

## Supplementary Materials

### Antiviral mechanism of virucidal sialic acid modified cyclodextrin

Yong Zhu <sup>1</sup>, Andrey Sysoev <sup>2</sup>, Paulo Jacob Silva <sup>1</sup>, Marine Batista <sup>1</sup> and Francesco Stellacci <sup>1</sup>.

<sup>1</sup> Institute of Materials, École Polytechnique Fédérale de Lausanne, Switzerland. Station 12, Lausanne 1015, Switzerland

<sup>2</sup> Department of Mechanistic Cell Biology, Max-Planck Institute of Molecular Physiology, Otto-Hahn-Straße 11, 44227 Dortmund, Germany

\* Correspondence: francesco.stellacci@epfl.ch

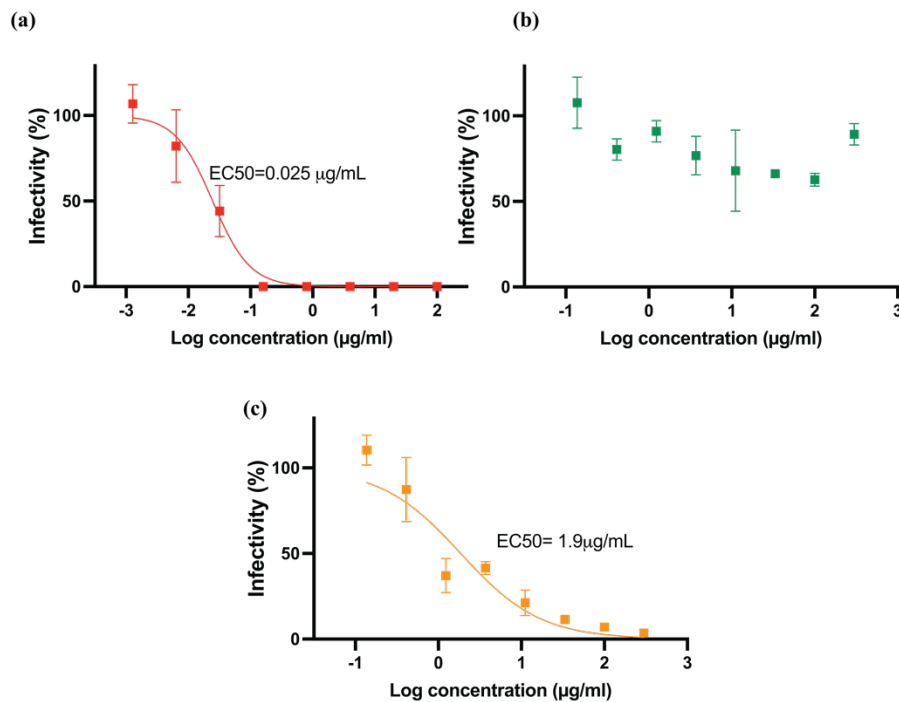


Figure S1. H1N1 Inhibition of (a) CD-6'SLN EC<sub>50</sub> = 0.025 µg/mL (95% CI 0.017-0.035 µg/mL), (b) CD-(S-C11-COOH)<sub>7</sub> EC<sub>50</sub> > 300 µg/mL and (c) CD-(Mal-PEG8)<sub>7</sub>-6'SLN EC<sub>50</sub> = 1.86 µg/mL (95% CI 1.05-3.42 µg/mL) against H1N1 (A/Netherlands/2009). The virus was first treated with test materials for 1 h and then applied to the cell.

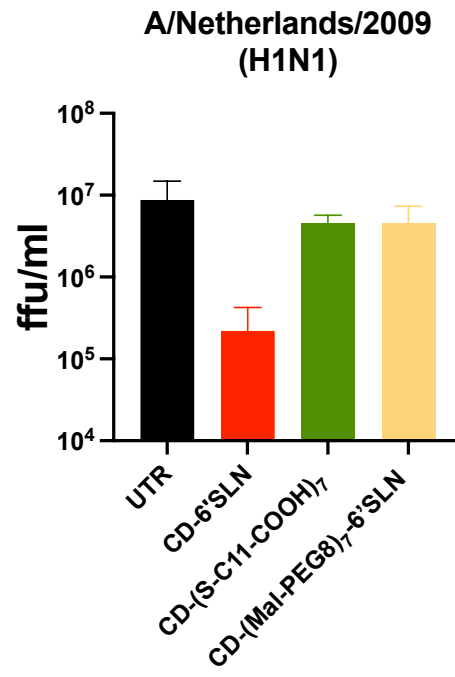


Figure S2. Virucidal results of CD-6'SLN, CD-(S-C11-COOH)<sub>7</sub> and CD-(Mal-PEG8)<sub>7</sub>-6'SLN against H1N1 (A/Netherlands/2009).

