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Supporting Information

Oxidative esterification via photocatalytic C-H activation

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1. Synthesis of materials

a) Synthesis of g-C_3N_4:

The graphitic carbon nitride, g-C_3N_4, was synthesized by calcinations of urea at 500 ^{0}C.

b) Synthesis of VO@g-C_3N_4 catalyst:

g-C_3N_4 (1.0 g) was dispersed in 200 ml aqueous methanol (50 %) under sonication; to this dispersion the methanolic solution of vanadyl acetylacetonate [$VO(acac)_2$; 1 mmol] was added and stirred for 3h at room temperature. The reaction mixture was centrifuged, washed with methanol and dried under vacuum at 50 ^{o}C to give the formation of VO@g-C_3N_4 catalyst as pale yellow solid. The VO@g-C_3N_4 was isolated and characterized using SEM, TEM, XRD and ICP-AES analysis

(c) Recycling of VO@g-C_3N_4 catalyst:

To establish the recyclability of the VO@g-C_3N_4 catalyst for oxidative esterification of alcohol, a set of experiments were performed using benzyl alcohol as a substrate in methanol. After the completion of each reaction the VO@g-C_3N_4 catalyst was recovered using centrifuge, washed with acetone and reused for the oxidative esterification of benzyl alcohol using fresh reagents. The VO@g-C_3N_4 catalyst could be recycled and reused up to eight times without losing its activity (S1). The metal leaching of VO@g-C_3N_4 catalyst was studied by ICP-AES analysis before and after the reaction. The concentration of vanadium was found to be 4.91% before the reaction and 4.88% after the 8th cycle. The ICP-AES of the mother liquor did not show the presence of vanadium confirming the fact that the g-C_3N_4 holds the oxo-vanadium complex tightly which eliminates the vanadium leaching and enables efficient recycling.

