Electronic Supplementary Material (ESI) for Catalysis Science & Technology.

Unraveling the hydrolysis of β-1,4-glycosidic bonds in cello-oligosaccharides over carbon catalysts

Pengru Chen, [a,b] Abhijit Shrotri, [a] * Atsushi Fukuoka [a] *

[a]Institute for Catalysis, Hokkaido University, Kita 21 Nishi 10, Kita-ku, Sapporo, Hokkaido 001-0021, Japan

[b]Graduate School of Chemical Sciences and Engineering, Hokkaido University, Kita 13 Nishi 8, Kita-ku, Sapporo, Hokkaido 060-8628, Japan

Content list:

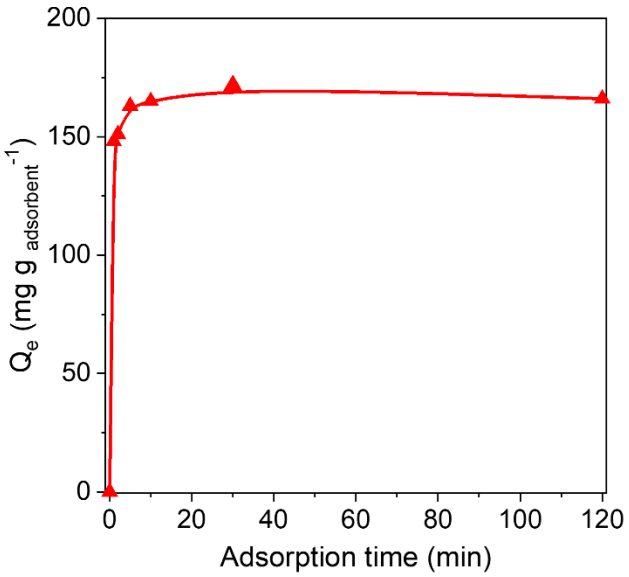


Fig. S1. Time dependent adsorption of cellotetraose (G4) over AC-air. Conditions: 1 mL 4 mM G4, 10 mg AC-air, 30 min, room temperature.

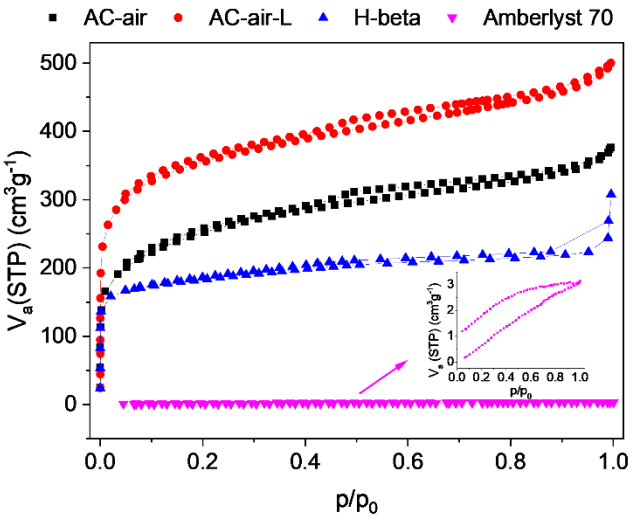


Fig. S2. N_2 adsorption isotherms of solid catalysts.

