Electronic Supplementary Information

In situ Synthesis of Ultrafine Metal Clusters triggered by Dodecaborate Supramolecular Organic Frameworks

Bin Qi, Xin Li, Liang Sun, Bo Chen, Hao Chen, Chenchen Wu, Haibo Zhang* and Xiaohai Zhou*

College of Chemistry and Molecular Sciences, Wuhan University, Wuhan 430072, China.

Content

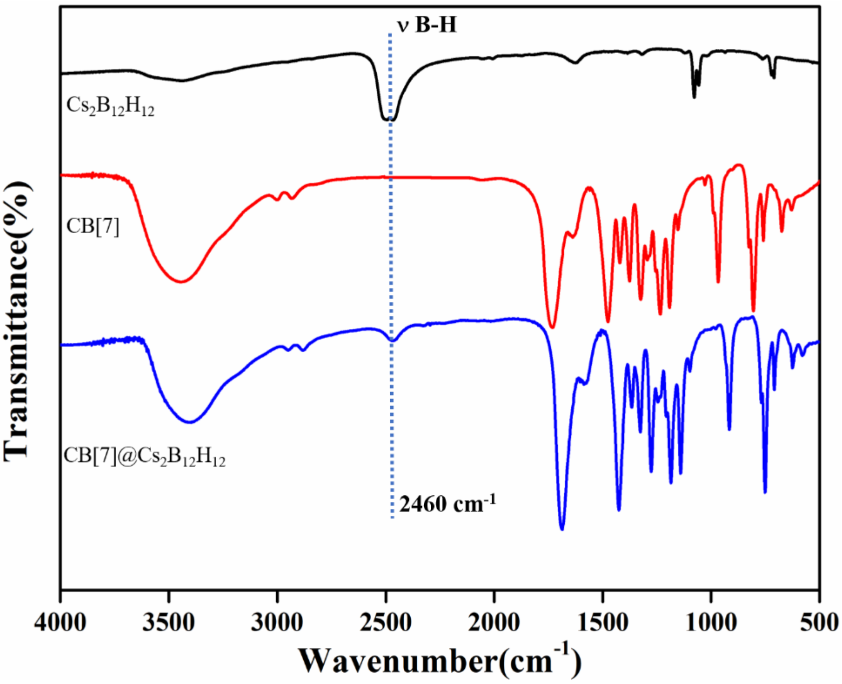


Figure S1. FT-IR spectrum of pure Cs_2[*closo*-$B_{12}H_{12}$], CB[7] and Cs_2[*closo*-$B_{12}H_{12}$]@CB[7] assemblies.

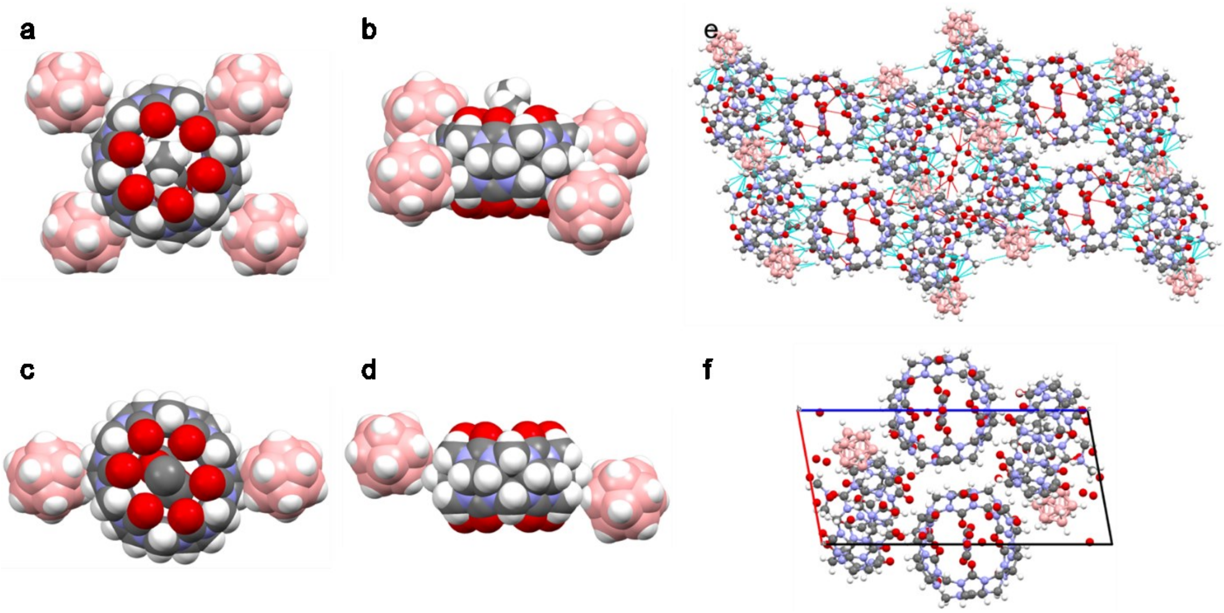


Figure S2. Views of the CB6/$B_{12}H_{12}^{2-}$ complex XRD structure.

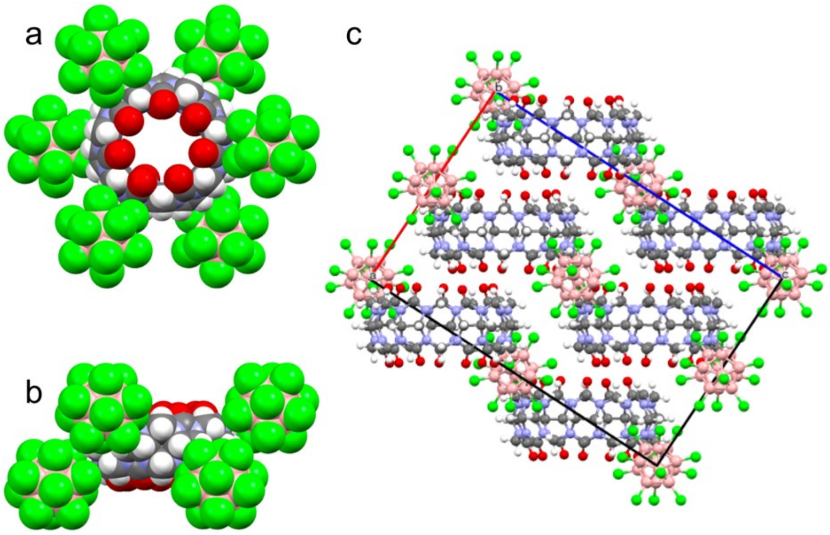


Figure S3. Views of the CB7/$B_{12}Cl_{12}^{2-}$ complex XRD structure.

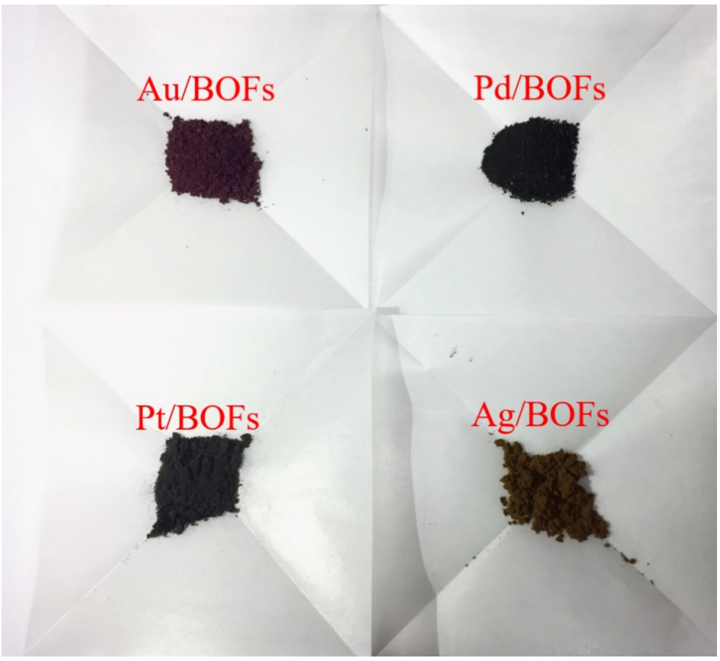


Figure S4. The photographic images of (a) the metal/BOFs reaction systems standing for 0.5 h, (b) the obtained final metal/BOFs products.

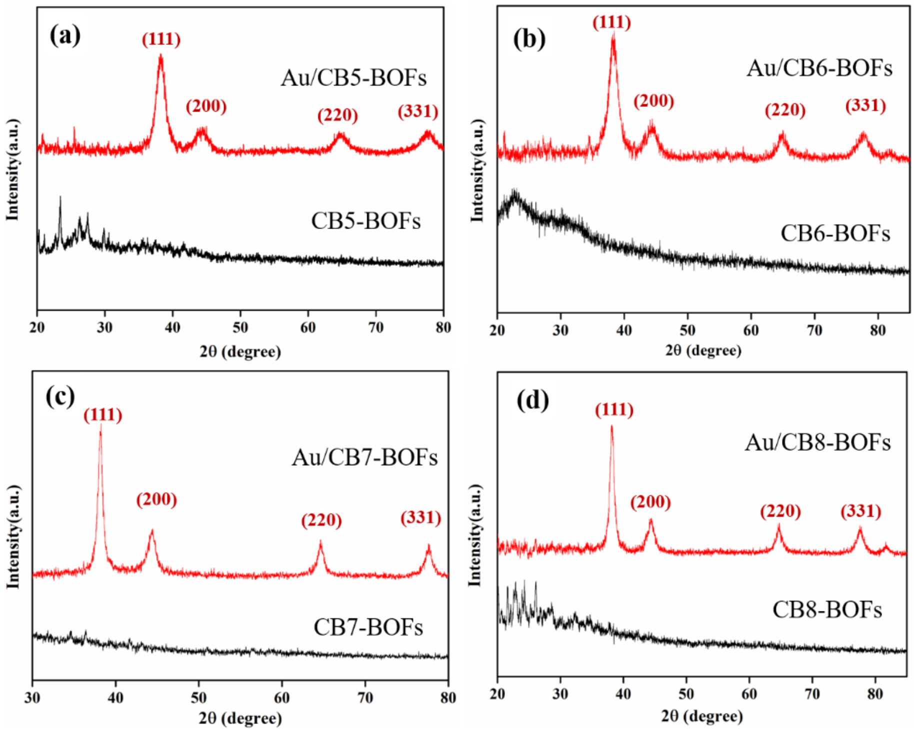


Figure S5. XRD results of CBn-BOFs and Au/CBn-BOFs.

