

# “ONE POT MULTI COMPONENT SYNTHESIS OF IMIDAZOLE DERIVATIVES”

A Project work submitted to University of Calicut in partial fulfilment of the requirement for the Degree of Master of Science in Chemistry

ANCY C P

Reg No: CRAVMCH001

Under the supervision of

**Dr. ARUN S**

Assistant Professor, Department of Chemistry

Christ College(Autonomous) Irinjalakuda



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*9/8/2023*
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2021-2023**

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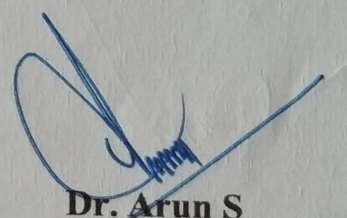
Date: 20<sup>th</sup> July 2023

**Dr. Arun S**

Asst. Professor in Chemistry

**CERTIFICATE**

This is to certify that **ANCY C P** (Reg.No. CRAVMCH001) has carried out a project work entitled “**ONE POT MULTI COMPONENT SYNTHESIS OF SUBSTITUTED IMIDAZOLE DERIVATIVES**” is an authentic record of the research project carried out by my supervision and guidance in the P.G & Research Department of Chemistry, Christ College, Irinjalakuda. It is further certified that this project report has not previously formed the basis for the award of any Degree, Diploma, Fellowship or other similar title of recognition by any other university or Institutions.



**Dr. Arun S**

**CARMEL COLLEGE (AUTONOMOUS) MALA**  
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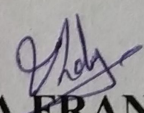


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Place : Mala  
Date :



  
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Place : Mala

Date :



# “COMPARATIVE STUDY OF ALKALINE AND NEUTRAL ELECTROLYTES FOR POROUS CARBON BASED SUPERCAPACITOR”

A Project work submitted to University of Calicut in partial fulfilment of the requirement for the Degree of Master of Science in Chemistry

**ANGEL AJ**

Reg No: **CRAVMCH002**

Under the supervision of

**Dr. DIJO DAMIEN**

Assistant Professor, Department of Chemistry

Christ college (Autonomous) Irinjalakuda



*Valued by  
Dr. DiJo  
21/10/2023.*

**POSTGRADUATE DEPARTMENT OF CHEMISTRY  
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2021-2023**

Supervisor

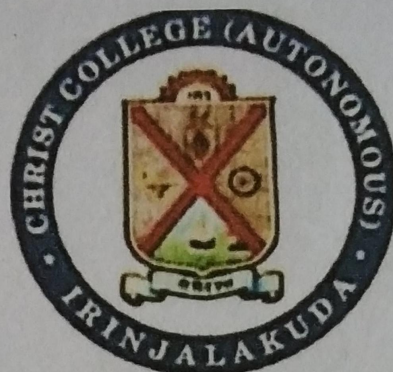


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## CERTIFICATE

This is to certify that the project work entitled, "COMPARATIVE STUDY OF ALKALINE AND NEUTRAL ELECTROLYTES FOR POROUS CARBON BASED SUPERCAPACITOR" is an authentic record of the study carried out by Ms ANGEL AJ (Reg.No.CRAVMCH002) under the guidance of Dr.DIJO DAMIEN, Assistant Professor , Department of Chemistry, Christ College, Irinjalakuda, in partial fulfillment of the requirement for the award of the Degree , Master of Science in Chemistry during the academic year 2021-2023.

Place: Irinjalakuda

Date: 9/08/2023

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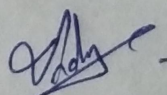
**CERTIFICATE**

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Place : Mala

Date : 9/08/2023



  
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# “SYNTHESIS AND CHARACTERIZATION OF CARBON DOTS FROM POLYETHYLENE GLYCOL”



The Project report submitted to the  
University of Calicut

For partial fulfilment of the award of the degree of

**MSc. Chemistry**

By

**ANJALY P J**

(Reg No: CRAVMCH003)

Under the guidance of

**Dr. ANITHA C KUMAR**

**PROFESSOR**



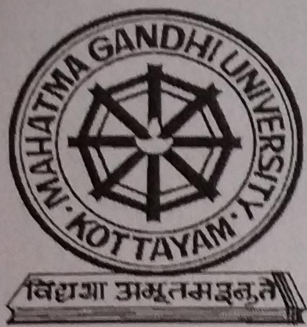
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**MAY 2023**

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ABIRAMI KA



# MAHATMA GANDHI UNIVERSITY

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### CERTIFICATE

This is to certify that the work entitled, “**SYNTHESIS AND CHARACTERIZATION OF CARBON DOTS FROM POLYETHYLENE GLYCOL**” is an authentic record of project work carried out by **Ms. ANJALY P J** in partial fulfilment of the requirements for the award of the degree of master of science in chemistry, from the University of Calicut at School of Chemical Sciences, Mahatma Gandhi University, Kottayam under our guidance during May 2023 - June 2023.

