



Department : Chemistry		
Academic Year : 2023-24		
Sr. No.	Programme Code	Name of the Programme
01.	1764	M. Sc. Chemistry

## Contents

Sr. No.	Name of the Student	Page no.
1.	Aakanksha Patel	1-3
2.	Aayush	4-6
3.	Abhimanyu Guha	7-9
4.	Allen Joban	10-12
5.	Anuradha Barad	13-14
6.	Archana Minj	15-17
7.	Ashish Khute	18-20
8.	Ashish Kumar Prajapati	21-23
9.	Ashutosh Melly	24-26
10.	Bhamini Uike	27-29
11.	Bhanupratap Meher	30-32
12.	Dayasagar Sa	33-35
13.	Dhrutisundar Nayak	36-38
14.	Dipti Dhamde	39-41
15.	Gowtham G	42-44
16.	Harish	45-47



17.	Harshit Kumar	48-50
18.	Indra Kumari	51-53
19.	Ipsita Sahoo	54-56
20.	Jagannath Prasad Sahoo	57-59
21.	Jagriti Nag	60-62
22.	Jaya Kashyap	63-65
23.	Jyotirmayee Pal	66-68
24.	Kanchana	69-70
25.	Kommu Raju	71-73
26.	Kundan Pandey	74-76
27.	Lipsamayee Bhoi	77-79
28.	Muskan Deshmukh	80-82
29.	Nikhil Bareth	83-85
30.	Payal Thakur	86-88
31.	Poulomi Bhadra	89-91
32.	Pragya Sahu	92-94
33.	Pratibhan Gabel	95-97
34.	Preeti	98-99
35.	Priyanshi	100-102
36.	Ravindra Kumar Maravi	103-105
37.	Reena Goyal	106-108
38.	Ritik Ekka	109-110
39.	Samikshya Nanda	111-113
40.	Satyapriya Gahare	114-116
41.	Shiba Prasad Barik	117-118



42.	Shristi Rai	119-121
43.	Shivangi Mishra	122-124
44.	Shravya Kumar Singh	125-127
45.	Siddharth Mishra	128-130
46.	Sonu kumar	131-133
47.	Sumit Ranjan Das	134-136
48.	Supriya Rai	137-139
49.	Suresh Kr Jena	140-142
50.	Swaraj Shreechandan Sahu	143-145
51.	Swarnika Pandey	146-148
52.	Swati Kamde	149-151
53.	Takehswar Sahu	152-154
54.		
55.		
56.		
57.		
58.		
59.		

**अध्यक्ष/Head**  
**रसायन शास्त्र विभाग**  
**Deptt. of Chemistry**  
**गुरु घासीदास विश्वविद्यालय,**  
**Guru Ghasidas Vishwavidyalaya,**  
**बिलासपुर 495009 (छ.ग.)**  
**Bilaspur 495009 (C.G.)**

Signature and Seal of the Head



**DEPARTMENT OF CHEMISTRY**  
**GURU GHASIDAS UNIVERSITY, BILASPUR**

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

**A Project**

**On**

**REMEDIATION OF DYES USING PHYTODERIVED  
BIOCHAR FROM CAROB TREE SEEDS**

**Master of Science IV Semester**

**Session 2023-24**

**SUPERVISED BY**

**Dr. SUNIL KUMAR SINGH**

**(ASSOCIATE PROFESSOR)**

**DEPARTMENT OF CHEMISTRY**

**GURU GHASIDAS CENTRAL UNIVERSITY**

**BILASPUR (C.G.)**

**SUBMITTED BY**

**AAKANKSHA PATEL**

**M.Sc. 4<sup>th</sup> Sem**

**ROLL NO. - 22104101**

*AS*  
*09/09/24*





## DEPARTMENT OF CHEMISTRY

# GURU GHASIDAS UNIVERSITY, BILASPUR

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

### CERTIFICATE OF THE GUIDE

This is to certify that AAKANKSHA PATEL has carried out this experiment under my supervision in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) on the topic "**REMEDIATION OF DYES USING PHYTODERIVED BIOCHAR FROM CAROB TREE SEEDS**"

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

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 forward to the respective examiners for evaluation. I wish her every success in her career and life.

(Signature of Guide)

Dr. SUNIL KUMAR SINGH

ASSOCIATE PROFESSOR

(DEPARTMENT OF CHEMISTRY)

(Signature of Student)

AAKANKSHA PATEL



## DEPARTMENT OF CHEMISTRY

### GURU GHASIDAS UNIVERSITY, BILASPUR

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

#### FORWARDING CERTIFICATE

This is to certify that the project work entitled **"REMEDIATION OF DYES USING PHYTODERIVED BIOCHAR FROM CAROB TREE SEEDS"** submitted by this project is submitted for the partial fulfilment of requirements for the degree of M.Sc. in Chemistry and forwarded to the examiner for evaluation. I wish her every success in his life.

(Signature of H.O.D)

**HEAD**

Head / Head

**DEPARTMENT OF CHEMISTRY**

Dept. of Chemistry

गुरु गहासिदास विश्वविद्यालय,

Guru Ghasidas Vishwavidyalaya,

बिलासपुर 495009 (छ.ग.)

Bilaspur 495009 (C.G.)

(Signature of Student)

**AAKANKSHA PATEL**



DEPARTMENT OF CHEMISTRY

**GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR**

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

---

**A Project Report**

**On**

**"PRODUCTION OF BIODIESEL FROM ALGAE"**

**Master of Science IV Semester (chemistry)**

**Session: 2023 – 2024**

**SUBMITTED TO**

**Dr. BHASKAR SHARMA**

**(ASSISTANT PROFESSOR)**

**DEPARTMENT OF CHEMISTRY**

**SUBMITTED BY**

**AAYUSH VIPIN SAHU**

**M.Sc. IV SEMESTER**

**ROLL NO. 22104103**

**ENR. NO. GGV/22/07203**



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 "**production of biodiesel from algae**" 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 him every success in his life.

(Signature of H.O.D.)

**DR. G. R. PATRA**  
इसाईन शास्त्र विभागाध्यक्ष  
HEAD OF DEPARTMENT  
गुरु गणेशदास विश्वविद्यालय  
(DEPARTMENT OF CHEMISTRY)  
गुरु गणेशदास विश्वविद्यालय  
बिलासपुर 495009 (C.G.)  
बिलासपुर 495009 (C.G.)

(Signature of Student)

AAYUSH VIPIN SAHU



## TABLE OF CONTENTS

S.No.	Topic	Page no.
01	ABSTRACT	1-1
02	INTRODUCTION	2-6
03	PRODUCTION OF BIODIESEL FROM ALGAE  a) Experimental section - Materials and equipment - Reagents and chemicals b) Methodology - Algae cultivation - Harvesting - Lipid and oil extraction - Transesterification	6-14
04	RESULTS AND DISCUSSIONS  a) Yield and efficiency b) Effect of different factors c) Environmental impact d) Applications of algal biodiesel e) Algal biodiesel vs other fuels	14-21
05	CONCLUSION	22
06	REFERENCES	22-24



**DEPARTMENT OF CHEMISTRY**

**GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR**

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

---

**A Project Report**

**On**

**"SYNTHESES AND CHARACTERIZATION OF BIMETALIC AND  
HETEROBIMETALIC COMPLEXES"**

**Master of Science IV Semester**

**Session: 2022 – 2024**

**SUPERVISOR**

Dr. SURYABHAN SINGH  
(ASSISTANT PROFESSOR)  
DEPARTMENT OF CHEMISTRY  
GURU GHASIDAS CENTRAL UNIVERSITY  
BILASPUR (C.G.)

**SUBMITTED BY**

ABHIMANYU GUHA  
M.Sc. IV SEMESTER  
ROLL NO.22104104



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 AND CHARACTERIZATION OF BIMETALIC AND HETEROBIMETALIC COMPLEXES"** 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 his every success in her life.

  
Prof. G. K. PATRA

HEAD OF DEPARTMENT

Head  
Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
Bilaspur - 494 030

## TABLE OF CONTENTS

S.No.	Topic	Pg No.
01	Introduction	7-13
02	<u>SYNTHESIS AND CHARACTERIZATION OF BIMETALIC AND HETEROBIMETALIC COMPLEXES</u>  a) CHEMICALS REQUIRED b) GLASS WARE AND INSTRUMENT REQUIRED c) SYNTHESIS	13-14
03	RESULT AND DISCUSSION	14-18
04	APPLICATIONS OF BIMETALIC AND HETEROBIMETALIC COMPLEXES	19
05	CONCLUSION	19
07	REFERANCE	20-23



# **Guru Ghasidas Vishwavidyalaya**

(A Central University)



**Bilaspur, Chhattisgarh**

**A**

**Literature Based Project Report**

**On**

**"Electrochemical sensors for the detection of Arsenic"**

**As Partial Fulfilment for the Degree of M.Sc. in**

**Chemistry For Session 2023-2024**

**Guided By**

**Dr. Uday Pratap Azad**  
Assistant Professor  
Guru Ghasidas Vishwavidyalaya

**Submitted By**

**Allen Joban**  
M.Sc. 4<sup>th</sup> Semester  
Roll No.: 22104105




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. Allen Joban** has carried out a project work in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G. on the topic "**Electrochemical sensors for the detection of Arsenic**". This project is Submitted as a partial fulfillment for the degree of M.Sc. in Chemistry and forwarded to the examiner for evaluation.

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

# CONTENT

## S.NO. TITLE

1.	Abstract	1
2.	Introduction	2
3.	Types of Electrochemical sensors	4
4.	Electrode materials and modifications	7
5.	Mechanism of detection	11
6.	Performance Metrics	13
7.	Applications and Case studies	18
8.	Challenges and Limitations	23
9.	Recent Advances and Future Directions	26
10.	Conclusion	29
11.	Reference	30



DEPARTMENT OF CHEMISTRY

GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR

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

A Project Report

On

**"SYNTHESIS AND CHARACTERIZATION OF MgO NANOPARTICLES  
EXTRACTED FROM NEEM LEAVES BY GREEN METHOD"**

Master of Science IV Semester

Session: 2023 – 2024

**SUBMITTED TO**

Dr. BHASKAR SHARMA

(ASSISTANT PROFESSOR)

DEPARTMENT OF CHEMISTRY

GURU GHASIDAS CENTRAL UNIVERSITY

BILASPUR (C.G.)

**SUBMITTED BY**

ANURADHA BARAD

M.Sc. IV SEMESTER

ROLL NO. 22104106

ENR.NO. GGV/22/07206

AP  
04/09/24





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 AND CHARACTERIZATION OF MAGNESIUM OXIDE NANOPARTICLES EXTRACTED FROM NEEM LEAVES BY GREEN METHOD"** 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.

  
(Signature of H.O.D.) 04-09-24

Dr. G.K. Barua Head  
अध्यक्ष  
HEAD  
Dept. of Chemistry  
गुरु गणेशदास विश्वविद्यालय,  
(DEPARTMENT OF CHEMISTRY)  
बिलासपुर 495009 (B.N.)  
बिलासपुर 495009 IC.G.

Anuradha Barad  
(Signature of Student)  
ANURADHA BARAD

## TABLE OF CONTENTS

Sl.No.	Topic	Pg No.
01	ABSTRACT	7
02	INTRODUCTION	8
03	A BRIEF INFORMATION FOR MgO NANOPARTICLES AND IT'S PROPERTIES	9
04	EXPERIMENTAL METHOD 1) Materials 2)Preparation of neem leaf extract 3)Synthesis of MgO Nanoparticles 4)calcination	10-13
05	OPTIMIZATION STUDIES FOR THE SYNTHESIS OF MgO NPs 1)Influence of neem leaf extract 2)Effect of Temperature 3)Influence of Calcination Temperature	13
06	INSTRUMENTS USED FOR CHARACTERIZATION OF MgO NPs	14
07	RESULT AND DISCUSSION 1)UV-VISIBLE SPECTROSCOPY 2)FTIR SPECTROSCOPY	15-16
08	APPLICATION	17
09	CONCLUSION	18
10	REFERENCES	18-21



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 "**Photocatalytical degradation of organic compounds**" 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.

(Signature of H.O.D.)

**Dr. G.K. PATRA**

SENIOR / HEAD

DEPT. OF CHEMISTRY

**(DEPARTMENT OF CHEMISTRY)**

Guru Ghasidas Vishwavidyalaya

Bilaspur - 494009 (B.R.)

Phone: 03182-251111

(Signature of Student)

**ARCHANA MINJ**





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**

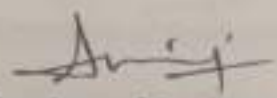
This is to Certify that **ARCHANA MINJ** has carried out this literature-based survey under my supervision in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) on the topic "**Photocatalytical degradation of organic compounds.**" She has worked diligently, and methodically and 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. MANORAMA**

( PROFESSOR )

(DEPARTMENT OF CHEMISTRY)

  
(Signature of Student)  
**ARCHANA MINJ**





DEPARTMENT OF CHEMISTRY

**GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR**

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

---

**A Project Report**

**On**

**"Photocatalytical degradation of organic compounds"**

**Master of Science IV Semester**

**Session: 2022 – 2024**

**SUBMITTED TO**

Dr. MANORAMA

( PROFESSOR )

DEPARTMENT OF CHEMISTRY

**SUBMITTED BY**

ARCHANA MINJ

M.Sc. IV SEMESTER

ROLL NO. 22104107

**Synthesis & Characterization Of Carboxymethyl Cellulose(CMC)  
Wrapped CuO Nanoparticles Via Chemical Precipitation Method**

**A Project Submitted to**

**Guru Ghasidas Vishwavidyalaya, Bilaspur  
(C.G.)**



**In Partial Fulfilment for the Award of the Degree  
Of**

**Master of Science in Chemistry**

**By**

**ASHISH KHUTE**

**Under the Guidance of**

**Dr. Arti Srivastava, Associate professor**

**Department of Chemistry**

**Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)**

**SESSION 2022 – 2024**

© Guru Ghasidas Vishwavidyalaya, Bilaspur, (C.G.), India, 2024.

**ALL RIGHT RESERVED**



## DECLARATION BY THE CANDIDATE

I the undersigned solemnly declare that the report of the major project entitled **"Synthesis & Characterization of Carboxymethyle Cellulose (CMC) Wrapped CuO Nanoparticles Via Chemical Precipitation Method"** based on my work carried out during my study in the Department of Chemistry, Guru, Ghasidas, Vishwavidyalaya, Bilaspur under the supervision of **Dr. Arti Srivastava**. I assert that the statements made and conclusions drawn are an outcome of my research work.