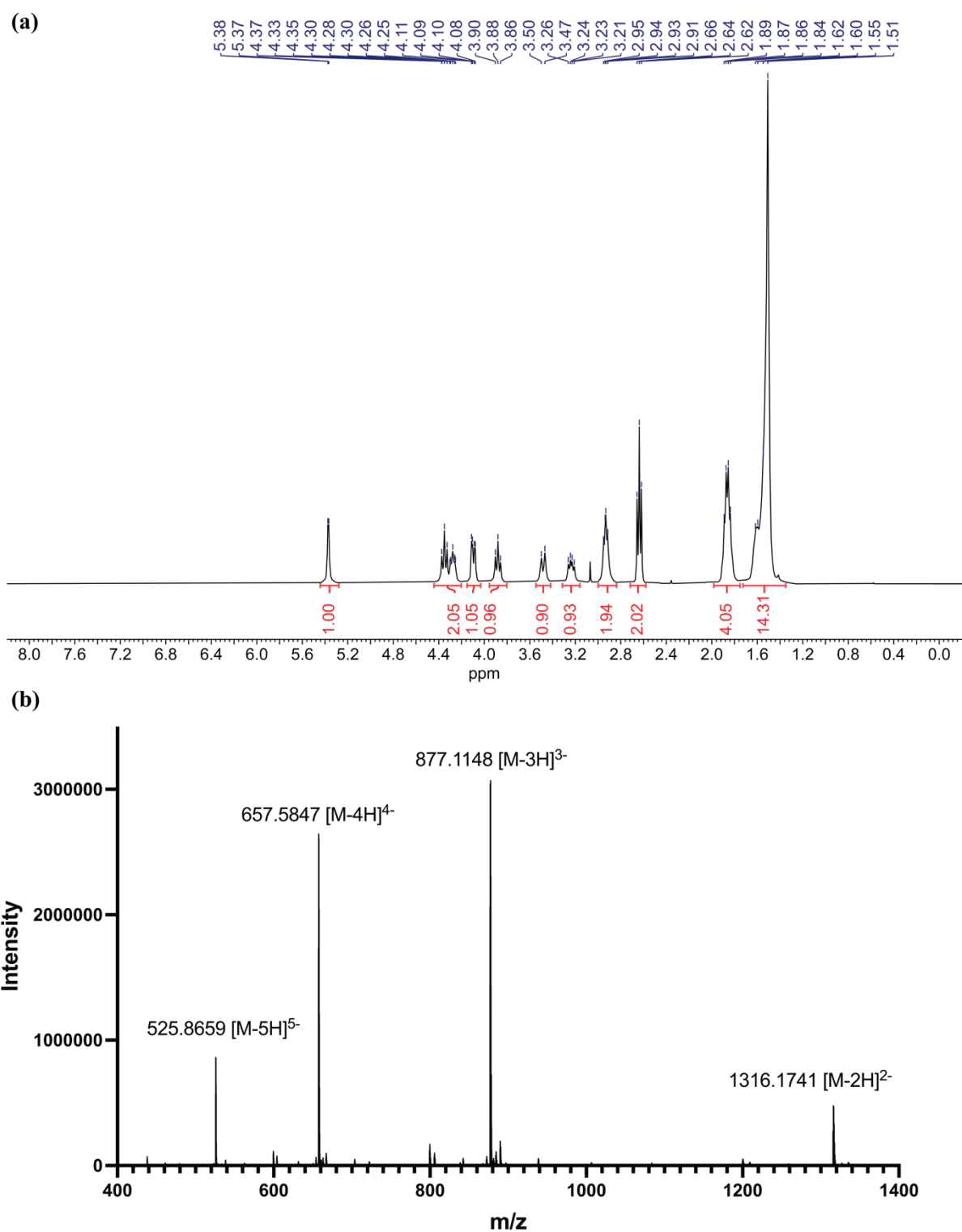


Figure S3. Characterization of CD-(S-C11-COOH)<sub>7</sub>. (a) <sup>1</sup>H NMR of CD-(S-C11-COOH)<sub>7</sub> in TFA-d (b) Mass spectrum of CD-(S-C11-COOH)<sub>7</sub>.

