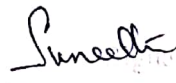


KAKATIYA GOVERNMENT COLLEGE
HANUMAKONDA

Name : Dr. K. Suneetha
 Designation : Asst. prof. of chemistry
 Year of Award of Ph.D. : 2022
 Name of the University : Osmania University, Hyderabad
 Year of entering into Govt. Service : 25/07/2008 JL
 21/05/2013 DL

S. No.	Details of copies of Certificates	Remarks
1	Copy of Ph.D Certificate	Enclosed
2	Press note	Enclosed
3	Research work dates of seminars and Pre-Ph.D Date of joining in this college	Enclosed 30/06/2018
4	Details of Ph.D Admission-part time or full time	Part time
5	Copies of RDC Approval letters of Ph.D	ENCLOSED
6	Name of guide/supervisors with mobile number, email id	Prof. C. Gyana Kumari 9849549376 Prof. c. gyana@gmail.com
7	Copies of guide allotment letter	
8	No. of increments sanctioned for Ph.D.	03
9	Published Research article-copies.	Enclosed
10	Original Ph.D Thesis.- Book.	Available in the office


PRINCIPAL
KAKATIYA GOVT. COLLEGE
Hanamkonda.


[K. SUNEETHA]
Asst. prof. of chemistry

OU 969364

Osmania University



Faculty of *Science*



This is to certify that *N. Puneelha*
son / daughter of *N. Ramchandram*
having pursued a course of study prescribed by this University
and having passed the requirements by Examination and by
thesis has been admitted to the Degree of

Doctor Of Philosophy

in the Subject of *Chemistry*

The title of the Thesis is :

*Synthesis, Spectral Characterization and Biological Activity of
Metal Complexes of Benzimidazole and Bis Benzimidazole Derivatives*

The candidate has been declared qualified for the award of the
Degree of Ph.D. on *29 Nov 2022*

Given under the seal of the University



EN102380783

Hyderabad, T.S.

Dated *Kartika 9, 1945*
October 31, 2023



Puneelha
Vice-Chancellor



CONFIDENTIAL SECTION
EXAMINATION BRANCH
NO. 656/Pb.D/Exams/2011

OSMANIA UNIVERSITY
HYDERABAD-500 007, T.S.
Dated: 29 Nov, 2011

PRESS NOTE

The following candidates who had presented the Thesis on the subject mentioned against each for the degree of Ph.D are declared qualified for the award of Degree of Doctor of Philosophy (Ph.D.) of Osmania University, Hyderabad

S.N. No.	Reference No.	Name of the Candidate Father Name	Subject	Thesis Title	Supervisor/ Regn. Date
1	PHD/M/483	Ms. I Sandhya D/o. Chari Murthy	Telugu(Oriental)	Simantani Rachanalu - Sarajita Chirana	Dr. Ch Venkat Reddy Faculty of Ori. Languages, O.U., Hyd. (08/02/2013) Dr. V B Narasimha Asst. Professor, Dept. of CSE, O.U., Hyd. (06/11/2013)
2	PHD/M/484	Ms. Rani Dhanavath D/o. Jeebha	Information Technology	Achieving Load Balancing in Cloud and Wireless Mesh Networks Through Multiple Gateways	Dr. K Nageswara Rao Asst. Professor, Dept. of English, O.U., Hyd. (11/03/2011)
3	PHD/M/485	Ms. Nuchikat Parvath Sreeja D/o. Nuchikat Parvath Sachindranath	English	Cluster Interaction in a Select Short Fiction of Indian Women Writers in English	Dr. M Vishnuvardhan Rao Director, ICMR, NIMS, New Delhi (31/01/2017)
4	PHD/M/486	Ms. Meekala Thirupathi Reddy S/o. Meekala Venkat Reddy	Statistics	Big Data Analytics in Nutrition and Health Data - A Statistical Model Building	Dr. V B Narasimha Asst. Professor, Dept. of CSE, O.U., Hyd. (20/02/2013)
5	PHD/M/487	Ms. S Radha Rani D/o. S Nanniah Sree	Information Technology	A Novel Framework of Hybrid Cloud Security with Data Dynamics	Dr. Shaik Abdul Kareem Asst. Professor, G D.C., Falaknura, Hyd. (30/03/2011)
6	PHD/M/488	Ms. Abdul Halim S/o. Md. Saifur Alam	Urdu(Oriental)	Hyderabad Mein Adabi Rasail - Azad Ke Band	Prof. J Savithri Dept. of English, O.U., Hyd. (19/09/2005)
7	PHD/M/489	Ms. K E Sarawathi D/o. K R Eshwar	English	Jewish Gothic - Fear in the Novels of Saul Bellow, Bernard Malamud and Cynthia Ozick	Prof. C Gyana Kumari (Retd.) Dept. of Chemistry, O.U., Hyd. (25/02/2013)
8	PHD/M/490	Ms. K Suresha D/o. K Ramchandram	Chemistry	Synthesis, Spectral Characterization and Biological Activity of Metal Complexes of Benzimidazole and Bis Benzimidazole Derivatives	

