

The hydrothermal depolymerization of sodium alginate in sub-critical conditions

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Alginate, the main component of algae, is the polymer consisting of mannuronic and guluronic acids as monomers. The depolymerization of sodium alginate via hydrothermal treatment under sub-critical water conditions (120–240 °C) is regarded as one of the methods to obtain the valuable chemicals or fuels from the marine biomass. Through the depolymerization of hexuronic acids, such as mannuronic acid and guluronic acid, were produced by selective cleavage of 1,4-glycosidic bonds in the sodium alginate. In addition, carboxylic acids and dicarboxylic acids were obtained by decomposition of hexuronic acids' ring structure. Based on our experiment results, as the reaction temperature and time increased, it was found that alginate was increasingly depolymerized to produce smaller molecules, such as the organic acids, as indicated by pH measurement and GPC analysis. The gas chromatography with mass spectrometer (GC/MS) and high performance liquid chromatography (HPLC) were employed for identification of various unknown products and its quantification, respectively.