Electronic Supplementary Information

A versatile carbohydrate based gelator for the oil water separation, nanoparticles synthesis and dye removal

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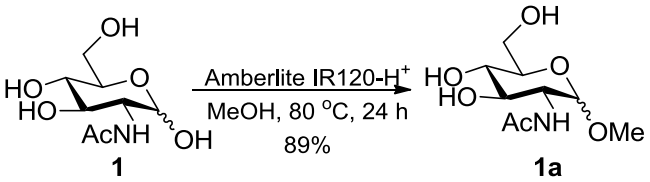
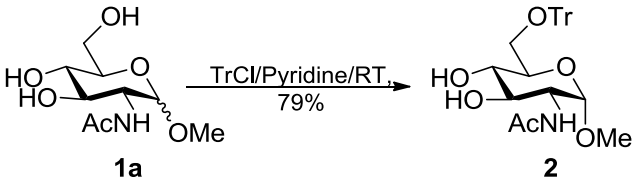
1. Synthesis schemes

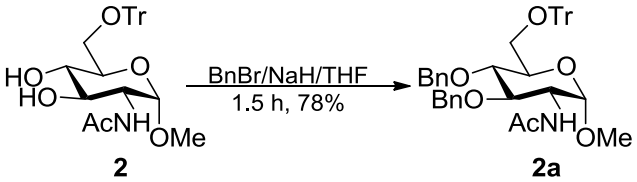
1.1. Scheme-S1 (Synthesis of Methyl 2-acetamido-2-deoxy- D-glucopyranoside)[1]



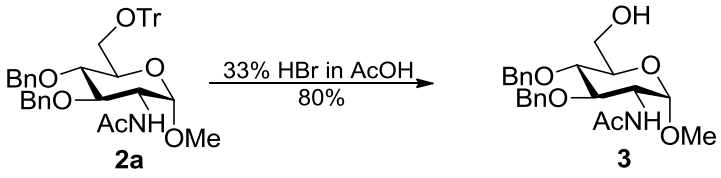
1.2. Scheme-S2 (Synthesis of Methyl 6-*O*-triphenylmethyl-2-acetamido-2-deoxy-α-D-glucopyranoside)[2]



1.3 Scheme-S3 (Synthesis of Methyl 3,4-di-*O*-benzyl-6-*O*-triphenylmethyl-2-acetamido-2-deoxy-α-D-gluco pyranoside)[3]



1.4. Scheme-S4 (Synthesis of Methyl 3,4 -di-*O*-benzyl-2-acetamido-2-deoxy-α-D-glucopyranoside)[4]



References:

1. N. Goyal, H. P. R. Mangunuru, B. Parikh, S. Shrestha and G. Wang, *Beilstein J. Org. Chem.* 2014**, 10**, 3111–3121

2. A. Roy, A. K. Ray, A. Mukherjee, N. Roy, *Indian J. of Chem., Sec B*: 1987, **26B**, 1165-1167

3. T. Suami, Kin-ichi Tadano, Y. Iimura, H.Tanabe, ***Carbohydr. Res*.** 1985, **135**, 319-323

4. a) L. Petersen and K. J. Jensen, ***J. Chem. Soc., Perkin Trans. 1,*** 2001, 2175-2182; b) M.L. Falcone-Hindley and J. T. Davis, ***J. Org. Chem.*** 1998, **63**, 5555-5561.

Table S1: Gelation abilities of gelator in various liquids

Solvent	**Concentration in wt%**	**CGC in wt%**	**Time required for completion of gelation**				**Appearance**
			At room temperature	**Ice bath cooling**	**Water bath sonication**	**Probe sonication**	
Benzene	0.5	0.41	9 min 54 sec	4 min 58 sec	25 sec	6 sec (0.55 wt %)	TG
Toluene	0.55	0.35	3 min 54 sec	52 sec	20 sec	2 sec	TG
m-Xylene	0.55	0.42	1 min 11 sec	10 sec	41 sec	2 sec	TG
p-Xylene	0.55	0.41	1 min 10 sec	15 sec	45 sec	4 sec	TG
o-Xylene	0.55	0.38	2 min 56 sec	40 sec	1 min 6 sec	2 sec	TG
Mesitylene	0.55	0.41	45 sec	32 sec	34 sec	3 sec	TG
Chlorobenzene	0.62	0.5	16 min 15 sec	4 min 15 sec	----	4 sec (1wt%)	TG
Bromobenzene	1	0.85	1 min 19 sec	45 sec	----	----	TG
Iodo benzene	0.63	0.63	9 min 30 sec	2 min 07 sec	----	----	TG

