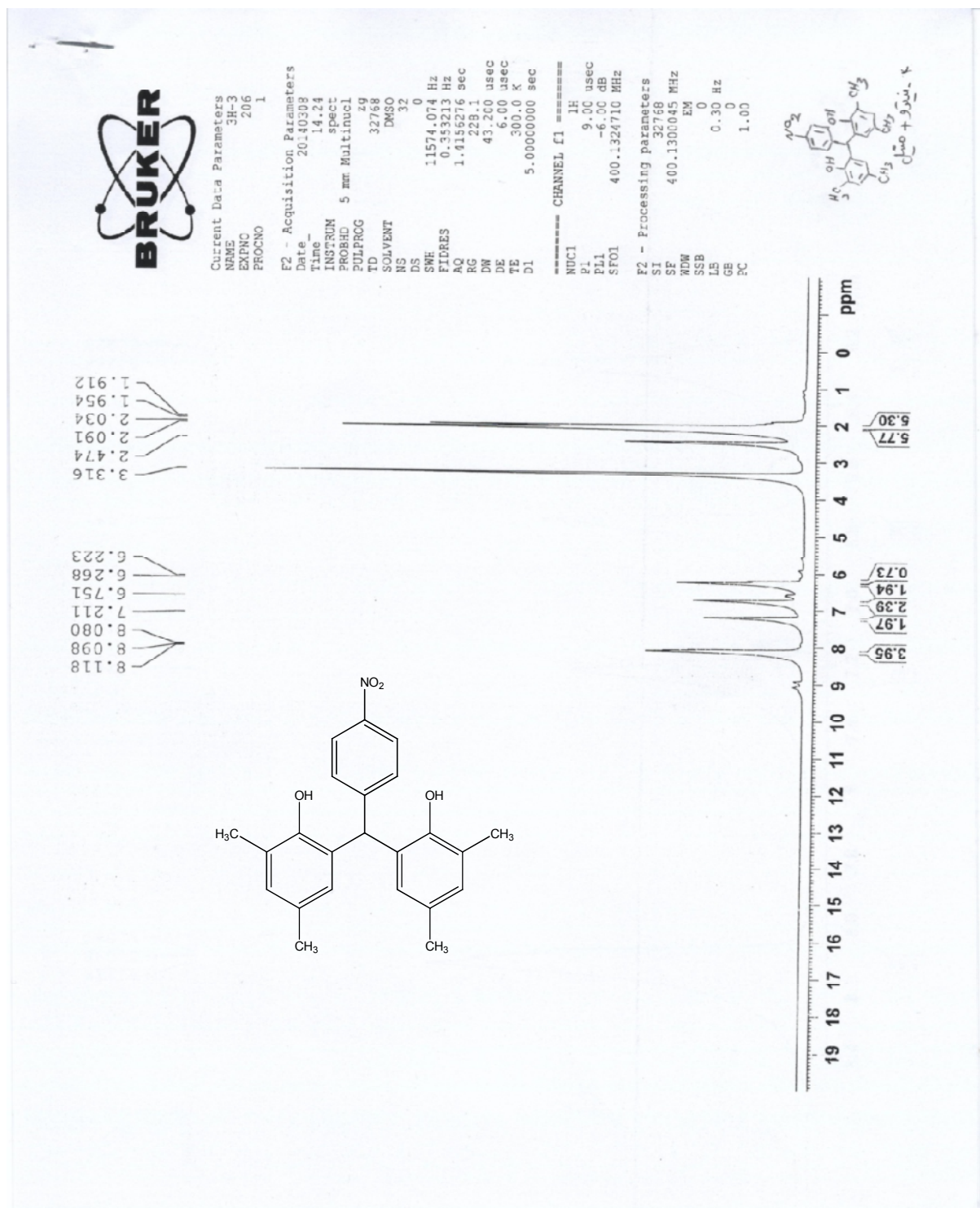
Highly Sulfonated Graphene and Graphene Oxide Nanosheets as Heterogeneous Nanocatalysts in Green Synthesis of Bisphenolic Antioxidants under Solvent Free Conditions

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8731751167, I. R. Iran

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¹H NMR Spectra of prepared compounds.





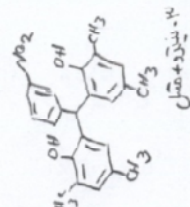
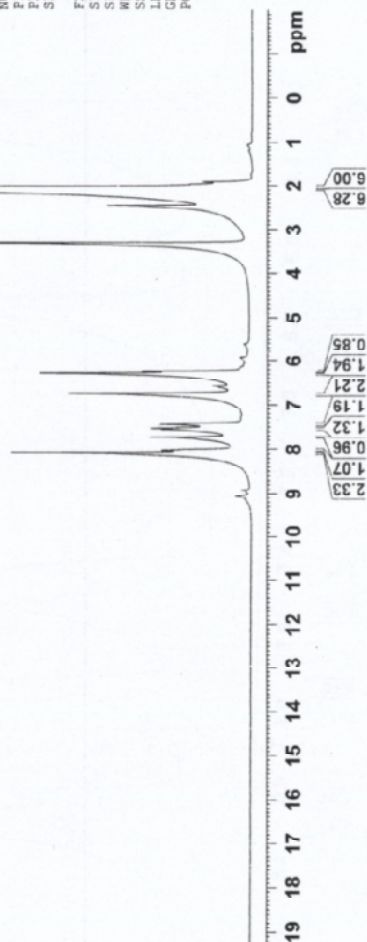
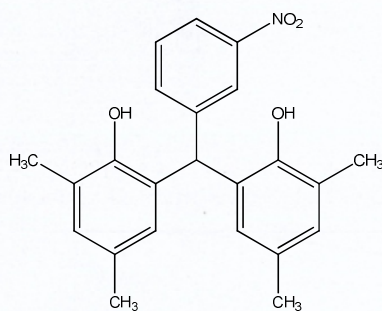
Current Data Parameters
NAME 3H-3
EXPNO 209
PROCNO 1

F2 - Acquisition Parameters
Date_ 20140306
Time 15.52
INSTRUM spect
PROBHD 5 mm Multibore1
PULPROG zgpg30
TD 32768
SOLVENT DMSO
NS 16
DS 0
SWH 11574.074 Hz
FIDRES 0.353213 Hz
AQ 1.4156276 sec
RG 101.6
LW 43.200 usec
DE 6.00 usec
TE 300.0 K
D1 5.0000000 sec

CHANNEL f1
NUC1 ¹H
P1 9.00 usec
PL1 -2.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 32768
SF 400.1300045 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