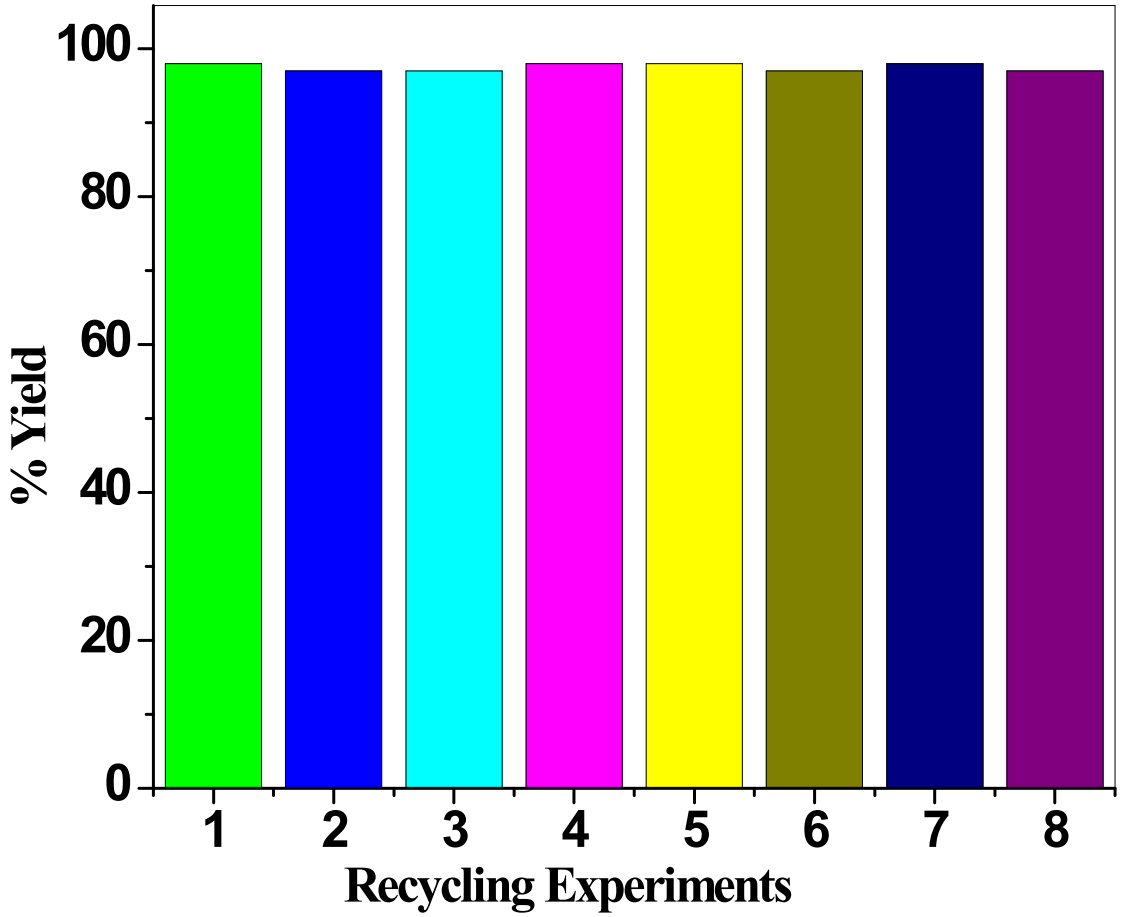


Figure S1: Histogram for recycling experiments

2. TEM image g-C_3N_4 support

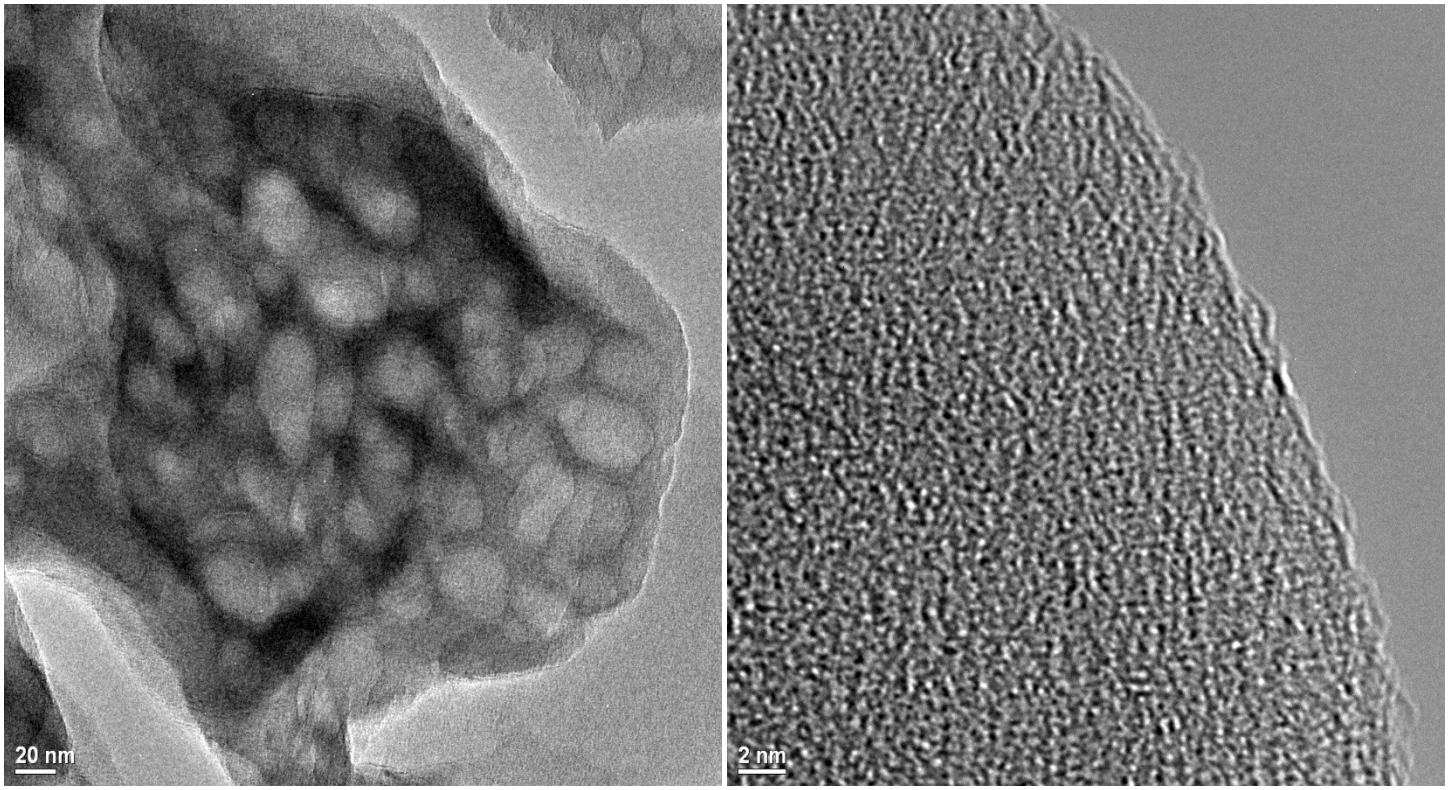


Figure S2: TEM image of g-C_3N_4 support

3. SEM image of recycled VO@C_3N_4 catalyst

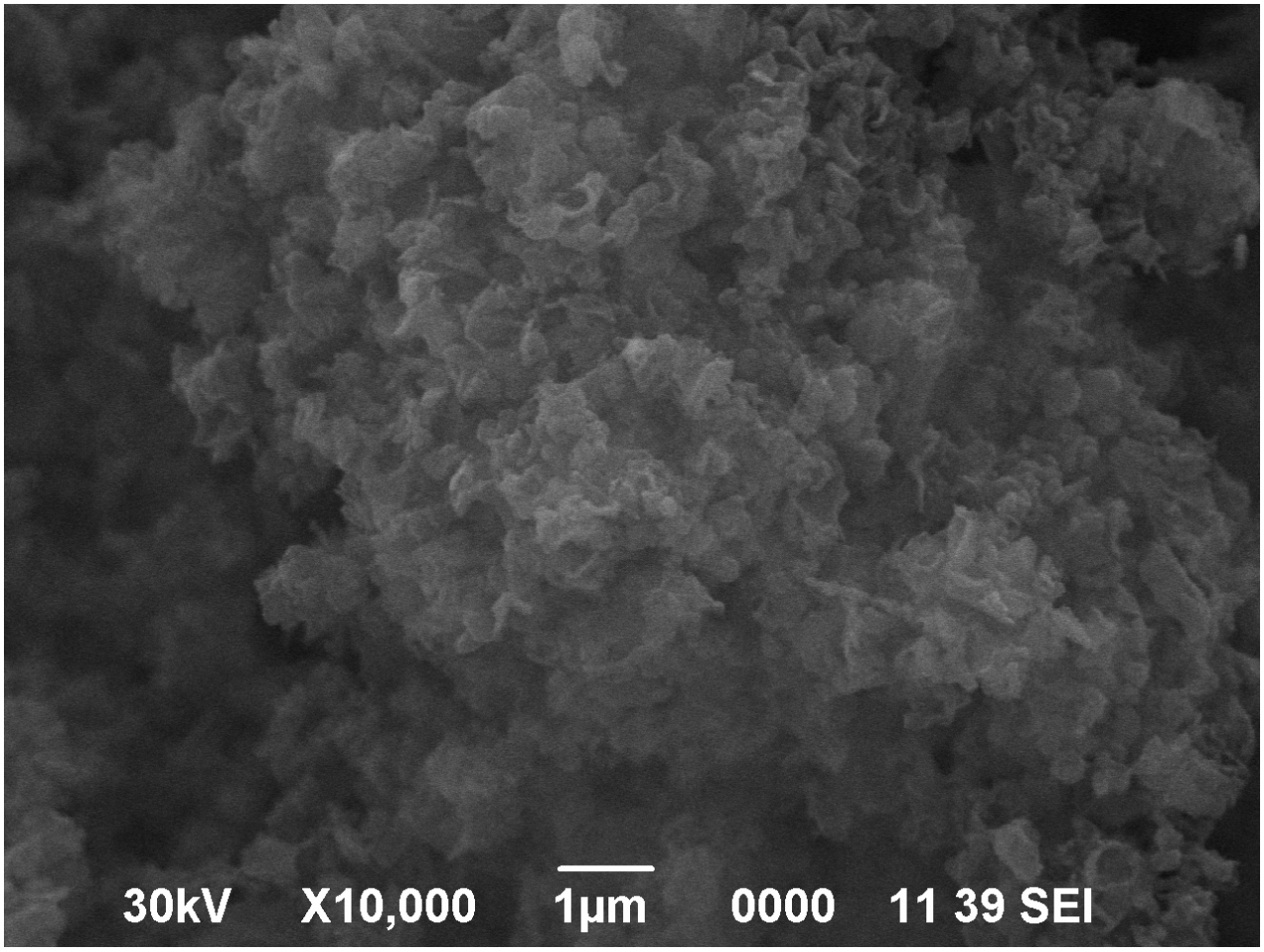
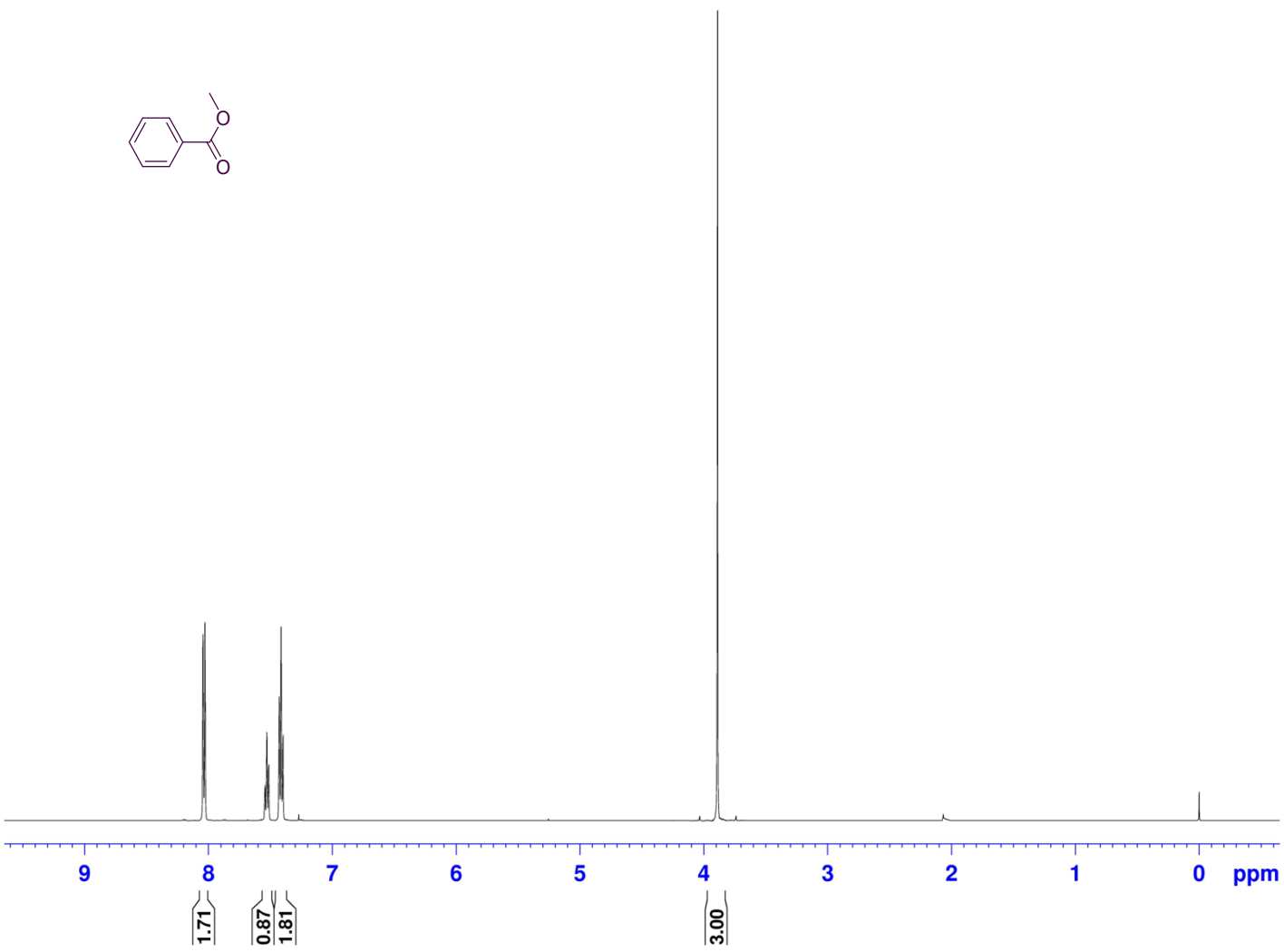


