

Supporting information

Specific Recognition of D-fructose Based on Tetra-Boronic Functionalized Viologen in Aqueous Solution

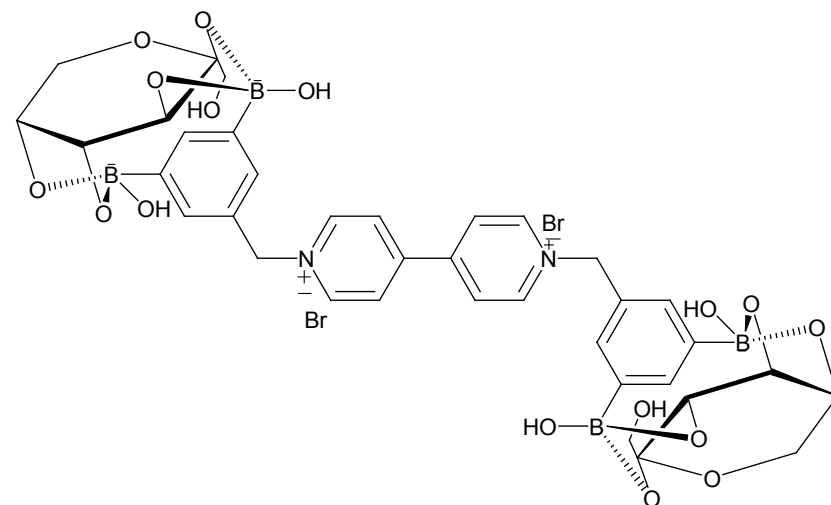
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Electronic Supplementary Information (ESI†)

1. The speculated binding way of ToBV and D-fructose Scheme *S1*
2. Fluorescent spectra of quenching and sensing for monosaccharides Fig. *S1* to Fig. *S8*
3. The ¹H NMR and ¹³C NMR of compounds Fig. *S9* to Fig. *S12*



Scheme. S1 The speculated binding way of ToBV and D-fructose.

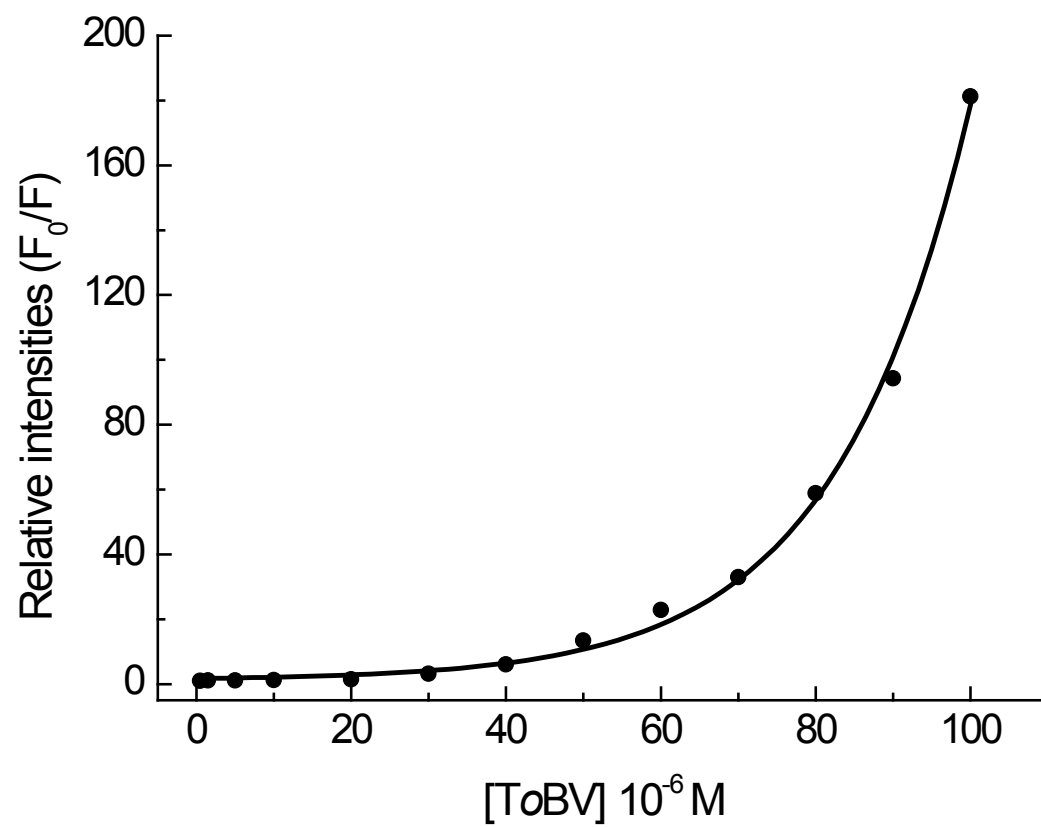


Fig. S1 Stern-Volmer plot of HPTS (4.0×10^{-6} M) quenching by ToBV, measured in phosphate buffer solution pH 7.4.

