

Acknowledgement

At the very beginning, I bow my head and offer flowers of reverence to “Mahamana” the late Pt. Madan Mohan Malviya, the founder of Banaras Hindu University, for his lifetime sacrifice and efforts in establishing such a great temple of learning for the cause of millions of students like me. The most valuable thing I acquired from my study at IIT, BHU is to protect, survive and endure myself in this world with increased confidence and additional faith in my abilities to achieve.

I would like to take this opportunity to express my deepest and warmest gratitude to all the people who have contributed through their guidance, encouragement, inspiration, valuable knowledge, patience and kindness during my research work. Without their support, it was very difficult to achieve my goal.

First and foremost, with profound feeling of immense gratitude, I express my whole hearted thanks to my supervisor, Professor R.B. Rastogi Head, Department of Chemistry, IIT (BHU), for giving me the opportunity to study and work on an interesting and challenging research field. I owe my thanks for her enthusiastic, invaluable support and sometimes very vigorous guidance, as well as her motherly support and continuous encouragement throughout this research work. She always provides a motivating and enthusiastic atmosphere to work with, it was a great pleasure to do my research work and thesis under her supervision. I would like to express my sincere gratitude to my co-supervisor Prof. Devendra Kumar, for his insightful, invaluable guidance, encouraging solicited advice, ideas, stimulating discussions and removing any difficulty faced by me during the research.

I owe many thanks to my RPEC members Prof. M.M. Singh, chemistry department and Prof. A.P. Harsha, Mechanical Engineering department, for their liberal attitude, continuous

Acknowledgement

encouragement and valuable suggestions. I wish to express my vivid thanks to Dr. Gurmeet Singh who is always ready to help me in any manner at every stage.

I acknowledge with thanks the members of central instrumentation facility center (CIFC). Thanks are also due to Institute library and the office staff of the chemistry department for their help and support. I would like to acknowledge Prof. A. S. K. Sinha, Chemical Engineering, IIT (BHU) for providing me the facility of XPS. My heartfelt thanks are to Dr. A. K. Tewari and Dr. Praveen Singh, Department of Chemistry, BHU for carrying out the theoretical calculations of the additives. I am extremely thankful to Prof. R. K. Mandal, Department of Metallurgical Engineering, IIT (BHU) for availing the SEM/EDX facilities. Besides these people, I am also grateful to technical staff of Workshop, IIT (BHU) for their assistance in grinding of bearing balls.

I would like to express my grateful thanks to my senior Dr. Vinay Jaiswal for his fair attitude, subject knowledge, fruitful and active discussions, valuable suggestions. Special acknowledgements are to my colleagues Punita mourya, Gunjan Panday, Priyanka Singh and Surendra Yadav for their consistent support and all kind of help extended during the period of my research work. My special thanks are also to my juniors Shivani Gupta and Dinesh Verma for their active support.

Finally, I express my hearty indebtedness to my parents Dr. Virendra Singh & Rashmi and my family for their confidence, continuous encouragement, moral support, precious blessings, patience and substantial help throughout my life. Nothing would have ever been possible without my parent's unconditional love, everlasting affection and encouragement. Also

Acknowledgement

I would like to express my deepest appreciation to my brother Dr. Asheesh Kumar, for his assistance, patience and endless encouragement who has been undeniably my source of energy to achieve the best in my life.

Above all I pay my regards to the Almighty for not letting me down at my struggling time and showing me the golden lining in the dark clouds.

Place: Varanasi

Date:

*(Kalyani)
Research Scholar
Department of Chemistry
IIT(BHU) Varanasi-221005
(September 2012 – January 2017)*