8.084
8.032
7.732
7.550
7.531
7.512
7.439
6.752
6.576
6.287
6.240



4-نیترو-2-میل

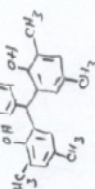
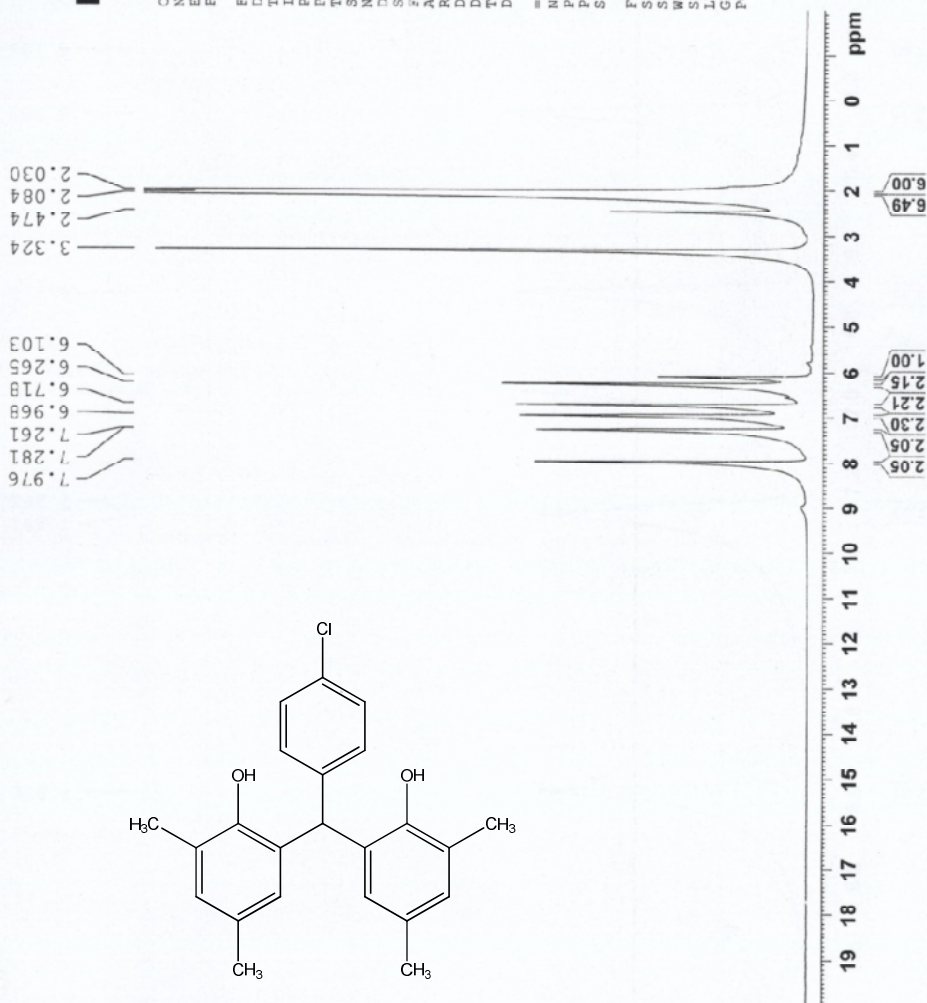


Current Data Parameters
NAME 3H-3
EXPNO 234
PROCNO 1

F2 - Acquisition Parameters
Date_ 20140312
Time 8.16
INSTRUM spect
PROBHD 5 mm Multinucl
PULPROG zg
TD 32768
SOLVENT DMSO
NS 32
DS 0
SWH 11574.074 Hz
FIDRES 0.353213 Hz
AQ 1.4156276 sec
RG 161.3
DW 43.200 usec
DE 6.00 usec
TE 300.0 K
D1 5.00000000 sec

===== CHANNEL f1 =====
NUC1 1H
P1 9.00 usec
PL1 -6.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 32768
SF 400.1300045 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 1.00
PC 0



Chemical structure of the compound, 2,6-bis(4-chlorophenyl)-2,6-dimethyl-1,4-bis(4-hydroxyphenyl)ethane.

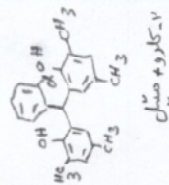
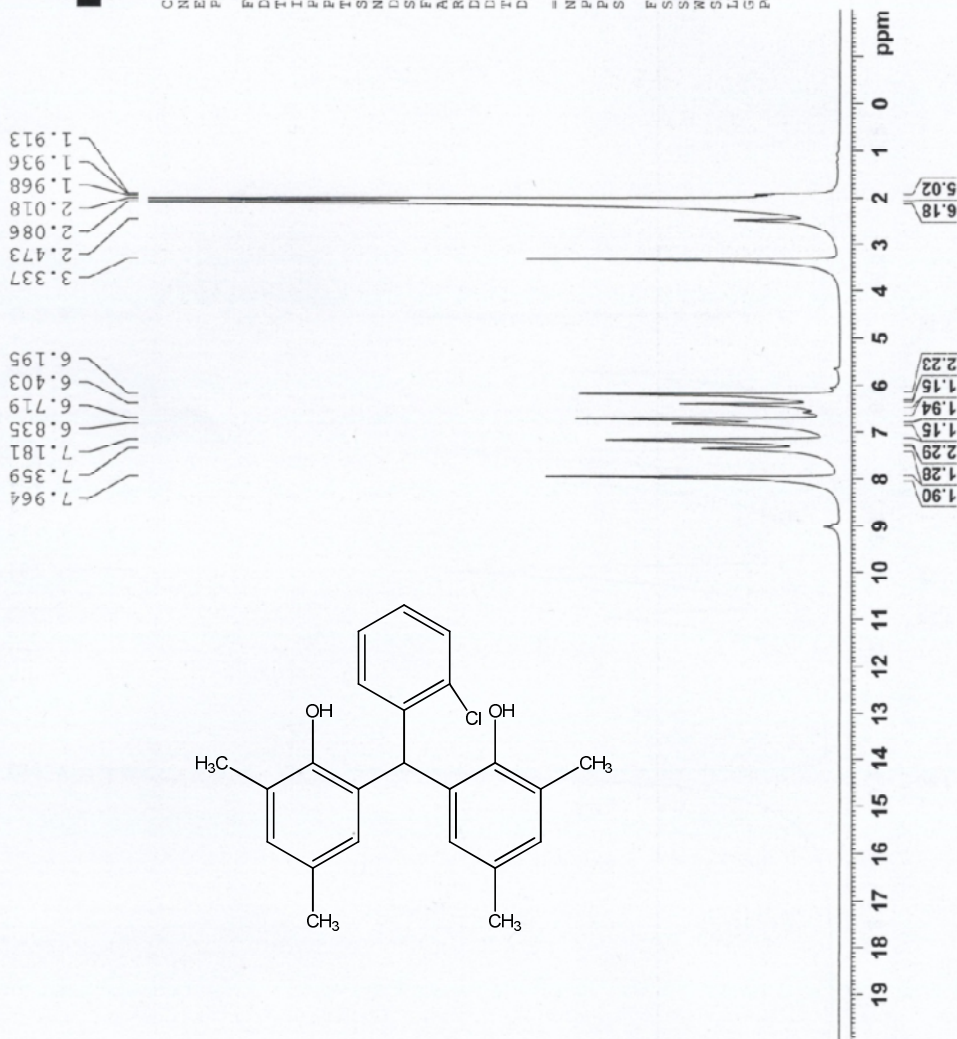


Current Data Parameters
NAME 3H-3
EXPNO 171
PROCNO 1

F2 - Acquisition Parameters
Date_ 20140304
Time 8.37
INSTRUM spect
PROBHD 5 mm Multinucl
PULPROG zg
TD 32768
SOLVENT DMSO
NS 32
DS 0
SWH 11574.074 Hz
FIDRES 0.353213 Hz
AQ 1.4156276 sec
RG 64
DM 43.200 usec
DE 6.00 usec
TE 300.0 K
D1 5.0000000 sec

CHANNEL f1
NUC1 ¹H
P1 9.00 usec
PL1 -6.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 32768
SF 400.1300045 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00





Current Data Parameters
NAME 3H-5
EXPNO 241
PROCNO 1

F2 - Acquisition Parameters

Date_ 20140315
Time_ 8.57
INSTRUM spect
PROBHD 5 mm Multinucl
PULPROG zg
TD 32768
SOLVENT DMSO
NS 32
DS 0
SWH 11574.074 Hz
FIDRES 0.353213 Hz
AQ 1.4156276 sec
RG 161.3
DW 43.200 usec
DE 6.00 usec
TE 300.0 K
D1 5.0000000 sec

