Electronic Supplementary Material (ESI) for Organic & Biomolecular Chemistry.

Total Synthesis of Wikstrol A and Wikstrol B

Kui Lu,*[a] Ming Li,[a] Yuna Huang,[a] Yuanyuan Sun,[a] Zhi Gong,[a] Qijun Wei,[a] Xia Zhao,[b] Yongmin Zhang*[a,c] and Peng Yu*[a]

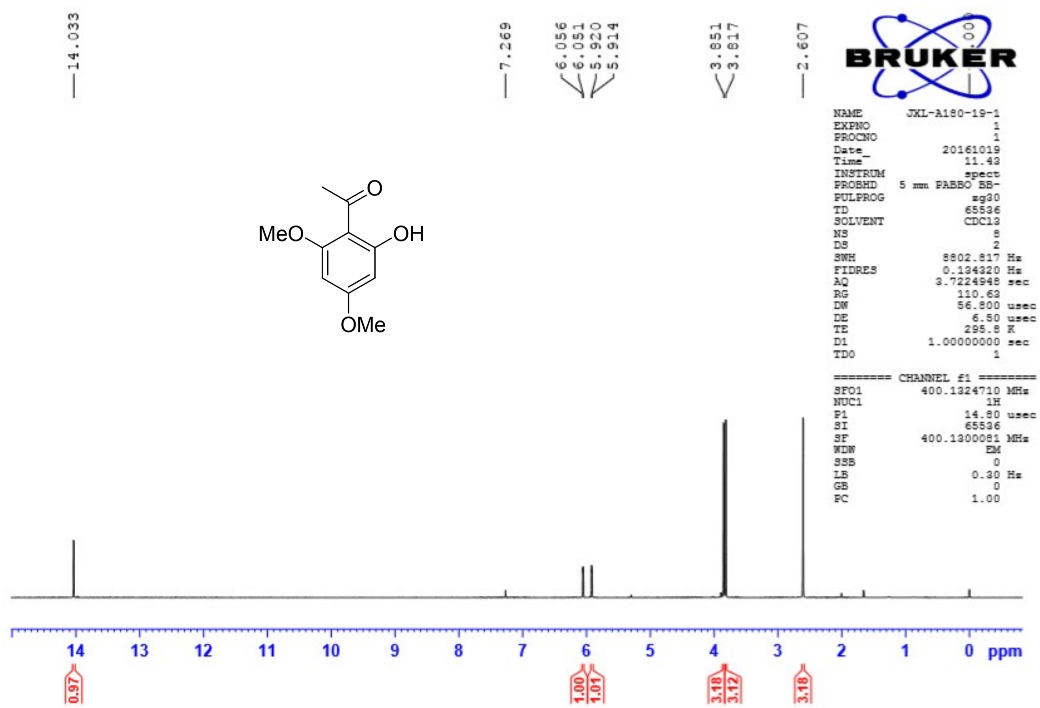
[a] *China International Science and Technology Cooperation Base of Food Nutrition/Safety and Medicinal Chemistry, Key Laboratory of Industrial Microbiology of Ministry of Education, Tianjin Key Laboratory of Industry Microbiology, College of Biotechnology, Tianjin University of Science & Technology, Tianjin, China, 300457; E-mail: lukui@tust.edu.cn; yupeng@tust.edu.cn*

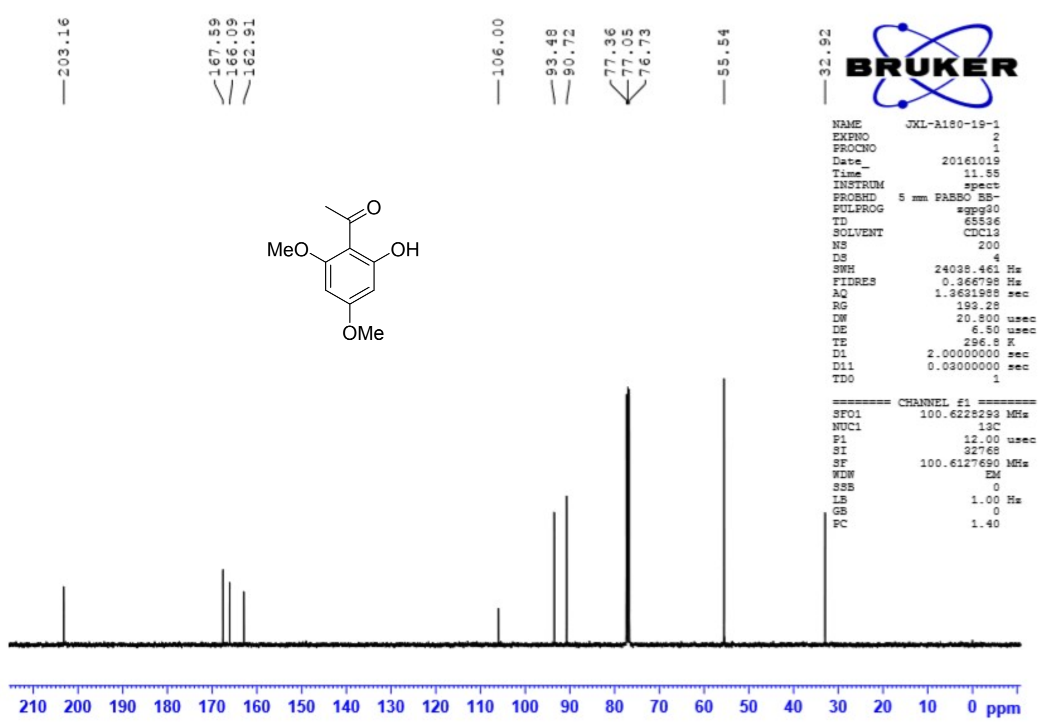
[b] *College of Chemistry, Tianjin Normal University, Tianjin 300387, China*

[c] *Sorbonne Université, Institut Parisien de Chimie Moléculaire, UMR CNRS 8232, 4 place Jussieu, 75005 Paris, France; E-mail: yongmin.zhang@upmc.fr*

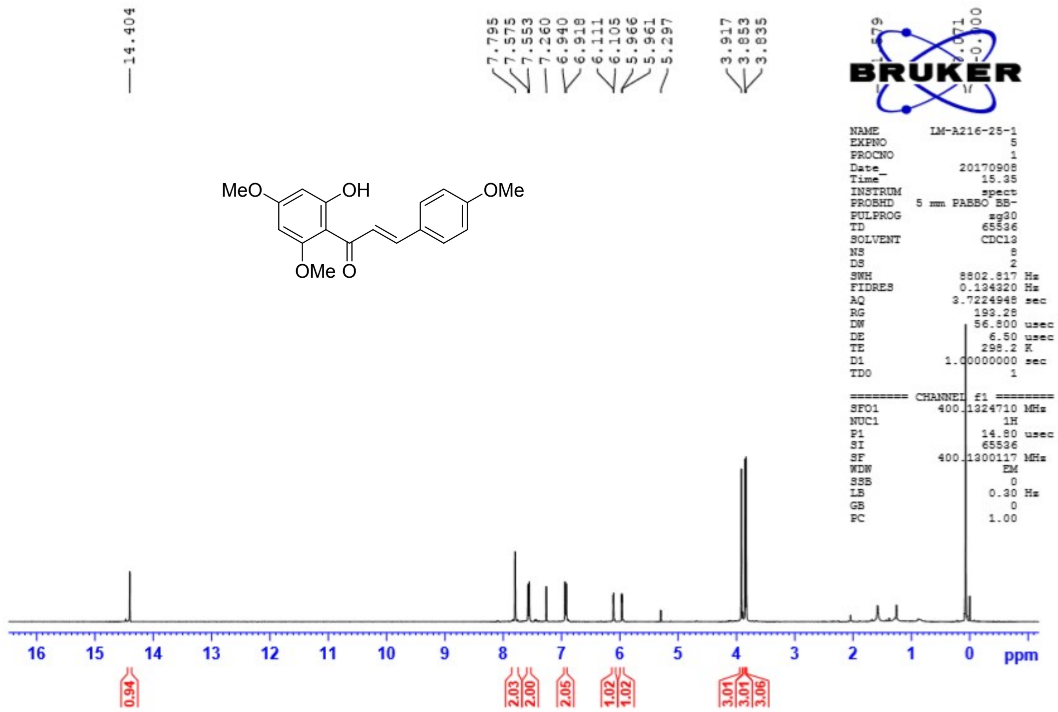
Contents **Page**

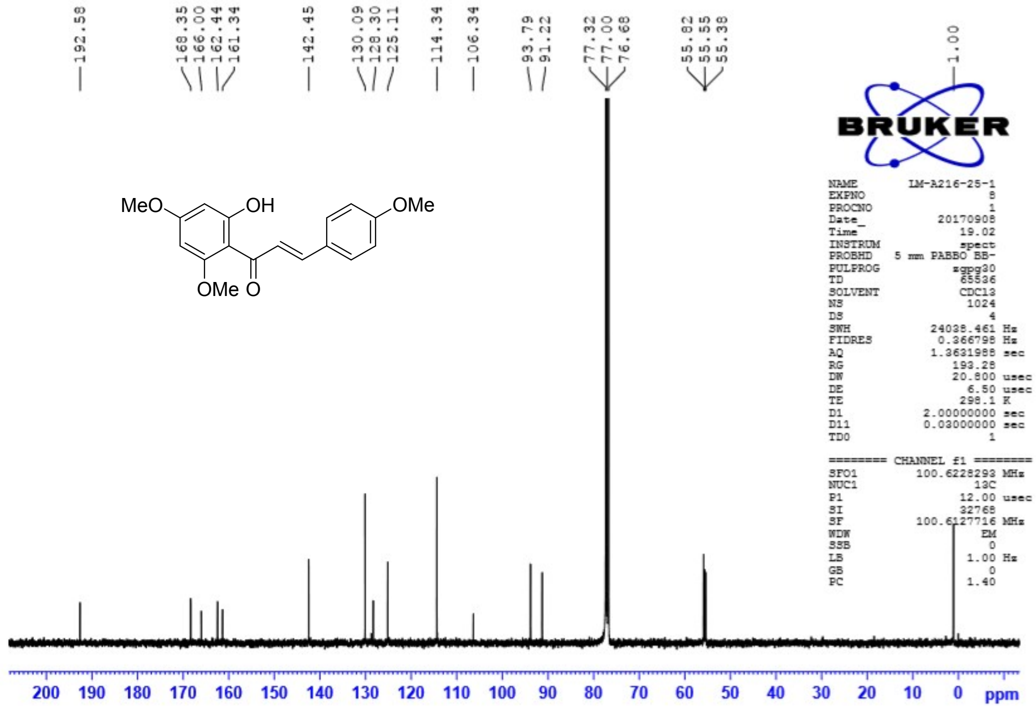
[1]H and [13]C NMR spectra of 1-(2-hydroxy-4,6-dimethoxyphenyl)ethan-1-one (11) in $CDCl_3$