1,2 dichlorobenzene	0.62	0.46	14 min 20 sec	1min 30 sec	----	----	TG
EtOH:H_2O (1:2)	1.6	-----	15 min	1 min 36 sec	----	----	OG
DMSO:H_2O (1:2)	1	-----	65 min	----	----	----	TG
DMSO: H_2O (1:1)	1	-----	----	1 min 50 sec	----	----	TG
Diesel	2	2	3 min	54 sec	----	----	OG
Petrol	0.5	0.38	1 min 3 sec	54 sec	----	----	TG
Aniline	0.55	----	S	S	----	----	S
Nitro benzene	0.55	----	S	S	----	----	S
THF	0.55	----	S	S	----	----	S
n-hexanol	0.55	----	S	S	----	----	S
Ethylene glycol	0.55	----	S	S	----	----	S

TG - Transparent gel, **OG** - Opaque gel and **S**-Soluble *All CGC were calculated at room temperature

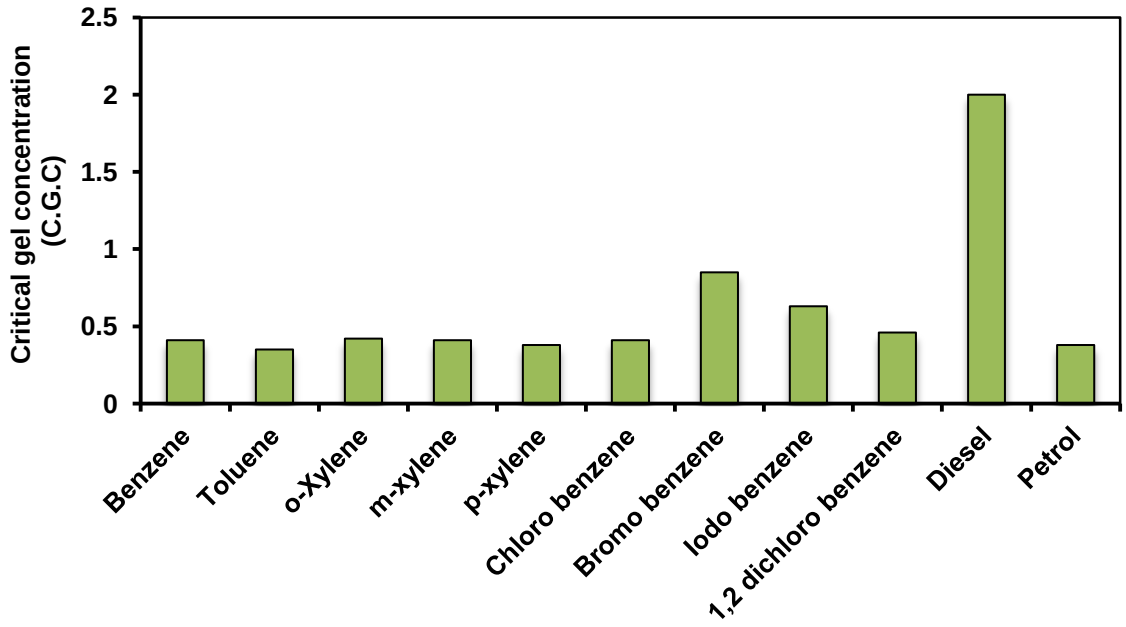


Figure S1 Bar graph C.G.C values of gelator for some of the organic solvents and oils

2. Determination of gel-sol transition temperatures (T_{gel})

Gel prepared using toluene and gelator was taken in a glass vial. A glass bead was placed on the top of gel sample and the vial was sealed. Afterward vial was heated in a thermo-stated oil bath and the temperature of the bath was increased at a rate of 0.1 °C /min using temperature controller. The temperature at which ball penetrates the gel and reaches to the bottom of the gel is regarded as the T_{gel} of the system.

The T_{gel} of the toluene gel was measured to be 68°C.

3. Characterization of the gelator

3.1 FTIR analysis of the gelator

IR spectrum of the gelator consists of following bands:

3294 cm^{-1} (O-H stretching overlapping the N-H stretching), 3030 (ArC-H stretching),2919 cm^{-1} (C-H stretching), 1644 cm^{-1} (amide II band, C-O stretching of the acetyl group), 1551 cm^{-1} (amide II band, N-H bending) 1485–1380 cm^{-1} (asymmetrical C-H bending of the CH_2 group), 1373 and 1359 cm^{-1} (C-H plane bending), 1070 cm^{-1} (C-O-C stretching), 1055 cm^{-1} (C-O-C stretching), 1040 cm^{-1} (C-O stretching).

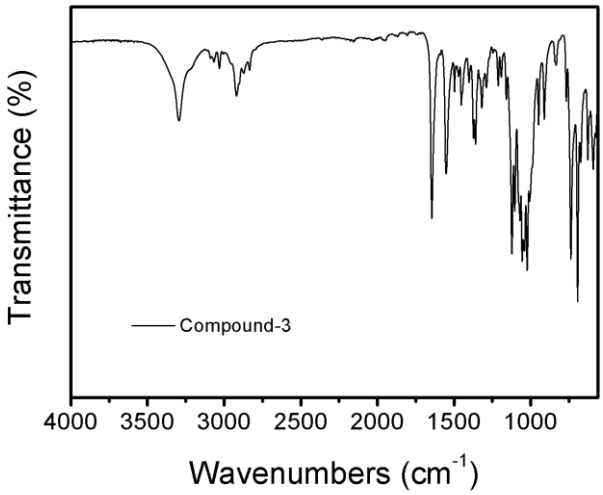


Figure S2 FTIR spectrum of the gelator (Compound-3)