**Ms. ATHULYA K R**

Research Scholar

Department of Applied Chemistry

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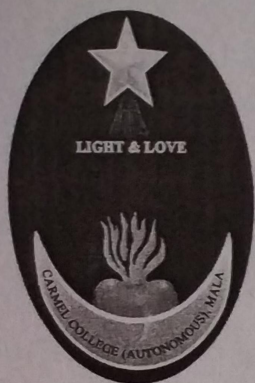
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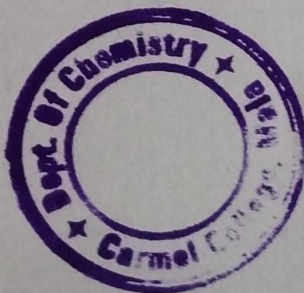
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**Dr. VIDYA FRANCIS**

Assistant Professor

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**Dr. PRINCY K G**

Associate Professor and Head of the Department

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# “GRAPHENE SUPPORTED Ni, Co OXIDE AS THE HYDROGEN EVOLUTION CATALYST FOR WATER SPLITTING REACTION”

A Project work submitted to University of Calicut in partial fulfilment of the requirement for the Degree of Master of Science in Chemistry

**ANN THERESA PAUL**  
Reg No: **CRAVMCH004**

Under the supervision of  
**Dr. V T JOY**  
Head of the Department of Chemistry  
Christ College(Autonomous), Irinjalakuda



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3. *[Signature]* ABIRAMI KA

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**2021-2023**

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**Head of the Department**

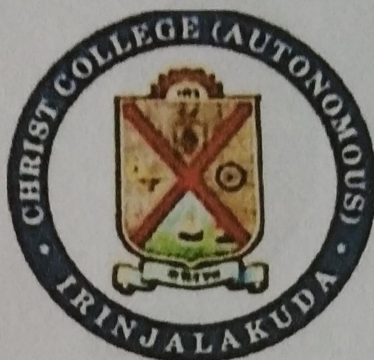
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This is to certify that the project work entitled, "GRAPHENE SUPPORTED Ni,Co OXIDE AS THE HYDROGEN EVOLUTION CATALYST FOR WATER SPLITTING" is an authentic record of the study carried out by Ms ANN THERESA PAUL (Reg.No.CRAVMCH004) under the guidance of Dr .V.T Joy, Associate Professor & Head, Department of Chemistry, Christ College, Irinjalakuda, in partial fulfillment of the requirement for the award of the Degree , Master of Science in Chemistry during the academic year 2021-2023.

Place: Irinjalakuda

Date: 9-08-2023

**DR V.T JOY**

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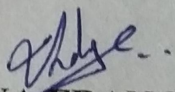
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Date : 9-08-2023



  
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Place : Mala

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Head of the Department of  
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# “SYNTHESIS, CHARACTERIZATION AND CATALYTIC ACTIVITY STUDIES OF FEW AMINO ACID SCHIFF BASE COMPLEXES”

A Project work submitted to University of Calicut in partial fulfilment of the requirement for the Degree of Master of Science in Chemistry

**ANUSREE P S**  
Reg No: **CRAVMCH005**

Under the supervision of  
**Dr. MANJU SEBASTIAN**  
Assistant Professor, Department of Chemistry  
St. Mary's College Thrissur



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**2021-2023**

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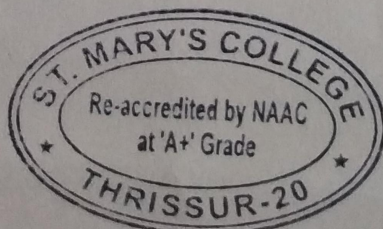
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Place: Thrissur

Date : 9-08-2023

**Dr. MANJU SEBASTIAN**

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Assistant professor  
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**CARMEL COLLEGE (AUTONOMOUS) MALA**  
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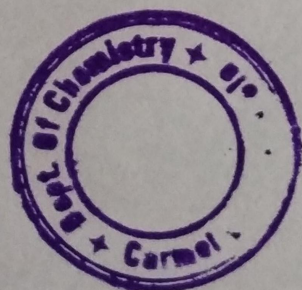


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Place : Mala

Date : 9-08-2023



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Head of Department

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**Dr. PRINCY K.G.**

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Place : Mala

Date : 9-08-2023



**DR. ROSHINI K. THUMPAKARA**  
Associate Professor  
Department of Chemistry  
Carmel College (Autonomous) Mala

# “TAILORING ELECTROSPUN POLYMER NANOCOMPOSITE MEMBRANE AS A PROMISING SEED COAT FOR EFFECTIVE GERMINATION”

A Project work submitted to Calicut University in partial fulfilment of the requirement for the Degree of Master of Science in Chemistry

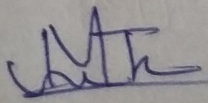
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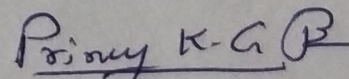


