

Biomass Carbohydrates Conversion to 5-Hydroxymethylfurfural(5-HMF): A Review †

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Abstract: 5-Hydroxymethylfurfural (HMF) belongs to the group of value-added chemicals, and it is a biomass-derived platform chemical. It has grabbed great attention and research interest because it can produce many high-quality fuels and high-value-added chemicals. HMF shows good market prospects and has magnificent potential applications. However, practical production has not yet been achieved, in which one of the significant constraints is the lower conversion efficiency of catalytic systems. Therefore, considerable efforts have been adapted to explore innovative and effective catalytic systems from the past two decades to overcome this issue. To better understand current research work, this review systematically summarizes the recent progress on various homogeneous catalysts and comprehensively generalizes the latest reports on different heterogeneous catalysts systems with various solvent systems to convert biomass-derived carbohydrates. This review also summarizes the discoveries of the most recent studies on acid-catalyzed hydrolysis, including (i) biomass pre-treatment, (ii) glucose production from cellulose hydrolysis, (iii) fructose formation from glucose isomerization, (iv) HMF formation from glucose/ fructose dehydration. All the changes have been carried out to improve selectivity, product synthesis, cost, and energy optimization, which can lead to shifting the process towards a greener process over existing methods.

Keywords: biomass; 5-hydroxymethylfurfural (HMF); isomerization; dehydration.

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Conflicts of Interest

The authors declare no conflict of interest.