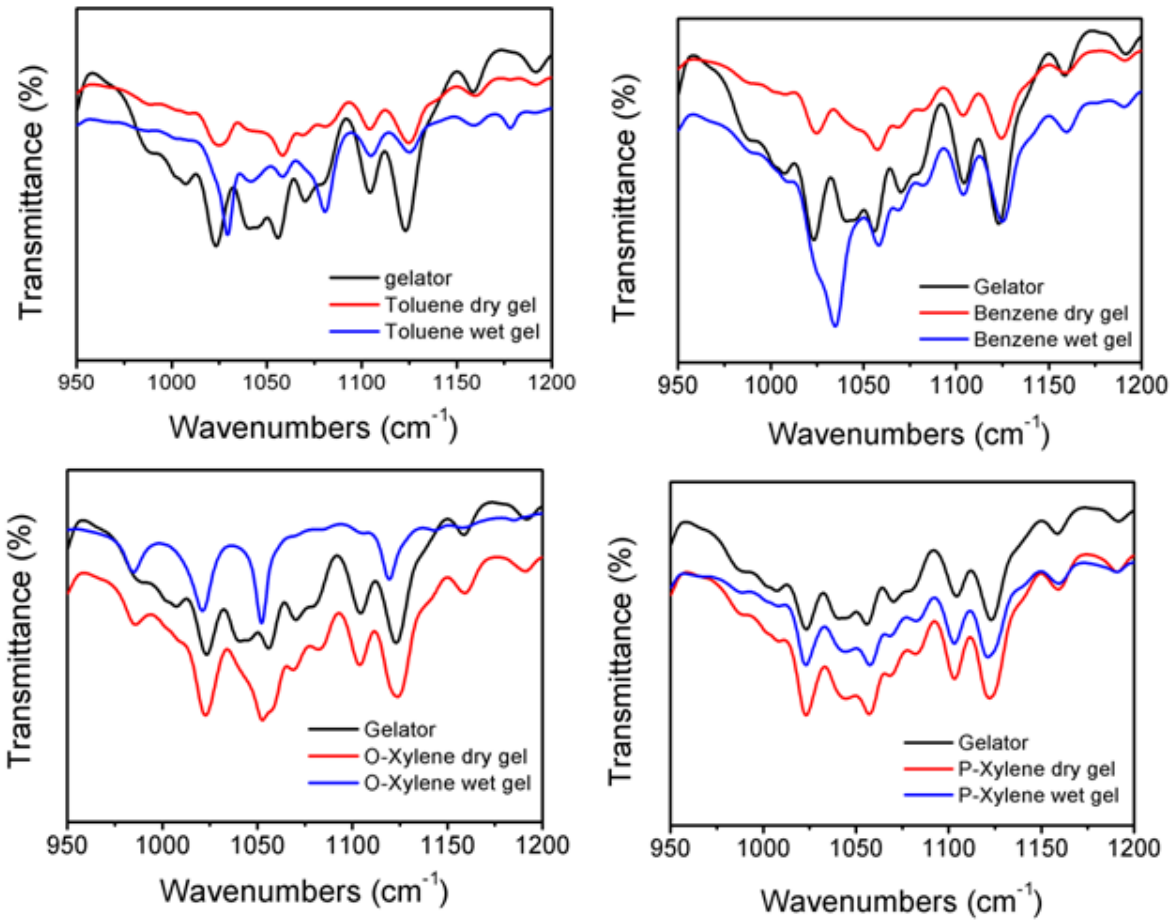


Figure S3 FTIR spectra of the organogel having different organic solvents

3.2 UV-vis analysis of the gelator

The UV-vis spectrum of the gelator consists of peaks positioned at 210 and 257 nm which might be attributed to the π- π* transitions.

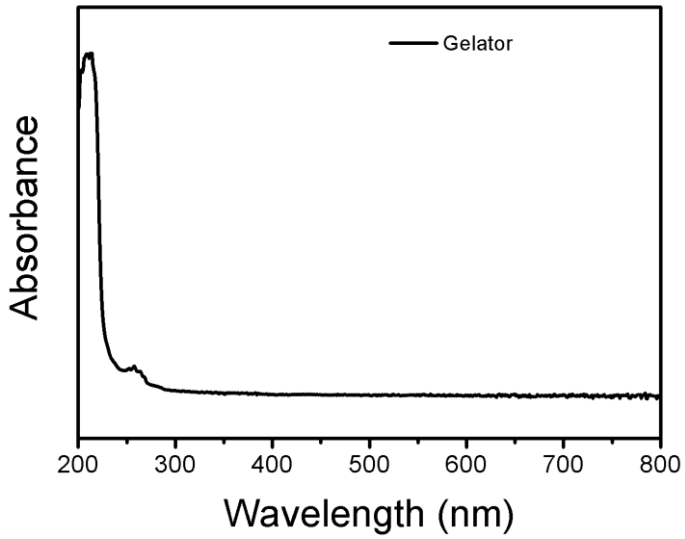


Figure S4 UV-vis spectrum of the gelator

4. Phase selective gelation of nonpolar solvents in presence of water

5 mg gelator and fixed volume of liquid were taken in a glass vial and sonicated, heated slowly to dissolve the gelator completely. Thereafter water (1 mL) was slowly added into the glass vial and resulting mixture was allowed to cool down to room temperature. Finally the vial was turned upside down and system was considered as gel if it doesn't fell down.

