ACKNOWLEDGEMENTS

I am very much thankful to God for providing me with an opportunity to work under Dr. S. R. Dave, Reader, Department of Microbiology. Dr. Dave other than being my guide is a friend, philosopher, guardian and everything a wonderful human being could be. Under his guidance I was able to acquire the knowledge of the microbial world by making a fascinating adventure into the world of microbiology and its role in Biohydrometallurgy.

It was his constant intelligent efforts, organized style of working that made the entire scientific work simple and easy for me to understand and hence I was able to gain a deeper insight of the subject. Though while working with him a complete discipline is to be maintained but he not only forgave me for my mistakes but helped me overcome it. He is easily approachable and inspire of his busy schedules, even during the holidays, be it day or night, he spared his valuable time for me for discussing and designing of the experimental phases but never once did he show signs of tiredness on his face.

I am truly honoured to have been blessed with the opportunity of working with such a personality whose work is appreciated not only in India but even in foreign countries. I am proud to leach out some of his deep knowledge and enrich myself.

Dr. S. G. Desai, former Head of our Department is in fact the first person to be thanked as it was with his kind permission that I was given the task of this dissertation. Though busy with his academic schedules whenever he was free he used to inquire about the progress of my work. He was also kind enough to provide me with several valuable suggestions and it was under him that the students and the teaching and non-teaching staff got the fatherly love and oneness of belonging to a joint family. I really feel his absence while submitting this work.

Dr. N. K. Yadav, Head of our Department and a devoted teacher, is to be sincerely thanked for providing me with all the laboratory facilities in the department which made my working smooth and efficient. He was very cooperative and always eager to know the progress of my work. I was always on a look out to pick up several of his valuable tips and suggestions.
Dr. B. V. Patel, lecturer in our department, but far than being a teacher he always behaved as a close friend with whom I could share the lighter moments of life and enjoy tea in the leisure hours. His constant cooperation and suggestions in all the years of my work and assistance with him since the day I was his student is worth thanking. Also I am thankful to Mrs. Minu Saraf, lecturer in our department.

Prof. H. L. Ehrlich, Prof. A. E. Torma, Prof. O. H. Tuovinen, Prof. S. N. Groudev, Dr. D. Morin, Dr. J. A. Brierley and Dr. C. L. Brierley are some eminent scientists at the international front in our field, with whom I had the opportunity to correspond and who helped me with their suggestions and valuable reprints which helped me in carrying out my work and designing my experiments more efficiently. I owe them my humble respects and thanks for all their cooperation rendered to me. I am also thankful to all other scientists actively involved in the field of biohydrometallurgy for sending me with reprints of their wonderful work.

During my course of work I had the opportunity to come in contact with scientists of international repute like - Dr. A. D. Agate, Prof. K. A. Natarajan, and L. B. Sukla who provided me with clues for my work and made available their literatures and library facilities of their respective departments whenever I approached them. I am sincerely thankful to them.

Also I am highly indebted to my teachers: P. J. Soni A. D. Darji, A. K. Bhat, P. M. Pandya, Rakesh Patel, Bhairvi Joshi, Subita Pal, Bhakti Desai, Kiran Patel and Smruti Pandya for supporting me with their blessings.

I am thankful to the Directors of Rajpura-Dariba and Zawar Mines (Hindustan Zinc Ltd.), Agnigundal Mines, Gujarat Mineral Development Corporation, (Ambamata mines) for supplying me with the required complex ore samples. I also take this opportunity to thank Shri Chairman G.M.D.C. and Shri S. B. Vora and Shri N. C. Sonny, G. M. D. C. for their kind interest shown in the project and for sponsoring the Bioleaching project in our department. Vora Saheb and his staff were always ready to help me in getting the multimetal minerals and other details regarding the mining and metallurgy of our country.

It is indeed a great pleasure for me to show my gratitude to the non-teaching staff of our department - Bharatbhai, Parikhbhai, Diptiben, Khandubhai,
Dharmsinh and Kanji for whom I lack words to express. Their wonderful Cooperation and constant company during my working tenure has made each day in the department a golden moment and very memorable for years to come.

I am thankful to the U.G.C, New Delhi (Jul'91-Feb'93) and G.M.D.C, Ahmedabad (Jan'94 ..) for supporting me with financial support as Junior Research Fellow in the respective projects. I am also thankful to the University office staff and Mr. Ghorri at G.M.D.C. for helping me complete the formalities to get the finance released.

The help rendered by our skilled and efficient workshop team led by Shri Patel and Shri Agrawal comprising of Jivabhai, Mohoikarbhai, Bhojabhai, Ranchodbhai, Girishbhai and Chunara who were always present there to help me solve the technical problems. I am also thankful to Shri Ketan Desai - incharge of the sophisticated instruments laboratory and the staff of the School Office for their help in completing the formalities for registration as a Ph. D student. Chagan's tea stall of our campus also has an important role to play as it was the place where many of our important discussions took place over a cup of tea. I am also thankful to the teaching, non-teaching staff and the Ph.D students of the Botany, Chemistry and Zoology departments who helped me in one or the other way whenever required and to Dr. Nayan Jain for providing me with the Graphics Software.

A word of gratitude from the heart is not enough for the love, moral support and encouragement, I received from my friends and their families. Though the list is endless I feel great pride to mention a few like Naveen, Manisha, Phalguni, Sonal, Nagesh, Raju, Raj, Rakesh, Kuljit, Himanshu and Apurva.

Also thanks are due to the former research staff of Ph.D and M. Phil and especially my Ph.D colleagues Noopur, Devayani, Anupama and Shri P. S. Wakte who all had a very important role to play in making my work a success and with whom I shared some of the liveable moments of life.

I am thankful to the L. D. Engineering College Staff for permitting me to grind the ore samples and to the G.M.D.C. staff Ambamata multimetal project, Ambaji in helping me with grinding of the Polymetallic concentrate samples and with the AAS for analysis of the samples.
I am also thankful to Prashantbhai for taking beautiful photographs of the experimental work. A word of thanks is also reserved for the Director and especially to Shri P. J. Bose - ATIRA who took great pains and inspite of being a busy person, spared his valuable time for me to take some of the scanning electronmicrographs.

Though this work is a result of collective support of all the above mentioned individuals, I owe my final indebtedness to my Daddy, Mummy and brother - Arun who made everything possible for me to attain my goal. I lack words to appreciate my own family but they were cooperative and were always near me at any time day/night and it was their love, warmth and care that encouraged me to work hard. I hope I was able to make them happy and make their dreams true by submitting this work. I also take this opportunity to thank my relatives for their words of encouragement and to Mrs. Smita Dave (My guide’s Wife) whose good wishes and support proved to be an additional blessing.

Lastly I am extremely thankful to Mr. Chintan Gandhi (C.N. Computers, Maninagar), with whom I was glad to spare the precious moments while he skillfully executed his job of composing this dissertation on computer with complete sincerity and atmost perfection to enable me to present this work. I highly appreciate his patience which he maintained throughout his work and specifically while correcting the final manuscript. Also thanks are on Mr. Ajay Trivedi (GraphTek) and his staff for his Laser Jet Facilities.

Final word at last to be quoted is that my heartfelt thanks to all with whom I was associated and some whom I may have not mentioned, if it was not for you all this work would not have been here today.

Ahmedabad
May 95

Menon Ajit G.