

CHAPTER -X

CONCLUDING REMARKS

In this thesis, I have studied the interactions of some biomolecules and simple molecules by physicochemical processes in liquid media. A detailed investigation has been done on different interactions, such as solute-solute, solute-solvent and solvent-solvent interactions in various solvent systems. Molecular interactions have been explored by dint of thermodynamic and transport properties of solutions. Systematic study made on the properties has an immense importance in gaining a better knowledge of these interactions. These interactions help in better understanding the nature of solute and solvent, that is, whether the solute modifies or distorts the structure of the solvent.

In **Chapter-IV**, after a systematic study of the density, viscosity, refractive index and ultrasonic speed of α -amino acids in aqueous Bu_4PBF_4 solution at 298.15 K, we have obtained a comprehensible idea about the presence of strong solute-solvent interactions which increases with the increase in the number of carbon atoms of the studied amino acids and with increase of mass fraction of Bu_4PBF_4 in the aqueous mixture. The refractive index and the molar refraction values suggest that L-Valine molecules are more tightly packed in the solution leading to higher solute-solvent interaction than the other studied amino acids.

Chapter V deals with the study on solution behaviour of alkali metal perchlorates (LiClO_4 , NaClO_4 and KClO_4) prevailing in N, N- dimethyl formamide with the manifestation of ion solvation consequence. Extensive investigation of LiClO_4 , NaClO_4 and KClO_4 in N,N-Dimethyl Formamide reveals that LiClO_4 is more associated in Formamide than the other two perchlorates and it remains as ion-pairs. The ion-association is found minimum in the case of KClO_4 in N,N-Dimethyl Formamide. The said interaction of NaClO_4 arises in

the intermediacy of LiClO_4 and KClO_4 . The volumetric, viscometric and interferometric studies reveal the predominance of ion-solvent interaction over the ion-ion interaction in all the studied solutions.

In **Chapter VI** discussion on the physico-chemical study of some bioactive solutes in aqueous potassium acetate solution have been made. The values of the limiting apparent molar volume (ϕ_V^0), viscosity B -coefficients and limiting partial isentropic compressibility (ϕ_K^0) are indicative of the presence of strong solute-solvent interactions which increases with the increase in the number of carbon atoms of the studied amino acids and with increase of mass fraction of Potassium Acetate in the aqueous mixture. The refractive index and the molar refraction values suggest that L-Valine molecules are more tightly packed in the solution leading to higher solute-solvent interaction than the other studied amino acids.

The study in **Chapter-VII** demonstrates probing solute-solvent interactions of some bioactive solutes in aqueous barium nitrate solution on the basis of physicochemical contrivances. The values of the limiting apparent molar volume (ϕ_V^0), viscosity B -coefficients and limiting partial isentropic compressibility (ϕ_K^0) indicate the presence of strong solute-solvent interactions which increases with the increase in the number of carbon atoms of the amino acids and also with the increase of mass fraction of Barium Nitrate in the aqueous mixture. The refractive index and the molar refraction values indicate that molecules of L-Valine are more tightly packed in the solution resulting higher solute-solvent interaction than the other two amino acids.

The study in **Chapter-VIII** demonstrates that potassium iodide is more associated in Nicotinic acid than the other two halides. The ion-association is found minimum in the case of potassium chloride in Nicotinic acid. The said interaction of potassium bromide arises in the intermediacy of potassium iodide and potassium chloride. The present study reveals the

predominance of ion-solvent interaction over the ion-ion interaction in all the solution under investigation.

The study in **Chapter-IX** is associated with the study on interactions of some metal perchlorates prevailing in formamide by physicochemical approach. Extensive investigation of LiClO_4 , NaClO_4 and KClO_4 in Formamide reveals that LiClO_4 is more associated in Formamide than the other two perchlorates and it remains as ion-pairs. The ion-association is found minimum in the case of KClO_4 in Formamide. The said interaction of NaClO_4 becomes in between LiClO_4 and KClO_4 . The volumetric, viscometric and interferometric studies reveal the predominance of ion-solvent interaction over the ion-ion interaction in all the studied solutions.

Extensive investigations of the different transport and thermodynamic properties of the electrolytes will facilitate in understanding the scenery of the ion-solvent interactions and the role of solvents in various physicochemical processes.

Different phenomena associated with solution chemistry may be well understood by virtue of proper understanding of the ion-ion and ion-solvent interactions in the solution. However, it is compulsory to remember that molecular interactions are very complex in nature. There are strong forces existing in the molecule and it is not really feasible to separate them all. Nevertheless, if careful judgement is used, convincing conclusions can be strained in many cases involving the order of the system and degree of structure.

In my dissertation, an extreme importance has been given to Amino acids, the monomeric unit of the Polypeptide (protein) belonging to the class of Biomolecules, because of their key role in biochemistry, nutrition supplements, fertilizers, food technology, biodegradable plastic and drugs industry. I have also dealt with the 'Room Temperature Ionic liquids' being the current interest in all branches of chemistry because of their potential uses as 'designer solvents' and 'green' replacements for volatile organic

solvents in the reactions involving inorganic and bio-catalysis. They are also utilized as heat transfer fluids for processing biomass and as electrically conductive liquids in electrochemistry (batteries and solar cells).

From my experimental observations, it is obvious that vital informations regarding various types of interactions i.e. ion-solvent interactions have been obtained successfully in different liquid media .These results are very important and useful in various industries such as modern battery, medicine as well as different types pharmaceutical, cosmetics products.