

**SYNTHESIS OF RIGID POLYURETHANE FOAM FROM
WASTE COOKING OIL-BASED POLYOL USING
TRANSESTERIFICATION REACTION AND PALM OIL
EMPTY FRUIT BUNCH ACTIVATED CARBON AS
ADSORBENT**

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JANUARY 2014

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ABSTRACT

SYNTHESIS OF RIGID POLYURETHANE FOAM FROM WASTE COOKING OIL-BASED POLYOL USING TRANSESTERIFICATION REACTION AND PALM OIL EMPTY FRUIT BUNCH ACTIVATED CARBON AS ADSORBENT

The choice of waste cooking oil (WCO) as a raw material for rigid polyurethane foam production is recognized to be an attractive and economic alternative to the use of vegetable oils. However, the presence of free fatty acids, impurities and high viscosity of waste cooking oil may require several pretreatments before the transesterification reaction. Palm oil empty fruit bunch (EFB) activated carbon used to purify the waste cooking oil before it undergoes the transesterification reaction. In this study, it proved that by using palm oil EFB activated carbon can reduce FFA from 3.42 % to 0.87%. Acid value also decreases from 6.81ml KOH/g to 1.73 ml KOH/g. FTIR spectroscopy analysis was carried out. Based on the results, purification of WCO by using palm oil EFB activated carbon does not affect the functional group that presence in the WCO. After waste cooking oil undergoes the purification, the next step is transesterification. To ensure this reaction is successful, the test of hydroxyl value, acid value, and FTIR spectroscopy analysis was carried out. In this study, it was obtained 1.73 ml KOH/g and 75 mPa.s are respectively to the value of acid value and viscosity. For FTIR spectrum of WCO-based polyol showed the peak of hydroxyl (OH) group, carbonyl (C=O) group and carbamate (C-N) group was presence in the WCO-based polyol at wavenumber 3368.52 cm^{-1} , 1740.08 cm^{-1} and 1619.33 cm^{-1} respectively. Polyurethane produced by using the waste cooking oil has a compressive strength and densities at 0.72 MPa and 298.6 kg/m^3 respectively. From FTIR spectroscopy analysis showed the presence of amide (N-H) group at wavenumber 3795.06 cm^{-1} , C-H alkene at 2924.71 cm^{-1} , carbonyl (C=O) group at 1713.87 cm^{-1} , C-N-H group at wavenumber 1513.06 cm^{-1} and C-O-C at wavenumber 1229.93 cm^{-1} .