CHAPTER 6

SUMMARY AND CONCLUSIONS
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The main aim of the study was to optimise the reactive extrusion conditions in the conventional modification processes of polyethylenes in a single screw extruder.

The optimum conditions for peroxide crosslinking of low density polyethylene (LDPE), linear low density polyethylene (LLDPE) and their blend were determined in a torque rheometer. The actual reactive extrusion was performed in a laboratory single screw extruder using the optimum parameters. The influence of the coagent, triallyl cyanurate (TAC), on the crosslinking of low density polyethylene in the presence of peroxide was also investigated. The peroxide crosslinking was found to improve the mechanical properties and the thermal stability of the polyethylenes. The efficiency of crosslinking was found to be improved by the addition of coagent such as TAC. The result of these studies are reported in chapter 3.

The optimum conditions for silane grafting viz temperature, shear rate, silane and DCP concentrations were determined on a torque rheometer in the case of LDPE, LLDPE and their blend. Silane grafting of LDPE in the presence of peroxide was performed with and without addition of water. Compounding of such mixtures in the melt at high temperatures caused decomposition of the peroxide and grafting of alkoxy silyl groups to the polyethylene chains. Water
molecules caused hydrolysis of Si-OR groups and formation of Si-O-Si crosslinks was confirmed by FTIR spectra in chapter 4.

The optimum parameters for maleic anhydride modification of LDPE, LLDPE and their blend were determined. The grafting reaction was confirmed by FTIR spectroscopy. Modification of polyethylenes with maleic anhydride in the presence of dicumyl peroxide was found to be useful in improving mechanical properties. The improvement was found to be mainly due to the grafting of carboxyl group and formation of crosslinks between the chains. The crosslinking initiated improvements indicate extended property profiles and new application fields for polyethylenes.

On the whole the study shows that the optimum conditions for modifying polyethylenes can be determined on a torque rheometer and actual modification can be performed in a single screw extruder by employing the optimum parameters for improved mechanical/ thermal behaviour without seriously affecting their processing behaviour.