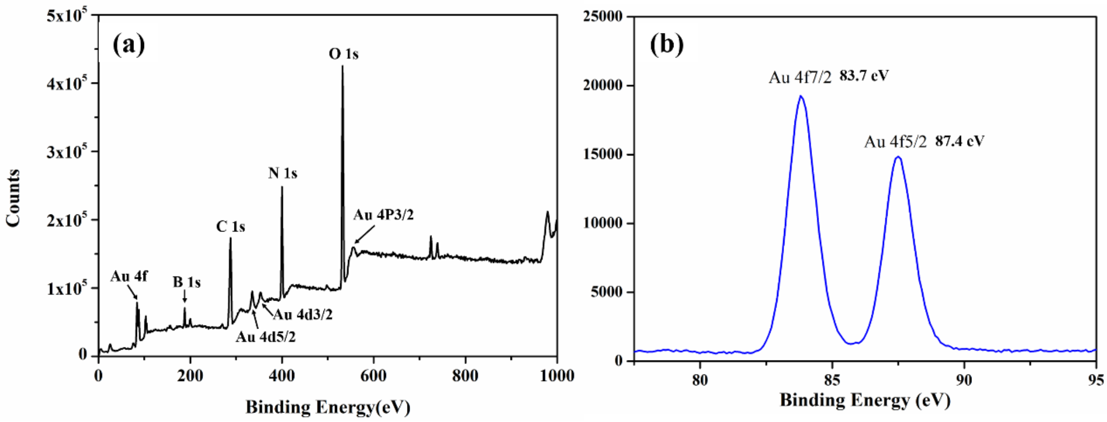


Figure S6. The survey XPS spectra (a) and high-resolution XPS Au 4f spectra (b) of Au-BOFs.

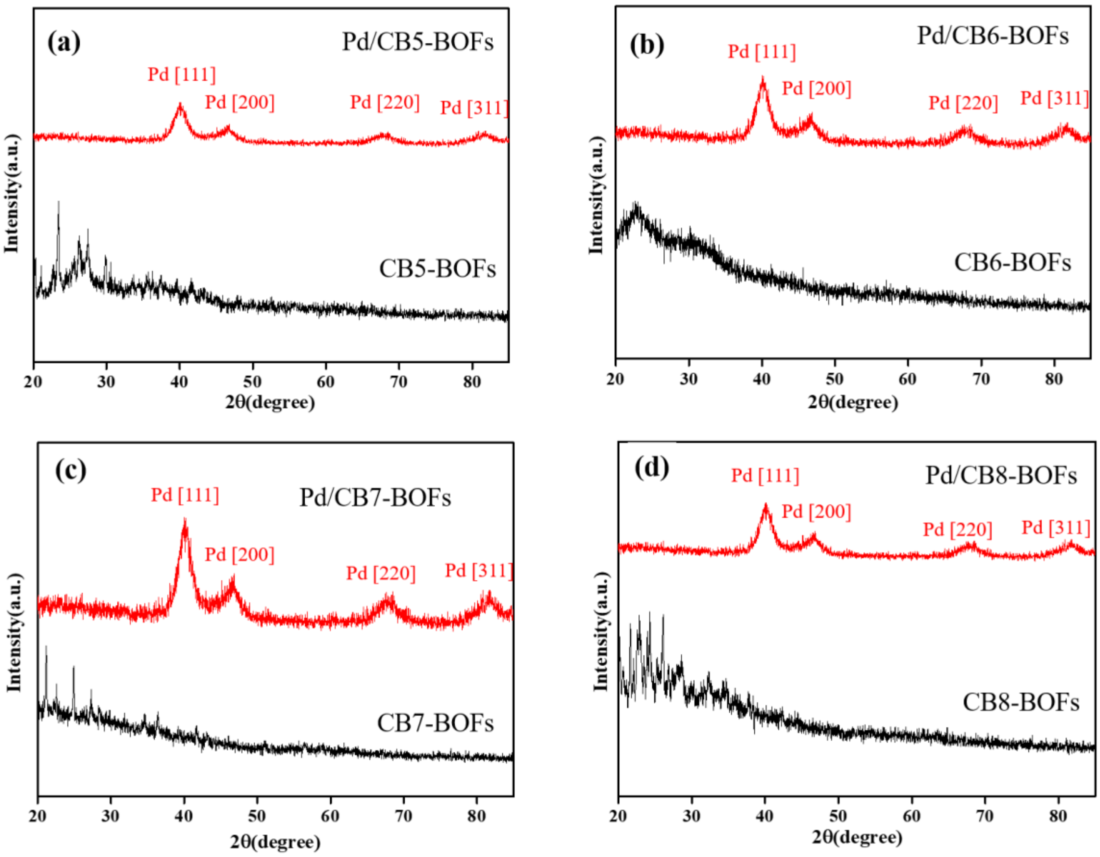


Figure S7. XRD results of CBn-BOFs and Pd/CBn-BOFs.

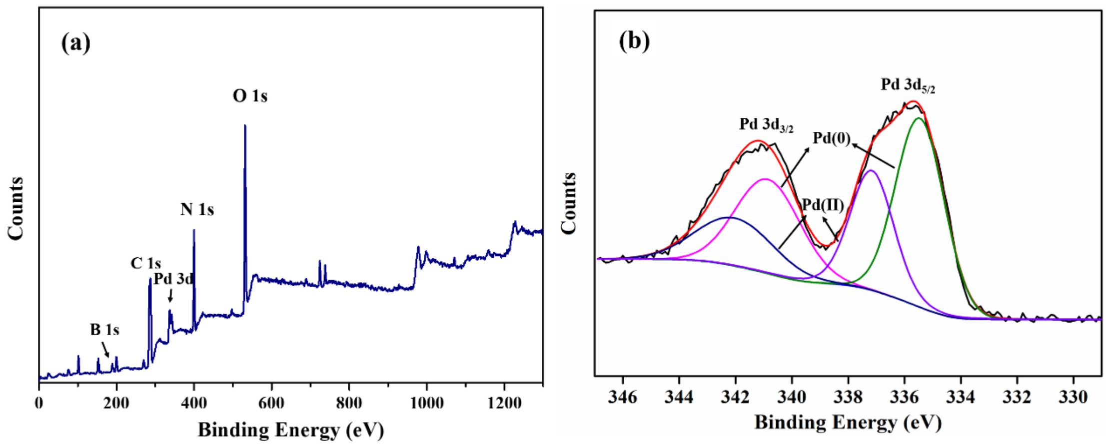


Figure S8. The survey XPS spectra (a) and high-resolution XPS Pd 3d spectra (b) of Pd-BOFs.

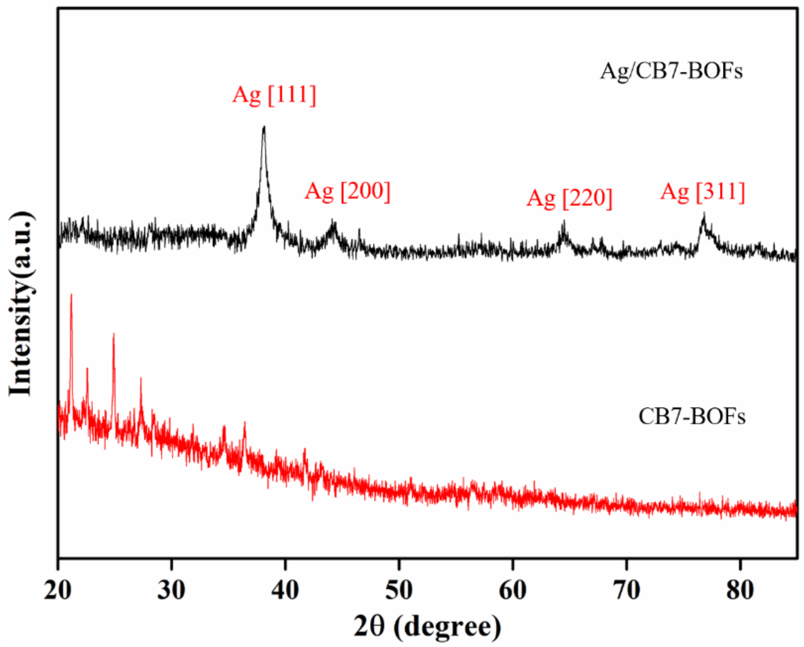


Figure S9. XRD results of Ag/ BOFs.

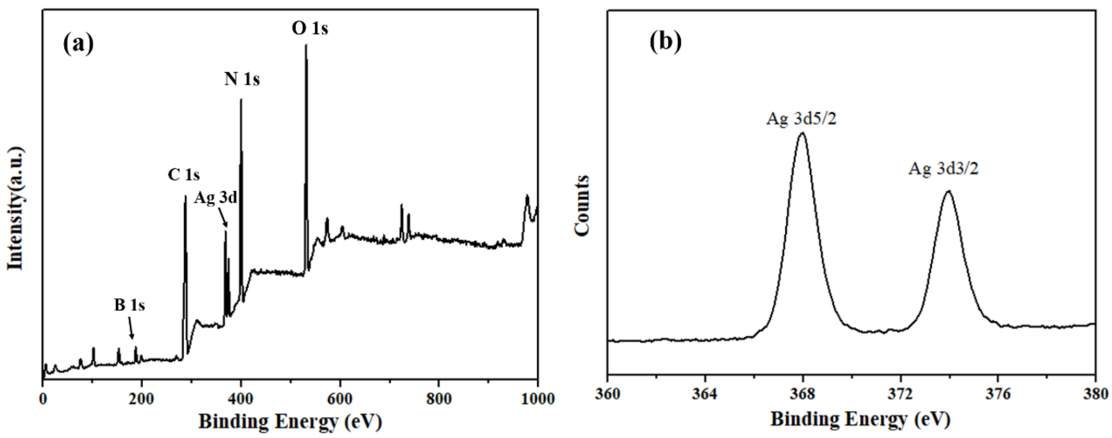


Figure S10. The survey XPS spectra (a) and high-resolution XPS Ag 3d spectra (b) of Ag/BOFs.