Signature of the Candidate

Ashish Khute

Roll No.: 22104108

Enrolment No.: GGV/19/7041

Signature of the Supervisor

**Dr. Arti Srivastava**

Associate Professor

Department of chemistry

Guru Ghasidas Vishwavidyalaya

Bilaspur - 495009

Date: 04/09/2024

Place : Bilaspur C.G.

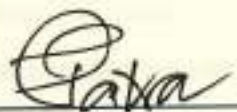




## FORWARDING CERTIFICATE

This is to certify that **Mr. Ashish Khute** has carried out this research-based project in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur, (C.G.) on the topic **"Synthesis & Characterization Of Carboxymethyle Cellulose (CMC) Wrapped CuO Nanoparticles Via Chemical Precipitation Method"**. This project is submitted for the partial fulfilment of the requirement for the degree of **M. Sc. in Chemistry**.

I wish him every success in his life.

 04/09/24

Signature of the HOD

Dr. G. K. Patra

Professor

Department of Chemistry, G.G.V., Bilaspur, (C.G.)

Date:

Place: Bilaspur, C.G.

## TABLE OF CONTENTS

SL. No.	CONTENT	Page No.
01	ABSTRACT	08
02	INTRODUCTION	09-10
03	EXPERIMENTAL 3.1 Material 3.2 Synthesis Of CuO-NPs 3.3 Synthesis Of CMC Wrapped CuO-NPs (CuONPs@CMC) 3.4 Reaction Involved in CuONPs Formation	11
04	CHARACTERIATION TECHNIQUES 4.1 UV-Vis SPECTROSCOPY 4.2 FTIR SPECTROSCOPY 4.3 X-Ray Diffraction (XRD)	12
05	RESULT AND DISCUSSION 5.1 FTIR Analysis 5.2 UV-Vis Analysis	13-16
06	APPLICATIONS OF CuO NANOPARTICLES	17
07	CONCLUSION	18
08	REFERENCES	19-22

# **A Comprehensive Review of Rare Earth Elements: Chemistry, Applications, and Environmental Impacts**

**A Project Report Submitted**

**to**

**Guru Ghasidas Vishwavidyalaya, Bilaspur**



*In partial fulfillment of the requirement for the degree of*

**Master of Science  
in  
Chemistry**

**Submitted by**

**Aashish Kumar Prajapati**

**Supervisor**

**Dr. Bharat Lal Sahu**

**Department of Chemistry**

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

**(2024)**



# Guru Ghasidas Vishwavidyalaya

(A Central University established under Central Universities Act 2009)

Dr. G. K. Patra  
Professor & Head  
M.Sc., Ph.D.

Former Dean, School of  
Physical Sciences



Department of Chemistry

Guru Ghasidas University  
Bilaspur-495009, CG, India



[patra29in@yahoo.co.in](mailto:patra29in@yahoo.co.in)

+91-7587312992

+91-9433378801

Ref. No.

Bilaspur, Date:

## FORWARDING CERTIFICATE

This is to certify that **Aashish Kumar Prajapati** has completed the project work entitled "**A Comprehensive Review of Rare Earth Elements: Chemistry, Applications, and Environmental Impacts**" under the supervision of **Dr. Bharat Lal Sahu**, for the partial fulfillment of required degree of "**Master of Science**" and forwarded to the Examiner for evaluation.

*I wish his every success in the future life.*

Date: 04-09-2024

Place: Bilaspur

Signature of the Head  


अध्यक्ष / Head  
रसायन शास्त्र विभाग  
Deptt. of Chemistry  
गुरु घासीदास विश्वविद्यालय,  
गुरु गhasidas Vishwavidyalaya  
बिलासपुर 495009 (छ.ग.)  
Bilaspur 495009 (C.G.)

## **INDEX**

<b>S. No.</b>	<b>Content</b>	<b>Page No.</b>
1.	Summary	1
2.	Introduction	1-3
3.	Distribution of REE in the Earth's Crust and Mineralogy	3 - 4
4.	REE Exploration	5-10
5.	High – technology Applications of REE	10-22
6.	Recycling	22-24
7.	Conclusion	24-25
8.	References	25-27



# **Synthesis and Characterization of Mono and Di-Chalcone Derivatives from Aldol Condensation**

**A Project Report Submitted to**

**Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G.**



*In partial fulfillment of the requirement for the degree of*

**Master of Science  
in  
Chemistry**

**Submitted by**

**Ashutosh Melly**

**M.Sc. 4<sup>th</sup> Sem (Organic Spl.)**

**Enrolment No. GGV/22/07208**

**Roll No. 22104109**

**Supervisor**

**Dr. Bijnaneswar Mondal**

**Assistant Professor**

**Department of Chemistry**

**Guru Ghasidas Vishwavidyalaya**

**September 2024**



# Guru Ghasidas Vishwavidyalaya

(A Central University established under Central Universities Act 2009)

Prof. Goutam K. Patra  
Head of the Department



Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
Bilaspur - 495009, C.G.

## FORWARDING CERTIFICATE

This is to certify that **Mr Ashutosh Melly** has completed the project work entitled as "**Synthesis and Characterization of Mono and Di-Chalcone Derivatives from Aldol Condensation**" under the supervision of **Dr. Bijnaneswar Mondal**, for the partial fulfilment of required degree of "**Master of Science in Chemistry**".

To the best of my knowledge and belief of the project

- 1) is original and has not been submitted anywhere for award of any degree.
- 2) Fulfils the requirement of the Ordinance relating to the M.Sc. degree of the university.

I recommend the project report be forwarded to the respective examiners for evaluation.

Date: 04-09-24

Place: Bilaspur, C.G.

Signature of the HoD

सहायक प्राध्यापक  
Dept. of Chemistry  
गुरु घासीदास विश्वविद्यालय,  
गुरु गहासिदास विश्वविद्यालय  
बिलासपुर 495009 (C.G.)  
बिलासपुर 495009 (C.G.)

## **TABLE OF CONTENTS**

<b>Entry</b>	<b>Content</b>	<b>Page No.</b>
1.	Introduction	07
2.	Classification Of Chalcone Derivatives	08-09
3.	Applications Of Chalcones Derivatives	09-10
4.	Traditional Synthesis of Chalcones Derivatives	10-11
5.	Our Methods for Synthesis of Chalcones Derivatives	11-13
6.	Results And Discussions	14-17
7.	Conclusion	17-18
8.	References	18





DEPARTMENT OF CHEMISTRY

**GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR**

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

A Project Report

On

**"Synthesis and characterization of Cd (II) complexes with Schiff bases"**

Master of Science IV Semester

Session: 2022 – 2024

**SUBMITTED TO**

Dr. NIRAJ KUMARI

(ASSISTANT PROFESSOR)

DEPARTMENT OF CHEMISTRY

*Bhamini*  
**SUBMITTED BY**

BHAMINI UIKE

M.Sc. IV SEMESTER

ROLL NO. 22104110





DEPARTMENT OF CHEMISTRY

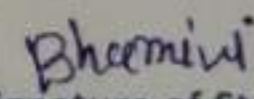
**GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR**

(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 and characterization of Cd (II) complexes with Schiff bases**" 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.

  
(Signature of H.O.D.)  
अध्यक्ष / Head  
रसायन विभाग  
Dept. of Chemistry  
गुरु घासीदास विश्वविद्यालय,  
Ghasidas Vishwavidyalaya  
(DEPARTMENT OF CHEMISTRY)  
बिलासपुर - 495009 (C.G.)

  
(Signature of Student)

**BHAMINI UIKE**

## TABLE OF CONTENTS

S.No.	Topic	
01	Abstract	
02	Introduction	
03	Synthesis of compounds i) Materials ii) Experiment section	
04	Result and discussion	7-
05	Applications	10
06	Conclusion	11-1
07	Reference	12- 15





**DEPARTMENT OF CHEMISTRY**  
**GURU GHASIDAS UNIVERSITY, BILASPUR**

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

A Project (review work)

On

**“ Bio-based nanocomposites for dye removal ”**

*As a Partial Fulfilment for the Requirement  
of The Degree Of*

*Master of Science in Chemistry*

Session 2022-24

**SUPERVISED BY**

Dr. SUNIL KUMAR SINGH

(ASSOCIATE PROFESSOR)

DEPARTMENT OF CHEMISTRY

GURU GHASIDAS CENTRAL UNIVERSITY

BILASPUR (C.G.)

**SUBMITTED BY**

BHANUPRATAP MEHER

M.Sc. 4<sup>th</sup> Sem

ROLL NO. - 22104111

AG  
04/09/24



## DEPARTMENT OF CHEMISTRY

# GURU GHASIDAS UNIVERSITY, BILASPUR

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

### CERTIFICATE OF THE GUIDE

This is to certify that BHANUPRATAP MEHER has carried out this Review work under my supervision in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) on the topic "**BIO-BASED NANOCOMPOSITES FOR DYE REMOVAL**"

He has worked diligently, and methodically and also collected the literature very sincerely and carefully. During this review work, he has learnt about adsorption process.

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

(Signature of Guide)

**D. NIL KUMAR SINGH**

**ASSOCIATE PROFESSOR**

**(DEPARTMENT OF CHEMISTRY**

**G.G.V. ,BILASPUR)**

(Signature of Student)

**BHANUPRATAP MEHER**





## DEPARTMENT OF CHEMISTRY

### GURU GHASIDAS UNIVERSITY, BILASPUR

[A Central University Established by the Central University Act, 2009 No. 25 of 2009]

#### FORWARDING CERTIFICATE

This is to certify that the project (review work) entitled "**BIOBASED NANOCOMPOSITES FOR DYE REMOVAL**" submitted by this project is submitted for the partial fulfilment of requirements for the degree of M.Sc. in Chemistry and forwarded to the examiner for evaluation. I wish him every success in his life.

(Signature of H.O.D)

HEAD

DEPARTMENT OF CHEMISTRY

बिस्पुर / Bilaspur  
G. G. V. BILASPUR  
Dept. of Chemistry  
गुरु गणेशदास विश्वविद्यालय,  
गुरु गणेशदास विश्वविद्यालय,  
Chemistry 434009 (B.T.)  
435009 (C.G.)

(Signature of Student)

Bhanupratap Meher

A  
Literature Based Project Report  
On

**"Electrochemical detection of glucose by  
nanozyme modified electrodes."**

A Project Thesis Submitted for  
Partial Fulfilment of the Requirement for the Degree of  
M.Sc. in Chemistry

**Session - 2023-2024**

UNDER THE GUIDANCE OF

**Dr. Uday Pratap Azad**  
(Assistant Professor)  
Department of Chemistry

SUBMITTED BY

**Dayasagar Sa**  
M.Sc. (Chemistry)  
IV Semester  
Roll No. 22104113



**Guru Ghasidas Vishwavidyalaya**  
(A Central University)  
Bilaspur (C.G.) 495001, India



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

## FORWORDING CERTIFICATE

This is to certify that, **Dayasagar Sa** has carried out this literature survey based on project in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur (C.G.) on the topic "**Electrochemical detection of glucose by nanozyme modified electrodes.**"

This project submitted for the partial fulfilment of required degree of M.Sc. in Chemistry and forwarded to examiner for evaluation.

I wish every success in his life.

A handwritten signature in black ink, appearing to read 'G. Patra'.

Prof. Goutam Kumar Patra  
(Head, Department of chemistry)  
Guru Ghasidas Vishwavidyalaya  
Bilaspur (C.G.)

अध्यक्ष / Head  
रसायन विभाग  
Department of Chemistry  
गुरु घासीदास विश्वविद्यालय,  
बिलासपुर 495009 (छ.ग.)  
Bilaspur 495009 (C.G.)



## INDEX

- ABSTRACT (0-1)
- INTRODUCTION (2-3)
- LITERATURE REVIEW (3-5)
- THEORITICAL BACKGROUND (6-9)
- METHODS AND MATERIAL (9-22)
- CONCLUSION (22)
- FUTURE ASPECT (22-23)
- REFERENCE (23-25)



# **Synthesis and Characterization of Zinc Oxide/Cobalt Oxide Nanocomposite**

Submitted to  
**Guru Ghashidas Vishwavidyalaya**

For partial fulfilment of the requirement for the award of the degree of

**Master of Science**

In

**CHEMISTRY**

By

**Mr. Dhrutisundar Nayak**

*(Exam Roll No: 22104115)*

**Under the guidance of**

**Dr. Arti Srivastava**

**Associate Professor**



**DEPARTMENT OF CHEMISTRY**

**Guru Ghasidas Vishwavidyalaya**

**Bilaspur**

**2022-24**

## DECLARATION

I do hereby declare that the project entitled "**Synthesis and Characterization of Zinc Oxide/Cobalt Oxide Nanocomposite**" has been prepared and submitted by me to the Dept. of Chemistry as a partial fulfillment of the requirements for the Master's Degree in Science in the course curriculum. It is the original work I did under the able and timely guidance of **Associate Professor Dr. Arti Srivastava**, my faculty guide. Further, it has neither been submitted for the award of any other degree nor been published elsewhere earlier in full or in part.

Place: Bilaspur

Date: 04/09/24

Dhrutisundar Nayak

(Dhrutisundar Nayak)

Exam Roll No: 22104115



# Guru Ghasidas Vishwavidyalaya

(A Central University established under Central Universities Act 2009)



*Dr. Arti Shrivastav*  
*Associate Professor*

Department of Chemistry  
Guru Ghasidas University  
Bilaspur-495009, CG, India

## CERTIFICATE

This is to certify that the project entitled "**Synthesis and Characterization of Zinc Oxide/Cobalt Oxide Nanocomposite**" is a record of bonafide project work carried out by Mr. Dhrutisundar Nayak under my supervision and guidance. It embodies the result of his original contribution. The project has reached the standard of fulfilling the regulation requirements relating to the Master's Degree in Science. No part of this project has been submitted to any institution for the award of any degree. I wish him all the best and success in his future endeavors.

Date: 04/09/2024  
Place: Bilaspur

  
Dr. Arti Shrivastava  
Associate Professor



**CERTIFICATE BY THE HEAD OF THE  
DEPARTMENT**

The Thesis entitled **"Synthesis and Characterization of ZnO-  
Co<sub>3</sub>O<sub>4</sub>"** Submitted by **Dhrutisundar Nayak** (Roll No. 22104115,  
Enrollment No.: GGV/22/07214) has been examined by the  
undersigned as a part of the examination and is hereby  
recommended for the award of the degree of **Master of Science in  
chemistry** in the Department of Chemistry of **Guru Ghasidas  
Vishwavidyalaya, Bilaspur (C.G.)**.

