

CHAPTER IV

CONCLUSIONS

The effect of antistatic sizing agent on the silanol condensation of γ -methacryloxypropyltrimethoxysilane (γ -MPS) hydrolyzates has been studied using size exclusion chromatography (SEC) and Fourier transform infrared spectroscopy (FTIR) techniques. The pH and composition of vinyl trimethyl quarternary ammonium chloride (VTAC) in the mixture system have an effect on the silanol condensation of γ -MPS hydrolyzates. VTAC shows an enhancement effect on silanol condensation at low concentration but the effect is reversed as the VTAC concentration is increased. Results from FTIR indicate the possibility of the formation of a micell-like structure at high concentration of VTAC leading to an enhancement effect at long drying times.

Study of the condensation reaction of γ -MPS in the presence of polyvinyl acetate (PVAc) and polyethyleneglycol (PEG) by SEC and FTIR indicate that PVAc and PEG have a significant effect on silanol condensation of γ -MPS. It was found that PVAc enhanced silanol condensation through its interaction with the methacryl group of γ -MPS. In the system with only γ -MPS and PEG, PEG was found to restrict silanol condensation. However, in the system with both PEG and PVAc, PEG was found to reinforce the enhancing effect of PVAc by exerting a 'neighboring' effect on the silanol condensation. The morphology of the mixture system containing PVAc and PEG molecules is postulated to be a micelle-like structure with PVAc molecules miscible with the methacryl-functional groups of γ -MPS and PEG molecules forming hydrogen bonding with the silanol groups in the γ -MPS phase.