

# Kakatiya University



Faculty of Science

Roll No. \_\_\_\_\_

This is to certify that Ravula Nagesh

Son / Daughter of Nallaiah

having pursued a course of study prescribed by this University and  
having passed the requisite Examination by thesis, has been admitted  
to the Degree of

**Doctor of Philosophy**

(Awarded in November 2007)

The subject in which he/she presented a thesis for the Degree  
was ( Chemistry )

"Metal Complexes of  
Quinoxaline Derivatives - A  
Physico-Chemical Study"

Given under the seal of the University

Warangal

A handwritten signature in black ink, appearing to read 'A. Prasad', is written over the printed title 'Vice-Chancellor'.

Dated Magha 10, 1929  
January 31, 2008

Prof. M.V. RANGA RAO  
M.A. LL.M.Ph.D.  
Controller of Examinations  
Professor of Law



KAKATIYA UNIVERSITY  
Accredited with 'A' Grade by NAAC  
Vidyaranyaपुरi,  
WARANGAL - 506 009 ( A P ) INDIA

Phones : (+91) 0870 2438822 (Off), Fax : 0870-2438875, Mobile : 09390100822, E-Mail : mv.rangarao@yahoo.co.in

No. 1476 /E1/Ph.D/KU/2013

Date : 22-12-2013

## CERTIFICATE

This is to certify that Mr. Ravula Mogili S/o Mallaiah has submitted his Ph.D thesis on 'METAL COMPLEXES OF QUINOXALINE DERIVATIVES- A PHYSICO-CHEMICAL STUDY', Department of Chemistry, Kakatiya University, Warangal. The thesis was awarded Doctor of Philosophy in the month of November 2007.

Further, Ph.D. Degree is awarded to Mr. Ravula Mogili following the process of admission, registration, course work and external evaluation as defined by the UGC at para 3.2.2. of G.O.Ms.No. 14 Education, dated 20-02-2010.

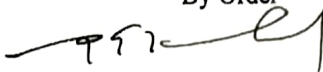
Yours faithfully,

(Prof. M.V. Ranga Rao)

**PRESS NOTE**

Sri. Ravula Mogili, Research Scholar in Chemistry, University College, Kakatiya University, Warangal who has presented a thesis for the Degree of Ph.D. in Chemistry entitled "METAL COMPLEXES OF QUINOXALINE DERIVATIVES - A PHYSICO-CHEMICAL STUDY" has been declared qualified for the Degree of Doctor of Philosophy (Ph. D.) of the Kakatiya University.

"By Order"



CONTROLLER OF EXAMINATIONS

**Copy forwarded for information to:**

1. The Registrar, Kakatiya University, Warangal
2. The Secretary, University Grants Commission, Bahadurshah Zafar Marg, New Delhi – 110 002
3. The Editor, University News, Association of Indian Universities, 16 Kotla Marg, New Delhi – 110 002
4. The Dean, Faculty of Science, Kakatiya University, Warangal.
5. The Co-ordinating Officer, U.G.C. Unit, Kakatiya University, Warangal
6. The Principal, University College, Kakatiya University, Warangal
7. The Chairman, Board of Studies in Chemistry, Kakatiya University, Warangal
8. The Head, Department of Chemistry, Kakatiya University, Warangal.
9. The EXAMINER
10. Prof. S. Srihari (Supervisor), Department of Chemistry, Kakatiya University, Warangal..
11. The Nodal Officer, Kakatiya University, Warangal
12. The Member-in-Charge, University Library, Kakatiya University, Warangal
13. The Joint Registrar (Admn.), Kakatiya University, Warangal
14. The Deputy Registrar, (Admn./Accounts/Academic), Kakatiya University, Warangal.
15. The Public Relations Officer, Kakatiya University, Warangal
16. The Secretary to Vice-Chancellor, Kakatiya University, Warangal
17. The Sections E5 & E6, Examination Branch, Kakatiya University, Warangal
18. The Person concerned ( Sri. Ravula Mogili S/o. Mallaiah)

Roll No. 0001-2613

Name Ravula Megidi

Son/Daughter of Mallab

PAPERS	THEORY		PRACTICAL		TOTAL		RESULT
	MAXIMUM MARKS	MARKS SECURED	MAXIMUM MARKS	MARKS SECURED	MAXIMUM MARKS	MARKS SECURED	
I General chemistry	100	74	-	-	100	74	Pass
II Inorganic chemistry	100	70	-	-	100	70	
AGGREGATE					200	144	

