CHAPTER IV
CONCLUSIONS

Glycolato siloxane polymer was successfully synthesized using triethylenetetramine (TETA) as a base at a reaction time of 25 h. The effect of TETA concentration, crosslinking reaction time and dioctyl phthalate concentration were studied.

The crosslinking process was first initiated by the exchange of EG with glycerol. The resulting products were then crosslinked to form a network-like polymer. The crosslinking process was conducted under vacuum at 100°C. The range of ceramic yield ranged approximately from 40 to 60 %. For TETA concentration of 15 mol% condition, the crosslinked product at each crosslinking reaction time gave ceramic yields which are only slightly different, indicating a similar structure. When TETA concentrations of 20, 25 and 30 mol% were employed, both the TETA concentration and the crosslinking reaction time have an effect on the formation of the network structure since they gave significantly different ceramic yields.

The crosslinked polymers were cast as films by adding dioctyl phthalate at a concentration of 0.5 mol% before the crosslinking step. The temperature which was suitable for casting was at ~80°C under vacuum. The storage modulus (G′) and loss modulus (G″) were measured using a rheometer at different temperatures (from 25° to 250°C). The transiton temperature of the crosslinked polymer was in the range of 170°-200°C. The crosslinked polymer will decompose at temperature over 200°C. At some conditions, the obtained ceramic yields were slightly higher than the theoretical ceramic yields because of the presence of water in the product which hydrolyzed EG and glycerol

groups in polymer molecules to form Si-O-Si bonds. Thus, the modulus could be less than when there was less Si-O-Si bonds since oxygen atoms make the polymer molecules more flexible. The optimum condition for crosslinked glycolato siloxane polymer is at TETA concentration of 30 mol% with a crosslinking time of 10 h. since it gives the lowest ceramic yield and the highest modulus which means the crosslinked polymer has the highest stiffness at this condition as well.