



<b>Department : Chemistry</b>		
<b>Academic Year : 2021-21</b>		
<b>Sr. No.</b>	<b>Programme Code</b>	<b>Name of the Programme</b>
01.	312	M. Sc.

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Field Project/Industrial Training for the academic session 2021-22

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गुरु घासीदास विश्वविद्यालय  
(केन्द्रीय विश्वविद्यालय अधिनियम 2009 क्र. 25 के अंतर्गत स्थापित केन्द्रीय विश्वविद्यालय)  
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Guru Ghasidas Vishwavidyalaya  
(A Central University Established by the Central Universities Act 2009 No. 25 of 2009)  
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Signature and Seal of the Head

**अध्यक्ष/Head**  
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Bilaspur 495009 (C G.)





A

Literature-Based Project Report

On

HETEROCYCLIC COMPOUNDS OF CHALCONES AND  
THEIR APPLICATIONS



Submitted for

*Partial Fulfilment of the Requirement for the Degree of  
Master of Science in Chemistry*

Session- 2022

Under the supervision of

**Dr. V. K. Rai**

Assistant professor

And guidance of

**Dr. Bhaskar Sharma**

Assistant professor

Submitted By

**AARTI RAJPUT**

Roll no. - 20410001

GGV/20/07201

MSc IV Chemistry

DEPARTMENT OF CHEMISTRY

GURU GHASIDAS VISHWAVIDYALAYA, Bilaspur (C.G.) 495009, India

(A Central University Established by Central Universities Act 2009 No. 25 of 2009)



DEPARTMENT OF CHEMISTRY  
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)  
(A Central University Established by Central Universities Act 2009 No. 25 of 2009)



## CERTIFICATE

This is to certify that AARTI RAJPUT has carried out this literature survey-based project under our supervision and guidance in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) on the topic “**HETEROCYCLIC COMPOUNDS OF CHALCONES AND THEIR APPLICATION**”

She has worked diligently, methodically, and collected the literature sincerely and carefully. During this project work, she has learnt about various organic transformations and new synthetic techniques related to the entitled topics.

To the best of our knowledge, the work presented in this project is original and has not been submitted anywhere. We recommended the project report be forwarded to the respective examiners for evaluation. We wish her all the success in her career and life.

**Supervision by**

**Dr. V. K. Rai**

Assistant Professor

Department of Chemistry

*B. Sharma*

**Guided by**

**Dr. Bhaskar Sharma**

Assistant Professor

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Guru Ghasidas Vishwavidyalaya Bilaspur (C.G.) 495009, India



DEPARTMENT OF CHEMISTRY  
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)

(A Central University Established by Central Universities Act 2009 No. 25 of 2009)



**FORWARDING CERTIFICATE**

This is to certify that **AARTI RAJPUT** has carried out this literature survey-based project in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) on the topic “**HETEROCYCLIC COMPOUNDS OF CHALCONES AND THEIR APPLICATIONS**”. This project is submitted for the partial fulfilment of requirements for the degree of M.Sc. in Organic Chemistry and forwarded to the examiner for evaluation.

I wish her every success in her life.

Date – 13/09/22  
Place – Bilaspur (CG)

Head  
Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
Bilaspur (C.G.)  
13.09.22  
**Prof. Gautam Kumar Patra**  
Head, Department of Chemistry,  
Guru Ghasidas Vishwavidyalaya,  
Bilaspur (C.G.) 495009, India



## DECLARATION

I hereby declare that the literature-based review work presented in the project entitled “**HETEROCYCLIC COMPOUNDS OF CHALCONES AND THEIR APPLICATIONS**” submitted as partial fulfilment of M.Sc. in Organic Chemistry has been performed by me in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur under the supervision of **Dr. V. K. Rai** and the guidance of **Dr. Bhaskar Sharma sir**.

The work presented in the project dissertation is original and will remain the intellectual property of the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.).

Date: 13/09/2022  
Place: Bilaspur (C.G.)

अरती राजपूत  
**AARTI RAJPUT**  
M.Sc. IV Semester  
(Organic Chemistry)  
Roll No.- 20410001  
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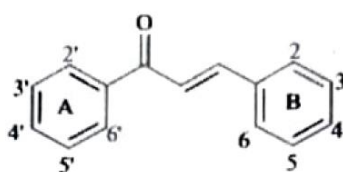
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## 1. INTRODUCTION

Chalcones are  $\alpha$ ,  $\beta$ -unsaturated ketones (trans-1,3-diaryl-2-propen-1-ones), consisting of two aromatic rings (A and B) attached by  $\alpha$ ,  $\beta$ -unsaturated carbonyl system with a variety of substituents. Many heterocycles of biological importance, such as 1,4-diketones, benzothiazepine, flavones, and pyrazolines, can be synthesized using chalcones as key precursors.<sup>[1]</sup>



Chalcone

The heterocyclic chalcones have a heteroaryl which contains oxygen, sulfur, or nitrogen.<sup>[8,9]</sup>

Chalcones and their derivatives of heterocyclic compounds have been studied mainly for their biological activities as anti-tumor, anti-inflammatory, anti-cancer, antioxidant, antibiotic, anti-malarial, anti-protozoal, anti-HIV, and treatment of diabetes. Due to these activities, this class of compounds has a wide application in the pharmaceutical industry.<sup>[12,13]</sup>

The heterocyclic chalcones due to their pharmacological activities, which are attributed to the structural aspects of these molecules, especially

- (i) The unsaturated bond between the aliphatic carbons;
- (ii) The ketone group; and
- (iii) The presence of heteroatoms.<sup>[6,7,8]</sup>

For instance, compounds containing some nitrogen heterocycles, such as pyrazole, benzimidazole, and triazole have been reported to possess antiproliferative, anti-inflammatory, kinase inhibitory, antimicrobial, and anticancer properties.<sup>[15]</sup>

Meanwhile, oxygen as well as sulfur-containing heterocycles, such as benzofuran, benzopyran, and benzo-thiophene derivatives, have therapeutics potential as antitubercular, antibacterial, antioxidant, cytotoxic, and anti-cancer.<sup>[16]</sup>

Widespread benefits of organic compounds containing heterocyclic moieties, influence the synthesis of chalcone derivatives.



**Department of Chemistry**  
**Guru Ghasidas vishwavidyalaya, Bilaspur**  
**(C.G.)**

**M.Sc. Project**  
**Dissertation Report**

**Submitted for Partial fulfillment of Masters in Chemistry**

**Adsorptive Removal of Organic dye from  
Eucalyptus sheathiana bark Ash: A Review**



**By - Abhinav Patel**  
**Roll No.: 20410002**

**Supervisor:**  
**Dr. Charu Arora**  
**Department of Chemistry**  
**Guru Ghasidas University**  
**Bilaspur-495009 (C.G.)**





DEPARTMENT OF CHEMISTRY  
GURU GHASIDAS VISHWAVIDYALAYA,  
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Central University Act 2009) BILASPUR (C.G.) 495009

### FORWARDING CERTIFICATE

This is to certify that the Dissertation entitled “**Adsorptive Removal of Organic dye from Eucalyptus sheathiana bark Ash: A Review**” is an authenticated record of review work done from April 2022 to August 2022 by **Abhinav Patel**, a student of M.Sc. Chemistry IV<sup>th</sup> semester, Department of Chemistry, GGV.

The work presented in this dissertation is based on the literature survey and is submitted by her for the award of above-mentioned degree.

*Patel*  
13.03.22  
Head, Department of  
Chemistry  
Bilaspur  
Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
Bilaspur (C.G.)





Department Of Chemistry  
Guru Ghasidas Vishwavidyalaya,  
(A Central University Established by the  
Central University Act 2009) Bilaspur (C.G) 495009

**CERTIFICATE**

This is to certify that **Abhinav Patel** has carried out her dissertation on  
“**Adsorptive Removal of Organic dye from Eucalyptus sheathiana  
bark Ash: A Review**”. The work presented in this dissertation is based  
on the literature survey (review work) and is submitted by him for the  
award of M.Sc. in Chemistry.

*Chauhan*  
(Supervisor)



## DECLARATION

I hereby declare that the work presented in the dissertation entitled-“**Adsorptive Removal of Organic dye from Eucalyptus sheathiana bark Ash: A Review**” is submitted in partial fulfillment of M.Sc. Chemistry was carried out by me in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G)

The work presented in this project dissertation is a review work based on the literature survey. The information presented in the dissertation report including data, figures and pictures is representative of the available literature collected by me.

DATE -:08/09/2022

ABHINAV PATEL

Place -: Bilaspur






## ACKNOWLEDGEMENT

I express my gratitude and sincere thanks to my parents and family, for their understanding, constant support, and encouragement which helped me a lot to work more efficiently during crucial times of the completion of the project.

I express sincere thanks to the Head of the Department, for providing facilities that enable me to complete my work successfully and most importantly for always being a source of inspiration throughout my work.

I take this golden opportunity to express my gratitude and sincere thanks to my respected guide **Dr. Charu Arora, Assistant Professor**, Department of Chemistry, GGU, Bilaspur for his guidance, constant encouragement, and support which boosted me with confidence and I am proud to say that it has been a most fruitful and enjoyable experience to work under his guidance.

I am also thankful to all the professors including Ph.D. scholars for their help in making this project a successful one. Also special thanks to my friends and classmates for sharing their valuable assistance.

  
ABHINAV PATEL



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# GURU GHASIDAS VISHWAVIDYALAYA BILASPUR, C.G.



SESSION: 2021-2022

## PROJECT ON A REVIEW ON SCHIFF BASES AND THERE APPLICATIONS

*Submission for*

*Partial Fulfillment of Master of Science in Chemistry*

### CHEMISTRY HONORS

#### SUPERVISED BY

**Dr Sunil Kumar Singh**

Associate Professor,

Department of Chemistry,

Guru Ghasidas Vishwavidyalaya,

Bilaspur, C.G.

#### SUBMITTED BY

**Bikash Chandra Ratha**

Master of Science,

Chemistry Honors,

Enroll No. - GGV/17/7039,

Roll N o. - 20410012



Department of Chemistry

Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G.

(A Central University Established by Central University Act 2009 No. 25 of 2009)

## Forwarding Certificate

This is to certify that Mr. Bikash Chandra Ratha has carried out review project in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G. on the topic "A Review On Schiff Bases And There Applications". This project is Submitted for the degree of M.Sc. in Chemistry and forwarded to examiner for evaluation.

Prof. Goutam Kumar Patra

Head of Department,  
Department of Chemistry,  
Guru Ghasidas Vishwavidyalaya,  
Bilaspur, C.G.

Head  
Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
Bilaspur (C.G.)



Department of Chemistry

Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G.

(A Central University Established by Central University Act 2009 No. 25 of 2009)

Certificate

This is to certify that Mr. Bikash Chandra Ratha has carried out project on the topic "A Review On Schiff Bases And There Applications" in the Department of chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G. under my supervision.

He has worked diligently, meticulously and methodically and collected the literature very sincerely and carefully. During this project work he has learnt about different types of organic synthesis.

To the best of my knowledge the work presented in this project is original and not submitted anywhere. I recommend the project report to be forwarded to the respective examiners for Evaluation. I wish him all the success in his carrier and life.

  
13.9.22  
Supervised By

**Dr Sunil Kumar Singh**

Associate Professor,  
Department of Chemistry,  
Guru Ghasidas Vishwavidyalaya,  
Bilaspur, C.G.





## Department of Chemistry

Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G.

(A Central University Established by Central University Act 2009 No. 25 of 2009)

## Declaration

I hereby declare that the literature report presented in this project entitled "A Review On Schiff Bases And There Applications" for the degree of M.Sc. in Chemistry has been performed in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G. under supervision of Dr. S.K. Singh.

The work presented in this project Dissertation is original and will remain intellectual property of Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G.

Date: 13/09/2022

Place: Bilaspur

Bikash Chandra Ratha

Bikash Chandra Ratha





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# Guru Ghasidas Vishwavidyalaya

(A Central University)



Bilaspur , Chhattisgarh

A Review Project Report On

**“Synthesis And Application Of Calix[4]Arene As Green Catalyst”**

As Partial Fulfilment for the Degree of ‘M.Sc. in Chemistry’

For Session 2021-22

Guided By

**Dr. S.K.Singh Sir**  
Associate Professor  
Department Of Chemistry  
Guru Ghasidas Vishwavidyalaya

Submitted By

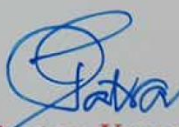
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M.Sc. 4<sup>th</sup> Semester  
Roll No.: 20410042



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(A Central University Established by Central University Act 2009 No. 25 of 2009)

## Forwarding Certificate

This is to certify that Mr. Saumy Sharma has carried out review project in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G. on the topic "Synthesis and study the Application of *p*- sulfonic acid calix[4]arene as Green Catalyst". This project is Submitted for the degree of M.Sc. in Chemistry and forwarded to examiner for evaluation.

  
13.09.22  
Prof. Goutam Kumar Patra  
Head of Department,  
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Department of Chemistry

Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G.

