

**MELT REACTION OF POLYMER BLENDS COMPRISING
POLY(ϵ -CAPROLACTONE) AND EPOXIDIZED NATURAL RUBBER
WITH ADDITION OF TOLUENE-4-SULFONIC ACID AS CATALYST**

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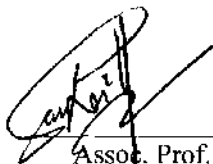
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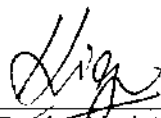
This Final Year Project Report entitled **“Melt Reaction of Polymer Blends Comprising Poly(ϵ -caprolactone) and Epoxidized Natural Rubber with Addition of Toluene-4-Sulfonic Acid as Catalyst”** was submitted by Nurul Zayana Binti Yahya, in partial fulfillment of the requirements for the Degree of Bachelor of Sciences (Hons.) Chemistry in the Faculty of Applied Sciences, and was approved by



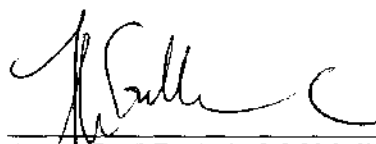
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ABSTRACT

MELT REACTION OF POLYMER BLENDS COMPRISING POLY(ϵ -CAPROLACTONE) AND EPOXIDIZED NATURAL RUBBER WITH ADDITION OF TOLUENE-4-SULFONIC ACID AS CATALYST

Reactive blends of poly(ϵ -caprolactone) (PCL-diol) (semicrystalline polymer), epoxidized natural rubber with 50 mole % epoxidation level (ENR-50) (amorphous polymer) and toluene-4-sulfonic (pTSA) (as the catalyst) were studied. Neat PCL-diol, neat ENR-50 and PCL-diol/ENR-50 50/50 blends doped with different concentrations of pTSA were prepared using solvent casting method. Homogenous distribution of pTSA in the samples is confirmed by the visual inspection. Chemical structures for neat polymers and the blends doped with pTSA do not change as compared to that of the undoped samples after fourier transform infra red (FTIR) analysis at room temperature. Weight average molecular weight (M_w) of doped-PCL-diol remains around 3500 g mol^{-1} while M_w of doped-ENR-50 decreases slightly at higher concentrations of pTSA after gel permeation chromatography (GPC) analysis. Co-continuous structure of undoped-PCL-diol/ENR-50 50/50 blend and the dispersion of PCL-diol in the matrix of ENR-50 for the doped-blend suggest the immiscibility of the two neat polymers by using polarizing optical microscopic (POM). Glass transition temperature (T_g) analysis confirms the immiscibility of the neat constituents where two T_g s that corresponds to the neat polymers for the doped and undoped-50/50 blends are observed by differential scanning calorimetry (DSC) analysis. Under non-isothermal heating up to $200 \text{ }^\circ\text{C}$, the melt reaction takes place and the reaction temperature (T_{rxn}) for PCL-diol/ENR-50 50/50 blends doped with pTSA decreases at higher concentration of pTSA.