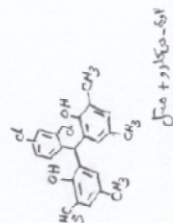
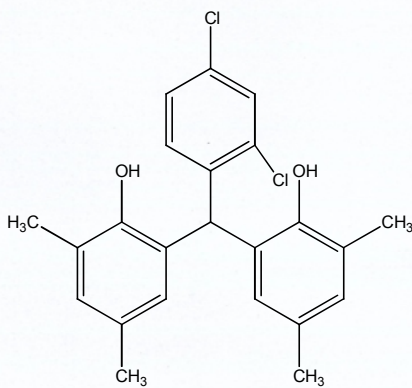
===== CHANNEL f1 =====
NUC1 1H
P1 9.00 usec
PL1 -6.00 dB
SFO1 400.1324710 MHz

F2 - Processing Parameters

SI 32768
SF 400.1300045 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

8.012
7.502
7.299
6.807
6.786
6.736
6.330
6.177
3.334
3.326
2.478
2.082
2.034
2.027
1.926

1.24
1.07
1.36
1.92
2.01
1.23
2.13
6.34
6.00



19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 ppm



Current Data Parameters
NAME: 3H-3
EXPNO: 183
PROCNO: 1

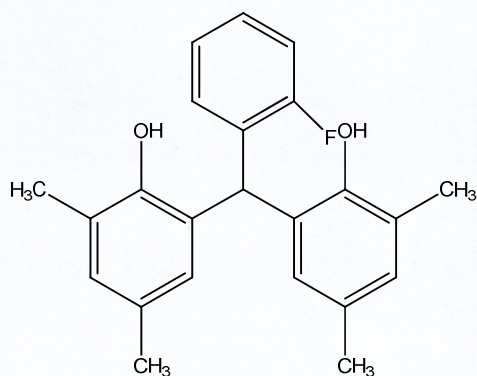
F2 - Acquisition Parameters
Date_ 20140305
Time_ 8.09
INSTRUM spect
PROBHD 5 mm Multinucl
PULPROG zg
TD 32768
SOLVENT DMSO
NS 32
DS 0
SWH 11574.074 Hz
FIDRES 0.353213 Hz
AQ 1.4156276 sec
RG 71.6
DW 43.200 usec
DE 6.00 usec
TE 300.0 K
D1 5.00000000 sec

===== CHANNEL f1 =====
NUC1 1H
P1 9.00 usec
PL1 -6.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 32768
SF 400.1300645 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

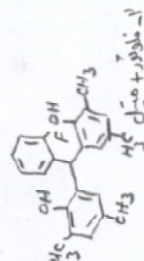
7.984
7.202
7.064
6.779
6.728
6.350
6.263

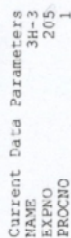
3.347
2.477
2.095
2.027
1.951



19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 ppm

2.07
2.17
1.30
2.17
3.38
1.39
2.17
5.72
6.00





F2 - Acquisition Parameters

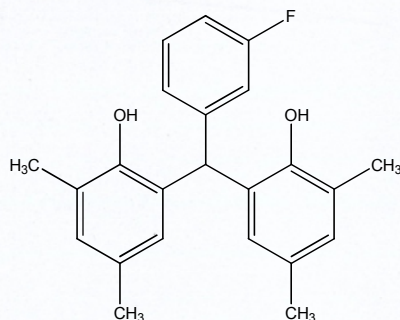
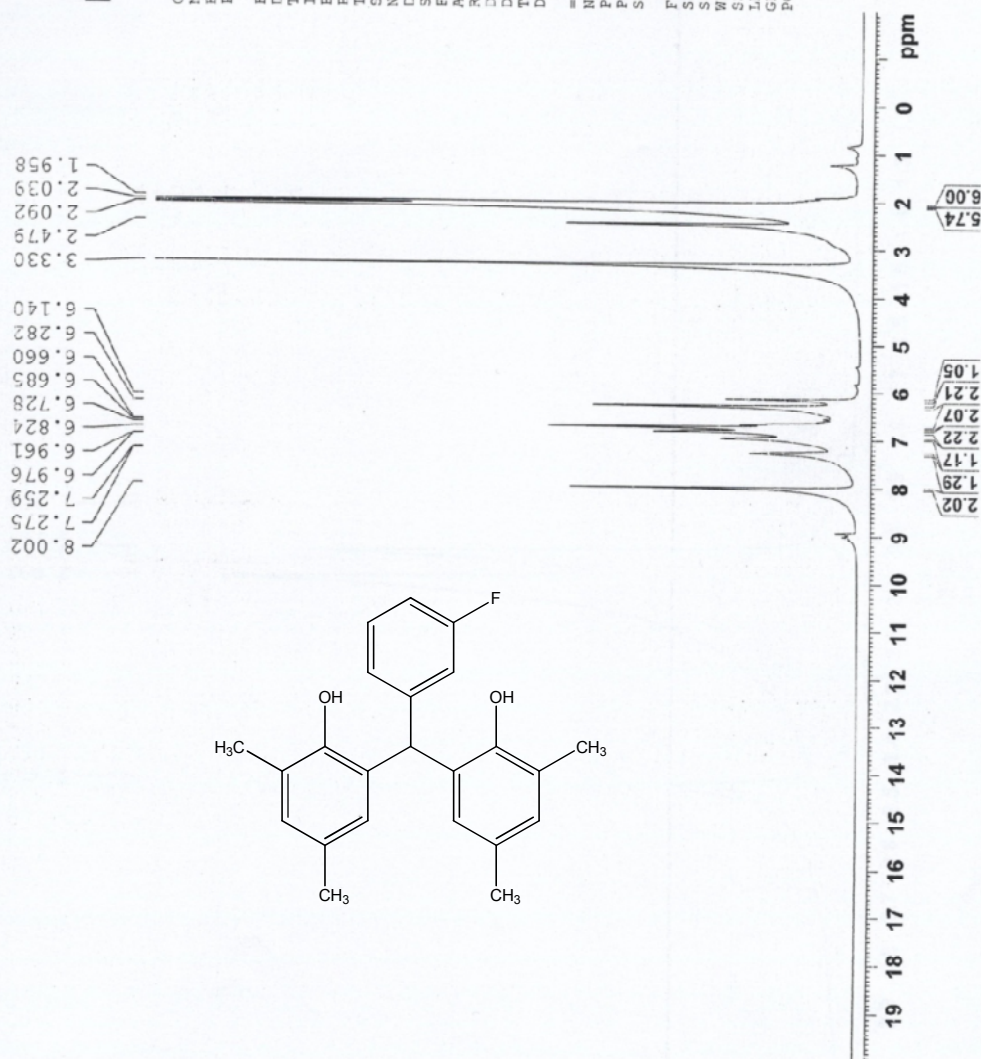
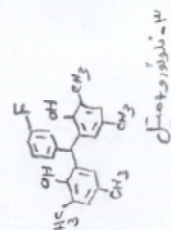
Rate	Acquisition Parameters
14.15	12740368
INSTRUM	Spect
PROBHD	5 mm Multinucl
PULPROG	zg
ID	32748
SOLVENT	DMSO
NS	32
DS	0
SWH	11574.074
FIDRES	0.353213
MG	1.4156276
W	161.3
W	43.200
W	6.00
TE	300.0
TD	5.0000000

```

===== CHANNEL f1 =====
NUC1      1H      9.00 usec
Pl        -6.00 dB
Pl1
SF01      400.1324710 MHz