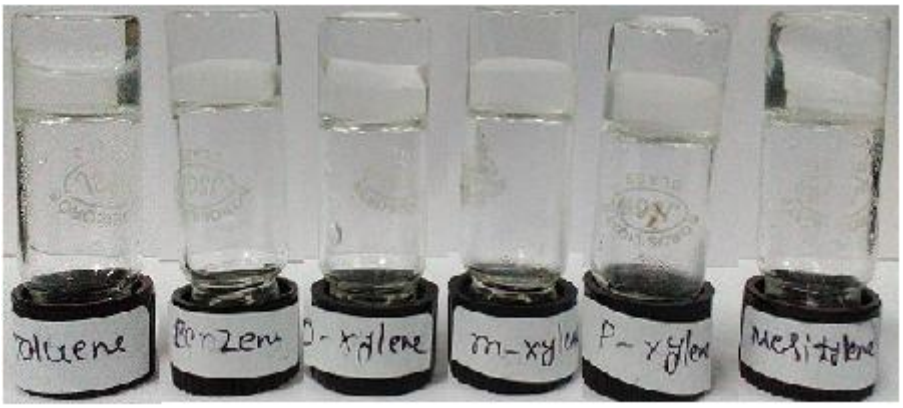


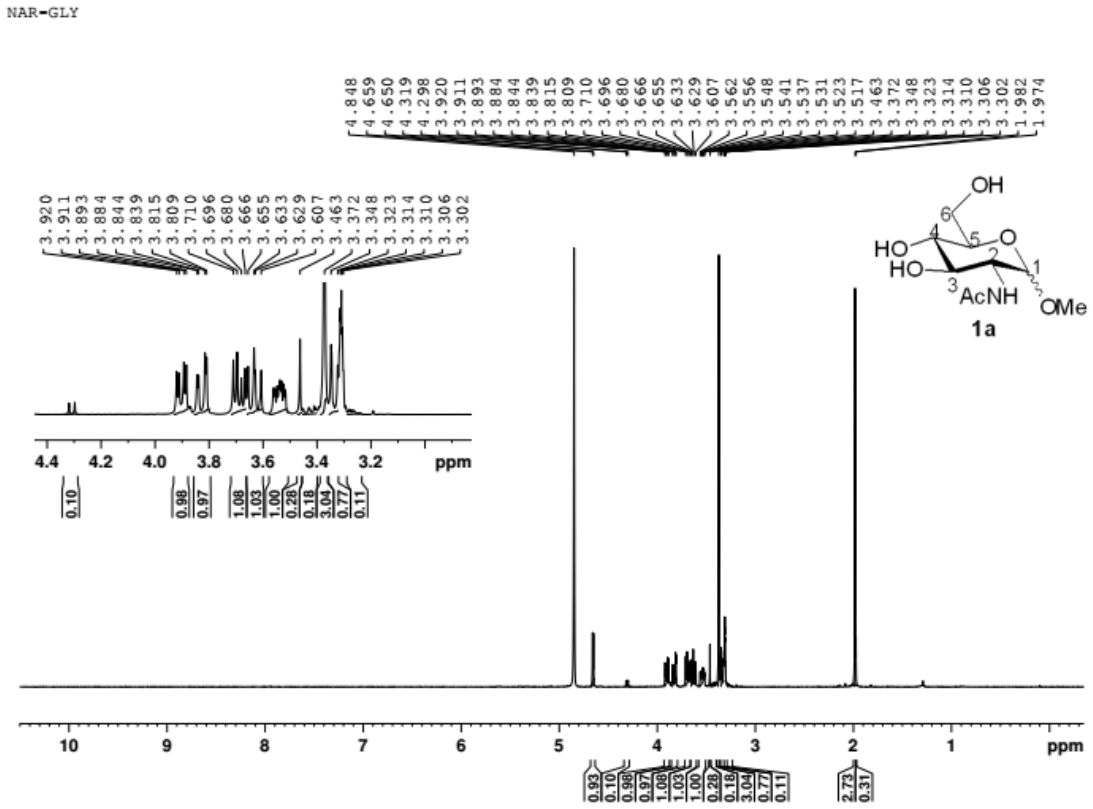
Figure S5 Organogels holding water from left to right toluene, benzene, o-xylene, m-xylene, p-xylene and mesitylene