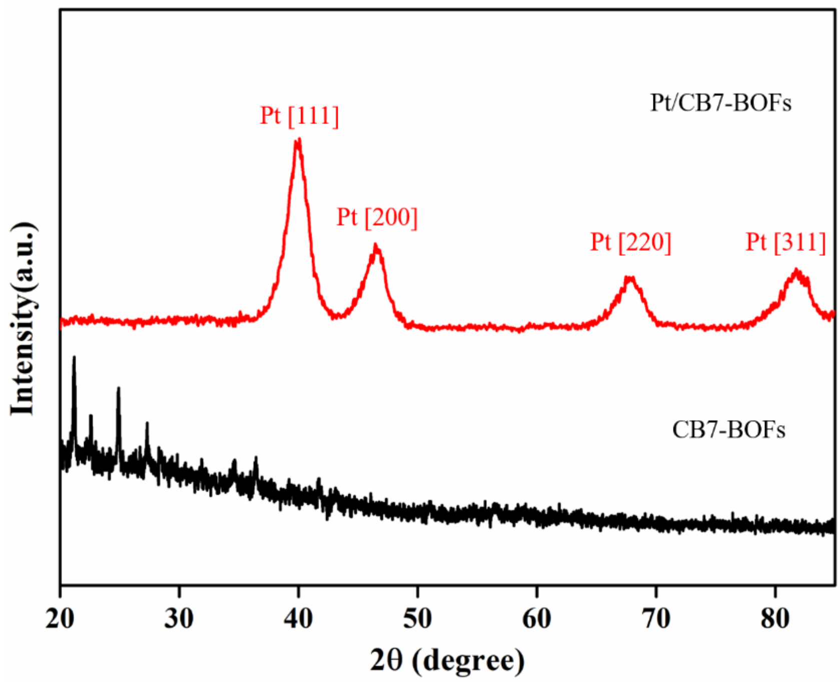


Figure S11. XRD results of Pt/ BOFs.

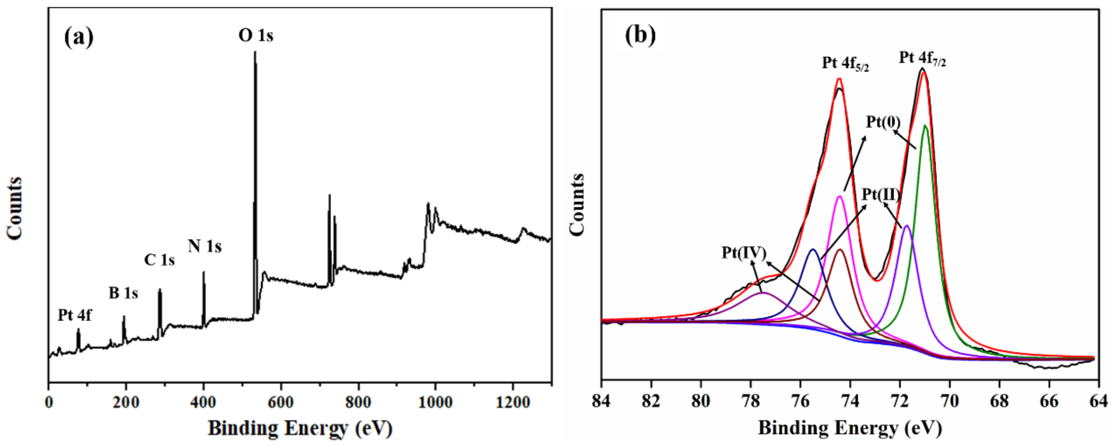


Figure S12. The survey XPS spectra (a) and high-resolution XPS Pt 4f spectra (b) of Pt/BOFs.

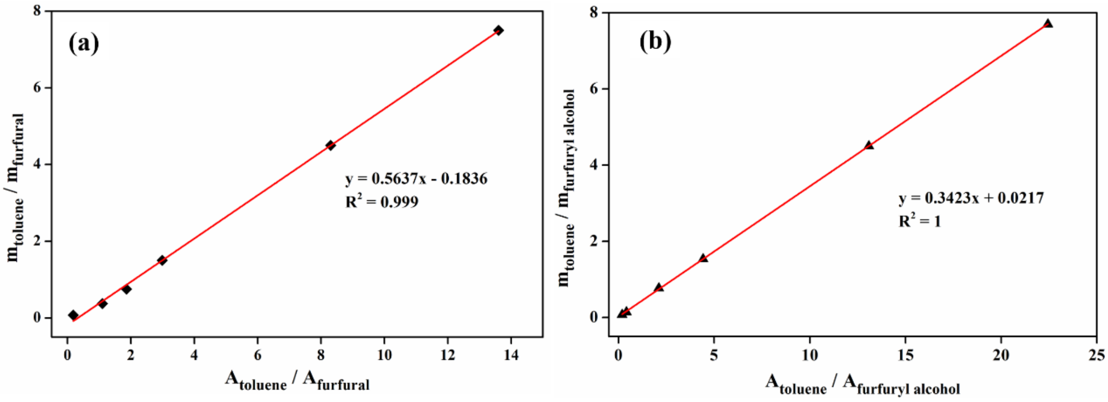


Figure S13. The GC standard curves of (a) toluene and FAL, (b) toluene and FOL. A represented the integral value in the GC spectrum.

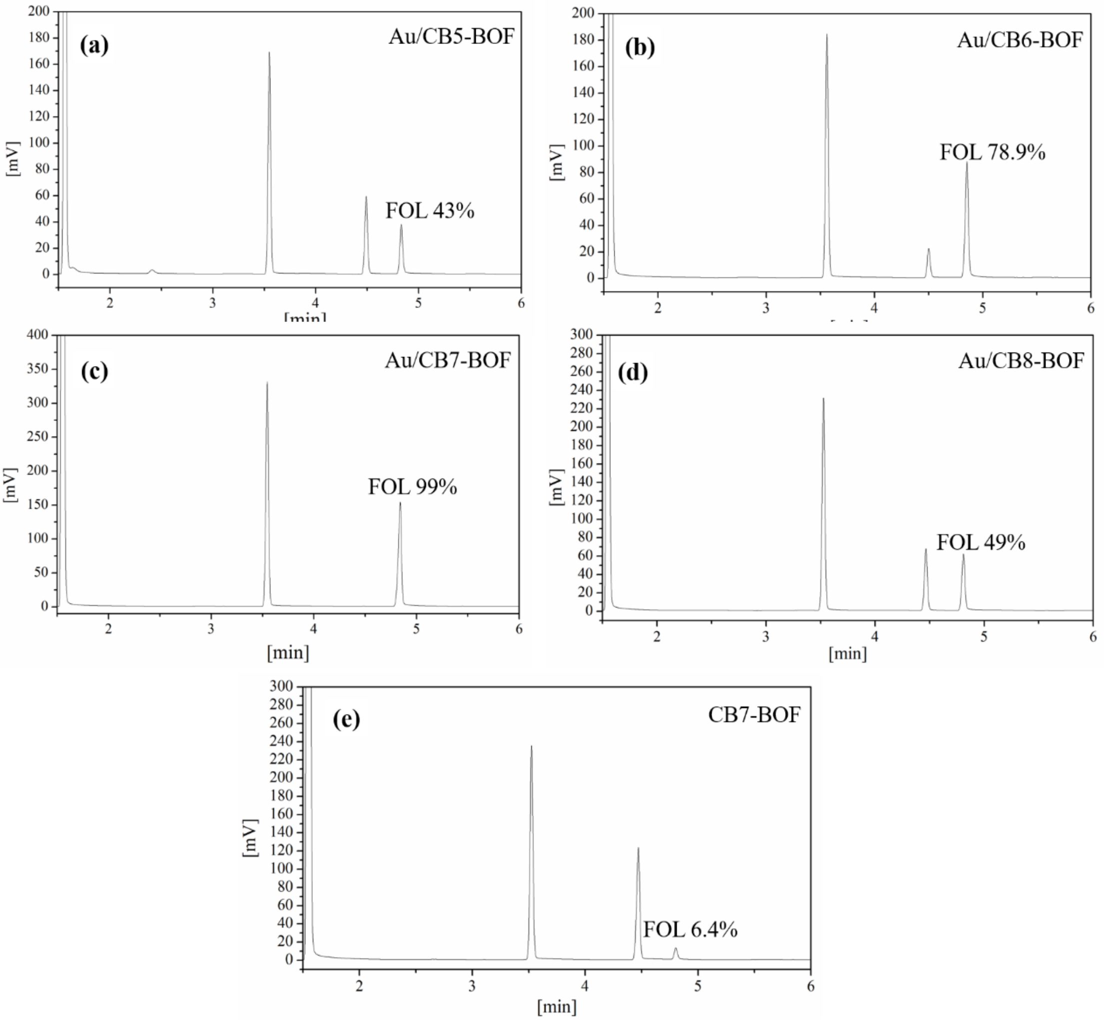


Figure S14. The GC spectrum of the conversion of FAL to FOL treated with various a) b) c) d) Au/BOFs and e) BOFs catalysts.

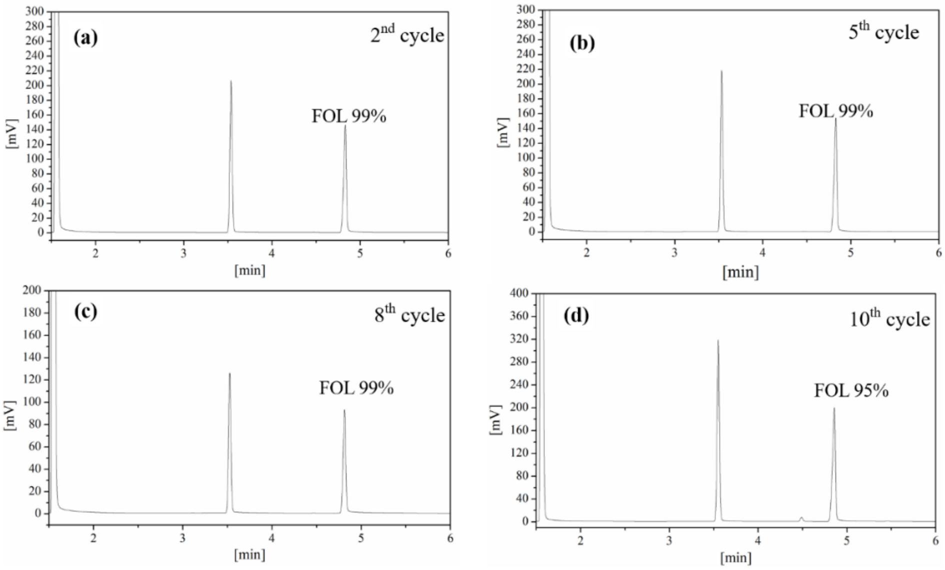


Figure S15. The GC spectrum of the recycling tests of FAL to FOL treated with Au/CB7-BOFs catalysts.