(A Central University Established by Central University Act 2009 No. 25 of 2009)

Certificate

This is to certify that Mr. Saumy Sharma has carried out project on the topic "Synthesis and study the Application of *p*- sulfonic acid calix[4]arene as Green Catalyst" (A Review Work) in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G. under my supervision.

He has worked diligently, meticulously and methodically and collected the literature very sincerely and carefully. During this project work he has learnt about different types of organic synthesis.

To the best of my knowledge the work presented in this project is original and not submitted anywhere. I recommend the project report to be forwarded to the respective examiners for Evaluation. I wish him all the success in his carrier and life.

  
Supervised By

**Dr. Sunil Kumar Singh**

Associate Professor,

Department of Chemistry,

Guru Ghasidas Vishwavidyalaya,

Bilaspur, C.G.



Department of Chemistry

Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G.

(A Central University Established by Central University Act 2009 No. 25 of 2009)

Declaration

I hereby declare that the literature report presented in this project entitled “Synthesis and study the Application of *p*- sulfonic acid calix[4]arene as Green Catalyst” (A Review Work) for the degree of M.Sc. in Chemistry has been performed in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G. under supervision of Dr. S.K. Singh Sir.

The work presented in this project Dissertation is original and will remain intellectual property of Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G.

Date:

Place: Bilaspur

Saumy Sharma



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A  
PROJECT REPORT  
ON  
WATER POLLUTION BY SURFACE ACTIVE AGENT  
(A REVIEW WORK)

A DISSERTATION REPORT PREPARED  
FOR THE PARTIAL FULFILLMENT OF THE DEGREE  
OF  
MASTER OF SCIENCE  
IN  
CHEMISTRY  
2020-2022



SUBMITTED BY  
*CHITRESH KUMAR BARETH*  
MASTER OF SCIENCE  
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4<sup>th</sup> SEMESTER

UNDER THE GUIDANCE OF  
*DR. SUNIL KUMAR SINGH*  
(ASSOCIATE PROFESSOR)



गुरु घासीदास विश्वविद्यालय  
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## Forwarding Certificate

This is to certify that Mr. Chitresh Kumar Bareth carried out review project in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G. on the topic "WATER POLLUTION BY SURFACE ACTIVE AGENT(A REVIEW WORK)". This project is Submitted for the degree of M.Sc. in Chemistry and forwarded to examiner for evaluation.

**Prof. Goutam Kumar Patra**  
Head of Department,  
Department of Chemistry,  
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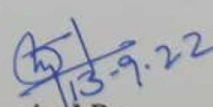
(A Central University Established by Central University Act 2009 No. 25 of 2009)

Certificate

This is to certify that Mr. Chitresh Kumar Bareth has carried out project on the topic "WATER POLLUTION BY SURFACE ACTIVE AGENT(A REVIEW WORK)" in the Department of chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G. under my supervision.

He has worked diligently, meticulously and methodically and collected the literature very sincerely and carefully. During this project work he has learnt about different types of organic synthesis.

To the best of my knowledge the work presented in this project is original and not submitted anywhere. I recommend the project report to be forwarded to the respective examiners for Evaluation. I wish him all the success in his carrier and life.

  
Supervised By

**Dr Sunil Kumar Singh**

Associate Professor,

Department of Chemistry,

Guru Ghasidas Vishwavidyalaya,

Bilaspur, C.G.



Department of Chemistry  
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(A Central University Established by Central University Act 2009 No. 25 of 2009)

## Declaration

I hereby declare that the literature report presented in this project entitled "WATER POLLUTION BY SURFACE ACTIVE AGENT(A REVIEW WORK)" for the degree of M.Sc. in Chemistry has been performed in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G. under supervision of Dr. S.K. Singh.

The work presented in this project Dissertation is original and will remain intellectual property of Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G.

Date: 13/09/2022

Place: Bilaspur

*Chitresh*

Chitresh Kumar Bareth



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### 1. INTRODUCTION

### 2. CLASSIFICATION OF SURFACANT

### 3. SOURCES

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### 5. REMOVAL

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**CHALCONE SYNTHESIS AND ITS USAGE-  
(REVIEW BASED PROJECT)**

A DISSERTATION REPORT PREPARED  
FOR THE PARTIAL FULFILLMENT OF THE DEGREE  
OF  
MASTER OF SCIENCE  
IN  
CHEMISTRY



By

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Under the supervision of

**Dr. VIJAI K. RAI**

(Assistant Professor)

And guidance of

**Dr. S.K. Singh**

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**DEPARTMENT OF CHEMISTRY  
GURU GHASIDAS VISHWAVIDAYALAYA  
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**2022**





## CERTIFICATE

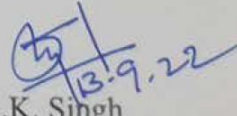
This is to certify that this dissertation entitled “**Chalcone synthesis and its usage-(review-based project.)**” is based on the original study conducted by **Miss. Srishtishree Mahapatra** with sincere and active interest.

This is a partial fulfillment of the requirements for the award of “Masters of Science” in the department of Chemistry from Guru Ghasidas University.

None of this review work presented in this dissertation has been submitted to any other university or institution for the award of any degree or otherwise to the best of our knowledge.

  
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GGV, BILASPUR

  
Dr S.K. Singh  
ASSOCIATE PROFESSOR

अध्यक्ष/Head  
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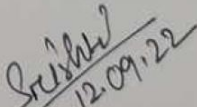
## DECLARATION

I hereby declare that the work presented in this project review entitled "Chalcone Synthesis and its usage-(review-based project.)" submitted for the partial fulfillment of M.Sc. Chemistry 4<sup>th</sup> semester is carried out by me at Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G).

The work presented in this project review is original and will remain the intellectual property of the department of Botany, Guru Ghasidas Vishwavidyalaya Bilaspur (C.G). The information presented in the review report including data, figure, and pictures are duly credited. If any discrepancy, mistake, or plagiarism found in the report, the responsibility for the same will be solely mine.

Date: 12/09/2022

Place: Bilaspur

  
12.09.22  
Srishtishree Mahapatra

M.Sc. 4<sup>th</sup> Semester  
Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
Bilaspur (C.G)



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**गुरु घासीदास विश्वविद्यालय**  
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**DEPARTMENT OF CHEMISTRY**

**GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR**

(A Central University Established by the Central Universities Act, 2009 No. 25 of 2009)

**A Literature Based Project Report**

**On**

**“Synthesis of Silver and Gold Nanoparticles using Plant Extracts”**

**Master of Science IV Semester**

**Session : 2021 – 2022**

**SUPERVISED BY**

**Dr. BHASKAR SHARMA**

**(ASSISTANT PROFESSOR)**

**DEPARTMENT OF CHEMISTRY**

**GURU GHASIDAS CENTRAL UNIVERSITY**

**BILASPUR (C.G.)**

**SUBMITTED BY**

**KALPANA TIDKE**

**M.Sc. IV SEMESTER**

**ROLL NO. 20410023**





DEPARTMENT OF CHEMISTRY

GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR

(A Central University Established by the Central Universities Act, 2009 No. 25 of 2009)

CERTIFICATE OF THE GUIDE

This is to Certify that **KALPANA TIDKE** has carried out this literature survey based project under my supervision in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) on the topic "**Synthesis of Silver and Gold Nanoparticles using Plant Extracts**".

She has worked diligently, methodically and also collected the literature very sincerely and carefully. During this project work she has learnt about various organic transformation.

To the best of our knowledge the work presented in this project is original and has not been submitted anywhere. I recommend the project report to be forwarded to the respective examiners for evaluation. I wish very success in her career and life.

(Signature of Guide)

Dr. BHASKAR SHARMA

ASSISTANT PROFESSOR

(DEPARTMENT OF CHEMISTRY)

(Signature of Student)

KALPANA TIDKE

गुरु घासीदास विश्वविद्यालय  
(केन्द्रीय विश्वविद्यालय अधिनियम 2009 क्र. 25 के अंतर्गत स्थापित केन्द्रीय विश्वविद्यालय)  
कोनी, बिलासपुर - 495009 (छ.ग.)



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DEPARTMENT OF CHEMISTRY

GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR

(A Central University Established by the Central Universities Act, 2009 No. 25 of 2009)

**FORWARDING CERTIFICATE**

This is to Certify that the project work entitled "**Synthesis of Silver and Gold Nanoparticles using Plant Extracts**" Submitted by this project is submitted for the partial fulfillment of requirements for the degree of M.Sc. in Chemistry and forwarded to examiner for evaluation. I wish every success in her life.

(Signature of H.O.D.)

Dr. G.K. PATRA

HEAD

(DEPARTMENT OF CHEMISTRY)

(Signature of Student)

KALPANA TIDKE

Head  
Department of Chemistry  
Guru Ghasidas Vishwavidyalaya



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A  
Project Report  
ON

# *Synthesis of Tri-Aryl Pyridine Derivatives Using Task-Specific Acidic Ionic Liquid*

*Submitted for*

*Partial Fulfillment of the Requirement for the Degree of*

*Master of Science in Chemistry*

*Session: 2021-2022*

**SUPERVISED BY**  
**Dr. Subhash Banerjee**  
Assistant Professor  
Department of Chemistry

**SUBMITTED BY**  
**Sameera Kheta**  
Roll no. 20410040  
Enroll No. GGV/20/07212



**Department of Chemistry**  
**Guru Ghasidas Vishwavidyalaya**  
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**Department of Chemistry**  
**Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)**  
**(A Central University Established by Central Universities Act 2009**  
**No. 25 of 2009)**

**FORWARDING CERTIFICATE**

This is to certify that **Sameera Kheti** has carried out this project in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur (C.G.) on the topic "**Synthesis of Tri-Aryl Pyridine Derivatives Using Task-Specific Acidic Ionic Liquid**". This project is submitted for the partial fulfillment of requirements for the degree of M. Sc. in Chemistry and forwarded to examiner for evaluation.

I wish every success in his life.

  
**Prof. Goutam K. Patra**

**Head, Department of Chemistry**  
**Guru Ghasidas Vishwavidyalaya**  
**Bilaspur, CG**



Department of Chemistry  
Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)  
(A Central University Established by Central Universities Act  
2009 No. 25 of 2009)

CERTIFICATE

This is to certify that Sameera Kheti has carried out this project under my supervision in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) on the topic "Synthesis of Tri-Aryl Pyridine Derivatives Using Task-Specific Acidic Ionic Liquid".

He has worked diligently, methodically and also collected the literature very sincerely and carefully. During this project work he has learnt about various organic syntheses related to the entitled topic.

To the best of our knowledge the work presented in this project is original and has not been submitted anywhere. I recommend the project report to be forwarded to the respective examiners for evaluation.

I wish every success in his career and life.

*Sameera Kheti*  
*13.09.22*

SUBMITTED BY  
**Sameera Kheti**  
M.Sc. Chemistry  
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Enroll No. GGV/20/07212

*Dr. Subhash Banerjee*  
*13/09/22*

SUPERVISE BY  
**Dr. Subhash Banerjee**  
Assistant Professor  
Department of Chemistry  
GGV Bilaspur (C.G.)





Department of Chemistry  
Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)  
(A Central University Established by Central Universities Act  
2009 No. 25 of 2009)

## DECLARATION

I hereby declare that the report presented in this project entitled "**Synthesis of Tri-Aryl Pyridine Derivatives Using Task-Specific Acidic Ionic Liquid**" submitted as partial fulfillment of M.Sc. in Chemistry has been performed in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur under the supervision of Dr. Subhash Banerjee.

The work presented in the project dissertation is original and will remain intellectual property of Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.).

*Sameera Kheta*

Date: 13.09.22  
Place: Bilaspur

SAMEERA KHETI  
M. Sc. IV Semester  
Enroll no. GGV/20/07212  
Roll no. 20410040



### ACKNOWLEDGEMENT

I owe a great many thanks to a great many people who helped and supported me during the writing of this paper.

I am extremely indebted to **Dr. Subhash Banerjee, Assistant Professor, Department of Chemistry, GGV, Bilaspur** without whose kind guidance and support, I would not have completed my semester project successfully. He was instrumental in assigning me this work; he provided all the required resources and ensured by all means that I come up with valid results. I would like to express my special thanks of gratitude to my mentor **Miss Geetika Patel and Mr. Ashok Raj Patel** for their support in completing my project.

Then I wish to thank **Prof. Goutam K Patra, Head of Department, Department of Chemistry, GGV**, for allowing me to carry out this project as a part of my course M.Sc. Chemistry at his department.