Cf. Vardhani
29/11/2011


Addl. Controller of Examinations
(Confidential)


DEPARTMENT OF CHEMISTRY: UNIV. COLLEGE OF SCIENCE: O.U. HYD.

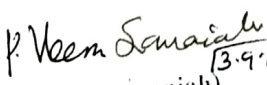
Research Design Seminar Report

The Research Design seminar of Mrs.K.Suneetha was conducted in Lecture Hall - 1 on 13.09.2019 at 12.45 P.M. in the department of chemistry, O.U on the topic of "Synthesis, Spectral Characterization and biological activity of metal Complexes of Benzimidazole and Bis Benzimidazole derivatives".


The candidate has presented detailed comprehensive literature review of the Research topic and the plan of work satisfactory.


(Rtd. Prof. C. Gyana Kumari)
(Supervisor)


(Dr. G. Vijaya Charan)
(Subject Expert)


(Prof. P. Veerasomaiah)
Chairperson BOS

Chairperson
Board of Studies in Chemistry
Dept of Chemistry
Osmania University
Hyderabad



Head
(Department of Chemistry) 13/9

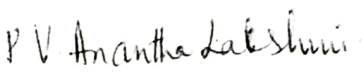
Head
Department of Chemistry
Osmania University
Hyderabad


DEPARTMENT OF CHEMISTRY: UNIV. COLLEGE OF SCIENCE: O.U. HYD.


Research Progress Seminar Report

The Research Progress seminar of Mrs. K. Suneetha was conducted in Lecture Hall No.II on 09.12.2019 at 12.30.P.M. in the Department of Chemistry, O.U on the topic "Synthesis, Spectral Characterization and Biological Activity of Metal complexes of Benzimidazole and Bis benzimidazole Derivatives" The candidate has presented detailed comprehensive literature review of the Research topic and the plan of work and progress of the work satisfactorily.


(Prof. C. Gyanakumari)
(Supervisor)
Professor (Rtd)
Department of Chemistry
Osmania University
HYDERABAD - 500 007.


(Dr. P.V. Anantha lakshmi)
(Subject Expert)
Asst. Professor
Department of Chemistry
Osmania University
HYDERABAD - 500 007


(Prof. K. Bhaskar)
Chairperson BOS
Member of
Board of Studies in Chemistry
Department of Chemistry
Osmania University
Hyd-07.


(Prof. P. Veera Somaiah)
Head
Department of Chemistry
Head
Department of Chemistry
Osmania University
Hyderabad.

DEPARTMENT OF CHEMISTRY: UNIV. COLLEGE OF SCIENCE: O.U. HYD.


Pre - Submission Seminar Report

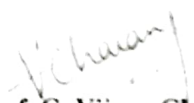
The Pre-Viva examination of **Mrs. K. Suneetha** in the Department of Chemistry, O.U on 10.03.2022 at 4.00 P.M. The pre-viva was presented as a seminar, open to all Teachers and Research Scholars.


The candidate was asked to present the work carried out by her and then asked questions related to her topic of work "**Synthesis, Spectral Characterization and Biological Activity of Metal complexes of Benzimidazole and Bis benzimidazole Derivatives**". The candidate has answered all the questions satisfactorily.

