

Acknowledgements

With a deepest gratitude, I offer my heartfelt praises to the Supreme **Maa (Vaishnu Devi)**, whose benevolent blessings have endowed me with a sound mind and a healthy body. It is with his divine grace that I was able to navigate through the intricate complexities of my research and bring it to fruition. Words cannot express the depth of my gratitude towards the almighty for her unwavering support throughout this journey.

As I revel in this moment of achievement, I am delighted to take this moment to express my overwhelming appreciation and indebtedness to my research supervisor, **Prof. Pushpa Robin**. Her perseverance and love for perfection is truly contagious and inspiring. Your combination of firmness, concern, and faith in me has been the driving force that has led me to where I am today. I am truly grateful to you, madam, for always listening attentively and being readily available whenever needed. Without your support this journey was not possible madam. Thank you from the bottom of my heart, Ma'am, for all that you have done.

I would like to take a moment to express my heartfelt gratitude to the Late **Professor Vihas Vasu**, who served as my external member and provided invaluable guidance and encouragement throughout my Ph.D. journey. His insightful suggestions and unwavering support played a pivotal role in shaping my work, and I will always be indebted to him for his contributions. During, his final days, he and his wife, **Dr. Jyoti Vihas Vasu**, went above and beyond by assisting me in signing critical documents required to submit Synopsis, despite their difficult circumstances. This act of kindness exemplifies the exceptional qualities of a great teacher and a compassionate human being. I am forever grateful to **Professor Vihas Vasu** for his teachings and his selfless dedication to his students. May his legacy continue to inspire future generation.

My deepest appreciation goes to the Vice Chancellor, **Professor V K Srivastava** of The Maharaja Sayajirao University of Baroda and to **Professor Haribhai Kataria**, the Dean of Faculty of Science, for their vital role in providing me with the necessary resources and infrastructure to successfully complete my research work. My sincere gratitude also goes out to the former Vice Chancellor, **Professor Parimal H. Vyas** of The Maharaja Sayajirao University of Baroda, for his contribution in providing the essential resources and infrastructure during my research work

I would like to extend a special and heartfelt thanks to **Professor Haribhai Kataria (The Dean, Faculty of Science)** for his invaluable support, guidance, and unwavering commitment throughout my Ph.D. journey. **Professor H. Kataria** has consistently demonstrated an exceptional level of dedication to his students, taking the time to encourage and motivate us to perform at our best. His willingness to lend a listening ear, offer valuable advice, and go above and beyond to help students in need is truly remarkable. I am deeply grateful for his generosity and compassion, and I feel blessed to have had the privilege of learning under his guidance.

I take this opportunity to thank **Prof. C. Ratna Prabha**, Head, Department of Biochemistry for her constant support and valuable suggestions. Her leadership and guidance have been instrumental in providing me with a conducive learning environment and helping me to achieve my Ph.D. goals.

I extend my utmost gratitude to the Doctoral Research Committee members- including the **Late Professor Vihas Vasu, Professor Rajesh Singh, Prof. C. Ratna Prabha** and **Prof. Pushpa Robin** for their invaluable contributions to my Ph.D. work. Their insightful suggestions, unwavering encouragement have been instrumental in shaping my research journey. I would also like to express my appreciation to the past faculty member, **Prof. R. Begum**, for her kind support and guidance throughout my Ph.D. journey. Her mentorship has been immensely valuable to me, and I am grateful for the time and effort she invested in my Ph.D. growth. Special thanks to other teaching staff of the department, for giving me very valuable life lessons.

I express my heartfelt gratitude to **Dr. Shashikant Acharya** for his constant support and guidance throughout my Ph.D. journey. His helpful nature and willingness to guide have been invaluable, and I cherish our tea times together as they provided me with insightful advice and encouragement. Thank you, Sir.

I express my heartfelt gratitude to **Dr. Ravi Vijayvargia** for giving me an access to some of his lab instruments.

PhD is a life changing experience both personally and professionally. This thesis was not possible without the support of my family. I am very grateful to my **beloved Parents** and **Siblings** for their unwavering support and guidance throughout my life, and especially during my PhD journey. Their selflessness and unconditional love have been a constant source of strength. They have always been there for me, sacrificing their own needs and desires to

ensure my well-being and success. Their support has been instrumental in helping me pursue my dreams. I will forever be indebted to them for their love, support, and the sacrifices they have made for me. You always believed in me when I was occupied with self-doubt. Thank you for reminding me that success belongs to those who never quit!!