*Sameera Kheti*  
*13.09.22*

**Sameera Kheti**  
**M.Sc. IV Semester**  
**Department of Chemistry,**  
**Guru Ghasidas Vishwavidyalaya,**  
**Bilaspur (C.G), 495009, INDIA**



A

Project Report

ON

*VISIBLE LED LIGHT DRIVEN SYNTHESIS  
OF BIS COUMARIN DERIVATIVES  
UNDERCATALYST-FREE CONDITIONS*

*Submitted for*

*Partial Fulfillment of the Requirement for the Degree of*

*Master of Science in Chemistry*

SESSION: 2021-2022

**SUPERVISED BY**  
Dr. Subhash Banerjee  
Assistant Professor  
Department of Chemistry

**SUBMITTED BY**  
Gargee Rathore  
Roll no. 20410018  
Enroll. No. GGV/17/7165



**Department of Chemistry**  
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Bilaspur (C.G.) 495009, India





Department of Chemistry

Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)

(A Central University Established by Central Universities Act 2009  
No. 25 of 2009)

### FORWARDING CERTIFICATE

This is to certify that **Gargee Rathore** has carried out this project in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur (C.G.) on the topic "**Visible LED light driven synthesis of Bis coumarin derivatives under catalyst free conditions**". This project is submitted for the partial fulfillment of requirements for the degree of M.Sc. in Chemistry and forwarded to examiner for evaluation.

I wish every success in her life.

**Prof. Gautam Kumar Patra**

Head of Department

Department of Chemistry

Guru Ghasidas Vishwavidyalaya

**Head**  
Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
Bilaspur (C.G.)



Department of Chemistry  
Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)  
(A Central University Established by Central Universities Act  
2009 No. 25 of 2009)

CERTIFICATE

This is to certify that **Gargee Rathore** has carried out this project under my supervision in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) on the topic "**Visible LED light driven synthesis of Bis coumarin derivatives under catalyst free conditions**".

She has worked diligently, methodically and also collected the literature very sincerely and carefully. During this project work she has learnt about various organic syntheses related to the entitled topic.

To the best of our knowledge the work presented in this project is original and has not been submitted anywhere. I recommend the project report to be forwarded to the respective examiners for evaluation. I wish every success in her career and life.

  
SUBMITTED BY 13/09/2022

**Gargee Rathore**  
M.Sc. Chemistry  
Roll No. 20410018  
Enroll No. GGV/17/7165

  
SUPERVISED BY

**Dr. Subhash Banerjee**  
Assistant Professor  
Department of Chemistry  
GGV Bilaspur (C.G.)



Department of Chemistry  
Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)  
(A Central University Established by Central Universities Act  
2009 No. 25 of 2009)

## DECLARATION

I hereby declare that the report presented in this project entitled **“Visible LED light driven synthesis of Bis coumarin derivatives under catalyst free conditions”** submitted as partial fulfillment of M.Sc. in Chemistry has been performed in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur under the supervision of Dr. Subhash Banerjee.

The work presented in the project dissertation is original and will remain intellectual property of Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.).

Date:

13/09/2022

Place: Bilaspur

Gargee Rathore

M. Sc. Chemistry 4<sup>th</sup> Semester  
(2021-2022)

Enroll no. GGV/17/7165

Roll no. 20410018





## ACKNOWLEDGEMENT

I owe a great many thanks to a great many people who helped and supported me during the writing of this paper.

I am extremely indebted to **Dr. Subhash Banerjee, Assistant Professor, Department of Chemistry, GGV, Bilaspur** without whose kind guidance and support, I would not have completed my semester project successfully. He was instrumental in assigning me this work; he provided all the required resources and ensured by all means that I come up with valid results. I would like to express my special thanks of gratitude to my mentor **Miss Geetika Patel** and **Mr. Ashok Raj Patel** for their support in completing my project.

Then I wish to thank **Prof. Goutam Kumar Patra, Head of Department, Department of Chemistry, GGV**, for allowing me to carry out this project as a part of my course M.Sc. Chemistry at his department.

**Gargee Rathore**  
M.Sc. Chemistry  
Department of Chemistry,  
Guru Ghasidas Vishwavidyalaya,  
Bilaspur (C.G), 495009, INDIA



A  
Project Report  
ON

## *Cobaltide Catalyzed Synthesis Of Benzothiazole*

*Submitted for*

*Partial Fulfillment of the Requirement for the Degree of*

*Master of Science in Chemistry*

*Session: 2021-2022*

**SUPERVISED BY:**

**Dr. Subhash Banerjee**  
**Assistant Professor**  
**Department of Chemistry**

**SUBMITTED BY:**

**Parimal Sao**  
**Roll no. 20410034**  
**Enroll No. GGV/17/7156**



**Department of Chemistry**  
**Guru Ghasidas Vishwavidyalaya**  
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Bilaspur (C.G.) 495009, India



Department of Chemistry  
Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)  
(A Central University Established by Central Universities Act 2009  
No. 25 of 2009)

FORWARDING CERTIFICATE

This is to certify that **Parimal Sao** has carried out this project in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur (C.G.) on the topic "**Cobaltide Catalyzed Synthesis of Benzothiazole**". This project is submitted for the partial fulfillment of requirements for the degree of M.Sc. in Chemistry and forwarded to examiner for evaluation.

I wish every success in his life.

**Prof. Goutam K. Patra**

Head, Department of Chemistry,  
Guru Ghasidas Vishwavidyalaya,  
Bilaspur, CG

**Head**  
Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
Bilaspur (C.G.)





Department of Chemistry  
Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)  
(A Central University Established by Central Universities Act  
2009 No. 25 of 2009)

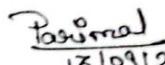
CERTIFICATE


This is to certify that **Parimal Sao** has carried out this project under my supervision in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) on the topic "**Cobaltide Catalyzed Synthesis of Benzothiazole**".

He has worked diligently, methodically and also collected the literature very sincerely and carefully. During this project work he has learnt about various organic syntheses related to the entitled topic.

To the best of our knowledge the work presented in this project is original and has not been submitted anywhere. I recommend the project report to be forwarded to the respective examiners for evaluation.

I wish every success in his career and life.

  
18103122  
**SUBMITTED BY:**  
**Parimal Sao**  
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Department of Chemistry  
GGV Bilaspur (C.G.)



Department of Chemistry  
Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)  
(A Central University Established by Central Universities Act  
2009 No. 25 of 2009)

## DECLARATION

I hereby declare that the report presented in this project entitled "**Cobaltide Catalyzed Synthesis of Benzothiazole**" submitted as partial fulfillment of M.Sc. in Chemistry has been performed in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur under the supervision of Dr. Subhash Banerjee.

The work presented in the project dissertation is original and will remain intellectual property of Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.).

Date: 13/03/22  
Place: Bilaspur

*Parimal*  
13103122  
PARIMAL SAO  
M. Sc. IV Semester  
Enroll no. GGV/17/7156  
Roll no. 20410034



### ACKNOWLEDGEMENT

I owe a great many thanks to a great many people who helped and supported me during the writing of this paper.

I am extremely indebted to Dr. Subhash Banerjee, Assistant Professor, Department of Chemistry, GGV, Bilaspur without whose kind guidance and support, I would not have completed my semester project successfully. He was instrumental in assigning me this work; he provided all the required resources and ensured by all means that I come up with valid results. I would like to express my special thanks of gratitude to my mentor Miss Geetika Patel and Mr. Ashok Raj Patel for their support in completing my project.

Then I wish to thank Dr. Goutam K Patra, Head of Department, Department of Chemistry, GGV, for allowing me to carry out this project as a part of my course M.Sc. Chemistry at his department.

*Parimal*  
13/09/22

Parimal Sao  
M.Sc. IV Semester  
Department of Chemistry,  
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DEPARTMENT OF CHEMISTRY  
GURU GHASIDAS VISHWAVIDYALAYA  
BILASPUR, C.G. (A CENTRAL UNIVERSITY)



---

**DECLARATION**

I hereby declare that the project work presented in this dissertation entitled **“CARBENE BASED PINCER LIGANDS”** have been done by me under the guidance of **Dr. SURYABHAN SINGH** (Professor), GGV, Bilaspur, C.G.

---

**ASMITA SAO**

(M.Sc. Inorganic Chemistry, IV<sup>th</sup> Semester)  
GURUGHASIDAS VISHWAVIDYALAYA  
(A CENTRAL UNIVERSITY)  
BILASPUR, CG



**Dr. SURYABHAN SINGH**  
**ASST.PROFESSOR,**  
**DEPARTMENT OF CHEMISTRY**  
**Guru Ghasidas Vishwavidyalaya,**  
**Bilaspur, C.G. (A central University)**



## CERTIFICATE

This is to certify that **ASMITA SAO** (M.Sc. Inorganic Chemistry, 4<sup>th</sup> Semester) has been completed a project on "**CARBENE BASED PINCER LIGANDS**". This project is submitted for the partial fulfillment of required degree in chemistry.

I wish for her every success in the future.

*Suryabhan Singh*

Signature  
**DR. SURYABHAN SINGH**  
Asst. Professor  
Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
(A central University),  
Bilaspur, C.G.



**DR. GOUTAM KUMAR PATRA (HOD)**

Professor  
Department of Chemistry  
Guru Ghasidas Vishwavidyalaya,  
Bilaspur [A Central university]



### **FORWARDING CERTIFICATE**

This is to certify that **ASMITA SAO** (M.Sc. Inorganic Chemistry) has been completed a project on "**CARBENE BASED PINCER LIGANDS**" under the supervision of **Dr. SURYABHAN SINGH** This project work is submitted for the partial fulfillment of required degree in chemistry and forwarded to Examiner for evaluation.

I wish her every success in the future life.

 13/5/21

Signature  
**DR. GOUTAM KUMAR PATRA**  
HEAD OF DEPARTMENT OF CHEMISTRY  
GURU GHASIDAS VISHWAVIDYALAYA  
(A CENTRAL UNIVERSITY),  
BILASPUR, C.G.





DEPARTMENT OF CHEMISTRY,  
GURU GHASIDAS VISHWAVIDYALAYA,  
[A CENTRAL UNIVERSITY]  
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### ACKNOWLEDGEMENT

First of all, I would like to declare my feeling in the dignity of almighty that created me with his great immense and patience to achieve this milestone. I own my deep sense of admiration, incredible thanks from the bottom my heart to my guide and my inspiration **DR. SURYABHAN SINGH** (Professor) Department of Chemistry, GURU GHASIDAS VISHWAVIDYALAYA BILASPUR (C.G.) for his keen interest and extraordinary guidance, constructive criticism that contain the capacity of architect this project. I take this opportunity to express my sincere thanks for providing me a golden opportunity to work on this project and for his able guidance, co-operation and inspiration.

I am also thankful to Mr. Raju Meshram & Mr. D. K. Verma sir (Lab Assistant) Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) for providing chemicals which required in my project.

Finally, I gladly express my thanks to all those loving personalities who have directly or indirectly helped me in some way or other during the course of this project.

ASMITA SAO

(M.Sc. Inorganic Chemistry, IV<sup>th</sup> Semester)

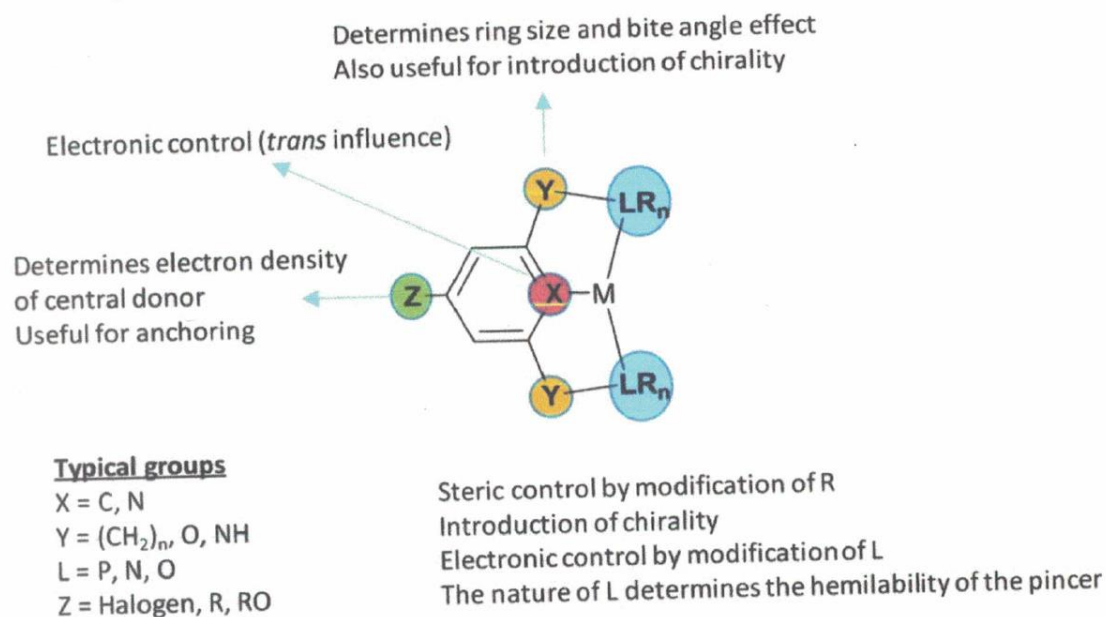


## Carbene pincer Ligand

### Introduction

As a type of coordination complex, transition metal pincer complexes consist of a pincer ligand and a transition metal. The pincer ligands bind tightly to three adjacent coplanar sites in a meridional configuration. They confer high thermal stability to the complexes they form due to the inflexibility of their pincer-metal interaction. This stability is in part ascribed to the constrained geometry of the pincer, which inhibits cyclometallation of the organic substituents on the donor sites at each end. In the absence of this effect, cyclometallation is often a significant deactivation process for complexes, in particular limiting their ability to effect C-H bond activation. The organic substituents also define a hydrophobic pocket around the reactive coordination site. Stoichiometric and catalytic applications of pincer complexes have been studied at an accelerating pace since the mid-1970s. Most pincer ligands contain phosphines. [3] Reactions of metal-pincer complexes are localized at three sites perpendicular to the plane of the pincer ligand, although in some cases one arm is hemi-labile and an additional coordination site is generated transiently. As early as the 1920s, anionic pincers were formed using carbanion as the central donor site and phosphine as flanking donors; PCP pincers were derived from

these compounds.