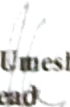
An earlier Seminar was conducted and certified by the supervisor

Based on the evaluation of the work done and satisfactory performance of the candidate in the pre-viva presentation, She is permitted to submit thesis for Ph.D in Chemistry, Osmania University.


(Prof. C. Gyanakumari)
Supervisor
Professor (Retd)
Department of Chemistry
Osmania University
HYDERABAD - 500 007


(Prof. G. Vijaya Charan)
Subject Expert
Professor
Department of Chemist.
Osmania University
HYDERABAD - 500 007


(Prof. P. Leelavathi)
Chairperson BOS
Chairperson
Board of Studies in Chemistry
Dept of Chemistry
Osmania University, Hyderabad


(Prof. U. Umesh Kumar))
Head
Department of Chemistry
Osmania University
HYDERABAD-500 007



OSMANIA UNIVERSITY PA243536

MEMORANDUM OF MARKS

Ph.D. COURSE WORK APRIL 2015

Examination

FACULTY OF SCIENCE

REF NO: 201514574

DATE 08-07-2015

NAME: Koppu Suneetha

ROLL NO. 900710555031

FATHER'S NAME: K. Ramchandram

SL. NO	SUBJECT NAME	UNIVERSITY EXAMINATION		RESULT
		MAXIMUM MARKS	MARKS SECURED	
	ORGANIC CHEMISTRY			
1	RESEARCH METHODOLOGY	100	55	PASS
2	SPECIALISATION (BROAD FIELD)	100	45	FAIL
TOTAL		100	100	
GRAND TOTAL		===	===	

TOTAL IN WORDS : * ONE * ZERO * ZERO *

GRAND TOTAL AT THE END OF THE COURSE ===

RESULT: FAILED

MINIMUM PASS MARKS: FIFTY

CLERK IN CHARGE

SUPERINTENDENT

G. Bhikshamala

CONTROLLER OF EXAMINATIONS



OSMANIA UNIVERSITY

MEMORANDUM OF MARKS PY 781797

Examination Ph.D COURSE WORK MAY 2016
FACULTY OF SCIENCE

REF NO: BD17032274

DATE 14/03/2017

NAME: KOPPU SUNEETHA

ROLL NO: 900710555031

FATHER'S NAME: K RAMACHANDRAM

SL NO.	SUBJECT NAME	UNIVERSITY EXAMINATION		RESULT
		MAXIMUM MARKS	MARKS SECURED	
1	ORGANIC CHEMISTRY SPECIALISATION (BROAD FIELD)	100	51	PASS
TOTAL		100	51	
GRAND TOTAL		===	===	

TOTAL IN WORDS: FIVE ONE

GRAND TOTAL AT THE END OF THE COURSE: ===

RESULT: COMPLETED

CLERK-IN-CHARGE

SUPERINTENDENT

CONTROLLER OF EXAMINATIONS



**OFFICE OF THE DEAN
FACULTY OF SCIENCE
UNIV. COLLEGE OF SCIENCE
OSMANIA UNIVERSITY
HYDERABAD - 500 007**

No. 74 /DFSc/OU/2013

January 30, 2013

ORDERS

Sub : FACULTY OF SCIENCE, OSMANIA UNIVERSITY - Admission into Ph.D
Course 2010-2011 - Orders - Issued

Ref: Admission Notification No 602/Ph.D/2012/Acad dated 28.5.2012

...

The candidates in the enclosed list Ph.D. Course of Osmania University for the academic year 2010-2011 on the recommendation of the Admission Committee under Faculty of Science in the subject mentioned against his/her name.

The selected candidates are required to fulfill the conditions mentioned against their names and to submit their Joining Reports (Proforma provided) by **March 4, 2013**; failing which, their admission orders would be deemed to have been withdrawn. No further notice will be given. The Joining Reports along with the original demand draft and all necessary documents should be submitted to the Departments concerned. **No joining report will be accepted without the T.C. (Transfer Certificate) in original or a letter from the respective University where from the Post Graduate Degree has been obtained to the effect that no separate Transfer Certificate will be issued by that University.** The Dean's office shall then issue a list of names of the admitted candidates to the Heads of the Departments concerned, which shall be final.

The registration is valid for a period of four years for Full Time Research Scholars and five years for Part Time Research Scholars from the date of joining, after which period, it will be cancelled unless otherwise extended.

