

Acknowledgement

First and foremost, praises and thanks to the ‘**GOD**’, the Most Gracious, Most Merciful and the Almighty, for showering me with blessings during my research work to complete it successfully.

Words can never be enough to express how deeply grateful I am for my research guide **Dr. Chetan K. Modi** for allowing me into his research group and giving me an opportunity to work with him. I have been blessed with a better understanding in the field of **CATALYSIS** and **MATERIALS SCIENCE** with the help of his immense zeal, benevolent support, deep knowledge and wit. I truly respect your sincerity, hard work, dedication, and devotion towards the work, and that’s an inspiration to me. He has given me full freedom throughout the whole research work and his productive guidance, time to time motivating me during my doctorate work. Sir, you will always hold a very precious position in my life. I pray to God to impart you always with good health, peace, achievement and tons of happiness.

I would like to express my deepest gratitude to **Prof. R. C. Tandel**, Head, Applied Chemistry Department, Faculty of Technology and Engineering, The Maharaja Sayajirao University of Baroda, Vadodara for his words of encouragement throughout the course of my research journey. I would also like to thank **Prof. P. T. Deota**, **Dr. D. P. Bharambe** and **Dr. Rakesh Sharma** for their immense contribution and support throughout my research work.

This work would not have been possible without the financial aid assisted by ‘**The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat**’ in connection with award of the University Research Scholarship.

I am also extremely indebted to **Prof. P. K. Jha**, Department of Physics, Faculty of Science, The Maharaja Sayajirao University of Baroda, Vadodara, for being exceptionally supportive in the analysis work.

I have no words to express my gratitude for my research colleague **Dr. Ravi S. Vithalani**, he is not only the colleague but also played the role of my ‘Big Brother’. In fact, his valuable insight, constructive support, his extensive discussions throughout my research work has helped me in every promising way

at any time. I want to express my special thanks to **Ms. Urvi Lad**, for her company, friendship who spent lots of time in discussing various aspects of research and for her valuable suggestions that boosted my confidence and morale.

Words fail to express my admiration for my friend late **Mr. Yogesh Chamkure** for helping me in numerous ways during various stages of my PhD work and in my personal matters. I would be thankful for his invaluable advice and valuable suggestions that nudged me towards my goals. After he passed away, work in the lab would definitely not be as pleasant!

I am also extremely grateful to **Dr. Nikita Tiwari**, who has always been there for any kind of help at any time. Thanking for her invaluable advice and feedback on my research and directly-indirectly helping me in my personal life. Being a very cooperative, caring and supportive friend, she has actually kept me away from losing spirit.

Our lab has been a very magnificent place and it is joyful to have many crazy people over all these years coming under the same roof. My acknowledgement will never be completed without my research lab mates, Bharat Maru, Komal Trivedi, Dr. Pavan Karkare, Srujal Sonera, Ankur Mistry, Dr. Sneha Singh, Dr. Sofia Shaikh, Brijesh Patel, Hemil Patel, Gaurang Bhatt and Darshna . I honestly acknowledge my colleagues Dr. Som Narayan, Mr. Dipak Upadhyay, Irfan Shaikh and M. Sc. Dissertation students for their kind help and support.

I would not miss expressing my sincere thanks to **Mrs. Tejal C. Modi** for her underpin and moral support during the entire period of my research work.

I will be failing in my duty if I don't express gratitude to some of my friends in the university and out of the university with whom I have discussed my research experiences, since they brought me joy and enlightenment. I wish to keep in mind some of my friends and well-wishers, Vinay Patel, Dhruv Patel, Chintan Patel, Vishang Patel, Siddharth Patel, Mitul Patel, Bhargav Patel, Banti Patel, Deep Patel, Shaily Patel, Sneha Patel, Nandini Patel, Axi Patel for their immense moral support and encouragement.

I am also grateful to Dr. Arun Basrur, Mrs. Ruhi Pathan and Mr. Ali Akbar Vohra for their great support in resolving the problem regarding GC

analysis and help during my Ph.D. work. I am also thankful to Mr. Sanjeev Kane and Dr. Himanshu Srivastava for their valuable support in the analysis during my research work.

I would like to convey my heartfelt regards to all of my respected teachers who were involved throughout my PhD work for their proper guidance and influential teaching directly or indirectly. My heartfelt thanks go to all my teaching and non-teaching staff members of the department, staff members of TK Gajjar & Hansa Mehta Library and administrative office staff members for their support.

A special acknowledgement goes to Prof. B. T. Thakar, VNSG University, Surat and Dr. Pankaj Patel, BKM Science College, Valsad for helping me throughout my PhD work.

Last but not the least, I am intensely and eternally thankful to my father **Mr. Subhash B. Patel** who made me a stronger person and who has been an inspiration for me and also my caring mother **Mrs. Ila S. Patel** who taught me to believe in myself and the importance of hard work, honesty and values that really helped in life. My parents are my biggest strength pillar and are playing a vital role in whatever I am now and will be in the future. Foremost, I would like to express my sincere gratitude to **my nephew (Reyansh)**, his role in my life as a **Catalyst**. I am unable to express the sheer joy and happiness that I get by spending time with him. I also thankful to my grandparents Mr. Babubhai Patel and Mrs. Shantaben Patel, and my other family members Mr. Hashmukh Patel, Mr. Rajesh Patel, Mr. Raj Patel, Mrs. Hemlata patel, Mrs. Daxa Patel, Mrs. Nita Patel, Mr. Nirlep Patel, Mrs. Krima Patel, and my younger siblings Kejal, Dhruvi, Riya, Preyash, Vishant, Lay, Shania, Maitry and Aum for their love, enthusiasm and constant moral support.

Finally, I would like to acknowledge everybody who paved my way towards the successful apprehension of this thesis as well as express my regret that I could not mention them individually.