Chapter 6

SUMMARY AND CONCLUSIONS
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Mechanical and rheological behaviour of thermoplastic elastomers based on triblock copolymers viz., SBS, SIS and SEBS were compared with those derived from blends of thermoplastics and elastomers viz., PVC and NBR. The stress-strain behaviour of both these classes of thermoplastic elastomers was more or less similar to that of elastomers. However, certain members of these classes, such as SBS in the triblock polymers and NBR/PVC blends containing fairly high proportions of PVC, show yielding phenomena. Such members also show higher hysteresis loss, showing some deviations from the mechanical behaviour of elastomers.

The peculiar rheological behaviour of both these classes of thermoplastic elastomers stems from the fact that the two phase behaviour of these materials persist even in the melt under normal conditions of processing. Single phase melt flow is achieved only under very high temperature and/or shear which eventually leads to substantial degradations. This means that the two phase behaviour of the melts should normally be taken care of under normal processing operations. Thus SBS, SIS and SEBS
exhibit two distinct flow behaviour depending upon the shear and/or temperature to which they are exposed. The critical factor here is whether the polystyrene domains are destroyed or not. The same two phase melt behaviour is shown by NBR/PVC blends, too, the critical factor in this case being the fusion of PVC particles. The melt elasticity parameters of the two classes of TPEs were also found to exhibit a close similarity with viscosity characteristics. Due to the complex nature of melts, instruments such as Brabender plastocorder in which uniformity of shear and temperature are difficult to achieve may not give a very good rheological representation of such thermoplastic elastomers. For studying the flow transition, a wide range of shear rates is required which is usually not achieved with precision in a Brabender plastocorder.

Of the two classes of thermoplastic elastomers, the one derived from elastomer/plastic blends has slight edge over the triblock copolymers, in the comparative ease with which the properties can be modified over a very wide range by adjusting the composition, characteristics of individual polymers, use of interfacial additives, use of
chemical modifiers, co-crosslinking etc. However, the homogeneity of the blends is dependant upon the processing history which requires close control if uniformity in properties is to be achieved.