Aggregate in words: One hundred and Forty four only

Result: Passed

*[Signature]*  
Superintendent

*[Signature]*  
Controller of Examinations



Office of the Dean  
Faculty of Science  
Kakatiya University  
Warangal

Prof. Digamber Rao  
D E A N

No: 34/DFS/Bot./KU/2k

Date: 23.11.2000

CALL LETTER

To  
- R. Masili  
- S. Malladi  
- ~~\_\_\_\_\_~~

With reference to your application for admission to Ph.D.  
in Chemistry you are informed to attend the interview  
on 8-12-2k at 1100 am in the Department of \_\_\_\_\_  
Chemistry at your expense.

You are requested to bring all the Original Certificates  
(M.Sc. Memo, Provisional/Degree Certificates, Caste and Income  
Certificate etc) along with you.

Remarks:

*Digamber Rao*  
D E A N  
FACULTY OF SCIENCES  
KAKATIYA UNIVERSITY  
WARANGAL 506 002

**Dr. T. SRINIVAS**  
*Associate Professor of Sociology*  
Addl. Controller of Examinations  
(Confidential)

**KAKATIYA UNIVERSITY**  
VIDYARANYAPURI, Warangal - 506 009 A.P. INDIA



Off : 0870-2453800  
2438001 to 2438016 Extn 511  
Resi : 0870-2457469  
Cell : 9866524115  
Fax : 91870-2438875  
e-mail : sociology.srinivas@yahoo.co.in  
sociologysrinivas@gmail.com

Date: 09-07-2007.

## CERTIFICATE

This is to certify that **Mr. Ravula Mogili**, Research Scholar in **Chemistry**, University College, Kakatiya University, Warangal worked under the supervision of Prof. S. Srihari, Department of Chemistry, Kakatiya University, Warangal. He submitted Ph.D. thesis entitled "**METAL COMPLEXES OF QUINOXALINE DERIVATIVES A PHYSICO-CHEMICAL STUDY**" for Ph.D. Degree in Chemistry of the Kakatiya University on **09-07-2007**.

**ADDL. CONTROLLER OF EXAMINATIONS**



US 20100209537A1

(19) **United States**

(12) **Patent Application Publication**  
**Bangalore et al.**

(10) **Pub. No.: US 2010/0209537 A1**

(43) **Pub. Date: Aug. 19, 2010**

(54) **METAL COMPLEXES WITH ANTICANCER  
ACTIVITY**

**Publication Classification**

(76) **Inventors:** **Ramesh Bangalore**, Sunnyvale, CA  
(US); **Bharani Srikonda**,  
Sunnyvale, CA (US); **Ramakrishna**  
**Devarakonda**, St. Louis, MO (US);  
**Mogili Ravula**, Warangal (IN);  
**Srihari Somu**, Warangal (IN);  
**Rama Narasimha Reddy Anreddy**,  
Warangal (IN); **Ravinder Manchal**,  
Warangal (IN)

(51) **Int. Cl.**  
**A61K 33/24** (2006 01)  
**C07F 15/00** (2006 01)  
**C07F 1/08** (2006 01)  
**C07F 15/04** (2006 01)  
**A61K 31/498** (2006 01)  
**A61P 35/00** (2006 01)

(52) **U.S. Cl.** ..... **424/649, 556/137, 544/225, 514/249**

(57) **ABSTRACT**

This inventive subject matter relates to novel transitional metal complexes of Quinoxalines, methods for making such compounds, and methods for using such compounds for treating diseases and disorders mediated by kinase activity.

The present invention relates to new substituted Quinoxaline compounds, their tautomers, stereoisomers, polymorphs, esters, metabolites, and prodrugs, to the pharmaceutically acceptable salts of the compounds, tautomers, stereoisomers, polymorphs, esters, metabolites, and prodrugs, to compositions of any of the aforementioned embodiments together with pharmaceutically acceptable carriers, and to uses of any of the aforementioned embodiments, either alone or in combination with at least one additional therapeutic agent, in the prophylaxis or treatment of cancer.