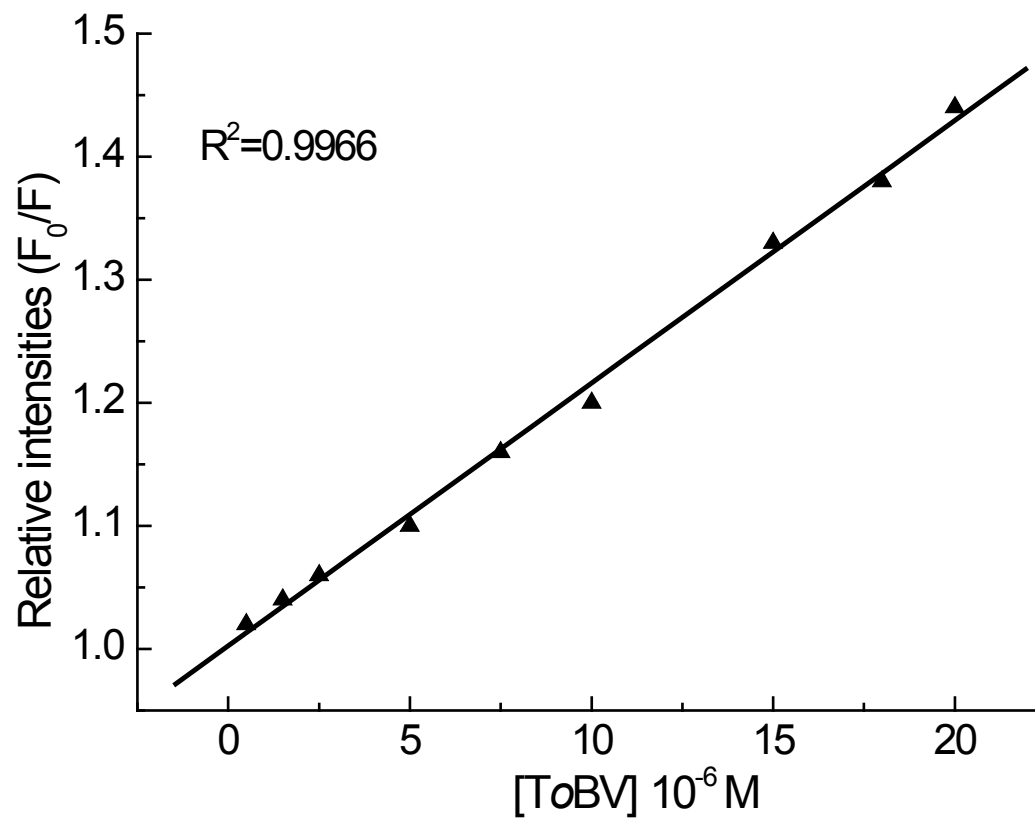


Fig. S2 Stern-Volmer plot of HPTS (4.0×10^{-6} M) quenching by lower concentration of ToBV, measured in phosphate buffer solution pH 7.4.

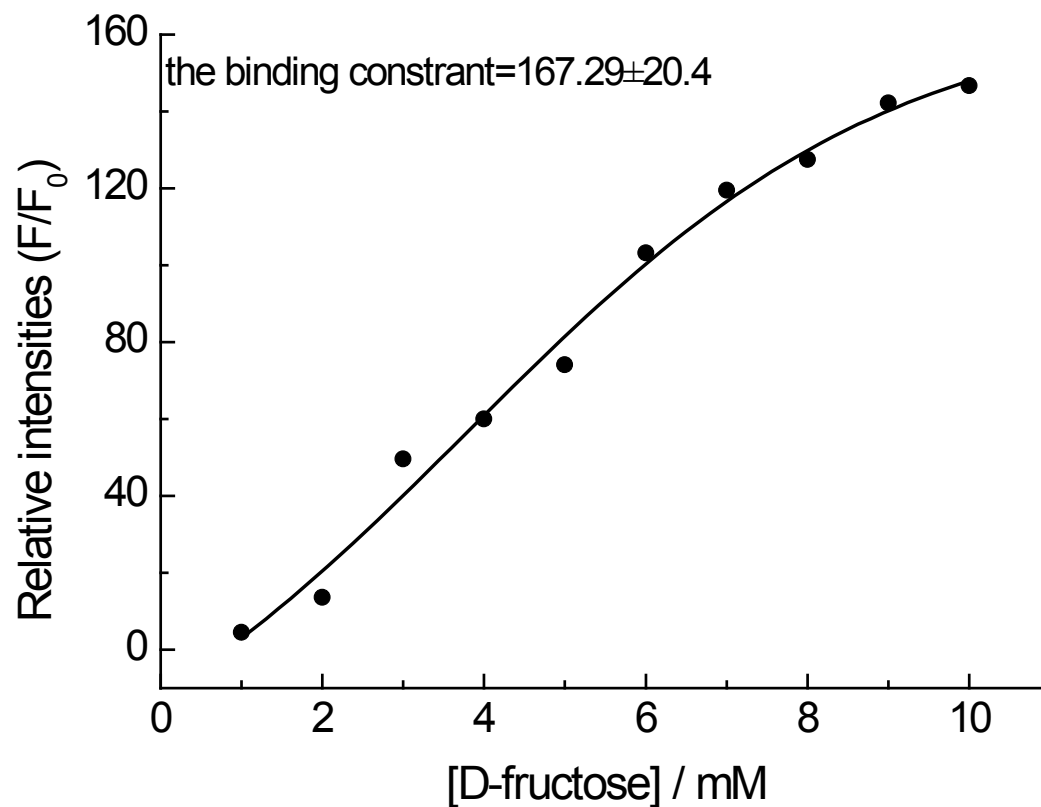


Fig. S3 The superlinear relation response by introduction of quencher followed by D-fructose to HPTS solution (4.0×10^{-6} M) at pH 7.4. The T₀BV/HPTS ratio for this data was 150/1 and final D-fructose concentration was 10 mM.