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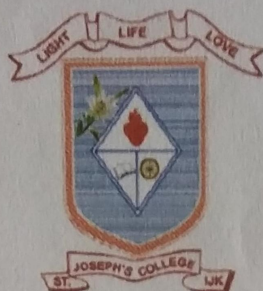
POSTGRADUATE DEPARTMENT OF CHEMISTRY  
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2021-2023

  
Supervisor



  
Head of the Department

**DEPARTMENT OF CHEMISTRY**  
**ST. JOSEPH'S COLLEGE (AUTONOMOUS) IRINJALAKUDA**  
**(NAAC Re-accredited with 'A++' grade)**



**CERTIFICATE**

This is to certify that the work entitled “**TAILORING ELECTROSPUN POLYMER NANOCOMPOSITE MEMBRANE AS A PROMISING SEED COAT FOR EFFECTIVE GERMINATION**” submitted to Faculty of Science, University of Calicut in partial fulfilment of the requirement for the degree of Master of Science in Chemistry is authentic record of the project work carried out at P.G. & Research Department of Chemistry, St. Joseph's College (Autonomous), Irinjalakuda by **ASHIBA E A (Reg.No.CRAVMCH006)**, M.Sc. Chemistry student, P.G Department of Chemistry, Carmel College (Autonomous) Mala (affiliated to University of Calicut, Kerala) and was supervised and guided by me.

Place: Irinjalakuda

Date : 9/8/23

**Dr. MINI THOMAS**

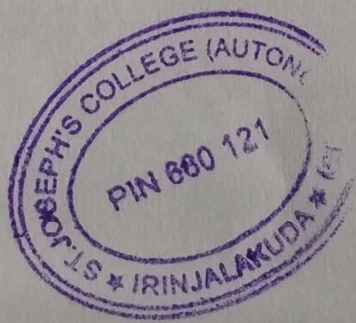
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Place : Mala

Date : 9/8/23



*Princy K G*

**Dr. PRINCY K G**  
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Place : Mala

Date : 9/8/23



**Dr. ROSHINI K THUMPAKARA**  
Associate Professor  
Department of Chemistry  
Carmel College (Autonomous)  
Mala

# STARCH AS A BIOPOLYMER PRECURSOR FOR THE SYNTHESIS OF CARBON DOTS



The project report submitted to the  
University of Calicut  
for partial fulfillment of the award of the degree of

**M.Sc. Chemistry**

By

**ASWATHI M**

Reg No: **CRAVMCH007**

Under the guidance of

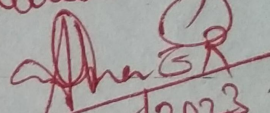
**Dr. ANITHA C KUMAR**

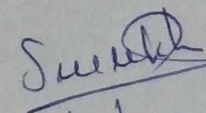
**PROFESSOR**




**SCHOOL OF CHEMICAL SCIENCES  
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**MAY 2023**

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9/8/2023

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9/8/23

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ABIRAMI KA





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Re-accredited by NAAC with A Grade

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Tel: 0481-2731036, E-mail: office.scs.@mgu.ac.in

### CERTIFICATE

This is to certify that the project work entitled, “**STARCH AS A BIOPOLYMER PRECURSOR FOR THE SYNTHESIS OF CARBON DOTS**” is an authentic record of the study carried out by **Ms. ASWATHI M** (Reg. No. CRAVMCH007) in partial fulfilment of the award of the Degree of Master of Science in Chemistry of Calicut University at School of Chemical Sciences, Mahatma Gandhi University, Kottayam, under our guidance during May 2023-June 2023.

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Research Scholar  
Department of Applied  
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**Dr. ANITHA C KUMAR**  
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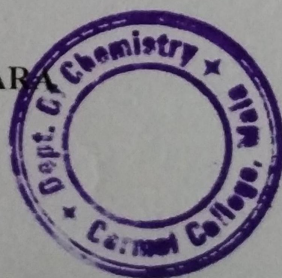
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## CERTIFICATE

*This is to certify that the dissertation entitled “STARCH AS A BIOPOLYMER PRECURSOR FOR THE SYNTHESIS OF CARBON DOTS” is an authentic record of the work carried out by ASWATHI M, (Reg. No: CRAVMCH007) under the supervision and guidance of Dr. ANITHA C KUMAR, Professor, School of Chemical Sciences, Mahatma Gandhi University, Kottayam, and co-guidance Dr. ROSHINI K THUMPAKARA, Associate Professor, Department of Chemistry, Carmel College (Autonomous) Mala, during the period May-June 2023. This work has been carried out in partial fulfillment for the award of the degree of Master of Science in Chemistry during the academic year 2021-2023, from the University of Calicut, Malappuram. The work presented in this project has not been submitted for any other degree or diploma earlier.*

**Dr. ROSHINI K THUMPAKARA**  
Associate Professor  
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**Dr. PRINCY K G**  
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**“VITEX NEGUNDO PLANT LEAF EXTRACT ASSISTED GREEN  
SYNTHESIS OF ZINCTITANATE NANOPARTICLES FOR THE  
PHOTODEGRADATION OF METHYLENE BLUE DYE”**

