

PROCESS SIMULATION AND TECHNO-ECONOMIC ANALYSIS OF BTEX PRODUCTION FROM SAPIUM OIL

A THESIS

Submitted By:

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In partial fulfillment of the award of the degree of

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Under the guidance of

DR. PANKAJ KUMAR



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CERTIFICATE

This is to certify that the thesis entitled "**Process Simulation and Techno-economic Analysis of BTEX production from sapium oil**" submitted by **Arijit Paul, Arpita Das, Dhoke Vaibhavi Sanjay, Md Farook Azam, Pushpa Lakra, Yalamarthi Vinod** to the Guru Ghasidas Vishwavidyalaya towards partial fulfillment of the requirements for the award of the Degree of Bachelor of Technology in Chemical Engineering is a bonafide record of the work carried out by them under my supervision and guidance.

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ABSTRACT

Sapium oil (SO) have a significant potential for BTEX (Benzene, Toluene, Ethyl Benzene, and Xylene) production as a sustainable substitute of petroleum-derived chemical building blocks. Catalytic reforming is an existing industrial process to produce BTEX. This study investigates the catalytic pyrolysis for BTEX production from SO. Aspen plus is used to perform the simulation for catalytic pyrolysis of SO. Analyzing the techno-economics of converting SO to BTEX involves evaluating the feasibility, costs, and efficiency of the conversion process using net present value (NPV) as metric. Results show that based on the current market price of feedstock and products, processes negative NPV suggesting that process is not profitable at this moment. However, the break-even analysis suggests that minimum selling price of benzene and toluene were 2.63\$/kg and 1.24\$/kg respectively. Overall, the synthesis of sustainable bioaromatics from SO over encaged AlPO_4 zeolite catalyst represents a promising route towards achieving a more sustainable and environmentally friendly chemical industry.