  
Signature of HOD 04/09/24

Date



# Contents

SECTION	TITLE	Page No.
1.1	Introduction	8
1.2	Size-dependant properties of nanoparticle	9-11
2.0	Synthesis of nanoparticle	13-14
3.0	Experimentation	16
4.0	Characterization	18-21
5.0	Application	23-24
6.0	Conclusion	26
7.0	References	28-30

# **Synthesis and Characterization of Various Knoevenagel Derivatives from Aromatic Aldehydes**

**A Project Report Submitted to**

**Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G.**



*In partial fulfilment of the requirement for the degree of*

**Master of Science  
in  
Chemistry**

**Submitted by**

**Dipti Dhamde**

**M.Sc. 4<sup>th</sup> Sem (Organic Spl.)**

**Enrolment No. GGV/21/07220**

**Roll No. 22104116**

**Supervisor**

**Dr. Bijnaneswar Mondal**

**Assistant Professor**

**Department of Chemistry**

**Guru Ghasidas Vishwavidyalaya**

**4<sup>th</sup> September 2024**



# Guru Ghasidas Vishwavidyalaya

(A Central University established under Central Universities Act 2009)

Prof. Goutam K. Patra  
Head of the Department



Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
Bilaspur - 495009, C.G.

## FORWARDING CERTIFICATE

This is to certify that *Miss Dipti Dhamde* has completed the project work entitled as "*Synthesis and Characterization of Various Knoevenagel Derivatives from Aromatic Aldehydes*" under the supervision of *Dr. Bijananeswar Mondal*, for the partial fulfilment of required degree of "*Master of Science in Chemistry*".

To the best of my knowledge and belief of the project

- 1) is original and has not been submitted anywhere for award of any degree.
- 2) Fulfils the requirement of the Ordinance relating to the M.Sc. degree of the university.

I recommend the project report be forwarded to the respective examiners for evaluation.

Date: 04-09-24

Place: Bilaspur, C.G.

  
Signature of the HoD  
Dept. of Chemistry  
Guru Ghasidas Vishwavidyalaya,  
Bilaspur - 495009 (C.G.)

## **TABLE OF CONTENTS**

<b>Entry</b>	<b>Content</b>	<b>Page No.</b>
1.	Introduction	7-8
2.	Importance and Applications	8-9
3.	Conventional Methods for Synthesis	9-14
4.	Our Methods for Synthesis	14-23
5.	Conclusion	23-24
6.	References	24-25



# **Innovative Approaches to Heavy Metal Remediation in Water: A Review of Current Methods and Future Prospects**

**A Project Report Submitted**

**to**

**Guru Ghasidas Vishwavidyalaya, Bilaspur**



*In partial fulfillment of the requirement for the degree of*

**Master of Science  
in  
Chemistry**

**Submitted by**

**Gowtham G**

**Supervisor**

**Dr. Bharat Lal Sahu**

**Department of Chemistry**

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

**(2024)**

# Guru Ghasidas Vishwavidyalaya

(A Central University established under Central Universities Act 2009)

Dr. G. K. Patra  
Professor & Head  
M.Sc., Ph.D.

Former Dean, School of  
Physical Sciences



Department of Chemistry  
Guru Ghasidas University  
Bilaspur-495009, CG, India



[patra29in@yahoo.co.in](mailto:patra29in@yahoo.co.in)

+91-7587312992

+91-9433378801

Ref. No.

Bilaspur, Date:

## **FORWARDING CERTIFICATE**

This is to certify that **Gowtham G** has completed the project work entitled "**Innovative Approaches to Heavy Metal Remediation in Water: A Review of Current Methods and Future Prospects**" under the supervision of **Dr. Bharat Lal Sahu**, for the partial fulfillment of required degree of "**Master of Science**" and forwarded to the Examiner for evaluation.

I wish his every success in the future life.

Date: 4/11/24

Place: Bilaspur

Signature of the Head

अध्यक्ष / Head

स्नातकोत्तर विभाग

Dept. of Chemistry

गुरु घासीदास विश्वविद्यालय,

Guru Ghasidas Vishwavidyalaya

बिलासपुर 495009 (छ.ग.)

Bilaspur 495009 (C.G.)

## **INDEX**

<b>S. No.</b>	<b>Content</b>	<b>Page No.</b>
1.	Summary	1
2.	Introduction	2
3.	Heavy Metal source	3
4.	Results and discussion	4-21
5.	Conclusion	22
6.	References	23-33

---



A  
PROJECT REPORT  
ON

BENZIL DIHYDRAZONE BASED  
FLUOROSCENT- COLORIMETRIC  
CHEMOSENSOR FOR THE DETECTION  
OF  $\text{Ni}^{2+}$  IONS

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



Department of Chemistry

GURU GHASIDAS VISHWAVIDYALAYA  
(A Central University A<sup>++</sup> Grade Accredited By NAAC)

2022-2024

Supervisor:

Prof. G. K. PATRA

GURU GHASIDAS VISHWAVIDYALAYA  
(A CENTRAL UNIVERSITY A<sup>++</sup> GRADE  
ACCREDITED BY NAAC) BILASPUR, C.G.

Submitted by:

Harish

M. Sc. Inorganic Chemistry,  
IV<sup>th</sup> Semester  
Roll No. 22104118



*Prof. GOUTAM KUMAR PATRA*  
**PROFESSOR,**  
**DEPARTMENT OF CHEMISTRY**  
Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G.  
(A central University A<sup>++</sup> Grade Accredited By NAAC)  
BILASPUR, C.G.)



### CERTIFICATE

This is to certify that HARISH (M.Sc. Inorganic Chemistry, IV<sup>th</sup> Semester) has been completed a project on "BENZIL DIHYDRAZONE BASED FLUORESCENT- COLORIMETRIC CHEMOSENSOR FOR THE DETECTION OF Ni<sup>2+</sup> IONS".

This project is submitted for the partial fulfillment of required degree in chemistry.

I wish for his every success in the future.

Signature

**Prof. GOUTAM KUMAR PATRA**  
Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
(A central UNIVERSITY A<sup>++</sup> Grade Accredited  
By NAAC) BILASPUR C.G.

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

**ORTHO-PHENYLENEDIAMINE BASED DI-SCHIFF BASE  
CHEMOSENSOR FOR SELECTIVE AND SENSITIVE DETECTION  
OF Ag<sup>+</sup> ION**

A Project submitted in partial fulfilment for the requirements for the Degree of

**MASTERS OF SCIENCE IN CHEMISTRY**

**SUBMITTED BY:**

**Harshit Kumar**

**EXAMINATION ROLL NO.: 22104119M.Sc.**

**INORGANIC CHEMISTRY (4<sup>th</sup>)**



**DEPARTMENT OF CHEMISTRY**

**GURU GHASIDAS VISHWAVIDYALAYA**

**2022-2024**

**Under the Supervision of**

**PROF. GOUTAM KUMAR PATRA**

**GURU GHASIDAS VISHWAVIDYALAYA**

**BILASPUR, KONI, C.G.**

A handwritten signature in blue ink, appearing to be 'AG', with a long horizontal stroke extending to the right.



DEPARTMENT OF CHEMISTRY  
GURU GHASIDAS VISHWAVIDYALAYA  
BILASPUR, KONI, C.G.

CERTIFICATE

This certifies that **Harshit Kumar** a student enrolled, **Examination Roll Number: 22104119** in the **IV Semester** of the **Master of Science in Inorganic Chemistry** program at the **Department of Chemistry, Guru Ghasidas Vishwavidyalaya**, has compiled the project titled **"Ortho-phenylenediamine based di-Schiffbase Chemosensor for selective and sensitive detection of Ag<sup>+</sup>-ion"** based solely on literature research for the partial fulfilment of the requirements for the award of the **Master of Science degree in Inorganic Chemistry at Guru Ghasidas Vishwavidyalaya**. The student is solely responsible for any instances of plagiarism, and the teachers of the Department of Chemistry bear no responsibility for any such issues arising from this report.

I wish for her every success in the future.

Signature

**PROF. GOUTAM KUMAR PATRA**

*(Head of Department of Chemistry)*

Guru Ghasidas Vishwavidyalaya

Bilaspur, Koni, C.G.



# CONTENTS

S. No.	Topic	Page No.
1.	Introduction	7 - 8
2.	Literature Review	8 - 10
3.	Synthesis of L	10
4.	Results and Discussion	10 - 13
5.	Conclusion	13 - 15

# Guru Ghasidas Vishwavidyalaya

(A Central University established under Central Universities Act 2009)

Prof. Manorama

Professor

(B.Sc./M.Sc.),

Ph.D., NET





Department of Chemistry

Guru Ghasidas University

Bilaspur-495009, CG, India

 manoramabhu@gmail.com

 +91-7587401982

 +91-7587401982

Ref. No.

Bilaspur, Date:

## CERTIFICATE

This is to certify that **Indrakumari** has completed the project work entitled "**A Brief Overview Of Microfluidics**" under my supervision for the partial fulfillment of required degree of "**Master of Science**". I wish her every success in the future life.

Date: 64/09/2024

Place: Bilaspur

  
Signature

# Guru Ghasidas Vishwavidyalaya

(A Central University established under Central Universities Act 2009)

Dr. G. K. Patra

Professor & Head

M.Sc., Ph.D.

Former Dean, School of  
Physical Sciences



Department of Chemistry

Guru Ghasidas University

Bilaspur-495009, CG, India



[patra29jagad@yahoo.co.in](mailto:patra29jagad@yahoo.co.in)

+91-7587312992

+91-9433378801

Bilaspur, Date:

Ref. No.

## FORWARDING CERTIFICATE

This is to certify that *Indrakumari* has completed the project work entitled "A Brief Overview of Microfluidics" under the supervision of *Prof. Manorama*, for the partial fulfillment of required degree of "Master of Science" and forwarded to the Examiner for evaluation. I wish his every success in the future life.

Date: 04/09/2024

Place: Bilaspur

Signature of the Head

अध्यक्ष / Head

रसायन शास्त्र विभाग

Deptt. of Chemistry

गुरु घासीदास विश्वविद्यालय,

Guru Ghasidas Vishwavidyalaya,

बिलासपुर 495009 (छ.ग.)

Bilaspur 495009 CG



# A Brief Overview of Microfluidics

A Project Report Submitted

to

Guru Ghasidas Vishwavidyalaya, Bilaspur



*In partial fulfillment of the requirement for the degree of*

Master of Science  
in  
Chemistry

Submitted by

Indrakumari

Supervisor

Prof. Manorama

Department of Chemistry

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

(2024)

AG

# Synthesis, Characterization and Applications of Mxenes



Dissertation submitted for  
Partial fulfilment for the Degree of

MASTER OF SCIENCE  
in  
CHEMISTRY

Under Supervision of  
**Prof. Ashish Kumar Singh**  
Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
Koni- Bilaspur 495009 (C.G.)

Submitted by  
**Ipsita Sahoo**  
M.Sc. Chemistry IV<sup>th</sup> Semester  
Roll. No. 22104121  
Enrolment No. GGV/22/07219

## CERTIFICATE

This is to certify that **Ms. IPSITA SAHOO**, student of Master of Science (Chemistry) in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) has completed her dissertation entitled "**Synthesis, Characterization and applications of Mxenes**" and submitted to the Department under the supervision of Prof. Ashish Singh. The dissertation is the partial fulfilment for the award of the degree of Master of Science in Chemistry.

  
Prof. G. K. Patra

Head of the Department

सहायक प्राध्यापक  
Chemistry  
गुरु गणेशदास विश्वविद्यालय,  
बिलासपुर 495009 (B.P.)  
बिलासपुर 495009 (C.G.)



## Table of Contents

Chapter	Title	Pages
1	Summary	07-08
2	Introduction	09
3	Synthesis of MXenes	10-12
4	Characterization	12-20
5	Applications	21-27
6	Conclusion	28
7	References	29-32

**EVALUATION OF  $ZnCl_2$  TREATED BARK ASH AS AN  
ADSORBENT FOR MALACHITE GREEN REMOVAL  
FROM WASTEWATER**

**A Project Report Submitted to  
Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G.**



This dissertation is submitted in partial fulfilment of the  
requirements for the degree of

**Master of Science**

**in**

**Chemistry**

**Sep 2024**

Submitted by

Jagannath Prasad Sahoo

M.Sc. 4<sup>th</sup> Sem (Physical chemistry)

Enrolment No. GGV/22/07220

Roll No. 22104122

Supervisor

Dr. Charu Arora (Professor)

Department of Chemistry

Guru Ghasidas Vishwavidyalaya

A handwritten signature in blue ink, likely belonging to Dr. Charu Arora, is written over a horizontal line.



# Guru Ghasidas Vishwavidyalaya

Prof Charu Arora  
Professor  
Dept. of Chemistry



Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
Bilaspur-495009, C.G.

(A Central University established under Central Universities Act 2009)

## CERTIFICATE

This is to certify that *Mr. Jagannath Prasad Sahoo* has completed the project dissertation entitled "*Evaluation of  $ZnCl_2$  Treated Bark Ash as an Adsorbent for Malachite Green Removal from Wastewater*" under my supervision for the partial fulfilment of required degree of "*Master of Science in Chemistry*". Throughout this project, he has demonstrated diligence, a methodical approach, and a sincere commitment to collecting and reviewing relevant literature. In the process, he has gained a comprehensive understanding of various aspects of chemical science related to the topic at hand.

To the best of my knowledge and belief of the project

- 1) is original and has not been submitted anywhere for award of any degree.
- 2) Fulfils the requirement of the Ordinance relating to the M.Sc. degree of the university.

I wish him every success in the future life.

Date: 4.9.24

Place: Bilaspur, (C.G)

*Charu Arora*  
Signature of the Supervisor



(A Central University established under Central Universities Act 2009)

Prof. Goutam K. Patra  
Head of the Department



Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
Bilaspur - 495009, C.G.

## FORWARDING CERTIFICATE

This is to certify that *Mr. Jagannath Prasad Sahoo* has completed the project work entitled as "*Evaluation of  $ZnCl_2$  Treated Bark Ash as an Adsorbent for Malachite Green Removal from Wastewater*" under the supervision of Prof *Charu Arora*, for the partial fulfilment of required degree of "*Master of Science in Chemistry*".

