

Supporting Material

Two-Step Hydrothermal Pretreatments for Co-Producing Xylooligosaccharides and Humic-like Acid from Vinegar Residue

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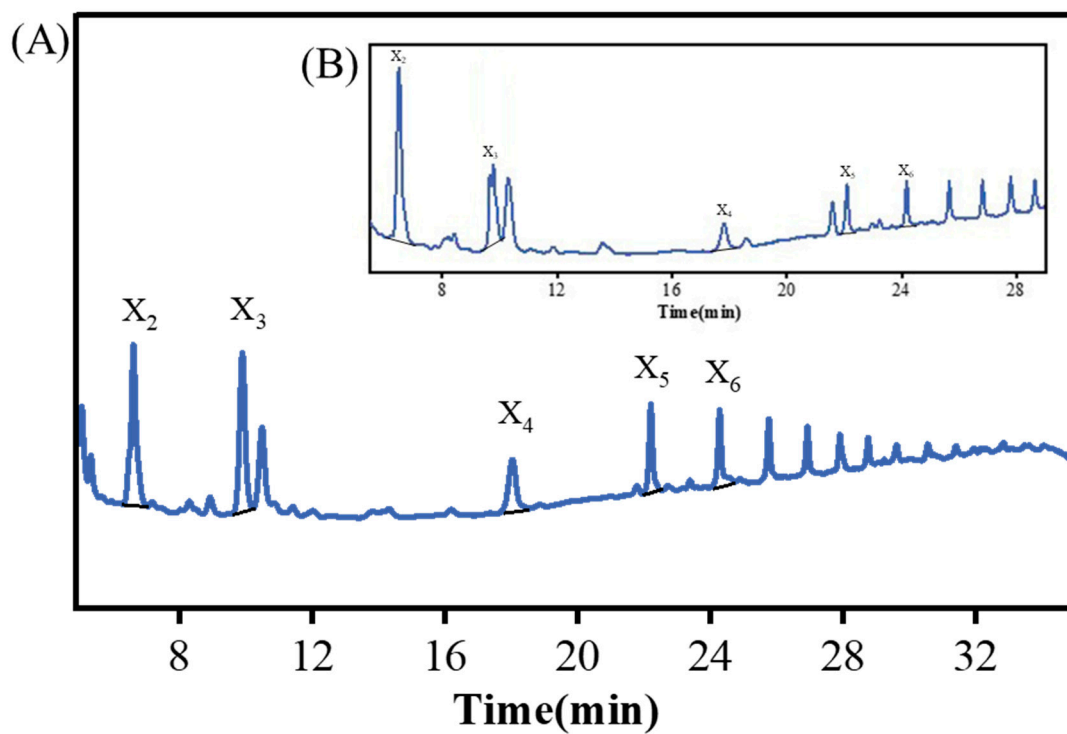


Figure S1. HPAEC chromatogram of (A) the XOS autohydrolysate from vinegar residue at 170 °C for 50 min and (B) the XOS obtained by endoxylanase hydrolysis autohydrolysate of vinegar residue at 170 °C.

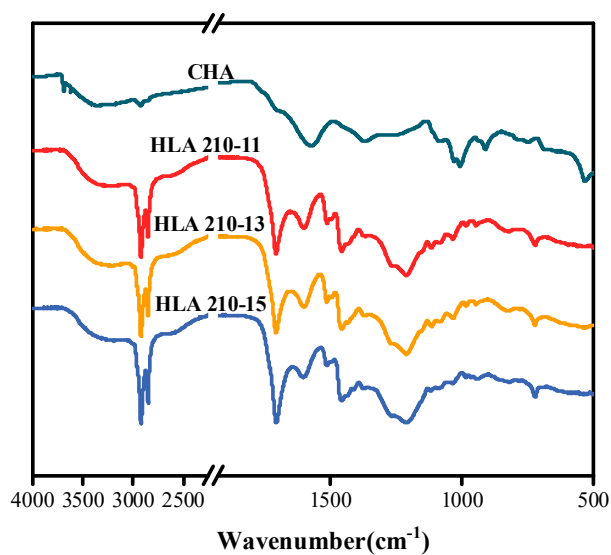


Figure S2. FT-IR spectra of CHA and HLA 210-11/13/15.

Abbreviations: CHA, commercial humic acid; HLA 210-11/13/15, humic-like acid (HLA) produced from the supernatant of the second-step hydrothermal pretreatment (0.6 mol/L KOH at 210 °C for 11, 13 and 15 h, respectively) after acidification (using 1 mol/L HCl to pH2) and precipitation.

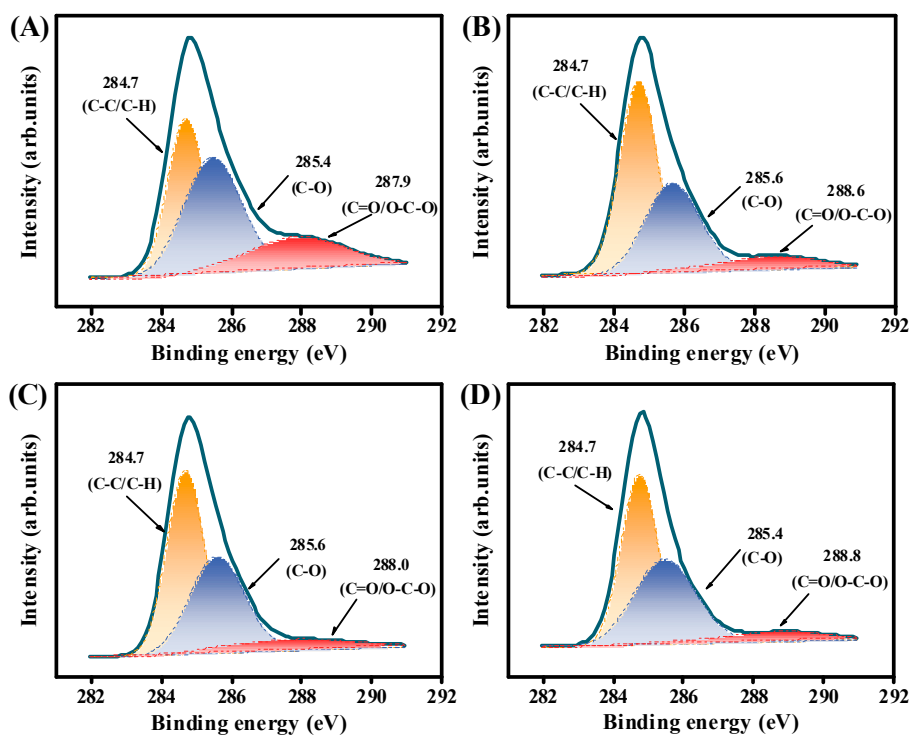


Figure S3. High-resolution C 1s XPS spectra of CHA (A) and HLA 210-11/13/15 (B-D).

Abbreviations: CHA, commercial humic acid; HLA 210-11/13/15, humic-like acid (HLA) produced from the supernatant of the second-step hydrothermal pretreatment (0.6 mol/L KOH at 210 °C for 11, 13 and 15 h, respectively) after acidification (using 1 mol/L HCl to pH2) and precipitation.

Table S1. Organic acids composition analysis in the unwashed vinegar residue.

Component	Contents (mg/g)
Formic acid	1.21±0.1
Acetic acid	20.05±0.2
Butyric acid	2.48±0.0
Lactic acid	4.62±0.0
Propionic acid	7.80±0.1