```

F2 - Processing parameters	
SI	32768
SF	400.1300C45 MHz
WDW	EM
SSE	0
LB	0.30 Hz
GB	0
PC	1.00



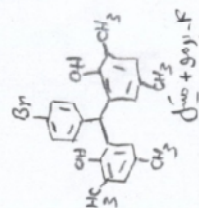


Current Data Parameters
NAME 3H-3
EXPNO 186
PROCNO 1

F2 - Acquisition Parameters
Date_ 20140305
Time_ 8.18
INSTRUM spect
PROBHD 5 mm Multinucl
PULPROG zg
TD 32768
SOLVENT DMSO
NS 32
DS 0
SWH 11574.074 Hz
FIDRES 0.353213 Hz
AQ 1.4156276 sec
RG 114
DW 43.200 usec
DE 6.00 usec
TE 300.0 K
D1 5.00000000 sec

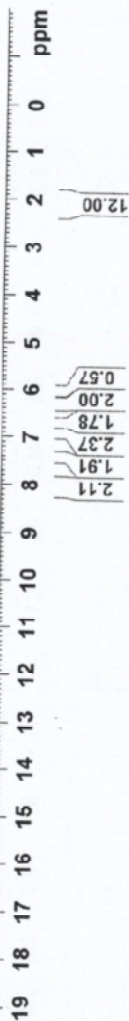
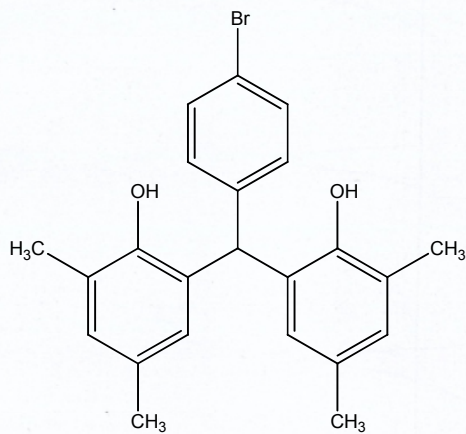
CHANNEL f1
NUC1 1H
P1 9.00 usec
PL1 -6.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 32768
SF 400.1300045 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



7.965
7.388
6.886
6.704
6.251
6.072

3.318
2.459
2.069





Current Data Parameters
NAME 3H-3
EXPNO 215
PROCNO 1

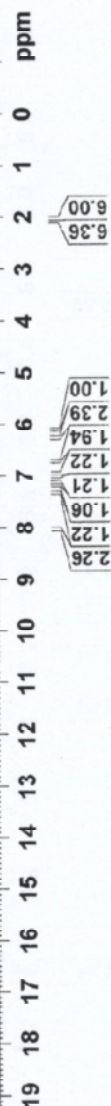
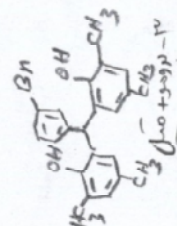
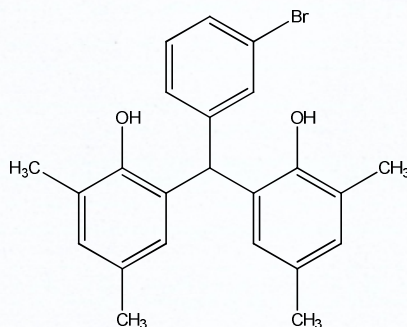
F2 - Acquisition Parameters
Date_ 20140309
Time 14.00
INSTRUM spect
PROBHD 5 mm Multinucl
PULPROG zg
TD 32768
SOLVENT DMSO
NS 32
DS 0
SWH 11574.074 Hz
FIDRES 0.353213 Hz
AQ 1.4156276 sec
RG 143.7
DW 43.200 usec
DE 6.00 usec
TE 300.0 K
D1 5.00000000 sec

CHANNEL f1 =====
NUC1 1H
P1 9.00 usec
PL1 -6.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 32768
SF 400.1300045 MHz
WDW EM
SSB 0
IB 0
CB 0
IC 1.00

3.325
2.472
2.085
2.034

8.015
7.338
7.213
7.194
7.065
6.967
6.727
6.267
6.108





Current Data Parameters
NAME 5H-3
EXPNO 170
PROCNO 1

F2 - Acquisition Parameters

Date_ 20140304
Time_ 8.19
INSTRUM spect
PROBHD 5 mm Multinucl
PULPROG zg
TD 32768
SOLVENT DMSO
NS 32
DS 0
SWH 11574.074 Hz
FIDRES 0.353213 Hz
AQ 1.4156276 sec
RG 64
DM 43.200 usec
DE 6.00 usec
TE 300.0 K
D1 5.0000000 sec

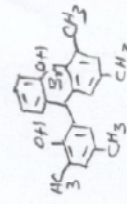
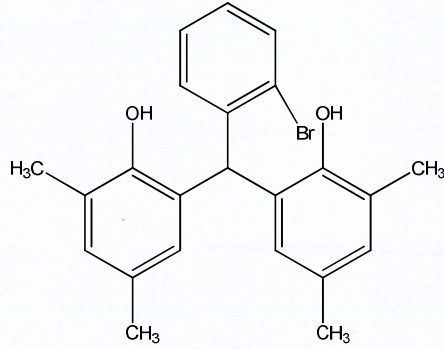
===== CHANNEL f1 =====
NUC1 ¹H
P1 9.00 usec
PL1 -6.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters