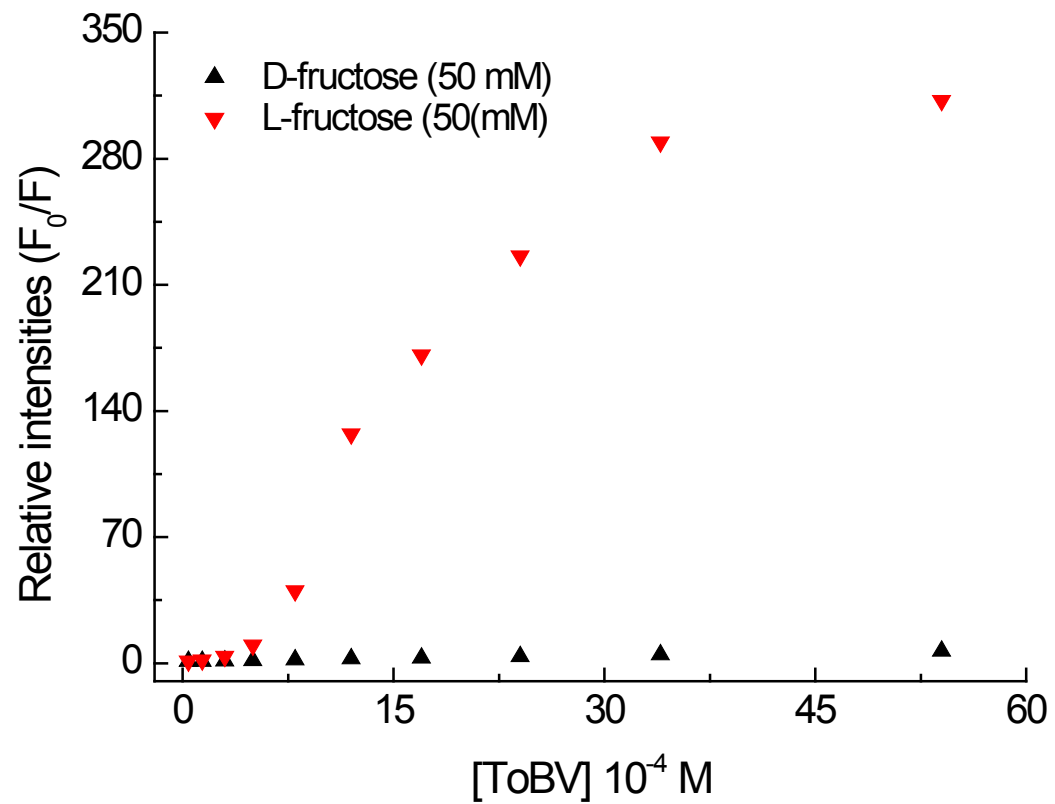


Fig. S4 Stern-Volmer plots of HPTS (4.0×10^{-6} M) quenching by ToBV in the presence of D-fructose and L-fructose (50 mM), respectively.

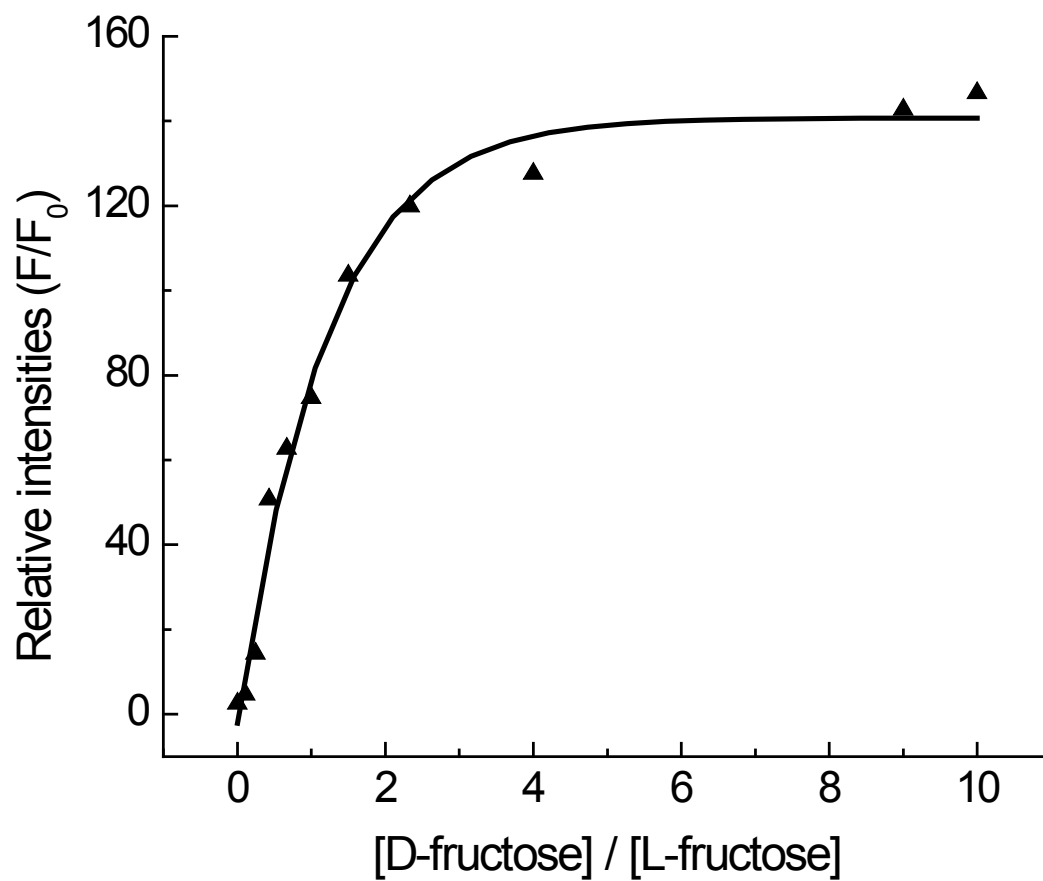


Fig. S5 The ratios curve by introduction D/L-fructose to the sensing system with HPTS (4.0×10^{-6} M) and ToBV (6.0×10^{-4} M). The total concentration of D-fructose and L-fructose was 10 mM.

