Synopsis

Of

The Thesis Entitled

Synthesis and antimicrobial evaluation of some novel nitrogen and oxygen containing heterocycles

To be submitted to M. S. University Of Baroda

For the Degree

Of

DOCTOR OF PHILOSOPHY

In Chemistry

By

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Under guidance of

Prof.Shubhangi S.Soman

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Synopsis of the Thesis

To be submitted to The Maharaja Sayajirao University of Baroda

For the degree of **DOCTOR OF PHILOSOPHY**

Name of the student : Nirav Narendrakumar Shah

Faculty : Science

Subject : Chemistry

Name of Guide : Prof.Shubhangi S Soman (M.Sc. PhD).

Title of the Thesis : Synthesis and antimicrobial evaluation of some novel nitrogen and oxygen containing heterocycles.

Registration Number : FoS/5/1821

Date of Registration : 21/08/2012

Place of Work : Department Of Chemistry, Faculty of Science,

The M .S. University Of Baroda

Vadodara

(Gujarat,India)

DECLARATION

This is to certify that the research work embodied in this synopsis entitled '' synthesis and antimicrobial evaluation of some novel nitrogen and oxygen containing heterocycles'' is an authentic work carried out by the candidate at the department of chemistry under the supervision of Prof.Shubhangi S Soman. The work has not been submitted in part or in full for any degree or diploma of this or any other university/Institution.

Prof.Shubhangi S Soman — Nirav N Shah

(Guide) — (Candidate)

Dr. N D Kulkarni

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SYNOPSIS

The work reported in the thesis with the title, "SYNTHESIS AND ANTIMICROBIAL EVALUATION OF SOME NOVEL NITROGEN AND OXYGEN CONTAINING HETEROCYCLES" has been described under the following different chapters.

CHAPTER -1 INTRODUCTION

Chapter -1 briefly introduces importance of heterocycles in the field of drug development and discovery along with the relative literature review of the work done so far on, coumarin ,pyridine ,naphthopyrone, benzthiazol, chalcones and chalcone derived pyrazoles etc compounds in the past. Chapter -1 further describes aims and objectives of proposed research work.

Coumarin

Chroman or 'Coumarin' is an aromatic heterocyclic organic compound. It is a bicyclic structure, consisting of benzene ring fused to a six member oxygen heteroatom. The benzopyrones can be subdivided into the benzo-α-pyrones to which the coumarin belongs and the benzo-γ-pyrones of which the flavonoids are principal members.Coumarin is generally known as Benzo-2-pyrone or Chromen-2-one. Coumarin comprises a very large class of compounds found throughout the plant kingdom. Coumarin and the benzopyrone is representative of very diverse and potentially useful groups of drugs. These molecules generally have a broad range of biological activities which includes antimicrobial, antifungal, anticancer, anticoagulant, cardiovascular, anti inflammatory, anti viral, and antioxidant activities.

Pyridine

Pyridine is a basic heterocyclic organic compound with the chemical formula C_5H_5N. It is structurally related to benzene, with one group (=CH-) replaced by a nitrogen atom. Pyridine is a prototypical electron-poor six membered ring heterocycle.The pyridine ring occurs in many important compounds including azines and vitamins like niacin and pyidoxal.Pyridine is widely used as a precursor to agrochemicals and pharmaceuticals and is also important solvent and reagent. Pyridine is added in ethanol to make it unsuitable for drinking purpose. It is also used for invitro synthesis of DNA.

Benzthiazol

Benzthiazol is among the usually occurring heterocyclic nuclei in many marine and natural plant products. It's a weak base heterocyclic compound. It consist of a 5-membered 1, 3 thiazole ring fused with a benzene ring and is an aromatic compound with the formula C_7H_5NS. Benzthiazol is a privileged bicyclicliic ring system with multiple applications. The benzthiazol ring is potential component in nonlinear optics.2-amino benzothiazol scaffold is one of the privileged structure in medicinal chemistry.

Chalcone

Chalcones considered as the precursors of flavones and isoflavones are widely present in edible plants. Chemically, they consist of open chain flavonoids in which the aromatic rings are joined by three carbons α, β – unsaturated carbonyl system. When simple or substituted acetophenone on Claisen -Schmidt condensation with different substituted aromatic aldehydes, it gives various substituted 'Chalcones'. Chalcones either natural or synthetic are known to exhibit various biological activities like antifungal, antibacterial, antimalarial, anti-inflammatory and anticancer activities. Chalcones have also been served as starting or coupling materials for synthesis of more complex synthetic compounds.