5. Gel formation in polar solvents

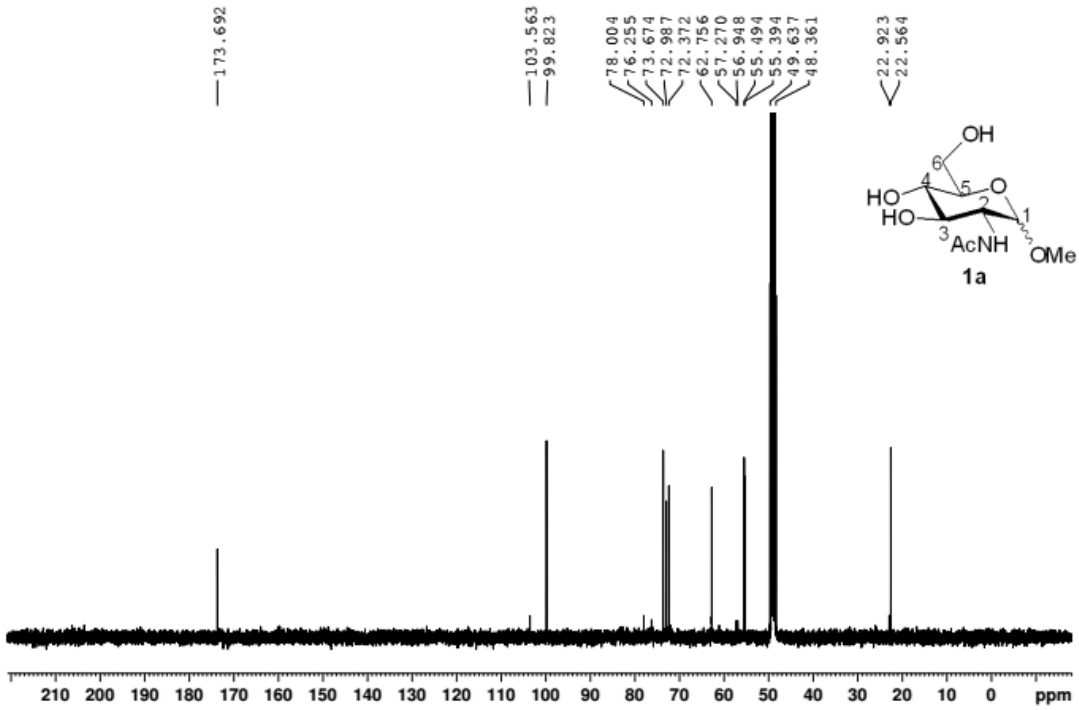
Gelator **3** and DMSO: H_2O in 1:2 ratio was taken in a glass vial and sonicated at room temperature (1 min), resulting mixture was kept at room temperature for a specified time (Table S1) to form gel and finally the vial was inverted (Figure S6). A system was considered as gel if it doesn't fell down on keeping vial upside down. Similarly procedure was applied for gel formation in EtOH: H_2O (1: 2) co-solvent (Figure S6).

Figure S6 Gels prepared by dissolving gelators in DMSO, EtOH and H_2O in different ratio (a) DMSO:H_2O (1:2) at 0.5 mg/ 0.5 ml (b) EtOH:H_2O (1:2) at 0.8 mg/0.5 ml