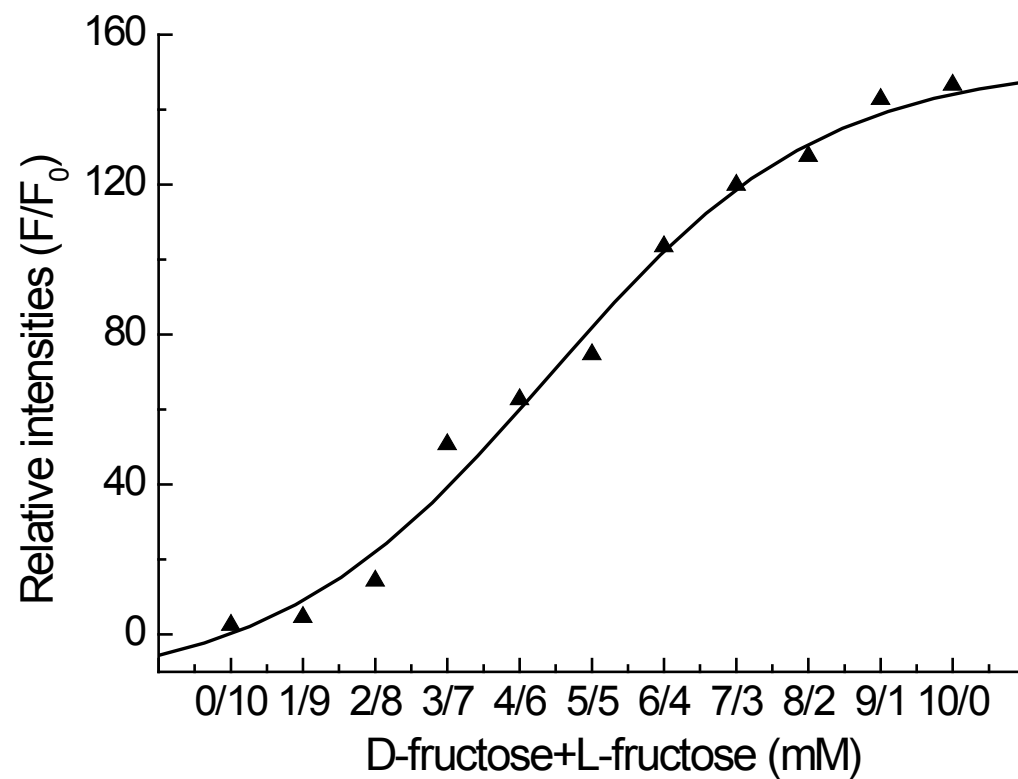


Fig. S6 Characteristic fluorescence response by introduction D-fructose and L-fructose to the sensing system with HPTS (4.0×10^{-6} M) and ToBV (6.0×10^{-4} M). The total concentration of D-fructose and L-fructose was 10 mM.

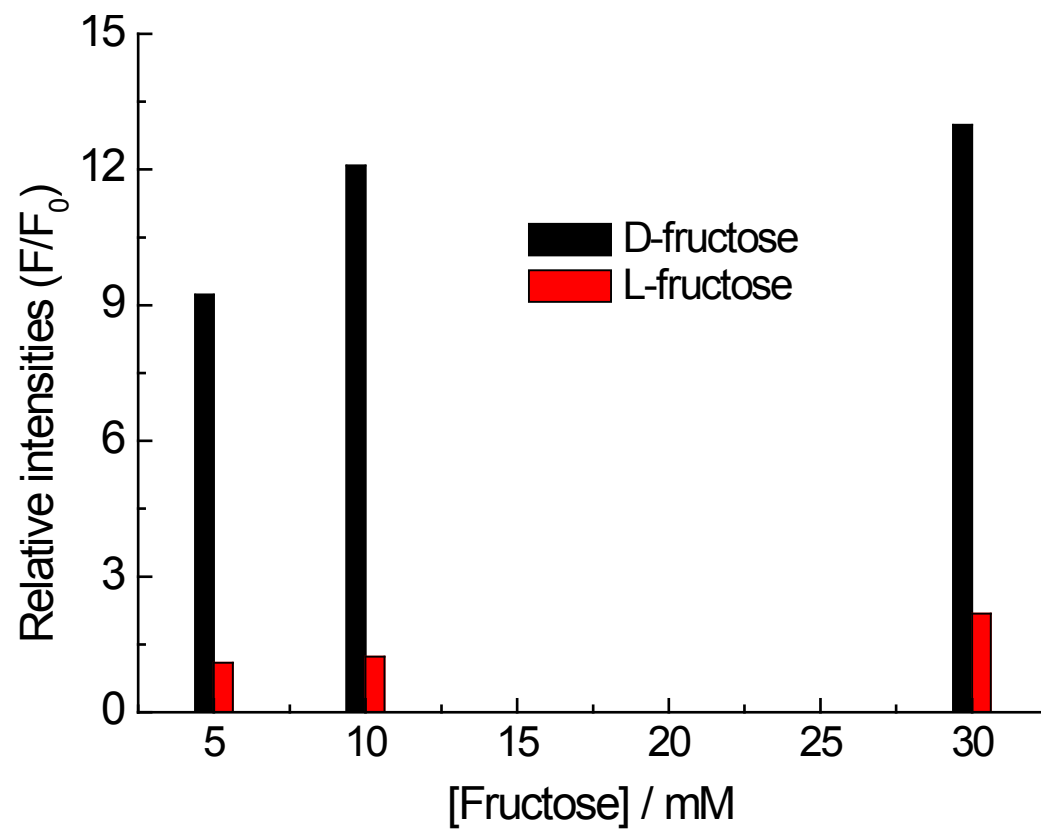


Fig. S7 The binding characteristics of HPTS (4.0×10^{-6} M) and ToBV (2.0×10^{-4} M) with D-fructose and L-fructose in pH 7.4 phosphate buffer solutions.