SI 32768
SF 400.1300045 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

7.970
7.538
7.218
7.103
7.087
6.836
6.722
6.356
6.184

3.349
2.478
2.091
2.020
1.944



dimethyl-
hydroxy-
phenyl-
ether

19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 ppm

2.13
1.02
1.38
1.03
1.92
1.11
1.98
5.90
5.48



Current Data Parameters
NAME 3H-3
EXPNO 169
PROCNO 1

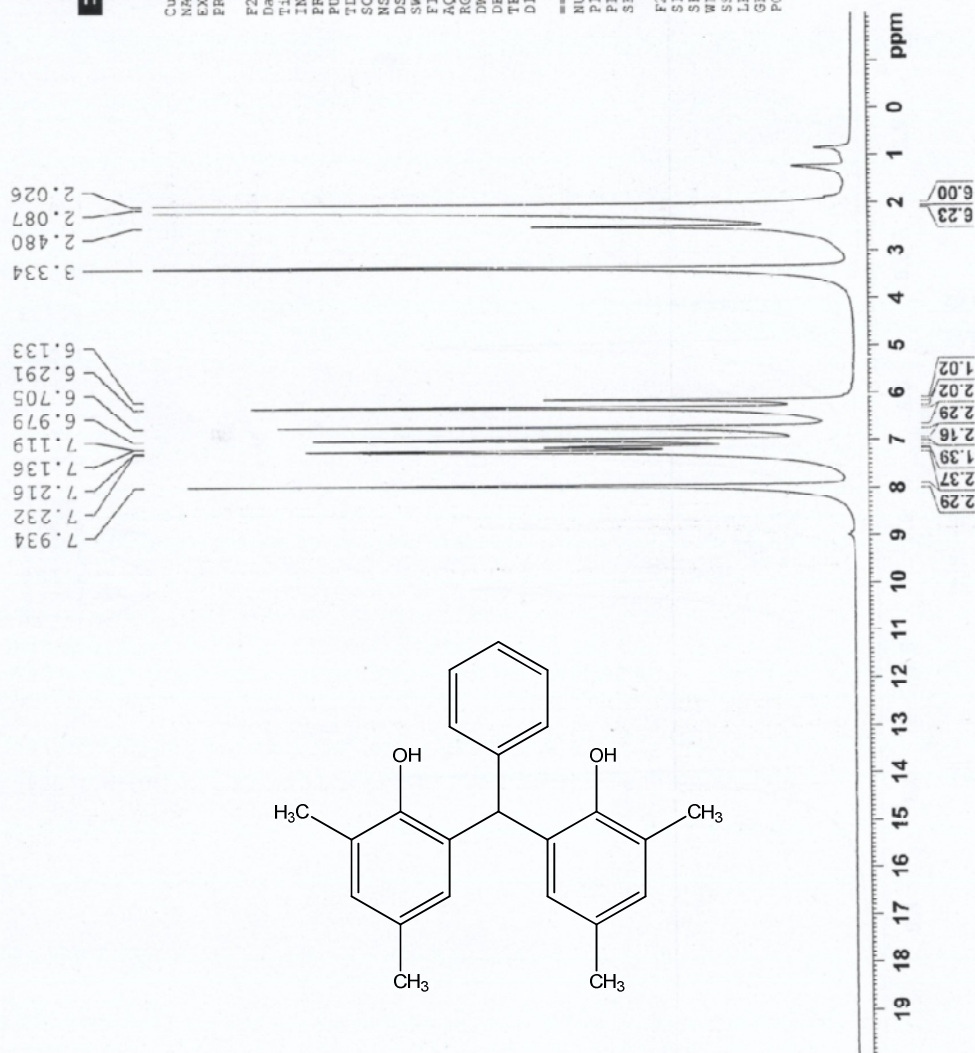
F2 - Acquisition Parameters

Date_ 20140303
Time_ 15.06
INSTRUM spect
PROBHD 5 mm Multinucl
PULPROG zg
TD 32768
SOLVENT DMSO
NS 32
DS 0
SWH 11574.074 Hz
FIDRES 0.363213 Hz
AQ 1.4116276 sec
RG 101.6
DW 45.200 usec
DE 6.00 usec
TE 300.3 K
D1 5.00000000 sec

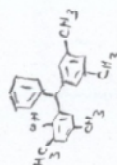
===== CHANNEL f1 =====
NUC1 1H
P1 9.00 usec
PL1 -5.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters

SI 32768
SF 400.1300045 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



بنیادی



بنیادی و متیل



Current Data Parameters
NAME 3H-3
EXPNO 207
PROCNO 1

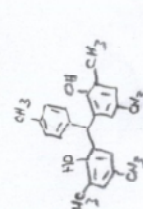
F2 - Acquisition Parameters

Date 20140308
Time 14.33
INSTRUM spect
PROBHD 5 mm Multiruc1
PULPROG zg
TD 32768
SOLVENT DMSO
NS 32
DS 0
SWH 11574.074 Hz
FIDRES 0.352213 Hz
AQ 1.415276 sec
RG 613
DE 43.200 usec
TE 300.0 K
D1 5.0000000 sec

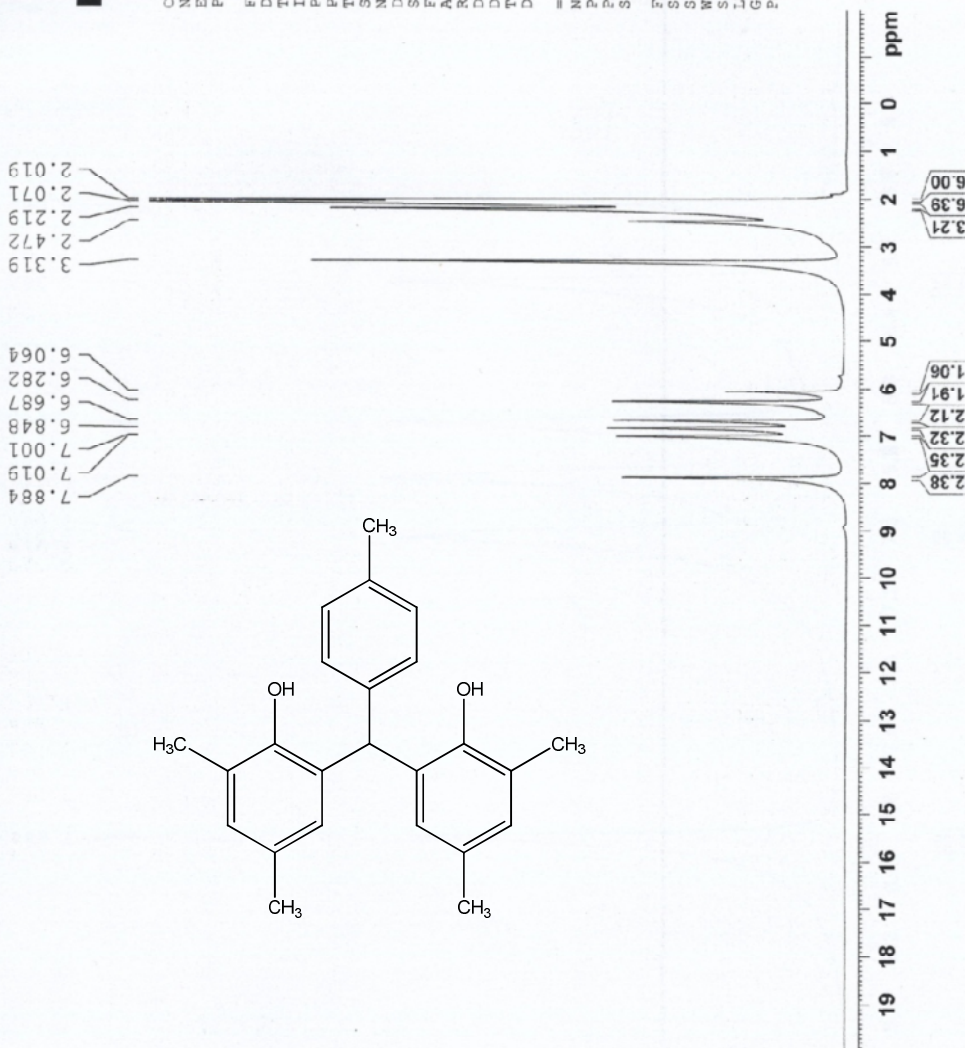
===== CHANNEL f1 =====
NUC1 1H
P1 9.00 usec
PL1 -6.00 dB
SFO1 400.1324710 MHz

