

INDIAN OIL CORPORATION LIMITED

BARAUNI REFINERY,

BEGUSARAI, BIHAR – 851114



IndianOil
The Energy of India

SUMMER INTERNSHIP REPORT

Under the guidance of

Mr. Akshay Singh Rajpoot

(Process Engineer, Technical Services)

Submitted by

Muskan Kumari (22021128)

In partial fulfillment of requirements for the degree of

BACHELOR OF TECHNOLOGY

IN

CHEMICAL ENGINEERING



Institute Of Technology, Guru Ghasidas Vishwavidyalaya , Bilaspur

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रिफाइनरिज प्रभाग
Refinery Division

इंडियन ऑयल कॉर्पोरेशन लिमिटेड
बराउनी रिफाइनरी, हाकपूर : बराउनी ऑयल रिफाइनरी,
बिना : बेगूसराय, बिहार - 851114
Indian Oil Corporation Limited
Barauni Refinery, P.O. : Barauni Oil Refinery,
Distt. : Begusarai, Bihar - 851 114
वेबसाइट : www.iocl.com
ई-मेल : baraunirefinery@indianoil.in
दूरभाष : 06243-240159 / 240110
फैक्स : 06243-240150 / 240278



ISO 9001, 14001 & OHSAS : 18001 Certified Refinery

Ref. No.: L&D/VT/2025/170

Dated: 07th July, 2025

This is to certify that Ms. Muskan Kumari, Roll No. 22021128 a Chemical Engineering student from Institute of Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur has gone through the Industrial Training at Indian Oil Corporation Limited, Barauni Refinery from 09th June to 07th July 2025.

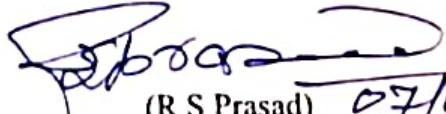
During the training period, Ms. Muskan Kumari was given exposure to various functions of the Production Department of Barauni Refinery including Industrial Safety.

Ms. Muskan Kumari took keen interest in learning the important aspects of different functions through interaction, manual study, onsite visit, workshop learning and demonstrated his inquisitive approach of continuous learning.

She has demonstrated desired discipline and punctuality during the training period and submitted a project report upon successful completion of her internship.

Barauni Refinery wishes Ms. Muskan Kumari a bright academic career and success in her future endeavor.

For and on behalf of Barauni Refinery


(R S Prasad) 07/07/25
Dy General Manager (EMS, MS, L&D)

राधे श्याम प्रसाद
RADHE SHYAM PRASAD
उप महाप्रबंधक (प्र. सेवाएँ, अधिगम एवं विकास)
Dy. General Manager (MS, L&D)
इंडियन ऑयल कॉर्पोरेशन लिमिटेड
INDIAN OIL CORPORATION LTD.
बराउनी रिफाइनरी, बेगूसराय-851 114 (बिहार)
BARAUNI REFINERY, BEGUSARAI 851 114 (BIHAR)

Barauni Refinery - In harmony with nature

पंजीकृत कार्यालय : जी-9, अली यावर जंग मार्ग, बान्द्रा (पूर्व), मुम्बई-400 051, महाराष्ट्र (भारत)
Regd. Office: G-9, Ali Yavar Jung Marg, Bandra (East), Mumbai-400 051, Maharashtra (India)
CIN - L 23201 MH 1959 GOI 011388



**GURU GHASIDAS VISHWAVIDYALAYA
BILASPUR (C.G.)**



A
PROJECT REPORT
ON
**“Ammonia Recovery and Slippage
Mitigation in Coke Oven Gas Treatment”**

Submitted in partial fulfilment of the requirement for the award of

BACHELOR OF TECHNOLOGY

IN

CHEMICAL ENGINEERING

Guided by:

Mr. Anand Shukla

GM, CO & CCD

Submitted by:

NIDHI NETAM

(22021129)

DEPARTMENT OF CHEMICAL ENGINEERING
School Of Studies Engineering & Technology
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)
(A Central University Established By The Central University Act 2009 No. 25 of 2009)

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भिलाई इस्पात संयंत्र
BHILAI STEEL PLANT

मानव संसाधन विकास विभाग

HUMAN RESOURCES DEVELOPMENT DEPARTMENT

प्रमाणपत्र
CERTIFICATE

पंजीयन क्र.

