

**SYNTHESIS HOT MELT ADHESIVE FROM CRUDE PALM  
OIL BY USING ISOPHORONE DIISOCYANATE**

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## ABSTRACT

### SYNTHESIS HOT MELT ADHESIVE FROM CRUDE PALM OIL BY USING ISOPHORONE DIISOCYANATE

The objectives of this study are; to synthesize polyurethane (PU) adhesive by using crude palm oil (CPO) and isophorone diisocyanate (IPDI), to determine the chemical and physical properties of the synthesized PU adhesive and to compare the properties of PU synthesized with IPDI with the one synthesized with toluene diisocyanate (TDI). The method used in synthesizing PU started with formation of alkyd resin or polyols from CPO and finished with alcoholysis reaction. From the study, polyurethane (PU) adhesive was able to be synthesized by using CPO and IPDI. The chemical properties testing of synthesized PU were performed by using Fourier Transform Infrared (FT-IR) and Thermal Gravimetric Analysis (TGA). The results from FT-IR shows that the synthesized adhesive has a  $\text{-CO}$  stretching band and  $\text{-CNH}$  bending band were observed at peak of  $1716\text{ cm}^{-1}$  and  $1562\text{ cm}^{-1}$  respectively. Based on the TGA results, first degradation curve that represents the aliphatic urethane linkage degradation was observed in the range of  $163\text{-}274^\circ\text{C}$ . Physical properties testing were performed by using a universal testing machine. The results from the universal testing machine showed that the maximum load and internal bonding of the synthesized PU adhesive are  $3052.2\text{ N}$  and  $610.5\text{ MPa}$  respectively. In comparison to PU-TDI adhesive, the maximum load and internal bonding of PU-IPDI is weaker. PU-TDI also has a distinct peak at  $873\text{ cm}^{-1}$  which represent the substituted ring of TDI and steep curve for first step degradation of aromatic urethane linkage degradation in temperature range of  $166\text{-}288^\circ\text{C}$ .