F2 - Processing Parameters

SI 32768
SF 400.1300045 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



2,6-DM-4-M-3,5-DH





Current Data Parameters
NAME 3H-3
EXPNO 238
PROCNO 1

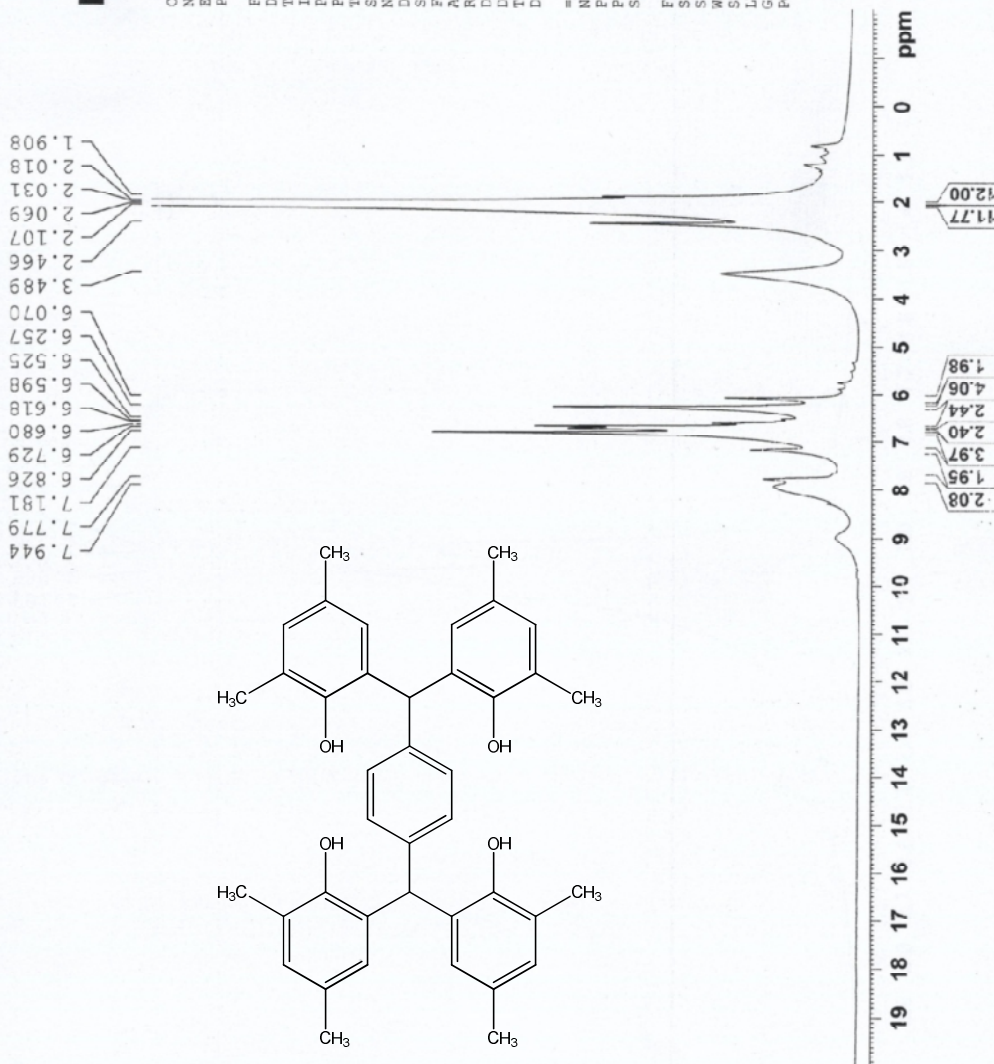
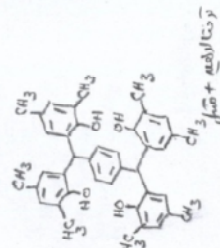
F2 - Acquisition Parameters

Date_ 20140312
Time_ 13.40
INSTRUM spect
PROBHD 5 mm Multinucl
PULPROG zg
TD 32768
SOLVENT DMSO
NS 32
DS 0
SWH 11574.074 Hz
FIDRES 0.353213 Hz
AQ 1.4156276 sec
RG 71.8
DW 43.200 usec
DE 6.00 usec
TE 300.0 K
D1 5.0000000 sec

===== CHANNEL f1 =====
NUC1 1H
P1 9.00 usec
PL1 -6.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters

SI 32768
SF 400.1300045 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



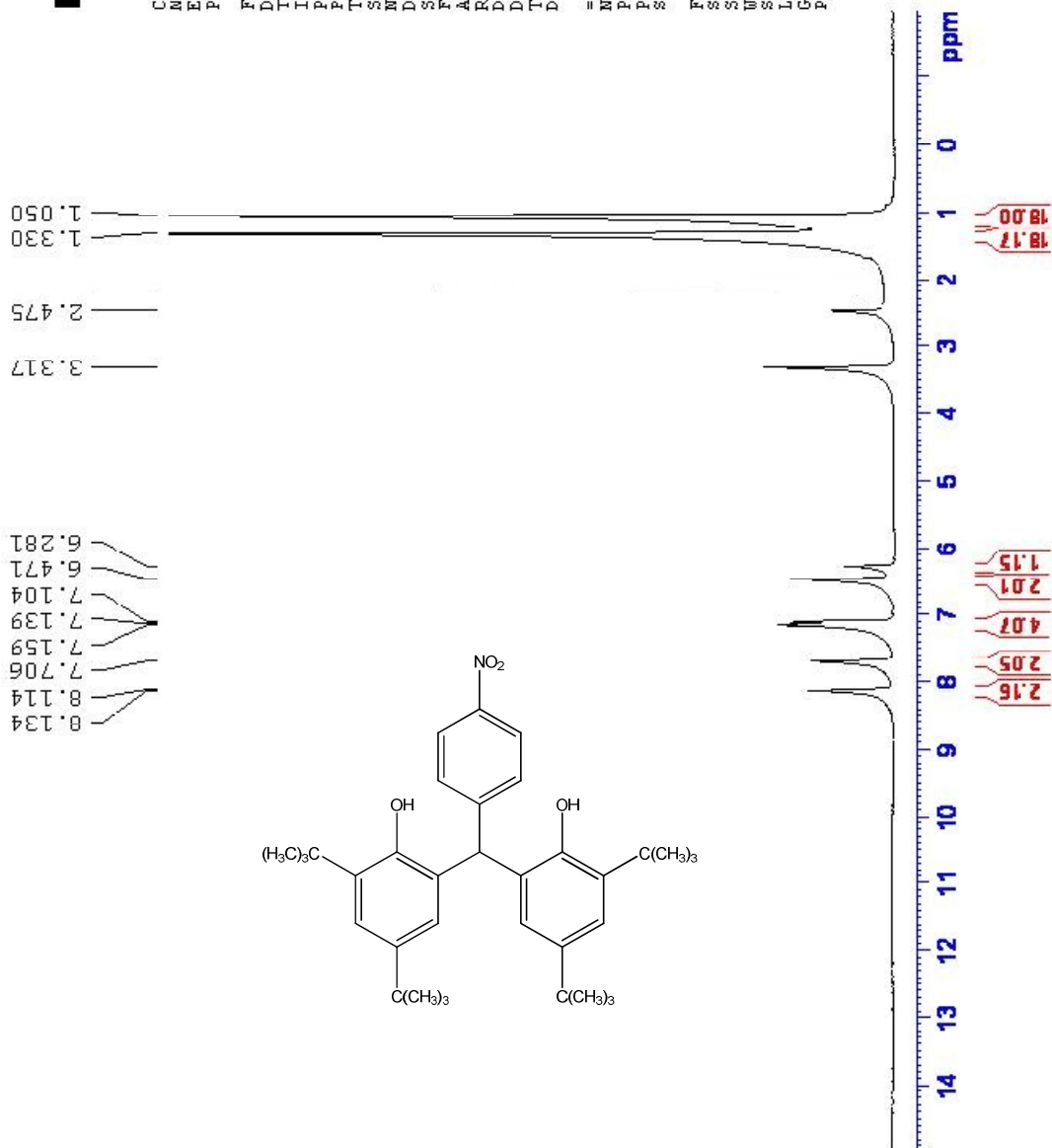


Current Data Parameters
NAME 3H
EXPNO 1904
PROCNO 1

F2 - Acquisition Parameters
Date_ 20131222
Time_ 10.12
INSTRUM spect
PROBHD 5 mm Multinucl
PULPROG zg
TD 32768
SOLVENT DMSO
NS 16
DS 0
SWH 11574.074 Hz
FIDRES 0.355213 Hz
AQ 1.4156276 sec
RG 256
DW 43.200 usec
DE 6.00 usec
TE 300.0 K
D1 5.00000000 sec