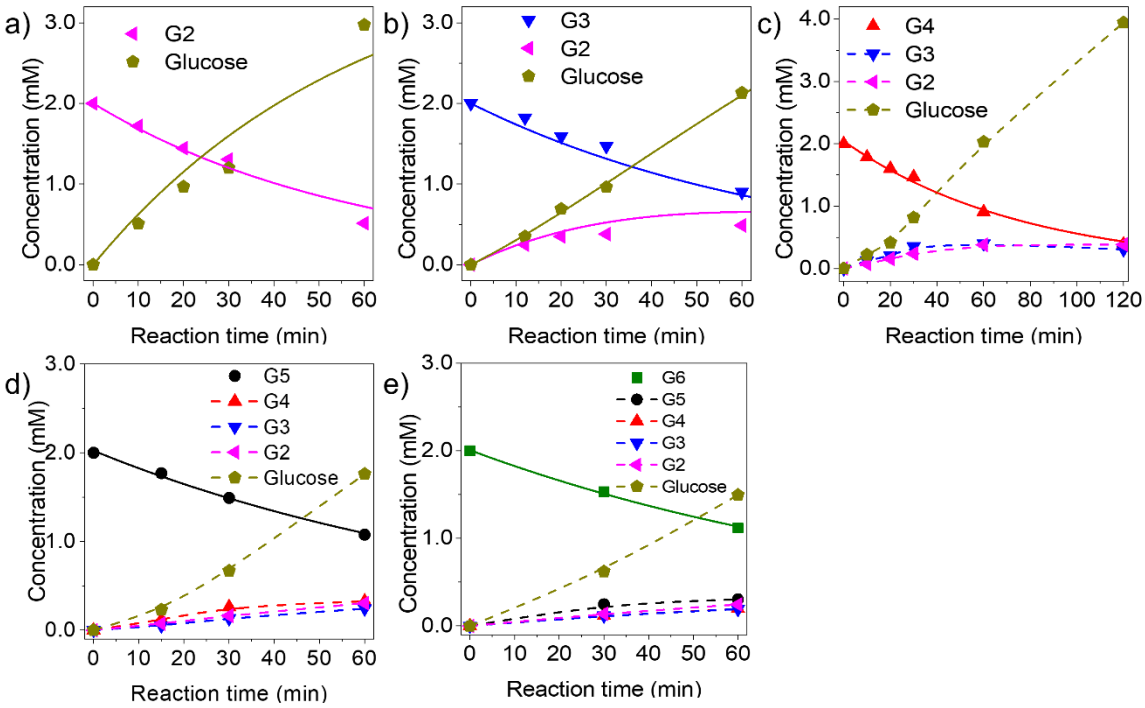


Fig. S3 Time dependent conversion of oligosaccharides and evolution of products in the presence of Amberlyst 70. Reaction conditions: 1 μmol cello-oligosaccharides (G2-G6), 5 mg Amberlyst 70, 0.5 mL H_2O, 0.5 MPa Ar, 413 K. a) G2, b) G3, c) G4, d) G5, e) G6.

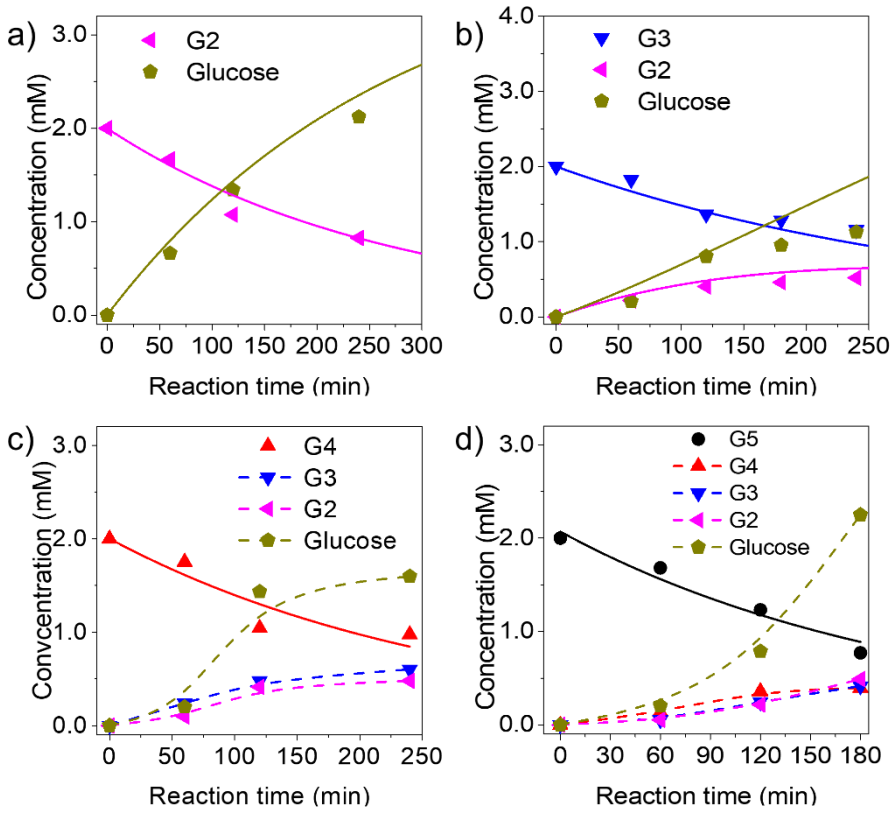


Fig. S4 Time dependent conversion of oligosaccharides and evolution of products in the presence of H-beta. Reaction conditions: 1 μmol cello-oligosaccharides (G2-G5), 5 mg H-beta, 0.5 mL H_2O, 0.5 MPa Ar, 413 K. a) G2, b) G3, c) G4, d) G5.