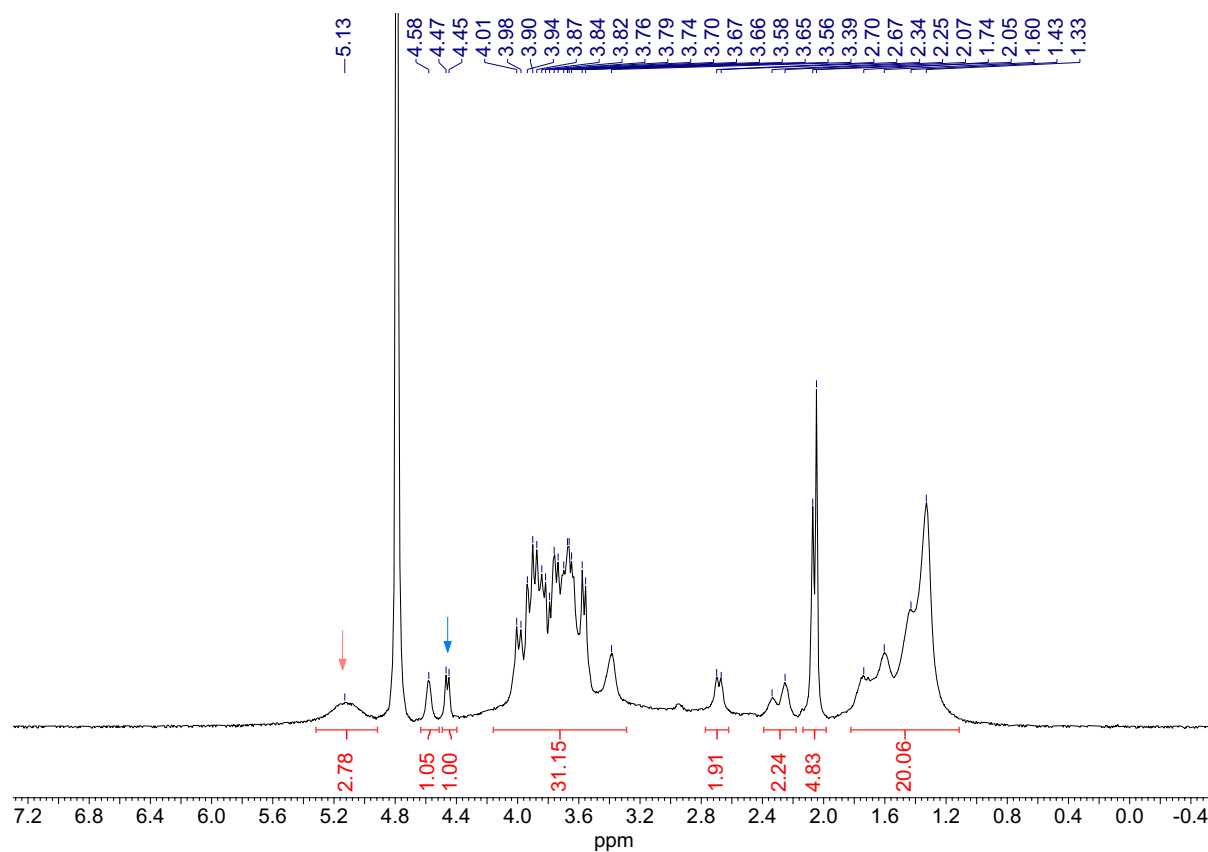


Figure S4.  $^1\text{H}$  NMR of CD-6'SLN in  $\text{D}_2\text{O}$ . Average number of 6'SLN (2.5) per  $\beta$ -cyclodextrin was calculated by comparing the integral of a distinctive peak from trisaccharide (blue arrow) and the integral of a peak from  $\beta$ -cyclodextrin (red arrow). Both peaks represent 1 hydrogen.

