

CHAPTER VI

CONCLUSION

6.1 CONCLUSION

6.1.1 Hydroxyl value of glycolyzed products

From the experiment, we found that hydroxyl value of glycolyzed products could be affected by the quantity of EG, time of depolymerization and temperature.

It was found that the quantity of EG had an effect on hydroxyl values of glycolyzed products. As the quantity of EG increased, the hydroxyl values of glycolyzed products also increased. The quantity of EG affects the initial rate of depolymerization of PET. At temperature of 190 °C and 4 hours of depolymerization time, hydroxyl values of PET/EG ratio of 1:4 are highest among the others (PET/EG ratio of 1:3.5, 1:3, 1:2.5, 1:2, 1:1.5), the hydroxyl value of glycolyzed products can be increased if the quantity of EG increases of 4 moles is used.

It was also found that when the depolymerization time increased, the hydroxyl value also increased. The hydroxyl value rapidly increased at the beginning of depolymerization after that they increased slowly, until the depolymerization reached equilibrium. The equilibrium was approached at 8 hours with PET/EG ratio of 1:4.

Temperature of depolymerization slightly affected hydroxyl value. The hydroxyl values slowly increased as the temperature of depolymerization increased.

6.1.2 Average molecular weight of oligomer

The quantity of EG and the time of depolymerization affected the average molecular weight of oligomer in glycolyzed products. Increasing the quantity of EG and depolymerization time decreased the average molecular weight of oligomer. These variables affected the average molecular weight of oligomer until the depolymerization

process reached equilibrium. The average molecular weight of oligomer at PET/EG ratio of 1:4 , 8 hours of depolymerization is shorter than the average molecular weight of oligomer at PET/EG ratio of 1:1.5 at 4 hours.

6.1.3 Mechanical properties of polyurethane

The molar ratio of MDI and chain-extender have the effect on hardness and tensile properties of polyurethane. As increasing the molar ratio of MDI and chain-extender , the hardness , modulus of elasticity and maximum stress at break also increase , but, % elongation at break decreases.

The type of chain-extender affects hardness and tensile properties of polyurethane. Polyurethane containing glycolized products has the hardness and tensile properties better than the one containing EG at high molar ratio of MDI and chain-extender. Molar ratio of polyol , MDI and chain extender ,had only little effect on modulus of elasticity. At the high molar ratio of PET/EG, the polyurethane containing EG has the modulus of elasticity and maximum stress at break less than the polyurethane containing glycolized products.

When increase the molar ratio of MDI : chain extender ,the percent elongation at break of polyurethane containing of EG was lower than the percent elongation at break of polyurethane containing of glycolized products.