All the selected candidates both Full-Time and Part-Time have to pay the fee as under:

1. Both Full Time and Part Time Scholars working in the Osmania University Rs.2,000=00 per year
2. Scholars working in recognised Research Centres outside the University Rs.5,000=00 per year

through a demand drafts drawn from any Nationalised Bank in favour of "Dean, Faculty of Science, Osmania University." They should submit their Joining Reports in the concerned University Department in the prescribed proforma in triplicate along with the Original DD., and M.Sc., Certificate (Xerox Copy) in proof of satisfaction of the conditions stipulated.

If the candidate fails to pay the fees mentioned above within the specified time his/her admission will be cancelled without further notice to the candidate.

The selected candidates are required to submit an undertaking to the effect that they do not ask for hostel facilities (Annexure II) along with their joining reports, failing which they will not be granted admission.

Candidates selected under the category "Part Time" are required to submit an undertaking in triplicate on the proforma provided (Annexure-III) that they would be taking necessary leave as per rules of the University.

The admission is conditional upon realisation of dues to the University if any from the candidates. The admissions are made on the basis of the present occupation of the candidates. In case there is a change in occupation or place of work during the period of their candidature in the Ph.D., course, their admission is liable to be cancelled. Any change in their occupation should be brought to the notice of the Dean, through the Supervisor and the Head of the Department, and the Dean may permit the candidate to continue his/her Ph.D. course as per the rules.

The candidates who are admitted into Ph.D. course shall not pursue any other course or appear for any other examination leading to any other Degree (both Full-Time and Part-Time) of this University or any other University. Any violation of this regulation will lead to the cancellation of admission.


DEAN

Faculty of Science, O.U.

To

The Research Scholar concerned.

Copy forwarded for information and necessary action to:-

DEAN
Faculty of Science
Osmania University,
HYDERABAD-500 007..

1. Principal, University College of Science, O.U.
2. The Vice Principal, Hostels, University College of Science, O.U.
3. The Head, Department of _____, O.U.
4. The Controller of Examinations, O.U.
5. The Addl. Controller of Examinations (Confidential), O.U.
6. The Dean, Development and UGC Affairs, O.U.
7. The Asst. Registrar (Academic), O.U.
8. The Librarian, University Library, O.U.
9. The Secretary to Vice-Chancellor, O.U.
10. The Officer on Special Duty to Vice-Chancellor, O.U.
11. The P.A. to Registrar, O.U.
12. The Chief Warden, Hostels & Messes, O.U.

Category - II

1

17

LIST OF CANDIDATES SELECTED FOR ADMISSION INTO Ph.D. IN CHEMISTRY 2010-2011

Subject: Chemistry


Category II

S. No	Name	Department	Category	Supervisor Allotted	FullTime/PT	Place of Work	
1	G. Satyanarayana Goud		BC-B	Prof. P. Veerasomaiah	PT	Dept. of Chem, UCS	Govt DL
2	Chandira Shekar.R		OC	Prof. P. Rabindra Reddy	FT	Dept. of Chem, UCS	
3	G. Srinivas		OC	Prof. S. Satyanarayana	PT	Dept. of Chem, UCS	
4	V. Naveen Kumar		BC-B	Prof. M. Vithal	FT	Dept. of Chem, UCS	
5	B. Rajitha		OC	Dr. M. Sayaji Rao	PT	Dept. of Chem, NC	IL
6	Faria Sultana		BC-E	Prof. Leelavathi P	PT	Dept. of Chem, UCW	
7	V. Jagadeeshwar Murthy		BC-B	Prof. C. Gyanakumari	FT	Dept. of Chem, UCS	
8	G. Sabita		SC	Prof. K Bhaskar	FT	Dept. of Chem, NC	
9	E.Kishan		ST	Prof. P. Venkateswar Rao	FT	Dept. of Chem, NC	
10	G. Vanajatha		OC	Prof. V. Prabhakar Reddy	PT	Dept. of Chem, UCS	
11	Annapurna		OC	Dr. Leelavathi P	PT	Dept. of Chem, UCW	Project fellow
12	Ch. Sudhakar Reddy		OC	Prof. K. Nageswar Rao	PT	Dept. of Chem, UCSS	
13	G. Vijaya Jyothi		OC	Dr. P. Saritha Reddy	PT	Dept. of Chem, UCW	
14	Y. Aparna		BC-B	Prof. Sharada N L	FT	Dept. of Chem, UCS	
15	J.Sowmya		OC	Dr. Leelavathi P	PT	Dept. of Chem, UCW	
16	M. Bhooshan		OC	Prof. K.C. Rajanna	PT	Dept. of Chem, UCS	
17	V. Srimai		OC	Prof. T. Parthasarathy	FT	Dept. of Chem, UCSS	
18	G. Sunitha		BC-D	Dr. M. Sayaji Rao	FT	Dept. of Chem, NC	
19	K. Srujana		OC	Prof. Devadas M	FT	Dept. of Chem, UCS	
20	K. Srinivasulu		OC	Prof. V. Prabhakar Reddy	PT	Dept. of Chem, UCS	
21	Anjum Fatima		OC	Dr. B. Sireesha	PT	Dept. of Chem, NC	