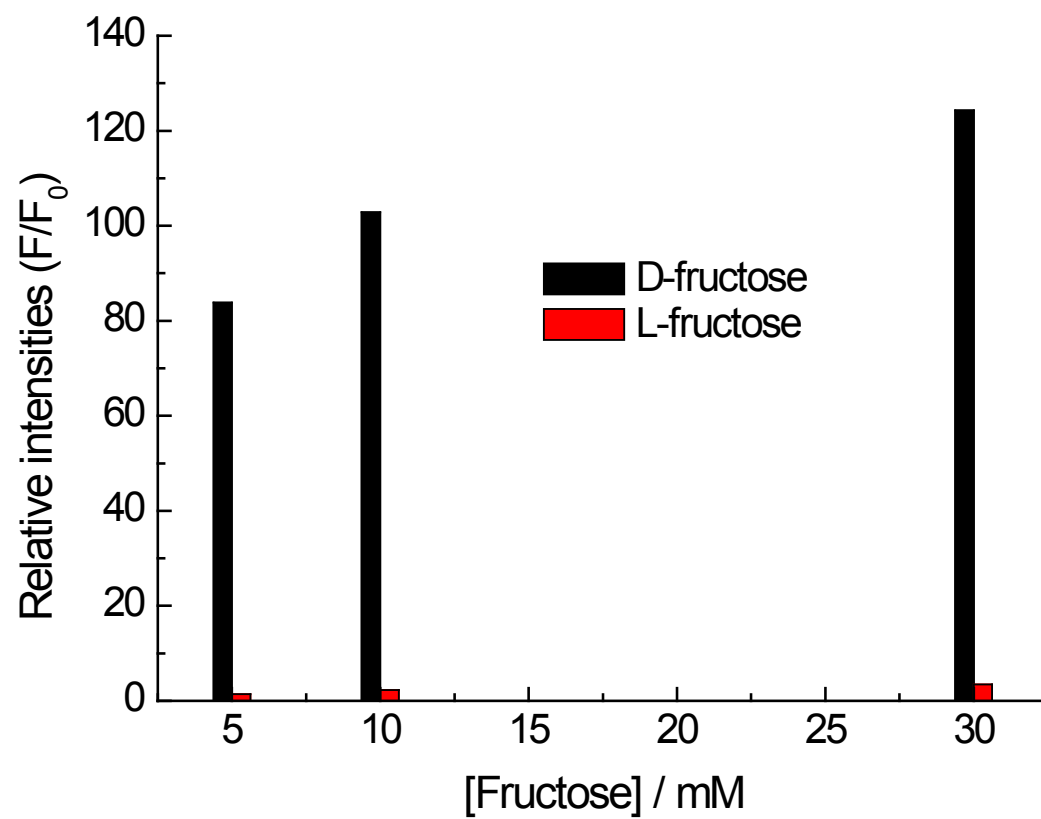
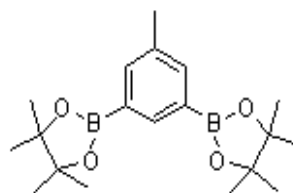


Fig. S8 The binding characteristics of HPTS (4.0×10^{-6} M) and ToBV (4.0×10^{-4} M) with D-fructose and L-fructose in pH 7.4 phosphate buffer solutions.

NAME 0101
EXPNO 378
PROCNO 1
Date_ 20100112
Time_ 15.35
NSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 8223.685 Hz
RDRES 0.125483 Hz
AQ 3.9846387 sec
RG 28.5
DW 60.800 usec
DE 6.50 usec
TE 296.1 K
D1 1.0000000 sec
TD0 1



----- CHANNEL f1 -----
NUC1 1H
P1 13.40 usec
PL1 0.00 dB
PL1W 10.95182514 W
SFO1 400.1324710 MHz
SI 32768
SF 400.1300127 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

