Acknowledgments

Besides working on the projects and publishing research articles, pursuing a Doctor of Philosophy has always been exhilarating. Most of the doctoral students probably view it as a journey with many crests and troughs. I view it as perseverance, hard work and dedication. I am indebted for all the aggrandizing experiences that I have experienced besides carrying out my actual research work. During these 5 years I met many inspiring and interesting people who helped me molding my endeavors for the future.

First of all I would like to express my deep gratitude to my supervisor Dr. Ananya Debnath for providing me a golden opportunity to work in her research facility at Indian Institute of Technology Jodhpur and steering me all the way till completion of the thesis with both criticism and zealous encouragements. Her sporadic guidance and valuable suggestions succoured me in completion of this work. She is an outstanding mentor and her problem solving approach is far beyond excellence. Working in her lab where the aspiration to "get things right" is impressive and I am privileged working in such a healthy environment.

I like to extend my gratitude towards Dr. Smarajit Karmakar, Associate Professor, Center for Interdisciplinary Sciences, Tata Institute of Fundamental Research, Hyderabad, for collaborating with me and giving valuable suggestions and his time for encouraging, inspiring and thought provoking discussions. I also extend my gratitude towards Dr. Debapratim Das, Professor, Department of Chemistry, Indian Institute of Technology Guwahati for providing me an opportunity to work with him for a different project and exploring new aspect of computational chemistry.

Besides my thesis supervisor, I would equally like to thank doctoral committee members for broadening my research horizon via their respective perspectives and providing additional comments. During my seminars, I have received valuable suggestions from doctoral committee members Dr. Manikandan Paranjyothy, Dr. Samanwita Pal and Dr. Satyajit Sahu which helped in tuning and refining my concepts and presentation skills.

I started my PhD work from January 2015 in Dr. Debnath's research lab where I had started getting positive vibes right from the beginning. I was warmly welcomed by Mr. Raju Lunkad and Ms. Shubhangi Shukla who have constantly supported me in understanding the work culture of the lab and improve my work ethics towards scientific research. A crucial ingredient in my work has been the rewarding interactions with my fellow Ph.D labmates Ms. Arpita Srivastava, Ms. Sheeba Malik and Ms. Renu Saini. Besides Ph.D labmates, I also thank my fellow Ph.D colleagues Dr. Dileep Kumar, Dr. Kumar Rahul, Mr. Amitap Khandelwal, Dr. Javed Ahmed Naikoo, Mr. Aniket Dilip Monde, Mr. Shivam Chaturvedi and Mr. Rohit Kumar with whom I cherish some wonderful memories. I would also like to thank the M.Sc. students of our group Ms. Neha Kumari, Mr. Parveen Gartan, Ms. Purva Dua, Mr. Avinash Garg and Mr. Piyush Singh for their help during my work besides research.

Beyond the academic colleagues I was blessed to have several friends who have supported me during my entire Ph.D journey. I would like to thank Mr. Anil Kumar, Mr. Dheerendra Yadav, Mr. Krishna Kant, Retd. Col. P. S Rathore, Mr. Rinkesh Mangal, Mr. Gaurav Nigam and Mrs. Rashmi Dhyami, Mr. Ganpat Chaudhary, Mr. Shubham Pandey, Mr. Mahesh Kumar and Mr. Sandeep Gehlot and Mrs. Swati Khushwaha for assisting me during non-academic work at the institute. Last but foremost, I thank the almighty God, my parents and Ms. Shalini Srivastava for standing by my side during the tough times of my Ph.D journey. Without the moral support of all the people I would not have been able to complete my research.