**Correspondence Address:**  
**Ramesh Bangalore**  
**1029 S. Bernardo**  
**Sunnyvale, CA 94087 (US)**

(21) **Appl. No.** 12/378,356

(22) **Filed** Feb. 17, 2009



# International Journal of Modern Chemistry and Applied Science

International Journal of Modern Chemistry and Applied Science 2016, 3(2),378-381

## Synthesis, Spectral and Antimicrobial Activity of Zn (II), Cd (II) and Hg (II) Complexes of Some Quinoxaline Schiff Bases

R.Mogili and K.Somi Reddy

Department of Chemistry, Govt Degree & PG College, Bhadrachalam, Khammam Dist., Telangana  
Department of Chemistry, Govt Degree & PG College, Hanamakonda, Warangal Dist., Telangana

**Abstract:** The complexes Zn(II), Cd(II) and Hg(II) of Quinoxaline based Schiff Bases derived from the condensation reaction of 3-Chloro-2-hydrazinoquinoxaline with 2-Hydroxybenzaldehyde and 2-Hydroxy-3-methoxybenzaldehyde have been prepared and characterized. These two ligands function as uni-negative bidentate co-ordinating ligand with Zn(II), Cd(II) and Hg(II) ions through phenolic oxygen and free azomethine nitrogen ( $\nu\text{C}=\text{N}$ ). The geometry and the bonding characteristics associated with the complexes have been deduced from the relevant spectral data. Further, the ligands and their Zn(II), Cd(II) and Hg(II) complexes have been screened for their antibacterial and antifungal activity and the results are presented.

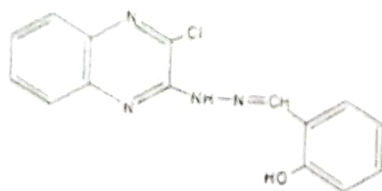
**Key words:** Metal complexes, Quinoxaline based Schiff bases, Synthesis, Spectral studies, antimicrobial activity

### Introduction:

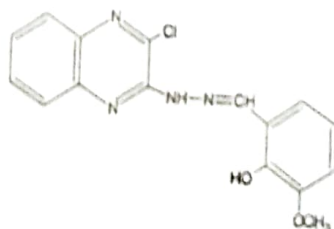
Quinoxalines are a class of fused six-membered nitrogen heterocyclics containing two nitrogens in mutually para disposition. These compounds have a wide range of applications in pharmacology, bacteriology and mycology<sup>(1-7)</sup>.

Quinoxaline and its derivatives have received attention as complexing agents owing to the presence of two potentially metal binding nitrogen centers at 1,4 positions. Further, significant chelating abilities could be developed in these systems by introducing suitable substituents in the heterocyclic ring or benzene ring.

Metal complexes of various Quinoxaline derivatives have been synthesized and characterized over the years. Quinoxalines attract an immense interest because of their diverse pharmacological applications. Owing to the importance associated with this class of compounds. We present herein the synthesis and characterization of Zn(II), Cd(II) and Hg(II) complexes of Quinoxaline-based Schiff bases namely 2-Hydroxybenzaldehyde-1-(3-chloro-2-quinoxaliny)hydrazone (HBCQOH) and 2-Hydroxy-3-methoxybenzaldehyde-1-(3-chloro-2-quinoxaliny)hydrazone (HMBCQH).



HBCQOH



HMBCQH

### Experimental

All the chemicals used were of A.R or B.D.H grade. The ligands HBCQOH and HMBCQH were prepared by stirred an equimolar mixture of 3-Chloro-2-hydrazinoquinoxaline<sup>8</sup> with 2-Hydroxybenzaldehyde and 2-hydroxy-3-methoxybenzaldehyde in DMF at room temperature for about 2 hours. When the solid separation completed, it was filtered, washed with water and recrystallized from  $\text{CHCl}_3$ -hexane. The colour, yield %, m.p( $^{\circ}\text{C}$ ) and elemental analysis(%) of HBCQOH and HMBCQH are respectively, yellow 68; 175-176  $^{\circ}\text{C}$ ; [Found(%) C,59.72; H,3.54; N,18.39;  $\text{C}_{15}\text{H}_{11}\text{N}_4\text{OCl}$  requires C,60.31; H,3.71; N,18.75] and bulk yellow, 72; 214-216 $^{\circ}\text{C}$ ; [Found(%) C,58.09; H,3.83; N,16.85;  $\text{C}_{16}\text{H}_{13}\text{N}_4\text{O}_2\text{Cl}$  requires C,58.46; H,3.99; N,17.04];