Regn. No. P-25/5326

प्रमाणित किया जाता है कि श्री / कुमारी

This is to certify that Shri / Ku. Nidhi Netam

सेमेस्टर विद्यार्थी

कालेज / संस्थान

..Sixth..... Sem., student ofB.Tech..... ofGGV..... College / Institute
(Chemical) Bilaspur

ने अवकाश कालीन प्रशिक्षु के रूप में दिनांक

से

तक प्रशिक्षण प्राप्त किया ।

has undergone project based training from 09/06/2025 to 05/07/2025

प्रोजेक्ट

Project Report on "Ammonia recovery and slippage mitigation in coke oven gas treatment:
A comparative study and major to reduce it"

इस अवधि में उनका कार्य निष्पादन

रहा ।

His / her performance during the training period has been Excellent

प्रभारी (प्रशिक्षण)

Incharge (Training)

सुष्मिता पाला / Sushmita Palla

31/06-2025 / DM (HR-L&D)

SAIL HR, BSP (P&S)

भिलाई, दिनांक

Bhilai, Dated 05/07/2025



GURU GHASHIDAS VISHWAVIDYALAYA

BILASPUR– 495009



Summer Internship Report

Internship Done in:

INDIAN OIL CORPORATION LIMITED HALDIA

(W.B.) - 721606



IndianOil

On

Overview of CGO-HDT and Furnace Efficiency Calculations

Name: Nishukant

Roll No.: 22021130

Branch: Chemical Engineering

Semester: - 7th

Guided By: - Mr. S. Margabandhu (Chief Prod. Manager)

Internship Duration: 9th June 2025 to 7th July 2025



इंडियन ऑयल कॉर्पोरेशन लिमिटेड

हल्दिया रिफाइनरी, डाकघर : हल्दिया ऑयल रिफाइनरी - 721606

जिला : पूर्व मेदिनीपुर (पो बंग)

Indian Oil Corporation Limited

Haldia Refinery, P.O. : Haldia Oil Refinery- 721606

District : Purba Medinipur, West Bengal

Website : www.iocl.com, E-mail : haldia refinery@indianoil.in

Phone : 91-3224-223270



IndianOil

रिफाइनरीज प्रभाग
Refineries Division

Ref No. HRLC/25-26/S.IT/126s

Date: 07 July 2025

Completion of Summer Internship at Haldia Refinery

(To Whomsoever It May Concern)

This is to certify that **Mr./Miss. Nishukant** studying in 6th Semester, 3rd Year in Chemical Engineering at Guru Ghasidas Vishwavidyalaya has undergone Summer Internship at Haldia Refinery, Indian Oil Corporation Limited from 09 June 2025 to 07 July 2025.

The project assigned to him/her was "Overview of CGO-HDT and Furnace Efficiency Calculations". His/Her assessment during the internship period for the above project is as follows:

- Attendance: Outstanding
- Project Review / Performance: Excellent
- Learning Ability / Knowledge: Excellent

Satisfactory	Good	Very Good	Excellent	Outstanding
Less Than 60%	60% to 70%	70% to 80%	80% to 90%	Above 90 %

We wish him/her all the success in his/her life.

 07/07/2025

B P Das
Manager (L&D)
Haldia Refinery

बानी पति दास, प्रबंधक (एंड डी)
Bani Pati Das, Manager (L & D)
इंडियन ऑयल कॉर्पोरेशन लिमिटेड, हल्दिया रिफाइनरी
Indian Oil Corporation Limited, Haldia Refinery

Nishukant
Chemical Engineering
Guru Ghasidas Vishwavidyalaya

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PETROLEUM REFINERY ENGINEERING

A Internship Report

In Fulfilment of the Requirement for Award of Degree of
Bachelor of Technology of the 3rd Year in Chemical Engineering

Submitted By

Omprakash (22021131)

Under the Guidance of

Dr. Avijit Ghosh



INDIAN INSTITUTE OF CHEMICAL ENGINEERING (IIChE)

Dr.H.L. Roy Building , Jadavpur University Campus,

188 Raja Subodh Chandra Mullick Road, Kolkata,700032

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Internship Programme - 2025

Duration 05.06.2025 to 27.07.2025

IIChE Training Institute (IIChE-TI)

Dr. H. L. Roy Building , Jadavpur University Campus, Kolkata 700032

CERTIFICATE OF COMPLETION

The certificate is hereby awarded to

Omprakash

from Guru ghasidas (a central) university

Who has successfully completed the INTERNSHIP PROGRAMME on the subject **Petroleum Refinery Engineering** following all necessary criteria of the institute with "**A+**".

Registrar IIChE

Chief Coordinator & Director IIChE-TI

Certificate ID: OIP/2025/B2/39/76

Email: iichehgfb@gmail.com / 9830752111

Date of Issue: 03 August 2025

A
Internship Report



**Submitted in partial fulfillment of the requirement of the degree of
Bachelor Of Technology of the 4th Year
In
Chemical Engineering**

Submitted by

Name
Pankaj Kumar

Roll No.
22021133

DEPARTMENT OF CHEMICAL ENGINEERING
School Of Studies Engineering & Technology
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)
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July 2025

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CERTIFICATE OF VOCATIONAL TRAINING - 2025
व्यावसायिक प्रशिक्षण प्रमाण पत्र - 2025

THE CERTIFICATE IS AWARDED TO

PANKAJ KUMAR PATEL

VT Roll No - VT25CHEM015

Branch - CHEMICAL ENGINEERING

Name of College/Institute - GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR

For satisfactorily completing Vocational Training at NTPC, Sipat, Bilaspur for a period of four weeks from 16/06/2025 to 15/07/2025. The participant has successfully completed the course and has also completed the project assigned to him/her as part of this course. We wish him/her a bright and successful future.