6. Copies of ^{1}H and ^{13}C NMR spectra of all compounds



NAR-GLY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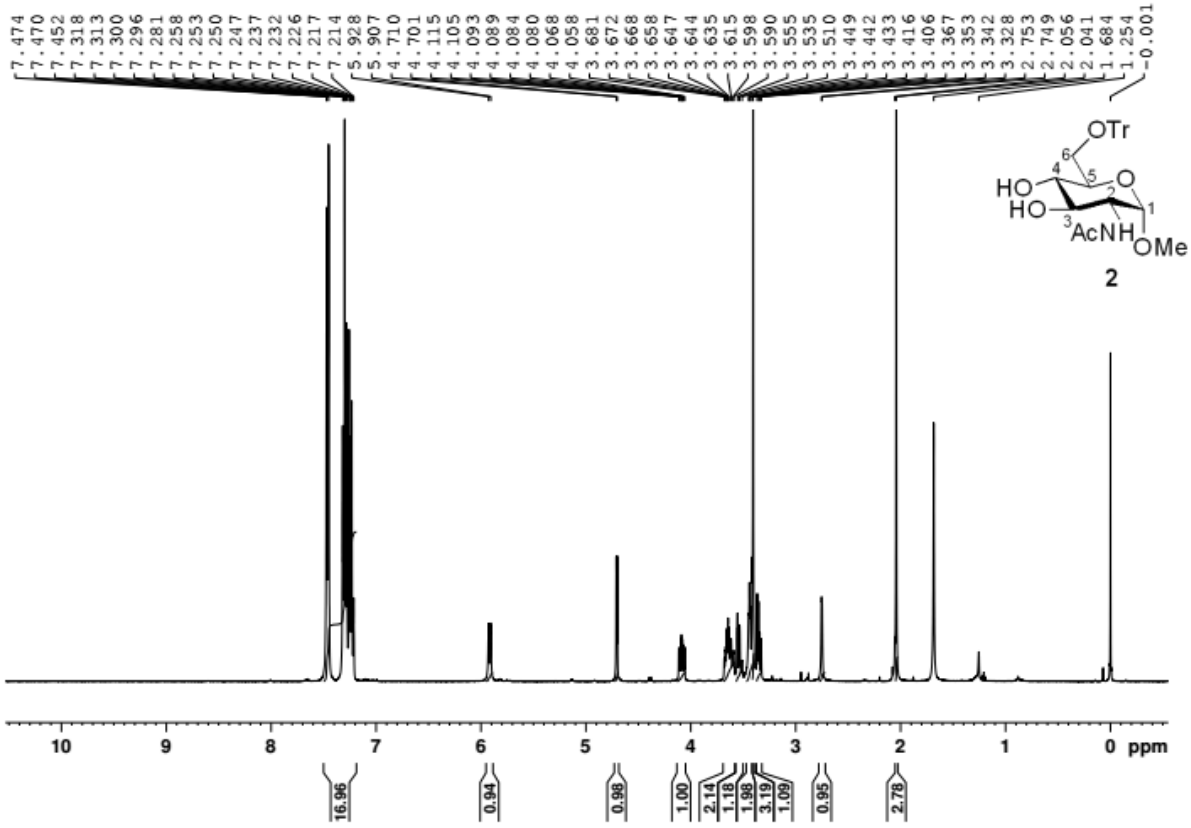
103.563
99.823
78.004
76.255
73.674
72.987
72.372
62.756
57.270
56.948
55.494
55.394
49.637
48.361
22.923
22.564
OH
6
4
5
O
HO
2
1
HO
3
AcNH
OMe
1a
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm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7.318
7.313
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7.253
7.250
7.247
7.237
7.232
7.226
7.217
7.214
5.928
5.907
4.710
4.701
4.115
4.105
4.093
4.089
4.084
4.080
4.068
4.058
3.681
3.672
3.668
3.658
3.647
3.644
3.635
3.615
3.598
3.590
3.555
3.535
3.510
3.449
