

# **BIONIC (Organic Biodiesel): Optimization of Biodiesel from Used Oil with Eggshell and Chicken Bone Catalyst for Energy Efficiency of Agricultural Diesel Engines**

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## **ABSTRACT**

Energy is part of the needs of people in every country, including Indonesia. According to the Central Statistics Agency of Indonesia, petroleum production in 2021 was 240.324 million barrels. Petroleum production will continue to decline every year, this means that non-renewable energy reserves will continue to run low. The use of biodiesel can reduce dependence on petroleum fuels. Biodiesel is an alternative fuel that can reduce emissions. On the other hand, used oil waste reaches 18,060,188 million liters per year. With that, we want to reduce dependence on petroleum by utilizing used oil as its raw material. The catalyst we use is eggshell containing 94%  $\text{CaCO}_3$ , 1%  $\text{MgCO}_3$ ,  $\text{Ca}_3(\text{PO}_4)_2$ , and chicken bones which have a source of calcium compounds, namely calcium phosphate and calcium carbonate. This study aims to determine the characteristics, manufacturing process and performance of biodiesel in agricultural diesel engines that use oil as a raw material with chicken bone and eggshell catalysts. The methods we use to obtain data are experiments and literature studies. In this method, the best sample obtained is sample 1 with a yield of 70.634%, a density of 0.80 g/mL, pH 6, the resulting organoleptic test is dark gray, the aroma is not pungent and the texture is slightly thick. The flame test and the test on the agricultural diesel engine used the best sample, namely sample 1, a comparison of B20 and B50 levels, the flame test obtained the results of both burning perfectly at B50 8.48 and B20 5.57. The trial on the diesel engine at B20 and B50 levels was able to run the agricultural diesel engine in idle conditions.

Keywords: biodiesel, used oil, chicken bones, egg shells, diesel engine