SPECTRAL, STRUCTURAL AND BIOLOGICAL STUDIES OF SOME METAL COMPLEXES OF ^{4}N-SUBSTITUTED 2-BENZOYLPYRIDINE THIOSEMICARBAZONES

Thesis submitted to the Cochin University of Science and Technology in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

in

CHEMISTRY

by

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July 2004

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CERTIFICATE

This is to certify that the thesis entitled **SPECTRAL, STRUCTURAL AND BIOLOGICAL STUDIES OF SOME METAL COMPLEXES OF ^{4}N-SUBSTITUTED 2-BENZOYLPYRIDINE THIOSEMICARBAZONES,** submitted to the Cochin University of Science and Technology, Kochi, by. **Ms. MARTHAKUTTY JOSEPH,** in partial fulfillment of the requirements for the Degree of Doctor of Philosophy, is an authentic record of the original research work carried out by her, under my guidance and supervision, in the Department of Applied Chemistry and has not been included in any other thesis or submitted previously for the award of any other degree.

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DECLARATION

I hereby declare that the present work entitled "**SPECTRAL, STRUCTURAL AND BIOLOGICAL STUDIES OF SOME METAL COMPLEXES OF ^{4}N-SUBSTITUTED 2-BENZOYLPYRIDINE THIOSEMICARBAZONES**" is an original work done by me under the guidance of **Dr. M.R. Prathapachandra Kurup**, Professor and Head of the Department of Applied Chemistry, Cochin University of Science and Technology and has not been included in any other thesis or submitted previously for the award of any other degree.

Marthakutty Joseph

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19th July 2004

Acknowledgements

I would like to place on record my sincere gratitude to Dr. M.R. Prathapachandra Kurup, Professor and Head of the Department of Applied Chemistry, Cochin University of Science and Technology, for his valuable guidance and unrelenting support throughout my research work. But for his constant encouragement and dedicated follow up I believe this work should not have been realized. I appreciate and acknowledge his dedication and stand beholden to him for his selfless support.

I sincerely thank Prof. Dr. S. Sugunan, former Head of the Department,. Prof. Dr. K. K. Mohammed Yusuff, and all the other members of the faculty, Department. of Applied Chemistry, Cochin University, for their help and encouragement. I thank Dr. H. K. Fun, School of Physics, Universiti Sains Malaysia and Dr. M. Nethaji, Principal Research Scientist, Indian Institute of Science, Bangalore for Single Crystal X-ray diffraction studies.

I remember with gratitude the service provided by the Regional Sophisticated Instrumentation Centre, at the Central Drug Research Institute, Lucknow, IIT Bombay, and Sophisticated instrumentation centre, IISc, Bangalore.

I thank A. Sreekanth, K. Anas. and T.R. John for recording the various spectra for me. I am grateful to Ms Archana Kishore, Dept.of Biotechnology, for helping me with the biological studies. I acknowledge in a special way the help and cooperation extended to me by my lab mates, Mr. Varghese Philip, V. Suni. and all the others

I am grateful to the Principal, Nirmala College, Muvattupuzha, for his support and encouragement. A word of thanks to Ms. Ceenamma Jacob and all my other colleagues in the Dept. of Chemistry and to the lab assistants for their support and help.

I cannot leave out my nephew, Jeson Dominic, who did the computer graphics for me, from the list of people I have to specially thank. My husband, Mr. Vincent Aerathu and my children Mathews and Anu have always been behind me to spur me on. My sister Ms. Mary Sojan also has contributed her share to my studies.

Above all I kneel down before God Almighty for having given me His strength and grace to carry this work to completion.

Marthakutty

PREFACE

Aqua complex ions of metals must have existed since the appearance of water on the earth, and the subsequent appearance of life depended on, and may even have resulted from the interaction of metal ions with organic molecules. Studies on the coordinating ability of metal ions with other molecules and anions culminated in the theories of Alfred Werner. Thereon the progress in the studies of metal complex chemistry was rapid. Many factors, like the utility and economic importance of metal chemistry, the intrinsic interest in many of the compounds and the intellectual challenge of the structural problems to be solved, have contributed to this rapid progress. X-ray diffraction studies further accelerated the progress.

The work cited in this thesis was carried out by the author in the Department of Applied Chemistry during 2001-2004. The primary aim of these investigations was to synthesise and characterize some transition metal complexes of 2-benzoylpyridine *N*(4)-substituted thiosemicarbazones and to study the antimicrobial activities of the ligands and their metal complexes. The work is divided into eight chapters.

Chapter 1 involves a brief introduction of the metal complexes of thiosemicarbazones including their stereochemistry and biological activities. The different analytical and spectroscopic techniques employed for the analysis of the ligands and their complexes are discussed in this chapter.

Chapter 2 deals with the synthesis and spectral characterization of the ligands, 2-benzoylpyridine *N*(4)-cyclohexylthiosemicarbazone (HL^1) and 2-benzoylpyridine *N*(4)- phenylthiosemicarbazone (HL^2). Single crystal X-ray diffraction studies of HL^1 also are given in this Chapter.

Chapter 3 contains the synthesis, spectral characterization, single crystal X-ray diffraction studies and antimicrobial activities of copper(II) complexes of 2-benzoylpyridine *N*(4)-cyclohexylthiosemicarbazone. Chapter 4 deals with the

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