Figure S3: SEM image of recycled VO@g-C_3N_4 catalyst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O
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8
7
6
5
4
3
2
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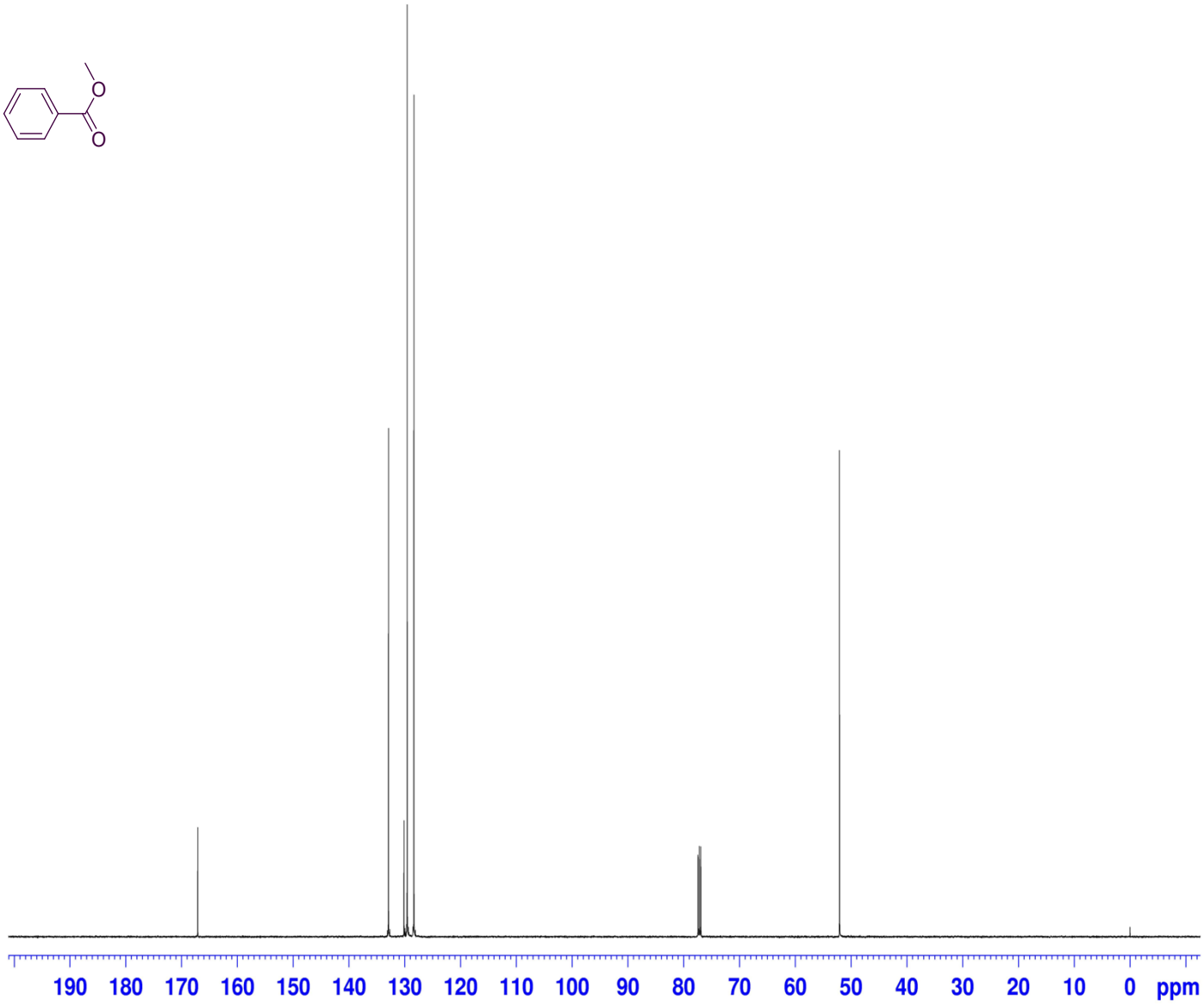
0.87
1.81
3.00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O
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180
170
160
150
140
130
120
110
100
90
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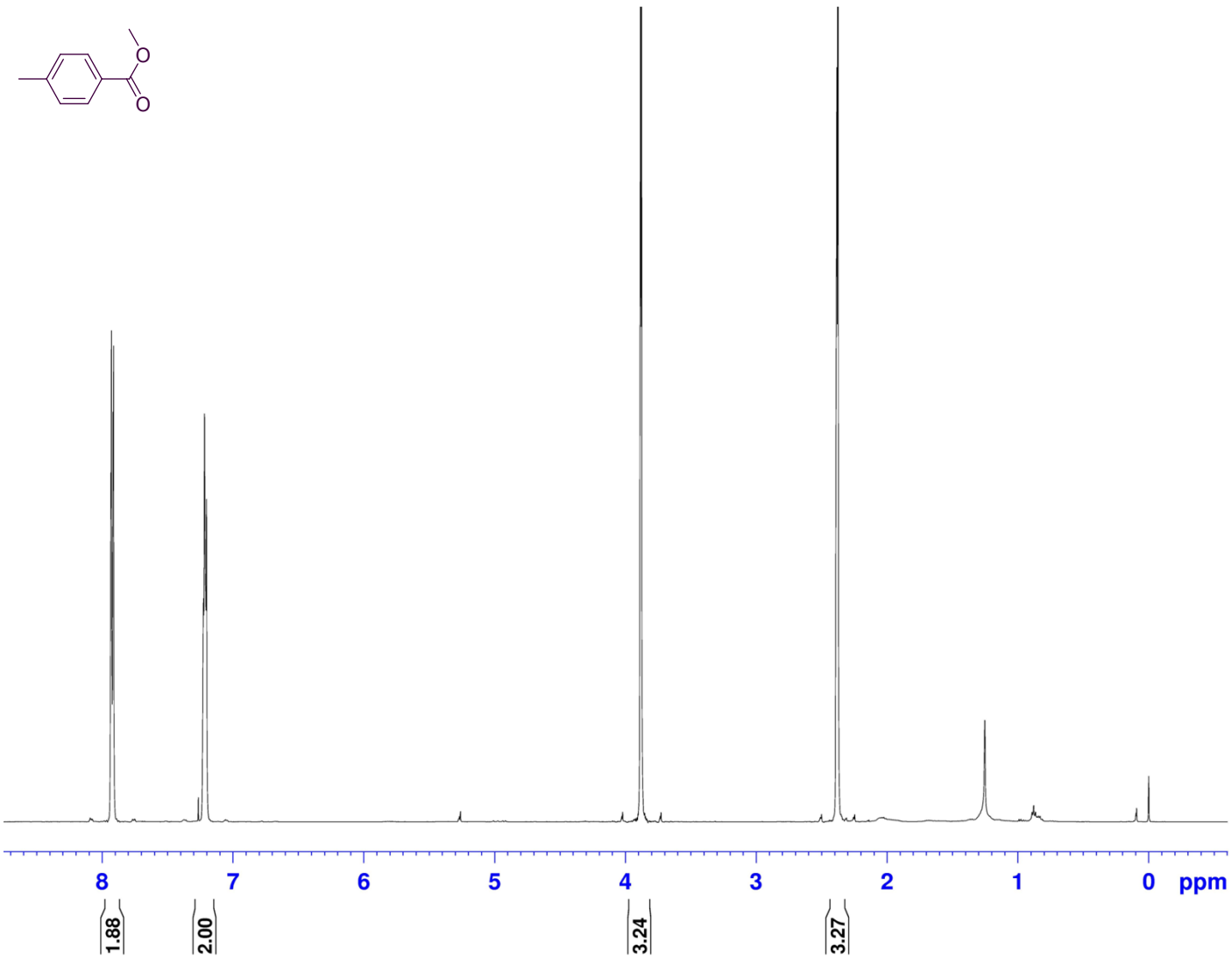
70
60
50
40
30
20
10
0
ppm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7
6
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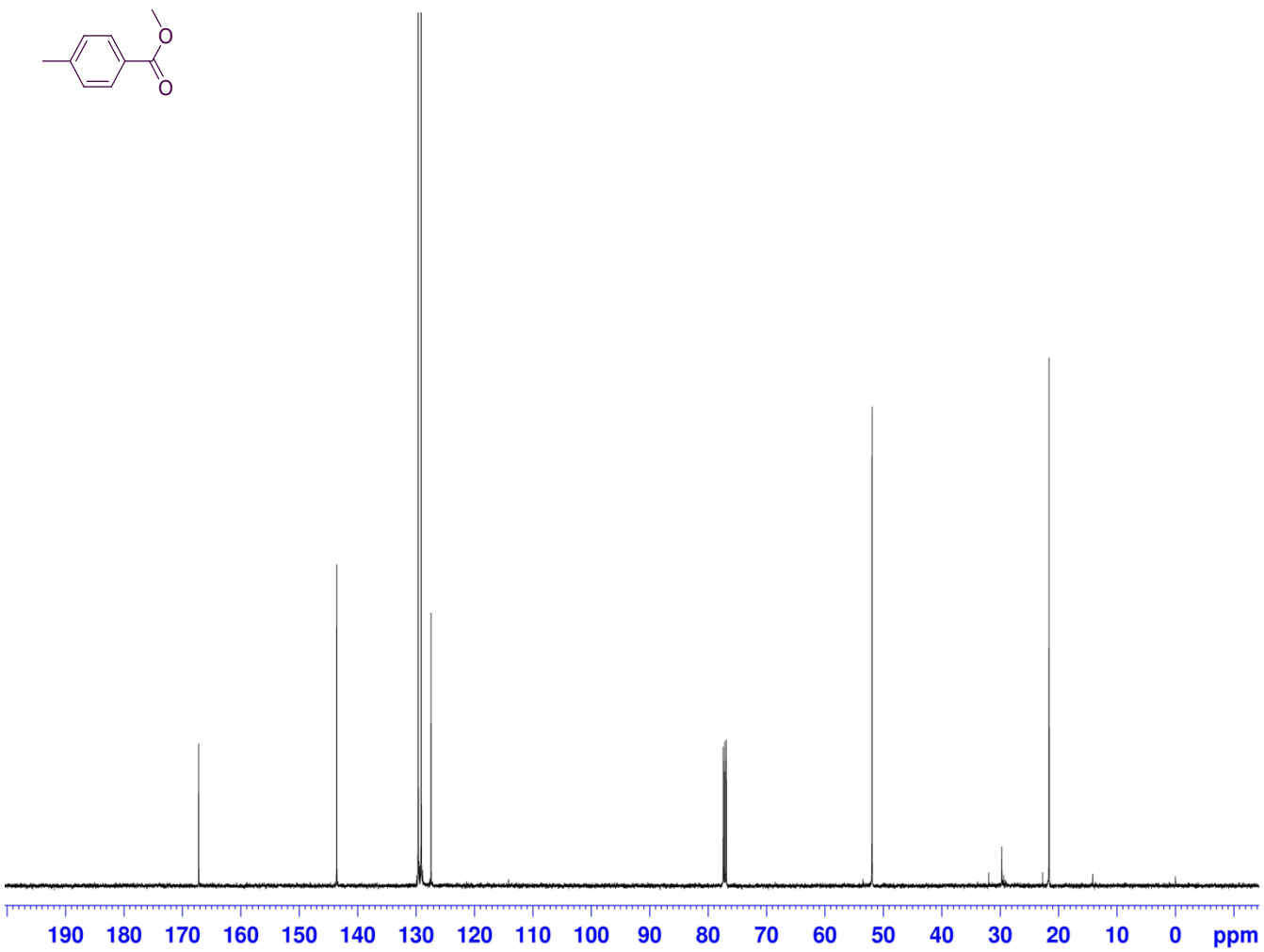