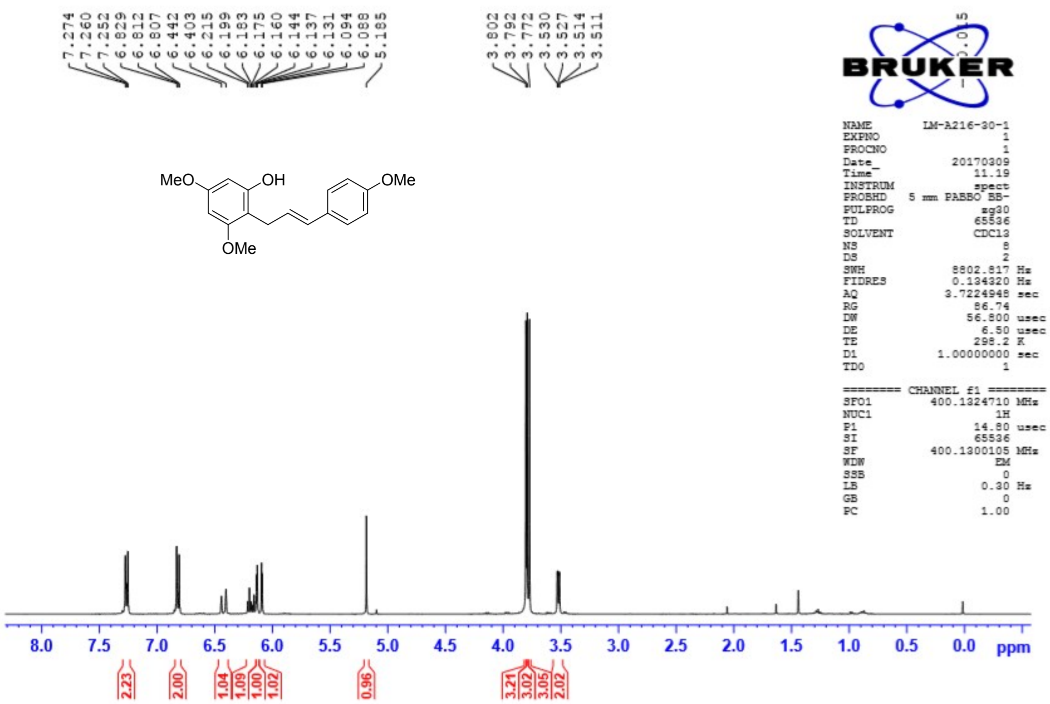


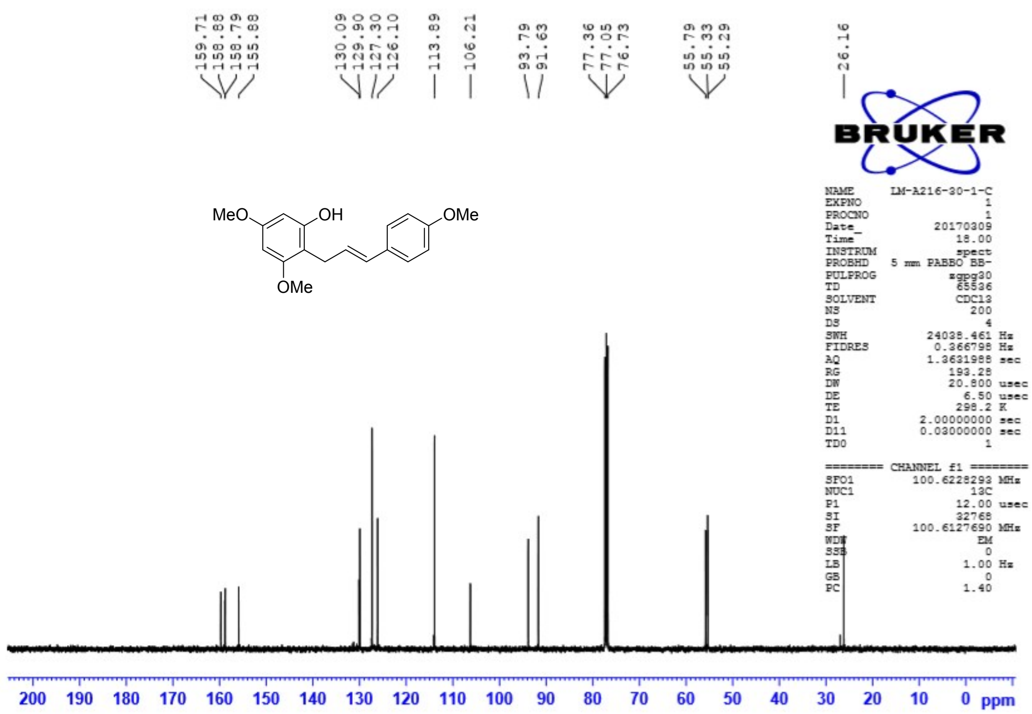
^{1}H and ^{13}C NMR spectra of (E)-1-(2-hydroxy-4,6-dimethoxyphenyl)-3-(4-methoxyphenyl)prop-2-en-1-one (12) in $CDCl_3$



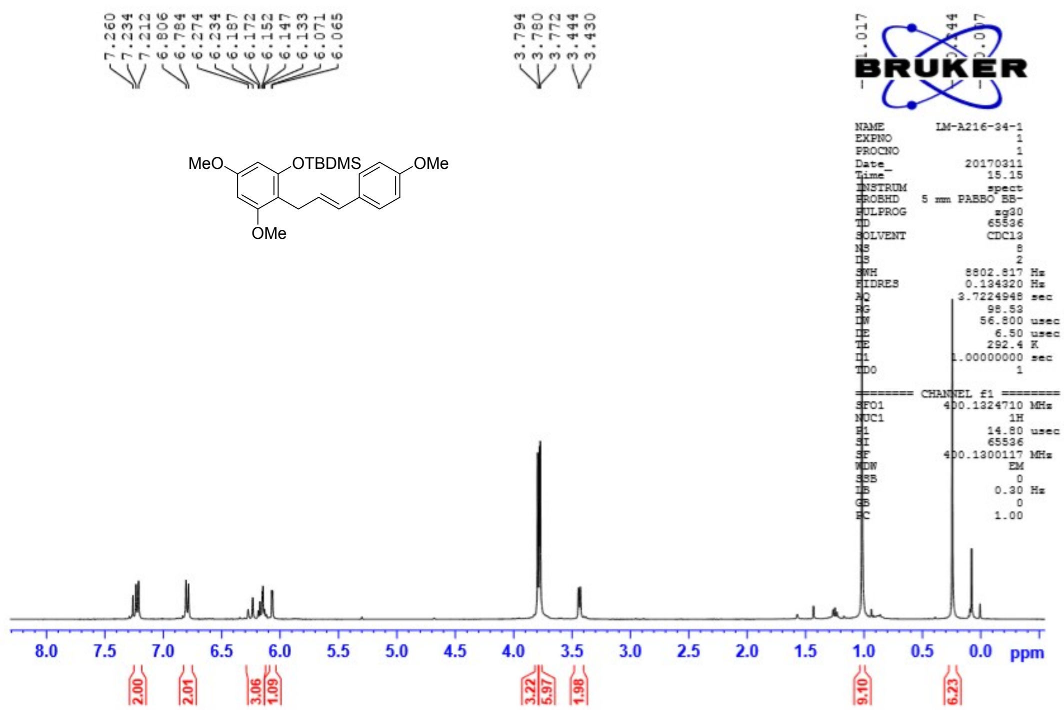


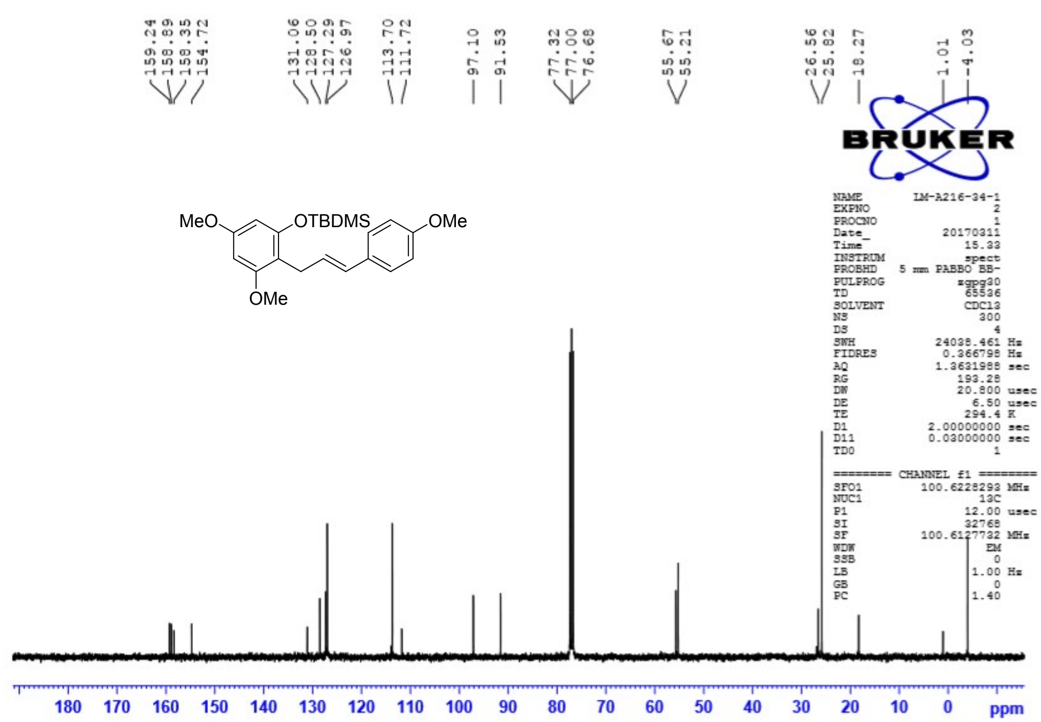
^{1}H and ^{13}C NMR spectra of (E)-3,5-dimethoxy-2-(3-(4-methoxyphenyl)allyl)phenol(13) in $CDCl_3$



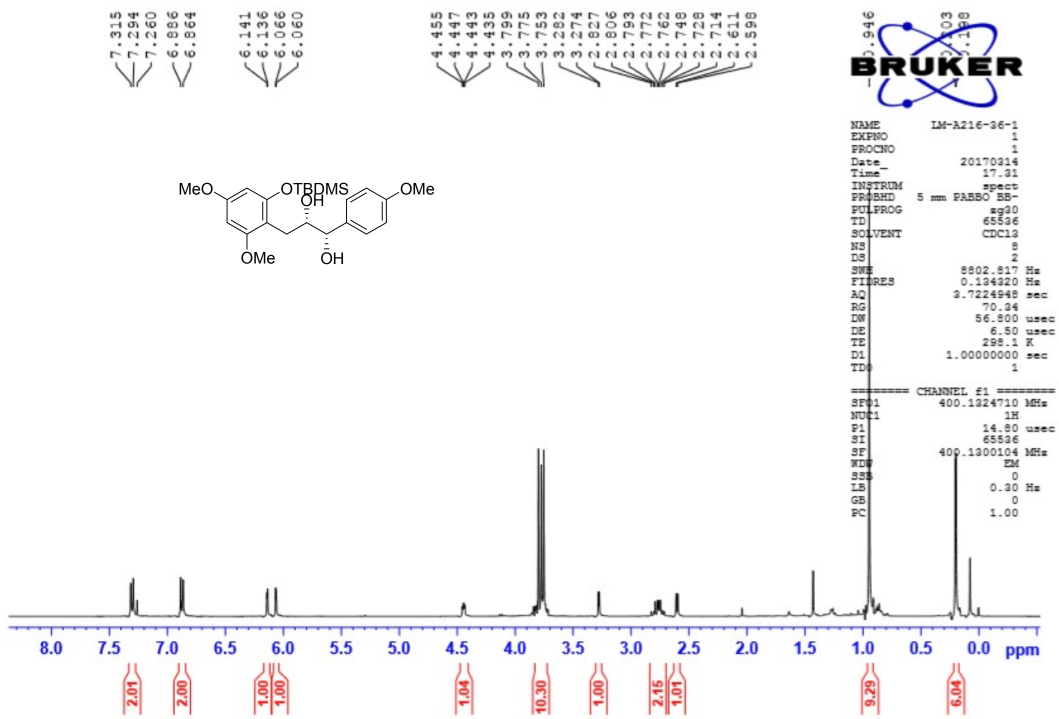


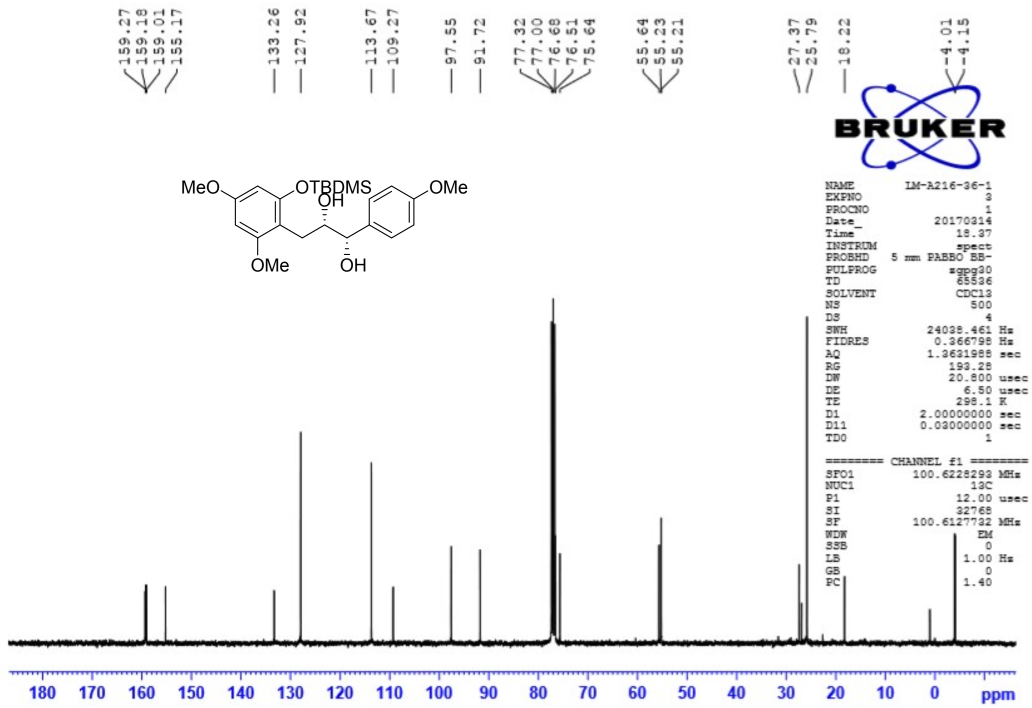
^{1}H and ^{13}C NMR spectra of (E)-tert-butyl(3,5-dimethoxy-2-(3-(4-methoxyphenyl)allyl)phenoxy)dimethylsilane(14) in $CDCl_3$