===== CHANNEL f1 =====
NUC1 1H
P1 5.00 usec
PL1 -6.00 dB
SF01 400.1324710 MHz

F2 - Processing parameters
SI 32768
SF 400.1300045 MHz
WDW EM
SSB 0
LB 0
GB 0
PC 1.00





Current Data Parameters
NAME: 3H-2
EXPNO: 21
PROCNO: 1

F2 - Acquisition Parameters

Date_: 20100909
Time: 13.31
INSTRUM: spect
PROBHD: 5 mm Multinuc1
PULPROG: zg
TD: 32768
SOLVENT: DMSO
NS: 32
DS: 0
SWH: 11574.074 Hz
FIDRES: 0.353213 Hz
AQ: 1.4156216 sec
RG: 40.3
DW: 43.200 usec
DE: 6.00 usec
TE: 300.0 K
D1: 5.0000000 sec

===== CHANNEL f1 =====

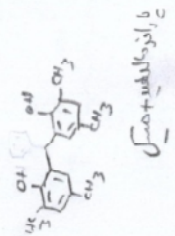
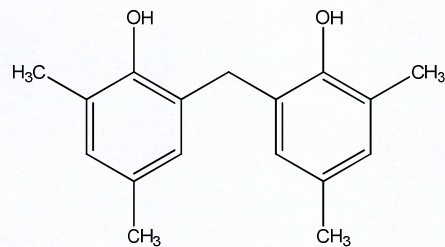
NUC1: 1H
P1: 9.00 usec
PL1: -6.00 dB
SFO1: 400.1324710 MHz

F2 - Processing parameters

SI: 32768
SF: 400.1300045 MHz
WDW: EM
SSB: 0
LB: 0.30 Hz
GB: 0
EC: 1.00

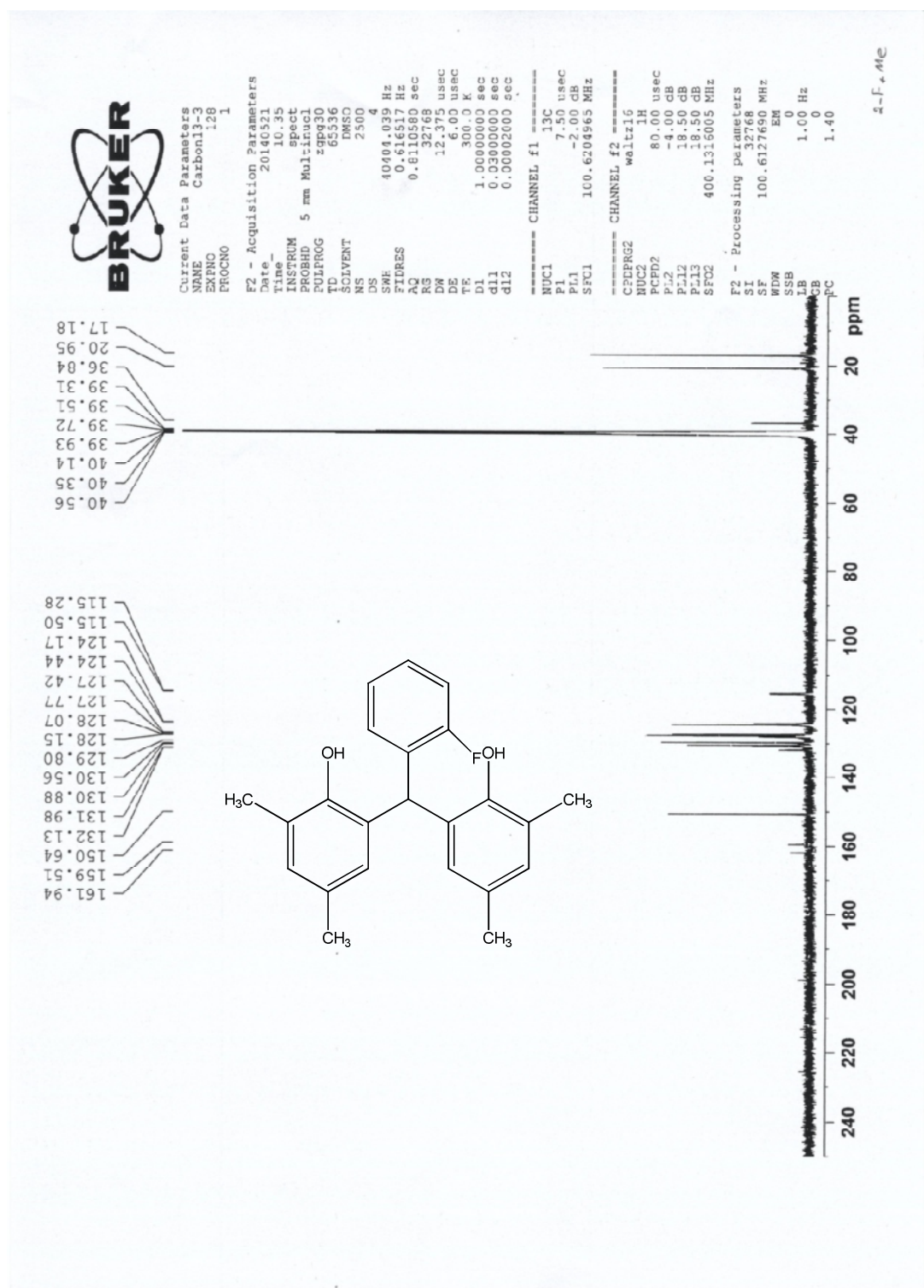
8.254
6.681
6.628
3.077
3.742
3.387
2.465
2.102
2.066
2.000

2.04
1.95
2.04
2.32
6.23
6.67



ppm

¹³C NMR Spectra of selected compounds.





Current Data Parameters
NAME Carbon13-3
EXPNO 133
PROCNO 1

F2 - Acquisition Parameters
Date_ 20140525
Time 13.47

INSTRUM spect
PROBHD 5 mm Multinucl
PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 2500
DS 4

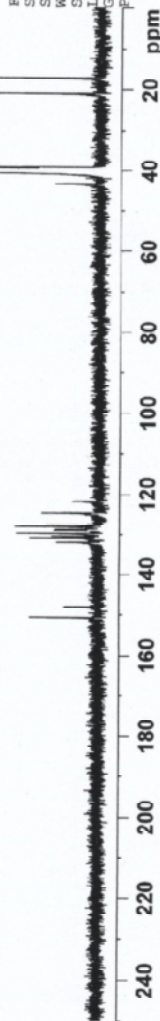
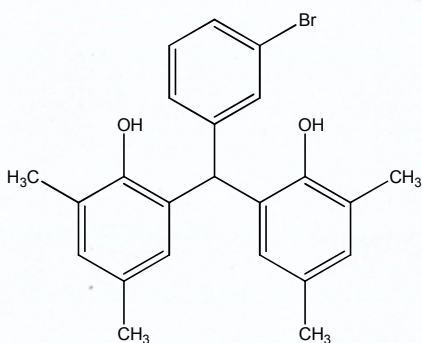
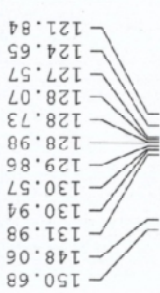
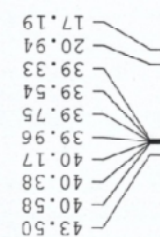
SWH 40404.039 Hz
FIDRES 0.616517 Hz
AQ 0.610580 sec
RG 32768
DM 12.375 usec
DE 6.00 usec
TE 300.0 K
D1 1.0000000 sec
d11 0.0300000 sec
d12 0.0000200 sec