**A Project work submitted to the University of Calicut in partial fulfilment of the  
requirement for the Degree of Master of Science in Chemistry**

**AYILLYA DEVARAJ**

**Reg No: CRAVMCH008**

**Under the Supervision Of  
Dr. NISHA GEORGE**

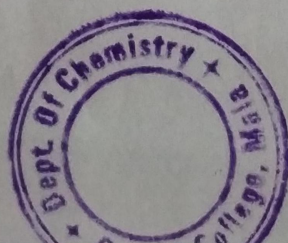
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9/8/2023.
2. Seen by  
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3. ABIRAMI K A

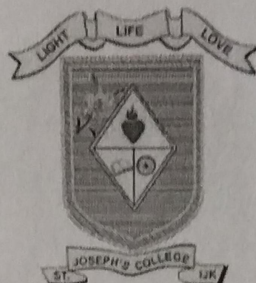
**POSTGRADUATE DEPARTMENT OF CHEMISTRY  
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MALA, THRISSUR  
2021-2023**

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Supervisor



*Poimyk A P*  
Head of Department

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**(NAAC Re-accredited with 'A++' grade)**

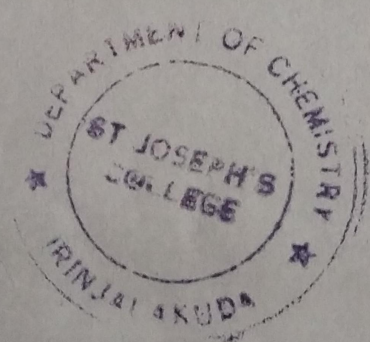


**CERTIFICATE**

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Date: 09/08/2023



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**CERTIFICATE**

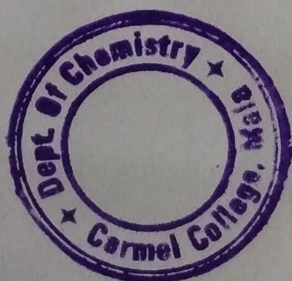
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*Princy K G*

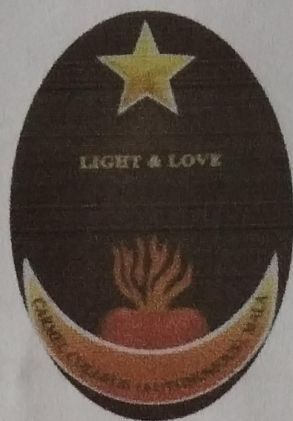
**Dr. PRINCY K G**  
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Place: Mala

Date: 09/08/2023



**CARMEL COLLEGE (AUTONOMOUS) MALA**  
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Place: Mala

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**Dr. ROSHINI K THUMPAKARA**  
Associate Professor Department of  
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**“EFFECT OF NANOSTRUCTURED POLYHEDRAL  
OLIGOMERIC SILSEQUIOXANE ON THE PHYSICAL  
PROPERTIES OF THERMOPLASTIC FLEXIBLE POLYVINYL  
ALCOHOL NANOCOMPOSITE”**

A Project work submitted to University of Calicut in partial fulfillment of the requirement  
for the Degree of Master of Science in Chemistry

**CHINJU DAVIS**  
Reg No: **CRAVMCH009**

Under The Supervision Of  
**Dr. AJALESH B NAIR**  
Assistant Professor, Department of Chemistry  
Union Christian College Aluva



1. Valued by  
A. N. S. R.  
9/8/2023.

2. S. Sreejith  
9/8/23

3. ABIRAMI KA

**POSTGRADUATE DEPARTMENT OF CHEMISTRY  
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2021-2023**

Supervisor

*Princy K. G. R.*  
Head of the Department

**Dr. PRINCY K.G.  
ASSOCIATE PROFESSOR & HEAD  
DEPT. OF CHEMISTRY  
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DEPARTMENT OF CHEMISTRY  
UNION CHRISTIAN COLLEGE ALUVA  
(NAAC Re-accredited with 'A' grade)



CERTIFICATE

This is to certify that the work entitled "Effect of Nanostructured Polyhedral Oligomeric Silsesquioxane on the physical properties of Thermoplastic flexible Polyvinyl alcohol nanocomposite" submitted to Faculty of Science,

University of Calicut in partial fulfilment of the requirement for the degree of Master of Science in Chemistry is authentic record of the project work carried out at P.G. & Research Department of Chemistry, Union Christian College Aluva by CHINJU DAVIS(Reg.No.CRAVMCH009) , M.Sc. Chemistry student, P.G Department of Chemistry, Carmel College (Autonomous) Mala (affiliated to University of Calicut, Kerala) and was supervised and guided by me.

