

TABLE OF CONTENTS

| SUBJECT | PAGE NO. |
|--|-----------------|
| Declaration | (iii) |
| Certificate | (iv) |
| Acknowledgements | (v-vi) |
| Preface | (vii) |
| Abstract | 1-11 |
| List of Tables | 12-17 |
| List of Figures | 18-20 |
| List of Schemes | 21-22 |
| List of Appendices | |
| Appendix A: List of Publication(s) | 23-24 |
| Appendix B: List of Seminars / Symposiums / Conferences Attended | 25 |
| <u>CHAPTER: I</u> Necessity of the Research Work 1.1. Scope, Objective and Applications of the Research Work 1.2. Choice and Importance of Solutes and Solvents Used 1.3. Methods of Investigation 1.4. Summary of the Work Emphasize in the Dissertation | 26-43 |

| SUBJECT | PAGE NO. |
|--|-----------------|
| <p><u>CHAPTER: II</u></p> <p>General Introduction(Review of the Earlier Works)</p> <p>II.1. Ionic liquids</p> <p>II.2. Solution chemistry</p> <p>II.3. Various driving forces of interaction</p> <p>II.4. Interactions in solution systems</p> <p>II.5. Investigation on different kind of interactions</p> <p>II.6. Density</p> <p>II.7. Viscosity</p> <p>II.8. Ultrasonic Speed</p> <p>II.9. Conductance</p> <p>II.10. Refractive index</p> <p>II.11. Surface Tension</p> <p>II.12. FTIR Spectroscopy</p> <p>II.13. UV-Visible Spectroscopy</p> <p>II.14. NMR Spectroscopy</p> | 44-157 |
| <p><u>CHAPTER: III</u></p> <p>Experimental Section</p> <p>III.1. Name, Structure, Physical Properties, Purification and Applications of the Chemicals used in the Research Work</p> <p>III.2. Experimental Methods</p> | 158-208 |
| <p><u>CHAPTER: IV</u></p> <p>Study of Ion pair and Triple-Ion Origination of an Ionic Liquid, ([bmmim][BF₄]) Predominant in Solvent Systems *</p> <p><i>*Published in RSC adv. 2014, 4, 62244-62254.</i></p> | 209-242 |

| SUBJECT | PAGE NO. |
|--|-----------------|
| <p>IV.1. Introduction</p> <p>IV.2. Experimental</p> <p> IV.2.1 Source and purity of samples</p> <p> IV.2.2 Apparatus and procedure</p> <p>IV.3. Results and discussion</p> <p> IV.3.1 Ion-pair formation</p> <p> IV.3.2 Triple-ion formation</p> <p>IV.4. Apparent Molar Volume</p> <p> IV.4.1. Temperature Dependent Apparent Molar Volume</p> <p>IV.5. Viscosity Calculation</p> <p>IV.6. FT-IR Spectroscopy</p> <p>IV.7. Conclusions</p> <p>Tables</p> <p>Figures</p> <p>Schemes</p> | |
| <p><u>CHAPTER: V</u></p> <p><i>Exploration of Host Guest Inclusion Complex of β-Cyclodextrin with an Ionic Liquid ([C₄mpy]Cl) in Aqueous Media by Physicochemical Approach*</i></p> <p><i>* Published in Chem Sci Rev Lett, 2015, 4(14), 619-629.</i></p> | 243-265 |
| <p>V.1. Introduction</p> <p>V.2. Experimental</p> <p> V.2.1 Materials and Reagents</p> <p>V.3. Results and discussion</p> <p> V.3.1 Surface Tension</p> <p> V.3.2 Conductance</p> <p> V.3.3 Apparent molar volume, Viscosity B- coefficient and Refractive index</p> <p>V.4. Conclusions</p> | |

| SUBJECT | PAGE NO. |
|---|-----------------|
| <p>Tables Figures Schemes</p> | |
| <p><u>CHAPTER: VI</u> Exploration of Solvation Consequences of Ionic Liquid [Bu₄PCH₃SO₃] in Various Solent Systems by Conductance and FTIR Study* <i>*Under Revision in J. Chem. Eng. Data, ACS.</i></p> | 266-295 |
| <p>VI.1. Introduction VI.2. Experimental VI.2.1 Source and purity of samples VI.2.2 Apparatus and procedure VI.3. Results and discussion VI.3.1 Electrical Conductance VI.3.2 FTIR Spectroscopic Study VI.4. Conclusions Tables Figures Scheme</p> | |
| <p><u>CHAPTER: VII</u> Study of Diverse Interfaces of Biologically Active Solutes in H₂O + Ionic Liquid Systems by Physicochemical Approach* <i>*Published in J. T. R. Chem, 2014, 21(1), 1-14.</i></p> | 296-313 |
| <p>VII.1. Introduction VII.2. Experimental VII.2.1 Source and purity of samples VII.2.2 Apparatus and procedure VII.3. Results and discussion VII.3.1 Density Calculation VII.3.2 Viscosity Calculation VII.3.3 Refractive Index Calculation VII.3.4 Ultrasonic speed Calculation</p> | |

| SUBJECT | PAGE NO. |
|--|-----------------|
| VII.4. <i>Conclusions</i> <i>Tables</i> <i>Figures</i> <i>Schemes</i> | |
| <u>CHAPTER: VIII</u> <i>Exploration of Inclusion Complex Formation between Ionic Liquid and β- Cyclodextrin by Conductance, Surface Tension and Spectrometric Study*</i> <i>*Communicated.</i> | 314-329 |
| VIII.1. <i>Introduction</i> VIII.2. <i>Experimental</i> VIII.2.1 <i>Chemicals</i> VIII.2.2 <i>Measurements</i> VIII.3. <i>Results and discussion</i> VIII.3.1 <i>Surface Tension</i> VIII.3.2 <i>Conductance</i> VIII.3.3 <i>UV-Visible Spectroscopy</i> VIII.3.4 <i>^1H NMR Study</i> VIII.3.5 <i>^1H NMR data</i> VIII.3.6 <i>Structural effect of the β-CD</i> VIII.4. <i>Conclusions</i> <i>Tables</i> <i>Figures</i> <i>Scheme</i> | |
| <u>CHAPTER: IX</u> <i>Study to Explore Assorted Interfaces of an Ionic Liquid Prevailing in Solvent Systems by Physicochemical Approach*</i> <i>*Published in RSC Advances, 2015, 5, 89431-89440.</i> | 330-364 |
| IX.1. <i>Introduction</i> | |

| SUBJECT | PAGE NO. |
|---|-----------------|
| <i>IX.2. Experimental</i> <i>IX.2.1 Source and purity of samples</i> <i>IX.2.2 Apparatus and procedure</i> <i>IX.3. Results and discussion</i> <i>IX.3.1 Ion-pair formation from conductance</i> <i>IX.3.2 Ion-pair formation from conductance</i> <i>IX.3.3. Apparent Molar Volume</i> <i>IX.3.4. Temperature Dependent Apparent Molar Volume</i> <i>IX.3.5. Viscosity Calculation</i> <i>IX.3.6. Refractive Index Calculation</i> <i>IX.3.7. FTIR Spectroscopic</i> <i>IX.4. Conclusions</i> <i>Tables</i> <i>Figures</i> <i>Scheme</i> | |
| <u>CHAPTER: X</u> | 365-369 |
| Concluding Remarks | |
| BIBLIOGRAPHY | 370-403 |
| INDEX | 404-406 |
| ENCLOSURES <i>Reprint of the Published Papers</i> | |