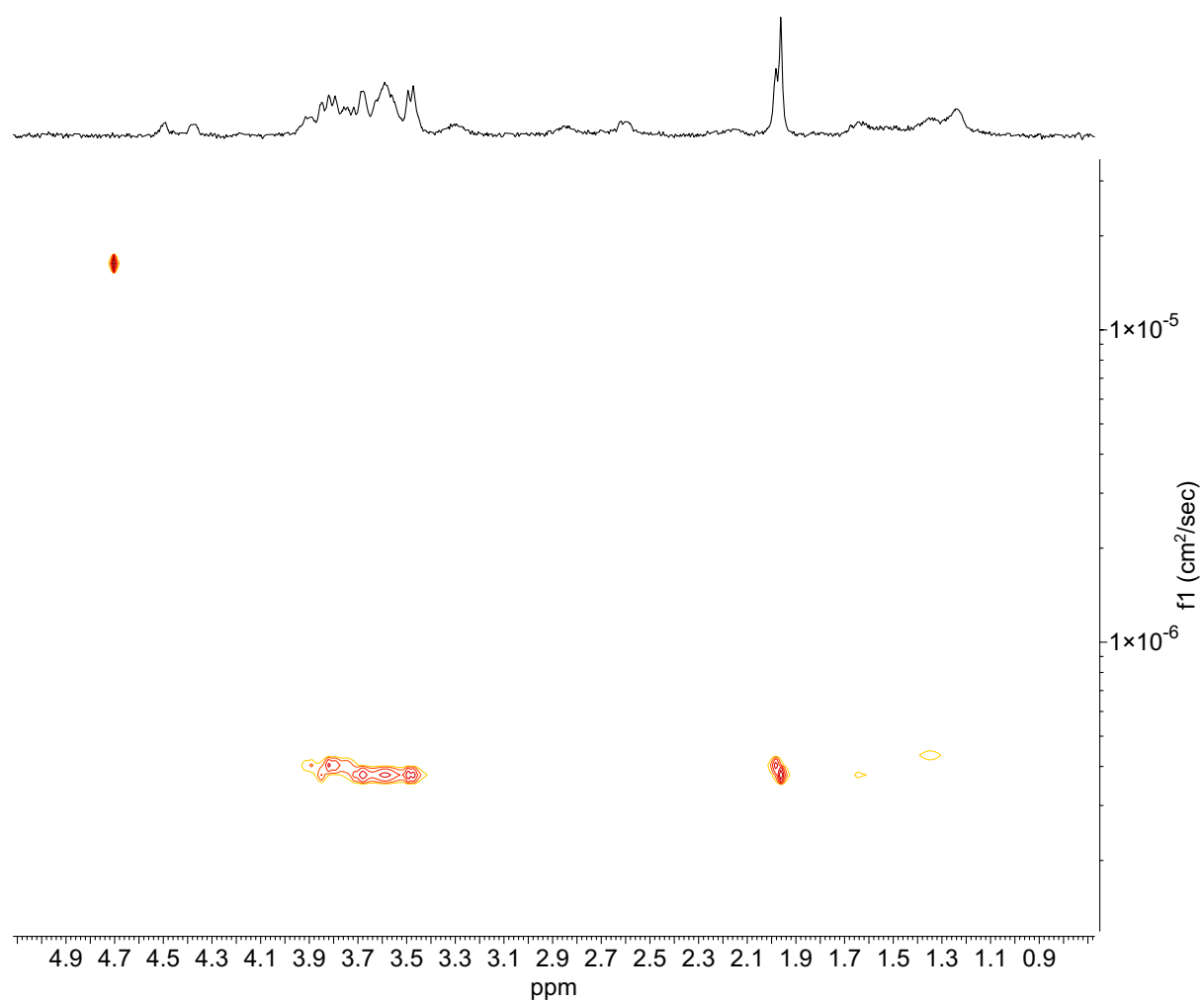


Figure S5. DOSY NMR of CD-6'SLN in  $\text{D}_2\text{O}$  shows the product is free of 6'SLN.