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Faculty of Science
OSMANIA UNIVERSITY,
HYDRABAD-500 007

DEPUTY REGISTRAR,
(Academic)
Osmania University,
Hydrabad - 500 007

22	N. Rajender	BC-D	Prof. V Uma	FT	Dept. of Chem, UCS	Project fellow
23	D. Sujatha	OC	Prof. P. Yadagir Swamy	PT	Dept. of Chem, UCE	
24	B. Vijaya Lakshmi	OC	Dr. Hari Padmasri	PT	Dept. of Chem, UCW	
25	S. Somasani	OC	Prof. K. Nageswar Rao	PT	Dr. Reddy's lab	
26	K. Nageshwan	OC	Dr. Ananthalakshmi PV	PT	Dept. of Chem, UCW	
27	S. Udaya Lakshmi	BC-B	Prof. P. Ettaiah	PT	Dept. of Chem, UCS	
28	B. Kamaigken Reddy	OC	Dr. M. Seyaji Rao	FT	Dept. of Chem, NC	
29	V. Shanith Prada	OC	Prof. V. Uma	FT	Dept. of Chem, NC	
30	A. Venugopal	BC-D	Prof. T. Parthasarathy	FT	Dept. of Chem, UCS	
31	K. Sunitha	BC-B	Prof. C. Gyanakumari	PT	Dept. of Chem, UCS	
32	B. Kavitha	BC-B	Dr. P. Saritha Reddy	FT	Dept. of Chem, UCW	
33	G. Gopinath	BC-B	Prof. David krupadanam	FT	Dept. of Chem, UCS	
34	V. Nagendra Babu	BC-B	Prof. P. Ettaiah	FT	Dept. of Chem, UCS	
35	A. Shyam Sunder Goud	BC-B	Prof. P. Veerasomiah	FT	Dept. of Chem, UCS	
36	B. Preetham	BC-D	Dr. Ananthalakshmi PV	PT	Dept. of Chem, UCW	
37	Hajula Raju	BC-D	Dr. B Sakram	FT	Dept. of Chem, UCS	
38	K. Anuradha	OC	Prof. E. Venugopal Reddy	FT	Dept. of Chem, UCS	
39	T. Nageswari	OC	Prof. C. Gyanakumari	PT	Dept. of Chem, UCS	
40	T. Lalitha Viveka	OC	Prof. Sharada I N	FT	Dept. of Chem, UCS	
41	A. Vamsi Krishna Reddy	OC	Prof. A. Madhusudhan Raju	FT	Dept. of Chem, UCT	
42	K. Mani	OC	Prof. Devadas M	PT	Dept. of Chem, UCS	
43	V. Krishna Reddy	OC	Dr. B. Sireesha	PT	Dept. of Chem, NC	
44	B. Badarash	BC-D	Dr. Subhashini N/P	PT	GVK Biosciences	
45	T. Krishna	BC-D	Prof. Ch. Prasad Rao	FT	Dept. of Chem, UCS	


 G. Srinivas
 Head, Institute
 H. No. 100, S.R.O. 007.



Synthesis, Characterization, Crystallite size Determination and Evaluation of Biological Activity of Novel Co(II), Ni(II), Cu(II), Zn(II) Ternary Metal Complexes