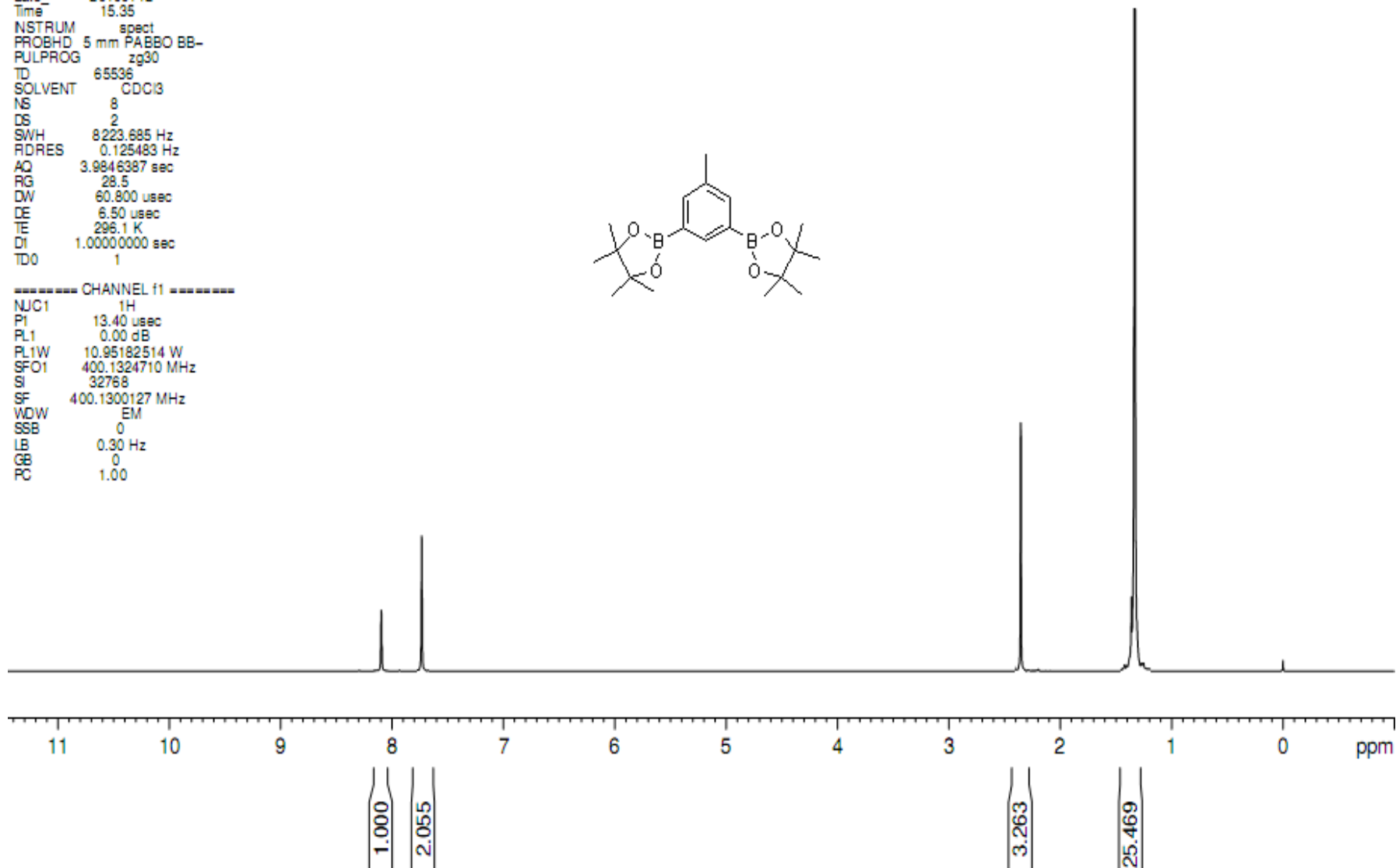
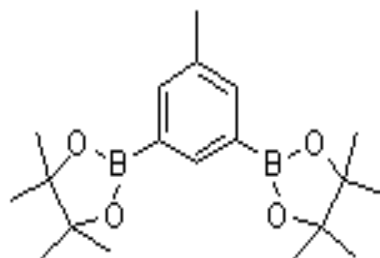


Fig. S9 400 MHz ^1H NMR of 3,5-bis-(4,4,5,5-tetramethyl-1,3,2-dioxaborolane)toluene in CDCl_3

NAME 0101
EXPNO 3008
PROCNO 1
Date_ 20100112
Time 22:18
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65535
SOLVENT CDCl3
NS 2048
DS 4
SWH 24038.461 Hz
FDRS 0.366798 Hz
AQ 1.3631968 sec
RG 32800
DW 20.800 usec
DE 6.50 usec
TE 298.5 K
D1 2.00000000 sec
D11 0.09000000 sec
TDO 1



----- CHANNEL f1 -----
NUC1 13C
PI 10.00 usec
PL1 -1.00 dB
PL1W 48.06661987 W
SFO1 100.6228298 MHz

----- CHANNEL f2 -----
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 0.00 dB
PL12 15.50 dB
PL13 15.50 dB
PL2W 10.95182514 W
PL12W 0.30888435 W
PL13W 0.30888435 W
SFO2 400.1316005 MHz
SI 32768
SF 100.6127690 MHz
VDW EM
SEB 0
LB 1.00 Hz
GB 0
PC 1.40