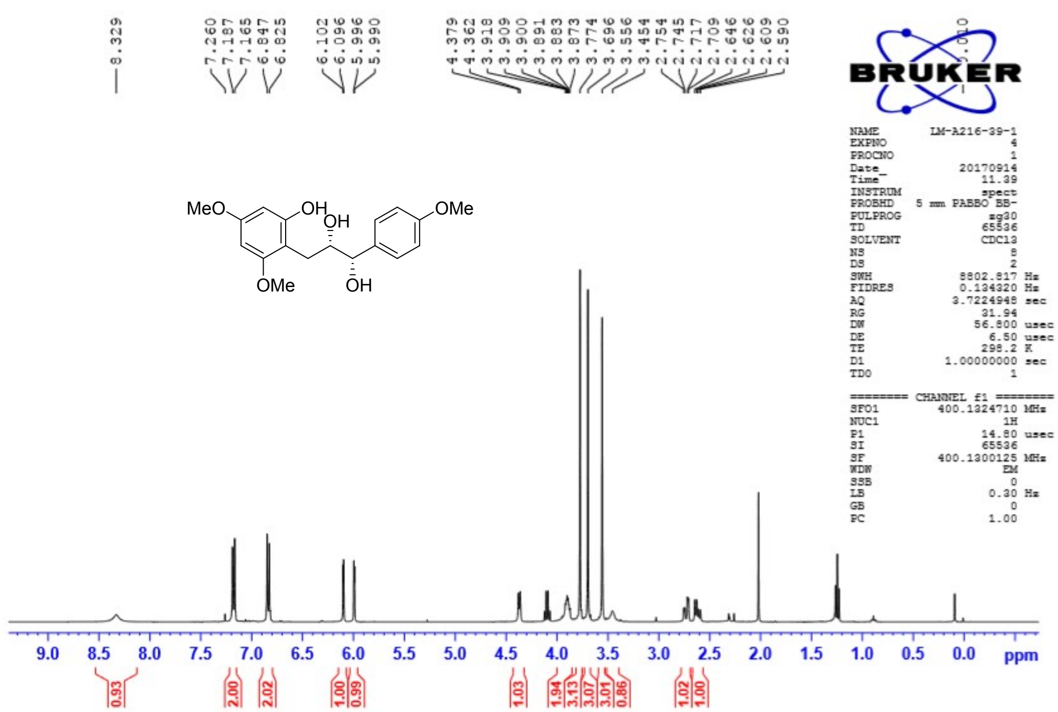


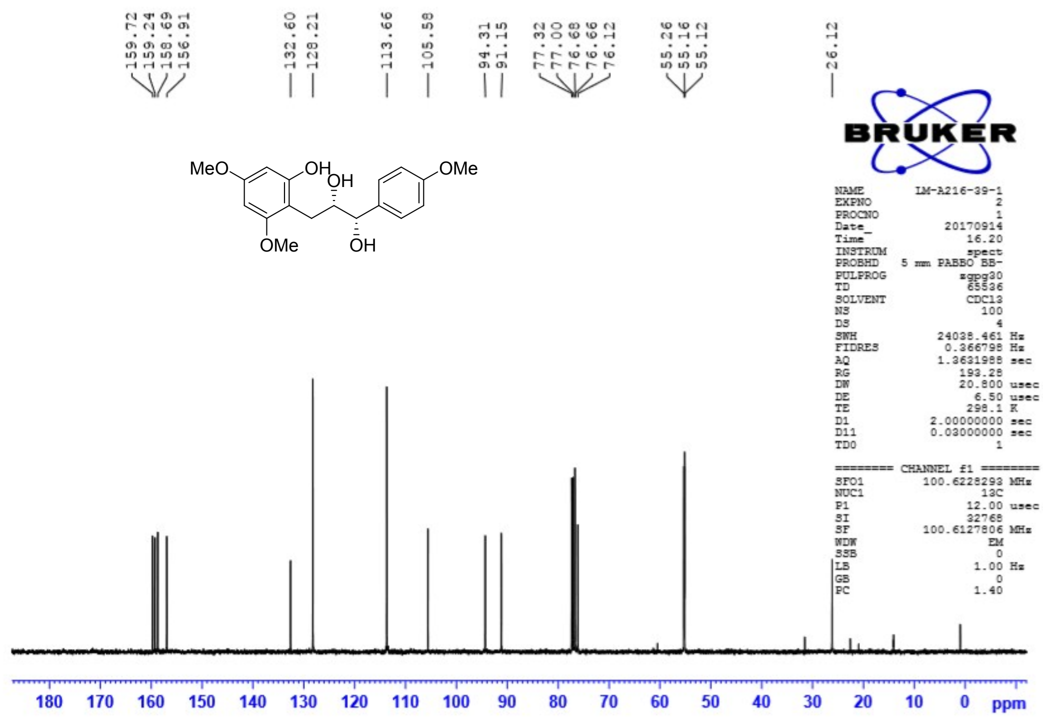
^1H and ^{13}C NMR spectra of (1S,2S)-3-(2-((tert-butyldimethylsilyl)oxy)-4,6-dimethoxyphenyl)-1-(4-methoxyphenyl)propane-1,2-diol(15) in $CDCl_3$



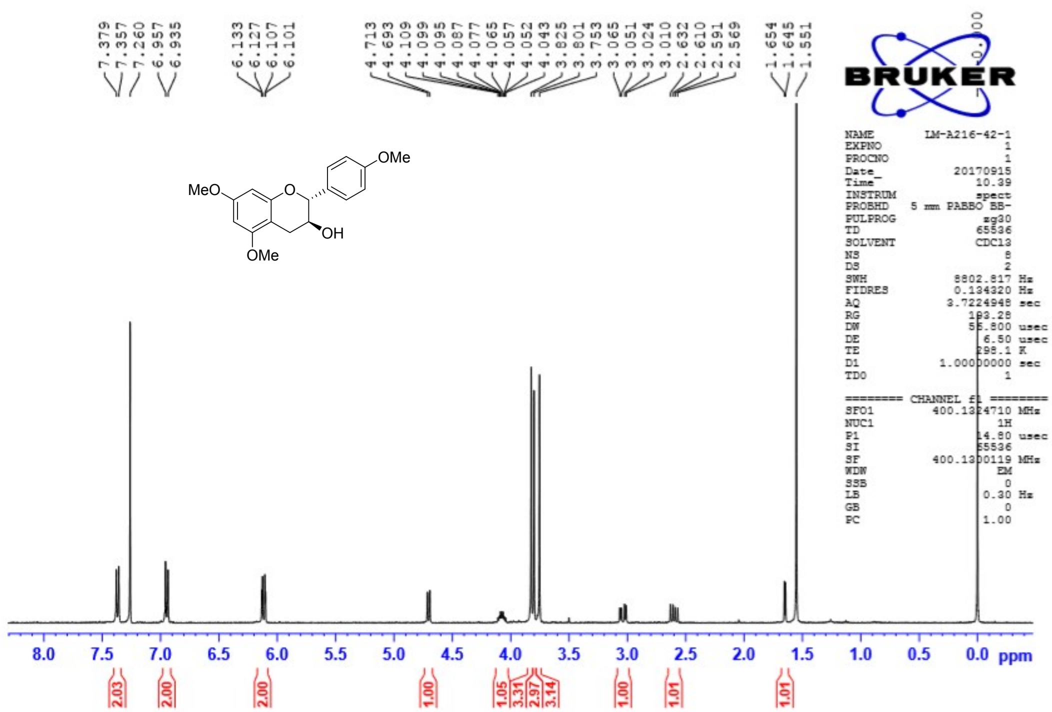


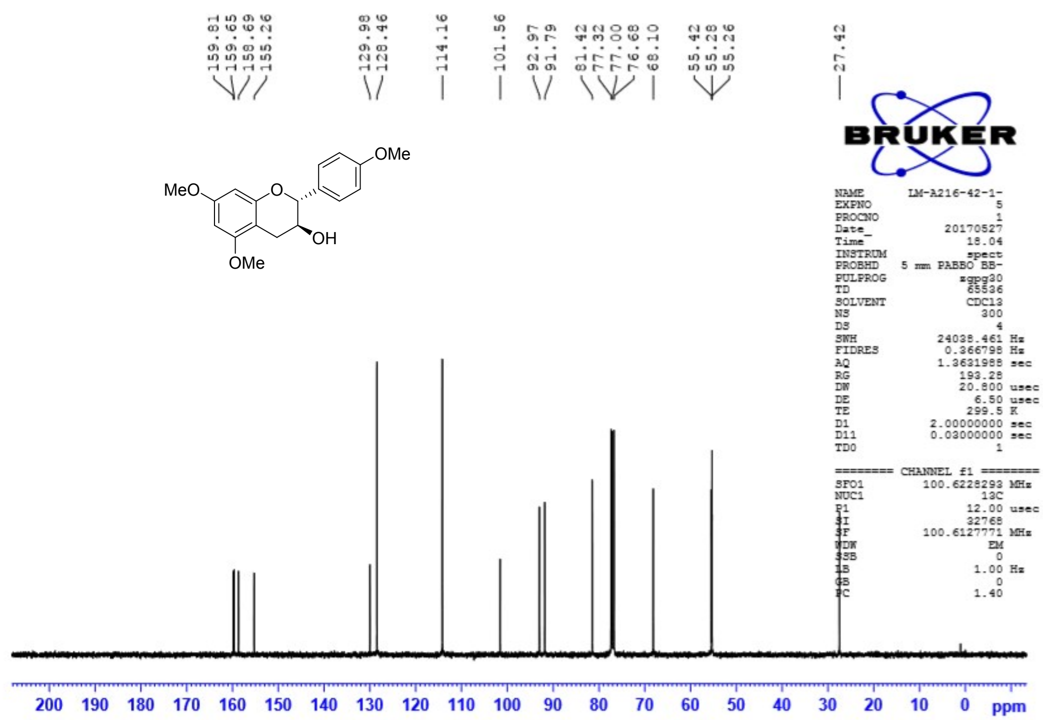
^{1}H and ^{13}C NMR spectra of (1S,2S)-3-(2-hydroxy-4,6-dimethoxyphenyl)-1-(4-methoxyphenyl)propane-1,2-diol (16) in $CDCl_3$