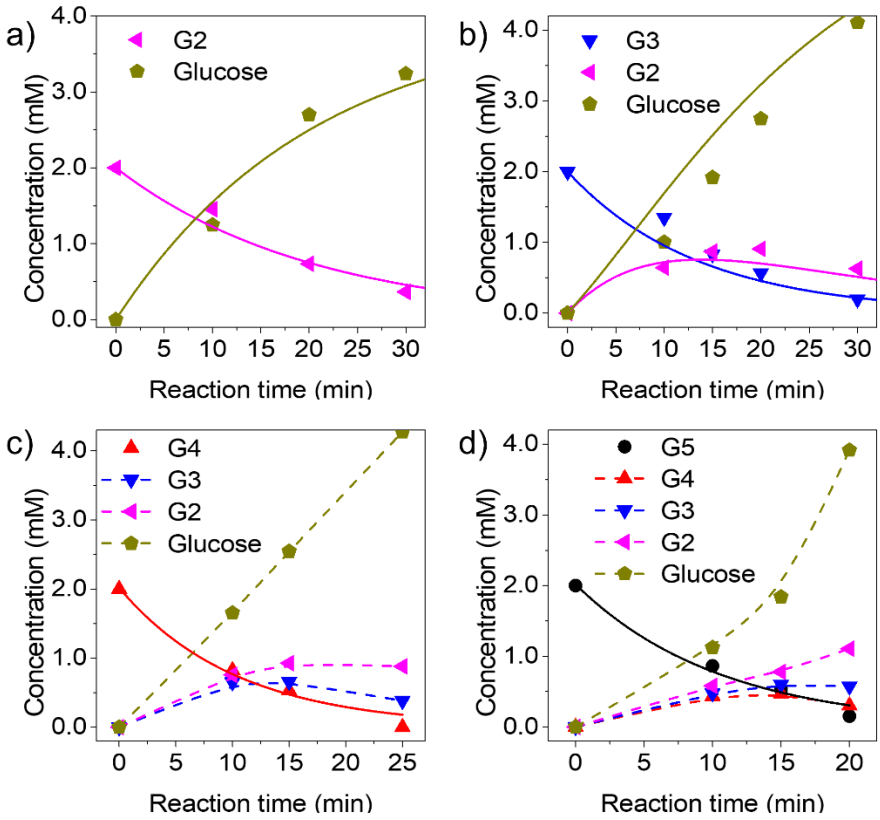


Fig. S5 Time dependent conversion of oligosaccharides and evolution of products in the presence of H_2SO_4. Reaction conditions: 1 μmol cello-oligosaccharides (G2-G5), 6.4 μmol H_2SO_4, 0.5 mL H_2O, 0.5 MPa Ar, 413 K. a) G2, b) G3, c) G4, d) G5.

