

# **Furfural Production from Oil Palm Biomass Using a Biomass-derived Supercritical Ethanol Solvent and Formic Acid Catalyst**

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## **Abstract**

This research aimed to produce furfural from oil palm biomass via a biomass-derived solvent (supercritical ethanol) and catalyst (formic acid). The process is 100% biomass-based without the addition of any synthetic chemicals. Ethanol can be produced from biomass through biochemical or thermochemical conversion processes, and formic acid is a by-product of furfural production. Hence, this proposed method is self-sustainable because both can be recycled in the process. Oil palm biomass as a feedstock can address the issue of waste from the palm oil mill industries and turn it into value-added platform chemical such as furfural. In this study, various reaction parameters were evaluated including temperature (240-280 °C), reaction time (1-30 min), biomass solid loading (0.4-0.8 g), and alcohol: acid ratio (1:1 and 1:2), in a high-pressure and high-temperature batch reactor. The highest furfural yield of 35.8% was obtained in this study, comparable to other commercial and conventional methods. Although the formation of furfural is promoted by formic acid, the reaction temperature significantly impacted the outcome. The significant role of supercritical ethanol as both solvent and reactant may explain the minimal effect of formic acid as a catalyst in the reaction. The high yield of furfural under supercritical ethanol conditions proven in this study illustrates the great potential of this production method. © 2016 The Authors.

## **Author keywords**

Formic acid Furfural Hemicellulose Oil palm biomass Supercritical ethanol

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