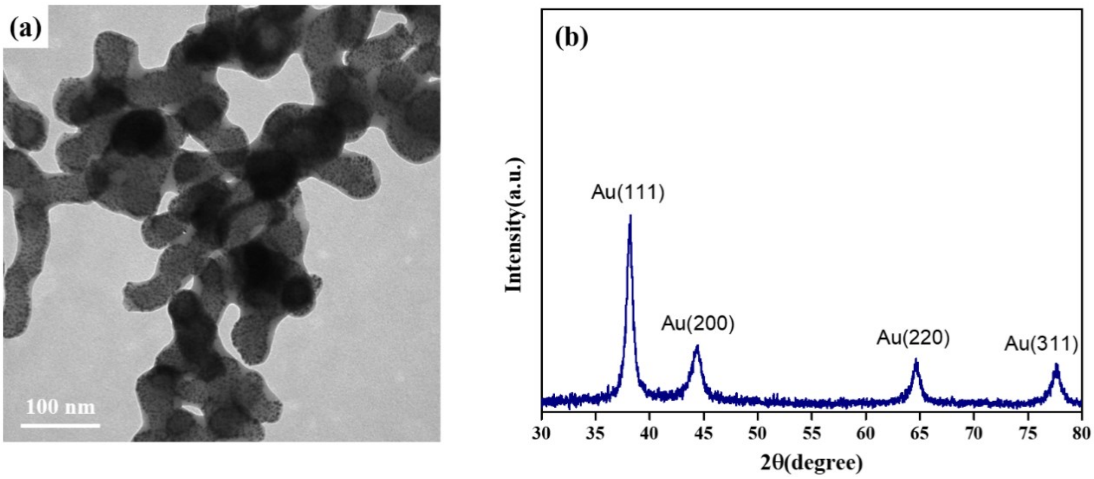
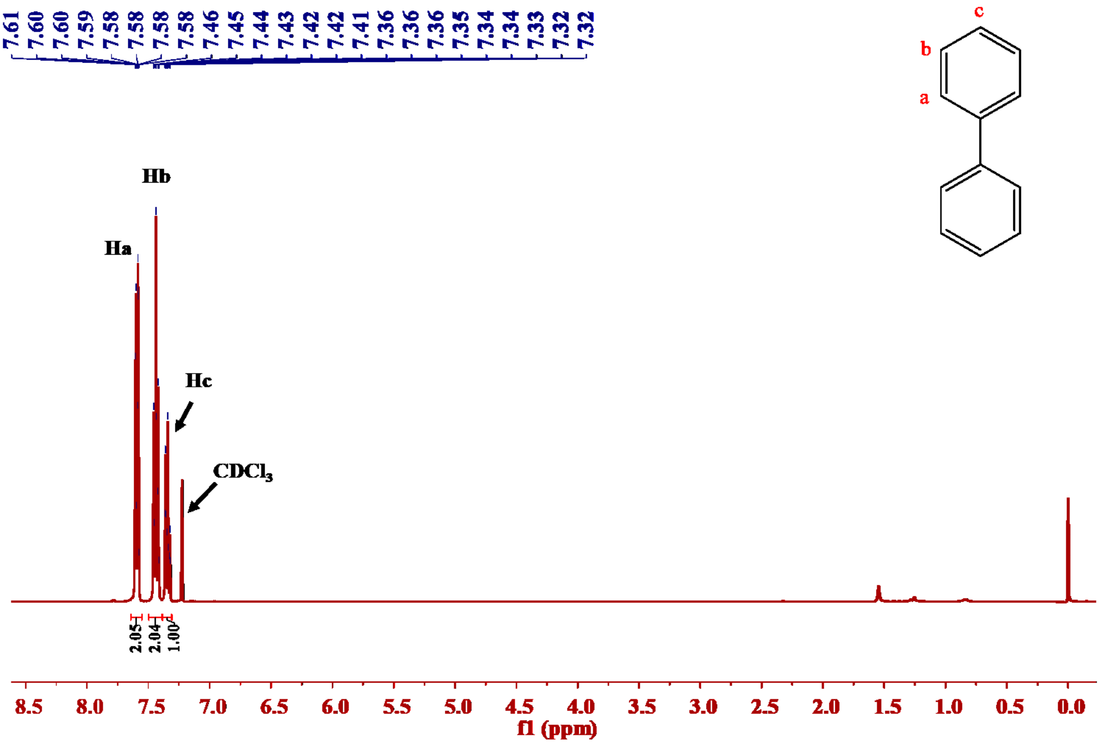


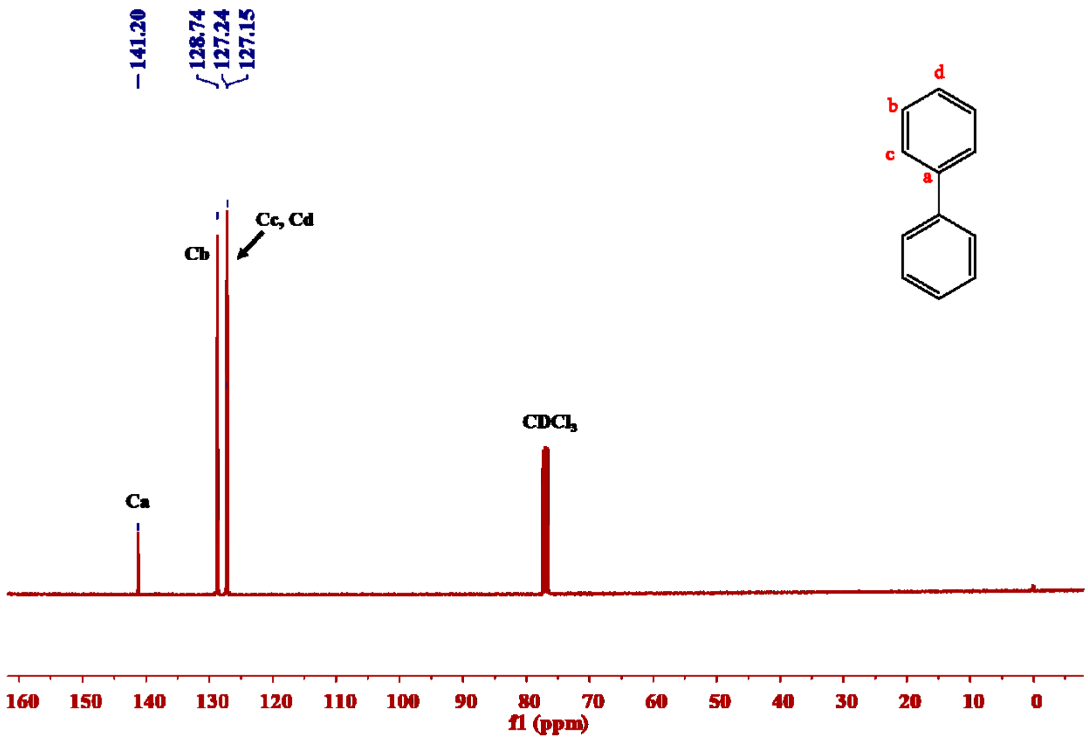
Figure S16. The TEM image (a) and powder XRD pattern (b) of the Au/CB7-BOFs catalysts after 15th round of catalysis.

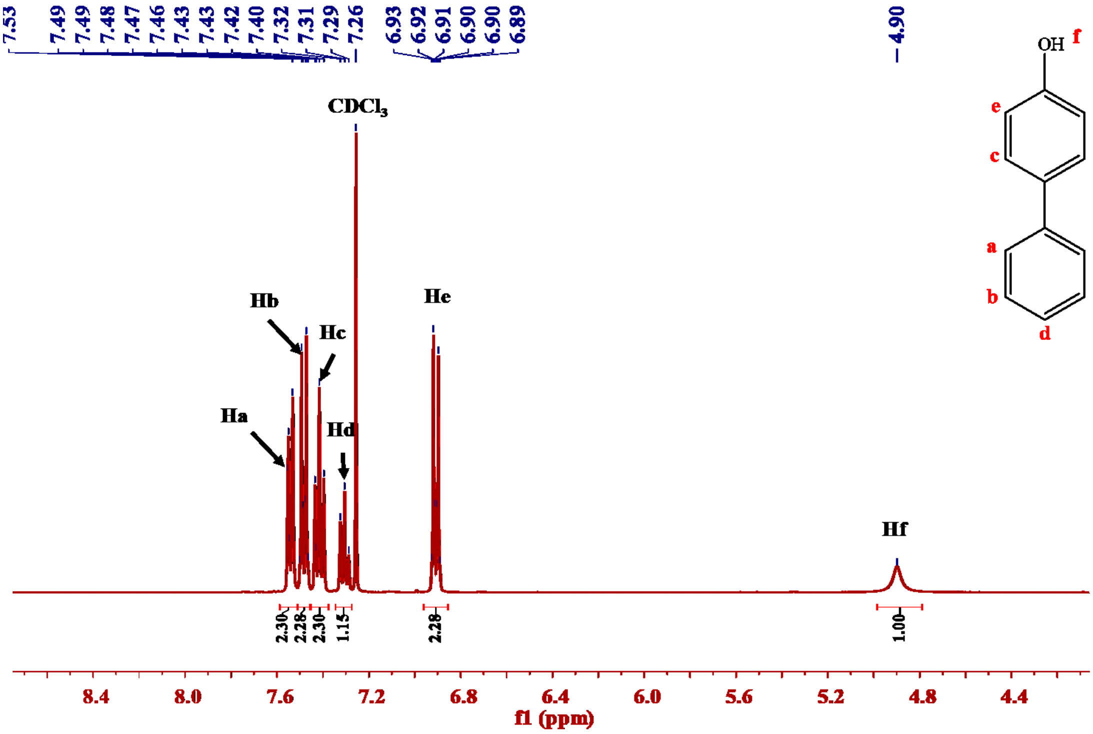
Table S1. Comparison of the catalytic performances of Au/BOFs catalyst with already reported catalysts towards the selective reduction of FAL with FOL.

catalyst	solvent	H_2 pressure (bar)	temperature (°C)	time (h)	FOL yield (%)	Publication date
$Ru(acac)_3$	/	30	120	9	98.1	2018[1]
$Cu/AC{-}SO_3H$	2-propanol	4	100	3	47.3	2017[2]
SO_4^{2-}/SnO_2-APG	/	1	170	0.33	93.1	2017[3]
Pt-NPs@SiO_2	heptane	40	80	4	87	2017[4]
$LaCu_{0.67}Si_{1.33}$	methanol	30	120	3	99	2017[5]
Ru-NNS	2-propanol	30	80	1	99	2017[6]
m-PhPZr	iPrOH	1	120	2	99	2017[7]
Co-Ru/C	2-propanol	1	150	4	100	2016[8]
Fe-Ru NPs@SILP	/	20	120	18	99	2016[9]
Ir@CN	H_2O/HCOOH	1	100	18	99	2015[10]
Au/BOFs	**2-propanol**	**1**	**45**	**1**	**99**	**This work**