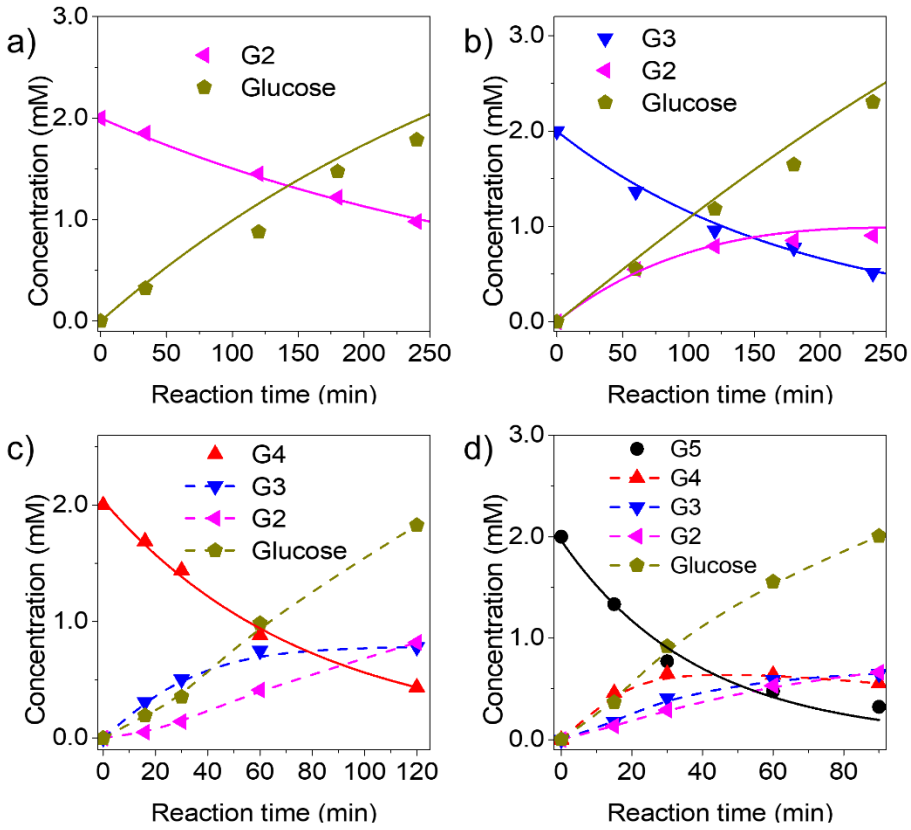


Fig. S6 Time dependent conversion of oligosaccharides and evolution of products in the presence of AC-air. Reaction conditions: 1 μmol cello-oligosaccharides (G2-G5), 5 mg AC-air, 0.5 mL H_2O, 0.5 MPa Ar, 403 K. a) G2, b) G3, c) G4, d) G5.

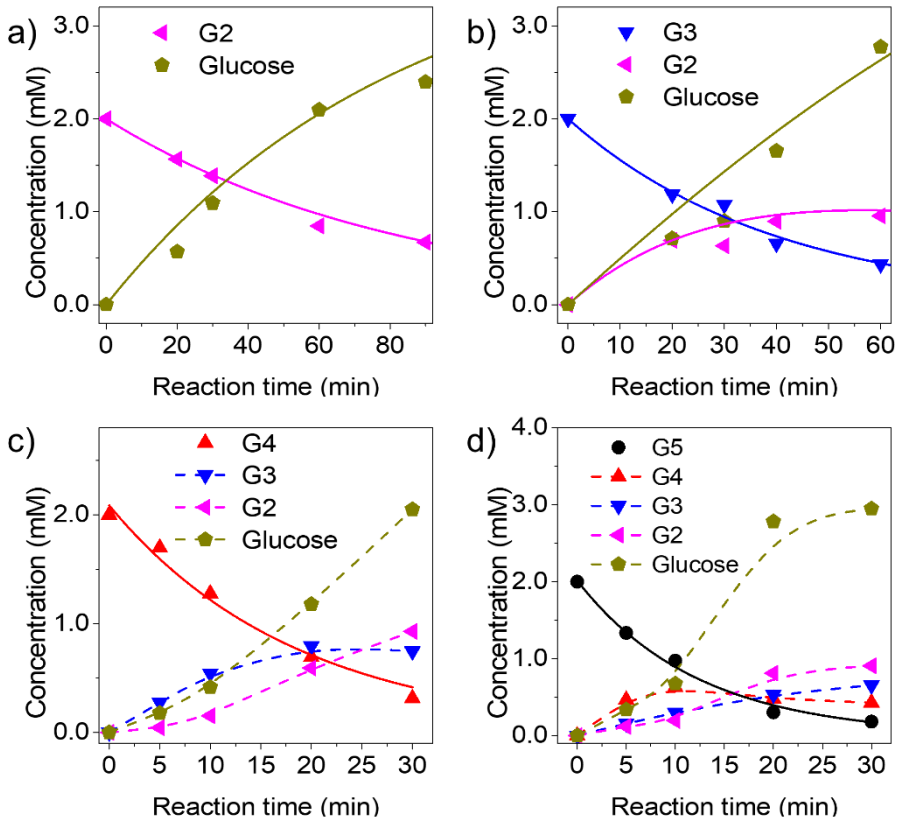


Fig. S7 Time dependent conversion of oligosaccharides and evolution of products in the presence of AC-air. Reaction conditions: 1 μmol cello-oligosaccharides (G2-G5), 5 mg AC-air, 0.5 mL H_2O, 0.5 MPa Ar, 423 K. a) G2, b) G3, c) G4, d) G5.