3.442
3.433
3.416
3.406
3.367
3.353
3.342
3.328
2.753
2.749
2.056
2.041
1.684
1.254
-0.001
OTr
6
4
5
O
HO
2
1
HO
3
AcNH
OMe
2
10 9 8 7 6 5 4 3 2 1 0 ppm
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0.94
0.98
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1.18
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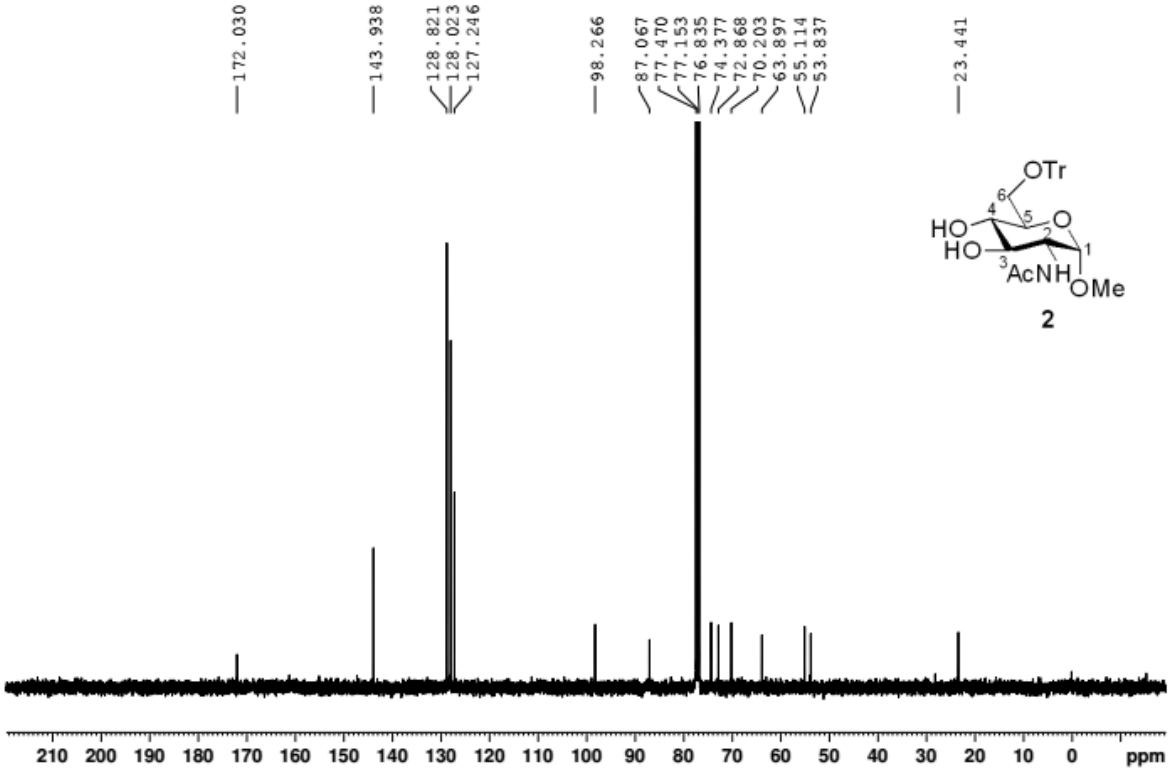
1.09
0.95
2.78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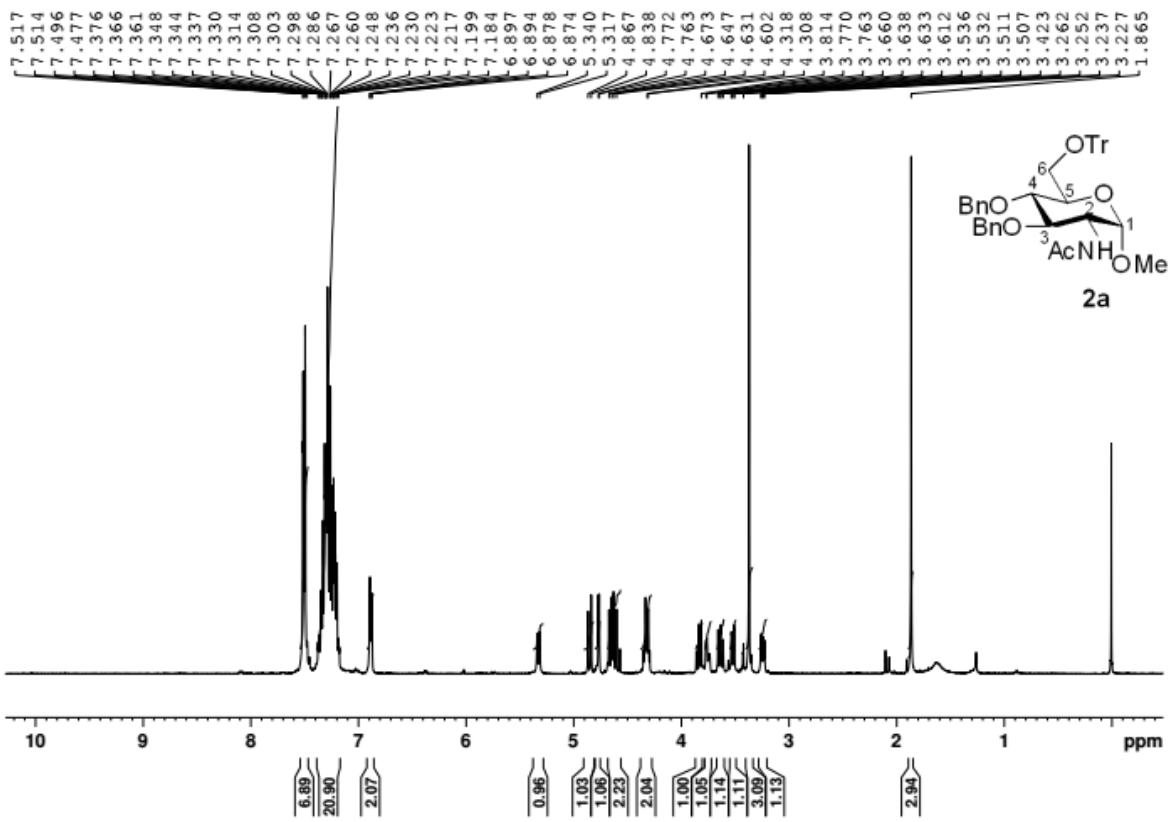
72.868
70.203
63.897
55.114
53.837
23.441
OTr
HO
HO
AcNH
OMe
2
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm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7.496
7.477
7.376