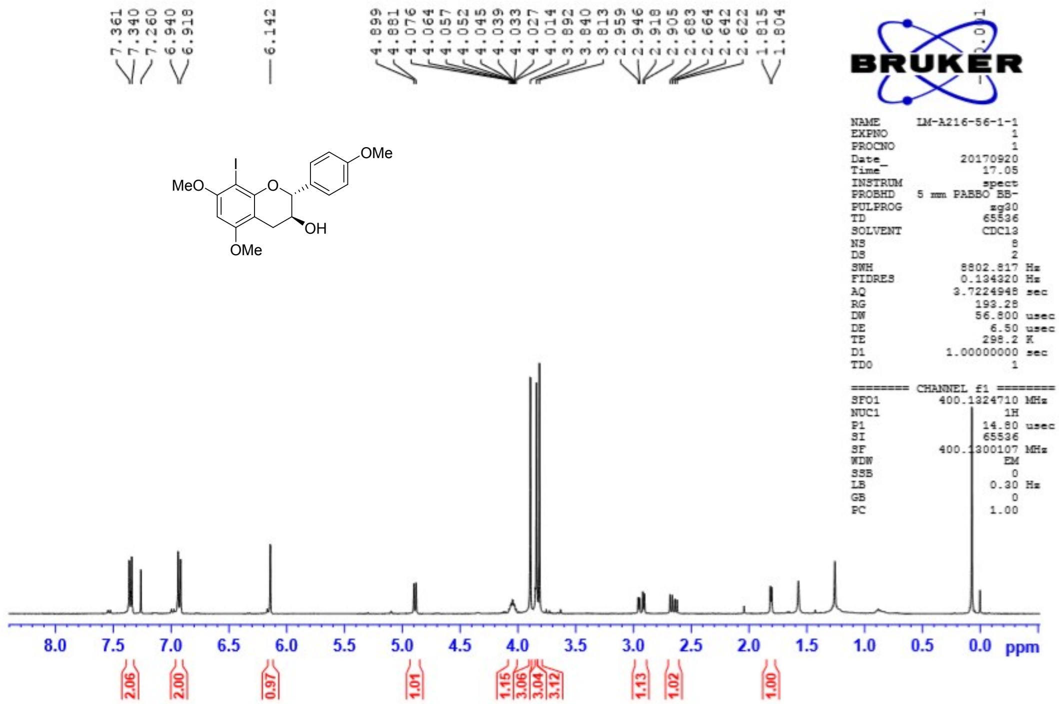


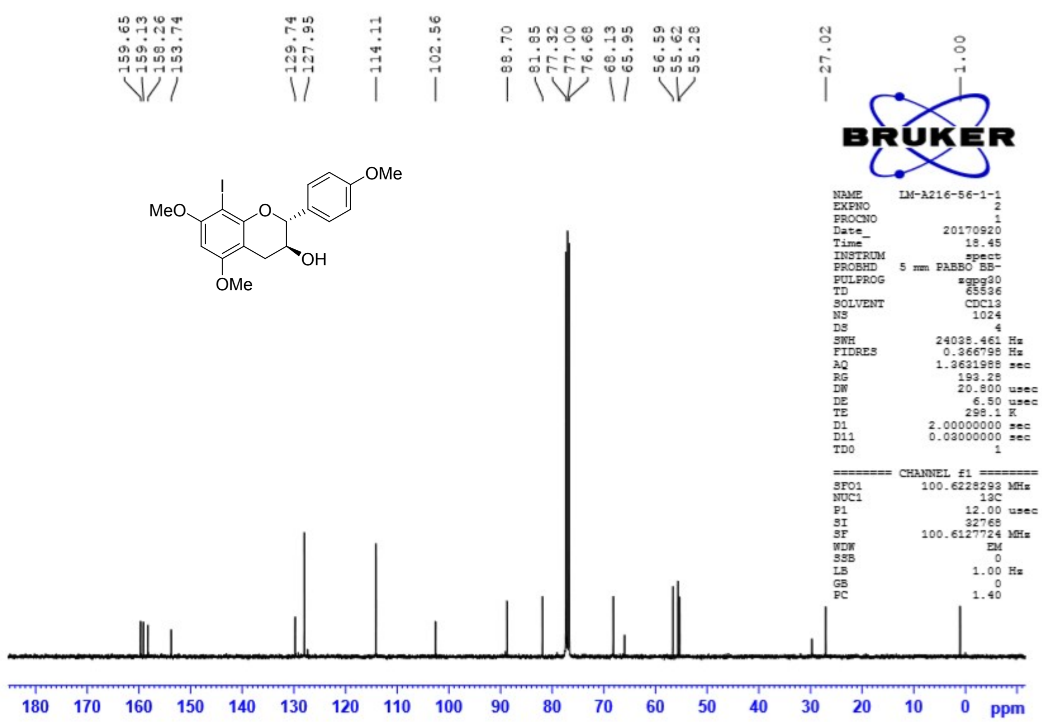
^{1}H and ^{13}C NMR spectra of (2R,3S)-5,7-dimethoxy-2-(4-methoxyphenyl)chroman-3-ol (17) in $CDCl_3$



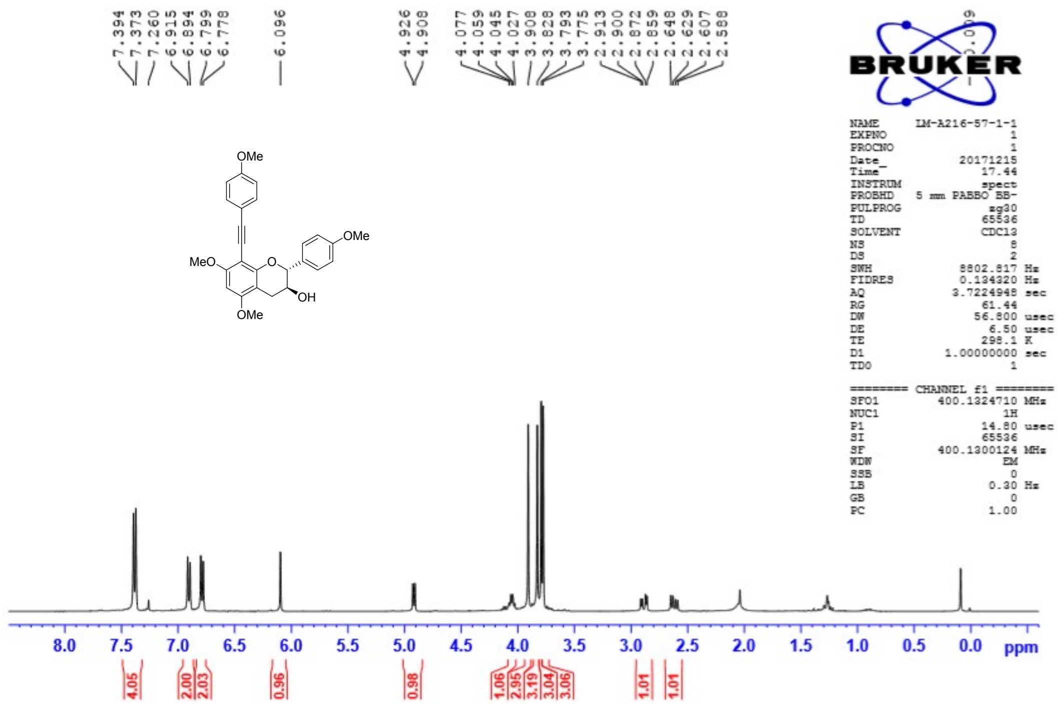


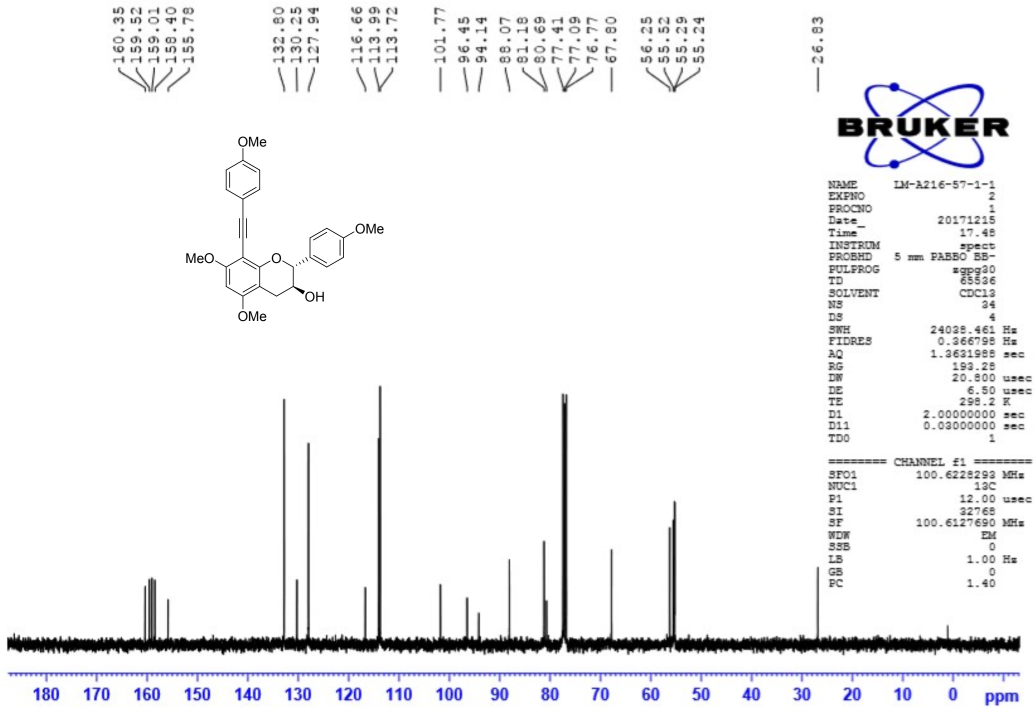
[1]H and [13]C NMR spectra of (2R,3S)-8-iodo-5,7-dimethoxy-2-(4-methoxyphenyl)chroman-3-ol (18) in $CDCl_3$



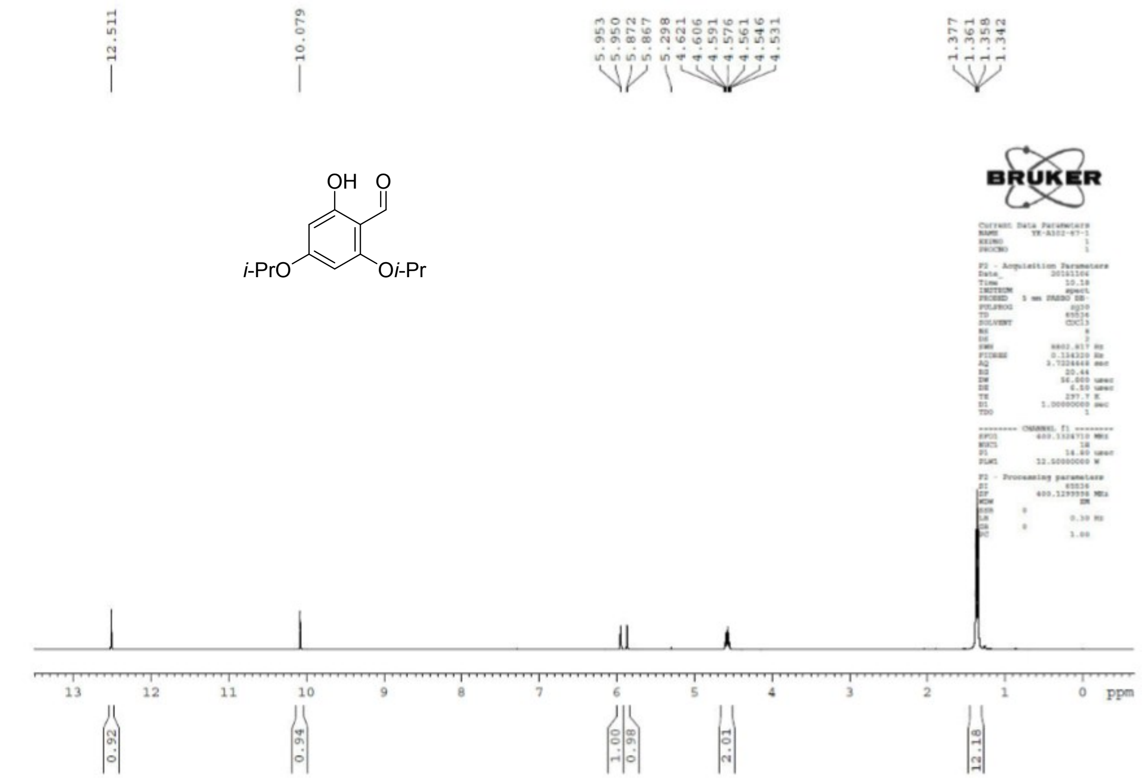


^{1}H and ^{13}C NMR spectra of (2R,3S)-5,7-dimethoxy-2-(4-methoxyphenyl)-8-((4-methoxyphenyl)ethynyl)chroman-3-ol(19) in $CDCl_3$