To the best of my knowledge and belief of the project

- 1) is original and has not been submitted anywhere for award of any degree.
- 2) Fulfils the requirement of the Ordinance relating to the M.Sc. degree of the university.

I recommend the project report be forwarded to the respective examiners for evaluation.

Date: 04-09-24

Place: Bilaspur, C.G.

  
Signature of the H.O.D

# **Synthesis and characterization of cyclotrimerized aromatic derivatives from various Acetophenones**

**A Project Report Submitted to  
Guru Ghasidas Vishwavidyalaya, Bilaspur,  
C.G.**



**In partial fulfilment of the requirement for the degree of**

**Master of Science  
in  
Chemistry**

**Submitted by**

**Jagriti Nag**

**M.Sc. 4<sup>th</sup> Sem (Organic Spl.)**

**Enrolment No. GGV/22/07221**

**Roll No. 22104123**

**Supervisor**

**Dr. Bijnaneswar Mondal**

**Assistant Professor**

**Department of Chemistry**

**Guru Ghasidas Vishwavidyalaya**

**4<sup>th</sup> September 2024**

*AG*  
*04/09/24*

# Guru Ghasidas Vishwavidyalaya

(A Central University established under Central Universities Act 2009)

Prof. Goutam K. Patra  
Head of the Department



Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
Bilaspur - 495009, C.G.

## FORWARDING CERTIFICATE

This is to certify that *Miss Jagriti nag* has completed the project work entitled as "*Synthesis and characterization of cyclotrimerized aromatic derivatives from various acetophenones*" under the supervision of *Dr. Bijnaneswar Mondal*, for the partial fulfilment of required degree of "*Master of Science in Chemistry*".

To the best of my knowledge and belief of the project

- 1) is original and has not been submitted anywhere for award of any degree.
- 2) Fulfils the requirement of the Ordinance relating to the M.Sc. degree of the university.

I recommend the project report be forwarded to the respective examiners for evaluation.

Date: 04/03/24

Place: Bilaspur, C.G.

Signature of the HOD  
Goutam K. Patra  
Head of the Department  
Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
Bilaspur - 495009 (C.G.)



## TABLE OF CONTENTS

Entry	Content	Page No.
1.	Introduction	01
2.	Application of 1,3,5-triphenylbenzene	02
3.	Conventional Methods for Synthesis of cyclotrimerized acetophenone	03-08
4.	Our Methods for Synthesis of cyclotrimerized acetophenones	09-12
5.	Conclusion	12
6.	References	13

A

Review Based Project Report

ON

*Molecular Machine And Application: A  
Brief Review*

*Submitted for*

*Partial Fulfillment of the Requirement for the Degree of*

*Master of Science in Chemistry*

*Session: 2023-2024*

SUPERVISED BY  
Dr. Suryabhan Singh  
Associate Professor  
Department of Chemistry

SUBMITTED BY  
Jaya Kashyap  
Roll no. 22104124  
Enroll No. GGV/22/07222



Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
(A Central University)  
Bilaspur (C.G.) 495009, India

*AK*



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 **JAYA KASHYAP** has carried out this literature survey based project in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur (C.G.) on the topic "**MOLECULAR MACHINE AND APPLICATION**". 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.

  
**Dr. Goutam ku. Patra**

Head of Department

Department of Chemistry

Guru Ghasidas Vishwavidyalaya



S.NO.	CONTENTS	PAGE NO.
1.	introduction	1
2	<b>BIOLOGICAL MOLECULAR MACHINE</b>	
2.1	<b>MYOSINS</b>	2-5
2.1.1	aspects of myosins structure	
2.1.2	myosins II 'S electromechanical characteristics and use	
2.1.3	myosins V 'S chromatomechanical characteristics and use	
2.2	<b>KINESINS</b>	
2.2.1	structure aspects of kinesins	5-7
2.2.2	the chemomechanical kinesin engine	
2.2.3	application of kinesins motor	
2.3	<b>DYNEINS</b>	8-9
2.4	<b>BACTERIAL FLAGELLA</b>	9-11
2.5	<b>ATP SYNTHESSES</b>	11-13
2.5.1	Structure of ATP synthases	
2.5.2	Characteristics of the F1- motors chemistry	
2.5.3	Chemomechanical property of fe rotors	
2.5.4	application of ATP synthases	
2.6	<b>CHAPERONINS</b>	13-16
2.6.1	function aspects of chaperonins	
2.6.2	structure of chemomechanical motion of chaperonins groel	
2.6.3	application of chaperonins	
3	<b>ARTIFICIAL MOLECULAR MACHINE</b>	17-18
	3.1 Molecular machine with DNA	
	3.2 Molecular machine non biological components	18-25
	a. Unidirectional rotary motions (ATP synthases and flagella mimcs)	
	b. Multiple interlocked motions	
	c. Coherent or tendem directed motions of assembled molecules	
	d. Molecular machinery for devises	



DEPARTMENT OF CHEMISTRY

**GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR**

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

**A PROJECT REPORT  
ON**

**"SYNTHESIS AND CHARACTERIZATION OF SILVER NANOPARTICLES  
USING NEEM EXTRACT"**

**Master of Science IV Semester**

**Session: 2023 – 2024**

**SUBMITTED TO**

**Dr. BHASKAR SHARMA**

**(ASSISTANT PROFESSOR)**

**DEPARTMENT OF CHEMISTRY**

**GURU GHASIDAS CENTRAL UNIVERSITY**

**BILASPUR (C.G.)**

**SUBMITTED BY**

**JYOTIRMAYEE PAL**

**M.Sc. IV SEMESTER**

**ROLL NO. 22104125**

*AG*  
*04/09/24*



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 AND CHARACTERIZATION OF SILVER NANOPARTICLES USING NEEM EXTRACT" 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.

  
(Signature of H.O.D.)

Dr. G.K. BHATIA  
HEAD  
Dept. of Chemistry  
(DEPARTMENT OF CHEMISTRY)  
Guru Ghasidas Vishwavidyalaya  
Bilaspur 494009 (B.H.)  
Pincode 494009 B.H.

Jyotirmayee Pal  
(Signature of Student)

JYOTIRMAYEE PAL



### TABLE OF CONTENTS

Sl.No.	Topic	Pg No.
01	ABSTRACT	7
02	INTRODUCTION	8-9
03	EXPERIMENT a) MATERIALS b) PREPARATION OF LEAF BROTH c) SYNTHESIS OF SILVER NANOPARTICLES	9-11
04	CHARACTERISATION OF SILVER NANOPARTICLES	11-13
05	RESULTS AND DISCUSSION a) EFFECT OF LEAF BROTH AS REDUCING AGENT b) EFFECT OF INITIAL CONCENTRATION OF AgNO <sub>3</sub> c) EFFECT OF TEMPERATURE	14-16
07	APPLICATION OF SILVER NANOPARTICLES	16-18
08	CONCLUSION	18
09	REFERENCES	19-21

*A Literature Based Project Report  
On*

*Synthesis of 2D Material  
Molybdenum Phosphide*



**Submitted For**  
*Partial Fulfilment of The Requirement for The Degree Of  
Master of Science in Chemistry*

**Supervised By**

Prof. Ashish Kumar Singh  
Department Of Chemistry  
Guru Ghasidas Vishwavidyalaya  
Bilaspur - 495009 (C.G.)

**Submitted By**

Ms. Kanchan  
M.Sc. IV Semester  
Roll No. 22104126  
Enroll. No. GGV/22/07224

**Department of Chemistry**  
**Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)**  
**Session 2022--2024**

AS  
04/09/24

# Guru Ghasidas Vishwavidyalaya

(A Central University established under Central Universities Act 2009)

Prof. G.K Patra

Head M.Sc., Ph.D., Post

Doc



Department of Chemistry

Guru Ghasidas University

Bilaspur-495009, India

## FORWARDING CERTIFICATE

*This is to certify that Kanchan has completed the project work entitled as "Synthesis of 2D material Molybdenum Phosphide" under the supervision of Prof. Ashish Kumar Singh, for the partial fulfilment of required degree of "Master of Science in Chemistry" and forwarded to the Examiner for evaluation.*

*I wish her every success in the future life.*

Date: 04-09-24

Place: Bilaspur, C.G.

Signature of the HOD

अध्यक्ष/Head  
महाविद्यालय विभाग  
Dept. of Chemistry  
गुरु गणेश विश्वविद्यालय,  
बिलासपुर 495009 (भ.ग.)  
Bilaspur 495009 (C.G.)



## CONTENT

SL. No	Topic	Pages
1	Abstract	1
2	Introduction	2-3
3	Properties	4
4	Historical Context	5-6
5	Synthesis	7-12
6	Characterization	13-15
7	Application	16-18
8	Conclusion	19
9	References	20-22

# **Metal Organic Framework Materials and Production of Ammonia**

**A Project Report Submitted**

**to**

**Guru Ghasidas Vishwavidyalaya, Bilaspur**



*In partial fulfillment of the requirement for the degree of*

**Master of Science  
in  
Chemistry**

**Submitted by**

**Kommu Raju**

**Supervisor**

**Dr. Suryabhan Singh**

**Department of Chemistry**

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

**(2024)**

# Guru Ghasidas Vishwavidyalaya

(A Central University established under Central Universities Act 2009)

**Dr. G. K. Patra**

*Professor & Head*

M.Sc., Ph.D.

**Former Dean, School of  
Physical Sciences**



**Department of Chemistry**

**Guru Ghasidas University**

**Bilaspur-495009, CG, India**



[patra29in@yahoo.co.in](mailto:patra29in@yahoo.co.in)

**+91-7587312992**

**+91-9433378801**

*Ref. No.*

*Bilaspur, Date:*

## **FORWARDING CERTIFICATE**

*This is to certify that **Kommu Raju** has completed the project work entitled "**Metal Organic Framework Materials and Production of Ammonia**" under the supervision of **Dr. Suryabhan Singh**, for the partial fulfillment of required degree of "**Master of Science**" and forwarded to the Examiner for evaluation.*

*I wish his every success in the future life.*

Date:

Place: Bilaspur

  
Signature of the Head



## **INDEX**

<b>S. No.</b>	<b>Content</b>	<b>Page No.</b>
1.	Abstract	1
2.	Introduction	2-3
3.	Mof - Assisted Photochemical Synthesis Of NH <sub>3</sub> via Reduction of N <sub>2</sub>	4-8
4.	Mof – Assisted Electrochemical NRR	9-12
5.	The Mof Mechanism Photocatalyst for NRR	12-14
6.	MOFs for NH <sub>3</sub> Capture and Storage	14-17
7.	Conclusion	18
8.	References	19-29

---

***Effective removal of basic fuchsin dye from waste water  
using eucalyptus bark ash***

***A Project Report Submitted to  
Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G.***



*This dissertation is submitted in partial fulfillment of the  
requirements for the degree of*

**Master of Science**

**in**

**Chemistry**

**Submitted by**

**Kundan Pandey**

M.Sc. 4<sup>th</sup> Sem (Physical chemistry)

Enrolment No. GGV/22/07226

Roll No. 22104128

**Supervisor**

**Prof. Charu Arora**

Department of Chemistry

Guru Ghasidas Vishwavidyalaya

**September 2024**

AG  
04/09/24

# Guru Ghasidas Vishwavidyalaya

(A Central University established under Central Universities Act 2009)

Prof Charu Arora

Professor of Dept.  
Chemistry



Department of Chemistry

Guru Ghasidas Vishwavidyalaya

Bilaspur-495009, C.G.

## CERTIFICATE

This is to certify that *Mr. Kundan Pandey* has completed the project dissertation entitled "*Effective removal of basic fuchsin dye from waste water using Eucalyptus bark ash*" under my supervision for the partial fulfilment of required degree of "*Master of Science in Chemistry*". Throughout this project, he has demonstrated diligence, a methodical approach, and a sincere commitment to collecting and reviewing relevant literature. In the process, he has gained a comprehensive understanding of various aspects of chemical science related to the topic at hand.

To the best of my knowledge and belief of the project

- 1) is original and has not been submitted anywhere for award of any degree.
- 2) Fulfils the requirement of the Ordinance relating to the M.Sc. degree of the university.

I wish him every success in the future life.

Date: 4.9.24

Place: Bilaspur, (C.G)

*Charu Arora*

Signature of the Supervisor



# Guru Ghasidas Vishwavidyalaya

(A Central University established under Central Universities Act 2009)

Prof. Goutam K. Patra  
Head of the Department



Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
Bilaspur - 495009, C.G.

## FORWARDING CERTIFICATE

This is to certify that *Mr. Kundan Pandey* has completed the project work entitled as *"Effective removal of basic fuchsin dye from waste water using eucalyptus bark ash"* under the supervision of *Prof Charu Arora*, for the partial fulfilment of required degree of *"Master of Science in Chemistry"*.

To the best of my knowledge and belief of the project

- 1) is original and has not been submitted anywhere for award of any degree.
- 2) Fulfils the requirement of the Ordinance relating to the M.Sc. degree of the university.

I recommend the project report be forwarded to the respective examiners for evaluation.

Date: 04-09-24

Place: Bilaspur, C.G.

  
Signature of the HoD

A Literature-based Project Report On

**“DOPED MOLYBDENUM DISULFIDE  
NANOMATERIALS AND ITS APPLICATION”**



DEPARTMENT OF CHEMISTRY

**GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR**

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

---

Master of Science IV Semester Session: 2022 – 2024

**SUBMITTED TO**

Dr. Ashish Kumar Singh

DEPARTMENT OF CHEMISTRY

GHASIDAS CENTRAL UNIVERSITY

BILASPUR (C.G.)

**SUBMITTED BY**

Lipsamayee Bhoi

M.Sc. IV SEMESTER

ROLL NO. 22104129



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 "**DOPED MOLYBDENUM DISULFIDE NANOMATERIALS 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.

 04-09-24

(Signature of H.O.D.)

