Summary

The chapterwise summary of the work presented in the various parts of the thesis is outlined below:

CHAPTER-I

This chapter deals with the role of thermodynamic excess functions in the study of molecular interactions in binary liquid mixtures of non-electrolytes and also contains a brief account of various intermolecular potential. This chapter also includes a brief description of the various current theories of associated solutions of non-electrolytes. Special emphasis has been paid to Flory theory, Mecke-Kempter association model and quasi lattice theory by Barker.

CHAPTER-II

In chapter II, molar excess volumes of mixing, $V^E$ have been measured experimentally as a function of temperature and composition by dilatometric technique. The molar excess volumes data of 1-propanol or 2-propanol (1) + cyclohexane or benzene or toluene or o-xylene or m-xylene or p-xylene (2) binary mixtures at 298.15, 303.15 and 308.15K
over the entire range of composition have been measured. The observed $V^e$ data have been explained qualitatively in terms of breaking of hydrogen bonding in the self associated propanol, disruption in the favourable orientation order of the pure propanol and electron donor acceptor interactions between propanol and an aromatic hydrocarbon. The $V^e$ data for these systems have also been analysed in term of Mecke-Kempter type association model with a Flory contribution term. The predicted $V^e$ values are in good agreement with the experimental data.

CHAPTER-III

In this chapter, molar excess enthalpy of mixing, $H^e$, have been measured for the same mixtures (as mentioned in chapter-II) at 298.15 and 308.15 K over the entire range of composition using flow microcolorimeter (LKB-2107, Broma, Sweden). The measured $H^e$ data have been analysed in terms of a Mecke-Kempter type of association model with a Flory contribution term and Barker's quasi lattice model. It has been found that the $H^e$ values predicted from Mecke-Kempter Association Model and Barker's quasi-lattice model to some extent are in good agreement with the experimental $H^e$ data.

CHAPTER IV

Molar excess Gibbs free energy of mixing values for 1-propanol or 2-propanol + cyclohexane, benzene, toluene, o-, m- or p-xylene at 298.15 and 308.15 K have been calculated by the Barker method from vapour pressure data measured by a static method. The free energies of mixing for these binary systems are also predicted in terms of the Mecke-Kempter with a Flory contribution term using two interaction parameters and Barker quasi-lattice model. The predicted values agree reasonably well with the experimental values in case of MK model but agreement is very poor in case of Barker's quasi-lattice model.

CHAPTER-V

In the last chapter, dielectric polarization, refractive indices and nmr spectroscopic studies have been made for these binary systems at 308.15 K. The results have been used in understanding the strength of interactions in the mixtures. Dielectric studies coupled with refractive indices and nmr studies confirmed the existence of weak electron donor acceptor type interactions.