2.00
3.24
3.27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O
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180
170
160
150
140
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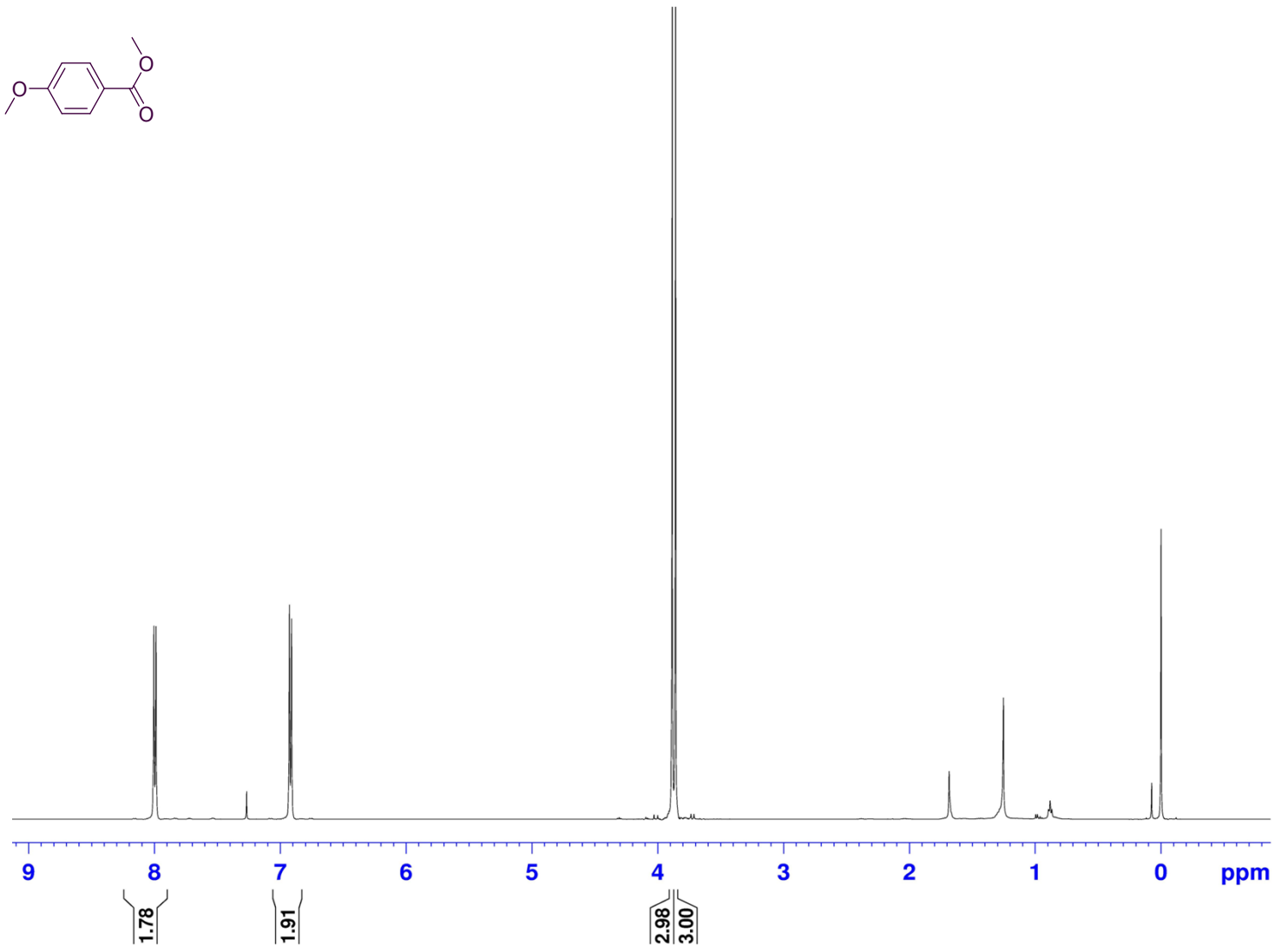
120
110
100
90
80
70
60
50
40
30
20
10
0
ppm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O
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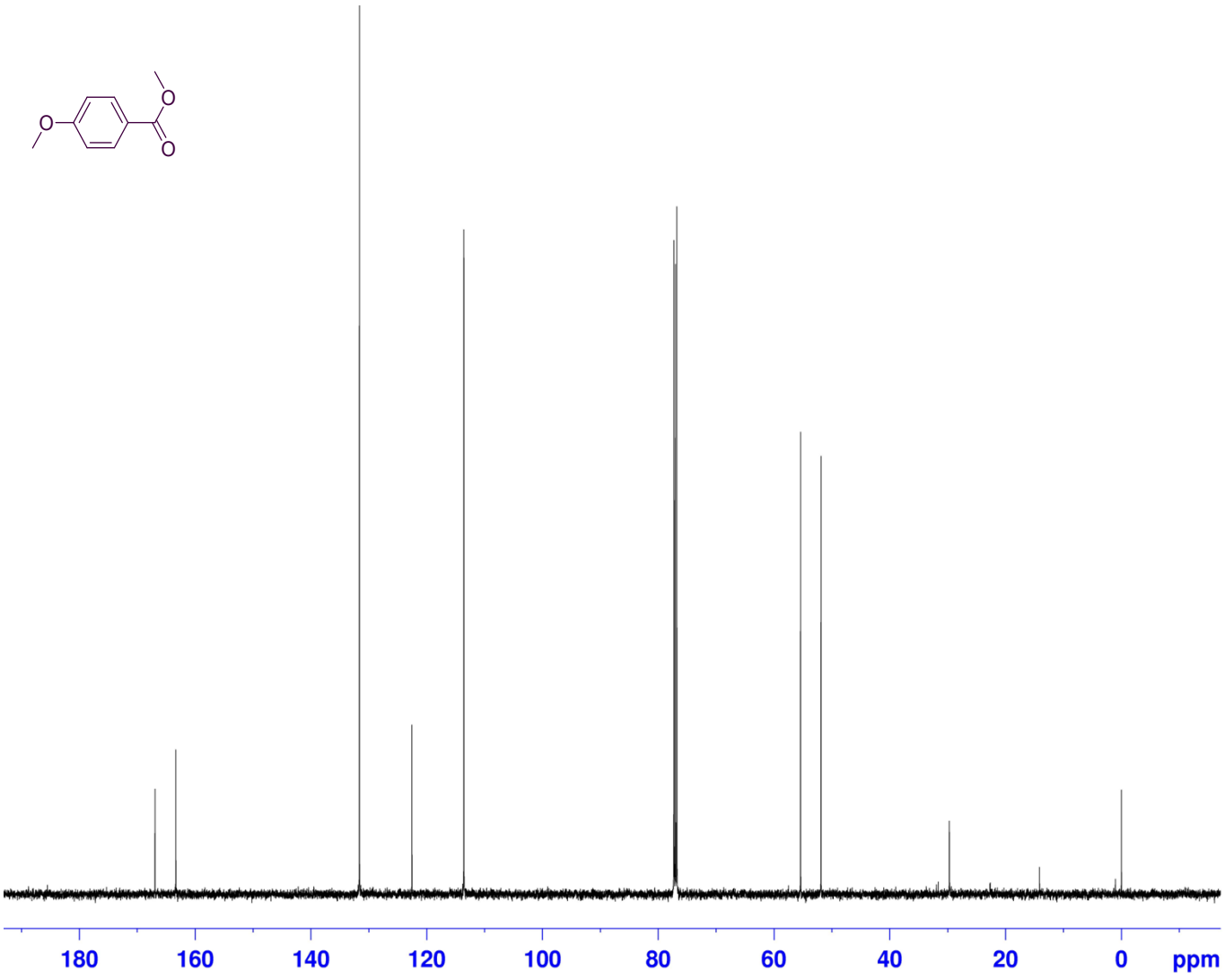
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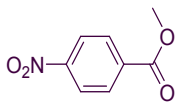
O
O
180
160
140
120
100
80
60
40
20
0
ppm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O
O