Suneetha Koppu*, Jyothi pilli, D. Venkata Bhaskar Rao,
and C. Gyanakumari

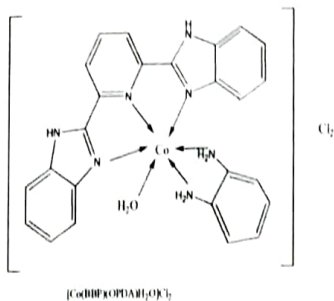
Department of Chemistry, Osmania University, Hyderabad 500007, Telangana, INDIA
Email id: skoppu67@gmail.com

Accepted on 26th August, 2019

ABSTRACT

Four novel mixed ligand metal complexes namely $[Co(L_1)(L_2)H_2O]Cl_2$ (1) $[Zn(L_1)(L_2)OAc]OAc$ (2), $[Ni(L_1)(L_2)SO_4]$ (3) and $[Cu(L_1)(L_2)Cl]Cl$ (4) where $L_1=2,6$ -bis (benzimidazole-2yl) pyridine (BBP), $L_2=Ortho$ phenylene diamine (OPDA) have been synthesized and characterized by elemental analysis, molar conductance measurements, magnetic susceptibility measurements, TGA, DTA studies, mass, IR, ESR, electronic, SEM-EDX, powder XRD studies. Based on elemental analysis and spectral studies six coordinated geometries were assigned to the metal complexes. Powder XRD studies proved that the complexes were in nanocrystalline phase. Antibacterial activity of metal complexes was checked against gram positive and gram negative bacterial pathogens such as MRSA, *B.cereus*, *B.subtilis*, *P.aeruginosa*, *E.coli*, *P.vulgaris*. The ternary metal complexes inhibited the growth of bacterial strains and exhibited better anti bacterial activity.

Graphical Abstract



Keywords: Antibacterial activity, Benzimidazole, Nanocrystalline phase, Ternary metal complex.

INTRODUCTION

Benzimidazole and its derivatives are an important class of aromatic heterocyclic compounds with a broad spectrum of biological activities such as antimicrobial, anticancer, antiviral, anti

Ni(II), Zn(II) TERNARY METAL COMPLEXES: SYNTHESIS, CHARACTERISATION AND ANTI BACTERIAL ACTIVITY

Koppu Suneetha *, Pilli Jyothi, Deshineni Rajitha, C. Gyanakumari
Department of Chemistry, Osmania University, Hyderabad 500007, Telangana, INDIA.

ABSTRACT: Two novel and air stable ternary Ni(II) and Zn(II) metal complexes namely $[Ni(L_1)(L_2)H_2O]$ (1) $[Zn(L_1)(L_2)H_2O]$ (2) where $L_1=2,6$ -bis (benzimidazole-2-yl) pyridine (BBP) and $L_2=$ Oxalate ion(AA) were synthesized and characterized by elemental analysis, molar conductance, magnetic susceptibility measurements, TGA, DTA studies, HRMS, IR, electronic spectra, SEM-EDX, powder XRD studies. Based on elemental analysis, electronic spectra, conductance and magnetic moment measurements, six coordinated geometries were assigned to all the four metal complexes. Both the complexes are non electrolytic in nature. Powder XRD studies proved that the complexes were in nano crystalline phase. Antibacterial activity of metal complexes was checked against 3 gram positive (MRSA, B.cereus, B.subtilis) and 3 gram negative bacterial pathogens (P.aeruginosa, E.coli, P.vulgaris). Both the metal complexes inhibited the growth of bacterial strains and exhibited highest zone of inhibition against P.aeruginosa at 100 μ g/mL.

Keywords: Anti bacterial activity; benzimidazole; nano crystalline phase; ternary metal complex.