Place: Aluva

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**CERTIFICATE**

This is to certify that the dissertation entitled “EFFECT OF NANOSTRUCTURED POLYHEDRAL OLIGOMERIC SILSEQUIOXANE ON THE PHYSICAL PROPERTIES OF THERMOPLASTIC FLEXIBLE POLYVINYL ALCOHOL NANOCOMPOSITE” is an authentic record of the work carried out by **CHINJU DAVIS**, Reg.No: **CRAVMCH009** under the guidance of **Dr. PRINCY K G** Associate professor, Department of Chemistry, Carmel College (Autonomous) Mala of the partial fulfillment for the award of the degree of Master of Science in Chemistry during the academic year 2021-2023.

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Date : 09/08/23

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**Dr. PRINCY K G**  
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Place : Mala

Date : 09/08/23

*Princy K G*

**Dr. PRINCY K G**  
Associate Professor  
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# "STUDY OF GRAPHENE SUPPORTED Ni, Co OXIDE AS THE OXYGEN EVOLUTION CATALYST FOR WATER SPLITTING REACTION"

A Project work submitted to University of Calicut in partial fulfilment of the requirement for the Degree of Master of Science in Chemistry

**DINI PAUL**

Reg No: **CRAVMCH010**

Under the supervision of

**Dr. V T JOY**

Head of the Department of Chemistry  
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**POSTGRADUATE DEPARTMENT OF CHEMISTRY  
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2021-2023**

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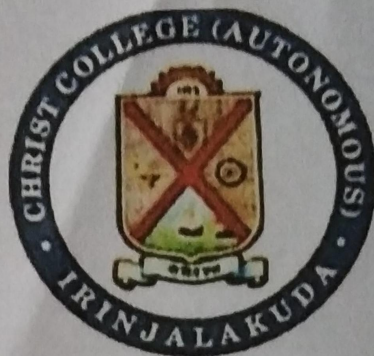
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Dr. Joy V.T.  
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**CHRIST COLLEGE , IRINJALAKUDA**  
(AUTONOMOUS), Reaccredited by NAAC with 'A' grade



**CERTIFICATE**

This is to certify that the project work entitled, "STUDY OF GRAPHENE SUPPORTED Ni<sub>2</sub>Co OXIDE AS THE OXYGEN EVOLUTION CATALYST FOR WATER SPLITTING REACTION" is an authentic record of the study carried out by Ms DINI PAUL (Reg.No.CRAVMCH010) under the guidance of Dr .V.T Joy, Associate Professor & Head, Department of Chemistry, Christ College, Irinjalakuda, in partial fulfillment of the requirement for the award of the Degree , Master of Science in Chemistry during the academic year 2021-2023.

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Date: 9/08/2023

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Place : Mala

Date : 09/08/2023



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**Mala- 680732**

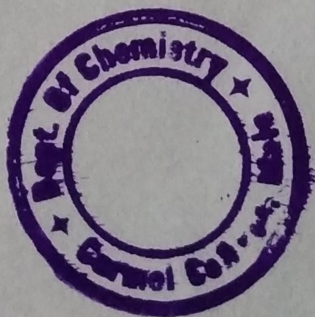


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Place : Mala

Date : 09/08/2023



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# “POLYCAPROLACTONE NANOFIBER LOADED WITH $\alpha$ - AMYLASE IMMOBILISED ON MCM-41 IN PRESENCE OF AGROCHEMICALS”

A Project work submitted to Calicut University in partial fulfilment of the requirement for  
the Degree of Master of Science in Chemistry

**JASHEENA P J**  
Reg No: **CRAVMCH011**

Under the supervision of  
**Dr. MINI THOMAS**  
Assistant Professor, Department of Chemistry  
St. Joseph's College Irinjalakuda



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ABIRAMI KA

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**CARMEL COLLEGE (AUTONOMOUS) MALA, THRISSUR**  
**2021-2023**

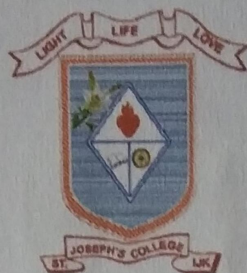
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Supervisor



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DEPARTMENT OF CHEMISTRY  
ST. JOSEPH'S COLLEGE (AUTONOMOUS) IRINJALAKUDA  
(NAAC Re-accredited with 'A++' grade)



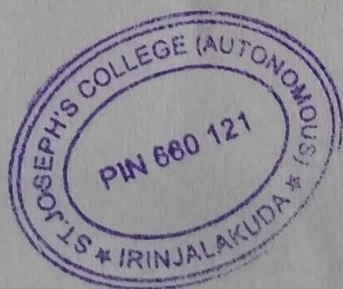
CERTIFICATE

This is to certify that the work entitled “POLYCAPROLACTONE NANOFIBER LOADED WITH  $\alpha$ -AMYLASE IMMOBILISED ON MCM-41 IN PRESENCE OF AGROCHEMICALS” submitted to Faculty of Science, University of Calicut in partial fulfilment of the requirement for the degree of Master of Science in Chemistry is authentic record of the project work carried out at P.G. & Research Department of Chemistry, St. Joseph's College (Autonomous), Irinjalakuda by **JASHEENA P J (Reg.No.CRAVMCH011)**, M.Sc. Chemistry student, P.G Department of Chemistry, Carmel College (Autonomous) Mala (affiliated to University of Calicut, Kerala) and was supervised and guided by me.