Various synthetic methods are available for synthesis of chalcones. The presence of a reactive α, β – unsaturated keto function in chalcones is found to be responsible for their antimicrobial activity, which may be altered depending on the type and position of substituent on the aromatic rings.

Pyrazoles

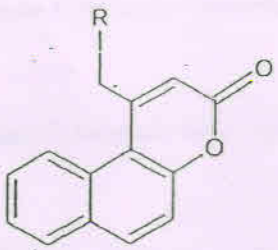
Pyrazoles are used extensively in the organic synthesis. Pyrazoles are nitrogen containing five member heterocyclic compounds. Among the two nitrogen atoms; one is basic and the other is neutral in nature. These are aromatic molecules due to their planar conjugated ring structures with six delocalized π electrons. The aromatic nature arise from the four π electrons and the unshared pair of electrons on the –NH nitrogen. These are widely found as a core structure in the large variety of compounds those posses' important biological activities.

The synthetic and natural coumarines have been studied widely for their various biological applications. The bacterial and fungal infections have increased significantly in past 25 years. The evaluation of antimicrobial resistance against bacterial strains against the currently available antibacterial drugs is an increasing concern.

We have tried to synthesize new coumarin and pyridine derivatives having potential antimicrobial activity. Since various drugs having coumarin moiety or pyridine moiety are there in market without any side effects, it was the basis to synthesize various coumarin or pyridine derivatives with fewer side effects, having good antimicrobial activity.

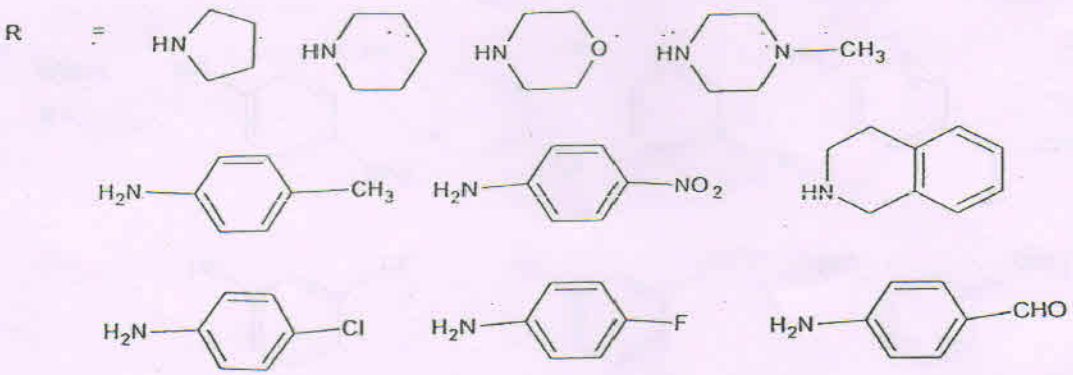
CHAPTER-2

It deals with the synthesis of 4-aminomethyl benzocoumarin. The compounds having following general formula were synthesized.



1-(substituted methyl)-3*H*-benzo[*f*]chromen-3-one

R =



The compounds of this chapter were synthesized by substitution reaction of various substituted aromatic OR aliphatic amines with 4-bromo methyl naphthopyrone.

Note: single crystal XRD data of 1-(substituted methyl)-3 *H-benzo [f] chromen-3-ones* has been deposited to Cambridge CCDC no.1054564.

The structures of the various synthesized compounds were assigned on the basis of elemental analysis, IR and ^{1}H NMR, and ^{13}C NMR spectral data.

All the above mentioned compounds were also screened for their antimicrobial and anticancer activity.

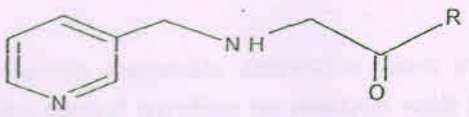
CHAPTER-3

The work reported in this chapter is presented in to three sections:

SECTION-1

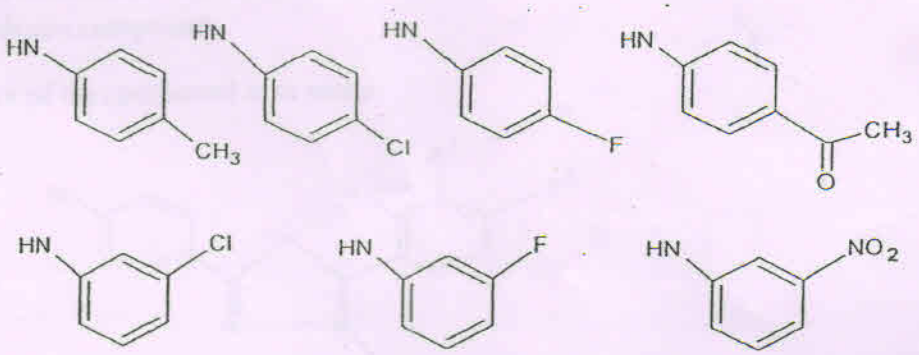
It deals with synthesis of *N*-(4-substituted phenyl)-2-[(pyridin-3-ylmethyl) amino] acetamide compounds

The compounds having following general formula were synthesized



Where,

R =

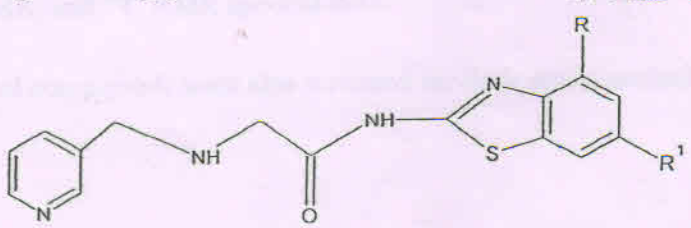


The compounds of this chapter were synthesized by reaction of various 2-bromo-*N*-(Substituted phenyl) acetamides with 3-amino methyl pyridine.

SECTION -2

It deals with synthesis of *N*-1, 3-substituted benzothiazol-2-yl-2-[(pyridin-3-ylmethyl) amino] acetamide.

The compounds having following general formula were synthesized.



Where R=H, R^1= -NO_2,-Cl,-F,-CH_3

R & R^1= NO_2 & -CH_3, -CH_3 & NO_2

The compounds of this chapter were synthesized by substitution reaction of various N-1, 3-substituted benzothiazol-2-yl-2-bromoacetamide with 3-amino methyl pyridine.

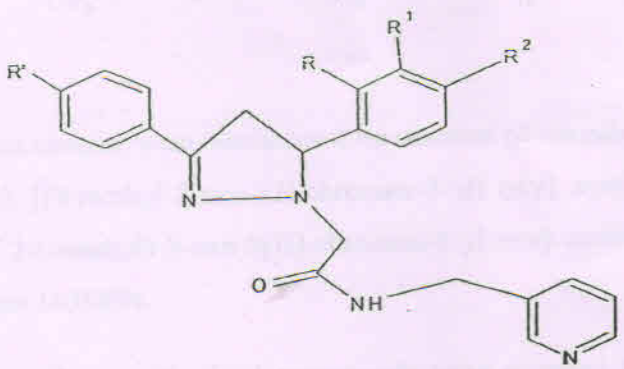
The structures of the various synthesized compounds were assigned on the basis of elemental analysis, IR and ^{1}H NMR, and ^{13}C NMR spectral data.

All the above mentioned compounds were also screened for their antimicrobial activity.

SECTION-3

It deals with the synthesis of various acetamide derivative from various substituted pyrazole prepared from chalcones. 3-amino methyl pyridine on reaction with bromo acetyl bromide gave corresponding bromoacetamide which on substitution with various Pyrazoles, prepared from chalcones gave the desire compound.

The general structure of the compound is as under:



Where, R, R^1, R^2 = H, OCH_3, Cl, 2, 4 –dichloro, F.

And R' = H, OCH_3.

The structures of the various synthesized compounds were assigned on the basis of elemental analysis, IR and ^{1}H NMR, and ^{13}C NMR spectral data.

All the above mentioned compounds were also screened for their antimicrobial activity.

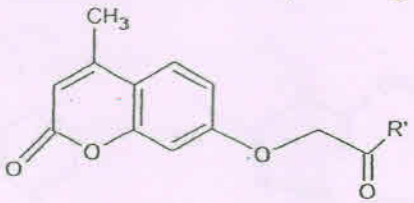
CHAPTER-4

The work reported in this chapter is presented in to two sections.