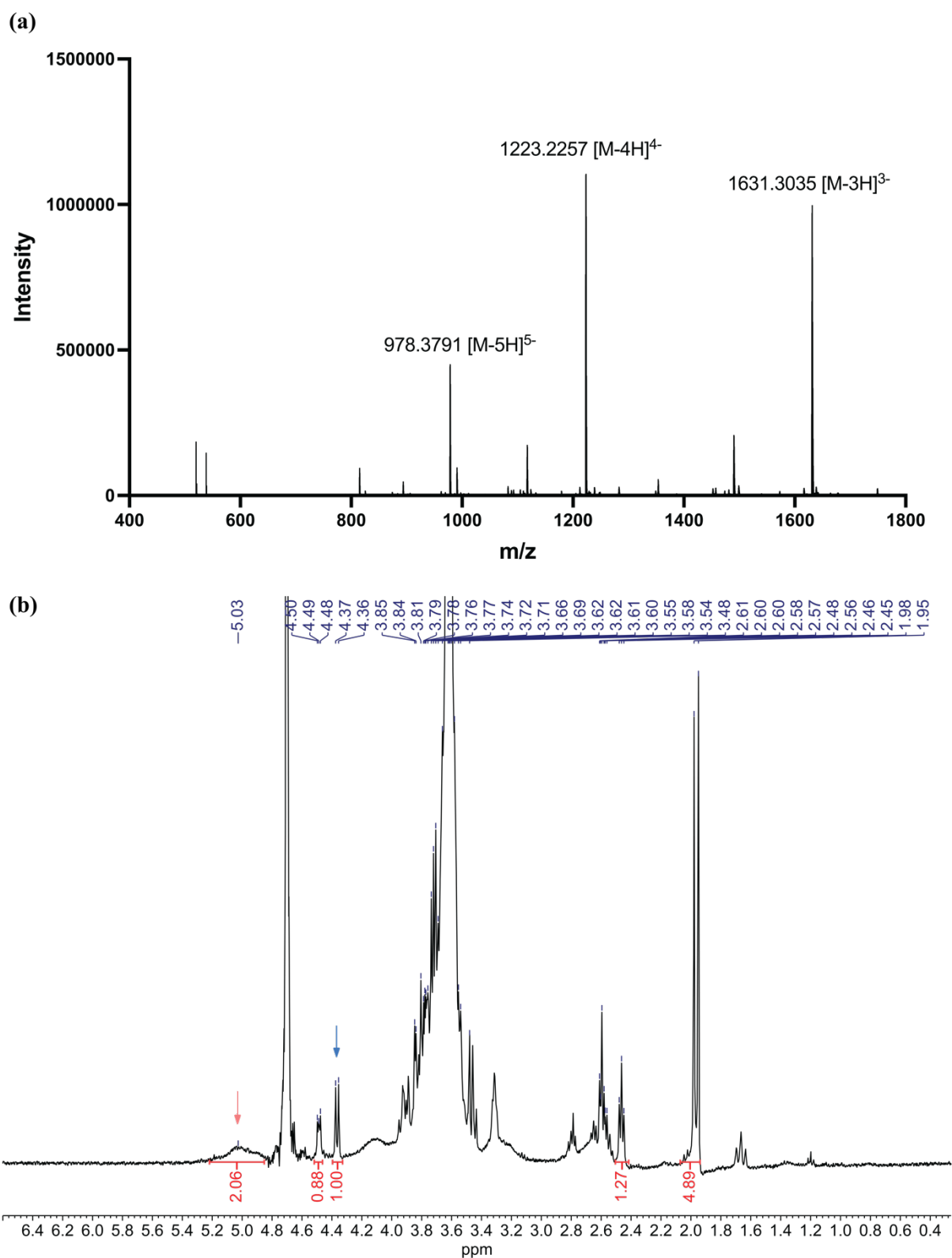


Figure S6. Characterization of CD-(Mal-PEG8)<sub>7</sub>-COOH and CD-(Mal-PEG8)<sub>7</sub>-6'SLN (a) Mass spectrum of CD-(Mal-PEG8)<sub>7</sub>-COOH before sugar modification. (b) <sup>1</sup>H NMR of CD-(Mal-PEG8)<sub>7</sub>-6'SLN in D<sub>2</sub>O. Average number of 6'SLN (3.4) per β-cyclodextrin was calculated by comparing the integral of a distinctive peak from trisaccharide (blue arrow) and the integral of a peak from β-cyclodextrin (red arrow). Both peaks represent 1 hydrogen.