[1]H NMR and [13]C NMR spectra for the products listed in Table 2 of the main text



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4.90
CDCl$_3$
Hb
Hc
Ha
Hd
He
Hf
2.30 2.28 2.30 1.15
2.28
1.00
8.4 8.0 7.6 7.2 6.8 6.4 6.0 5.6 5.2 4.8 4.4
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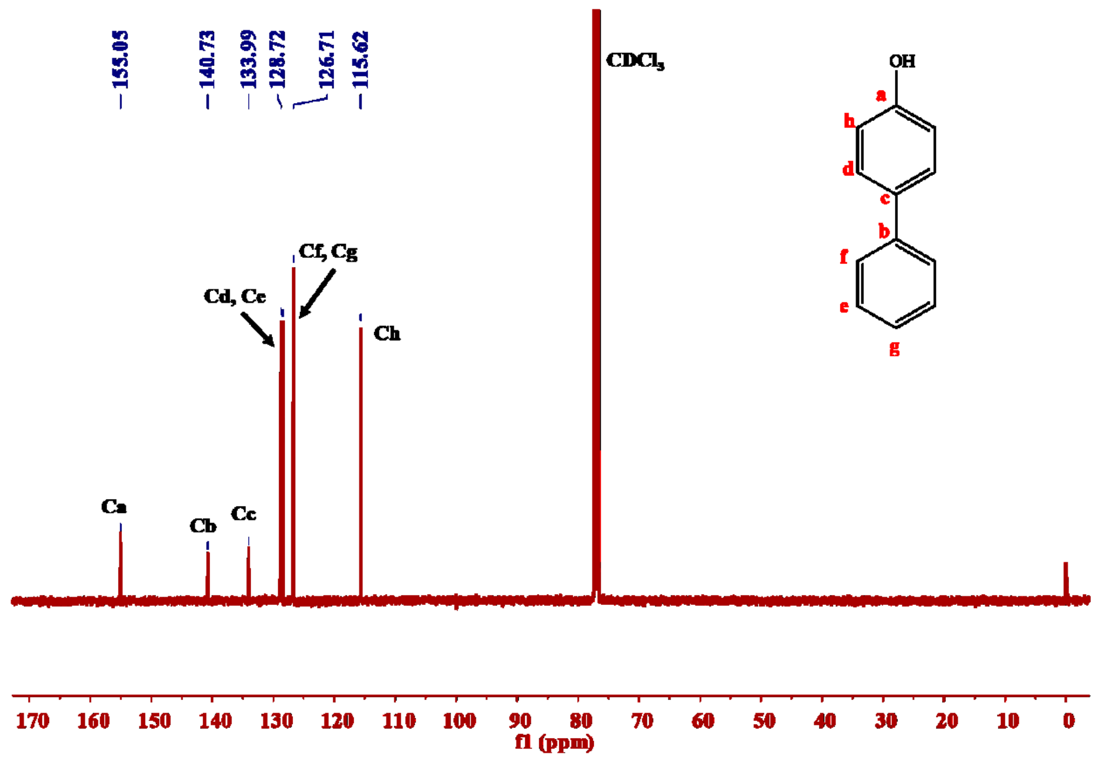
e
c
a
b
d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Cf, Cg
Cd, Ce
Ch
Ca
Cb
Cc
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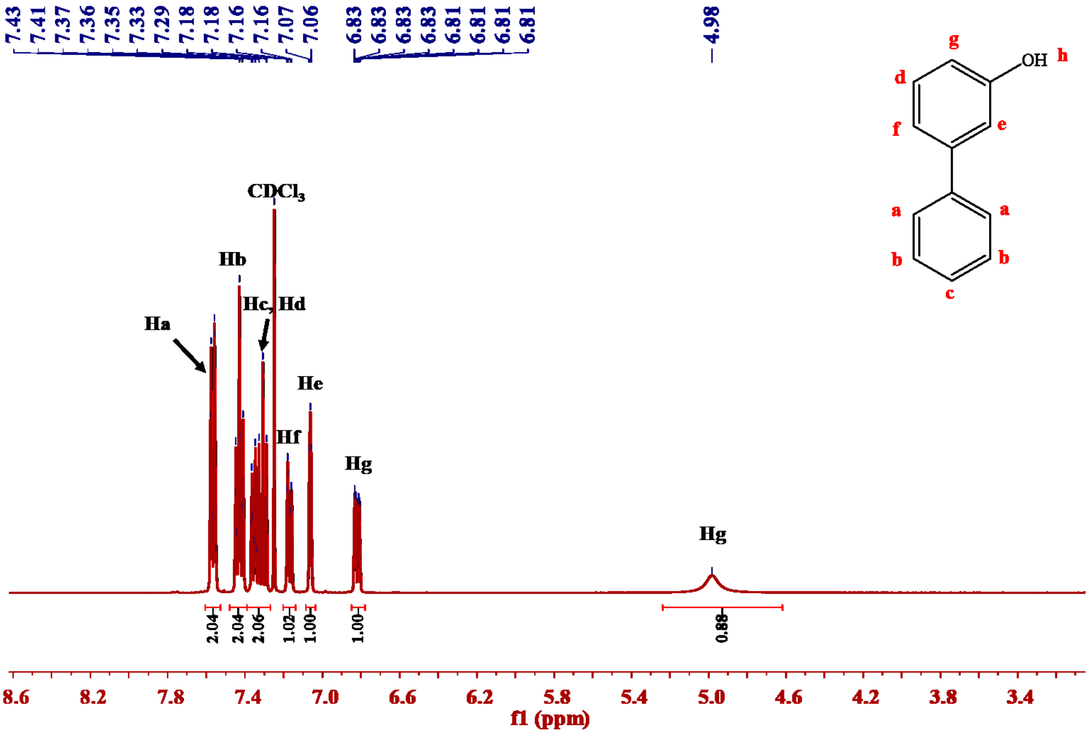
f1 (ppm)
OH
a
b
d
c
b
f
e
g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6.83
6.83
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6.81
6.81
6.81
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CDCl3
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Hc, Hd
Ha
He
Hf
Hg
Hg
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2.04
2.06
1.02
1.00
1.00
0.88
8.6
8.2
7.8
7.4
7.0
6.6
6.2
5.8
5.4
5.0
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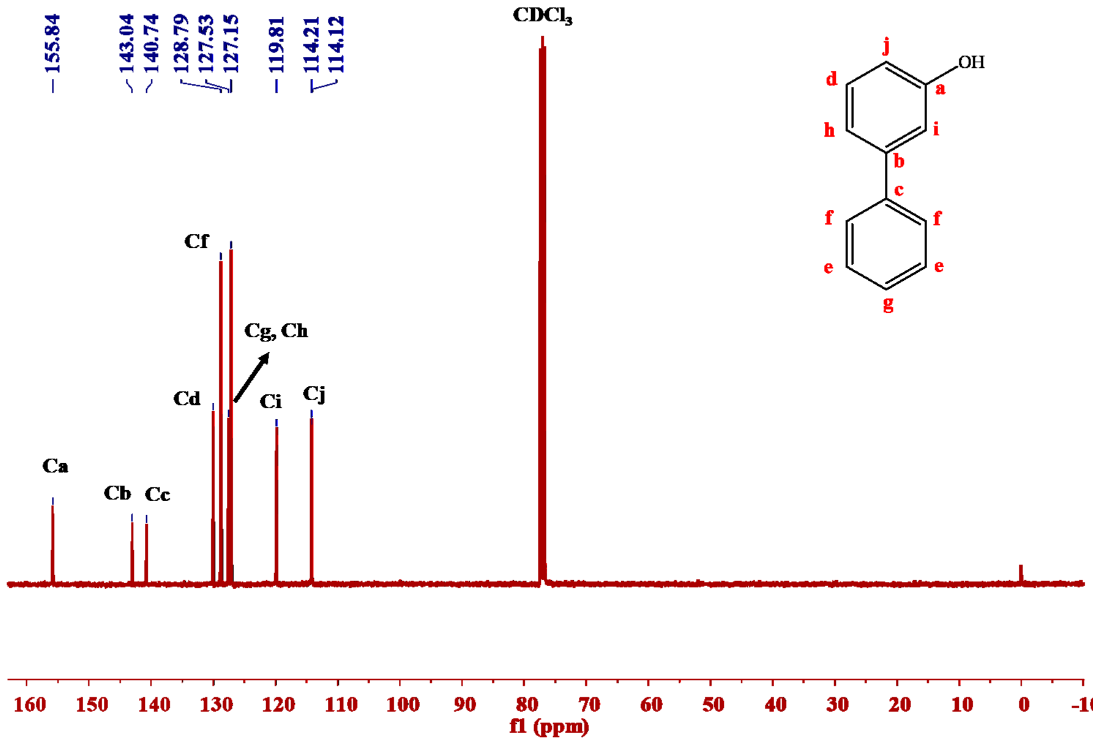
3.4
f1 (ppm)
g
OH
h
d
f
e
a
a
b
b
c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Cd
Ci
Cj
Ca
Cb
Cc
160
150
140
130
120
110
100
90
80
70
60