**Dr. G.K. PATRA**  
**HEAD**  
**(DEPARTMENT OF CHEMISTRY)**



# CONTENT

1. Abstract
2. Introduction
3. About Molybdenum Disulfide
4. Doped Molybdenum Disulfide
5. Historical Background
6. Structure of Doped Molybdenum Disulfide
7. Types of Doped Molybdenum Disulfide
8. Various Aspects and Characteristics
9. Doping strategies
  - 9.1 Dry doping
  - 9.2 Wet doping
10. Characterization
  - 10.1 Growth mechanism
  - 10.2 XRD
  - 10.3 SEM
11. Optical properties
12. Applications
13. Conclusion
14. Reference

*Synthesis of Tetrahydrobenzo[6]pyran Derivatives using Task-Specific  
Ionic Liquid, [AcMIm]<sub>2</sub>CuCl<sub>4</sub>*

*A Project Submitted to*

*Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)*



*In Partial Fulfilment For the Award of the Degree*

*of*

*Master of Science in Chemistry*

*By*

*Muskan Deshmukh*

*Under the Guidance of*

*Dr. Subhash Banerjee*

*Research Center*

*Department of Chemistry*

*Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)*

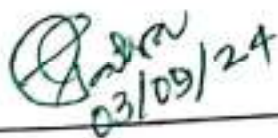
*August 2024*



## FORWARDING CERTIFICATE

This is to certify that **Miss. Muskan Deshmukh** has carried out this research-based project in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur, (C.G.) on the topic *"Synthesis of Tetrahydrobenzo[b]pyran Derivatives using Task-Specific Ionic Liquid, [AcMIm]<sub>2</sub>CuCl<sub>4</sub>"*. This project is submitted for the partial fulfillment of the requirement for the degree of M. Sc. in Chemistry and forwarded to the examiner for evaluation.

I wish every success in her life.

  
03/09/24

Signature of the HOD

**Dr. Goutam Kumar Patra**

Professor

Department of Chemistry, G.G.V., Bilaspur, (C.G.)



## INDEX

CHAPTERS	PAGE NO.
<u>CHAPTER 1: INTRODUCTION TO GREEN CHEMISTRY</u> -----	12-14
1.1: Introduction	
<u>CHAPTER 2: PRINCIPLES OF GREEN CHEMISTRY</u> -----	15-20
2.1: Principles	
<u>CHAPTER 3: GREEN SOLVENTS IN ORGANIC SYNTHESIS</u> -----	21-26
3.1: Introduction	
3.1.1: Water	
3.1.2: Fluorous Solvent	
3.1.3: Ionic Liquid	
3.1.4: Organic Carbonates	
3.1.5: Supercritical Carbon Dioxide	
3.1.6: Biosolvent	
<u>CHAPTER 4: IONIC LIQUIDS</u> -----	27-35
4.1: Introduction of Ionic Liquids	
4.2: Synthesis of Ionic Liquids	
4.3: Properties of Ionic Liquids	
4.4: Application of Ionic Liquids	
4.5: Current Research Trends	
4.6: Different Generations of Ionic Liquids	
4.7: Types of Ionic Liquids	
4.8: Conclusion	
<u>CHAPTER 5: ADVANTAGES OF IONIC LIQUIDS</u> -----	36-40
5.1: Advantages of Ionic Liquids	
5.2: Applications	
<u>CHAPTER 6: LITERATURE REVIEWS</u> -----	41-61

**CHAPTER 7: SYNTHESIS OF [AcMIm]<sub>2</sub>CuCl<sub>4</sub> TASK-SPECIFIC IONIC LIQUID**

-----62-66

7.1: Abstract

7.2: Introduction

7.3: Required Materials

7.4: Synthetic Procedure

7.4.1: Preparation of 1-Acetyl-3-methylimidazolium Chloride ([AcMIm]Cl)

7.4.2: Preparation of Acylmethylimidazolium copper chloride [AcMIm]<sub>2</sub>CuCl<sub>4</sub>

7.5: Chemical Reaction

**CHAPTER 8: APPLICATION OF [AcMIm]<sub>2</sub>CuCl<sub>4</sub> IN ORGANIC REACTIONS**

-----67-73

8.1: Abstract

8.2: Introduction

8.3: Required Materials

8.4: Synthetic Procedure

8.4.1: Procedure 1

8.4.2: Procedure 2

8.5: Chemical Reactions

8.5.1: Reaction Scheme 1

8.5.2: Reaction Scheme 2

**CHAPTER 9: RESULTS AND DISCUSSIONS----- 74-77**

9.1: Ionic Liquid [AcMIm]<sub>2</sub>CuCl<sub>4</sub>

9.2: 2-Amino-7,7-Dimethyl-5-Oxo-4-(Bromophenyl)-5,6,7,8-Tetrahydro-4H-Chromene-3-Carbonitriles

9.3: 2-Amino-7,7-Dimethyl-5-Oxo-4-(methylphenyl)-5,6,7,8-Tetrahydro-4H-Chromene-3-Carbonitriles

**CHAPTER 10: CONCLUSION----- 78-79**

**CHAPTER 11: ACKNOWLEDGMENT----- 80-82**

**CHAPTER 12: REFERENCES----- 83-92**

*Development of Ni-Based Task-Specific Room Temperature Ionic  
Liquids for Suzuki Coupling Reaction*

*A Project Submitted to*

*Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)*



*In Partial Fulfilment for the Award of the Degree*

*Of*

*Master of Science in Chemistry*

*By*

*Nikhil Bareth*

*Under the Guidance of*

*Dr. Subhash Banerjee*

*Research Centre*

*Department of Chemistry*

*Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)*

*August 2024*

*AG*  
*04/09/24*





## FORWARDING CERTIFICATE

This is to certify that **Mr. Nikhil Bareth** has carried out this research-based project in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur, (C.G.) on the topic "*Development of Ni-Based Task-Specific Room Temperature Ionic Liquids for Suzuki Coupling Reaction*". This project is submitted for the partial fulfilment of the requirement for the degree of **M. Sc. in Chemistry** and forwarded to the examiner for evaluation.

I wish every success in his life.

---

**Signature of the HOD**

**Prof. Goutam Kumar Patra**

Head of Department

Department of Chemistry, G.G.V., Bilaspur, (C.G.)

## Table of Content

Chapter No.	Content	Page No.
	Abstract	
1.	Introduction of green chemistry	1 - 2
2.	Twelve principles of green chemistry	3 - 6
3.	Green solvents in organic synthesis	7 - 10
4.	Ionic Liquids	11 - 15
5.	Advantages of Ionic Liquids	16 - 18
6.	Literature review	19 - 33
7.	Synthesis of Ionic Liquid	34 - 36
8.	Application of Ionic Liquid in organic reaction	37 - 39
9.	Results and discussion	40 - 42
10.	Conclusion	43 - 44
11.	References	45 - 52

# ***Synthesis and Characterization of Various Azobenzene Derivatives from Nitroarenes***

***A Project Report Submitted to  
Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G.***



***In partial fulfillment of the requirement for the degree of***

***Master of Science  
in  
Chemistry***

**Submitted by**

**Payal Thakur**

**M.Sc. 4<sup>th</sup> Sem (Organic Spl.)**

**Enrolment No. GGV/22/07232**

**Roll No.22104134**

**Supervisor**

**Dr. Bijnaneswar Mondal**

**Assistant Professor**

**Department of Chemistry**

**Guru Ghasidas Vishwavidyalaya**

**September 2024**



# Guru Ghasidas Vishwavidyalaya

(A Central University established under Central Universities Act 2009)

Prof. Goutam K. Patra  
Head of the Department



Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
Bilaspur-495009, C.G.

## FORWARDING CERTIFICATE

This is to certify that *Miss Payal Thakur* has completed the project work entitled as "*Synthesis and Characterization of Various Azobenzene Derivatives from Nitroarenes*" under the supervision of *Dr. Bijaneswar Mondal* for the partial fulfilment of required degree of "*Master of Science in Chemistry*".

To the best of my knowledge and belief of the project

- 1) is original and has not been submitted anywhere for award of any degree.
- 2) Fulfills the requirement of the Ordinance relating to the M.Sc. degree of the university.

I recommend the project report be forwarded to the respective examiners for evaluation.

Date: 04/09/2024

Place: Bilaspur, C.G.

Signature of the HoD

सहायक प्राध्यापक विभाग  
Deptt. of Chemistry  
गुरु घासीदास विश्वविद्यालय,  
गुरु-गहासिदास विश्वविद्यालय,  
बिलासपुर 495009 (छ.ग.)  
Bilaspur 495009 (C.G.)

## **TABLE OF CONTENTS**

<b>Entry</b>	<b>Content</b>	<b>Page No.</b>
1.	Introduction	7-8
2.	Classification Of Azo Derivatives	8-10
3.	Applications Of Azo Derivatives	10-12
4.	Conventional Methods for Synthesis of Azo Derivatives	12-15
5.	Our Methods for Synthesis of Azo Derivatives	15-16
6.	Results And Discussions	16-19
7.	Conclusion	19
8.	References	20-21

**BARBITURIC ACID PADLOCKED Ni(II)**  
**MACROCYCLES**

A Project submitted in partial fulfilment for the requirements for the Degree of  
**MASTERS OF SCIENCE IN CHEMISTRY**

SUBMITTED BY:

**POULOMI BHADRA**

EXAMINATION ROLL NO.: 22104135

M.Sc. INORGANIC CHEMISTRY(4<sup>th</sup>)



DEPARTMENT OF CHEMISTRY

GURU GHASIDAS VISHWAVIDYALAYA

2022-2024

Under the Supervision of

**PROF. GOUTAM KUMAR PATRA**

GURU GHASIDAS VISHWAVIDYALAYA

BILASPUR, KONI, C.G.

~ 1 ~





DEPARTMENT OF CHEMISTRY  
GURU GHASIDAS VISHWAVIDYALAYA  
BILASPUR, KONI, C.G.

### CERTIFICATE

This certifies that Miss POULOMI BHADRA a student enrolled, **Examination Roll Number: 22104135** in the IV Semester of the Master of Science in Inorganic Chemistry program at the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, has compiled the project titled "**BARBITURIC ACID PADLOCKED Ni(II) MACROCYCLES**" based solely on literature research for the partial fulfilment of the requirements for the award of the Master of Science degree in Inorganic Chemistry at Guru Ghasidas Vishwavidyalaya. The student is solely responsible for any instances of plagiarism, and the teachers of the Department of Chemistry bear no responsibility for any such issues arising from this report.

I wish for her every success in the future.

Signature 

PROF. GOUTAM KUMAR PATRA  
(Head of Department of Chemistry)  
Guru Ghasidas Vishwavidyalaya  
Bilaspur, Koni, C.G.



**DEPARTMENT OF CHEMISTRY**

**GURU GHASIDAS UNIVERSITY, BILASPUR**

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

---

**A Project**

**On**

**WATER REMEDIATION USING RHIZOME PLANT  
DERIVED ACTIVATED CARBON**

**Master of Science IV Semester**

**Session 2022-24**

**SUPERVISED BY**

**Dr. SUNIL KUMAR SINGH**

**(ASSOCIATE PROFESSOR)**

**DEPARTMENT OF CHEMISTRY**

**GURU GHASIDAS CENTRAL UNIVERSITY**

**BILASPUR (C.G.)**

**SUBMITTED BY**

**PRAGYA SAHU**

**M.Sc. 4<sup>th</sup> Sem**

**ROLL NO. - 22104136**

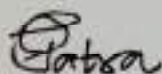
*AS*  
*04/09/24*

# GURU GHASIDAS UNIVERSITY, BILASPUR

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

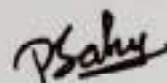
## FORWARDING CERTIFICATE

This is to certify that the project work entitled "**WATER REMEDIATION USING RHIZOME PLANT DERIVED ACTIVATED CARBON**" submitted by this project is submitted for the partial fulfilment of requirements for the degree of M.Sc. in Chemistry and forwarded to the examiner for evaluation. I wish her every success in his life.



(Signature of H.O.D)

**HEAD**  
**DEPARTMENT OF CHEMISTRY**  
Deptt. of Chemistry  
गुरु घासीदास विश्वविद्यालय,  
Guru Ghasidas Vishwavidyalaya,  
बिलासपुर 495009 (छ.ग.)  
Bilaspur 495009 (C.G.)



(Signature of Student)

**PRAGYA SAHU**



*Synthesis of Novel Acidic Ionic liquid, [AcMIm]<sub>2</sub>FeCl<sub>4</sub> for  
Alkylation of Aromatic Hydrocarbon*

*A Project Submitted to*

*Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)*



*In Partial Fulfilment For the Award of the Degree*

*Of*

*Master of Science in Chemistry*

*By*

*Pratibha Gabel*

*Under the Guidance of*

*Dr. Subhash Banerjee*

*Research Centre*

*Department of Chemistry*

*Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)*

*September 2024*

*Ag*  
*04/09/24*



## FORWARDING CERTIFICATE

This is to certify that **Ms. Pratibha Gabel** has carried out this research-based project in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur, (C.G.) on the topic "*Synthesis of Novel Acidic Ionic liquid, [AcMIm]<sub>2</sub>FeCl<sub>4</sub> for Alkylation of Aromatic Hydrocarbon*". This project is submitted for the partial fulfilment of the requirement for the degree of **M. Sc. in Chemistry** and forwarded to the examiner for evaluation.

I wish every success in her life.

---

Signature of the HOD

Dr. Gautam Kumar Patra

Professor

Department of Chemistry, G.G.V., Bilaspur, (C.G.)

## Table of Content

Chapter No.	Content	Page No.
	Abstract	
1.	Introduction of green chemistry	1 - 2
2.	Twelve principles of green chemistry	3 - 6
3.	Green solvents in organic synthesis	7 - 10
4.	Ionic Liquids	11 - 12
5.	Advantages of Ionic Liquids	13 - 15
6.	Literature review	16 - 27
7.	Synthesis of Ionic Liquid	28 - 29
8.	Application of Ionic Liquid in organic reaction	30 - 31
9.	Results and discussion	32 - 33
10.	Conclusion	34 - 35
11.	References	36 - 39



A LITERATURE BASED PROJECT REPORT

ON

**SYNTHESIS OF 2D  $\text{NiS}_2$  MATERIAL**



**SUBMITTED FOR**

**PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE DEGREE OF  
MASTER OF SCIENCE IN CHEMISTRY**

**SESSION 2022-2024**

**GUIDED BY**

Dr. Ashish kumarsingh

Professor

Department Of Chemistry

Guru Ghasidas university

Bilaspur (C.G.)