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ppm
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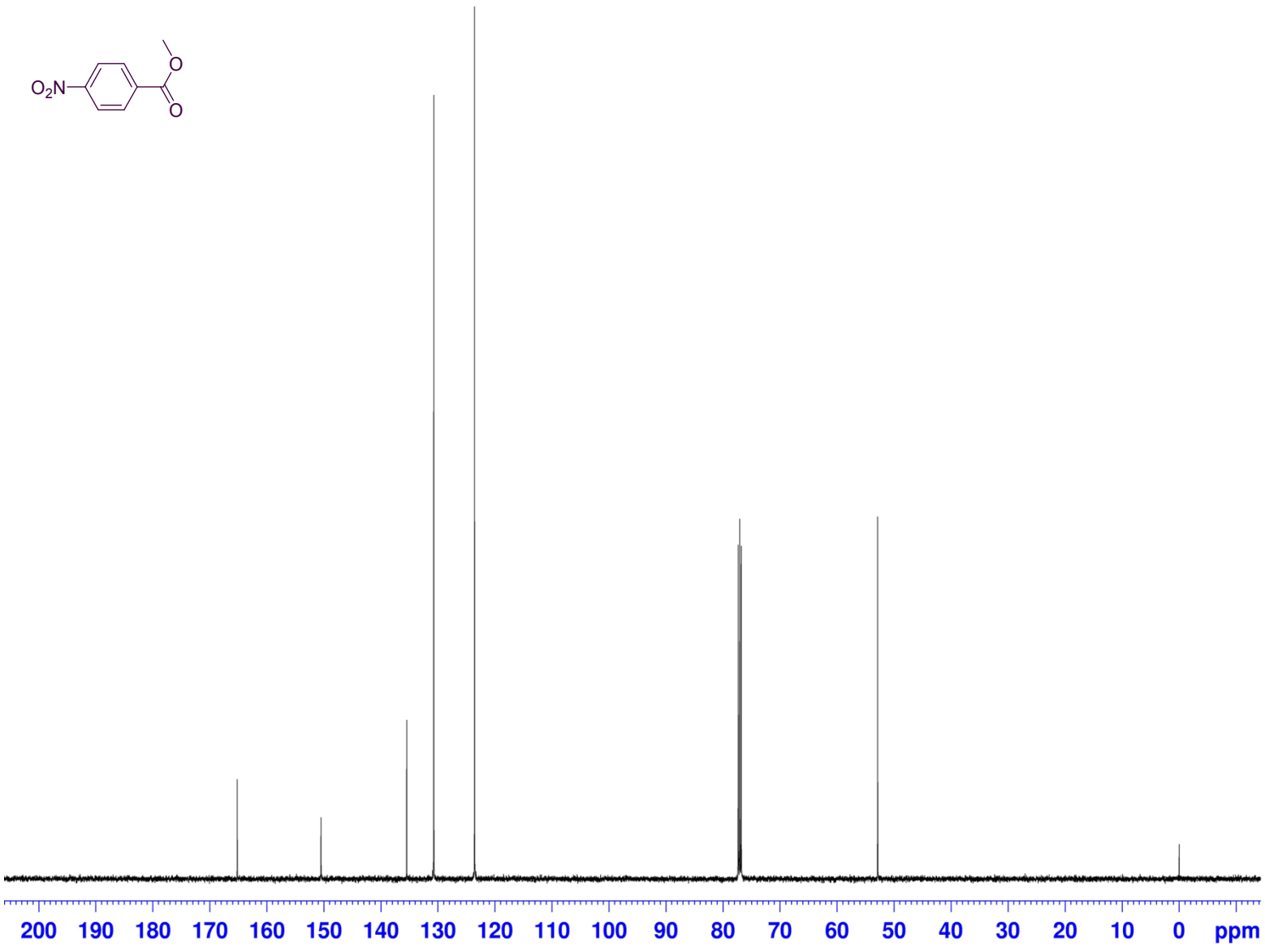
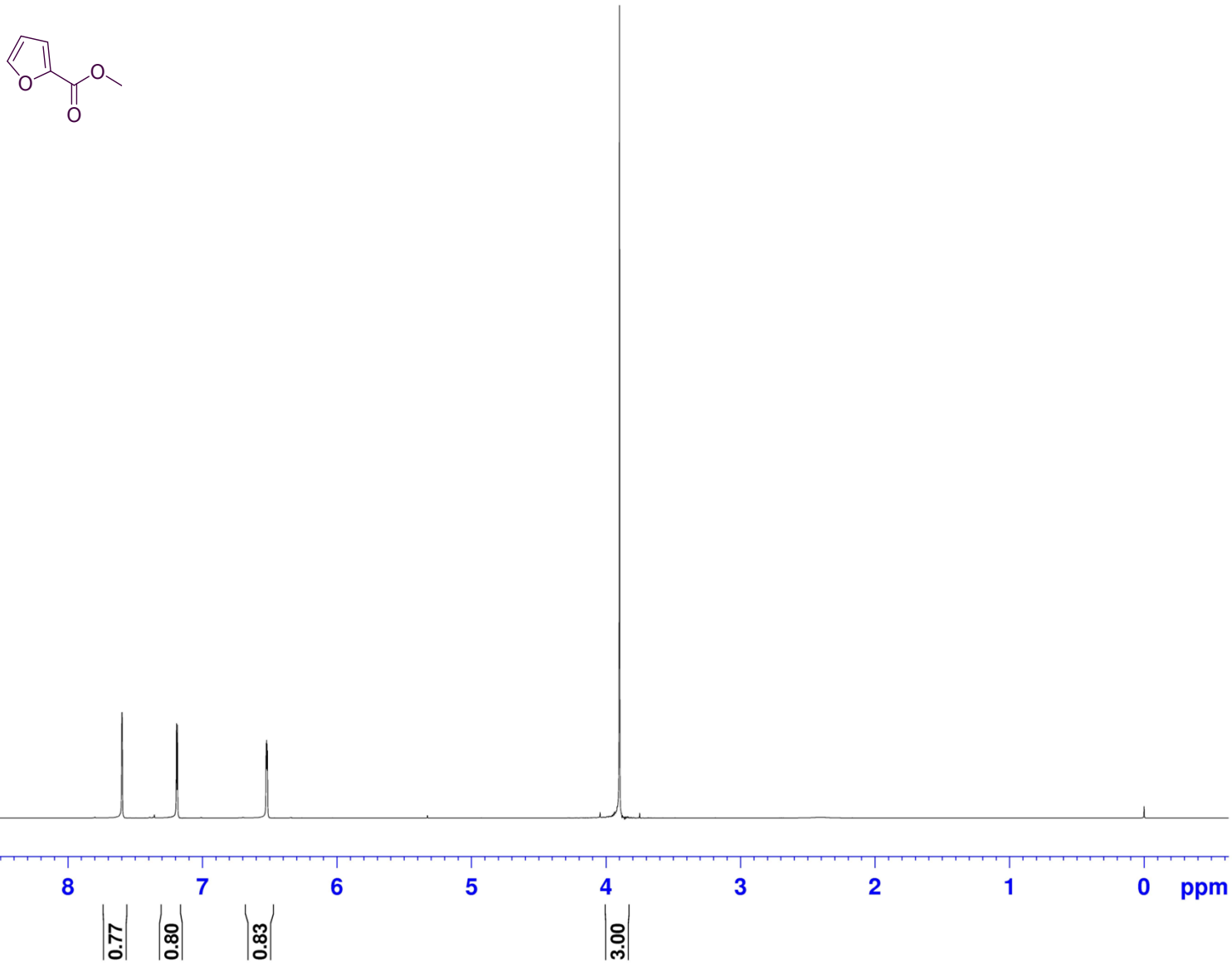