50
40
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0
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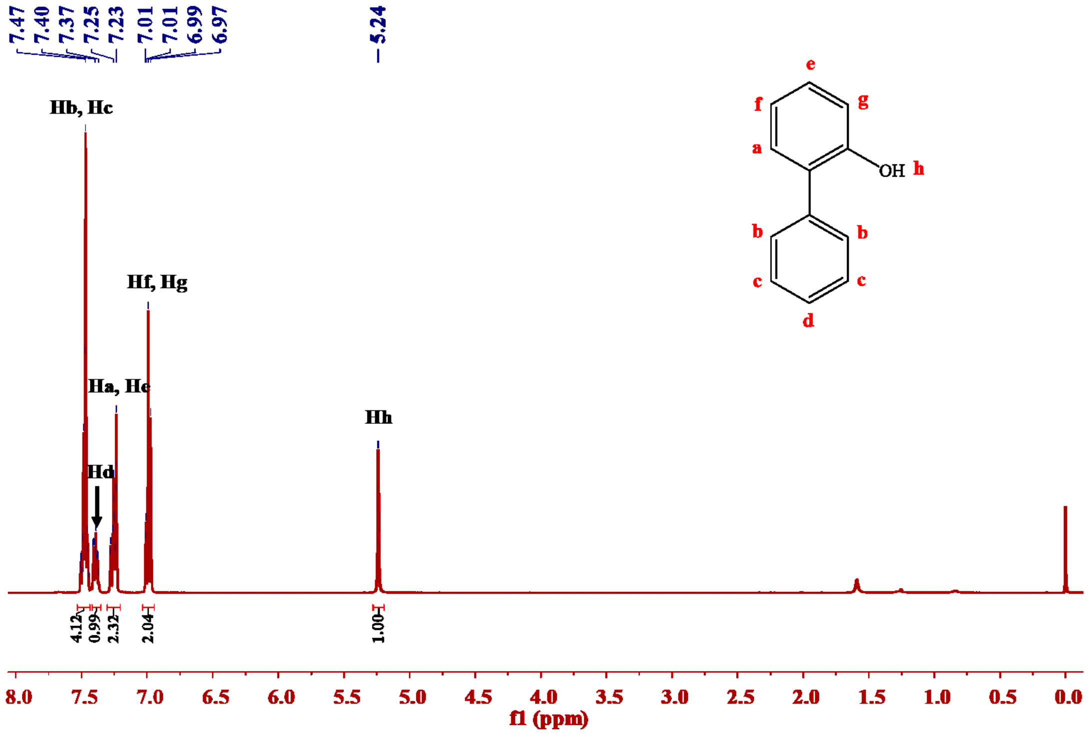
j
OH
d
a
h
i
b
c
f
f
e
e
g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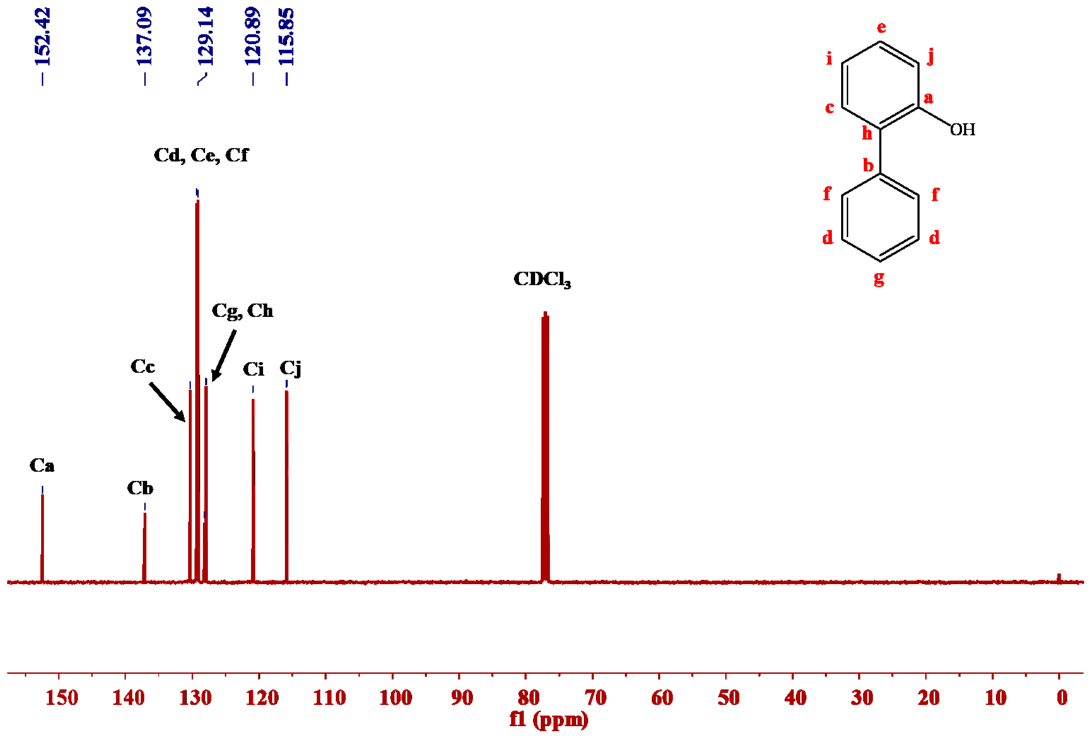
Hf, Hg
Ha, He
Hd
Hh
4.12
0.99
2.32
2.04
1.00
8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)
e
f
g
a
OH h
b
b
c
c
d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d
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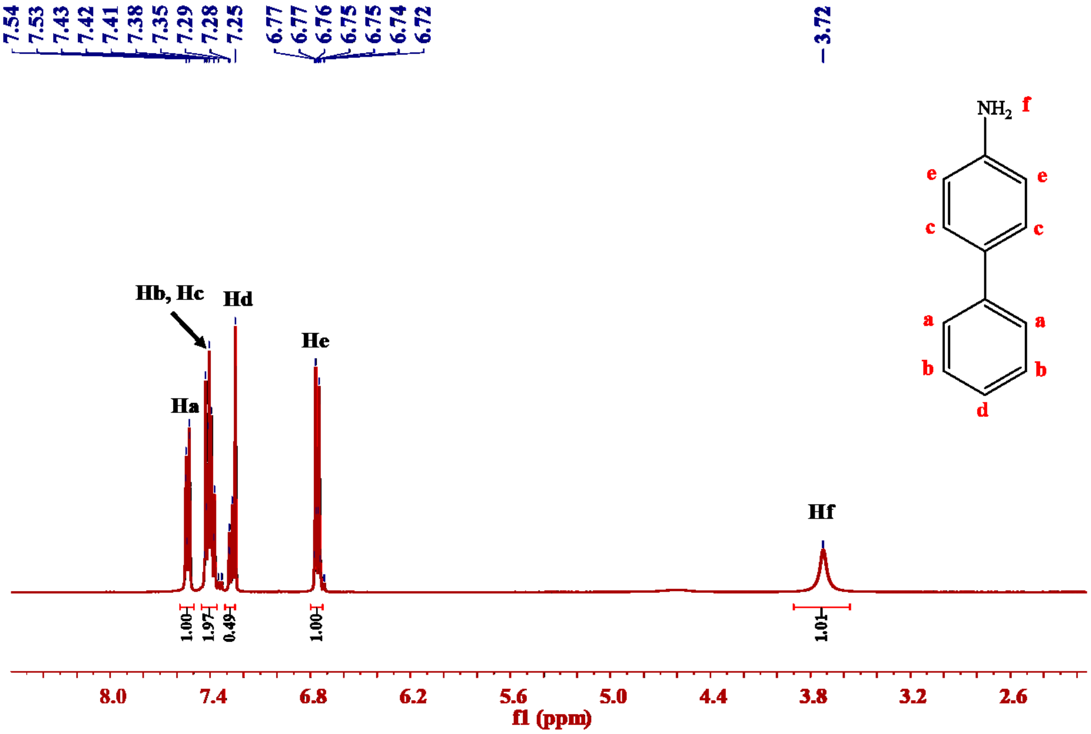
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6.75
6.74
6.72
3.72
NH2 f
e
e
c
c
a
a
b
b
d
Hb, Hc
Hd
He
Ha
Hf
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1.00
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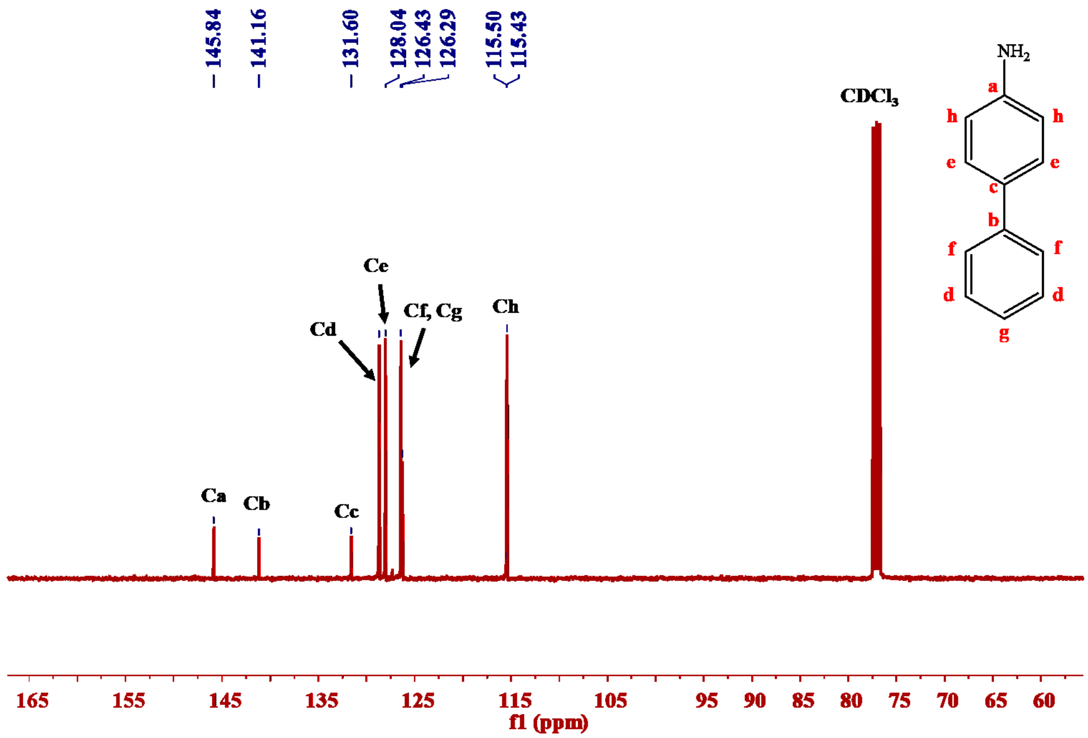
f1 (ppm)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e
c
b
f
f
d
d
g
Ce
Cf, Cg
Cd
Ch
Ca
Cb
Cc
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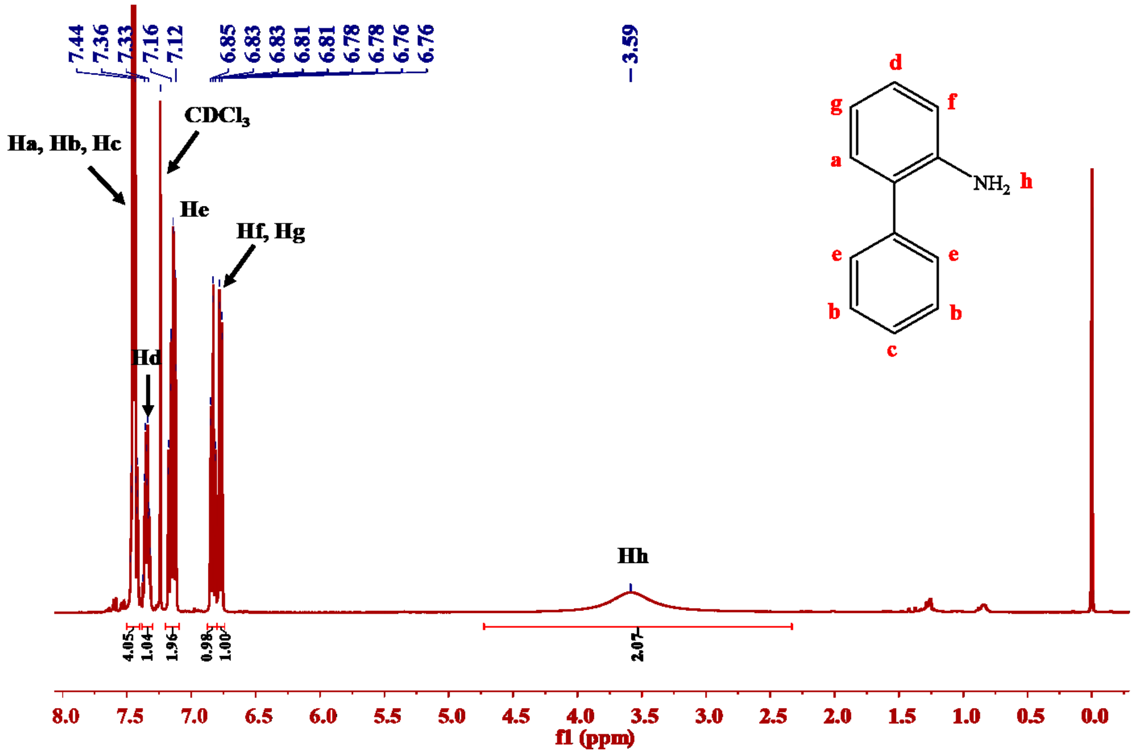
60
f1 (ppm)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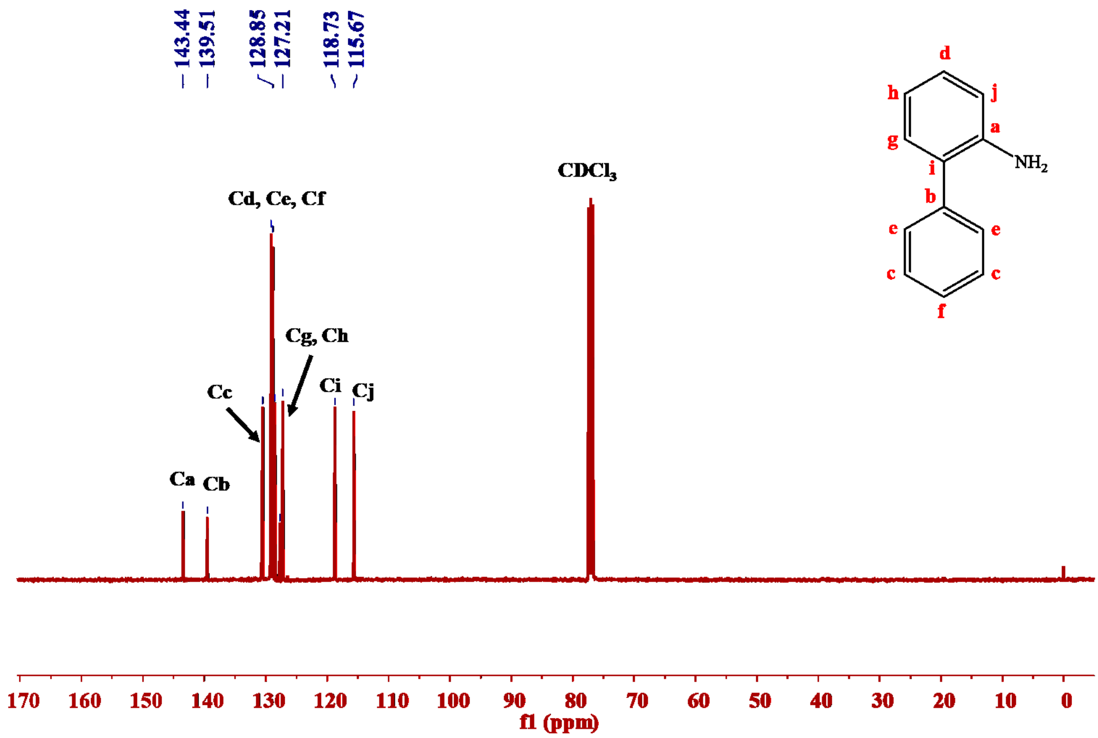
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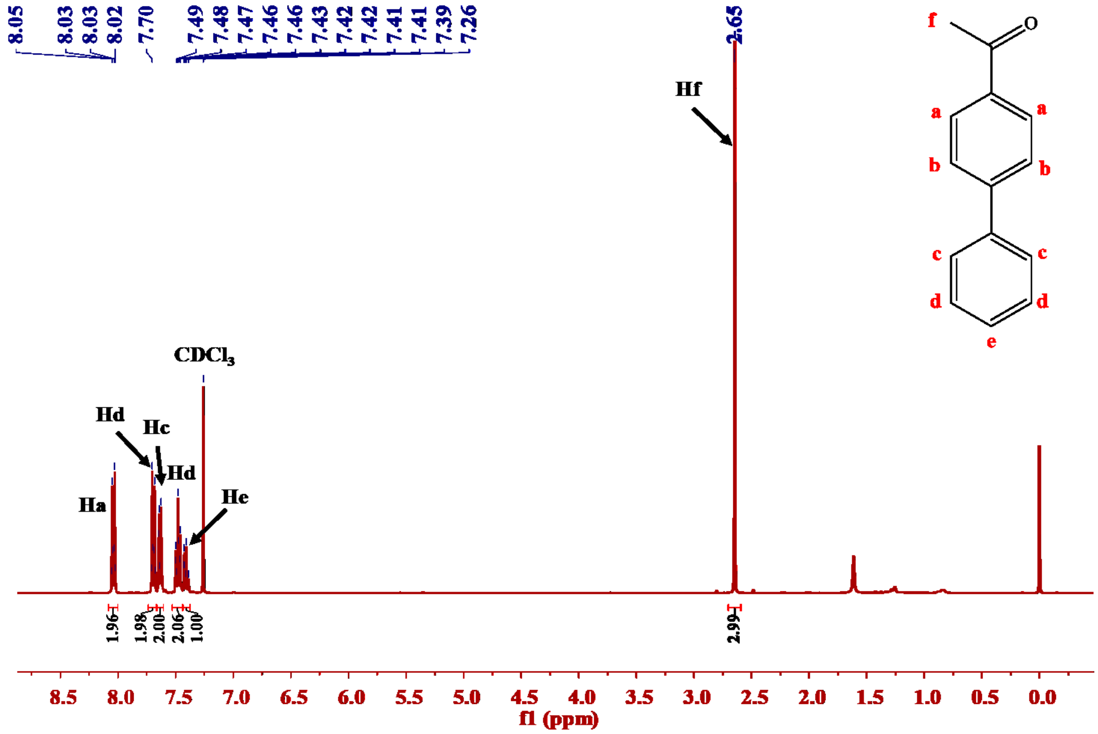
