



*This thesis is dedicated
To
My beloved
Parents and Siblings*



DECLARATION

I declare that the thesis entitled “**EXPERIMENTAL AND COMPUTATIONAL STUDIES OF VARIOUS INTERACTIONS OF SOME SIGNIFICANT COMPOUNDS PREVAILING IN SOLUTIONS AND INCLUSION COMPLEXES BY DIFFERENT METHODOLOGIES**” has been prepared by me under the guidance of Dr. Mahendra Nath Roy, Professor of Chemistry, University of North Bengal and co-guidance of Dr. Deepak Ekka, Assistant Professor of Chemistry, Coochbehar Panchanan Barma University. No part of this thesis has formed the basis for the award of any degree or fellowship previously.

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PREFACE

The work in the thesis entitled “**EXPERIMENTAL AND COMPUTATIONAL STUDIES OF VARIOUS INTERACTIONS OF SOME SIGNIFICANT COMPOUNDS PREVAILING IN SOLUTIONS AND INCLUSION COMPLEXES BY DIFFERENT METHODOLOGIES**” was initiated under the supervision of Dr. Mahendra Nath Roy, Prof. of Chemistry in the Department of Chemistry, University of North Bengal and co-guidance of Dr. Deepak Ekka, Assistant Professor of Chemistry, Coochbehar Panchanan Barma University. This research was conceived within the scope of the program focusing on "**Host-Guest Inclusion Complexation of Some Biologically Potent Molecules & Food Chemical - Ionic Liquid Interaction**" under the guidance of Professor Roy and within the research group led by him.

This endeavor constitutes an exploration into the supramolecular host-guest inclusion complexation of biologically active molecules, encompassing small drug molecules. The primary objective is to enhance their bioavailability by augmenting solubility. Additionally, the research aims to develop a drug delivery system that involves inclusion complexes, facilitating controlled release of water-soluble, highly potent drugs to specific sites without necessitating chemical modification of the drug molecules. Furthermore, the investigation delves into the interaction between food chemicals and ionic liquids as well as vitamins with caffeine solution.

Throughout my research journey, I had the privilege of actively engaging in various conferences and seminars held across the country. The opportunity to listen to and interact with distinguished experts and scientists was highly inspiring. Additionally, I was fortunate to publish works related to the thesis in well-regarded International as well as National Journals.

Consistent with the standard protocol for reporting scientific observations, appropriate acknowledgments have been provided whenever the work described relies on the findings of other investigators. I take full responsibility for any unintentional oversights and errors that may have occurred despite taking precautions. I look forward to facing additional challenges in my life, as it is my aspiration to apply the knowledge I have acquired during my endeavors in future undertakings.

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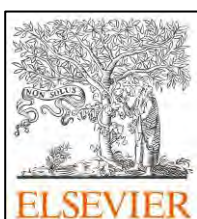
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APPENDIX A

LIST OF PUBLICATIONS

1. Physicochemical and Computational Investigations of some Food Chemicals Prevalent in Aqueous 1-butyl-1-methyl-pyrrolidinium chloride Solutions with the Manifestation of Solvation Consequences



Journal of Molecular Liquids 353 (2022) 118800

Included in the Thesis

2. Synthesis and Characterisation of an Inclusion Complex of DL-Aminoglutethimide with β -Cyclodextrin and its Innovative Application in a Biological System: Computational and Experimental Investigations



ACS Omega 7 (2022) 11208-11216

3. Exploring Various Interactions of Vitamin C and Vitamin B Compounds Prevailing in Aqueous Mixtures of a Nerve Stimulating Drug Molecule at Different Temperatures by Experimental and Computational Studies



IJACS 12 (2024)
Included in the Thesis

4. Probing the Assembly of Nicotinuric Acid with Alpha and Beta Cyclodextrin Molecules by Physiochemical Investigation and Computational Approach



Chemical, Biological and Physical Sciences
13 (2023) 4

Included in the Thesis

5. Probing Subsistence of Host-Guest Inclusion Complexes of Oligosaccharides with Allopurinol for Regulatory Release with the Manifestation of Solvation Consequences



IJACS 5 (2019) 621-628

6. Non-Covalent Interaction Between Ionic Liquid (1-ethyl-3-methylimidazolium Chloride-aluminum Chloride) and Pure Alcohols



Current Physical Chemistry 11 (2021)
184-200

7. Inclusion of Hydrazinophthalazine insight into the cavity of β -cyclodextrin: A study of surface tension and UV-vis spectroscopy



Assian Journal of Green Chemistry 5
(2021) 183-195

APPENDIX B

List of Seminar/Conference/Workshop attended

1. International seminar on Frontiers in Chemistry 2023 & Prof. C. N. Rao Endowment Lecture, Organised by: Department of Chemistry, University of North Bengal, 13-15th March 2023. *(Presented a poster)*
2. International Seminar on “Frontiers in Chemistry 2019” Sponsored by: University Grants Commission, New Delhi; Organised by: Department of Chemistry, University of North Bengal. *(Presented a poster)*
3. National Web-Based Conference on “Environmental Determinism, Diverse Pollution, Sources, And Controlling Management Through Sciences and Humanities”, Organised by Alipurduar University, 22-23rd March 2021. *(Oral Presentation)*
4. International Seminar on “The history of Science & Technology – A Journey from Metal Age to E-Age, Organised by: Department of Chemistry & IQAC, Alipurduar College, Alipurduar in Collaboration with: College of Science and Technology, Royal University of Bhutan, Rinchending, Bhutan, 12th March, 2019 *(Presented a poster)*
5. International Seminar on “International Year of the Periodic Table of Chemical Elements – 2019” 22nd – 23rd November 2019, Organised by: Department of Chemistry, University of North Bengal.
6. National Seminar on “Frontiers in Chemistry – 2019” Organised by: Department of Chemistry, University of North Bengal & CRSI North Bengal Local Chapter.
7. Science Academies Lecture Workshop on “Frontiers in Chemical and Material Sciences: Theory and Practice”, Organised by: Department of Chemistry, University of North Bengal.