





Fractionation of macroalgae carbohydrates using hydrothermal and dilute inorganic salt pretreatments to produce oligosaccharides and furans

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Abstract: Furans are among the most important compounds derived from biomass, providing conversion pathways for sustainable alternatives to petroleum-based fuels and materials. Furfural, 5-hydroxymethylfurfural (5-HMF), and 5-methylfurfural (5-MF) are furans that can be obtained by carbohydrate dehydration under acidic conditions at elevated temperature and pressure. One of the mechanisms to produce these compounds from lignocellulosic materials relies on prior fractionation of biomass carbohydrates and further dehydration catalysis. However, this is a costly and technically challenging method and it would be advantageous to develop a one-pot conversion mechanism that facilitates simultaneous biomass fractionation and conversion to furans. *Ulva lactuca* is an alga that has the advantage of being lignin-free and rich in glucose, rhamnose, and xylose, which are ideal for producing 5-HMF, 5-MF, and furfural, respectively. The high diversity of sugar constituents is also relevant for the production of added-value oligosaccharides. Catalysis with inorganic salts has been reported as a successful tool for biomass upgrading to furans when combined with hydrothermal pretreatments, and could provide a cheap and environmentally friendly one-step methodology for furan production. This study therefore aimed to investigate the effect of hydrothermal and dilute acid pretreatments, as well as treatment with inorganic salt solutions (ferric chloride, ferric nitrate, and aluminium nitrate) on *U. lactuca*