Nakka Ramesh
Sr. Manager (RLI)

KV Prasad
GM & Head (RLI-Simulator)

Ref No. RLI/SIPAT/VT/CERT/2025/VT25CHEM015

SUMMER TRAINING REPORT
AT
NATIONAL THERMAL POWER CORPORATION (SIPAT)
ON
WATER CHEMISTRY FOR POWER PLANT WITH SPECIFIC REFERENCE TO
SUPERCRITICAL BOILER
(June 2025-July 2025)



(SUBMITTED BY)
PRASHANT SAHAY
(ROLL NUMBER: 22021135)
(ENROLLMENT NUMBER: GGV/22/01535)
(2025-26)



Department of Chemical engineering
GURUGHASIDAS VISHWAVIDYALAYA
BILASPUR (C.G.) 495009

(A Central Universities established by Central Universities Act, 2009)

CONTENT

1. Abstract
2. Introduction
3. About organisation
4. Description of Supercritical Boiler
5. All Volatile Treatment (AVT)
6. Oxygenated Treatment (OT)
7. Comparison between AVT and OT Treatment
8. Conclusion



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CERTIFICATE OF VOCATIONAL TRAINING - 2025
व्यावसायिक प्रयिक्षण प्रमाण पत्र - 2025

THE CERTIFICATE IS AWARDED TO
PRASHANT SAHAY

VT Roll No -VT25CHEM031

Branch - CHEMICALENGINEERING

Name of College/Institute - GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR

For satisfactorily completing Vocational Training at NTPC, Sipat, Bilaspur for a period of four weeks from 16/06/2025 to 15/07/2025. The participant has successfully completed the course and has also completed the project assigned to him/her as part of this course. We wish him/her a bright and successful future.



DATE -19/07/2025

RdNo.RLI/SIPAT/VT/CERT/2025/VT25CHEM031

Nakka Ramesh
Sr. Manager (RLI)

KV Prasad
GM&Head (RLI-Simulator)



IndianOil



Project report on

“Overview of IOCL refinery Digboi”

Submitted by :
Priyanjana Malakar

semester : 7th

Duration : 15/05/2025 - 16/06/2025

Institute : Guru Ghasidas Viswavidyalaya

Abstract

This report presents a comprehensive overview of the IOCL Digboi Refinery, the oldest operating refinery in India and one of the oldest in the world, with a legacy dating back to 1901. The study explores the refinery's evolution, modernization efforts, and current operational landscape, highlighting its ISO-9001, ISO-14001, and BS OHSAS 18001 certifications that reflect a strong commitment to quality, safety, and environmental stewardship.

The report examines the refinery's crude processing capacity, the diversity of crude sources, and the integration of advanced units such as the Crude Distillation Unit (CDU), Delayed Coking Unit (DCU), Hydrotreater, Hydrogen Generation Unit, and Motor Spirit Quality Upgradation Unit. Special emphasis is placed on the refinery's technological advancements, including the adoption of NHT and ISOM units for producing high-quality fuels and specialty products like paraffin wax and Crumb Rubber Modified Bitumen.

Economic, operational, and environmental aspects are discussed, including the refinery's role in supplying petroleum products to the North-Eastern region of India, its contributions to the local and national economy, and its proactive measures for pollution control and sustainability. The report also addresses key safety protocols, effluent treatment, and waste management practices adopted by the refinery to ensure compliance with stringent environmental standards.

In conclusion, the IOCL Digboi Refinery stands as a model of continuous improvement and technological innovation in India's refining sector. Its ongoing modernization, focus on product quality, and commitment to environmental protection underscore its pivotal role in meeting the country's energy needs while striving for greater sustainability and operational excellence.