**SUBMITTED BY**

Preeti

MSc 4<sup>th</sup> Sem

Roll No. 22104138

Enroll No-GGV/22/07236

**DEPARTMENT OF CHEMISTRY**

**GURU GHASIDAS UNIVERSITY, BILASPUR (C.G.) 495009, INDIA**

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

AS  
04/09/24

## FORWARDING CERTIFICATE

This is to certify that Ms. Preeti has carried out this literature survey-based project in the Department of Chemistry , Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) on the topic "SYNTHESIS OF 2D NiS<sub>2</sub> MATERIAL" . This project is submitted for the partial fulfilment of requirements for the degree of MSc in Physical Chemistry and forwarded for evaluation.

I wish her every success in future.



Prof. G.K. Patra

04-09-24

Head , Department of Chemistry,

Guru Ghasidas Vishwavidyalaya

Bilaspur (C.G.) 495009, India

## CONTENT

S.NO.	TITLE
1.	Abstract
2.	Introduction
3.	Historical background
4.	Synthesis method
5.	Recent development
6.	Properties of $\text{NiS}_2$
7.	Application of $\text{NiS}_2$
8.	XRD Characterisation
9.	Conclusion
10.	Refference



A  
PROJECT REPORT  
ON

SYNTHESIS OF PYRENE - BASED SCHIFF  
- BASE FOR ANALYTICAL APPLICATION

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



Department of Chemistry

GURU GHASIDAS VISHWAVIDYALAYA  
(A Central University A<sup>++</sup> Grade Accredited By NAAC)

2022-2024

Supervisor:

Prof. G. K. PATRA  
GURU GHASIDAS VISHWAVIDYALAYA  
(A CENTRAL UNIVERSITY A<sup>++</sup> GRADE  
ACCREDITED BY NAAC) BILASPUR, C.G.

Submitted by:

PRIYANSHI  
M. Sc. Inorganic Chemistry,  
IV<sup>th</sup> Semester  
Roll No. 22104139

AG

**Prof. GOUTAM KUMAR PATRA**  
**PROFESSOR,**  
**DEPARTMENT OF CHEMISTRY**  
Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G.  
(A central University A\*\* Grade Accredited By NAAC)  
BILASPUR, C.G.)



### CERTIFICATE

This is to certify that PRIYANSHI (M.Sc. Inorganic Chemistry, IV<sup>th</sup> Semester) has been completed a project on " SYNTHESIS OF PYRENE-BASED SCHIFF-BASE FOR ANALYTICAL APPLICATION ".

This project is submitted for the partial fulfillment of required degree in chemistry.

I wish for his every success in the future.

**Signature**

**Prof. GOUTAM KUMAR PATRA**  
Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
(A central UNIVERSITY A\*\* Grade Accredited By  
NAAC) BILASPUR C.G.

## CONTENTS

	PAGE NO.
1. ABSTRACT	1
2. INTRODUCTION	1-10
2.1. SCHIFF BASE	1
2.2. CHEMO-SENSOR	3
3. LITERATURE REVIEW	9-12
4. AIMS AND OBJECTIVES	13
5. EXPERIMENTAL PART	13-17
5.1. MATERIALS AND GENERAL INFORMATION	13
5.2. SYNTHESIS AND CHARACTERISATION	13-15
5.2.1. Synthesis and characterization of (1E,2E)-1,2-diphenyl-1,2-bis (((E)-pyren-1-ylmethylene)hydrazineylidene)ethane (DPMHPMHE)	14
5.3. ION SENSING	17
5.3.1. Photo physical measurements	17
5.4. STOICHIOMETRY DETERMINATION	17
5.4.1. Job's plot measurements	17
6. RESULTS AND DISCUSSION	17-20
6.1. Cation sensing	17
6.1.1. UV-Vis spectroscopic detection	17
6.1.2. Fluorometric studies of the probe L	20
7. CONCLUSION	20
8. REFERENCES	21-23



**Synthesis & Characterization Of Carrageenan Wrapped CuO Nanoparticles  
via Chemical Precipitation Method**

*A Project Submitted to*

***Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)***



*In Partial Fulfilment For the Award of the Degree*

***Of***

***Master of Science in Chemistry***

***By***

***Ravindra Kumar Maravi***

*Under the Guidance of*

***Dr. Arti Srivastava, Associate Professor***

***Department of Chemistry***

***Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)***

*September 2024*

© Guru Ghasidas Vishwavidyalaya, Bilaspur, (C.G.), India, 2024.

**ALL RIGHT RESERVED**



## DECLARATION BY THE CANDIDATE

I the undersigned solemnly declare that the report of the major project entitled "*Synthesis & Characterization Of Carrageenan Wrapped CuO Nanoparticles Via Chemical Precipitation Method*" based on my work carried out during my study in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur under the supervision of **Dr. Arti Srivastava**. I assert that the statements made and conclusions drawn are an outcome of my research work.

**Signature of the Candidate**

Ravindra Kumar Maravi

Roll No.: 22104141

Enrolment No.: GGV/22/07239

**Signature of the Supervisor**

Dr. Arti Srivastava

Associate Professor



Forwarded to Guru Ghasidas Vishwavidyalaya, Bilaspur, (C.G.), India

**CERTIFICATE BY THE HEAD OF THE DEPARTMENT**

The M. Sc. Project entitled **"Synthesis & Characterization Of Carrageenan Wrapped CuO Nanoparticles Via Chemical Precipitation Method"** submitted by **Mr. Ravindra Kumar Maravi** (Roll No. 22104141, Enrolment No.: GGV/22/07239) has been examined by the undersigned as a part of the examination and is hereby recommended for the award of **Master of Science** in the Department of Chemistry of Guru Ghasidas Vishwavidyalaya, Bilaspur, (C.G.).

Signature of the Head of Department

Date: 04/03/24



## Table of Content

S.No	Content	Page No.
	Abstract	
1.	Introduction	9-10
2.	Experimental	11-13
3.	Results and discussion	14-16
4.	Applications	17
5.	Conclusion	18
6.	References	19-22

**“Imidazole based Optical chemosensor for detection of  $\text{Fe}^{3+}$  ion”**

A Project submitted in partial fulfilment of the requirements for the Degree of

**MASTERS OF SCIENCE IN CHEMISTRY**

SUBMITTED BY

**REENA GOYAL**

EXAMINATION ROLL NO.: 22104142

M.Sc. INORGANIC CHEMISTRY(4<sup>th</sup>)



DEPARTMENT OF CHEMISTRY

**GURU GHASIDAS VISHWAVIDYALAYA**

**2022-2024**

Under the Supervision of

**PROF. GOUTAM KUMAR PATRA**

**GURU GHASIDAS VISHWAVIDYALAYA**

**BILASPUR, KONI, C.G.**

~ 1 ~



DEPARTMENT OF CHEMISTRY  
GURU GHASIDAS VISHWAVIDYALAYA  
BILASPUR, KONI, C.G.

### CERTIFICATE

This certifies that Miss **REENA GOYAL**, a student enrolled, **Examination Roll Number: 22104142** in the IV Semester of the **Master of Science in Inorganic Chemistry** program at the **Department of Chemistry, Guru Ghasidas Vishwavidyalaya**, has compiled the project titled "**Imidazole based Optical chemosensor for detection of Fe<sup>3+</sup> ion**" based solely on literature research for the partial fulfilment of the requirements for the award of the **Master of Science degree in Inorganic Chemistry** at **Guru Ghasidas Vishwavidyalaya**. The student is solely responsible for any plagiarism, and the teachers of the Department of Chemistry bear no responsibility for any such issues arising from this report.

I wish for her every success in the future.

  
Signature

**PROF. GOUTAM KUMAR PATRA**

*(Head of Department of Chemistry)*

Guru Ghasidas Vishwavidyalaya

Bilaspur, Koni, C.G.

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



s.no	Topic	Page no.
1	Introduction	1-2
2	Literature review	2-3
3	Experimental Section	4-6
4	Result and discussion	6-8
5	Conclusion	9
6	Refrence	9-13

6

# **Pathways to Green Energy: A Review of Hydrogen Fuel Production and Its Environmental Implications**

**A Project Report Submitted**

**to**

**Guru Ghasidas Vishwavidyalaya, Bilaspur**



*In partial fulfillment of the requirement for the degree of*

**Master of Science  
in  
Chemistry**

**Submitted by**

**Ritik Ekka**

**Supervisor**

**Dr. Bharat Lal Sahu**

**Department of Chemistry**

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

**(2024)**


# Guru Ghasidas Vishwavidyalaya

(A Central University established under Central Universities Act 2009)

Dr. G. K. Patra  
Professor & Head  
M.Sc., Ph.D.

Former Dean, School of  
Physical Sciences



Department of Chemistry  
Guru Ghasidas University  
Bilaspur-495009, CG, India  
 [patra29in@yahoo.co.in](mailto:patra29in@yahoo.co.in)  
+91-7587312992  
+91-9433378801

Ref. No.

Bilaspur, Date:

## **FORWARDING CERTIFICATE**

This is to certify that **Ritik Ekka** has completed the project work entitled "**Pathways to Green Energy: A Review of Hydrogen Fuel Production and Its Environmental Implications**" under the supervision of **Dr. Bharat Lal Sahu**, for the partial fulfillment of required degree of "**Master of Science**" and forwarded to the Examiner for evaluation.

I wish his every success in the future life.

Date: 4-9-24

Place: Bilaspur

Signature of the Head

अध्यक्ष / Head  
रसायन शास्त्र विभाग  
Dept. of Chemistry  
गुरु घासीदास विश्वविद्यालय,  
Guru Ghasidas Vishwavidyalaya,  
बिलासपुर 495009 (छ.प.)  
Bilaspur 495009 (C.G.)



## **INDEX**

<b>S. No.</b>	<b>Content</b>	<b>Page No.</b>
1.	Summary	1
2.	Introduction	1-6
3.	Technology for Hydrogen Production	6-26
4.	Results and discussion	27-28
5.	Challenges and Perspective	28-29
6.	Conclusion	29
7.	References	30-33

---

# Synthesis and Characterization of Alumina nanoparticles

( $\text{Al}_2\text{O}_3$ ) via sol-gel method



Dissertation submitted in  
Partial fulfilment for the Degree of

MASTER OF SCIENCE  
in  
CHEMISTRY

By

**Samikshya Nanda**

M. Sc. Chemistry IV<sup>th</sup> Semester

Roll. No. 22104144

Enrolment No. GGV/22/07241

Under the Supervision of

**Dr. Arti Srivastava**

Associate Professor

DEPARTMENT OF CHEMISTRY  
GURU GHASIDAS VISHWAVIDYALAYA  
KONI- BILASPUR 495009 (C.G.)  
Session 2023-24

## DECLARATION BY THE CANDIDATE

I, **Samikshya Nanda**, hereby declare that the dissertation entitled "**Synthesis and Characterization of Alumina nanoparticles**" Submitted to the Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur for partial fulfilment of the requirements for the award of the degree of Master of Science (M. Sc.) in Chemistry. The work contained in the thesis is original and has been done by me under the supervision of Dr. Arti Srivastava (Associate Professor). To the best of my knowledge, the work has not been submitted to any other institution for any other Degree/ Diploma. I have followed the guidelines provided by the university in writing the thesis. The assistance and help received during the course of this investigation have been duly acknowledged.

Date: 04-Sept-2024

Place: Bilaspur

*Samikshya Nanda*  
**SAMIKSHYA NANDA**  
Roll No. – 22104144  
Enrolment No. – GGV/22/07241  
M.Sc. Chemistry IV<sup>th</sup> Semester



## CERTIFICATE OF THE SUPERVISOR

This is to certify that the work contained in the dissertation entitled "**Synthesis and Characterization Alumina nanoparticles**" submitted to the Department of Chemistry of Guru Ghasidas Vishwavidyalaya, Koni- Bilaspur (C.G.) by **Ms. Samikshya Nanda** (Roll No. 22104144) for the award of the degree of M. Sc. (Chemistry), is a record of bonafide research work carried out by her under my supervision. The contents embodied in the dissertation have not been submitted for the award of any other degree or diploma in any other university.

Date: 04 - Sept - 2024

Place: Bilaspur



Signature  
Head of the Department



Signature of Supervisor  
**Dr. Arti Srivastava**  
(Associate Professor)

## TABLE OF CONTENTS:

Chapter	Title	Pages
1	Abstract	07
2	Introduction	08-10
3	Experimental Procedure	11-12
4	Results and Discussion	13-17
5	Applications	18
6	Conclusion	19
7	References	20-23

# **Optimizing Cultivation and Production Techniques for Oyster Mushroom**

**A dissertation submitted in partial fulfilment of the requirement  
for the degree of Masters of Science (MSc.) in Chemistry**



By

Satyapriya Gahare

(EnrollmentNo.GGV/22/07242)

Under Supervision of

Dr. Khemchand Dewangan

Professor

**GURU GHASIDAS VISHWAVIDYALAYA**

**BILASPUR , 495009, CG, INDIA**

AG  
04/09/24



## **CERTIFICATE**

This is to certify that the thesis entitled "Optimizing Cultivation and Production Techniques for Oyster Mushroom" is the work carried by Miss. Satyapriya Gahare (Enrollment no. GGV/22/07242) of department of chemistry, Guru Ghasidas vishwavidyalaya, Bilaspur (C.G) is a verified record of the work completed under my direction and supervision. The thesis work has not been submitted to another university or organization for a degree or professional certification. She wrote this thesis alone, and it is free of plagiarism and clear enough in its grammar to be read. I certify that, unless otherwise mentioned in this thesis, the work contained within it is entirely my own original research.

Date: 4<sup>th</sup> Sept 24

Place: GGV, Bilaspur

  
Dr. Khemchand Dewangan

Project Supervisor

Department of Chemistry  
Guru Ghasidas vishwavidyalaya

Bilaspur-495009, CG, India

  
Prof. G. K. Patra 04/09/24

Head of Department

Department of Chemistry  
Guru Ghasidas vishwavidyalaya  
Bilaspur-495009, CG, India

अध्यक्ष / Head  
रसायन शास्त्र विभाग  
Deptt. of Chemistry  
गुरु घासीदास विश्वविद्यालय,  
Guru Ghasidas Vishwavidyalaya,  
बिलासपुर 495009 (छ.ग.)  
Bilaspur 495009 (C.G.)

