This thesis is dedicated

to

my beloved

parents & family

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Arpita Maiti

Declaration

I hereby assert that the thesis titled **"Probing Assorted Host-Guest Interactions Prevailing in Various Environments to Explore Different Target Analytes by Diverse Spectroscopic Contrivances"** represents the culmination of my original research. This work was conducted under the guidance of Prof. (Dr.) M N Roy (Supervisior) and Dr. Tanusree Ray (Co-supervisior) at the Department of Chemistry, University of North Bengal.

The content of this thesis is the outcome of my independent investigation, showcasing my dedicated efforts and comprehension of the subject matter. The data, results, and conclusions presented in this document are derived from authentic research findings and have not been previously submitted for any other degree or qualification, either at this institution or elsewhere.

I affirm that the content of this thesis is a genuine reflection of my research work, presented with the utmost honesty and integrity.

Arpita Maiti

.....

Arpita Maiti
Department of Chemistry
University of North Bengal
Darjeeling-734013
West Bengal, India

Date:

UNIVERSITY OF NORTH BENGAL

PROF (DR.) M. N. ROY
FRSC (London), UK
Senior Professor of Chemistry, NBU
Founder Vice-Chancellor of
Alipurduar University
Awardee of One Time Grant from UGC,
Prof. Suresh C. Ameta Award from ICS,
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and
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Bengal

"समानो मन्त्र समिति समानी"

Phone: 0353 2776381
Mobile: 094344 96154
Fax: +91 353 2699001
Darjeeling-734 013,
West Bengal, INDIA
April, 2024
Email:mahendraroy2002@yahoo.co.in
/mahendraroy2018@nbu.ac.in

CERTIFICATE

I certify that Mrs. Arpita Maiti has prepared the thesis entitled "**Probing Assorted Host-Guest Interactions Prevailing in Various Environments to Explore Different Target Analytes by Diverse Spectroscopic Contrivances**" for the award of the Ph.D. degree of the University of North Bengal, under our guidance. She has carried out research work at the Department of Chemistry, University of North Bengal.

Mahendra Nath Roy

Prof. (Dr.) Mahendra Nath Roy

(Supervisor)

Professor of Chemistry

Department of Chemistry

University of North Bengal

Darjeeling – 734013

West Bengal, India

Prof. (Dr.) M. N. Roy
FRSC (London), UK
Department of Chemistry
University of North Bengal
Darjeeling-734013, India

Date: 08-04-2024.

DEPARTMENT OF CHEMISTRY
SILIGURI COLLEGE
(Govt. Sponsored)
NAAC Accredited Grade B++
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CERTIFICATE

I certify that Mrs. Arpita Maiti has prepared the thesis entitled **"Probing Assorted Host-Guest Interactions Prevailing in Various Environments to Explore Different Target Analytes by Diverse Spectroscopic Contrivances."** for the award of **Ph.D. (Doctor of Philosophy)** degree of the University of North Bengal, under our guidance. She has carried out research work at the Department of Chemistry, University of North Bengal.

Tanusree Ray

Dr. Tanusree Ray

Dr. Tanusree Ray
Asstt. Professor In Chemistry
Siliguri College

(Co-supervisor)

Assistant Professor

Department of Chemistry

Siliguri College

Siliguri, 734001

West Bengal, India

Dated: 08.04.2024

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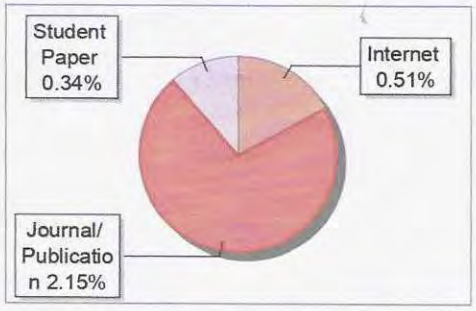

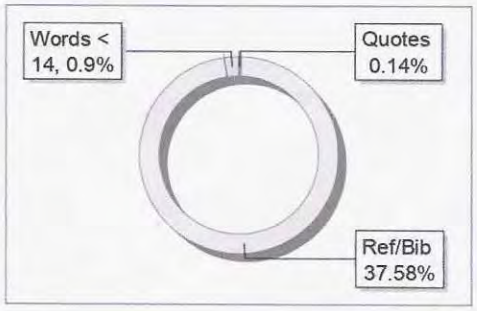

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Mahendra Nath Roy
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Tanusree Ray
(08.04.2024)

Arpita Maiti
08.04.2024

Prof. (Dr.) M. N. Roy
FRSC (London), UK
Department of Chemistry
University of North Bengal
Darjeeling-734013, India