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7.217
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7.184
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1.865
OTr
BnO
BnO
AcNH
OMe
2a
10 9 8 7 6 5 4 3 2 1 ppm
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1.05
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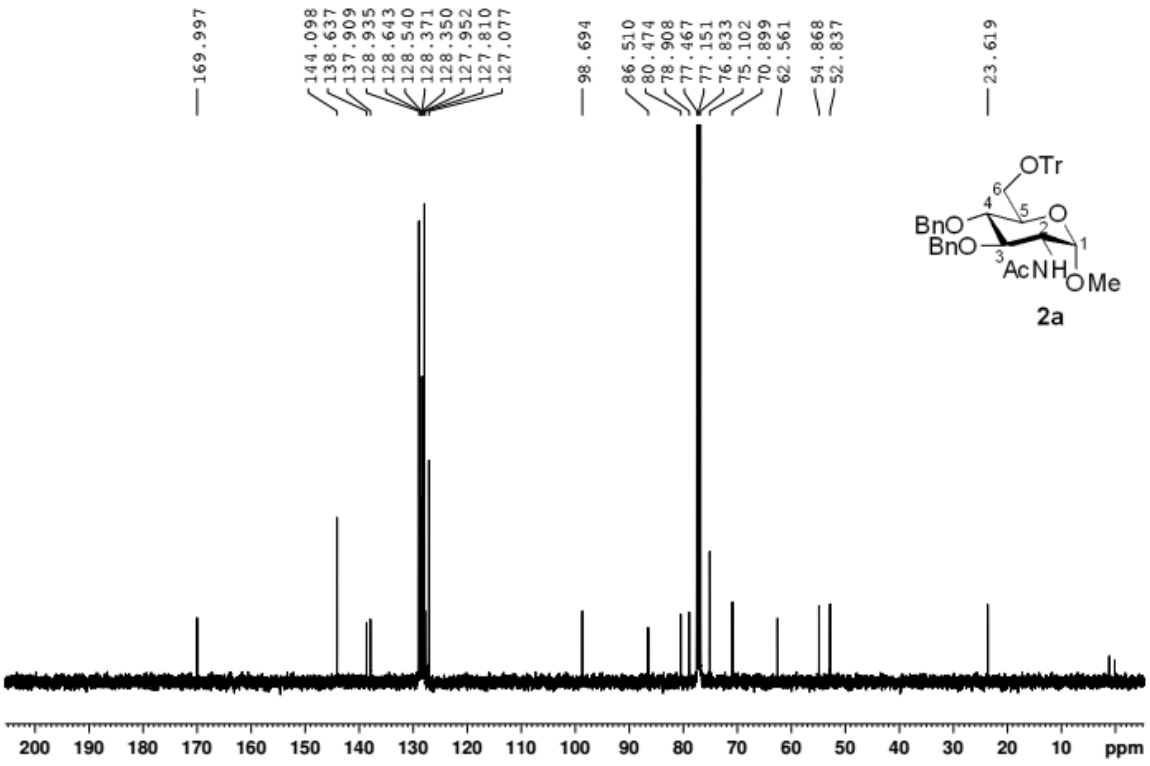
1.11
3.09
1.13
2.94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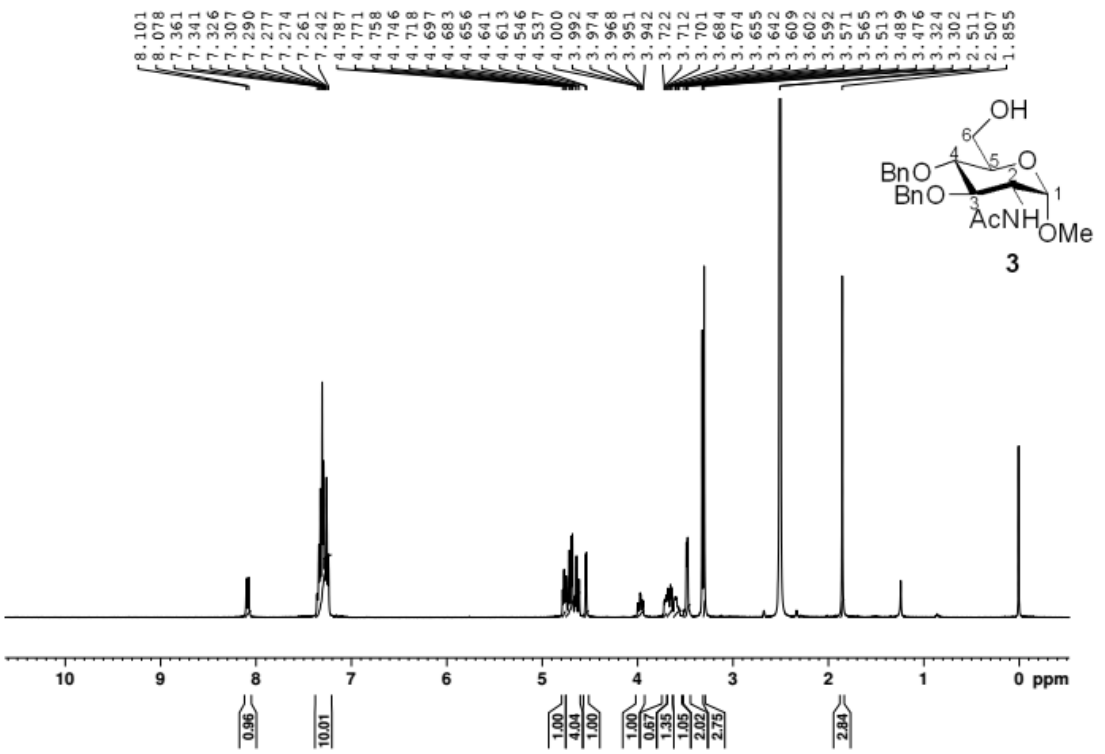
77.467
77.151
76.833
75.102
70.899
62.561
54.868
52.837
23.619
OTr
BnO
BnO
AcNH
OMe
2a
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 ppm

NAR-dt-1HNMR



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