**Statement**  
**Certificate**  
**Acknowledgement**

**Chapter 1. Introduction**

- 1.1 What is Mushroom
- 1.2 Scientific Classification
- 1.3 Morphology
- 1.4 Parts of mushroom
- 1.5 Safe and Poisonous Mushroom
- 1.6 Characteristic features

**Chapter 2. Objective of our project**

- 2.1 Different Species of oyster mushroom
- 2.2 Importance of mushroom

**Chapter 3 Production Technology**

- 3.1 Agroclimatic Requirement
- 3.2 Cultivation Technology
- 3.3 Spawn Preparation
- 3.4 Substrate Preparation

**Chapter 4. Material and Methodology Used**

- 4.1 Pure Culture preparation
- 4.2 Mother Spawn preparation
- 4.3 Materials Required
- 4.4 Instruments / Device Required

**Discussion**





### CERTIFICATE

This is to certify that the thesis entitled "Perovskite nanocrystal and its application" is the work carried by Mr. Shiba Prasad (Enrollment no. GGV/22/07244) of department of chemistry, Guru Ghasidas University, Bilaspur (C.G) is a verified record of the work completed under my direction and supervision. The thesis work has not been submitted to another university or organization for a degree or professional certification. She wrote this thesis alone, and it is free of plagiarism and clear enough in its grammar to be read. I certify that, unless otherwise mentioned in this thesis, the work contained within it is entirely my own original research.

Date: 4<sup>th</sup> Sept 24

Place: GGU, Bilaspur

  
Dr. Khemchand Dewangan

Project Supervisor

Department of Chemistry

Guru Ghasidas University

Bilaspur-495009, CG, India

  
Prof. G. K. Patra

Head of Department

Department of Chemistry

Guru Ghasidas University

Bilaspur-495009, CG, India

## CONTENT

Statement Certificate

Acknowledgement

Abstract

Chapter 1. Introduction

1.1 Solar Cell

1.2 Family of crystalline CsPbCl<sub>3</sub> nanocrystals

1.3 Structure of CsPbCl<sub>3</sub>

Chapter 2. Properties of Cesium lead halide perovskite

2.1 Electronic Properties

2.2 Defect Tolerant Nature

Chapter 3. Synthetic Methodology

3.1 Materials

3.2 Methods

Chapter 4. Characterization Techniques and Result discussion

4.1 UV- Visible Spectra analysis

4.2 XRD analysis

Chapter 5. APPLICATION

5.1 Solar Cell

Chapter 6. CONCLUSION

6.1 Future Prospects

6.2 REFERENCE

# Literature Review On Synthesis On Metal Nanoparticles and their Applications

A Project Report Submitted

to

Guru Ghasidas Vishwavidyalaya, Bilaspur



*In partial fulfillment of the requirement for the degree of*

Master of Science  
in  
Chemistry

Submitted by

Shristi Rai

Supervisor

Prof. Manorama

Department of Chemistry

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

(2024)



# Guru Ghasidas Vishwavidyalaya

(A Central University established under Central Universities Act 2009)


Professor  
Manorama



Department of Chemistry

Guru Ghasidas University  
Bilaspur-495009, CG, India

 [manoramabhu@gmail.com](mailto:manoramabhu@gmail.com)

 +91-7587401982

Ref. No.

Bilaspur, Date:

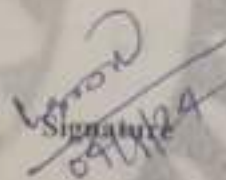
## CERTIFICATE

*This is to certify that **Shristi Rai** has completed the project work entitled "**Literature Review on Synthesis of Metal Nanoparticles and their Applications**" under my supervision for the partial fulfillment of required degree of "**Master of Science**".*

*I wish his every success in the future life.*

Date: 04/05/24

Place: Bilaspur

  
Signature  
04/05/24

# Guru Ghasidas Vishwavidyalaya

(A Central University established under Central Universities Act 2009)

Dr. G. K. Patra

Professor & Head

M.Sc., Ph.D.

Former Dean, School of  
Physical Sciences



Department of Chemistry

Guru Ghasidas University

Bilaspur-495009, CG, India

patra29@yahoo.co.in

+91-7587312992

+91-9433378801

Ref. No.

Bilaspur, Date:

## FORWARDING CERTIFICATE

This is to certify that Shristi Rai has completed the project work entitled "*Literature Review on Synthesis of Nanoparticles and their Applications*" under the supervision of Prof. Manorama., for the partial fulfillment of required degree of "*Master of Science*" and forwarded to the Examiner for evaluation.

I wish his every success in the future life.

Date: 04/03/24

Place: Bilaspur

Signature of the Head

अध्यक्ष/Head

रासायनिक विभाग

Dept. of Chemistry

गुरु गhasidas विश्वविद्यालय,

गुरु गhasidas विश्वविद्यालय,

बिलासपुर-495009 (C.G.)

बिलासपुर-495009 (C.G.)

# **Chemical Profiling and Biodiversity Assessment of Medicinal Plants in a GGV Campus: A Case Study**

**A Project Report Submitted**

**to**

**Guru Ghasidas Vishwavidyalaya, Bilaspur**



*In partial fulfillment of the requirement for the degree of*

**Masters of Science  
in  
Chemistry**

**Submitted by**

**Shivangi Mishra**

**Supervisor**

**Dr. Bharat Lal Sahu**

**Department of Chemistry**

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

**(2024)**



# Guru Ghasidas Vishwavidyalaya

(A Central University established under Central Universities Act 2009)

Dr. G. K. Patra  
Professor & Head  
M.Sc., Ph.D.

Head department of  
Chemistry



Department of Chemistry  
Guru Ghasidas University  
Bilaspur-495009, CG, India



[patra29in@yahoo.co.in](mailto:patra29in@yahoo.co.in)

+91-7587312992

+91-9433378801

Ref. No.

Bilaspur, Date:

## FORWARDING CERTIFICATE

This is to certify that **Shivangi Mishra** has completed the project work entitled "**Chemical Profiling and Biodiversity Assessment of Medicinal Plants in a GGV Campus: A Case Study.**" under the supervision of **Dr. Bharat Lal Sahu**, for the partial fulfillment of required degree of "**Masters of Science**" and forwarded to the Examiner for evaluation.

I wish his every success in the future life.

Date: 4<sup>th</sup> Sept 2024

Place: Bilaspur

Signature of the Head  
अध्यक्ष / Head

रसायन शास्त्र विभाग  
Dept. of Chemistry  
गुरु घासीदास विश्वविद्यालय,  
गुरु गhasidas Vishwavidyalaya,  
बिलासपुर 495009 (छ.ग.)  
Bilaspur 495009 (C.G.)

## **INDEX**

<b>S. No.</b>	<b>Content</b>	<b>Page No.</b>
1.	<b>Summary</b>	1
2.	<b>Introduction</b>	1-2
3.	<b>Biodiversity of plants in GGV campus</b>	3-8
4.	<b>Biodiversity of medicinal plants</b>	8-13
5.	<b>Phytochemicals in medicinal plants</b>	14-21
6.	<b>Result &amp; discussion</b>	21
7.	<b>Conclusion</b>	21-22
8.	<b>Refrence</b>	22-26





DEPARTMENT OF CHEMISTRY

**GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR**

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

A Project Report

On

**"Synthesis and characterization of Zn(II) complexes with Schiff bases"**

Master of Science IV Semester

Session: 2023 – 2024

**SUBMITTED TO**

Dr. NIRAJ KUMARI  
(ASSISTANT PROFESSOR)  
DEPARTMENT OF CHEMISTRY

**SUBMITTED BY**

SHRAVYA KUMAR SINGH  
M.Sc. IV SEMESTER  
ROLL NO. 22104149

AS





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 and characterization of Zn(II) complexes with Schiff bases**" 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 him every success in his life.

  
(Signature of H.O.D.)

PROF. G.K. PATRA  
अध्यक्ष/Head  
रसायन शास्त्र विभाग  
HEAD  
Deptt. of Chemistry  
गुरु गणेशदास विश्वविद्यालय  
(DEPARTMENT OF CHEMISTRY)  
Guru Ghasidas Vishwavidyalaya  
बिलासपुर 495009 (छ.ग.)  
Bilaspur 495009 (C.G.)

  
(Signature of Student)

SHRAYYA KUMAR SINGH



## TABLE OF CONTENTS

<b>S.No.</b>	<b>Topic</b>	<b>Pg No.</b>
01	Abstract	1
02	Introduction	2-4
03	Experimental section	5-6
04	Result and discussion	7-10
05	Conclusion	10
06	Reference	10-11

A  
Literature Based Project Report  
On

“ELECTROCHEMICAL SENSORS FOR THE DETECTION OF MYOGLOBIN”

A Project Thesis Submitted for  
Partial Fulfilment of the Requirement for the Degree of  
M.Sc. in Chemistry

Session - 2023-2024

UNDER THE GUIDANCE OF

Dr. Uday Pratap Azad  
(Assistant Professor)  
Department of Chemistry

SUBMITTED BY

SIDDHARTH MISHRA  
M.Sc. (Chemistry)  
IV Semester

Roll No. 22104151



Guru Ghasidas Vishwavidyalaya  
(A Central University)

Bilaspur (C.G.) 495001, 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, **SIDDHARTH MISHRA** has carried out this literature survey based on project in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur(C.G.) on the topic "**ELCTROCHEMICAL SENSORS FOR THE DETECTION OF MYOGLOBIN**" This project submitted for the partial fulfilment of required degree of M.Sc. in Chemistry and forwarded to examiner for evaluation.

I wish every success in his life.

A handwritten signature in black ink, appearing to read 'Goutam'.

**Prof. Goutam Kumar Patra**  
(Head, Department of chemistry)  
Guru Ghasidas Vishwavidyalaya  
Bilaspur (C.G.)

अध्यक्ष / Head  
रासायनिक विभाग  
Department of Chemistry  
गुरु गhasidas विश्वविद्यालय  
बिलासपुर (छ.ग.)  
बिलासपुर 495009 (छ.ग.)  
बिलासपुर 495009 (C.G.)



# CONTENT

S No	CONTENT
	ABSTRACT
1	INTRODUCTION
2	REVIEW OF LITERATURE
3	METHODOLOGY
4	ANALYSIS
5	DISCUSSION
6	CONCLUSION
7	REFERENCES

***Effective removal of malachite green dye from Camellia  
Sinensis***

***A Project Report Submitted to  
Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G.***



*This dissertation is submitted in partial fulfillment of the  
requirements for the degree of*

**Master of Science**

**in**

**Chemistry**

Submitted by

**SONU KUMAR**

M.Sc. 4<sup>th</sup> Sem (Physical chemistry)

Enrolment No. GGV/22/07249

Roll No. 22104152

Supervisor

**Prof. Charu Arora**

Department of Chemistry

Guru Ghasidas Vishwavidyalaya

*AG*  
*04/09/24*



# Guru Ghasidas Vishwavidyalaya

(A Central University established under Central Universities Act 2009)

Prof Charu Arora

Professor of Dept.  
Chemistry



Department of Chemistry

Guru Ghasidas Vishwavidyalaya  
Bilaspur-495009, C.G.

## CERTIFICATE

This is to certify that *Mr. Sonu Kumar* has completed the project dissertation entitled "*Effective removal of malachite green dye from Camellia Sinensis ash*" under my supervision for the partial fulfilment of required degree of "*Master of Science in Chemistry*". Throughout this project, he has demonstrated diligence, a methodical approach, and a sincere commitment to collecting and reviewing relevant literature. In the process, he has gained a comprehensive understanding of various aspects of chemical science related to the topic at hand.

To the best of my knowledge and belief of the project

- 1) It is original and has not been submitted anywhere for award of any degree.
- 2) Fulfils the requirement of the Ordinance relating to the M.Sc. degree of the university.

I wish him every success in the future life.

Date: 4.9.24

Place: Bilaspur, (C.G)

*Charu Arora*  
Signature of the Supervisor

# Guru Ghasidas Vishwavidyalaya

(A Central University established under Central Universities Act 2009)

Prof. Goutam K. Patra  
Head of the Department



Department of Chemistry  
Guru Ghasidas Vishwavidyalaya  
Bilaspur - 495009, C.G.

## FORWARDING CERTIFICATE

This is to certify that Mr. Sonu Kumar has completed the project work entitled as *"Effective removal of malachite green dye from Camellia Sinensis ash"* under the supervision of Prof Charu Arora, for the partial fulfilment of required degree of ***"Master of Science in Chemistry"***.

To the best of my knowledge and belief of the project

- 1) It is original and has not been submitted anywhere for award of any degree.
- 2) Fulfils the requirement of the Ordinance relating to the M.Sc. degree of the university.

I recommend the project report be forwarded to the respective examiners for evaluation.

Date: 4/9/24

Place: Bilaspur, C.G.

  
Signature of HoD  
अध्यक्ष/Head

रसायन शास्त्र विभाग  
Deptt. of Chemistry  
गुरु घासीदास विश्वविद्यालय,  
Guru Ghasidas Vishwavidyalaya,  
बिलासपुर-495009 (छ.ग.)  
Bilaspur 495009 IC G.



**DEPARTMENT OF CHEMISTRY**

**GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR**

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

---

**A Project Report**

**On**

**"SYNTHESIS OF COPPER OXIDE NANOPARTICLES CAPPING WITH  
POLYVINYL ALCOHOL AND ITS APPLICATION"**

**Master of Science IV Semester**

**Session: 2023 – 2024**

**SUBMITTED TO**

**Dr. BHASKAR SHARMA**

**(ASSISTANT PROFESSOR)**

**DEPARTMENT OF CHEMISTRY**

**GURU GHASIDAS VISHWAVIDYALAYA**

**BILASPUR (C.G.)**

**SUBMITTED BY**

**SUMIT RANJAN DAS**

**M.Sc. IV SEMESTER**

**ROLL NO: 22104153**

*AG*  
*04/09/24.*





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 COPPER OXIDE NANOPARTICLES CAPPING WITH POLYVINYL ALCOHOL 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 him every success in his life.

  
(Signature of H.O.D.) 09-09-24

Dr. G. K. Prasad  
HEAD  
रसायन शास्त्र विभाग  
Dept. of Chemistry  
गुरु गणेश विश्वविद्यालय  
(DEPARTMENT OF CHEMISTRY)  
गुरु गणेश विश्वविद्यालय  
बिलासपुर 495009 (B.I.)  
बिलासपुर 495009 (B.I.)