Place: Irinjalakuda

Date : 9/8/2023

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(Supervising guide)  
Assistant Professor  
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**Affiliated to University of Calicut**  
**Mala- 680732**



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This is to certify that the dissertation entitled “**POLYCAPROLACTONE NANOFIBER LOADED WITH  $\alpha$ -AMYLASE IMMOBILISED ON MCM-41 IN PRESENCE OF AGROCHEMICALS**” is an authentic record of the work carried out by **JASHEENA P J**, Reg.No: **CRAVMCH011** under the co-guidance of Ms. **NEETHU SUNNY** Assistant Professor, Department of Chemistry, Carmel College (Autonomous) Mala of the partial fulfillment for the award of the degree of Master of Science in Chemistry during the academic year 2021-2023.

Place : Mala

Date : 9/8/2023

**Ms. NEETHU SUNNY**  
Assistant Professor  
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**CARMEL COLLEGE (AUTONOMOUS) MALA**  
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Place : Mala

Date : 9/8/2023



**Dr. PRINCY K G**  
Associate Professor  
Department of Chemistry  
Carmel College (Autonomous)  
Mala

# "POROUS CARBON BASED ELECTRODES FOR ELECTROCHEMICAL DOUBLE LAYER CAPACTORS"

A Project work submitted to University of Calicut in partial fulfilment of the requirement for the Degree of Master of Science in Chemistry

**MELBYMOL JAMES**  
Reg No: **CRAVMCH012**

Under the supervision of  
**Dr. DIJO DAMIEN**  
Assistant Professor, Department of Chemistry  
Christ College Irinjalakuda



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**CARMEL COLLEGE (AUTONOMOUS) MALA, THRISSUR**  
**2021-2023**

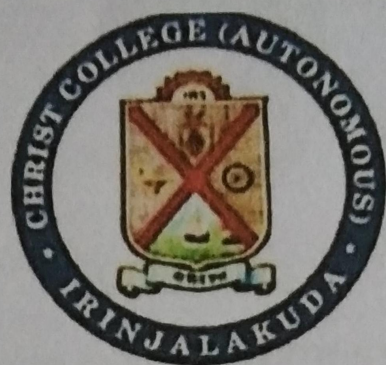
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(AUTONOMOUS), Reaccredited by NAAC with 'A' grade



## CERTIFICATE

This is to certify that the project work entitled, "POROUS CARBON BASED ELECTRODES FOR ELECTROCHEMICAL DOUBLE LAYER CAPACITORS" is an authentic record of the study carried out by Ms MELBYMOL JAMES(Reg.No.CRAVMCH012) under the guidance of Dr.DIJO DAMIEN, Assistant Professor , Department of Chemistry, Christ College, Irinjalakuda, in partial fulfillment of the requirement for the award of the Degree , Master of Science in Chemistry during the academic year 2021-2023.

Place: Irinjalakuda

Date: 9/8/2023

**DR. DIJO DAMIEN**

Assistant Professor

Department of chemistry

Christ College (Autonomous), Irinjalakuda

**CARMEL COLLEGE (AUTONOMOUS) MALA**  
**(Nationally Re-accredited with 'A' grade)**  
**Affiliated to University of Calicut**  
**Mala- 680732**



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Place : Mala

Date : 9/8/2023



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Carmel College (Autonomous)  
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**Dr. PRINCY K.G.**  
**ASSOCIATE PROFESSOR & HEAD**  
**DEPT. OF CHEMISTRY**  
**CARMEL COLLEGE, MALA**

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Place : Mala

Date : 9/8/2023



*Neethu*  
**Ms. NEETHU SUNNY**  
Assistant Professor  
Department of Chemistry  
Carmel College (Autonomous)  
Mala

# "MULTI COMPONENT SYNTHESIS OF $\beta$ - ACETAMIDO KETONE DERIVATIVES"

A Project work submitted to University of Calicut in partial fulfilment of the requirement for the Degree of Master of Science in Chemistry

NEEMA JOY  
Reg No: CRAVMCH013

Under the supervision of  
**Dr. ARUN S**  
Assistant Professor, Department of Chemistry  
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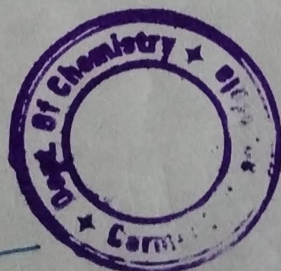


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Ref. CC/CHEM/AS/2021-23/01

Date: 20<sup>th</sup> July 2023

**Dr. Arun S**

Asst. Professor in Chemistry

**CERTIFICATE**

This is to certify that **NEEMA JOY** (Reg.No. CRAVMCH013) has carried out a project work entitled “**MULTICOMPONENT SYNTHESIS OF  $\beta$ - ACETAMIDO KETONE DERIVATIVES**” is an authentic record of the research project carried out by my supervision and guidance in the P.G & Research Department of Chemistry, Christ College, Irinjalakuda. It is further certified that this project report has not previously formed the basis for the award of any Degree, Diploma, Fellowship or other similar title of recognition by any other university or Institutions.

