SUMMARY

The study of solute-solvent interactions in poly (ethylene glycol) solutions has been undertaken in the present investigation. In recent times a number of equations have been used for this purpose. In the present work water+DMSO (50%, V/V) mixture has been used as mixed solvent besides the pure water and pure Dimethyl sulphoxide (DMSO) as solvent systems. The author has measured ultrasonic sound velocity, viscosity and density of poly (ethylene glycol) (Mol-Wt 6000) in H₂O + DMSO (50% V/V) and DMSO at 30, 35, 40 and 45°C and presented the results in this dissertation.

Chapter 1 gives a general introduction relating to the various aspects of polymer dissolution in solvents. It also describes various possible solute-solvent interactions in polymer solutions from their study of physico-chemical properties like ultrasonic velocity, viscosity and density. A brief introduction is also given for PEG about its synthesis and uses.

Chapter 2 describes purification procedures of chemicals used and the experimental methods relating to density and viscosity. It also presents the results of viscosity of poly(ethylene glycol) solutions and the data
has been used to calculate the Huggins constant 'K' and hydrodynamic volume 'Ve'. From these values it is concluded that the solute-solvent interactions are present in these polymer solutions and are in the following, order

\[ \text{PEG in H}_2\text{O} > \text{PEG in H}_2\text{O} + \text{DMSO(50\%, V/V)} > \text{PEG in DMSO} \]

Chapter 3 deals with the apparent molar volumes (\(\bar{v}\)) of the above said systems. The \(\bar{v}\) data has been analysed by an equation similar to the one proposed by Masson. The results are analysed in terms of the magnitude and sign of \(\bar{v}^0\) and \(d \bar{v}/d C\) and confirmed the presence of solute-solvent interactions in the polymer solutions studied.

Chapter 4 presents, the ultrasonic velocity experimental details and also the results obtained for the systems mentioned above. The variation of ultrasonic velocity (\(V\)), Rao number (\(R\)), molar compressibility (\(B\)), specific acoustic impedance (\(Z\)), van der waals constant (\(b\)) with concentration shows that these parameters increase with concentration but the relation is slightly non-linear while adiabatic compressibility (\(B_{ad}\)) decreases with concentration and the relation is slightly non-linear as in other properties. This non-linearity confirms the presence of solute-solvent interactions in PEG solutions.