  
(Signature of Student)

SUMIT RANJAN DAS

## TABLE OF CONTENTS

S.No.	Topic	Pg No.
01	Introduction	7-16
02	<u>SYNTHESIS OF COPPER OXIDE NANOPARTICLES AND PVA-CuO</u>  a) Chemicals Required. b) Synthesis. c) reaction	16-18
03	APPLICATION OF COPPER OXIDE NANO PARTICLES AND PVA-CuO NANOPARTICLES	19-20
04	RESULT AND DISCUSSION  a) characterization	21-22
05	CONCLUSION	23
06	REFERENCES	24-26

**A DISSERTATION WORK**  
**ON**  
**“SYNTHESIS AND CHARACTERIZATION OF**  
**CU(II) COMPLEX WITH SCHIFF BASES”**



**DEPARTMENT OF CHEMISTRY**  
**GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR**

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

**SUBMITTED TO**

**DR. NIRAJ KUMARI**

**(ASSITANT PROFESSOR)**

**DEPARTMENT OF CHEMISTRY**

**SUBMITTED BY**

**SUPRIYA RAI**

**M.SC. IV SEMESTER**

**ROLL NO.22104154**

*Handwritten signature*





**DEPARTMENT OF CHEMISTRY**

**GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR**

**CERTIFICATE**

THIS IS TO CERTIFY THAT SUPRIYA RAI OF M. Sc IV SEMESTER DEPARTMENT OF CHEMISTRY OF GURU GHASIDAS UNIVERSITY BILASPUR (C.G.) (ENROLLMENT NO. GGV/19/7215). ON THE TOPIC "SYNTHESIS AND CHARACTERIZATION OF CU(II) COMPLEX WITH SCHIFF BASES". SHE HAS SUCCESSFULLY COMPLETED HER DISSERTATION WORK. SHE HAS TAKEN PROPER CARE AND SHOWN AT MOST SINCERITY IN THIS PROJECT'S COMPLETION. I CERTIFY THAT THIS PROJECT IS UP TO MY EXPECTATIONS AND RECOMMEND THIS WORK BE FORWARDED TO THE RESPECTIVE EXAMINER FOR EVALUATION.

(SIGNATURE OF THE GUIDE)

**DR. NIRAJ KUMARI**

**(ASSISTANT PROFESSOR)**

(SIGNATURE OF STUDENT)

**SUPRIYA RAI**

(SIGNATURE OF HOD)

**Prof. G.K. PATRA**

अध्यक्ष (Head)  
(HEAD)  
रसायन शास्त्र विभाग  
Deptt. of Chemistry  
गुरु घासीदास विश्वविद्यालय,  
Guru Ghasidas Vishwavidyalaya  
बिलासपुर 495009 (छ.ग.)  
Bilaspur 495009 (C.G.)

## **CONTENTS**

<b>S.No</b>	<b>TOPIC</b>	<b>PAGE NO</b>
1	ABSTRACT	1
2	INTRODUCTION	2-6
3	MECHANISM	6-7
4	EXPERIMENTAL SECTION (a)Material and physiochemical methods (b)Preparation (c)Synthesis of ligand (d)Synthesis of complex	7-8
5	RESULT AND DISCUSSION	8
6	SPECTRAL CHARACTERIZATION	8-10
7	APPLICATION	11
8	CONCLUSION	12
9	REFERENCE	12-13



**A Project Report**

**On**

***Synthesis And Characterization Of  $\text{Fe}_2\text{O}_3$ -Ag Composite Nanoparticles***



**Submitted For**

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

**Supervised By**

Dr. Arti Srivastava  
Associate Professor  
Department Of Chemistry  
Guru Ghasidas Vishwavidyalaya  
Bilaspur - 495009 (C.G.)

**Submitted By**

Suresh Kumar Jena  
M.Sc. IV Semester  
Roll No. 22104155  
Enroll. No. GGV/22/07251

**2022-2024**

**Department of Chemistry**

**Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) Session**



# Guru Ghasidas Vishwavidyalaya

(A Central University established under Central Universities Act 2009)

Dr. Arti Srivastava

Associate Professor



Department of Chemistry

Guru Ghasidas University

Bilaspur-495009, India

## CERTIFICATE

*This is to certify that **Suresh Kumar Jena** has completed the project dissertation entitled as " **Synthesis And Characterization Of Fe<sub>2</sub>O<sub>3</sub>-Ag Composite Nanoparticles**" under my supervision for the partial fulfillment of required degree of "**Master of Science in Chemistry**". He has worked diligently, methodically and also collected the literature very sincerely. During this project work he has learnt about various aspects of chemical science 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 wish him every success in the future life.*

Date: 04/09/2024

Place: Bilaspur, C.G.

Signature of the Guide

# Guru Ghasidas Vishwavidyalaya

(A Central University established under Central Universities Act 2009)

Dr. Goutam Kumar Patra  
Professor and Head  
M.Sc., Ph.D., Post Doc.



Department of Chemistry  
Guru Ghasidas University  
Bilaspur-495009, India

## FORWARDING CERTIFICATE

*This is to certify that **Suresh Kumar Jena** has completed the project work entitled as "Synthesis And Characterization Of  $\text{Fe}_2\text{O}_3$ -Ag Composite Nanoparticles" under the supervision of Dr. Arti Srivastava, for the partial fulfillment of required degree of "Master of Science in Chemistry" and I wish him every success in the future life.*

Date: 04-09-24

Place: Bilaspur, C.G.

  
Signature of the HOD

## CONTENT

SL NO	TITLE	PAGE NO
1)	Abstract	7-8
2)	Introduction	8-10
3)	Material Requirement	11
4)	Synthesis of $\text{Fe}_2\text{O}_3$ NPs	11-12
5)	Synthesis of $\text{Fe}_2\text{O}_3$ -Ag NPs	13
6)	Results And Discussion	14-18
7)	Applications of Ag NPs	19
8)	Conclusion	20
9)	References	21-26



A PROJECT  
ON  
*'Separation of Water-Oil Emulsion using  
Nanodemulsifier coupled with Thermal Treatment'*



*Submitted as Partial Fulfilment for the  
Requirement of The Degree Of  
Master of Science in Chemistry*

**Department of Chemistry  
Guru Ghasidas Vishwavidyalaya, Bilaspur  
(C.G.) Session 2022-2024**

**Supervised By**

Dr. Sunil Kumar Singh  
Associate Professor  
Department Of Chemistry  
Guru Ghasidas  
Vishwavidyalaya  
Bilaspur – 495009 (C.G.)

**Submitted By**

Swaraj Shreechandan Sahu  
M.Sc. IV Semester  
Roll No. 22104157  
Enroll. No.  
GGV/22/07253

**SEPTEMBER 2024**

AS  
04/09/24

# Guru Ghasidas Vishwavidyalaya

(A Central University established under Central Universities Act 2009)

Dr. Sunil Kmar Singh

Associate Professor



Department of Chemistry

Guru Ghasidas University

Bilaspur-495009, India

## CERTIFICATE

This is to certify that **Swaraj Shreechandan Sahu** has completed the project dissertation entitled "*Separation of Water-Oil Emulsion using Nanodemulsifier coupled with Thermal Treatment*" under my supervision for the partial fulfillment of the required degree of "**Master of Science in Chemistry**". He has worked diligently, and methodically and also collected the literature very sincerely. During this project work he has learnt about various aspects of chemical science to the entitled topic.

To the best of my knowledge, the work presented is original and has not been submitted anywhere. I wish him every success in the future.

Date:

Place: **Bilaspur, C.G**

Signature of the Guide

# Guru Ghasidas Vishwavidyalaya

(A Central University established under Central Universities Act 2009)

Dr. Goutam Kumar Patra  
Professor and H.O.D



Department of Chemistry  
Guru Ghasidas University  
Bilaspur-495009, India

## FORWARDING CERTIFICATE

This is to certify that **Swaraj Shreechandan Sahu** has completed the project work entitled "*Separation of Water-Oil Emulsion using Nanodemulsifier coupled with Thermal Treatment*" under the supervision of **Dr. Sunil Kumar Singh**, for the partial fulfillment of the required degree of "**Master of Science in Chemistry**".

I wish him every success in his future life.

Date: 04-09-24

Place: Bilaspur, C.G

  
**Signature of the HOD**  
अध्यक्ष/Head  
रसायन शास्त्र विभाग  
Dept. of Chemistry  
गुरु गहरीदास विश्वविद्यालय,  
गुरु गहरीदास विश्वविद्यालय,  
बिलासपुर 495009 (छ.ग.)  
Bilaspur 495009 (C.G.)



# **Direct Friedel-Craft Alkylation of Arene with Alcohols using $[\text{AcMIm}]_2\text{ZnCl}_4$**

A project submitted to

**Guru Ghasidas Vishwavidyalaya ,Bilaspur (C.G.)**



*In partial fulfillment*  
*For the award of the degree*  
*of*  
*Master of science*  
*in*  
*Chemistry*  
*by*  
**SWARNIKA PANDEY**  
*Under the guidance of*  
**Dr. Subhash Banerjee**

*Research center*  
*Department of Chemistry,*  
**Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)**

**August 2024**

AS  
09/09/24



### FORWARDING CERTIFICATE

This is to certify that Miss. Swarnika Pandey has carried out the project in the Department of Chemistry, Guru Ghasidas Vishwavidyalaya (A Central university), Bilaspur (C.G.) on the topic '*Direct Friedel-Craft Alkylation of Arene with Alcohols using  $[AcMIm]_2ZnCl_4$* '. 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 her every success in her life.

### Signature of HOD

Dr. Goutam Kumar Patra

Professor

Department of Chemistry, G.G.V. Bilaspur (C.G.)

## TABLE OF CONTENT

Chapter no.	Content	Page No.
	Abstract	
1.	Introduction of Green Chemistry	11-12
2.	12 Principles of Green Chemistry	13-20
3.	Green solvents in Organic Synthesis	21-25
4.	What are Ionic Liquids?	26-30
5.	What are the advantages of Ionic Liquids?	31-33
6.	Literature review on Organic Synthesis using Ionic liquids.	34-40
7.	Synthesis of Imidazolium based Task Specific ionic liquid, $[\text{AcMIm}]_2\text{ZnCl}_4$	41-43
8.	Applications of $[\text{AcMIm}]_2\text{ZnCl}_4$ ionic liquid in organic reactions.	44-46
9.	Results and Discussion	47
10.	Conclusions	48
11.	References	49-54



A  
LITERATURE BASED PROJECT REPORT  
ON  
ELECTROCHEMICAL SENSING OF SEROTONIN IN FOOD PRODUCT  
BY USING MODIFIED ELECTRODE



SUBMITTED FOR

PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE DEGREE  
OF MASTER OF SCIENCE IN CHEMISTRY

Session 2022-2024

GUIDED BY

Dr. Uday Pratap Azad

Assistant Professor

Department of Chemistry

GURU GHASIDAS VISHWAVIDYALAYA

SUBMITTED BY

Ms. Swati Kamde

M.Sc. IV Semester

Roll No. 22104159

Enroll. No. GGV/22/07255

DEPARTMENT OF CHEMISTRY

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

## FORWARDING CERETIFICATE

This is to certify that **Ms. Swati kamde** has carried out project work in the department of chemistry, Guru Ghasidas Vishwavidyalaya, Bilaspur C.G. on the topic **'ELECTROCHEMICAL SENSING OF SERETONIN IN FOOD PRODUCT BY USING MODIFIED ELECTROD'**. This project is submitted as a partial fulfillment for the degree of M.Sc in chemistry and forwarded to the examiner for evalution.



**PROF. G K PATRA**

**Head, of Department**

**30231 / Head**

**Department of Chemistry**

**Deptt. of Chemistry**

**Guru Ghasidas Vishwavidyalaya**

**30231 / Head**

**Guru Ghasidas Vishwavidyalaya**

**BILASPUR (C.G.)**

**Pin code - 495009 IC G**



## CONTENTS

### S. NO. TITLE

#### ABSTRACT

1-3

#### 1. INTRODUCTION

3-5

#### 2. BIOSENSORS

5-8

#### 3. ELECTROCHEMICAL DETECTION TECHNIQUES

8-12

#### 4. FOOD BASED BIOSENSORS

12-13

#### 5. RECENT ADVANCES

13-15

#### 6. COMPARATIVE ANALYSIS OF APPROACHES AND TECHNOLOGIES FOR SEROTONIN DETECTION USING BIOSENSORS

15-16

#### 7. CHALLENGES AND LIMITATIONS

16

#### 8. FUTURE DIRECTION IN RESEARCH

17

#### 9. CONCLUSION

18-20

#### 10. REFERENCE



# Literature Review on Green synthesis of Nanoparticles

A Project Report Submitted

to

Guru Ghasidas Vishwavidyalaya, Bilaspur



*In partial fulfillment of the requirement for the degree of*

Master of Science  
in  
Chemistry

Submitted by

Takeshwar Sahu

Supervisor

Prof. Manorama

Department of Chemistry

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

(2024)

# Guru Ghasidas Vishwavidyalaya

(A Central University established under Central Universities Act 2009)

Prof. Manorama

Professor

M.Sc., Phd, B.H.U.



Department of  
Chemistry

Guru Ghasidas University  
Bilaspur-495009, CG, India

Ref. No.

Bilaspur, Date:

## CERTIFICATE

This is to certify that **Takeshwar Sahu** has completed the project work entitled "**Literature Review on Green synthesis of Nanoparticles**" under my supervision for the partial fulfillment of required degree of "**Master of Science**".

*I wish his every success in the future life.*

Date: 4/9/24

Place: Bilaspur

Signature

04/09/24

# Guru Ghasidas Vishwavidyalaya

(A Central University established under Central Universities Act 2009)

Dr. G. K. Patra

Professor & Head

M.Sc., Ph.D.

Former Dean, School of  
Physical Sciences



Department of  
Chemistry

Guru Ghasidas University

Bilaspur-495009, CG, India

[patra29in@yahoo.co.in](mailto:patra29in@yahoo.co.in)



+91-7587312992

+91-9433378801

Ref. No.

Bilaspur, Date:

## FORWARDING CERTIFICATE

*This is to certify that **Takeshwar Sahu** has completed the project work entitled "**Literature Review on Green synthesis of Nanoparticles**" under the supervision of **Prof. Manorama**, for the partial fulfillment of required degree of "**Master of Science**" and forwarded to the Examiner for evaluation.*

*I wish his every success in the future life.*

Date:  
Head

4/9/24

  
Signature of the

Place: Bilaspur

प्रमुख / Head  
रासायनिक विभाग  
Deptt. of Chemistry  
गुरु गणेश विश्वविद्यालय,  
गुरु गणेश विश्वविद्यालय,  
बिलासपुर 495009 (छ.ग.)  
बिलासपुर 495009 (C.G.)