**Dr. Arun S**



**CARMEL COLLEGE (AUTONOMOUS) MALA**  
**(Nationally Re-accredited with 'A' grade)**  
**Affiliated to University of Calicut**  
**Mala- 680732**



**CERTIFICATE**

This is to certify that the dissertation entitled “**MULTI COMPONENT SYNTHESIS OF  $\beta$  – ACETAMIDO KETONE DERIVATIVES**” is an authentic record of the work carried out by **NEEMA JOY**, Reg.No: **CRAVMCH013** under the supervision and guidance of **Dr. ARUN S**, Assistant Professor, Department of Chemistry Christ College (Autonomous ), Irinjalakuda and **ANCILYN ANTU.K**, Assistant Professor, Department of Chemistry, Carmel College (Autonomous) Mala of the partial fulfillment for the award of the degree of Master of Science in Chemistry during the academic year 2021-2023.

Place : Mala

Date : 9/8/2023



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**Dr. PRINCY K.G.**

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**ANCILYN ANTU.K**  
Assistant Professor  
Department of Chemistry  
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Place : Mala  
Date : 9/8/2023

# “PVA BASED NOVEL NANOCOMPOSITES : THERMAL AND MECHANICAL PROPERTIES”

A Project work submitted to Calicut University in partial fulfilment of the requirement for the Degree of Master of Science in Chemistry

**NEENA WILSON**  
Reg No: **CRAVMCH014**

Under the supervision of  
**Dr. AJALESH B NAIR**  
Assistant Professor, Department of Chemistry  
Union Christian College Aluva



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**POSTGRADUATE DEPARTMENT OF CHEMISTRY**  
**CARMEL COLLEGE (AUTONOMOUS) MALA, THRISSUR**  
**2021-2023**

# “PVA BASED NOVEL NANOCOMPOSITES : THERMAL AND MECHANICAL PROPERTIES”

A Project work submitted to Calicut University in partial fulfilment of the requirement for the Degree of Master of Science in Chemistry

**NEENA WILSON**  
Reg No: **CRAVMCH014**

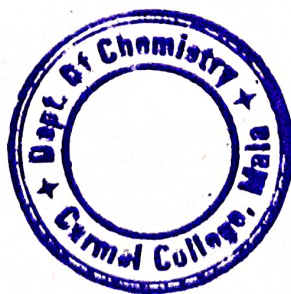
Under the supervision of  
**Dr. AJALESH B NAIR**  
Assistant Professor, Department of Chemistry  
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**POSTGRADUATE DEPARTMENT OF CHEMISTRY**  
**CARMEL COLLEGE (AUTONOMOUS) MALA, THRISSUR**  
**2021-2023**

**Supervisor**

**Dr. Ajalesh. B. Nair, M.Sc, Ph.D**  
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(NAAC Re-accredited with 'A' grade)**



**CERTIFICATE**

This is to certify that the work entitled **“PVA BASED NOVEL NANOCOMPOSITES : THERMAL AND MECHANICAL PROPERTIES”** submitted to Faculty of Science, University of Calicut in partial fulfilment of the requirement for the degree of Master of Science in Chemistry is authentic record of the project work carried out at P.G. & Research Department of Chemistry, Union Christian College Aluva by **NEENA WILSON (Reg.No.CRAVMCH014)**, M.Sc. Chemistry student, P.G Department of Chemistry, Carmel College (Autonomous) Mala (affiliated to University of Calicut, Kerala) and was supervised and guided by me.

Place: Aluva

Date : 09/08/2023

**Dr. AJALESH B NAIR**  
(Supervising guide)

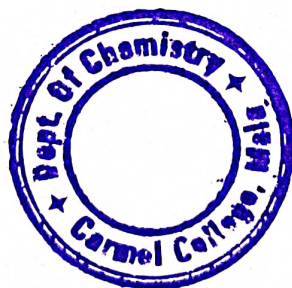
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**Dr. Ajalesh B. Nair, M.Sc., Ph.D**  
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**CERTIFICATE**

This is to certify that the dissertation entitled “**PVA BASED NOVEL NANOCOMPOSITES : THERMAL AND MECHANICAL PROPERTIES**” is an authentic record of the work carried out by **NEENA WILSON**, Reg.No: **CRAVMCH014** under the co-guidance of **Ms. ANCILYN ANTU K** Assistant Professor, Department of Chemistry, Carmel College (Autonomous) Mala of the partial fulfillment for the award of the degree of Master of Science in Chemistry during the academic year 2021-2023.