Dr. Tanusree Ray
Asstt. Professor In Chemistry
Siliguri College

Preface

With immense joy and a profound sense of achievement, I am delighted to present my doctoral thesis, titled "**Probing Assorted Host-Guest Interactions Prevailing in Various Environments to Explore Different Target Analytes by Diverse Spectroscopic Contrivances**." This thesis marks the culmination of my journey toward attaining a Doctor of Philosophy (Ph.D.) degree in Chemistry, showcasing the dedicated efforts and unwavering passion that have propelled me throughout my academic pursuit. My enrollment in the Ph.D. program at the University of North Bengal commenced on January 2, 2019, as indicated by letter no. Ph.D./Chem. (1922)/248/R-2024, under the esteemed guidance of Prof. (Dr.) M. N. Roy and Dr. Tanusree Ray, Siliguri College. This scholarly venture was initiated to delve into the intriguing realm of probing assorted host-guest interactions prevailing in various environments to explore different target analytes by diverse spectroscopic contrivances

The motivation driving this research emanated from the burgeoning interest in comprehending probing assorted host-guest interactions prevailing in various environments to explore different target analytes by diverse spectroscopic contrivances. These host-guest interactions prevailing in various environments to explore different target analytes exhibit captivating properties with potential applications in food technology, environmental research, environmental security programs. Unraveling the underlying mechanisms governing host-guest interactions to explore different target analytes and exploring their practical applications has been the driving force behind the present investigation.

I express my profound gratitude to my esteemed supervisor, Prof. (Dr.) M. N. Roy, and co-supervisor, Dr. Tanusree Ray, Siliguri College, whose extensive knowledge, expertise, and guidance have played a pivotal role in shaping the direction of this research. Their constant encouragement, invaluable insights, and constructive feedback have served as guiding beacons, illuminating my path during moments of uncertainty.

Additionally, I extend my heartfelt thanks to the Department of Chemistry at the University of North Bengal for fostering a nurturing academic environment and providing access to state-of-the-art facilities, which proved indispensable in conducting the present thesis research work.

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I express my sincere gratitude to **Prof. (Dr.) M. N. Roy**, my Ph.D. supervisor, and **Dr. Tanusree Ray**, my Ph.D. co-supervisor, Siliguri College for their invaluable scientific assistance and unwavering support during my research. Their extensive knowledge and passion for science have consistently inspired me, driving me to excel in the laboratory. Working with them has been a privilege, and I appreciate their patience in meticulously reviewing this thesis.

I extend my heartfelt thanks to the members of my thesis committee for their valuable suggestions and guidance throughout my research journey. I also acknowledge the support of Prof. (Dr.) B. Biswas, the Head of the Department of Chemistry at the University of North Bengal. I am also grateful to Prof. (Dr.) Pranab Ghosh and Prof. (Dr.) B. Sinha former Head of the Department of Chemistry at the University of North Bengal. My gratitude extends to all faculty members in the Department of Chemistry for their support, encouragement, and role modeling that has shaped my academic career.

Special appreciation goes to my lab members and all co-authors in my publications especially Manas Mahato, Sabbir Ahamed, Najmin Tohora, and Tuhina Sultana whose collaboration has been a delightful experience. I am equally thankful to all my teachers throughout my life especially, my uncle Prankrishna Maiti, Subhas Kumar Maity, Bulu and Bankim Adhikary, Alok Samanta, Elora Banerjee, Sumana Bhadra, Late Samar Chakraborty, Late Samarendra Nath Das, Late Debendranath Misra, Sisir Maity, Dr. Sudhir Pal, Dr. Nirmal Kumar Hazra, Dr. Anup Dasmahapatra, Dr. Mahadev Maity, Dr. Jayasree Laha, and Prof. (Dr.) Ajit K. Mahapatra for their excellent teaching, unwavering support, and encouragement which have significantly enhanced the quality of my life. Also, sincere gratitude goes to Dr. Sudipta Chakraborty, Ranjit Das, and my elder brother Sankhasubra Maiti for their support through out my life.

I am also thankful to my esteemed colleagues and Pranab Kumar Barai, Head Master, Tatu Singha Smriti High School, Uttar Dinajpur for their valuable support and encouragement during my research work.

I express my thanks to the Department of Science and Technology-Fund for Improvement of Science and Technology Infrastructure (DST-FIST) for providing essential research infrastructure.

Finally, my deepest gratitude goes to the numerous individuals who have motivated, encouraged, and supported me in all my endeavors. Especially, I am indebted to my father, Rajkrishna Maiti whose unwavering support and encouragement have played a pivotal role in all my achievements. My sincere gratitude also goes to my beloved mother, brother, and aunts, Soma Maiti, Arpan Maiti, Rita Maiti, and Mita Maiti for their constant support throughout my life. Heartfelt thanks to my better half, Dr. Sudhir Kumar Das, for his constant encouragement during my research journey. Thanks to God for presenting me with the best gift in the world, my two little daughters, Brihasmita and Avigna whose love inspired me always to do better in my life. Last, but not least, I am highly grateful to the almighty for supporting me during my journey and encouraging me to perform best in my life.

Arpita Maiti
Research Scholar
Department of Chemistry
University of North Bengal
Darjeeling-734013, INDIA

List of Figures

List of Tables

List of Schemes

List of Appendices