O2N
O
O
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm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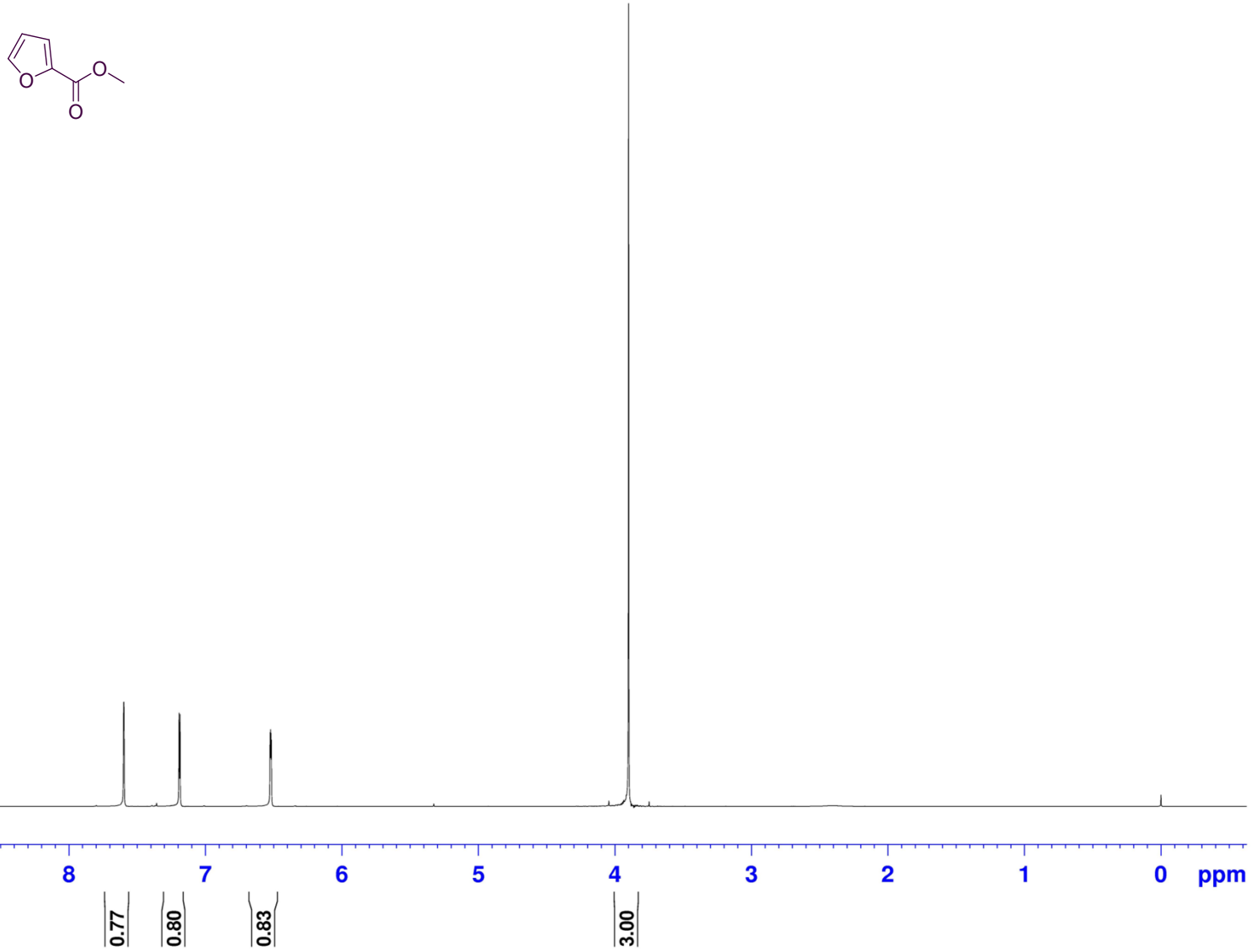
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6
5
4
3
2
1
0
ppm
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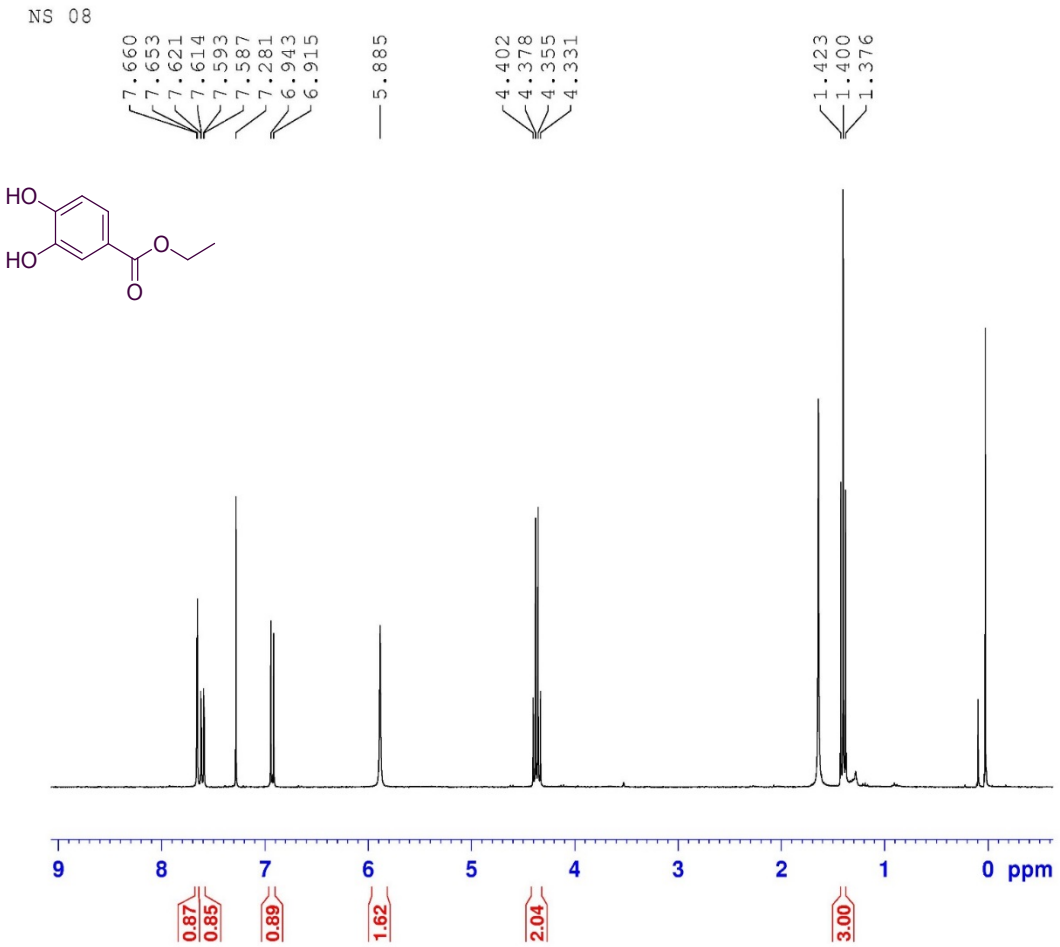
0.80
0.83
3.00