Place : Mala

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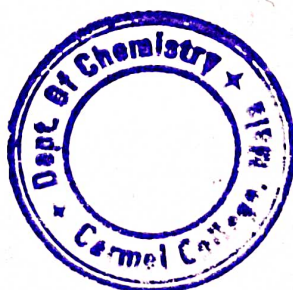


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Place : Mala

Date : 09/08/2023



*Princy K G*

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**“SYNTHESIS AND CHARACTERIZATION  
OF CARBON DOT FROM CHITOSAN”**



A Project report submitted to the University of Calicut  
for partial fulfilment of the Degree of

**MSc. Chemistry**

By

**SANDRA JOSE**

Reg. No: **CRAVMCH015**

Under the guidance of

**Dr. ANITHA C KUMAR**

**PROFESSOR**



**SCHOOL OF CHEMICAL SCIENCES**

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**MAY 2023**

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ABIRAMI K A





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This is to certify that the project work entitled, "SYNTHESIS AND CHARACTERIZATION OF CARBON DOT FROM CHITOSAN" is an authentic record of the study carried out by Ms. SANDRA JOSE (Reg. No. CRAVMCH015) in partial fulfillment of the requirement for the award of the Degree, Master of Science in Chemistry of Calicut University at School of Chemical Sciences, Mahatma Gandhi University, Kottayam, under our guidance during the academic year May 2023- June 2023.

Ms. ATHULYA K R  
Research Scholar  
Department of Applied  
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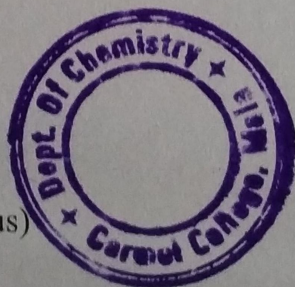
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## CERTIFICATE

*This is to certify that the dissertation entitled “SYNTHESIS AND CHARACTERIZATION OF CARBON DOT FROM CHITOSAN” is an authentic record of the work carried out by SANDRA JOSE, (Reg. No: CRAVMCH015) under the supervision and guidance of Dr. ANITHA C KUMAR, Professor, School of Chemical Sciences, Mahatma Gandhi University, Kottayam, and co-guidance Ms. SARANYA M P, Assistant Professor, Department of Chemistry, Carmel College (Autonomous), Mala, during the period May-June 2023. This work has been carried out in partial fulfillment for the award of the degree of Master of Science in Chemistry during the academic year 2021-2023, from the University of Calicut, Malappuram. The work presented in this project has not been submitted for any other degree or diploma earlier.*

Ms. SARANYA M P  
Assistant Professor  
Department of Chemistry  
Carmel College (Autonomous)  
Mala



Dr. PRINCY KG  
Associate Professor and Head of  
the Department  
Department of Chemistry  
Carmel College (Autonomous)  
Mala

# "GRAPHENE SUPPORTED Ni, Co OXIDE CATALYST FOR OXYGEN REDUCTION REACTION IN ZINC-AIR BATTERIES"

A Project work submitted to University of Calicut in partial fulfilment of the requirement for the Degree of Master of Science in Chemistry

**SANDRA SABU**  
Reg No: CRAVMCH016

Under the supervision of  
**Dr. V T JOY**  
Head of the Department of Chemistry  
Christ College(Autonomous), Irinjalakuda



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9/8/2023.  
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**Dr. Joy V.T.**  
Associate Professor & Head,  
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**CERTIFICATE**

This is to certify that the project work entitled, "GRAPHENE SUPPORTED Ni,Co OXIDE CATALYST FOR OXYGEN REDUCTION REACTION IN ZINC AIR BATTERIES" is an authentic record of the study carried out by Ms SANDRA SABU (Reg.No.CRAVMCH016) under the guidance of Dr .V.T Joy, Associate Professor & Head, Department of Chemistry, Christ College, Irinjalakuda, in partial fulfillment of the requirement for the award of the Degree , Master of Science in Chemistry during the academic year 2021-2023.

Place: Irinjalakuda

Date: 9/8/2023

**DR V.T JOY**

Head, Department of chemistry

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**Affiliated to University of Calicut**  
**Mala- 680732**



**CERTIFICATE**

This is to certify that the dissertation entitled "**GRAPHENE SUPPORTED Ni, Co OXIDE CATALYST FOR OXYGEN REDUCTION REACTION IN ZINC-AIR BATTERIES**" is an authentic record of the work carried out by **SANDRA SABU**, Reg.No: **CRAVMCH016** under the co-guidance of **Ms. SARANYA M.P**, Assistant Professor, Department of Chemistry, Carmel College (Autonomous), Mala of the partial fulfillment for the award of the Degree of Master of Science in Chemistry during the academic year 2021-2023.

Place : Mala

Date : 9/8/2023



**Ms. SARANYA M.P**  
Assistant Professor  
Department of Chemistry  
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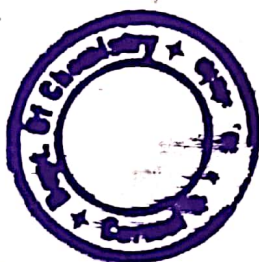


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