UNIVERSITI TEKNOLOGI MARA

KINETIC FORMATION OF TETRAESTER SIMULATION FROM SECONDARY DATA

ZARIQ NAZARUDDIN BIN NAZA BADI

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ABSTRACT

Transesterification is defined as a process that transforms an ester into a new ester through modification of the alkyl group. In this process of transesterification of the plant oils, it can produce a mixture of multiple FA alkyl esters by reacting the plant oils through many kinds of higher and lower chain length alcohol. The objectives of this research were to study the effect of stirring rate on kinetic formation of tetra ester using the secondary data and to determine the effect of stirring rate on kinetic rate constant. Because of the unavailable of the literature on the study of pentaerythritol ester from transesterification of POME, the research will only use the secondary data as a basis of the research. The study will be using "Mat Lab" programmer to do the simulation of the process. The Matlab is used to study the effect of stirring. The parameter in this study is the speed of the stirrer. There are 3 readings that will be tested, 300 rpm, 600 rpm, and 900 rpm. The rate constant, k will be calculated based on the overall stoichiometric equation. As a result of the study, the kinetic constant is increasing as the stirring rate increased, and the rate of disappearance of PE is faster as the time increased. As a conclusion, the model equation developed can be used to determine the rate constant at the different stirring rate for the transesterification reaction at 160 ^{o}C.

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CHAPTER ONE
INTRODUCTION

1.1 Research Background

It is estimated that regarding 500% of all the oil used winds up within the surroundings. Petroleum-based lubricants, that are the leading variety of base oil utilized in this business, are poorly degradable and represent an environmental hazard when discharged. This represents a powerful incentive to produce lubricants that are biodegradable. The bio-lubricant industry is growing based on these pressures, environmental issues, and sustainability. Bio-lubricants could also be defined usually as materials that are based on biodegradable and renewable base stocks. However, this definition is not universally accepted. In some areas, solely biodegradability is taken into account within the definition. For present functions, bio-lubricants are going to be outlined as biodegradable and renewable materials. Bio-lubricants are made up of vegetable and plant oils, that themselves are a kind of non-food biomass energy. Our planet is extremely keen about the utilization and consumption of fossil fuels to fulfil its energy desires. Clearly, our petroleum primarily based economy cannot be sustained indefinitely relying entirely on low-cost and non-renewable fossil based oils and materials for its energy needs.

There were many studies that had been made on producing the bio-lubricant. The good of the bio-lubricant had been proving in the previous study. For instance, vegetable oil-based lubricants (pure or artificially adjusted vegetable oils) are found to have ground-breaking lubricity than mineral-based oil particularly with respect to the boundary of the lubricant routine as announced in a few investigations (Krzan, Ceh, Kosir, & Vizintin, 2010). This is for the most part since fatty acid (FA) particles inside the vegetable oils can respond with metal surfaces to create low shear quality metallic soap layer. Some example of this simple reaction would be the reaction of iron and stearic acid (free FA) to form the iron stearate layer. A study of the effect of rapeseed oil-based bio-lubricants - biodiesel combination on engine performance using variable compression ratio (VCR) diesel engine was carried out by (Mobarak et al., 2014). It had been concluded that the standard diesel will be safely operated with bio-lubricants-biodiesel combination with none modifications. This study will be using the