गुरु घासीदास विश्वविद्यालय  
(केन्द्रीय विश्वविद्यालय अधिनियम 2009 क्र. 25 के अंतर्गत स्थापित केन्द्रीय विश्वविद्यालय)  
कोनी, बिलासपुर - 495009 (छ.ग.)



Guru Ghasidas Vishwavidyalaya  
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Koni, Bilaspur - 495009 (C.G.)



**GURU GHASIDAS VISHWAVIDYALAYA,**  
**BILASPUR, C.G., INDIA**

**METAL ORGANIC FRAMEWORKS**

**IN DRUG DELIVERY**

**A**

**PROJECT THESIS**

**SUBMITTED IN PARTIAL FULLFILLMENT OF THE**

**REQUIRMENT FOR THE**

**DEGREE OF**

**M.Sc. CHEMISTRY**

**SUBMITTED**

**BY**

**BATHU SHRUTHI**

**(ROLL NO. 20410009)**

**Under Supervision of**

**DR. SURYABHAN SINGH**

**DEPARTMENT OF CHEMISTRY,**

**GURU GHASIDAS VISHWAVIDYALAYA,**

**BILASPUR, C.G., INDIA**





## CERTIFICATE

This is to certify that **BATHU SHRUTHI** had carried out the project on the topic "**METAL ORGANIC FRAMEWORK IN DRUG DELIVERY**" in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G. This project is submitted for the partial fulfillment of required degree in chemistry.

I wish her all the success in her carrier and life.

**SUPERVISED BY**

**Dr. Suryabhan Singh**

**Asst. Professor**

**Dept. Of Chemistry**

**GGV, Bilaspur, C.G.**



## FORWARDING CERTIFICATE

This is to certify that **BATHU SHRUTHI** has carried out the project in the Department of chemistry, Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur, C.G. on the topic of "**METAL ORGANIC FRAMEWORK IN DRUG DELIVERY**". This project is submitted for the partial fulfillment of requirements for the degree of M.Sc. in chemistry and forwarded to examiner for evolution.

I wish her every success in her life.

PROF. PATRA GAUTAM

Head of department

Department of chemistry

Guru Ghasidas Vishwavidyalaya

Bilaspur, C.G., 495009, India



## ACKNOWLEDGEMENT

I would like to express my earnest and deepest gratitude to, **DR. SURYABHAN SINGH**, faculty for chemistry department for giving me this opportunity to do a project on such a valuable topic of “**METAL ORGANIC FRAMEWORK IN DRUG DELIVERY**”. I am grateful for the assistance, guidance, and support that were extended during the course of excellent research.

I wish to acknowledge **PROF. PATRA GOUTAM** (Head of Department of Chemistry), Guru Ghasidas Vishwavidyalaya who gave me opportunity to undergo project work and his valuable suggestion.

I am also thankful to all the teachers, lab assistants, librarian, clerk of the chemistry department and the college administration for providing the resources necessary for the research work. I thank my parent and friends for their moral support and love throughout my research work and project preparation. Above all I thank the god almighty for blessing me with the health and vitality to complete this project.

*Bathu Shruthi*

**BATHU SHRUTHI**

**ROLL NO. - 20410009**

**M.SC.-IV SEMESTER**





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DEPARTMENT OF CHEMISTRY  
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR  
(A Central University Established by Central University Act, 2009  
No 25 of 2009)



A  
PROJECT REPORT  
ON  
"Cytochrome: Structure, Function and Properties-  
A Brief Review"

Submitted in partial fulfilment of the requirements for the  
Award of the degree of  
"Master of Science in Chemistry"  
(Session 2021-2022)

**SUBMITTED BY**

**DEEPAK RATNAKAR**

Roll No. - 20410017

Enroll No. - GGV/17/7162

M.Sc. - 4<sup>th</sup> Semester

**UNDER THE GUIDANCE OF**

**DR. SURYABHAN SINGH**

(Asst. Prof. of Chemistry Dept.)  
Guru Ghasidas Central University,  
Bilaspur (C.G.)



## FORWARDING CERTIFICATE

This is to certify that **DEEPAK RATNAKAR** has carried out the project in the department of chemistry. Guru Ghasidas Vishwavidyalaya (A central University), Bilaspur (C.G.) on the topic "**Cytochrome: Structure, Function and Properties- A Brief Review**". This project is submitted for the requirement for the degree of M.Sc. in Chemistry and forwarded to examiner for evaluation.

I wish him every success in his life.

**HEAD OF DEPARTMENT**

**Prof. GOUTAM KUMAR PATRA**

DEPARTMENT OF CHEMISTRY,  
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Bilaspur 495009 (C.G.)





## DECLARATION

I declare that this written submission represents my ideas in my own words and where other's ideas or words have been included, I have adequately cited and referenced the original sources. The work presentation in this project dissertation entitled "*Cytochrome : Structure, Function and Properties- A Brief Review*" submitted as partial fulfilment of M.Sc. chemistry was carried out at Department of Chemistry, Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur (C.G). The work presented in this project dissertation is original and will remain intellectual property of Department of Chemistry, Guru Ghasidas Central University Bilaspur (C.G).



DEEPAK RATNAKAR

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Date: 13/09/22



### CERTIFICATE BY THE GUIDE

This is to certify that **DEEPAK RATNAKAR** has carried out the project in the department of chemistry. Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur (C.G.) on the topic "*Cytochrome: Structure, Function and Properties- A Brief Review*" under my guidance.

He has worked diligently, meticulously and methodically.

To the best of our knowledge the work presented in this project is original and he has not been submitted anywhere.

I wish him all the success in his carrier and life.

(Signature of the Guide)

**DR. SURYABHAN SINGH**

(Asst. Prof. of Chemistry Dept.)

GGV Bilaspur (C.G.)



### ACKNOWLEDGEMENT

I wish to express my sincere gratitude and indebtedness to **DR. SURYABHAN SINGH** Assistant Professor of Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) for introducing the present topic and for his inspiring guidance, criticism and valuable suggestion throughout this project work.

I would like to express my gratitude to **Prof. GOUTAM KUMAR PATRA** (Head of Department) Guru Ghasidas Vishwavidyalaya, Bilaspur who gave me opportunity to undergo project work and his valuable suggestion during my M.Sc. 4th semester Chemistry course. I would like to thank all the teachers, librarian, and office staff of the Chemistry department. Big thanks to all my dear friends who are directly or indirectly helped me in completion of my project work.

Thanking you

Date: 13/09/22





**GURU GHASIDAS VISHWAVIDYALAYA,**  
**BILASPUR, C.G., INDIA**

**METAL ORGANIC FRAMEWORKS**

**AS CATALYST**

A

PROJECT THESIS

SUBMITTED IN PARTIAL FULLFILLMENT OF THE

REQUIRMENT FOR THE

DEGREE OF

M.Sc. CHEMISTRY

**SUBMITTED**

**BY**

**MALWIKA BAGHEL**

**(ROLL NO. 20410029)**

**Under Supervision of**

**DR. SURYABHAN SINGH**

**DEPARTMENT OF CHEMISTRY,**

**GURU GHASIDAS VISHWAVIDYALAYA,**

**BILASPUR, C.G., INDIA**



## DECLARATION

I, **MALWIKA BAGHEL**, M.Sc. Chemistry (IV Semester) of Guru Ghasidas Vishwavidyalaya do hereby declare that, this project is done by me. I am highly indebted to the authors of the books that I have referred in my project as well as all the writers of the reviews and the owners of the information taken from website for it. It is only because of their contribution and proper guidance of my faculty advisor **DR. SURYABHAN SINGH**, that I was able to gather light on the subject.

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**M.SC. CHEMISTRY SEMESTER IV**



## CERTIFICATE

This is to certify that **MALWIKA BAGHEL** had carried out the project on the topic "**METAL ORGANIC FRAMEWORK AS CATALYST**" in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G. This project is submitted for the partial fulfillment of required degree in chemistry.

I wish her all the success in her carrier and life.

**SUPERVISED BY**

**Dr. Suryabhan Singh**

**Asst. Professor**

**Dept. Of Chemistry**

**GGV, Bilaspur, C.G.**





## FORWARDING CERTIFICATE

This is to certify that **MALWIKA BAGHEL** has carried out the project in the Department of chemistry, Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur, C.G. on the topic of "**METAL ORGANIC FRAMEWORK AS CATALYST**". This project is submitted for the partial fulfillment of requirements for the degree of M.Sc. in chemistry and forwarded to examiner for evolution.

I wish her every success in her life.

  
PROF. PATRA GAUTAM

Head of department

Department of chemistry

Guru Ghasidas Vishwavidyalaya

Bilaspur, C.G., 495009, India



## ACKNOWLEDGEMENT

I would like to express my earnest and deepest gratitude to, **DR. SURYABHAN SINGH**, faculty for chemistry department for giving me this opportunity to do a project on such a valuable topic of "**METAL ORGANIC FRAMEWORK AS CATALYST**". I am grateful for the assistance, guidance, and support that were extended during the course of excellent research.

I wish to acknowledge **PROF. PATRA GOUTAM** (Head of Department of Chemistry), Guru Ghasidas Vishwavidyalaya who gave me opportunity to undergo project work and his valuable suggestion.

I am also thankful to all the teachers, lab assistants, librarian, clerk of the chemistry department and the college administration for providing the resources necessary for the research work. I thank my parent and friends for their moral support and love throughout my research work and project preparation. Above all I thank the god almighty for blessing me with the health and vitality to complete this project.

*M. Baghel*

**MALWIKA BAGHEL**

**ROLL NO. - 20410029**

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**गुरु घासीदास विश्वविद्यालय**  
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**DEPARTMENT OF CHEMISTRY**

**GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR**

(A Central University Established by the Central Universities Act, 2009 No. 25 of 2009)

**A Literature-Based Project Report**

**On**

**“SYNTHESIS OF EPOXIDES VIA GREEN CHEMISTRY”**

**Master of Science IV Semester**

**Session: 2021 – 2022**

**SUBMITTED TO**

**Dr. BHASKAR SHARMA**

**(ASSISTANT PROFESSOR)**

**DEPARTMENT OF CHEMISTRY**

**GURU GHASIDAS CENTRAL UNIVERSITY**

**BILASPUR (C.G.)**

**SUBMITTED BY**

**PREETI BHAGAT**

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GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR

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### DECLARATION

This is to certify that I **PREETI BHAGAT** a student of (CHEMISTRY) of the department of chemistry session 2021-2022, **Roll No. 20410037** have carried out a project entitled "**SYNTHESIS OF EPOXIDES VIA GREEN CHEMISTRY**" Under the guidance of **Dr. BHASKAR SHARMA** from the Department of Chemistry, GGV Bilaspur (C.G.). This is an original work carried by me and the report has not been submitted to any other University for the award of any Degree or Diploma.

Date :

Place : Bilaspur

A handwritten signature in purple ink that reads 'Preeti'.

(Signature of Student)

**PREETI BHAGAT**



DEPARTMENT OF CHEMISTRY

GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR

(A Central University Established by the Central Universities Act, 2009 No. 25 of 2009)

CERTIFICATE OF THE GUIDE

This is to Certify that **PREETI BHAGAT** has carried out this literature survey-based project under my supervision in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) on the topic "**SYNTHESIS OF EPOXIDES VIA GREEN CHEMISTRY**".

She has worked diligently, methodically and also collected the literature very sincerely and carefully. During this project work, she has learned about various organic transformations.

To the best of our knowledge, the work presented in this project is original and has not been submitted anywhere. I recommend the project report be forwarded to the respective examiners for evaluation. I wish her every success in her career and life.

(Signature of Guide)

Dr. BHASKAR SHARMA

ASSISTANT PROFESSOR

(DEPARTMENT OF CHEMISTRY)

(Signature of Student)

PREETI BHAGAT





**DEPARTMENT OF CHEMISTRY**

**GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR**

(A Central University Established by the Central Universities Act, 2009 No. 25 of 2009)

**FORWARDING CERTIFICATE**

This is to Certify that the project work entitled **"SYNTHESIS OF EPOXIDES VIA GREEN CHEMISTRY"** Submitted by this project is submitted for the partial fulfillment of requirements for the degree of M.Sc. in Chemistry and forwarded to the examiner for evaluation. I wish her every success in her life.

