RESEARCH REPORT
PRODUCTION OF BIODIESEL FROM CHICKEN FAT WITH COMBINATION SUBCRITICAL METHANOL AND WATER PROCESS

Submitted by:

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SURABAYA

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LETTER OF APPROVAL

The research entitled:

Production of Biodiesel from Chicken Fat with Combination Subcritical Methanol and Water Process

Which was and submitted by:

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Has been approved and accepted as one of requirement for **Bachelor of Engineering** degree in Chemical Engineering Department, Faculty of Engineering, Widya Mandala Surabaya Catholic University by following supervisors.

Surabaya, 2nd June 2017

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PREFACE

The authors would like to thank God for His blessing so our research project has been accomplished. This report is one of the prerequisites in achieving Bachelor of Engineering degree in Chemical Engineering. The authors realize that the completion of this report is achieved by the support of many people. Therefore, the authors would like to thank to:

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The authors realize that this report is far from perfect, therefore any critics and comments which will better improve the research is gladly accepted. Lastly, the authors hope that the report will be useful to all readers who need information regarding the research of the report.

Surabaya, 2nd June, 2017

Authors

ABSTRACT

The world demand for energy to fuel (fossil fuel) increases as consumption levels increase. However, the availability of fossil fuels in nature cannot meet demand for fuel in the future. In addition, fossil fuels produce emissions that are harmful to the environment such as greenhouse gases that cause global warming. Currently, the production of biodiesel using vegetable oils that will lead to competition utilization of vegetable oils for food and industrial sectors.

Biodiesel can be produced through a transesterification reaction by reacting fats and alcohol, where the transesterification reaction can be performed in critical conditions (subcritical and critical condition) and atmospheric. Subcritical method considered more environmentally friendly because during the process does not use catalysts and more efficient time (compared to the conventional method) and energy (compared supercritical method).

The aim of this study is to investigate the effect of molar ratio of chicken fat and methanol and process temperature on biodiesel and to obtain the optimum temperature and molar ratio to produce the highest yield of biodiesel. In this study, the production of biodiesel using subcritical and chicken fat as raw materials that become waste in the food industry (nuggets, sausages, etc.) has been investigated. The production process has been varied in processing temperature (100, 125, and 150^{o}C) and the molar ratio of fats with methanol (1:14 – 1:70). Temperature and molar ratio is the main factor in biodiesel production through subcritical process, where the result of factorial method shows both variables give value of P-Value below 0.05 also the interaction between both variables. The optimum condition that obtained from Response Surface to produce biodiesel from chicken fat is 160.4^{o}C with molar ratio 1:81.6 Based on gas chromatography analysis, the purity of biodiesel obtained 80.17% and composed of Tridecanoic Acid Methyl Ester (C13:0), Myristoleic Acid Methyl Ester (C14:1), cis-10-Pentadecenoic Acid Methyl Ester (C15:1), Linoleic Acid Methyl Ester (C18:2n6c), Linolelaidic Acid Methyl Ester (C18:2n6t), cis-11-Eicosenoic Acid Methyl Ester (C20:1n9), Erucic Acid Methyl Ester (C22:1n9), Lignoceric Acid Methyl Ester (C24:0), cis-4,7,10,13,16,19-Docosahexaenoic Acid Methyl Ester (C22:6n3), and Nervonic Acid Methyl Ester (C24:1n9).

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