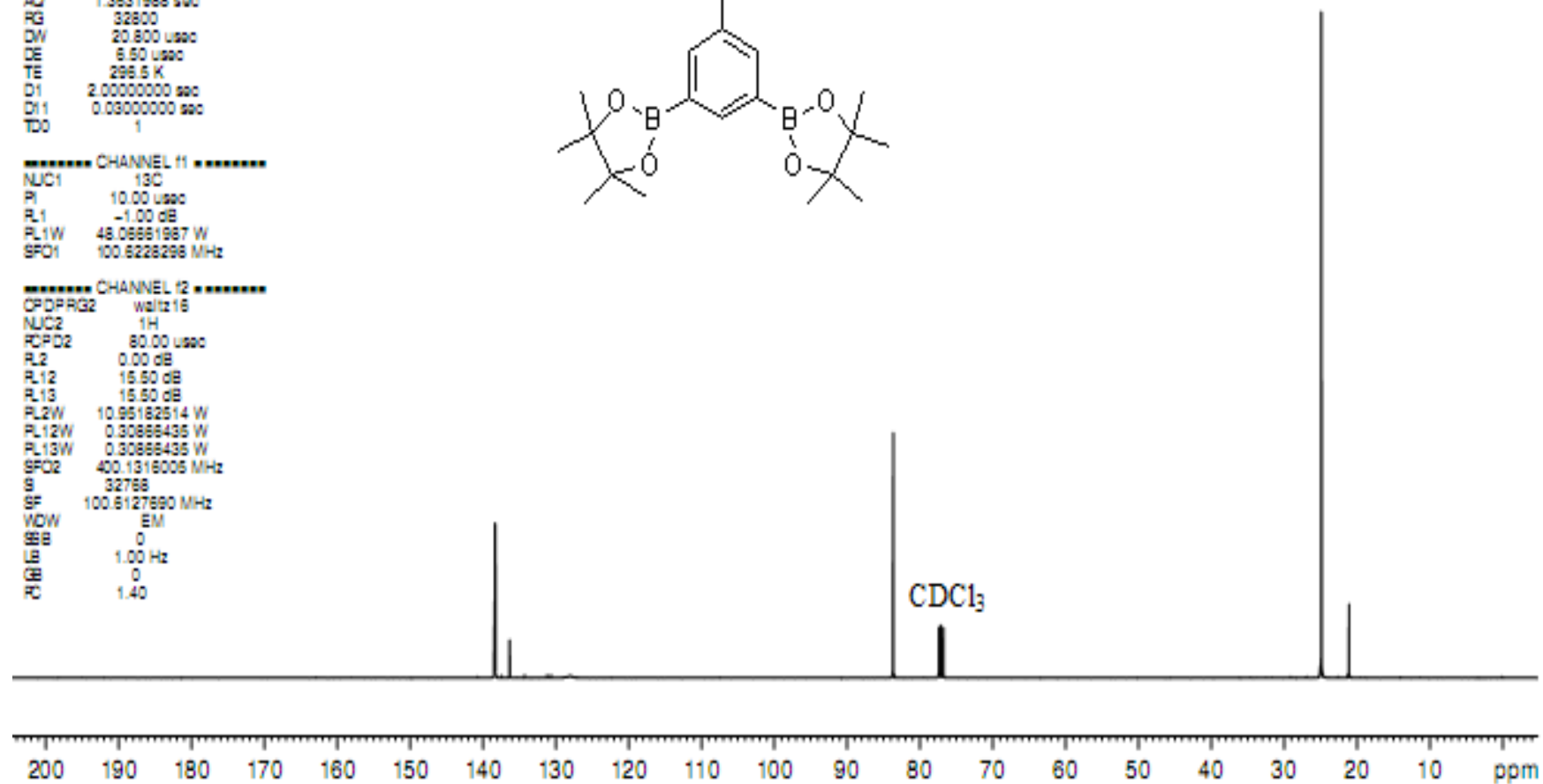


Fig. S10 100 MHz ^{13}C NMR of 3,5-bis-(4,4,5,5-tetramethyl-1,3,2-dioxaborolane)toluene in CD_3Cl_3 .

NAME 1007
EXPNO 1365
PROCNO 1
Date_ 20100727
Time_ 14.35
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT D2O
NS 8
DS 2
SWH 8223.685 Hz
FIDRES 0.125483 Hz
AQ 3.9846367 sec
RG 267
DNW 60.800 usec
DE 6.50 usec
TE 301.2 K
D1 1.00000000 sec
TD0 1

----- CHANNEL f1 -----
NUC1 1H
P1 13.40 usec
PL1 0.00 dB
PL1W 10.95182514 W
SFO1 400.1324710 MHz
SI 32768
SF 400.1300000 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

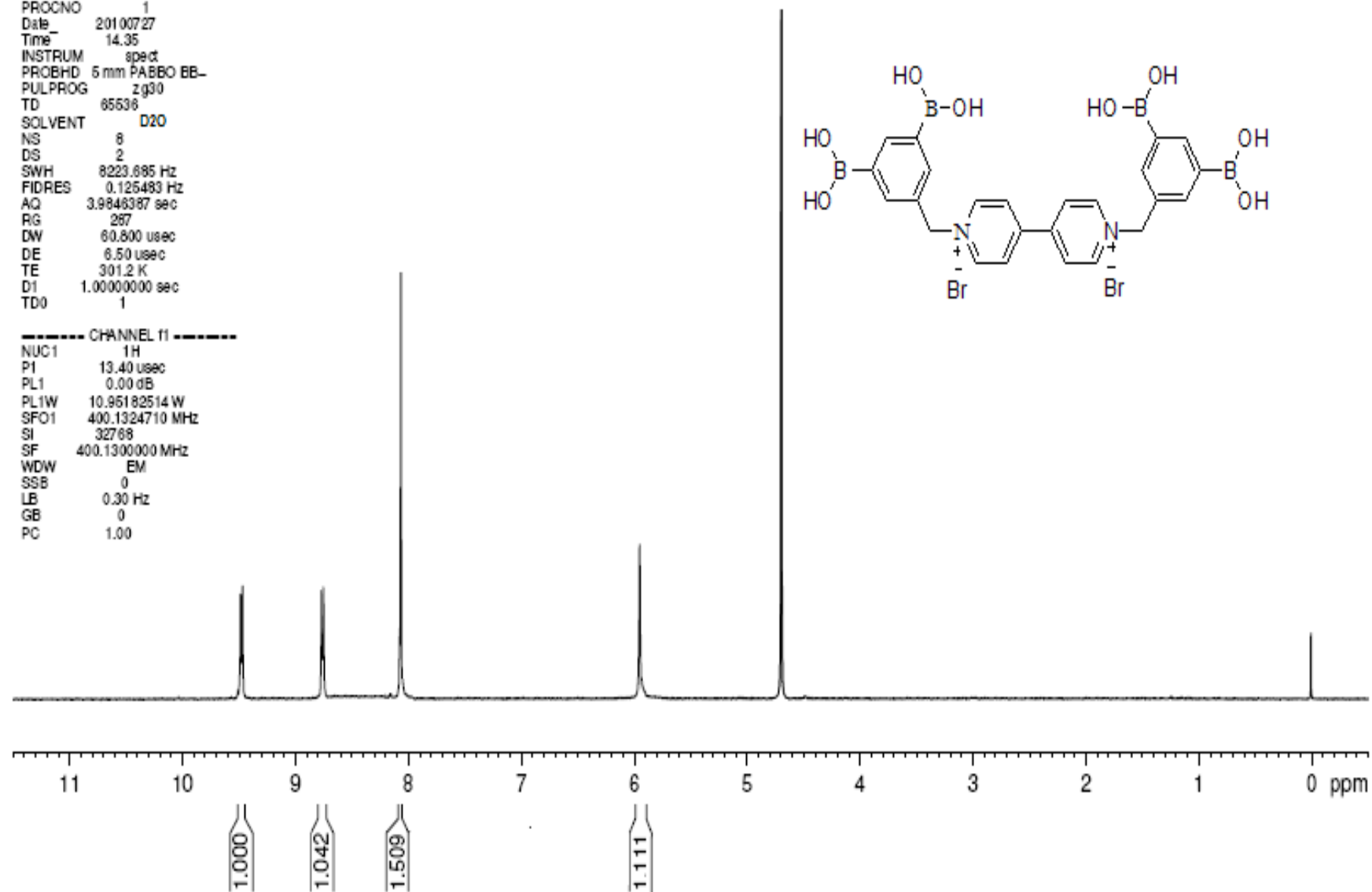
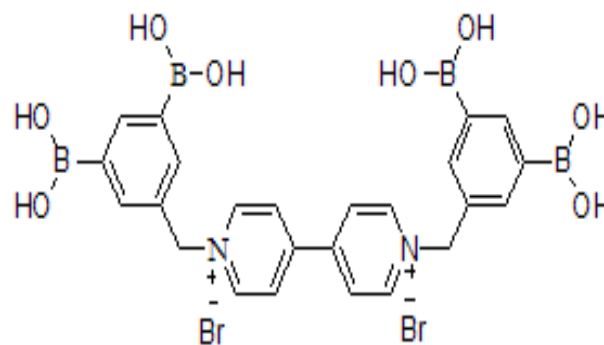