**Head**  
Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
Bilaspur (C.G.)  
*G.K. Patra*  
13-09-22  
(Signature of H.O.D.)

**Prof. G.K. PATRA**

**HEAD**

**(DEPARTMENT OF CHEMISTRY)**

*Preeti*  
(Signature of Student)

**PREETI BHAGAT**



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**DEPARTMENT OF CHEMISTRY**

**GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR**

(A Central University Established by the Central Universities Act, 2009 No. 25 of 2009)

**A Literature-Based Project Report**

**On**

**“PALLADIUM NANOPARTICLE AND ITS APPLICATION”**

**Master of Science IV Semester**

**Session: 2021 – 2022**

**SUPERVISED BY**

**Dr. BHASKAR SHARMA**

**(ASSISTANT PROFESSOR)**

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**SUBMITTED BY**

**RENU SAHU**

**M.Sc. IV SEMESTER**

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DEPARTMENT OF CHEMISTRY

GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR

(A Central University Established by the Central Universities Act, 2009 No. 25 of 2009)

DECLARATION

This is to certify that I **RENU SAHU** a student of the department of chemistry session 2021-2022, Roll No. **20410038**, have carried out a project entitled "**PALLADIUM NANOPARTICLE AND ITS APPLICATION**" Under the guidance of **Dr. BHASKAR SHARMA**, Department of Chemistry, GGV Bilaspur (C.G.). This is an original work carried by me and the report has not been submitted to any other University for the award of any Degree or Diploma.

Date :

Place : Bilaspur

  
(Signature of Student)

**RENU SAHU**



DEPARTMENT OF CHEMISTRY

GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR

(A Central University Established by the Central Universities Act, 2009 No. 25 of 2009)

CERTIFICATE OF THE GUIDE

This is to Certify that **RENU SAHU** has carried out this literature-based survey under my supervision in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) on the topic "**PALLADIUM NANOPARTICLE AND ITS APPLICATION**".

She has worked diligently, and methodically and also collected the literature very sincerely and carefully. During this project work, she has learnt about various organic transformations.

To the best of our knowledge, the work presented in this project is original and has not been submitted anywhere. I recommend the project report be forwarded to the respective examiners for evaluation. I wish her every success in her career and life.

(Signature of Guide)

Dr. BHASKAR SHARMA

ASSISTANT PROFESSOR

(DEPARTMENT OF CHEMISTRY)

(Signature of Student)

RENU SAHU



गुरु घासीदास विश्वविद्यालय  
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DEPARTMENT OF CHEMISTRY

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(A Central University Established by the Central Universities Act, 2009 No. 25 of 2009)

FORWARDING CERTIFICATE

This is to Certify that the project work entitled "**PALLADIUM NANOPARTICLE AND ITS APPLICATION**" Submitted by this project is submitted for the partial fulfillment of requirements for the degree of M.Sc. in Chemistry and forwarded to the examiner for evaluation. I wish her every success in her life.

*Patra*  
13.9.22

Head  
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(Signature of H.D.D.)

Dr. G.K. PATRA

HEAD

(DEPARTMENT OF CHEMISTRY)

*Renu Sahu*  
(Signature of Student)

RENU SAHU





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A

Project Report

On

**ADSORPTIVE REMOVAL OF CRYSTAL VIOLET BY**

**ACACIA NILOTICA SEED ASH**

In partial fulfilment degree of

M.Sc. Chemistry IV Semester

(Session: 2022)



Department of Chemistry

Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)

**SUBMITTED TO -  
Dr. CHARU ARORA**

Associate Professor

Department of chemistry

GGU Bilaspur (C.G)

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(A Central University established by the Act of Parliament 2009 No. 25 of 2009)

**FORWARDING CERTIFICATE**

This is to certify that **VARTIKA THAWAIT** has carried out post-graduation dissertation project work on “**ADSORPTIVE REMOVAL OF CRYSTAL VIOLET BY ACACIA NILOTICA SEED ASH**” under the supervision of **DR. CHARU ARORA**. This project work is submitted for the partial fulfilment of the required degree in chemistry and forwarded to the examiner for evaluation.

*Patra 18.09.22*  
**HEAD OF DEPARTMENT**

**PROF. G.K. PATRA**

**DEPARTMENT OF CHEMISTRY**

**GGV BILASPUR (C.G.)**

**Head**  
**Department of Chemistry**  
**Guru Ghasidas Vishwavidyalaya**  
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**Department of Chemistry**

Guru Ghashidas Vishwavidyalaya, Bilaspur (C.G.) 495009 [INDIA]

(A Central University established by the Act of Parliament 2009 No. 25 of 2009)

**CERTIFICATE**

This is to certify that **VARTIKA THAWAIT** has carried out the project in the department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, (C.G.) on the topic "ADSORPTIVE REMOVAL OF CRYSTAL VIOLET BY ACACIA NILOTICA SEED ASH" under my supervision.

She has worked diligently, meticulously, and methodically.

To the best of our knowledge the work presented in this project is original and has not been submitted anywhere.

I wish her all the success in her carrier and life.

**SUPERVISOR**

*Charu Arora*  
*13.9.22*  
**Dr. Charu Arora**

(Department of Chemistry)





## DECLARATION

I hereby declare that the work presented in the project dissertation entitled "ADSORPTIVE REMOVAL OF CRYSTAL VIOLET BY ACACIA NILOTICA SEED ASH" submitted in the partial fulfilment of M.Sc. Chemistry IV semester under PG programme was carried out by me at Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.).

The work presented in the project dissertation is original and will be intellectual property of the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.). The information presented in the dissertation report including data, figure and picture are original or duly credited. If any discrepancy, mistake or plagiarism is found in the report, the responsibility for the same will be solely mine.

Place - Bilaspur

Vartika

**VARTIKA THAWAIT**



## ACKNOWLEDGEMENTS

It is matter of great privilege for me to express my deep sense of gratitude towards all those who have directly enlightened me with their knowledge and help me in successful completion of my work.

I would like to express my deep sense of gratitude to **Prof. G.K.Patra**, Head of the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, for granting permission and providing me with an environment to complete my project successfully.

I take this golden opportunity to express my thanks to my dissertation supervisor **Dr. Charu Arora** Associate Professor, Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur for her constant invaluable guidance, encouragement and support which lead to the successful completion of the project.

I would also like to thanks all the faculty members and laboratory staff of this department for support and guidance whenever needed. Also special thanks to all my classmates.

Finally, yet importantly, I take this opportunity to express my gratitude and love to my parents and beloved family members, for their understanding, kind support and encouragement to do my work efficiently during the crucial times of the completion of the project.

*Vartika*

**VARTIKA THAWAIT**





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गुरु घासीदास विश्वविद्यालय  
(केन्द्रीय विश्वविद्यालय अधिनियम 2009 क्र. 25 के अंतर्गत स्थापित केन्द्रीय विश्वविद्यालय)  
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Guru Ghasidas Vishwavidyalaya  
(A Central University Established by the Central Universities Act 2009 No. 25 of 2009)  
Koni, Bilaspur - 495009 (C.G.)

A  
PROJECT REPORT  
ON

"SYNTHESIS AND CHARACTERIZATION OF  
COPPER-COPPER OXIDE NANOPARTICLES  
AND ITS POLYMERIC NANOCOMPOSITES  
USED IN PHOTODEGRADATION OF DYES"

Submitted in partial fulfilment for the Award of degree of

**M.Sc. CHEMISTRY**



2021-2022

SUBMITTED BY:  
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ENROLLMENT NO. : GGV/17/7168

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DEPARTMENT OF CHEMISTRY  
GURU GHASIDAS VISHWAVIDYALAYA  
BILASPUR, C. G. - 495009, INDIA





## CERTIFICATE



This is to certify that **ISHA GUPTA (M.Sc. Chemistry IVth Semester)** has submitted the project report entitled "**SYNTHESIS AND CHARACTERIZATION OF COPPER-COPPER OXIDE NANOPARTICLES AND ITS POLYMERIC NANOCOMPOSITE USED IN PHOTODEGRADATION OF DYES**" for partial fulfillment of requirement of M.Sc. Chemistry.

I hereby recommend to forward the project report to the University for the Award of M.Sc. Chemistry during the academic 2021-2022.

I wish her every success in her future..

  
13/01/2022  
SUPERVISOR

Dr. ARTI SRIVASTAVA  
ASST. PROFESSOR  
DEPARTMENT OF CHEMISTRY  
GURU GHASIDAS VISHWAVIDYALAYA  
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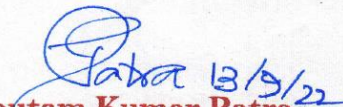


## FORWARDING



**Miss Isha Gupta** has completed her project entitled  
"SYNTHESIS AND CHARACTERIZATION OF COPPER-COPPER OXIDE  
NANOPARTICLES AND ITS POLYMERIC NANOCOMPOSITE USED IN  
PHOTODEGRADATION OF DYES" under the supervision and guidance  
of **Dr. Arti Srivastava** in partial fulfillment for degree of M.Sc. in  
Chemistry.

I wish her every success in her future life.

  
**Prof. Goutam Kumar Patra**

Head of Department  
Department of Chemistry  
Guru Ghasidas Vishwavidyalaya,  
Bilaspur (C.G.), India.





## DECLARATION



I hereby declare that the report presented in this dissertation entitled "SYNTHESIS AND CHARACTERIZATION OF COPPER-COPPER OXIDE NANOPARTICLES AND ITS POLYMERIC NANOCOMPOSITE USED IN PHOTODEGRADATION OF DYES" has been done by me.

  
13/09/2022  
STUDENT

MISS ISHA GUPTA  
M.Sc. CHEMISTRY IV<sup>th</sup> SEM  
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ASST. PROFESSOR  
DEPARTMENT OF CHEMISTRY  
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**GURU GHASIDAS VISHWAVIDYALAYA,  
BILASPUR**

(A Central University Established by the Central Universities Act, 2009  
No.25 of 2009)

**DEPARTMENT OF CHEMISTRY**

A  
PROJECT  
ON

**“DYANAMIC CROSS LINKING OF POLYACRYLAMIDE  
SODIUM ALGINATE BASED HYDROGEL”**

**MASTER OF SCIENCE  
(4<sup>TH</sup> SEM)**

**SESSION-2021-22**

**Guided**

**Dr. ARTI SRIVASTAVA**

Assistant professor  
Department Of chemistry  
Guru Ghasidas Vishwavidyalaya  
Central University  
Bilaspur (C.G.)

**Submitted**

**AMISHA SAHU**

Roll No. - 20410005  
Enrollment no-GGV/17/7019





**Department of Chemistry**  
**Guru Ghashidas Vishwavidyalaya, Bilaspur (C.G.)**  
(A Central University Established By Central Universities Act 2009 No.  
25 of 2009)

**CERTIFICATE**

This is to certify that Amisha Sahu (M. Sc 4<sup>th</sup> semester) has submitted the project report entitled "Dynamic crosslinking of polyacrylamide sodium alginate based hydrogel" or partial fulfillment of requirement of M.Sc. Chemistry.

I hereby recommend to forward the project report to the University for the Award of M.Sc. Chemistry during the academic 2021-2022.

I wish her every success in her future life.

  
**SUPERVISOR**

**Dr. ARTI SRIVASTAVA**  
ASST. PROFESSOR  
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INDIA





**Department of Chemistry**  
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(A Central University Established By Central Universities Act 2009 No.  
25 of 2009)

**FORWARDING CERTIFICATE**

Mis. Amisha Sahu has completed his project entitle "Dynamic crosslinking of polyacrylamide sodium alginate based hydrogel" under the supervision and guidance of Dr. Arti Srivastava in partial fulfillment for degree of M.Sc. in Chemistry.

I wish her every success in her future life.

*Goutam Kumar Patra* 13/9/22

**Dr. GOUTAM KUMAR PATRA**

Professor  
Head of Department  
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**Department of Chemistry**  
**Guru Ghasidas Vishwavidyalaya, Bilaspur**  
**(C.G.)**

(A Central University Established By Central Universities Act 2009 No.  
25 of 2009)

**DECLARATION**

I hereby declare that the work present in the project entitled  
“**Dynamic crosslinking of polyacrylamide sodium alginate based hydrogel**”  
submitted as partial fulfillment of M.Sc. Chemistry has been performed in the  
Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur under the  
supervision of **Dr. Arti Srivastava** Assistant Professor, Department of Chemistry,  
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I perform the work presented in this project dissertation in the Department of  
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*Amisha Sahu*  
**STUDENT**  
**Miss. AMISHA SAHU**  
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*Arti Srivastava*  
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**ASSISTANT PROFESSOR**  
DEPARTMENT OF CHEMISTRY  
GURU GHASIDAS VISHWAVIDYALAYA  
BILASPUR (C.G.), INDIA



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A Project Report

ON

**“Synthesis of Guar Gum and Borax based Self-Healing Hydrogel and its swelling capacity”**

Submitted for the

Partial Fulfilment of the Requirement for the Award of the Degree of  
Master of Science



Supervised By–Submitted By –

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ANJALI YADAV

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2021-2022

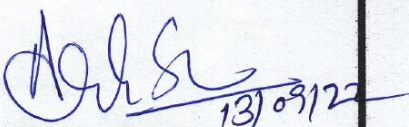


*Certificate by the Supervisor*

This is to certify that the project entitled “Synthesis of Guar Gum and Borax based self-healing hydrogel and its swelling capacity” submitted by Miss. ANJALI YADAV to Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, (C.G.) for the award of M.Sc. Degree in Chemistry is the research work done under my guidance.