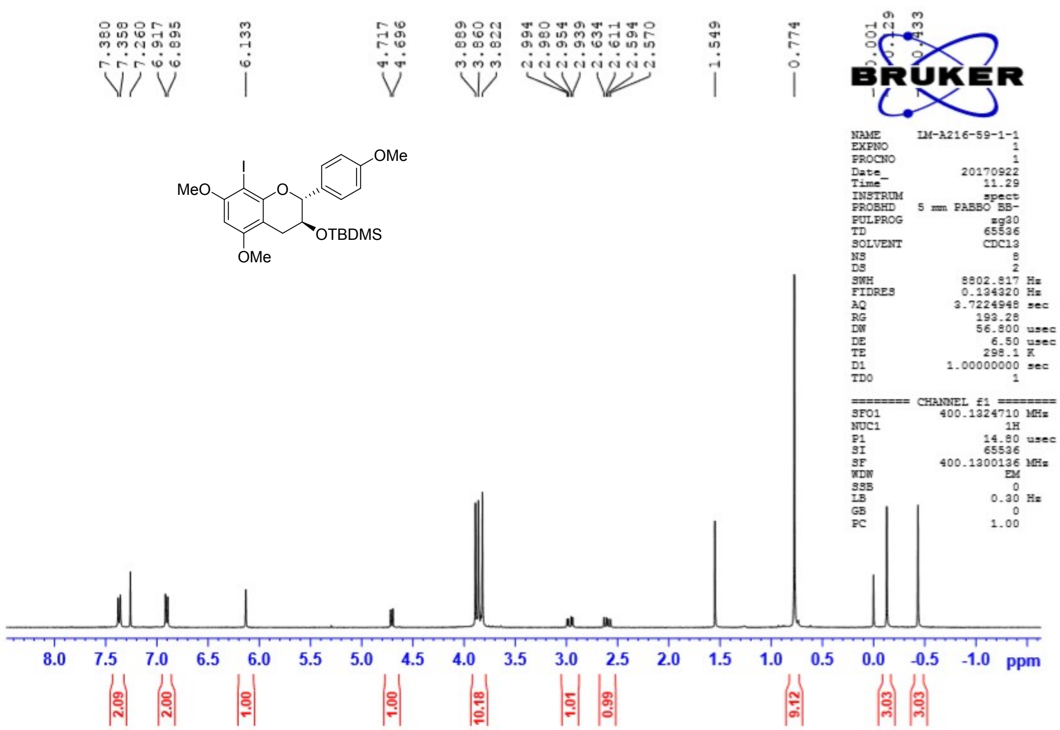


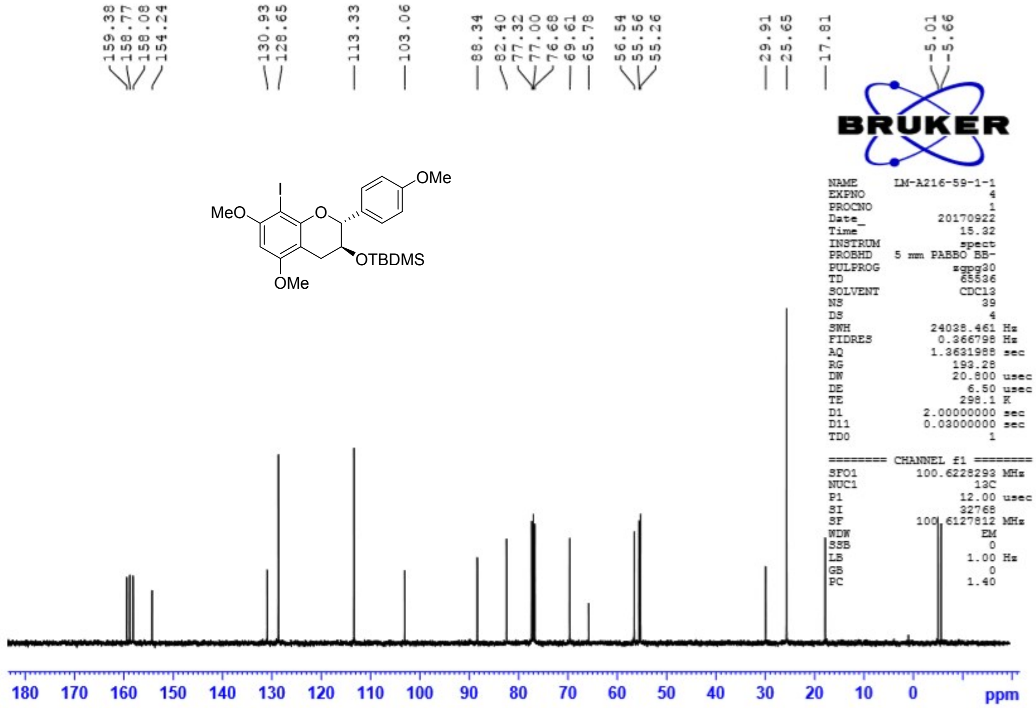


[1]H and [13]C NMR spectra of 2-hydroxy-4,6-diisopropoxybenzaldehyde(21) in $CDCl_3$

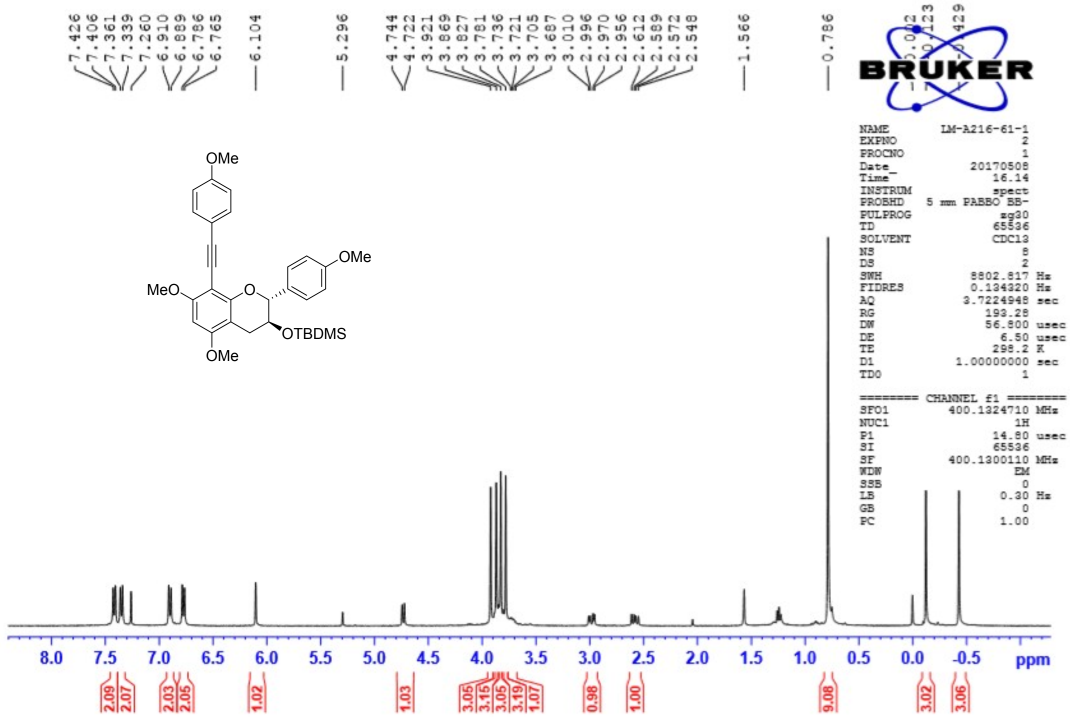


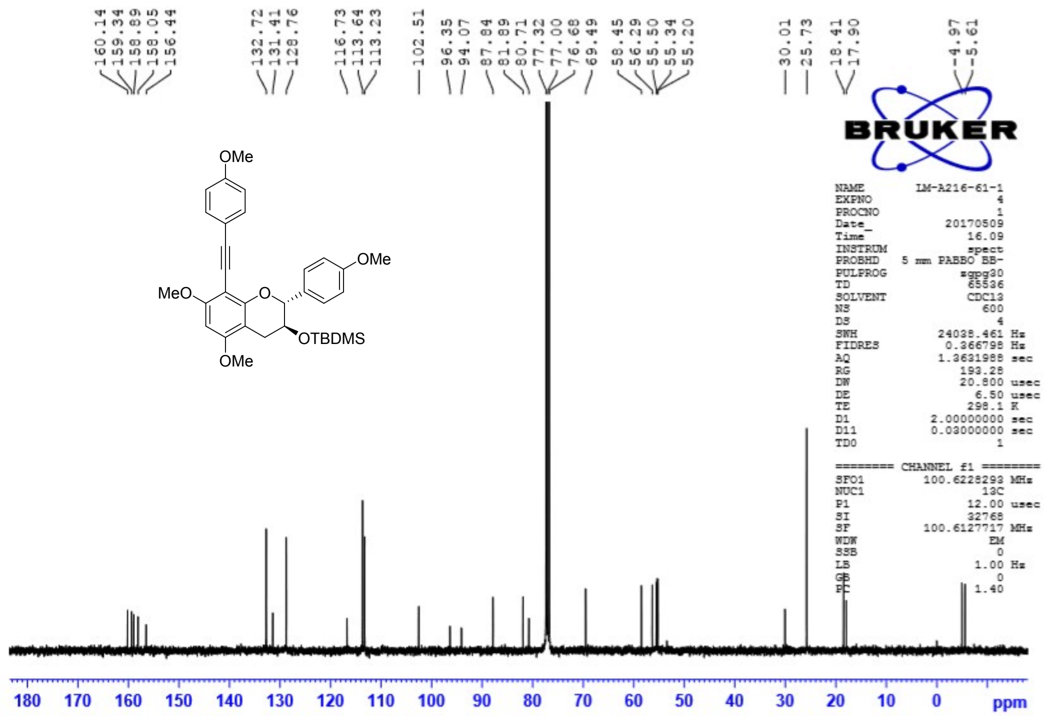
^{1}H and ^{13}C NMR spectra of tert-butyl(((2R,3S)-8-iodo-5,7-dimethoxy-2-(4-methoxyphenyl)chroman-3-yl)oxy)dimethylsilane (24) in $CDCl_3$