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7.41
7.39
7.26
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Hd
Hc
Hd
Ha
He
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1.98
2.00
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1.00
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4.0
3.5
3.0
2.5
2.0
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b
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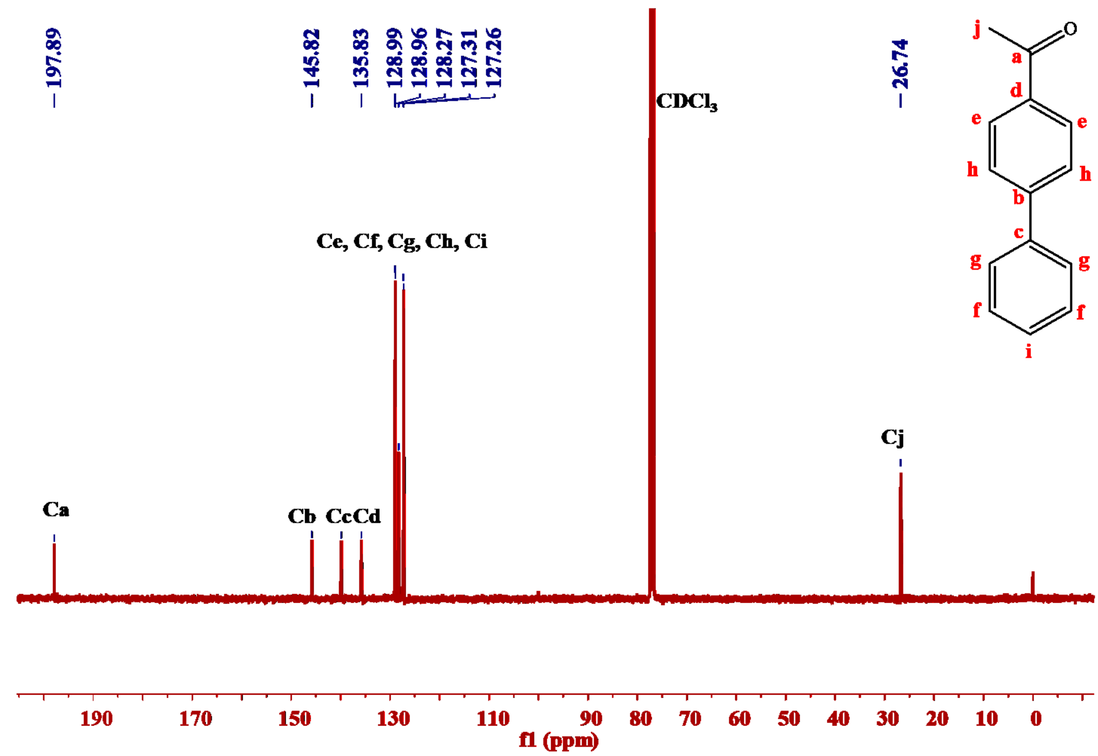
c
c
d
d
e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Ca
Cb
CcCd
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50
40
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h
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b
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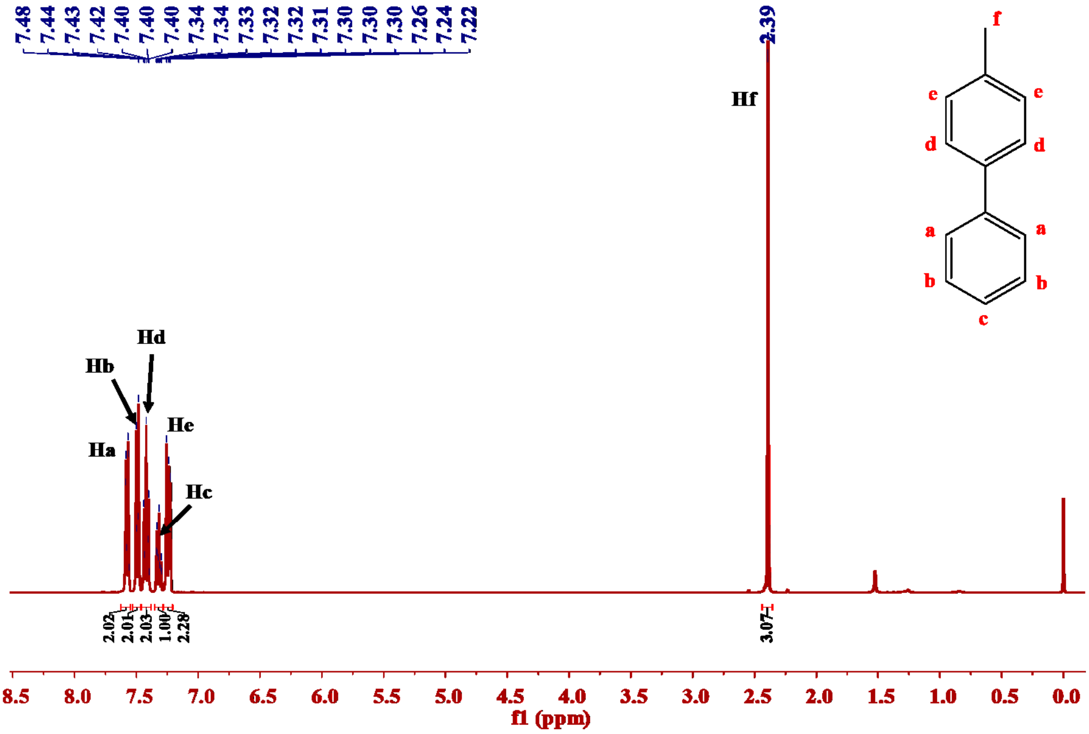
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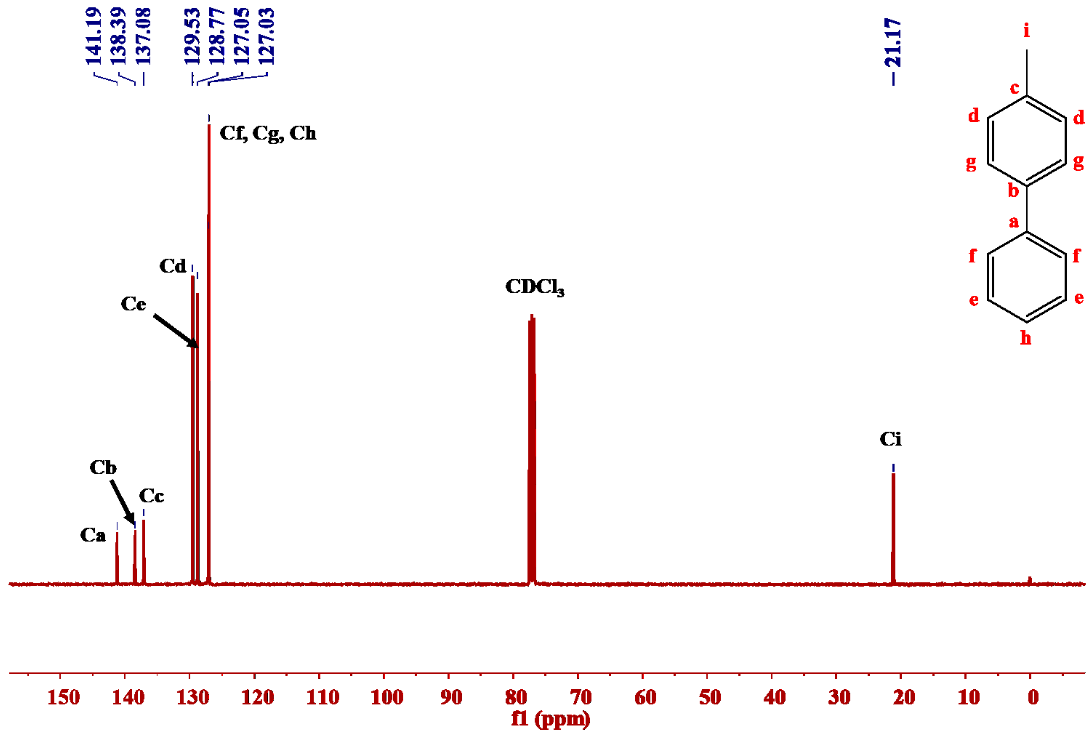
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f
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h
Cf, Cg, Ch
Cd
Ce
CDCl3
Ci
Cb
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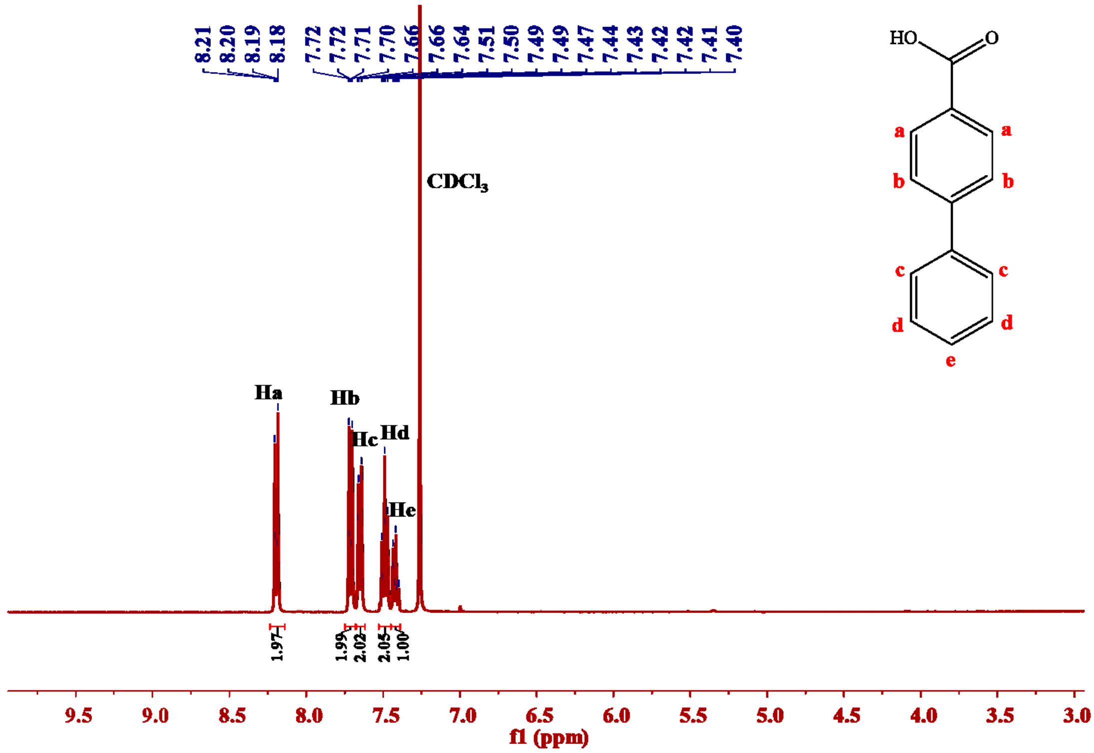