Date: 13/09/2022

Place: Bilaspur  
Guru Ghasidas Vishwavidyalaya  
Bilaspur (C.G.)

  
13/09/22  
Dr. ARTI SRIVASTAVA  
Assistant Professor  
Department of Chemistry






## DECLARATION



I hereby declare that the report presented in this dissertation entitled  
“Synthesis of Guar Gum and Borax based self- healing hydrogel and its  
swelling capacity” has been done by me.

  
**STUDENT**

MISS ANJALI YADAV

M.Sc. CHEMISTRY IV<sup>th</sup>SEM

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ENROLLMENT NO. : GGV/17/7023

  
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Dr. ARTI SRIVASTAVA

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BILASPUR (C.G.) INDIA





**A Project Report**

on

***Synthesis and Characterization of Silver and  
Iron Coupled Nanoparticle***

Submitted to  
Department of Chemistry,  
Guru Ghasidas Vishwavidyalaya, Bilaspur  
for the degree of Master of Science  
in Chemistry

Session-2021-2022

Guided by:

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## DECLARATION

I hereby declare that the work present in the project entitled “*Synthesis and Characterization of Silver and Iron Coupled Nanoparticles*” submitted as partial fulfillment of M.Sc. Chemistry has been performed in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur under the supervision of **Dr. Arti Srivastava** Assistant Professor, Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.).

I perform the work presented in this project dissertation in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.).

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Department of Chemistry  
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**CERTIFICATE**

This is to certify that Ms. Shatabdi Tripathy (M. Sc 4<sup>th</sup> semester) has submitted the project report entitled "*Synthesis and Characterization of Silver and Iron Coupled Nanoparticles*" or partial fulfillment of requirement of M.Sc. Chemistry.

I hereby recommend to forward the project report to the University for the Award of M.Sc. Chemistry during the academic 2021-2022.

I wish her every success in her future life.

**SUPERVISOR**

**Dr. ARTI SRIVASTAVA**

DEPARTMENT OF CHEMISTRY  
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BILASPUR (C.G.)  
INDIA





**Department of Chemistry**  
**Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)**  
(A Central University Established By Central Universities Act 2009 No. 25 of 2009)

**FORWARDING CERTIFICATE**

Ms. Shatabdi Tripathy has completed her project entitle "*Synthesis and Characterization of Silver and Iron Coupled Nanoparticles*" under the supervision and guidance of Dr. Arti Srivastava in partial fulfillment for degree of M.Sc. in Chemistry.

I wish her every success in her future life.

**Dr. GOUTAM KUMAR PATRA**

Professor  
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Bilaspur (C.G.), India.



A  
PROJECT REPORT  
ON  
SYNTHESIS AND CHARACTERISATION OF  
MALONONITRILE BASED SCHIFF BASE  
CHEMOSENSOR & ITS APPLICATION IN METAL ION  
DETECTION IN SEMI-AQUEOUS MEDIUM  
SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE  
DEGREE OF M.Sc. CHEMISTRY



Department of Chemistry  
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2020-2022

Supervisor:  
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PROFESSOR  
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Submitted by:  
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**DECLARATION**

I hereby declare that the project work presented in this dissertation entitled "*SYNTHESIS AND CHARACTERISATION OF MALONONITRILE BASED SCHIFF BASE CHEMOSENSOR & ITS APPLICATION IN METAL ION DETECTION IN SEMI-AQUEOUS MEDIUM*" have been done by me under the guidance of **Dr. GOUTAM KUMAR PATRA** (Professor), Department of Chemistry, GGV, Bilaspur, C.G.

*Bharat Kumar*

**BHARAT KUMAR SAHU**

(M.Sc. Inorganic Chemistry, IV<sup>th</sup> Semester)  
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*Dr. GOUTAM KUMAR PATRA*

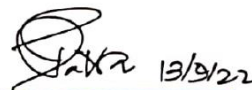
PROFESSOR,  
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### CERTIFICATE

This is to certify that *BHARAT KUMAR SAHU* (M.Sc. Inorganic Chemistry, 4<sup>th</sup> Semester) has been completed a project on "*SYNTHESIS AND CHARACTERISATION OF MANOLONITRILE BASED SCHIFF BASE CHEMOSENSOR & ITS APPLICATION IN METAL ION DETECTION IN SEMI-AQUEOUS MEDIUM*". This project is submitted for the partial fulfillment of required degree in chemistry.

I wish for his every success in the future.

 13/3/22

Signature

**DR. GOUTAM KUMAR PATRA**

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Department of Chemistry  
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Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
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DR. GOUTAM KUMAR PATRA (HOD)

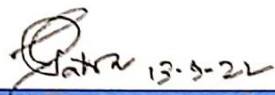
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**FORWARDING CERTIFICATE**

This is to certify that *BHARAT KUMAR SAHU* (M.Sc. Inorganic Chemistry) has been completed a project on "SYNTHESIS AND CHARACTERISATION OF MANOLONITRILE BASED SCHIFF BASE CHEMOSENSOR & ITS APPLICATION IN METAL ION DETECTION IN SEMI-AQUEOUS MEDIUM" under the supervision of Dr. G. K. PATRA. This project work is submitted for the partial fulfillment of required degree in chemistry and forwarded to Examiner for evaluation.

I wish his every success in the future life.

  
13-5-22

Signature  
**DR. GOUTAM KUMAR PATRA**  
HEAD OF DEPARTMENT OF CHEMISTRY  
GURU GHASIDAS VISHWAVIDYALAYA  
(A CENTRAL UNIVERSITY),  
BILASPUR, C.G.



DEPARTMENT OF CHEMISTRY,  
GURU GHASIDAS VISHWA VIDYALAYA,  
[A CENTRAL UNIVERSITY]  
BILASPUR, CG



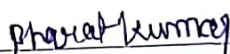
### ACKNOWLEDGEMENT

First of all, I would like to declare my feeling in the dignity of almighty that created me with his great immense and patience to achieve this milestone. I own my deep sense of admiration, incredible thanks from the bottom my heart to my guide and my inspiration **DR. G.K. PATRA** (Professor) Department of Chemistry, GURU GHASIDAS VISHWAVIDYALAYA BILASPUR (C.G.) for his keen interest and extraordinary guidance, constructive criticism that contain the capacity of architect this project. I take this opportunity to express my sincere thanks for providing me a golden opportunity to work on this project and for his able guidance, co-operation and inspiration

I express my sincere thanks to respected Meman Sahu sir and Vanshika mam for their special guidance and my friends who encourage and support me every time.

I am also thankful to Mr. Raju Meshram & Mr. D. K. Verma sir (Lab Assistant) Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) for providing chemicals which required in my project.

Finally, I gladly express my thanks to all those loving personalities who have directly or indirectly helped me in some way or other during the course of this project.

  
BHARAT KUMAR SAHU

(M.Sc. Inorganic Chemistry, IV<sup>th</sup> Semester)





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A  
PROJECT REPORT  
ON

REVIEW REPORT ON NANO-GRAPHENE OXIDE  
AND ITS POSSIBLE APPLICATION

SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS  
FOR THE DEGREE OF M.SC. CHEMISTRY



SUPERVISOR:

Dr. G.K.PATRA  
PROFESSOR  
GURU GHASIDASVISHWAVIDYALAYA  
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SUBMITTED BY:

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(Guru Ghasidas Vishwavidyalaya, Bilaspur C.G., india-495009)  
(A Central university established under Central University Act 2009)

2020-2022



Dr. Gautam Kumar Patra (HOD)  
Professor  
Department of Chemistry  
Guru Ghasidas Vishwavidyalaya,  
Bilapur[A Central University]

### FORWARDING CERTIFICATE

This is to certify that *AKASH DEWANGAN* (M.Sc. Inorganic Chemistry) has been completed a project on "REVIEW REPORT ON NANO - GRAPHENE OXIDE AND ITS POSSIBLE APPLICATION" under the supervision of Dr. G.K. PATRA. This project work is submitted for the partial fulfilment of required degree in chemistry and forwarded to examiner for evaluation.

I wish him every success in the future life.

  
Head  
Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
Bilaspur, (C.G.)

Dr. Goutam Kumar Patra (HOD)  
HEAD DEPARTMENT OF CHEMISTRY  
GURU GHASIDAS VISHWAVIDYALAYA,  
(A CENTRAL UNIVERSITY),  
BILASPUR, C.G.





## DECLARATION

I hereby declare that the literature report presented in this project entitled "REVIEW REPORT ON NANO-GRAPHENE OXIDE AND ITS POSSIBLE APPLICATION" for the degree of M.Sc. in Chemistry has been performed in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G. under supervision of Dr. Gautam Kumar Patra (Professor).

The work presented in this project Dissertation is original and will remain intellectual property of Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G.

Date:

Place: Bilaspur

**AKASH KUMAR DEWANGAN**

(M.SC. INORGANIC CHEMISTRY, IV<sup>th</sup> SEMESTER)



## ACKNOWLEDGEMENT

Completion of the project work which start with initial planning, literature search from various libraries (websites) then reading, understanding and compilation of material into the present project form, followed by experimental work is definitely a herculean task, which doesn't seems to be possible without grace of god. I pray to god to advance me in knowledge and that my endeavors guide me towards the right path.

It is my great pleasure to express my sincere gratitude to my esteem supervisor **Dr GK Patra**, Professor Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G. under whose guidance the present project work has been brought to completion, my heart leaps up in thankfulness for the benevolent, time, constant help and valuable suggestions throughout the project.

I wish to acknowledge **Prof. Goutam Kumar Patra**, Head of Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G. who gave me opportunity to undertake project work and his valuable suggestion during my M.Sc. in Chemistry Honors course.

I would also like to thank all teachers who directly or indirectly helped me to pursue my master in Chemistry.

I would also like to thank the laboratory attendants, librarian and office staffs of the Department of Chemistry.

A big thank to all my dear friends who directly and indirectly helped me to complete this project work.

Finally, I would also express my deep sense of gratitude to my parents and family members for their encouragement and support throughout, which always inspires me.

**AKASH KUMAR DEWANGAN**

(M.SC. INORGANIC CHEMISTRY, IV<sup>th</sup> SEMESTER)



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1

A  
PROJECT REPORT

ON

*SYNTHESIS AND CHARACTERISATION OF AZINE BASED SCHIFF  
BASE CHEMOSENSORS & THEIR APPLICATIONS IN METAL ION  
DETECTION IN AQUEOUS MEDIUM*

SUBMITTED IN PARTIAL FULFILLMENT OF THE  
REQUIREMENT FOR THE DEGREE OF M.SC. CHEMISTRY



*Patra*  
13/4/22

SUPERVISOR-  
DR.G.K. PATRA  
**PROFESSOR**  
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SUBMITTED BY-  
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2021-2022

1



**- DECLARATION-**

I hereby declare that the project work shown in this presentation entitled as-

“SYNTHESIS AND CHARACTERISATION OF AZINE BASED SCHIFF BASE CHEMOSENSORS & THEIR APPLICATIONS IN METAL ION DETECTION IN AQUEOUS MEDIUM ” have been done by me (soniya masih) in guidance of DR.G.K.PATRA (professor) gg, bilaspur CG....

  
**SONIYA MASIH**

(M.SC. Inorganic chemistry 4th sem)  
Guru ghasidas vishwavidyalaya  
(A CENTRAL UNIVERSITY)  
BILASPUR C.G

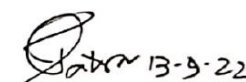


DR. GOUTAM KUMAR PATRA  
PROFESSOR,  
DEPT. OF CHEMISTRY  
Guru ghasidas vishwavidyalaya,  
BILASPUR C.G.(A central university)

**-CERTIFICATE-**

This is to certify that **SONIYA MASHI** (M.sc. Inorganic Chemistry 4th semester ) has been completed a project on - "SYNTHESIS AND CHARACTERISATION OF AZINE BASED SCHIFF BASE CHEMOSENSORS & THEIR APPLICATIONS IN METAL ION DETECTION IN AQUEOUS MEDIUM ". This project is submitted for partial fulfillment of required degree in chemistry.

I wish her every success in the future.