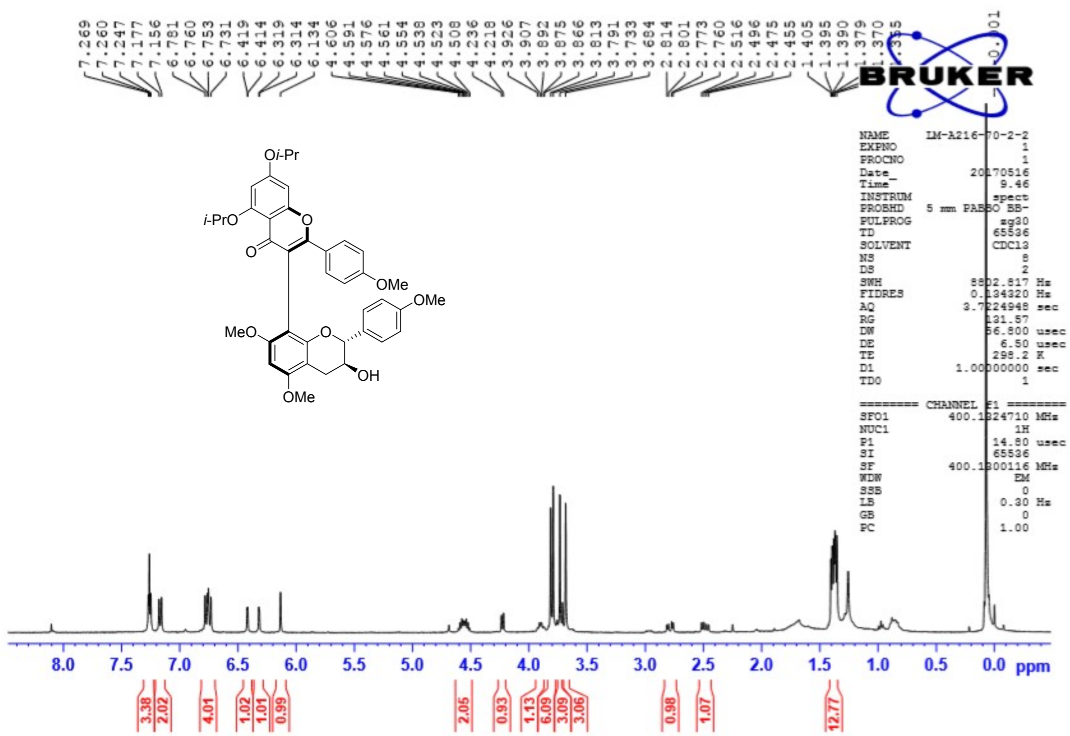


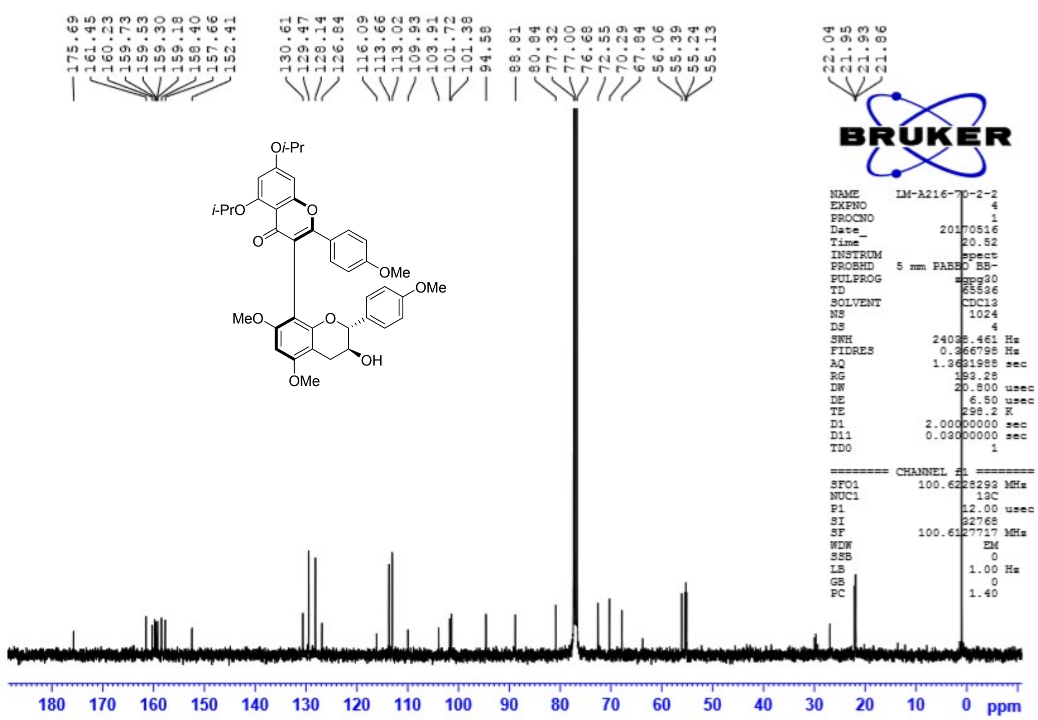
[1]H and [13]C NMR spectra of tert-butyl(((2R,3S)-5,7-dimethoxy-2-(4-methoxyphenyl)-8-((4-methoxyphenyl)ethynyl)chroman-3-yl)oxy)dimethylsilane (25) in $CDCl_3$



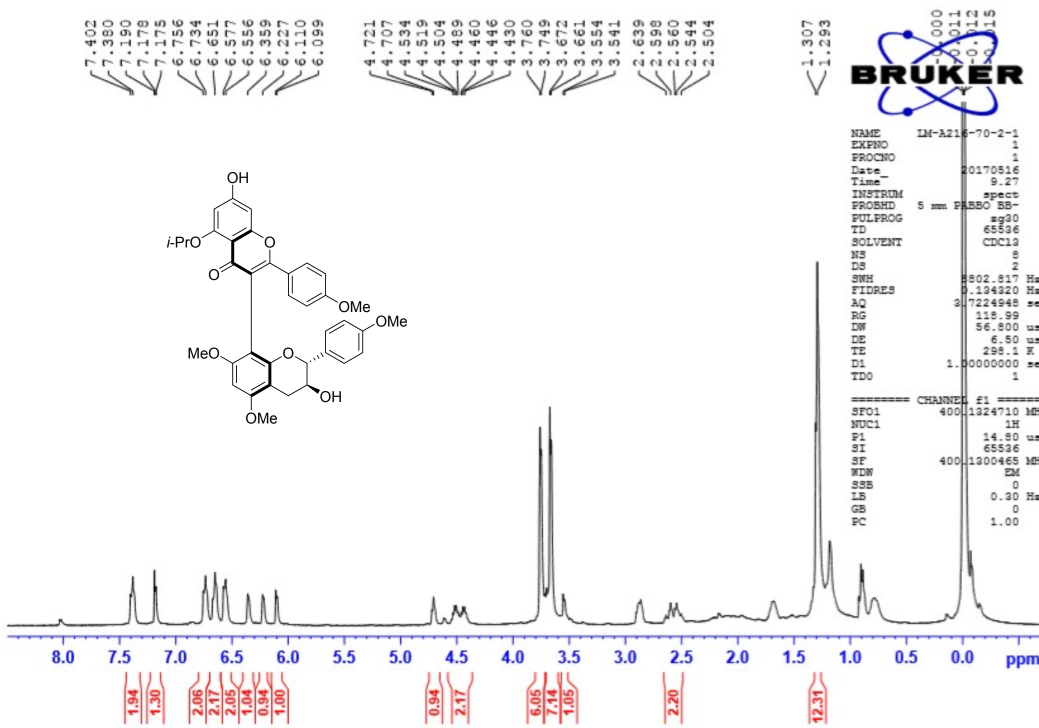


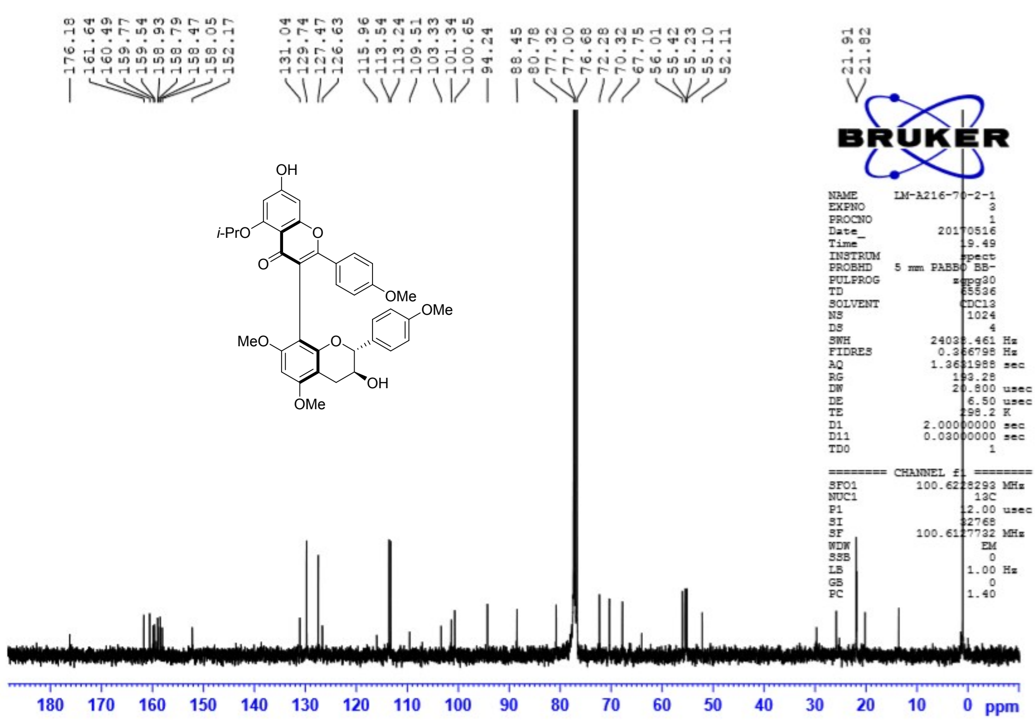
[1]H and [13]C NMR spectra of 3-((2R,3S)-3-hydroxy-5,7-dimethoxy-2-(4-methoxyphenyl)chroman-8-yl)-5,7-diisopropoxy-2-(4-methoxyphenyl)-4H-chromen-4-one (22) in $CDCl_3$



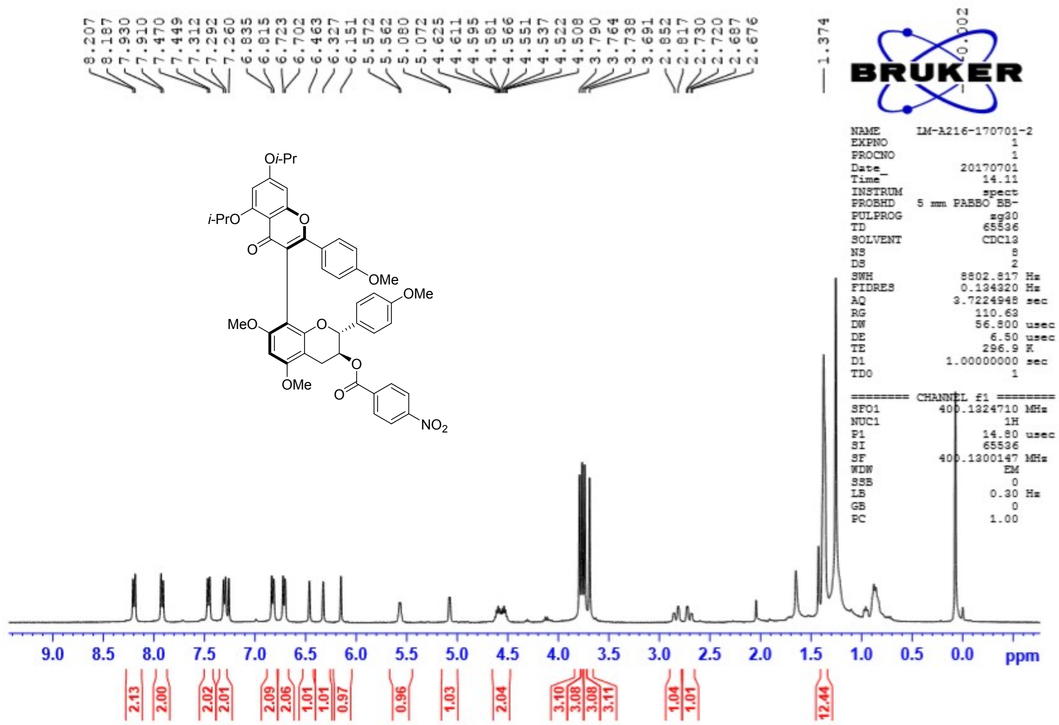


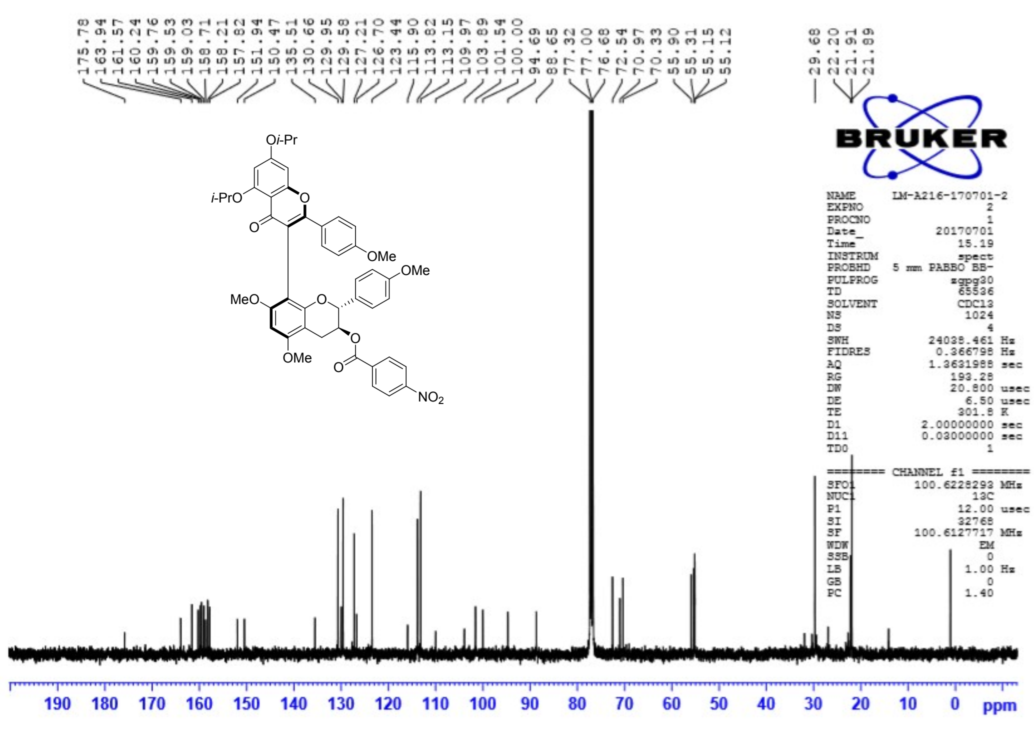
^{1}H and ^{13}C NMR spectra of 3-((2R,3S)-3-hydroxy-5,7-dimethoxy-2-(4-methoxyphenyl)chroman-8-yl)-5,7-diisopropoxy-2-(4-methoxyphenyl)-4H-chromen-4-one (23) in $CDCl_3$



