

The Production of Synthetic Diesel from Biomass

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ABSTRACT

This paper discusses the situation of biomass potential in Thailand and the alternative methods for the production of synthetic liquid transportation fuel from biomass to replace the conventional biofuels derived from esterification and fermentation processes which have some disadvantages, e.g., they cannot be used directly in the automobile without any blending with conventional fossil fuel.

The integration of biomass gasification and the Fischer-Tropsch synthesis (BG-FT) and the catalytic depolymerization processes (CDP) will be considered as an alternative way to overcome the disadvantages of both conventional biofuels. From the theoretical calculations of this work, the maximum synthetic diesel fuel from BG-FT with amount of 260.54 g/kg biomass for oxygen gasification and 373.24 g/kg biomass for steam gasification can be obtained, when palm oil fiber is used as feedstock. The maximum synthetic diesel fuel from CDP is 299.36 g/kg biomass when palm oil shell is used as feedstock.

In this work, the calculation is based only on the stoichiometric equations for BG-FT and on energy efficiency from former experimental works for CDP. In the future work, the model of BG-FT will be carried out by using Aspen Plus® program, whereas the CDP will be set up in laboratory for investigation of the effects of different conditions.

Key words: Synthetic Diesel, Biomass Gasification (BG), Fischer-Tropsch Synthesis (FT), Catalytic Depolymerisation Process (CDP)

INTRODUCTION

Nowadays, the industrial and transportation sector in Thailand is rapidly developing and growing continuously, therefore, its energy demand increases similarly. However, Thailand has insufficient fossil fuel resources to meet its own needs. Consequently, Thailand's energy supply depends on imported crude oil from Middle East countries. As today, according to the very high price of crude oil, Thailand faces the problem of oil crisis, therefore the government and also private organizations try to find the alternative ways to solve this problem. The use of biomass is one of the best alternative solution because biomass is still the cheapest fuel available in Thailand and it will be the major alternative fuel source in the future (Papong et al.,