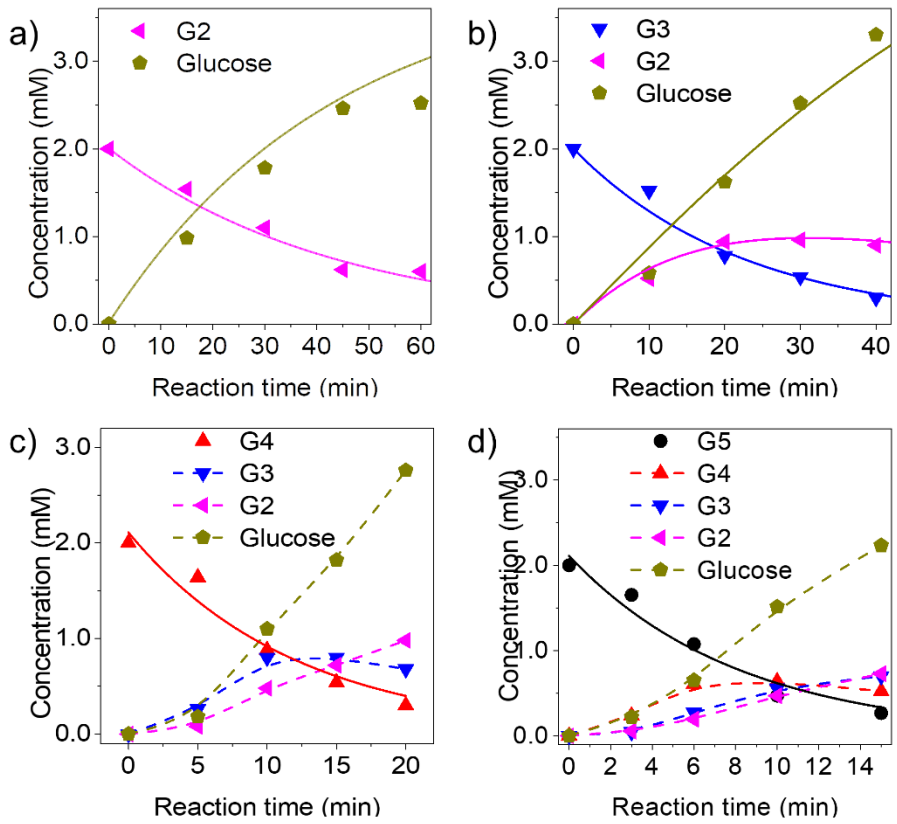


Fig. S8 Time dependent conversion of oligosaccharides and evolution of products in the presence of AC-air. Reaction conditions: 1 μmol cello-oligosaccharides (G2-G5), 5 mg AC-air, 0.5 mL H_2O, 0.5 MPa Ar, 433 K. a) G2, b) G3, c) G4, d) G5.

