

ACKNOWLEDGEMENT

I take this opportunity to express my sincere sense of gratitude and indebtedness to my esteemed supervisor Dr. Hiralal Pramanik, Associate Professor, Chemical Engineering & Technology, who helped enormously and always inspired me by his indispensable guidance and encouragement during the whole long research work. He has always supported and strengthened me in many direct and indirect ways. His meticulous and valuable reviews, constructive criticism and tireless review of the manuscript has immensely helped me to improve the work.

I also express my heartiest thanks to Prof. P. K. Mishra, Head of the Department, Department of Chemical Engineering & Technology, Indian Institute of Technology (BHU) and Prof. A.S.K. Sinha, Dean of Academic Affairs, Indian Institute of Technology (BHU) for providing essential research facilities and encouragement during the course of work.

I would especially thank Prof. P. Maiti and Dr. Vijaylakshmi Yadav, Indian Institute of Technology, Banaras Hindu University. Without the help of them, my project may not be completed. I am very thankful for their valuable advice & guidance, RPEC, DPGC members and all faculty members of Chemical Engineering & Technology Department for their useful suggestions. The instrumental facilities from CIFIC (IIT-BHU) Varanasi, are gratefully acknowledged.

My thanks to technical and nontechnical staffs especially Mr. Vinay of Energy Resource Lab, Department of Chemical Engineering & Technology, Indian Institute of Technology, Banaras Hindu University for their help.

I am very thankful to all technical and nontechnical staff of Department of Chemical Engineering & Technology, Institute of Technology and Banaras Hindu University.

I also owe my sincerest thanks to my seniors and friends; Mr. Amit Kumar Rathoure, Mr. Pramendra Gaurh, Mr. Deoashish Panjiara, Mr. Abhay Kumar Chaudhary, Mr. Abhay Pratap Singh, Mrs. Anjali Verma and Mr. Neeraj Yadav for their valuable help and support in experiment, data analysis and presentation in the thesis as well as papers over the years.

In the end, I must put on record my gratitude to my Parents, my wife and family for their support and encouragement for this endeavor.

Finally, I wish to extend warm thanks to all those who could not find a separate name but have helped directly or indirectly.

Above all, I am especially thankful to the Almighty God from whom I gathered the strength and perseverance during the course of my work.

Date:

Varanasi

(Uday Kumar Gupta)