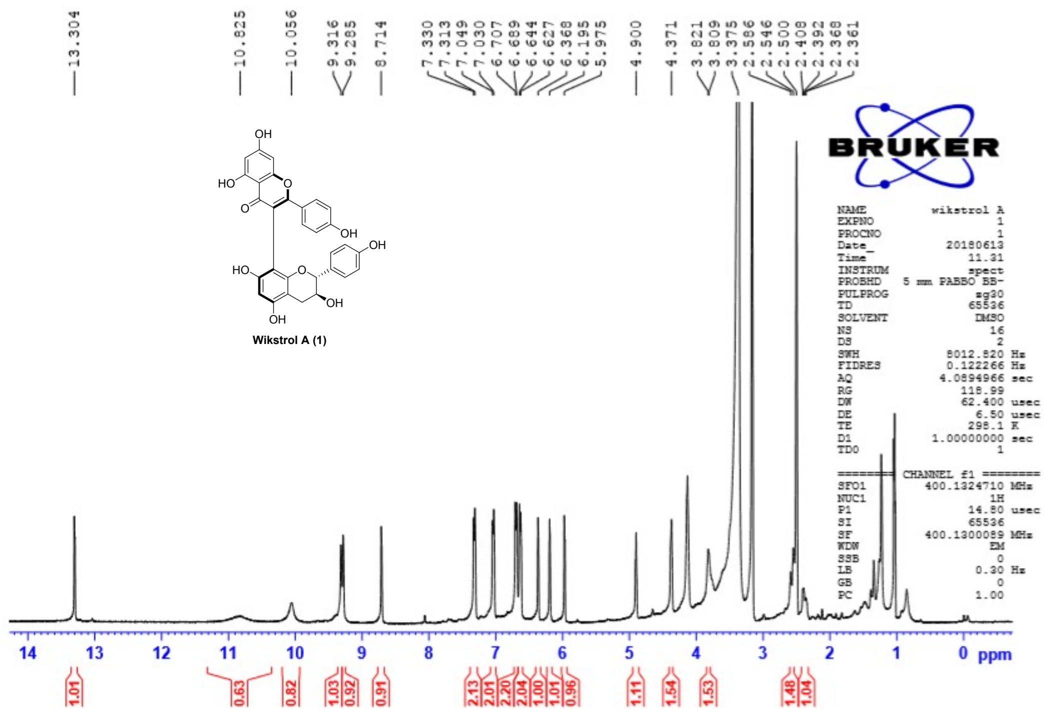


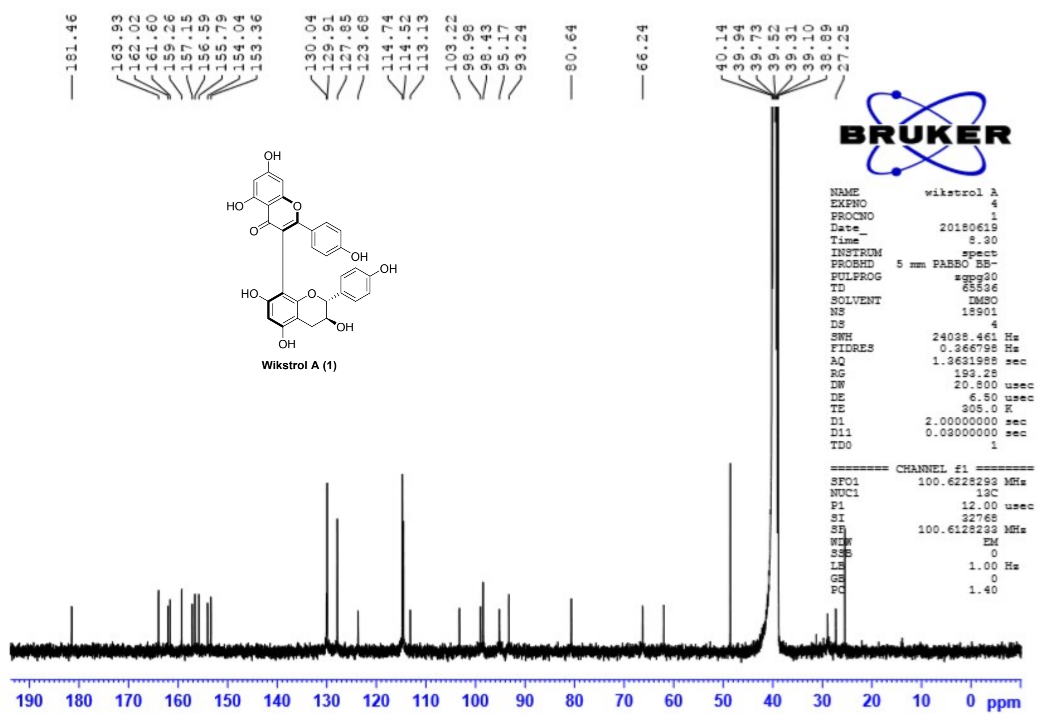
^1H and ^{13}C NMR spectra of (2R,3S)-8-(5,7-diisopropoxy-2-(4-methoxyphenyl)-4-oxo-4H-chromen-3-yl)-5,7-dimethoxy-2-(4-methoxyphenyl)chroman-3-yl 4-nitrobenzoate (26) in $CDCl_3$



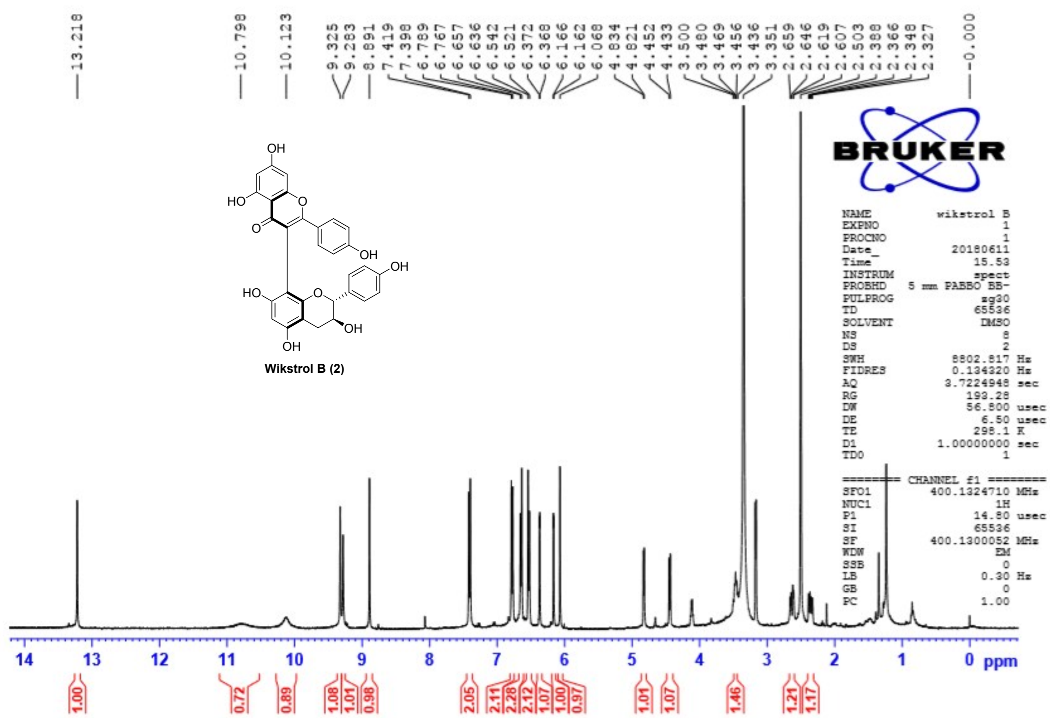


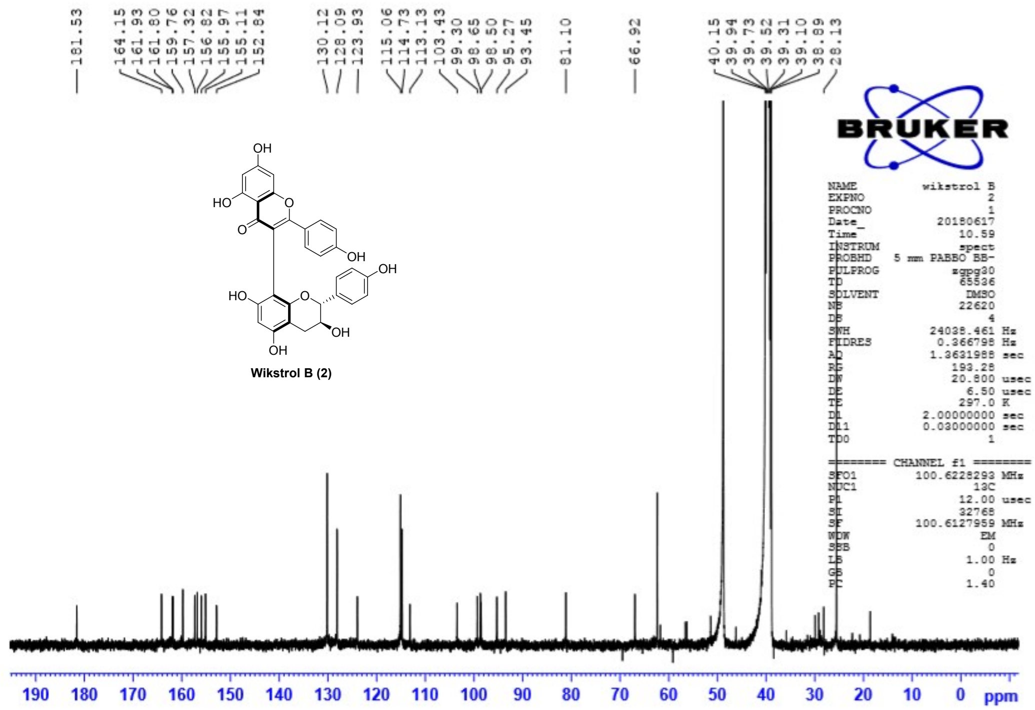
[1]H and [13]C NMR spectra of 5,7-dihydroxy-2-(4-hydroxyphenyl)-3-((2R,3S)-3,5,7-trihydroxy-2-(4-hydroxyphenyl)chroman-8-yl)-4H-chromen-4-one (1) in DMSO^{d6}





[1]H and [13]C NMR spectra of 5,7-dihydroxy-2-(4-hydroxyphenyl)-3-((2R,3S)-3,5,7-trihydroxy-2-(4-hydroxyphenyl)chroman-8-yl)-4H-chromen-4-one (2) in DMSO[d6]