===== CHANNEL f1 =====
NUC1 ¹³C
P1 7.30 usec
PL1 -2.00 dB
SFO1 100.6204965 MHz

===== CHANNEL f2 =====
CPOBPG2 waltz16
NUC2 ¹H
PCPD2 80.00 usec
PL2 4.00 dB
PL12 18.00 dB
PL13 18.00 dB
SFO2 400.1316015 MHz

F2 - Processing parameters
SI 32768
SF 100.6127650 MHz
WDW EM
SSB 0
GB 1.00 Hz
PC 1.40

304 Me



240 220 200 180 160 140 120 100 80 60 40 20 ppm



Current Data Parameters
NAME Carbon13
EXPNO 129
PROCNO 1

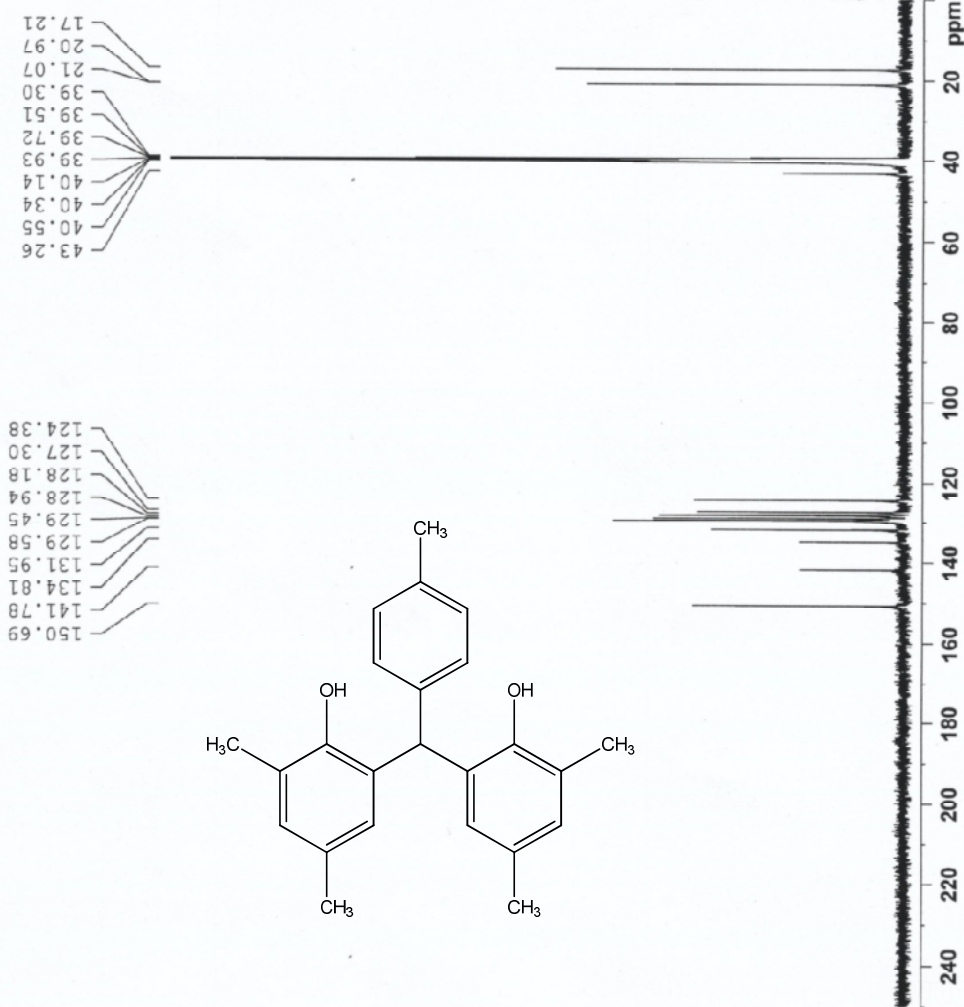
F2 - Acquisition Parameters
Date_ 20140524
Time_ 11.03
INSTRUM spect
PROBHD 5 mm Multinuc
PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 2500
DS 4
SWH 40404.039 Hz
FIDRES 0.616517 Hz
AQ 0.8110580 sec
RG 32768
DK 12.375 usec
DE 6.00 usec
TE 300.0 K
D1 1.00000000 sec
d11 0.03000000 sec
d12 0.00002000 sec

CHANNEL f1 13C
NUC1 13C
P1 7.50 usec
PL1 -2.00 dB
SFO1 100.6204965 MHz

CHANNEL f2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -4.00 dB
PL12 18.50 dB
PL13 18.50 dB
SFO2 400.1316005 MHz

F2 - Processing parameters
SI 32768
SF 100.6127690 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

4-MC + Me





Current Data Parameters
NAME Carbon13-3
EXPNO 144
PROCNO 1

F2 - Acquisition Parameters

Date_ 20140531
Time_ 13.46
INSTRUM spect
PROBHD 5 mm Multispec1
PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 2500
DS 4
SWH 40404.039 Hz
FIDRES 0.516517 Hz
AQ 0.8110560 sec
RG 32768
DM 12.375 usec
DE 6.00 usec
TE 300.0 K
D1 1.00000000 sec
d11 0.03000000 sec
d12 0.00002000 sec

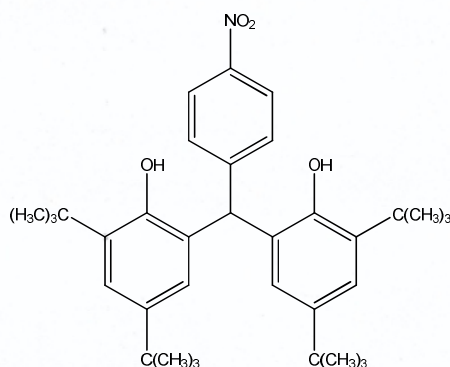
===== CHANNEL F1 =====
NUC1 13C
P1 7.50 usec
PL1 -2.00 dB
SFO1 100.6204965 MHz

===== CHANNEL F2 =====
CPDPRG2 waitz16
NUC2 1H
PCPD2 80.00 usec
PL2 -4.00 dB
PL12 18.50 dB
PL13 18.50 dB
SFO2 400.1316005 MHz

F2 - Processing parameters
SI 32768
SF 100.6127590 MHz
WDW EM
SSB 0
LB 0
GB 0
PC 1.40

44.12
40.54
40.33
40.12
39.91
39.70
39.50
39.29
35.16
34.27
31.70
30.35

153.25
151.02
146.18
141.46
137.52
130.87
130.64
130.50
125.08
123.47
121.76



ppm

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220

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300

320

340

360

380

400

420

440

460

480

500

520

540

560

580

600

620

640

660

680

700

720

740

760

780

800

820

840

860

880

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920

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960

980

1000

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Current Data Parameters
NAME Carbon13-3
EXPNO 122
PROCNO 1

F2 - Acquisition Parameters
Date_ 20140518
Time 13.53
INSTRUM spect
PROBHD 5 mm Multinuc1
PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 2500
DS 4
SWH 40404.039 Hz
FIDRES 0.616517 Hz
AQ 0.8110580 sec
RG 32769
DE 12.375 usec
TE 300.0 K
D1 1.00000000 sec
d11 0.03000000 sec
d12 0.00002000 sec

CHANNEL f1
NUC1 13C
P1 7.50 usec
PL1 -2.00 dB
SFO1 100.6204965 MHz

CHANNEL f2
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -4.00 dB
PL12 18.50 dB
PL13 18.50 dB
SFO2 400.1318005 MHz

F2 - Processing parameters
SI 32768
SF 100.6127690 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

Ther + Me