  
13-9-22  
**DR. GOUTAM KUMAR PATRA**  
PROFESSOR  
DEPT. OF CHEMISTRY  
GURU GHASIDAS VISHWAVIDYALAYA  
Bilaspur chhattisgarh 495009

**Head**  
Department of Chemistry  
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DR.GOUTAM KUMAR PATRA(HOD)

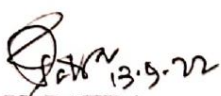
Ass.Professor  
Dept.of chemistry  
Guru Ghasidas Vishwavidyalaya,  
Bilaspur chhattisgarh 495009.



### FORWARDING CERTIFICATE

This is to certify that SONIYA MASIH (M.Sc. Inorganic chemistry) has been successfully completed the project on "SYNTHESIS AND CHARACTERISATION OF AZINE SCHIFF BASE CHEMOSENSORS & THEIR APPLICATION IN METAL ION DETECTION IN AQUEOUS MEDIUM" under the supervision of Dr.G.K. PATRA .This project work is submitted for the partial fulfillment of the required degree in chemistry and forwarded to the Examiner for evaluation.

I wish her every success and achievement in future life.

  
DR.G.K. PATRA  
HEAD OF DEPT. OF CHEMISTRY  
GURU GHASIDAS VISHWAVIDYALAYA ,  
BILASPUR (C.G)



DEPARTMENT OF CHEMISTRY,  
GURU GHASIDAS VISHWAVIDYALAYA,  
BILASPUR CHHATTISGARH.

**-ACKNOWLEDGEMENT-**

I would like to thank first and foremostly to our almighty God who has made me that able to do such work and achieve such milestone in my life I owe my deep sense of admiration, incredible thanks from bottom of my heart to my guide, mentor and my inspiration DR.G.K.PATRA Sir (Professor) and HOD of dept. of chemistry Guru Ghasidas vishwavidyalaya bilaspur chhattisgarh .for his keen interest and extraordinary guidance .constructive criticism that contain the capacity of architect my this project.

I express my sincere gratitude and thanks to Miss Vanshika Sharma ma'am and Mr. Meman Sahu sir for guiding me and providing me their guidance and help whenever I needed that their behavior towards me was very cheerful.

I would also like to thank Mr.Raju Meshram sir (Lab Assistant ) Dept. of chemistry, Guru Ghasidas Vishwavidyalaya Bilaspur Chhattisgarh for providing chemicals and instruments which was required in my project.

Finally, I would like to thank all my family members and friends for helping me and providing me mental support and always keeping me motivated. I would also like to thank all those who helped me directly or indirectly in completing this project .

  
SONIYA MASIH

(M.Sc. Inorganic chemistry 4th  
semester)



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A LITERATURE REVIEW BASED PROJECT REPORT ON  
**STUDIES ON DIFFERENT ENVIRONMENTAL REMEDIATIONS  
BY SYNTHESISED NANOMATERIALS**

FOR THE PARTIAL FULFILMENT OF  
MASTER OF SCIENCE DEGREE



DEPARTMENT OF CHEMISTRY, SCHOOL OF PHYSICAL SCIENCE,  
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR  
(SESSION: 2021 – 2022)

Submitted by

DAMARUDHAR DEHARI

M.Sc. 4<sup>th</sup> sem. chemistry

Roll No - 20410015

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Under the supervision of

Dr. GOUTAM KUMAR PATRA (PROFESSOR)

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(A Central University Established by Central University Act 2009 No. 25 of 2009)

## Forwarding Certificate

This is to certify that Mr. Damarudhar Dehari has carried out review project in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G. on the topic "STUDIES ON DIFFERENT ENVIRONMENTAL REMEDIATIONS BY SYNTHESISED NANOMATERIALS". This project is Submitted for the degree of M.Sc. in Chemistry and forwarded to examiner for evaluation.

Date-

  
Prof. Goutam Kumar Patra  
Head of Department,  
Department of Chemistry,  
Guru Ghasidas Vishwavidyalaya,  
Bilaspur, C.G.

Head  
Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
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Department of Chemistry

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(A Central University Established by Central University Act 2009 No. 25 of 2009)

## CERTIFICATE

This is to certify that Mr. Damarudhar Dehari has carried out project on the topic "STUDIES ON DIFFERENT ENVIRONMENTAL REMEDIATIONS BY SYNTHESISED NANOMATERIALS" in the Department of chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G. under my supervision.

He has worked diligently, meticulously and methodically and collected the literature very sincerely and carefully. During this project work he has learnt about different types of organic and inorganic synthesis.

To the best of my knowledge the work presented in this project is original and not submitted anywhere. I recommend the project report to be forwarded to the respective examiners for Evaluation. I wish him all the success in his carrier and life.

Date-

Supervised By


Dr. Goutam Kumar

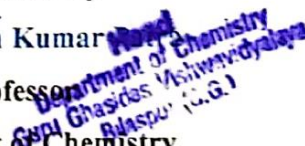
Professor

Department of Chemistry,

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Bilaspur, C.G.

  
13-03-22







Department of Chemistry

Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G.

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**Declaration**

I hereby declare that the literature report presented in this project entitled “**STUDIES ON DIFFERENT ENVIRONMENTAL REMEDIATIONS BY SYNTHESISED NANOMATERIALS**” for the degree of M.Sc. in Chemistry has been performed in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G. under supervision of Professor Dr. G. K. Patra .

The work presented in this project Dissertation is original and will remain intellectual property of Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G.

Date: 13/09/22

Place: Bilaspur

Damarudhar Dehari



## ACKNOWLEDGEMENT

Completion of the project work which start with initial planning, literature search from various libraries (websites) then reading, understanding and compilation of material into the present project form, followed by experimental work is definitely a herculean task, which doesn't seem to be possible without grace of god. I pray to god to advance me in knowledge and that my endeavours guide me towards the right path.

It is my great pleasure to express my sincere gratitude to my esteem supervisor Dr. Goutam Kumar Patra Sir Professor Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G. under whose guidance the present project work has been brought to completion, my heart leaps up in thankfulness for the benevolent, time, constant help and valuable suggestions throughout the project.

I wish to acknowledge Prof. Goutam Kumar Patra, Head of Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G. who gave me opportunity to undertake project work and his valuable suggestion during my M.Sc. in Chemistry Honours course.

I would also like to thank all teachers who directly or indirectly helped me to pursue my master in Chemistry.

I would also like to thank the laboratory attendants, librarian and office staffs of the Department of Chemistry.

A big thank to all my dear friends who directly and indirectly helped me to complete this project work.

Finally, I would also express my deep sense of gratitude to my parents and family members for their encouragement and support throughout, which always inspires me.

  
Damarudhar Dehari  
MSC IV SEM. CHEMISTRY



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**A**  
**Project Report**  
**On**  
**ADSORPTIVE REMOVAL OF ORGANIC DYES BY**  
**ZIRCONIUM BASED METAL ORGANIC FRAMEWORK**

In partial fulfillment degree of  
M.Sc. Chemistry IV Semester  
(Session: 2020-2022)



**Department of Chemistry**  
**Guru Ghasidasvishwavidyalaya, Bilaspur (C.G.),INDIA**  
(A central University Established by the central Universities Act 2009 No.25 of 2009)

**SUPERVISED BY-**

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Associate Professor  
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Bilaspur (C.G), 495009, INDIA

**SUBMITTED BY -**

**SADGI JAISWAL**  
Roll No. 20410039  
GGV/20/07211



Department of Chemistry

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(A Central University established by the Act of Parliament 2009 No. 25 of (2009))

**FORWARDING CERTIFICATE**

This is to certify that **SADGI JAISWAL** has carried out post-graduation dissertation project work on “**ADSORPTIVE REMOVAL OF ORGANIC DYES BY ZIRCONIUM BASED METAL ORGANIC FRAMEWORK**” under the supervision of **Dr. Charu Arora**. This project work is submitted for partial fulfillment of the required degree in chemistry and forwarded to the examiner for evaluation.

**HEAD OF DEPARTMENT**  
**Professor. Gutam Kumar patra**  
**DEPARTMENT OF CHEMISTRY**  
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**CERTIFICATE**

This is to certify that **SADGI JAISWAL** has carried out the project in the department of Chemistry, Guru GhasidasVishwavidyalaya, Bilaspur, (C.G.) on the topic “**ADSORPTIVE REMOVAL OF ORGANIC DYES BY ZIRCONIUM BASED METAL ORGANIC FRAMEWORK**” under my supervision.

She has worked diligently, meticulously, and methodically. To the best of our knowledge, the work presented in this project is original and has not been submitted anywhere. I wish her all the success in her carrier and life.

*Charu Arora*  
13.9.22

SUPERVISOR

**Dr. CharuArora**

(Department of Chemistry)





## DECLARATION

I hereby declare that the work presented in the project dissertation entitled “**ADSORPTIVE REMOVAL OF ORGANIC DYES BY ZIRCONIUM BASED METAL ORGANIC FRAMEWORK**” submitted in the partial fulfillment of M.Sc. Chemistry IV semester under PG program was carried out by me at Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.).

The work presented in the project dissertation is original and will be the intellectual property of the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.). The information presented in the dissertation report including data, figure and picture are original or duly credited. If any discrepancy, mistake or plagiarism is found in the report, the responsibility for the same will be solely mine.

Place – Bilaspur

  
SADGI JAISWAL



### ACKNOWLEDGEMENTS

It is matter of great privilege for me to express my deep sense of gratitude towards all those who have directly enlightened me with their knowledge and help me in successful completion of my work

I would like to express my deep sense of gratitude to **Dr. Gutam kumar Patra**, Head of the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, for granting permission and providing me with an environment to complete my project successfully.

I take this golden opportunity to express my thanks to my dissertation supervisor **Dr. Charu Arora** Associate Professor, Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bliaspur for her constant invaluable guidance, encouragement and support which lead to the successful completion of the project.

I wish to acknowledge **Dr. Charu Arora** (Head, Department of Chemistry, Guru Ghasidas Vishwavidyalaya) who gave me opportunity to work in practical lab with Ph.D. scholar **Ms. Nidhi Rai** for her support in this project.

I would also like to thanks all the faculty members and laboratory staff of this department for support and guidance whenever needed. Also special thanks to all my classmates.

Finally yet importantly, I take this opportunity to express my gratitude and love to my parents and beloved family members, for their understanding, kind support and encouragement to do my work efficiently during the crucial times of the completion of the project.

  
SADGI JAISWAL



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## M.S.C PROJECT

# DFT CALCULATION AND IN SILICO STUDY OF ANTI INFLAMMATORY DRUGS



By- **SHRUTI GAVEL**

Roll No: 20410047

Supervisor- Dr. Ashish Kumar Singh

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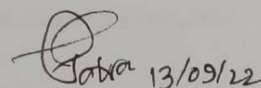


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Bilaspur (C.G) 495009

### CERTIFICATE

This is to certify that the Dissertation entitled “**DFT Calculation and In Silico study of Anti Inflammatory Drugs**” is an authenticated record of review work done from April 2022 to September 2022 by **Shruti Gavel**, a student of M.Sc. (Hons.) Chemistry IV<sup>th</sup> semester, Department of Chemistry, GGV.

The work presented in this dissertation is based on the literature survey and is submitted by her for the award of above-mentioned degree.

 13/09/22

Head, Department of Chemistry

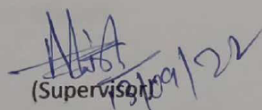
GGV, Bilaspur



Department Of Chemistry  
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Bilaspur (C.G) 495009

### CERTIFICATE

This is to certify that **Shruti Gavel** has carried out her dissertation on "**DFT Calculation and In Silico study of Anti Inflammatory Drugs** "The work presented in this dissertation is based on the literature survey (review work) and is submitted by her for the award of M.Sc. in Chemistry Honours.

  
(Supervisor) 19/12/22





DECLARATION

I hereby declare that the work presented in the dissertation entitled-“ **DFT Calculation and In Silico study of Anti Inflammatory Drugs**” is submitted in partial fulfillment of M.Sc. (Hon's.) Chemistry was carried out by me in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G)

The work presented in this project dissertation is a review work based on the literature survey. The information presented in the dissertation report including data, figures and pictures is representative of the available literature collected by me.

A handwritten signature in blue ink, appearing to read 'Anil Kumar', is written over a horizontal line.

DATE -:13/09/2022

Place -: Bilaspur



## ACKNOWLEDGEMENT

I express my gratitude and sincere thanks to my parents and family, for their understanding, constant support, and encouragement which helped me a lot to work more efficiently during crucial times of the completion of the project.

I express sincere thanks to the Head of the Department, for providing facilities that enable me to complete my work successfully and most importantly for always being a source of inspiration throughout my work.

I take this golden opportunity to express my gratitude and sincere thanks to my respected guide **Dr. Ashish Kumar Singh** Department of Chemistry, GGU, Bilaspur for his guidance, constant encouragement, and support which boosted me with confidence and I am proud to say that it has been a most fruitful and enjoyable experience to work under his guidance.