I. INTRODUCTION

Importance of metal complexes in coordination chemistry is enhancing continuously due to the synthesis of organic ligands containing variety of donor groups^{1,2} and it is multiplied many times when they have biological activity.^{3,4} Benzimidazoles are involved in a greater variety of biological processes. Substitution of benzimidazoles at 1, and 5 positions are interesting for their pharmacological effect.⁵ Benzimidazole and its derivatives are well known for their antibacterial⁶ antifungal, anti tumor, anti inflammatory⁷, antiviral⁸ anti convulsant⁹ anti cancer¹⁰ and anti malarial activities. Bis benzimidazole derivatives are still less developed¹¹. They are aromatic N donor organic linkers and have strong coordination activity. Hence we decided to synthesise 1:1:1 ternary metal chelates of 2,6 – bis(benzimidazol-2-yl) pyridine and Oxalic acid ligands. So the present communication comprises the synthesis, characterization and biological studies of ternary metal chelates containing N and O donors with Ni(II) and Zn(II) metal acetates.

2. MATERIALS AND METHODS

All the chemicals and solvents were of AR grade and were used as received without further purification. 2,6– pyridine dicarboxylic acid, O-phenylene diamine, Poly phosphoric Acid and Oxalic Acid were purchased from Sigma–Aldrich chemicals. All the experiments involving with the interaction of the ligand and complexes were dissolved in solvents ethanol, methanol, acetone DMSO and DMF. The C, H, and N percentage composition of complexes and ligand BBP were determined using micro analytical methods on Perkin Elmer 240C (USA) elemental analyzer. FT-IR spectra of the ligand and its complexes were recorded by using KBr pellets in the range 4000–400 cm^{-1} using FT-IR spectrometer. Magnetic moment measurements were carried out on a Guoy balance model 7550 using Hg $[Co(NCS)_4]$ as standard. The electronic spectra of the primary ligand (BBP) and its metal complexes were carried out in DMSO using Elico SL159 spectrophotometer. The mass spectra of the compounds were recorded by the ESI technique on VG AUTOSPEC mass spectrometer. The conductivity measurements were carried out in DMSO ($10^{-3}M$) using Digisun Electronic Digital conductivity meter, 0.01 M KCl solution is used for calibration. ESR spectra of metal complexes were recorded on JEOL JES-FA200ESR spectrometer (X-band microwave unit). Scanning electron microscopy (SEM) and EDS was obtained for complexes using Tescan Vega-3 LMU electron microscope. The X-ray powder diffraction analysis was carried out by PAN Analytical X'pert Powder X-ray diffractometer with Cu $K\alpha$ radiation. The powder x-ray diffraction data was analysed using Match program.



Synthesis, characterisation, cytotoxicity, DNA binding and antimicrobial studies of binary and ternary metal complexes of Co (II)

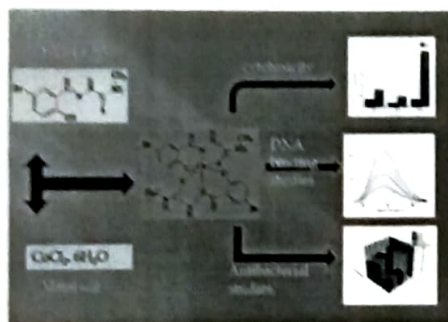
Pilli Jyothi^a, Suneetha Koppu^a, V. Sumalatha^{a,c}, B. Ushaiah^b, C. Gyana Kumari^{a,*}

^a Department of Chemistry, Osmania University, Hyderabad 500007, India

^b Department of Chemistry, Nilam College, Osmania University, Hyderabad 500011, India

^c Dept. of Chemistry, JNU college for Women, Tanali, Guntur (Dist), Andhra Pradesh, 522202, India

GRAPHICAL ABSTRACT



ARTICLE INFO

Keywords

Schiff's base ligand
Metal complex
Cytotoxicity
DNA binding studies
Antibacterial
Antifungal

ABSTRACT

A series of Schiff's base ligand metal complexes of Co (II) with binary, formulae [Co (L)₂] (mc-a), and ternary, formulae [Co(L) (L₁) (H₂O)] (mc-b), [Co (L) (L₂) (H₂O)] (mc-c) where L is (2Z)-2-(2-Hydroxy-5-Bromobenzylidene) Hydrazine N-methyl Carbo-Thioamide (Schiff's base ligand), L₁ is Ethylene Diamine and L₂ is Bipyridine were synthesized. The metal complexes have been characterized by Mass spectra, UV-Vis absorption, Magnetic susceptibility, FT-IR, SEM, and Powder XRD. The Schiff's base had been further identified by ¹H NMR. The complexes have been evaluated for their cytotoxicity, DNA binding studies, and antimicrobial studies. The cytotoxic results found that the metal complexes showed IC₅₀ values around 17.77–249.12 µg/ml. The DNA binding constants (k_b) of the metal complexes were determined as, 0.9 × 10⁴ M⁻¹, 0.5 × 10⁴ M⁻¹, 2.0 × 10⁴ M⁻¹ for mc-a, mc-b, mc-c respectively, indicating that the complexes strongly bind to DNA. Furthermore, these complexes showed significant activity against some bacteria & fungi.