Fig. S11 400 MHz ¹H NMR of T₀BV in D₂O

NAME 1007
EXPNO 3014
PROCNO 1
Date_ 20100728
Time 22.23
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT D2O
NS 4096
DS 4
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631988 sec
RG 32800
DW 20.800 usec
DE 6.50 usec
TE 302.3 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1



----- CHANNEL f1 -----
NUC1 13C
P1 10.00 usec
PL1 -1.00 dB
PL1W 48.06661967 W
SFO1 100.6226298 MHz

----- CHANNEL f2 -----
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 0.00 dB
PL12 15.50 dB

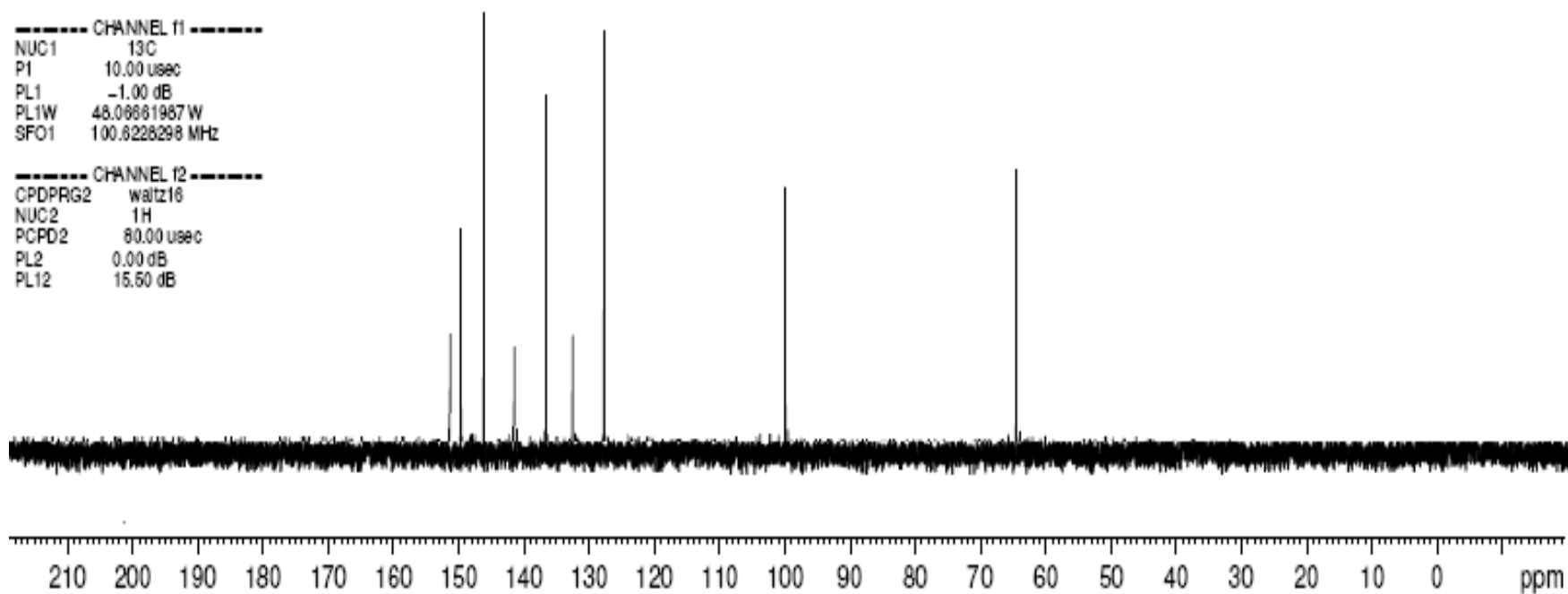


Fig. S12 100 MHz ^{13}C NMR of ToBV in D_2O