I am also thankful to all the professors including Ph.D. scholars for their help in making this project a successful one. Also special thanks to my friends and classmates for sharing their valuable assistance.



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Reference





## M.Sc. Project Dissertation Report

# *Synthesis and application of Graphene oxide and reduced graphene oxide*



**By**

Subhashree Sahu

Roll No.: 20410050

**Supervisor:** Dr. Ashish Kumar Singh

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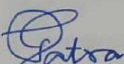


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This is to certify that the Dissertation entitled “**Synthesis and application of Graphene oxide and reduced graphene oxide**” is an authenticated record of review work done from April 2021 to August 2021 by **Subhashree Sahu**, a student of M.Sc. (Hons.) Chemistry IV<sup>th</sup> semester, Department of Chemistry, GGV.

The work presented in this dissertation is based on the literature survey and is submitted by her for the award of the above-mentioned degree.

  
Head, Department of Chemistry  
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Guru Ghasidas Vishwavidyalaya  
Bilaspur (C.G.)

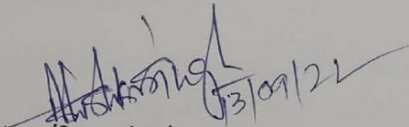


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The work presented in this dissertation is based on the literature survey (review work) and is submitted by her for the award of M.Sc. in Chemistry Honours.

  
(Supervisor)





## DECLARATION

I hereby declare that the work presented in the dissertation entitled- “Synthesis and application of Graphene oxide and reduced graphene oxide” is submitted in partial fulfillment of M.Sc. (Hon’s.) Chemistry was carried out by me in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G)

The work presented in this project dissertation is a review work based on the literature survey. The information presented in the dissertation report including data, figures, and pictures is representative of the available literature collected by me.

DATE : 13.09.22

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Place :- Bilaspur



### ACKNOWLEDGEMENT

I express my gratitude and sincere thanks to my parents and family, for their understanding, constant support, and encouragement which helped me a lot to work more efficiently during crucial times of the completion of the project.

I express sincere thanks to the Head of the Department, for providing facilities that enable me to complete my work successfully and most importantly for always being a source of inspiration throughout my work.

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I am also thankful to all the professors including Ph.D. scholars for their help in making this project a successful one. Also special thanks to my friends and classmates for sharing their valuable assistance.

**Subhashree Sahu**



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## References





**M.Sc. Project  
dissertation**

on

**Metal chalcogenide synthesis from single source  
precursor: Application in photoelectrolysis of water.**



By

Sejal sen

Roll no = 20410043

Supervisor: *Dr. Ashish Kumar Singh Department of Chemistry*  
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**CERTIFICATE**

This is to certify that the Dissertation entitled “**metal chalcogenide synthesis from single source precursor their application in photoelectrolysis of water**” is an authenticated record of review work done from April 2021 to August 2021 by **sejal sen**, a student of M.Sc. (Hons.) Chemistry IV<sup>th</sup> semester, Department of Chemistry, GGV.

The work presented in this dissertation is based on the literature survey and is submitted by her for the award of above-mentioned degree.

Head, Department of Chemistry  
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**Head**  
Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
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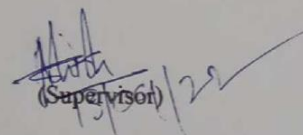


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**CERTIFICATE**

This is to certify that **sejal sen** has carried out her dissertation on “**metal chalogenide synthesis from single source precursor their application in photoelectrolysis of water**”

The work presented in this dissertation is based on the literature survey (review work) and is submitted by her for the award of M.Sc. in Chemistry Honours.

  
(Supervisor)





DECLARATION

I hereby declare that the work presented in the dissertation entitled- “metal chalcogenide synthesis from single source precursor their application in photoelectrolysis of water”

is submitted in partial fulfillment of M.Sc. (Hon’s.) Chemistry was carried out by me in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G)

The work presented in this project dissertation is a review work based on the literature survey. The information presented in the dissertation report including data, figures and pictures is representative of the available literature collected by me.

DATE -: 13/09/22

Place -: Bilaspur

Signature of student



### ACKNOWLEDGEMENT

I express my gratitude and sincere thanks to my parents and family, for their understanding, constant support, and encouragement which helped me a lot to work more efficiently during crucial times of the completion of the project.

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I take this golden opportunity to express my gratitude and sincere thanks to my respected guide **Dr. Ashish Kumar Singh** Department of Chemistry, GGU, Bilaspur for his guidance, constant encouragement, and support which boosted me with confidence and I am proud to say that it has been a most fruitful and enjoyable experience to work under his guidance.

I am also thankful to all the professors including Ph.D. scholars for their help in making this project a successful one. Also special thanks to my friends and classmates for sharing their valuable assistance.

*Sejal sen*



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13. Reference





M.Sc. Project Dissertation Report

**Carbon Quantum Dots: Synthesis and Application**  
**in Chemical Sensing**



By

Monali Sahu

Roll No.: 20410031

**Supervisor:** Dr. Ashish Kumar Singh

Department of Chemistry

Guru Ghasidas Vishwavidyalaya

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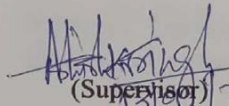


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**CERTIFICATE**

This is to certify that **Monali Sahu** has carried out her dissertation on “**Carbon Quantum Dots: Synthesis and Application in Chemical Sensing**”.

The work presented in this dissertation is based on the literature survey (review work) and is submitted by her for the award of M.Sc. in Chemistry Honours.

  
(Supervisor) 22




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**CERTIFICATE**

This is to certify that the Dissertation entitled “**Carbon Quantum Dots: Synthesis and Application in Chemical sensing**” is an authenticated record of review work done from April 2022 to August 2022 by **Monali Sahu**, a student of M.Sc. (Hons.) Chemistry IV<sup>th</sup> semester, Department of Chemistry, GGV.

The work presented in this Dissertation is based on the literature survey and is submitted by her for the award of above- mentioned degree.

  
Head, Department of Chemistry  
GGV, Bilaspur  
Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
Bilaspur (C.G.)





### DECLARATION

I hereby declare that the work presented in the dissertation entitled- "Carbon Quantum Dots: Synthesis and Application in Chemical Sensing" is submitted in partial fulfillment of M.Sc. (Hon's) Chemistry was carried out by me in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.).

The work presented in the project dissertation is a review work based on the literature survey. The information presented in the dissertation report including data, figures, and pictures is representative of the available literature collected by me.

DATE -: 13/09/22

Place -: Bilaspur

Monali Saha.  
Signature of student



### ACKNOWLEDGEMENT

I express my gratitude and sincere thanks to my parents and family, for their understanding, constant support, and encouragement which helped me a lot to work more efficiently during crucial times of the completion of the project.

I express sincere thanks to the Head of the Department, for providing facilities that enable me to complete my work successfully and most importantly for always being a source of inspiration throughout my work.

I take this golden opportunity to express my gratitude and sincere thanks to my respected guide **Dr. Ashish Kumar Singh** Department of Chemistry, GGU, Bilaspur for his guidance, constant encouragement, and support which boosted me with confidence and I am proud to say that it has been a most fruitful and enjoyable experience to work under his guidance.

I am also thankful to all the professors including Ph.D. scholars for their help in making this project a successful one. Also special thanks to my friends and classmates for sharing their valuable assistance.

**Monali Sahu.**



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# PROJECT REPORT ON

**Colorimetric and Fluorometric  
Sensor For Fluoride Based On Reduced  
Schiff Base**



DEPARTMENT OF CHEMISTRY  
SCHOOL OF PHYSICAL SCIENCE  
GURU GHASIDAS VISHWAVIDHYALAYA, BILASPUR.

MASTER OF SCIENCE IN CHEMISTRY  
4<sup>th</sup> SEMESTER

ACADEMIC YEAR- 2021-2022

UNDER THE GUIDANCE OF

Dr. NIRAJ KUMARI SINGH

Assistant Professor

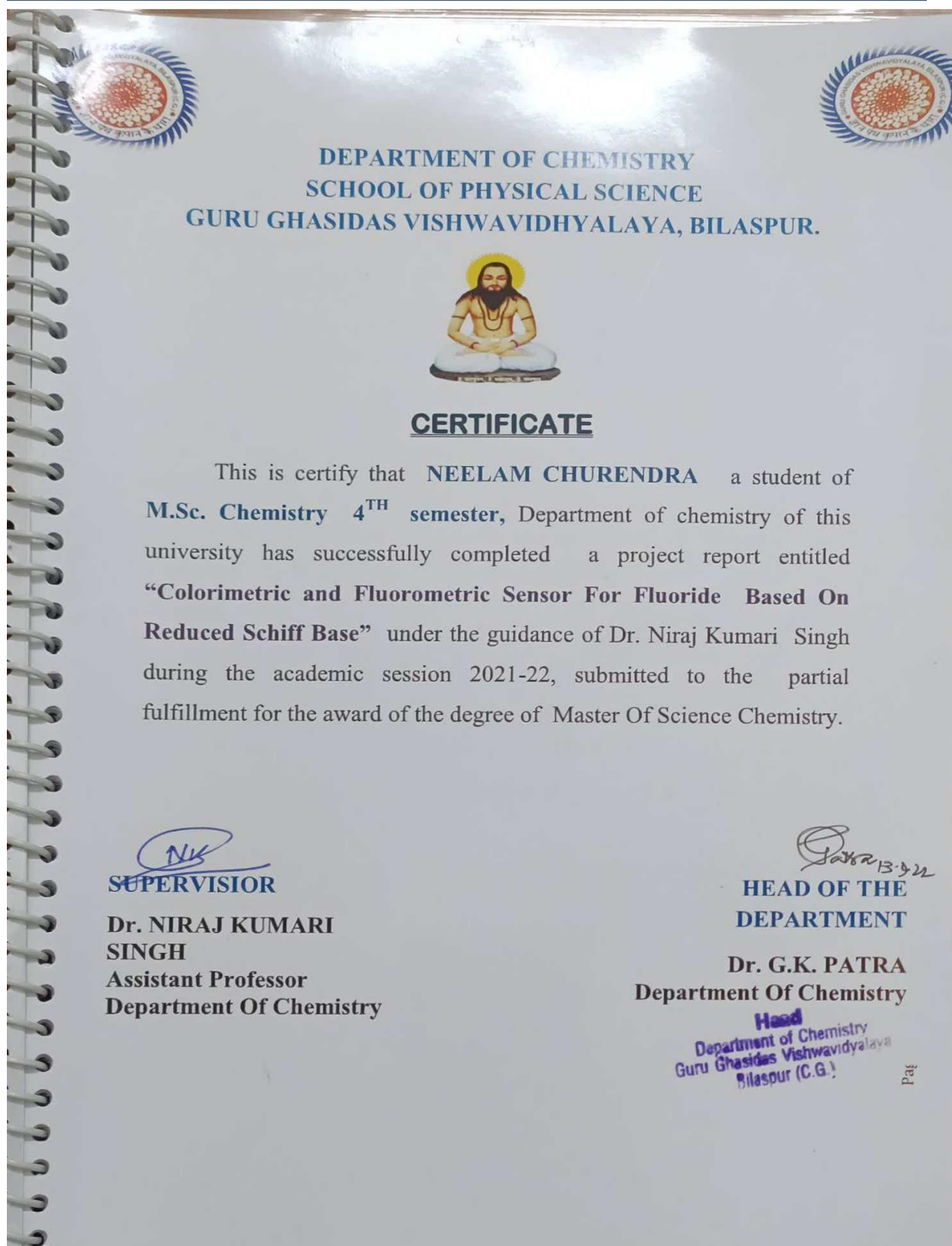
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SUBMITTED BY,

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Enrollment No. GGV/20/07209



DEPARTMENT OF CHEMISTRY  
SCHOOL OF PHYSICAL SCIENCE  
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**CERTIFICATE**

This is certify that **NEELAM CHURENDRA** a student of **M.Sc. Chemistry 4<sup>TH</sup> semester**, Department of chemistry of this university has successfully completed a project report entitled **“Colorimetric and Fluorometric Sensor For Fluoride Based On Reduced Schiff Base”** under the guidance of Dr. Niraj Kumari Singh during the academic session 2021-22, submitted to the partial fulfillment for the award of the degree of Master Of Science Chemistry.

  
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Paç



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MASTERS

IN

Chemistry

Session – 2021-22

**PROJECT REPORT**

**ON**

**\*\*A Novel Benzimidazolyl Schiff Base \*\***

GUIDED BY

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Signature

Date: 13-09-2022





## FORWARDING CERTIFICATE



This is to certify that Miss.VARSHA MAHILANE has carried out the project in the DEPARTMENT OF CHEMISTRY ,GURU GHASIDAS VISHWAVIDYALAYA ( A central University Bilaspur (C.G.)) on the “**A Novel Benzimidazolyl Schiff base**” of requirement for the Degree of **M.Sc. in Chemistry** and forwarded to examiner for evolution.

  
13/09/22  
**PROF.G.K.PATRA**

**HEAD**

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