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CDCl3
HO
O
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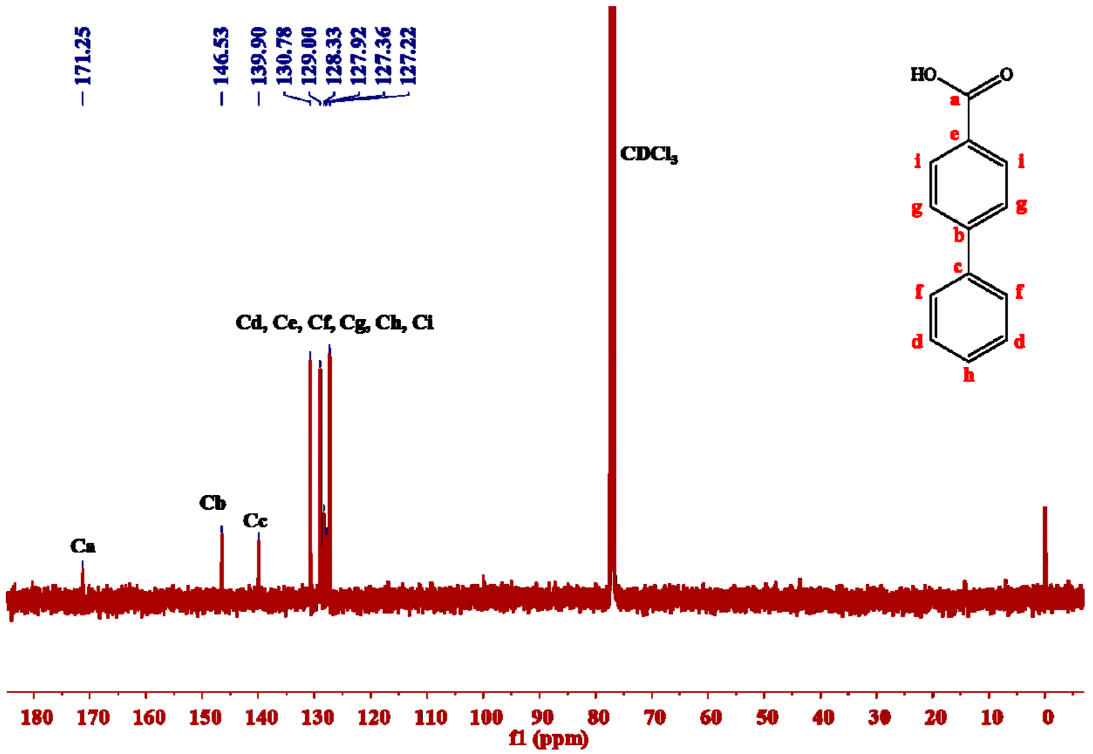
f1 (ppm)



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O
a
b
c
d
e
f
g
h
i
Cd, Ce, Cf, Cg, Ch, Ci
Ca
Cb
Cc
f1 (ppm)

References

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