The Zn(II) and Cd(II) complexes with the two ligands were prepared using respective metal acetates and Hg(II) complexes using respective metal chlorides. In the preparation of all the metal complexes, the metal and the ligand were combined in 1:2 mole ratio (the metal being in slight excess of what the ratio required) using required quantities of methanol or aqueous methanol for the metal salts and methanol for the ligands so as to effect their solubility. The contents were refluxed on a water bath for 2-3 hours and the solid that separated was filtered, washed with water, hot methanol and ether and dried in air. The elemental analyses were carried out by Carlo Erba 1108 elemental analyzer at RSIC, CDRI, Lucknow. Conductance measurements on the complexes were made in DMF at  $10^{-3}$  M concentration on a Digisun digital conductivity meter.



## Synthesis and antimicrobial activity of some quinazoline derivatives and their metal complexes

K. MAMATHA, R. MOGILI, M. RAVINDER and S. SRIHARI

Department of Chemistry, Kakatiya University, Warangal - 506 009 (India)

(Received: April 12, 2007; Accepted: June 04, 2007)

### ABSTRACT

A new series of 2,3-disubstituted quinazoline derivatives and their Fe(III), Cu(II), Zn(II) and Hg(II) complexes have been synthesized and tested against *Foxysporum B. subtilis* and *E. coli*. The analytical, spectral and antimicrobial activity data of the compounds synthesized are presented.

**Key words:** Quinazoline derivatives and their metal complexes, antimicrobial activity

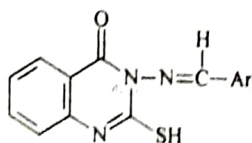
### INTRODUCTION

Quinazolines, particularly those which are 2,3-disubstituted quinazoline-(3H)-4-ones are reported to be physiologically and pharmacologically active and find application in the treatment of several diseases like leprosy, mental disorder, etc. These compounds are also quite useful as antibacterial, antifungal, antitubercular, anticonvulsant, antipyretic, antiamoebic, etc. agents<sup>1-4</sup>. Quinazolines and their derivatives possess coordinating sites like nitrogen, oxygen and sulphur and different types of activity associated with these compounds may be attributed to the complexation, through these sites, of metals present in the biosystem. In many cases, the metal ion association exerts a synergistic effect

on the activity of the free organic compound<sup>5</sup>. Considering the importance associated with this class of compounds, we report, herein, the synthesis and antimicrobial screening of Schiff bases derived from 3-amino-2-mercapto-quinazolin-4-(3H)-one and 2-hydroxybenzaldehyde, 2-hydroxy-1-naphthaldehyde, thiophene-2-carboxaldehyde and 3-formyl-chromone to give respectively 3-(2'-hydroxybenzalamino)-2-mercapto-quinazolin-4-one (HBAMQ), 3-(2'-hydroxynaphthalamino)-2-mercapto-quinazolin-4-one (HNAMQ), 3-(2'-thienylmethyleneamino)-2-mercapto-quinazolin-4-one (TMAMQ) and 3-(3'-chromylmethyleneamino)-2-mercapto-quinazolin-4-one (CMAMQ) (a) and their Fe(III), Cu(II), Zn(II) and Hg(II) complexes.

### EXPERIMENTAL

All the chemicals used were of A.R. or B.D.H. grade. 3-Amino-2-mercapto-quinazolin-4-(3H)-one (i) was prepared as reported earlier<sup>6</sup>. The ligands HBAMQ, HNAMQ, TMAMQ and CMAMQ were prepared using equimolar methanolic solutions of (i) and the respective aldehydes in presence of a few drops of piperidine and refluxing on a water bath for 3-6 hrs. The solids that separated during reflux were filtered, washed with methanol and



Ar = 2-OHC<sub>6</sub>H<sub>4</sub>, 2-OHC<sub>10</sub>H<sub>6</sub>, C<sub>4</sub>H<sub>3</sub>S, C<sub>9</sub>H<sub>5</sub>O<sub>2</sub>  
(a)