1. Introduction

The chemistry of Schiff's base is an important area of research with increasing interest due to their simple synthetic process, versatility, easy possible and application for their metal complexes [1].

Thiosemicarbazides and their metal complexes display a wide range of biological activities such as antitumor, antibacterial, antiviral and anti-malarial activities [2,3]. Ligands having Oxygen, Nitrogen, and Sulphur as donors are widely studied to their complexes cover many areas spacing from the effect of S and electron delocalization in Transition

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One-pot multi-component synthesis of novel ethyl-2-(3-((2-(4-(4-aryl)thiazol-2-yl)hydrazono)methyl)-4-hydroxy/isobutoxyphenyl)-4-methylthiazole-5-carboxylate derivatives and evaluation of their in vitro antimicrobial activity

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Abstract

A novel series of ethyl-2-(3-((2-(4-(4-aryl)thiazol-2-yl)hydrazono)methyl)-4-hydroxy/isobutoxyphenyl)-4-methylthiazole-5-carboxylate derivatives (**4a-f** and **5a-f**) were synthesized by employing one-pot multi-component approach involving ethyl 2-(3-formyl-4-oxy/isobutoxyphenyl)-4-methylthiazole-5-carboxylate, thiosemicarbazide and various phenacyl bromides/3-(2-bromoacetyl)-2H-chromen-2-one/2-(2-bromoacetyl)-3H-benzof[*f*]chromen-3-one in ethanol in the presence of catalytic amount of acetic acid. The structures of all the synthesized compounds were confirmed with spectral analysis, ie, IR, ¹H NMR, ¹³C NMR and mass spectrometry, and all the compounds were screened for their in vitro antimicrobial activity.

1 | INTRODUCTION

Antimicrobial resistance (AMR) is one of the most alarming issues for public health.^[1] According to World Health Organization (WHO), it estimated that after 2050, every year 10 million people will die to microbial infections.^[2] The microbial resistance is due to the misuse or over use of the medicines especially antibiotics. Nowadays, the research towards the development of new antimicrobial agents is not up to the level to check the growth in the antimicrobial resistance world-wide. Thus, it is essential to develop new antimicrobial agents to overcome the AMR.^[3]

Thiazole is nitrogen and sulphur containing five-member heterocyclic moiety, and it is playing crucial role in the drug discovery due to its broad spectrum of biological activities. Many derivatives of thiazole have been reported in drug development for the treatment of several diseases

like microbial,^[4-6] viral,^[7] and filarial^[8] infections. Thiazole analogues were also reported as anti-inflammatory,^[9] anticancer,^[10] antitumor,^[11] antioxidant,^[12] and inhibitors of enzymes like urokinase,^[13] ubiquitin-specific-processing protease 7 (USP7),^[14] β -glucuronidase,^[15] and peptidyl-prolyl *cis-trans* isomerase NIMA-interacting 1 (PIN1).^[16] Almost all the available Penicillins (antibiotics) have thiazole nucleus as an integral part of their structures. Especially, thiazole incorporated Schiff base (C=N) derivatives are reported as a potent antimicrobial agents.^[17,18] Recently, Rajitha et al^[19] reported excellent antimicrobial activity of thiazole incorporated Schiff base analogues. On the other hand, literature survey revealed that coumarin derivatives incorporated various substituted thiazole rings on the position of carbon-3 exhibit promising antimicrobial activity.^[20]

In view of the above facts and in continuation of our interest on synthesis of novel potential antimicrobial agents,^[21] in the present work, we have designed and

**SYNTHESIS, SPECTRAL CHARACTERIZATION AND
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BENZIMIDAZOLE AND BIS BENZIMIDAZOLE DERIVATIVES**

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