

***Analysis of Free Fatty Acid Reduction in Used Cooking Oil with Cocoa Bean Shell Charcoal Adsorbent (Theobroma cacao L.)***  
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**ABSTRACT**

*Used cooking oil is a waste resulting from the use of cooking oil that has an FFA value of > 2% due to repeated heating during frying. It is necessary to reduce the FFA content first, to be able to proceed to the transesterification process in making biodiesel to avoid saponification reactions. This research utilizes nested cocoa bean shell waste as an adsorbent in reducing the FFA content of used cooking oil. This study aims to determine the effect of the combination of the addition of cocoa bean shell charcoal concentration and adsorption time on the reduction of free fatty acid levels. This study used a 2-factor Completely Randomized Design (CRD) with 3 treatment levels each. The first factor is the length of adsorption time (W) with variations (90, 120, and 150 minutes). The second factor is the concentration of activated charcoal (K) with variations (8, 11, and 14% m/v). Tested with analysis of variance (ANOVA) and if there are differences in the mean of the test results followed by Duncan's Multiple Range Test (DMRT). The results of this study showed that the highest percentage reduction in FFA levels after the adsorption process was in the W3K1 variation (150 minutes, 8% m/v) of 66.9%, with pure oil quality of FFA 0.99%, density 0.881 gr/cm<sup>3</sup>, and kinematic viscosity 2.3 cSt.*

**Keywords:** *Adsorbent, Adsorption, Cocoa Bean Shell Charcoal, FFA, Waste Cooking Oil*