NS 08



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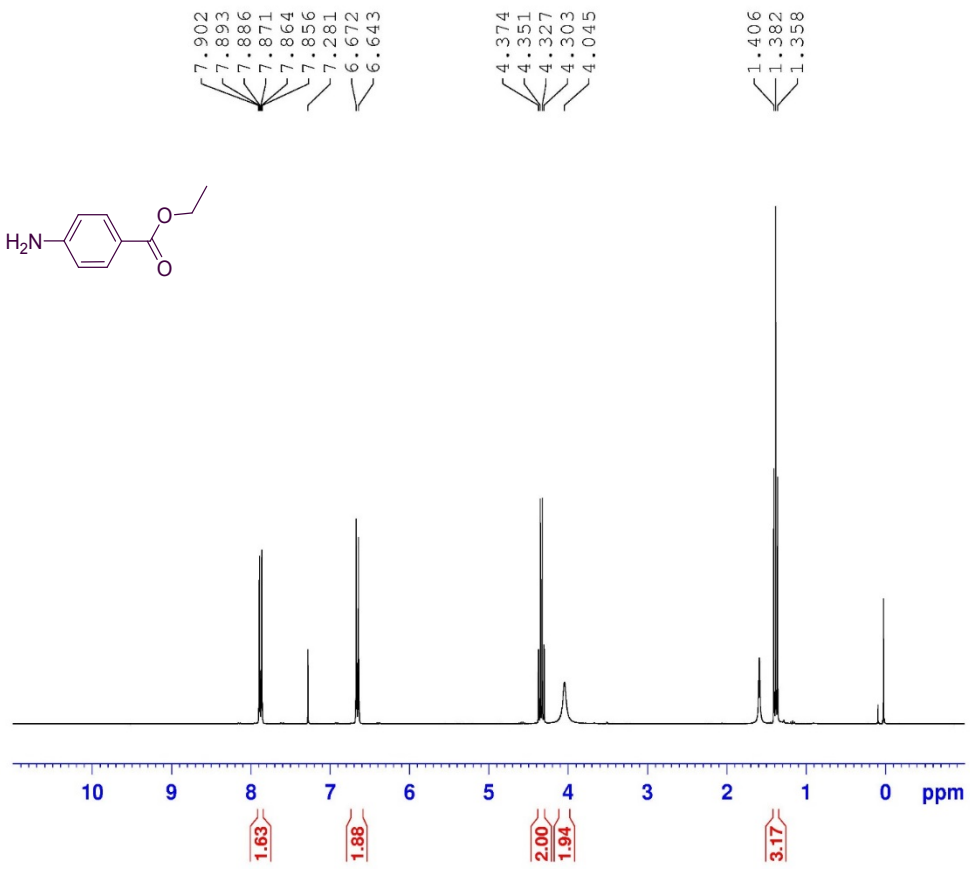
EXPNO	1
PROCNO	1
Date_	20150821
Time	15.27
INSTRUM	spect
PROBHD	5 mm BBO BB-1H
PULPROG	zg
TD	32768
SOLVENT	CDCl3
NS	32
DS	2
SWH	6188.119 Hz
FIDRES	0.188846 Hz
AQ	2.6477852 sec
RG	456.1
DW	80.800 usec
DE	6.50 usec
TE	303.0 K
D1	1.00000000 sec
TD0	1

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

NUC1	1H
P1	13.00 usec
PL1	3.20 dB
PL1W	12.02264404 W
SFO1	300.1318534 MHz
SI	32768
SF	300.1300000 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00

NS 09



NAME	NS 09
EXPNO	1
PROCNO	1
Date_	20150821
Time	14.35
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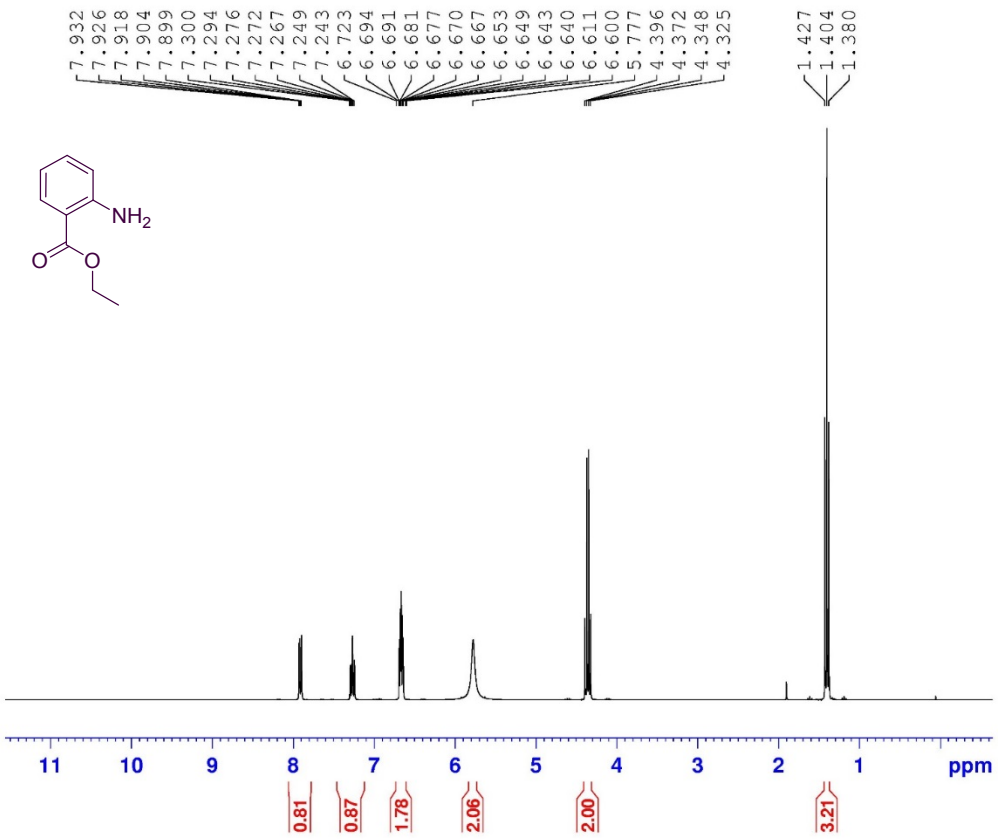
PROBHD	5 mm BBO BB-1H
PULPROG	zg
TD	32768
SOLVENT	CDC13
NS	16
DS	2
SWH	6188.119 Hz
FIDRES	0.188846 Hz
AQ	2.6477852 sec
RG	322.5
DW	80.800 usec
DE	6.50 usec
TE	303.0 K
D1	1.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	13.00 usec
PL1	3.20 dB
PL1W	12.02264404 W
SFO1	300.1318534 MHz
SI	32768
SF	300.1300000 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00

NS 10



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EXPNO	1
PROCNO	1
Date_	20150821
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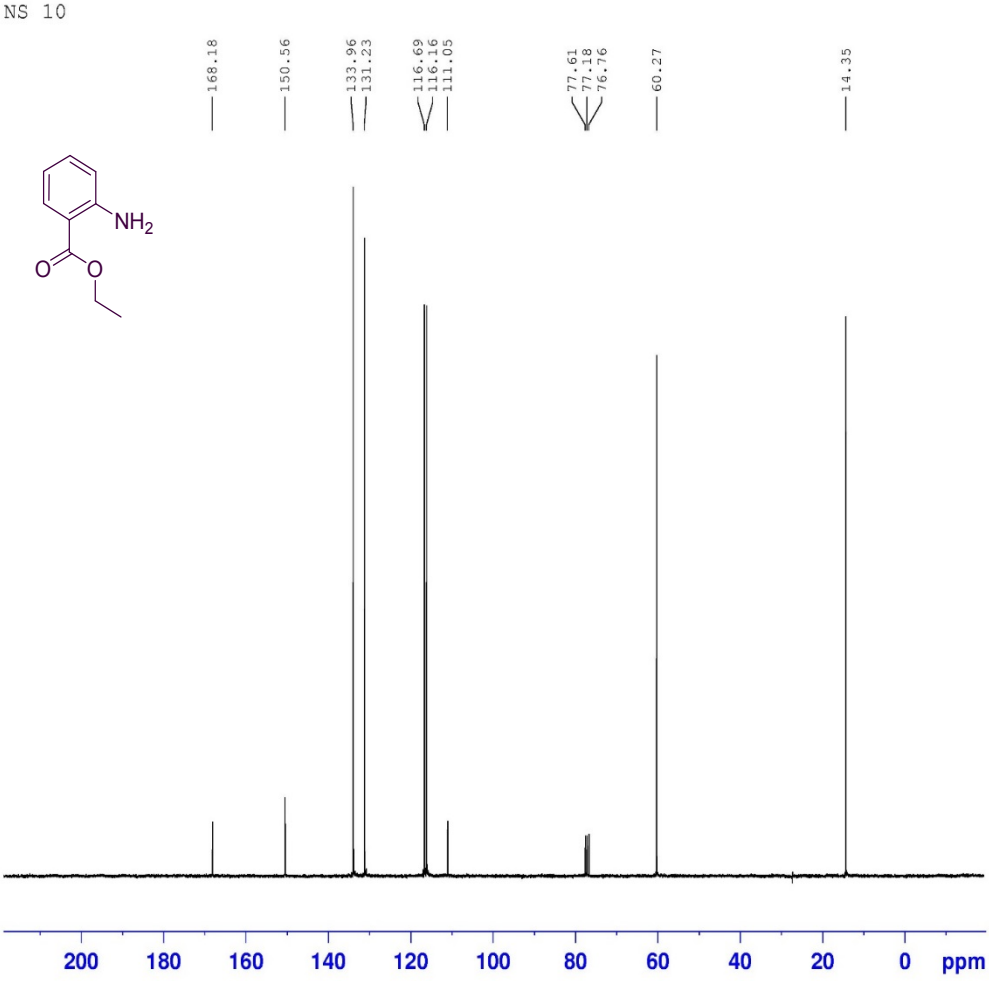
PROBHD	5 mm BBO BB-1H
PULPROG	zg
TD	32768
SOLVENT	CDCl3
NS	8
DS	2
SWH	6188.119 Hz
FIDRES	0.188846 Hz
AQ	2.6477852 sec
RG	32
DW	80.800 usec
DE	6.50 usec
TE	303.0 K
D1	1.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	13.00 usec
PL1	3.20 dB
PL1W	12.02264404 W
SFO1	300.1318534 MHz
SI	32768
SF	300.1300000 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00