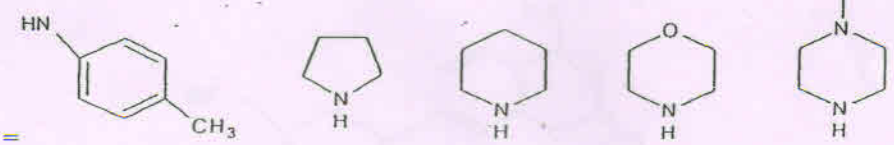
SECTION-1

It deals with the synthesis of various 2-[4-methyl-2-oxo-2H-chromen-7-yl)-oxy] acetamides

The compounds having following general formula were synthesized in the good yield.



Where, R' =



The compounds of this chapter were synthesized by reaction of various substituted aromatic and aliphatic amines with [(4-methyl-2-oxo-2*H*-chromen-7-yl) oxy] acetyl chloride. Note: single crystal XRD data of 2-(-methyl)-2-oxo-2[H]-chromen-7-yl oxy) acetate has been deposited to Cambridge CCDC no.1439494.

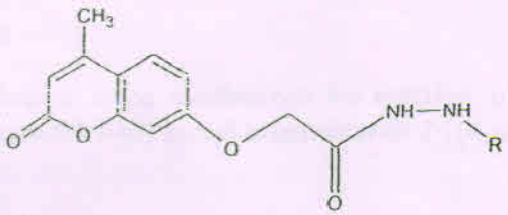
The structures of the various synthesized compounds were assigned on the basis of elemental analysis, IR and ^{1}H NMR, and ^{13}C NMR spectral data.

All the above synthesized compounds were screened for their antimicrobial activity.

SECTION-2

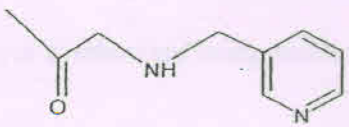
It deals with the synthesis of 2-[(4-methyl-2-oxo-2*H*-chromen-7-yl) oxy] acetohydrazide and various derivatives from this acetohydrazide

The general structure of the synthesized compound is as under:

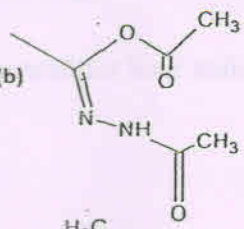


R=

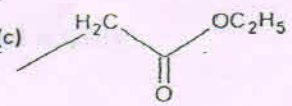
(a)



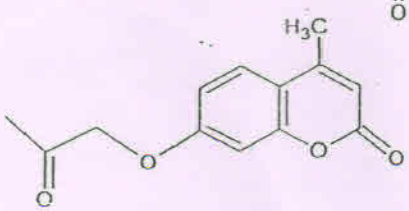
(b)



(c)



(d)



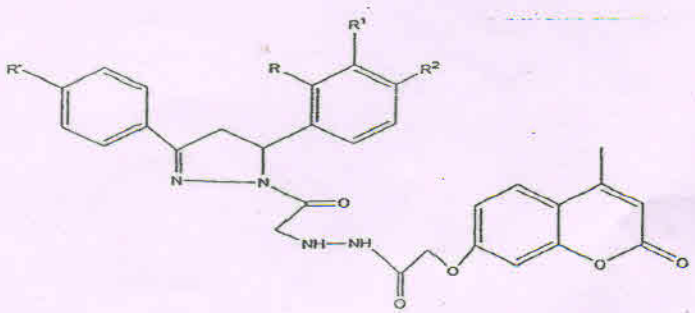
The structures of the various synthesized compounds were assigned on the basis of elemental analysis, IR and ^{1}H NMR, and ^{13}C NMR spectral data.

All the above synthesized compounds were screened for their antimicrobial activity.

CHAPTER-5

In continuation of the work mentioned in previous chapter it was thought to synthesize some other compounds from 2-[(4-methyl-2-oxo-2*H*-chromen-7-yl) oxy] acetohydrazide

The general structure of the compound is as under:



Where, R, R^1, R^2 = H, OCH_3, Cl, Dichloro, F.

and R = H, OCH_3, CH_3.

The compounds of this chapter were synthesized by reaction of various substituted (3, 5-diphenyl-4, 5-dihydro-1*H*-pyrazol-1-yl) acetyl bromide with 2-[(4-methyl-2-oxo-2*H*-chromen-7-yl) oxy] acetohydrazide.

The structures of the various synthesized compounds were assigned on the basis of elemental analysis, IR and ^{1}H NMR, and ^{13}C NMR spectral data.

All the above synthesized compounds were screened for their antimicrobial activity.

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