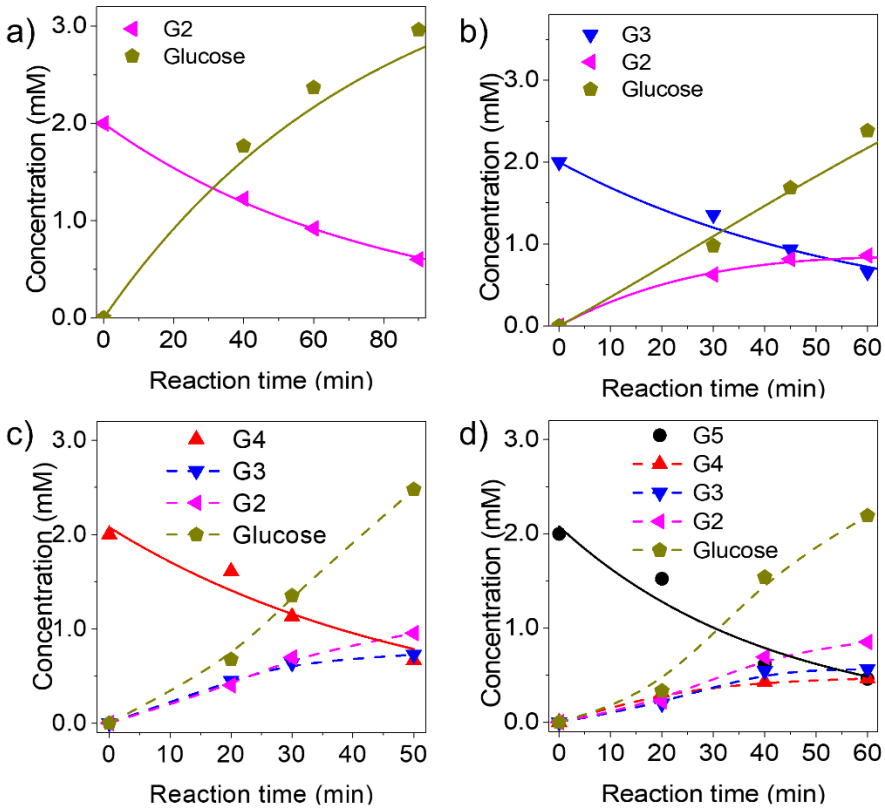


Fig. S9 Time dependent conversion of oligosaccharides and evolution of products in the presence of H_2SO_4. Reaction conditions: 1 μmol cello-oligosaccharides (G2-G5), 6.4 μmol H_2SO_4, 0.5 mL H_2O, 0.5 MPa Ar, 393 K. a) G2, b) G3, c) G4, d) G5.

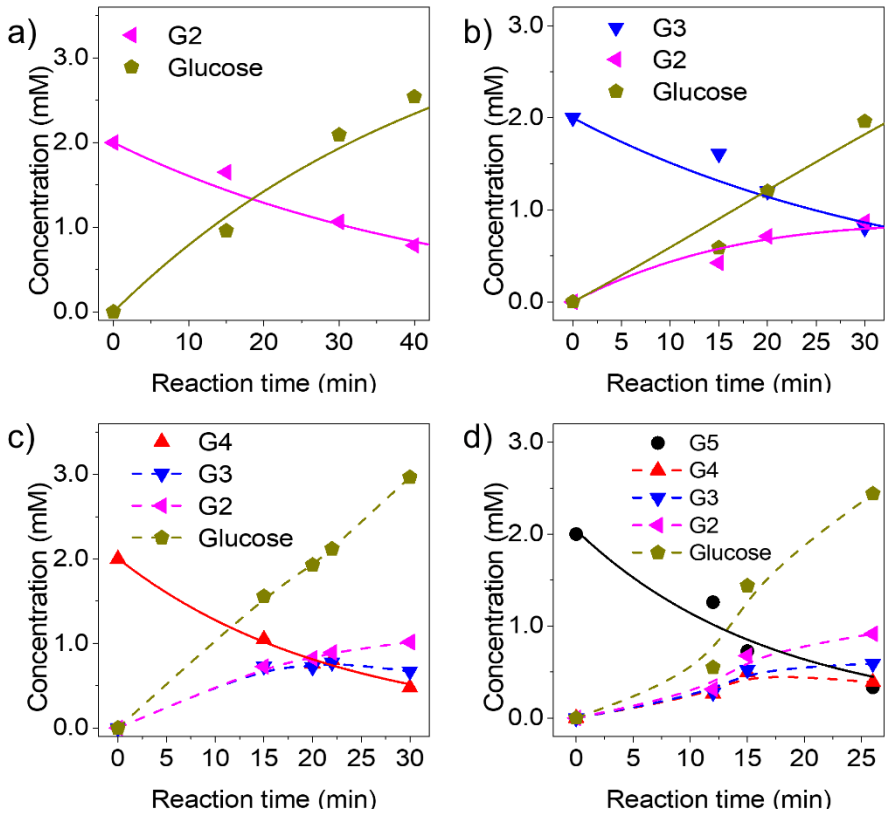


Fig. S10 Time dependent conversion of oligosaccharides and evolution of products in the presence of H_2SO_4. Reaction conditions: 1 μmol cello-oligosaccharides (G2-G5), 6.4 μmol H_2SO_4, 0.5 mL H_2O, 0.5 MPa Ar, 403 K. a) G2, b) G3, c) G4, d) G5.

