National University of Science and Technology
Zimbabwe

FACULTY OF INDUSTRIAL TECHNOLOGY

DEPARTMENT OF CHEMICAL ENGINEERING

RESEARCH AND DEVELOPMENT PROJECT

TOPIC: MANUFACTURE OF BIO-BUTANOL FROM MOLASSES AS AN ALTERNATIVE TO ETHANOL PRODUCTION

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ABSTRACT

This project focuses on the manufacture of biobutanol from sugar cane molasses and its possibility to substitute ethanol production in Zimbabwe. Zimbabwe has two main sugar milling companies namely Triangle Ltd and Hippo Valley Estates where the molasses is a by-product and most of it is used to manufacture ethanol at Triangle Ltd. Most of the molasses produced at Hippo Valley Estates is sold to Triangle Ltd and the rest is used as feedstock and road surfacing. The objective of this study is to access the feasibility of manufacturing butanol from molasses instead of ethanol. Due to butanol's numerous advantages over ethanol a higher profit margin may be realised with butanol when they are both manufactured from molasses. To determine the viability, three process routes are developed. The first two process routes incorporate well established industrial technologies: Process Route 1 consist of batch fermentation and steam stripping distillation, while in Process Route 2, some of the distillation columns is replaced with a liquid-liquid extraction column. The third process route incorporates fed-batch fermentation and gas-stripping, an unproven technology on industrial scale. Economic feasibility of these biobutanol production process designs was carried to establish the best process design and Process Route 3 proved to be the most profitable design in current economic conditions.