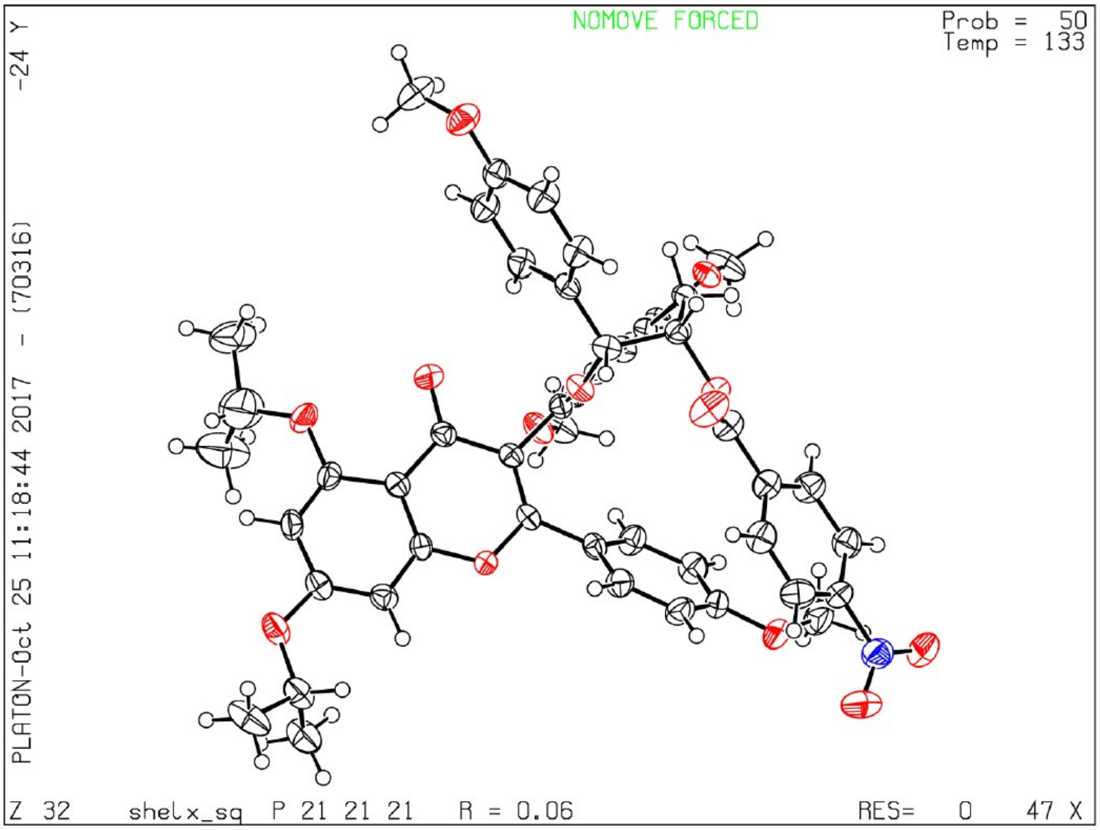


Crystallography data of compound **26**

Datablock: shelx_sq

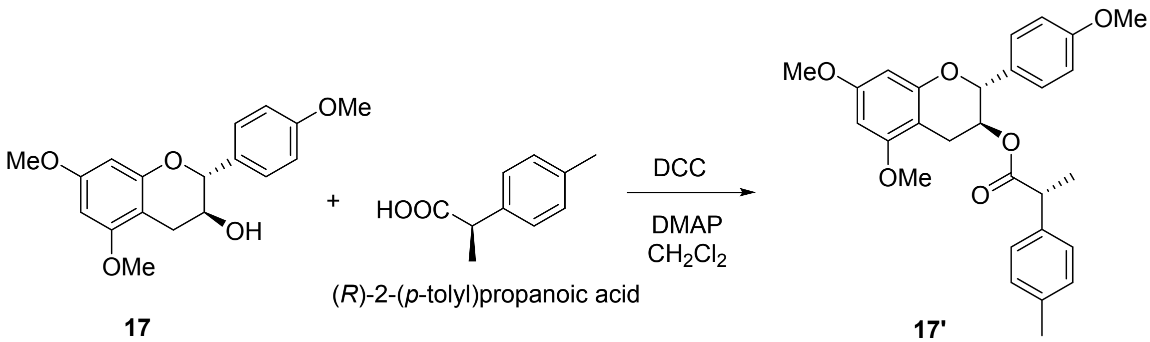
```
Bond precision:   C-C = 0.0053 A          Wavelength=0.71073

Cell:             a=11.2462(14)     b=16.3107(19)     c=25.345(3)
                  alpha=90          beta=90           gamma=90
Temperature:      133 K

                  Calculated                   Reported
Volume            4649.1(10)                   4649.1(10)
Space group       P 21 21 21                   P 21 21 21
Hall group        P 2ac 2ab                    P 2ac 2ab
Moiety formula    C47 H45 N O13 [+ solvent]    C47 H45 N O13
Sum formula       C47 H45 N O13 [+ solvent]    C47 H45 N O13
Mr                831.84                       831.84
Dx,g cm-3         1.189                        1.188
Z                 4                            4
Mu (mm-1)         0.087                        0.087
F000              1752.0                       1752.0
F000'             1752.98
h,k,lmax          14,21,33                     14,21,32
Nref              10749[ 5945]                 10671
Tmin,Tmax         0.981,0.990                  0.845,1.000
Tmin'             0.981

Correction method= # Reported T Limits: Tmin=0.845 Tmax=1.000
AbsCorr = MULTI-SCAN

Data completeness= 1.79/0.99      Theta(max)= 27.573

R(reflections)= 0.0560( 6995)     wR2(reflections)= 0.1194( 10671)

S = 1.017                   Npar= 558
```

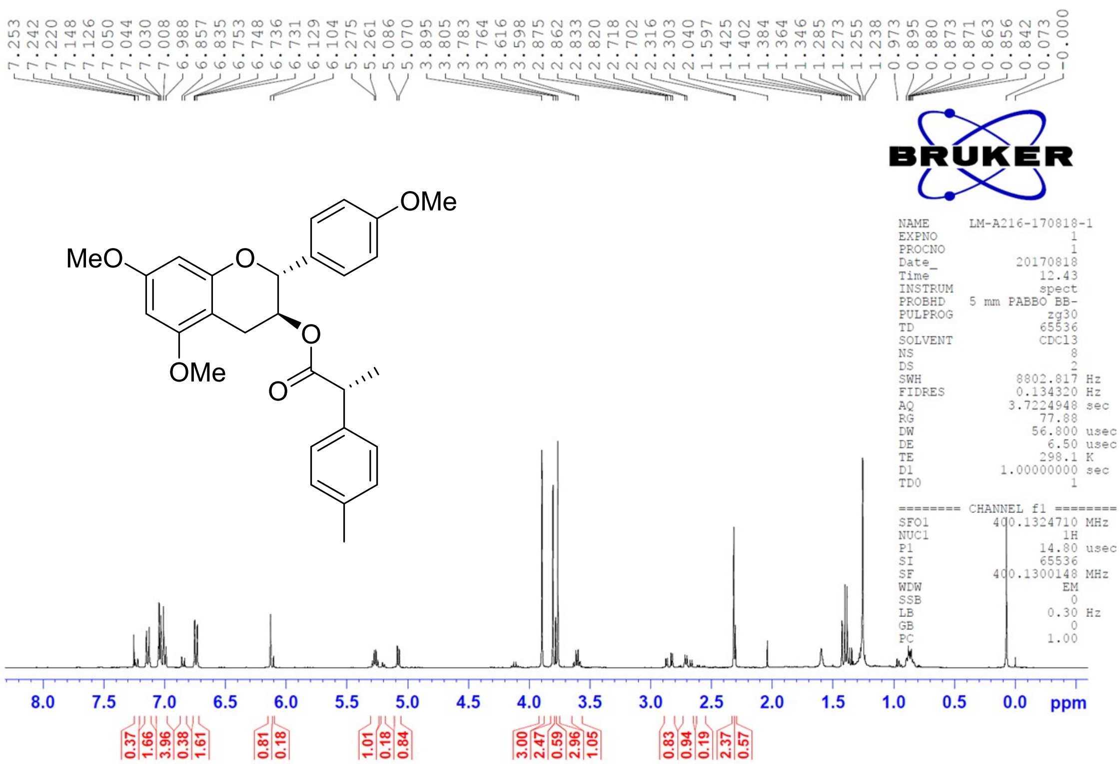
The following ALERTS were generated. Each ALERT has the format
      test-name_ALERT_alert-type_alert-level.
Click on the hyperlinks for more details of the test.



NOMOVE FORCED
Prob = 50
Temp = 133
-24 Y
PLATON-Oct 25 11:18:44 2017 - (70316)
Z 32 shelx_sq P 21 21 21 R = 0.06 RES= 0 47 X

The optical purity of key intermediate 17 was determined by coupled with (R)-2-(p-tolyl)propanoic acid. From [1]HNMR of the coupling product, the ratio of the two isomers is 5:1. This result means that the ee value of compound 17 is around 83%.





NMR spectrum comparation of natural **w**ikstrol A and wikstrol B with the synthetic samples

wikstrol A

^{1}H NMR		^{13}C NMR	
Natural sample in DMSO^{d6}	Synthetic sample in $CDCl_3$	Natural sample in DMSO^{d6}	Synthetic sample in $CDCl_3$
2.37 (dd, J = 16.2, 7.4 Hz, 1H)	2.38 (dd, J = 16.0, 8.8 Hz, 1H)	27.2	27.25
2.57 (dd, J = 16.2, 5.8 Hz, 1H)	2.56 (dd, J = 16.0, 5.2 Hz, 1H)	66.4	66.24
3.80 (m, 1H)	3.82-3.81 (m, 1H)	80.8	80.64
4.38 (d, J = 6.7 Hz, 1H)	4.37 (d, J = 7.6 Hz, 1H)	93.5	93.24
4.88 (d, J = 4.8 Hz, 1H)	4.90 (d, J = 5.2 Hz, 1H)	95.3	95.17
5.94 (s, 1H)	5.98 (s, 1H)	98.7	98.43
6.17 (d, J = 2.1 Hz, 1H)	6.20 (d, J = 1.6 Hz, 1H)	99.2	98.98
6.34 (d, J = 2.1 Hz, 1H)	6.37 (d, J = 1.6 Hz, 1H)	103.5	103.22
6.63 (d, J = 8.6 Hz, 2H)	6.64 (d, J = 6.8 Hz, 2H)	113.4	113.13
6.68 (d, J = 8.8 Hz, 2H)	6.70 (d, J = 7.2 Hz, 2H)	114.8	114.52
7.04 (d, J = 8.6 Hz, 2H)	7.04 (d, J = 7.6 Hz, 2H)	115.1	114.74
7.32 (d, J = 8.8 Hz, 2H)	7.32 (d, J = 6.8 Hz, 2H)	124.0	123.68
8.68 (s, 1H)	8.71 (s, 1H)	128.3	127.85
9.24 (s, 1H)	9.29 (s, 1H)	130.4	129.91
9.27 (s, 1H)	9.32 (s, 1H)	130.4	130.04
9.96 (s, 1H)	10.06 (s, 1H)	153.8	153.36
10.73 (s, 1H)	10.30 (s, 1H)	154.4	154.04
13.31 (s, 1H)	10.83 (s, 1H)	156.2	155.79
		157.0	156.59
		157.6	157.15
		159.7	159.25
		162.1	161,60
		162.5	162.02
		164.3	163.93
		182.0	181.46

wikstrol B

^{1}H NMR		^{13}C NMR	
Natural sample in DMSO^{d6}	Synthetic sample in $CDCl_3$	Natural sample in DMSO^{d6}	Synthetic sample in $CDCl_3$
2.34 (dd, *J* = 15.1, 8.4 Hz, 1H)	2.36 (dd, *J* = 16.0, 8.8 Hz, 1H)	27.7	28.13
2.65 (dd, *J* = 15.1, 5.2 Hz, 1H)	2.63 (dd, *J* = 16.0, 5.2 Hz, 1H)	66.6	66.92
3.46 (m, 1H)	3.44-3.50 (m, 1H)	80.8	81.10
4.43 (d, *J* = 6.8 Hz, 1H)	4.44 (d, *J* = 7.6 Hz, 1H)	93.4	93.45
4.80 (d, *J* = 5.1 Hz, 1H)	4.83 (d, *J* = 5.2 Hz, 1H)	95.0	95.27
6.04 (s, 1H)	6.07 (s, 1H)	98.3	98.50
6.13 (d, *J* = 2.1 Hz, 1H)	6.16 (d, *J* = 1.6 Hz, 1H)	98.7	98.65
6.34 (d, *J* = 2.1 Hz, 1H)	6.37 (d, *J* = 1.6 Hz, 1H)	99.0	99.30
6.51 (d, *J* = 8.6 Hz, 2H)	6.53 (d, *J* = 8.4 Hz, 2H)	103.0	103.43
6.64 (d, *J* = 8.6 Hz, 2H)	6.65 (d, *J* = 8.4 Hz, 2H)	112.8	113.13
6.76 (d, *J* = 8.8 Hz, 2H)	6.78 (d, *J* = 8.4 Hz, 2H)	114.5	114.73
7.40 (d, *J* = 8.8 Hz, 2H)	7.41 (d, *J* = 8.4 Hz, 2H)	114.9	115.06
8.87 (s, 1H)	8.89 (s, 1H)	123.7	123.93
9.26 (s, 1H)	9.28 (s, 1H)	127.9	128.09
9.30 (s, 1H)	9.32 (s, 1H)	129.9	130.12
10.07 (s, 1H)	10.12 (s, 1H)	152.6	152.84
10.72 (s, 1H)	10.22 (s, 1H)	154.9	155.11
13.22 (s, 1H)	10.80 (s, 1H)	155.6	155.97
		156.5	156.82
		157.2	157.32
		159.5	159.76
		161.5	161,80
		161.6	161.93
		164.6	164.15
		181.2	181.53