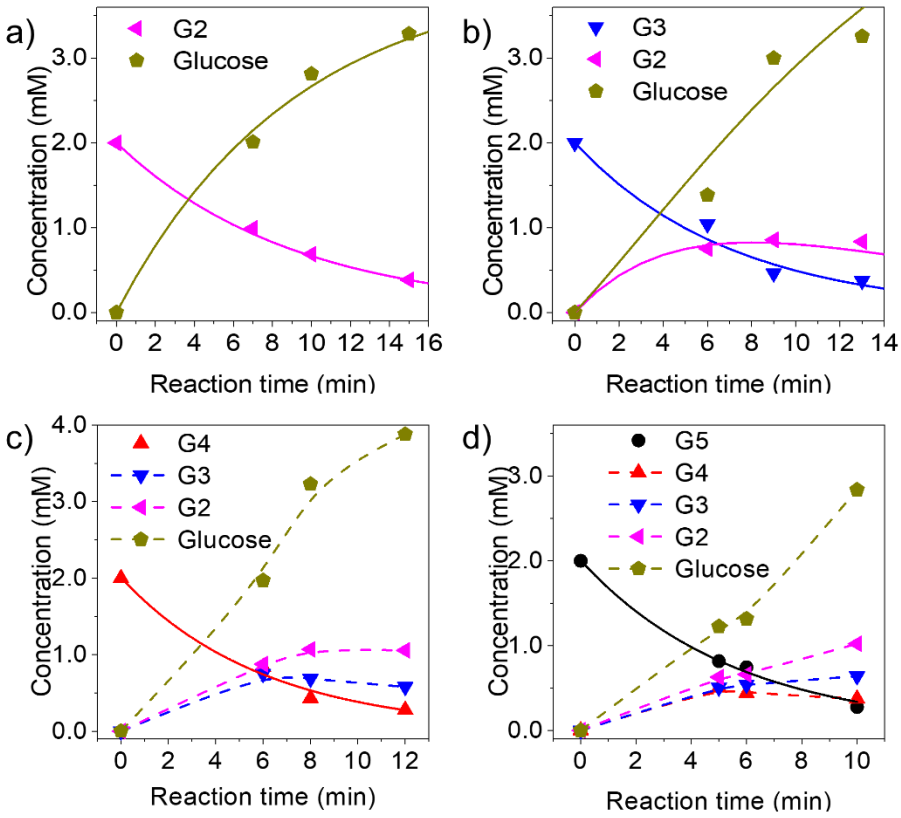
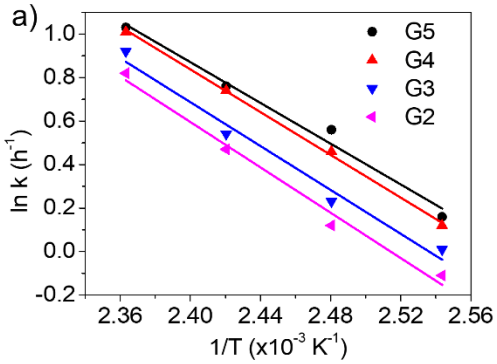


Fig. S11 Time dependent conversion of oligosaccharides and evolution of products in the presence of H_2SO_4. Reaction conditions: 1 μmol cello-oligosaccharides (G2-G5), 6.4 μmol H_2SO_4, 0.5 mL H_2O, 0.5 MPa Ar, 423 K. a) G2, b) G3, c) G4, d) G5.

a)



b)

Substrate	*Ea* (KJ mol $^{-1}$)
G2	100
G3	97
G4	94
G5	89

Fig. S12 Arrhenius plot (a) of cello-oligosaccharides hydrolysis on H_2SO_4 and the calculated activation energy (b).