NS 10



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EXPNO	3
PROCNO	1
Date_	20150821
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INSTRUM	spect
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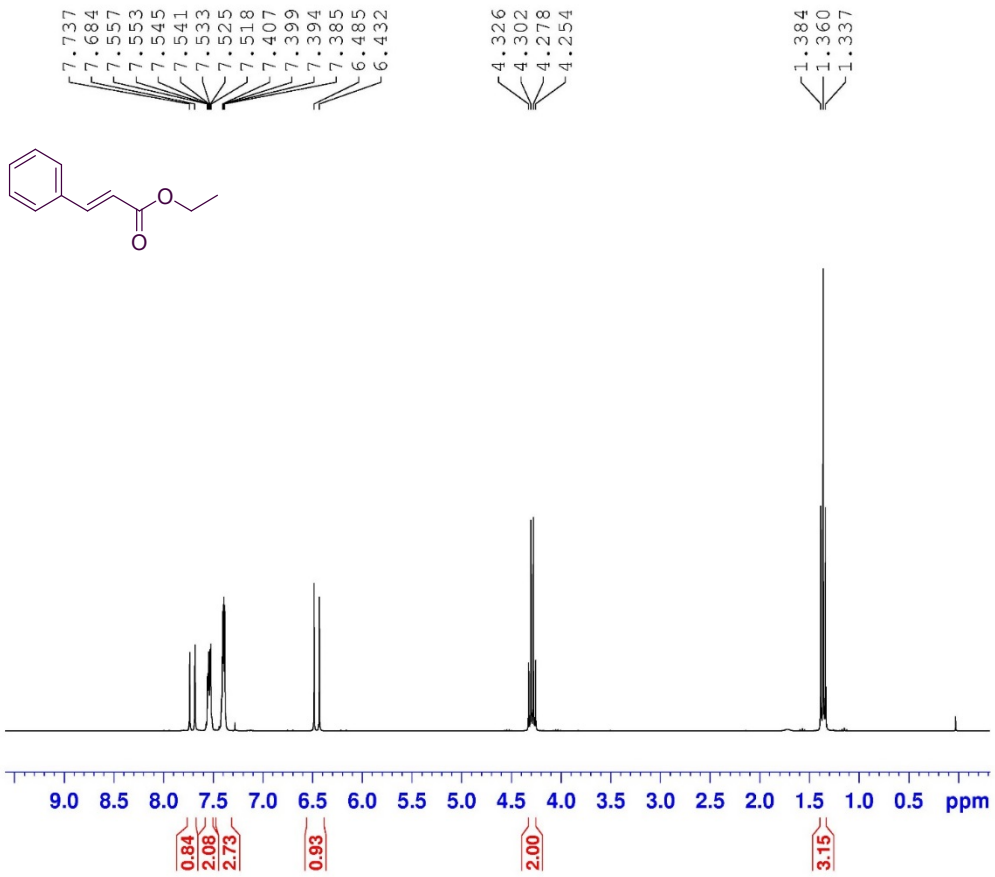
PULPROG	zgig
TD	32768
SOLVENT	CDC13
NS	1024
DS	4
SWH	17985.611 Hz
FIDRES	0.548877 Hz
AQ	0.9110282 sec
RG	35.9
DW	27.800 usec
DE	6.50 usec
TE	303.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	10.00 usec
PL1	1.80 dB
PL1W	49.78760910 W
SFO1	75.4752953 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	3.20 dB
PL12	18.98 dB
PL2W	12.02264404 W
PL12W	0.31768745 W
SFO2	300.1312005 MHz
SI	32768
SF	75.4677490 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

NS 11



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PROCNO	1
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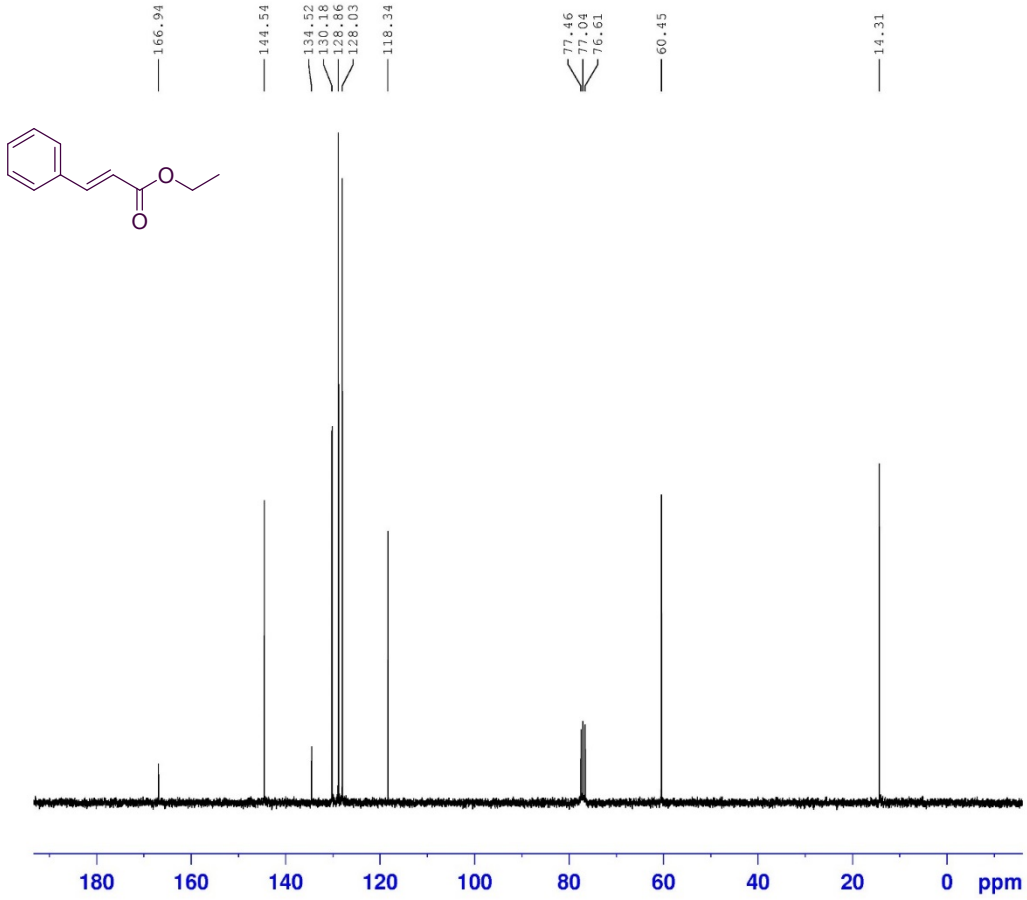
Time	11.46
INSTRUM	spect
PROBHD	5 mm BBO BB-1H
PULPROG	zg
TD	32768
SOLVENT	CDCl3
NS	16
DS	2
SWH	6188.119 Hz
FIDRES	0.188846 Hz
AQ	2.6477852 sec
RG	114
DW	80.800 usec
DE	6.50 usec
TE	303.0 K
D1	1.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	13.00 usec
PL1	3.20 dB
PL1W	12.02264404 W
SFO1	300.1318534 MHz
SI	32768
SF	300.1300000 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00

NS 11



BRUKER

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PROCNO	1
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PULPROG	zgig
TD	32768
SOLVENT	CDCl3
NS	300
DS	4
SWH	17985.611 Hz
FIDRES	0.548877 Hz
AQ	0.9110282 sec
RG	8192
DW	27.800 usec
DE	10.00 usec
TE	303.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	10.00 usec
PL1	1.80 dB
PL1W	49.78760910 W
SFO1	75.4752953 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	3.20 dB
PL12	18.98 dB
PL2W	12.02264404 W
PL12W	0.31768745 W
SFO2	300.1312005 MHz
SI	32768
SF	75.4677490 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40