I would like to express my utmost appreciation to my beloved **husband, Akash Dave**, for providing constant and unwavering support during my Ph.D. journey, while simultaneously pursuing his own academic goals. His presence by my side through all the obstacles and challenges was a source of immense encouragement and strength when I needed it the most. Despite the demands of his own research, he always made himself available to lend a listening ear and a helping hand whenever I needed it. His unwavering support and understanding have been pivotal in my success, and I am deeply grateful for his presence in my life.

I would like to express my deepest gratitude to my **beloved In-laws** for their unwavering support and encouragement throughout my PhD journey. Their constant motivation, financial assistance, and invaluable guidance have been instrumental in the successful completion of my degree. I am truly blessed to have such wonderful and supportive **In-laws** who have always been there for me during both the good and difficult times. Thank you for everything you have done for me, I will forever be grateful for your kindness and generosity. I would like to express my heartfelt appreciation to **Mrs. Shakuntala Mehta**, my beloved Aunt, who has been a pillar of support throughout my PhD journey, especially during the challenging times. Her unwavering support, love and guidance have been a source of inspiration for me. I am grateful for their presence in my life.

Special thanks to my dear friends, **Dr. Nakshi Desai, Mr. Gaurav Kansagara** for their unwavering support during my challenging times. Their intellectual contributions and providing me necessary chemicals were invaluable in helping me navigate through difficult situations.

I would like to express my sincere gratitude to **Dr. Tabassum Mansuri** and **Dr. Suresh Antony**, my seniors in the lab, for their invaluable guidance and support throughout my Ph.D. journey. **Dr. Brinda Panchamia** and **Dr. Poonam Singh** also deserve my thanks for instilling a positive outlook towards life and research in me and providing me with valuable technical suggestions. I am deeply indebted to my friend and colleague, **Ms. Jinal Thakkar**, for her unwavering assistance and timely help, which made my Ph.D. journey much smoother.

I would also like to thank my Ph.D. colleagues from the department, **Mr. Raju Dabhi, Mr. Sandeep Kumar, Mrs. Dhruti Aman Shah, Mrs. Sushmita Singh, Ms. Dhruvi Kakadiya, Mr. Nishant Parmar, Mr. Jayvadan Vaishnav, Ms. Minal Mane, Mr. Dhruv Gohil, Mrs. Vaidehi Chatupale, Ms. Megha Chaudhari, and Ms. Krishna Bhutia, Kaushal Chaudhary, Nidhi Nagariya** for their constant support in providing me with necessary consumables and chemicals.

Special thanks to my friend from The Department of Chemistry, **Ms. Dhruvi Pithadia** for helping me with chemistry related doubts and technical inputs.

I would like to express my sincere gratitude to the M.Sc. dissertation students (**Dr. Apeksha Joshi, Jagath Vedamurthy, Dhaval Jivani, Krishna Shah, Juee Satam, Ankita Roy and Anshu Pandey**) for their hard work and dedication during their research projects. Their presence during my PhD journey has made it a joyous and fulfilling experience. I am grateful for their friendship and support.

I would like to express my heartfelt appreciation to the non-teaching staff who have played an integral role in my PhD journey. **Mr. Ramesh Nare and Mr. Manish Chauhan** for helping with issuing chemicals and consumables was invaluable and greatly facilitated my research. **Mr. Balwant Gohil** for his diligent work in the office helped ensure a smooth working environment. **Mr. Ramesh Kamle** for his help in paper work. **Mrs. Axita Thappa**, for assisting with paperwork related to my PhD. **Mr. Sandeep Bandal** company over a cup of tea provided a refreshing break from the rigors of research. Finally, **Mr. Shailesh Raval** thorough knowledge of the necessary paperwork required for a PhD student was invaluable, and his timely advice was always appreciated. I am grateful for their tireless efforts and support, which have made my PhD journey a much smoother and enjoyable experience.

I acknowledge the financial support provided to me by **Gujarat State biotechnology Mission (GSBTM)** and **DST PURSE** for my fellowship.

Lastly, thanks to each person of the university who helped me in some or other way which has made my journey successful.

Tanvi Khanna