## Synthesis and Spectral Studies of Some Metal Complexes of Some Phenylhydrazones

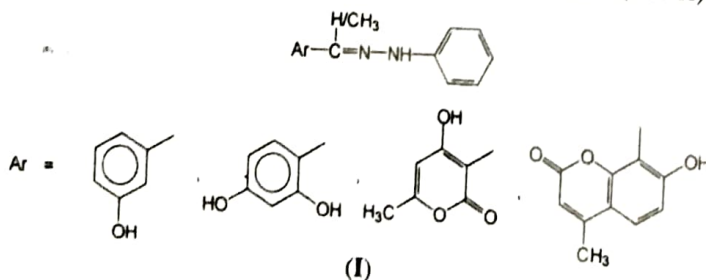
K. GOVINDA CHARY, K. MAMATHA, R. MOGILI, M. RAVINDER and S. SRI HARI\*  
 Department of Chemistry, Kakatiya University, Warangal-506 009, India  
 Fax: (91)(870)2438800; Tel: (91)(870)2438001-16 Ext. 228  
 E-mail: sriharisomu@yahoo.co.in

Fe(III), Ni(II), Cu(II), Ru(III) and Pd(II) complexes of phenylhydrazones derived from 3-hydroxy benzaldehyde, resorcealdehyde, dehydro acetic acid and 7-hydroxy-4-methyl-8-acetyl coumarin have been synthesized and characterized by physico-chemical data. All the ligands behave as mononegative, bidentate ones. The geometry and the bonding characteristics of the complexes have been deduced from relevant data.

**Key Words:** Synthesis, Metal complexes, Phenylhydrazones.

### INTRODUCTION

Hydrazones, simple as well as substituted ones are potential organic ligands for metals usually from the transition groups forming chelates. These compounds constitute an important class owing to their coordinating capability, analytical and industrial potentiality and biological activity<sup>1,2</sup>. The literature survey reveals that phenylhydrazones, of all the substituted hydrazones have been little explored as chelating agents, despite their promising nature. Phenylhydrazones find use mainly in qualitative and gravimetric analyses, as indicators of high alkalinity and in spectrophotometric and catalytic procedure<sup>3,5</sup>. With an objective of exploring the applicability of this class of hydrazones, we report herein, the synthesis and spectral characterization of Fe(III), Ni(II), Cu(II), Ru(III) and Pd(II) complexes of 3-hydroxybenzaldehyde phenylhydrazone (HBPH), resorcealdehyde phenylhydrazone (RAPH), dehydroacetic acid phenylhydrazone (DAPH) and 7-hydroxy-4-methyl-8-acetyl-coumarin phenylhydrazone (HCPH) (I).



**METAL COMPLEXES OF QUINOXALINE DERIVATIVES**  
-  
**A PHYSICO-CHEMICAL STUDY**



**THESIS SUBMITTED TO THE**  
**KAKATIYA UNIVERSITY FOR THE AWARD OF THE**  
**DEGREE OF**  
*Doctor of Philosophy*  
**IN**  
**CHEMISTRY**

**Submitted by**  
**RAVULA MOGILI**  
M.Sc.

**DEPARTMENT OF CHEMISTRY**  
**KAKATIYA UNIVERSITY**  
**WARANGAL - 506 009 (A.P.)**

**JULY - 2007**



Dr. S. SRIHARI  
Professor and Head

Department of Chemistry  
Kakatiya University  
Warangal 506 009

---


Grams: KAKATIYA, Phone: 0870-2461419 (Off), 0870 -2438674 (Res.) Fax: 0870-2438800  
e mail: sriharisomu@yahoo.co.in

---

Date : 9.7.2007

### CERTIFICATE

This is to certify that the thesis entitled "**METAL COMPLEXES OF QUINOXALINE DERIVATIVES -A PHYSICO-CHEMICAL STUDY**", being submitted to the Kakatiya University, Warangal by Mr. R. MOGILI for the award of the **DEGREE OF DOCTOR OF PHILOSOPHY IN CHEMISTRY** is based on the results of the investigation carried out by him in the Department of Chemistry, Kakatiya University, Warangal under my guidance and supervision. This work has not been submitted earlier, either in part or in full, for any Degree or Diploma of any University or Institution.

  
(Dr. S. SRIHARI)  
Research Supervisor