GURU GHASIDAS VISHWAVIDYALAYA
BILASPUR – 495009



Summer Training Report
On
“ How to achieve zero liquid discharge in power plants”
At



NATIONAL THERMAL POWER CORPORATION LIMITED SIPAT

Submitted by
Priyanka kumari(22021138)

Guided by
Mr.Nakka Ramesh

DEPARTMENT OF CHEMICAL ENGINEERING
School Of Studies Engineering & Technology
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)
(A Central University Established By The Central University Act 2009 No. 25 of 2009)

July 2025

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CERTIFICATE OF VOCATIONAL TRAINING - 2025
व्यावसायिक प्रशिक्षण प्रमाण पत्र - 2025

THE CERTIFICATE IS AWARDED TO

PRIYANKA KUMARI

VT Roll No - VT25CHEM019

Branch - CHEMICAL ENGINEERING

Name of College/Institute - GURU GHASIDAS VISHWA VIDYALAYA, BILASPUR

For satisfactorily completing **Vocational Training at NTPC, Sipat, Bilaspur** for a period of four weeks from 16/06/2025 to 15/07/2025. The participant has successfully completed the course and has also completed the project assigned to him/her as part of this course. We wish him/her a bright and successful future.



DATE - 19/07/2025

Ref No. RLI/SIPAT/VT/CERT/2025/VT25CHEM019

Nakka Ramesh
Sr. Manager (RLI)

KV Prasad
GM & Head (RLI-Simulator)

GURU GHASIDAS VISHWAVIDYALAYA
BILASPUR - 495009



Summer Internship Report

Internship From NTPC Sipat



On

How To Achieve Zero Liquid Discharge In Power Plant

Submitted by

Rahul Kumar (22021139)

Guided by

Mr. Nakka Ramesh

DEPARTMENT OF CHEMICAL ENGINEERING
School Of Studies Engineering & Technology
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)
(A Central University Established By The Central University Act 2009 No. 25 of 2009)
July 2025

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CERTIFICATE OF VOCATIONAL TRAINING - 2025
व्यावसायिक प्रशिक्षण प्रमाण पत्र - 2025

THE CERTIFICATE IS AWARDED TO
RAHUL KUMAR

VT Roll No -VT25CHEM020

Branch - CHEMICAL ENGINEERING

Name of College/Institute - GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR

For satisfactorily completing **Vocational Training at NTPC, Sipat, Bilaspur** for a period of four weeks from 16/06/2025 to 15/07/2025. The participant has successfully completed the course and has also completed the project assigned to him/her as part of this course. We wish him/her a bright and successful future.



DATE -19/07/2025

Ref No. RLI/SIPAT/VT/CERT/2025/VT25CHEM020

Nakka Ramesh
Sr. Manager (RLI)

KV Prasad
GM & Head (RLI-Simulator)

Project Report On:
**Studies Of Alkaline Water Electrolysis for Hydrogen Production and
Kinetic Study of Catalytic Wet D₂-O₂ Recombination Reaction**

A

Project Report For
Partial Fulfillment of Requirement

For the Degree of

B. Tech (Chemical Engineering)

Submitted by: Mr. Raj Chandrakar

Enrollment No. (GGV/22/01541)

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

Checked by: Shri Sachin Kamath, SO/F & Guide
Shri Jitendra Singh, TO/E & Guide

Reviewed by: Dr. K.C Sandeep, Head, PDS, HWD

Approved by: Kalyan Bhanja, Head, HWD

Heavy Water Division
Chemical Engineering Group
Bhabha Atomic Research Centre, Trombay
Mumbai-400085

15 May - 30 June 2025



Government of India
Bhabha Atomic Research Centre
Heavy Water Division

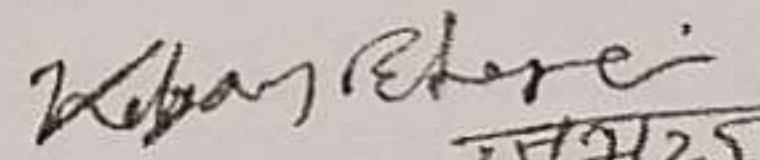
Ref: BARC/HWD/EO-I-99087

15 July 2025

CERTIFICATE

To whom so ever may it concern

This is to certify that **Mr. Raj Chandrakar** of the Department of Chemical Engineering, **Guru Ghasidas Vishwavidyalaya (Central University)**, Bilaspur, Chhattisgarh has worked on the topic of "Studies on alkaline water electrolysis for hydrogen production and kinetic study of catalytic wet D_2-O_2 recombination reaction" as a part of the University-Industry/Institute linked B.Tech. Project Work in Heavy Water Division, Bhabha Atomic Research Centre, Mumbai, satisfactorily during the period from 15-May-2025 to 30-June-2025. He was found to be sincere, dedicated and hard working during the course of her training.


15/7/25
Shri. Kalyan Bhanja

Head, Heavy Water Division,
Chemical Engineering Group,
Bhabha Atomic Research Centre

कल्याण भंजा / K. Bhanja
अध्यक्ष, भारती भारती प्रभाग
Head, Heavy Water Division
भारती परमाणु अनुसंधान केन्द्र,
Bhabha Atomic Research Centre,

Telephone: 022 2559 3915

Office: Engg. Hall 2, Heavy Water Division

Email : kbhal@barc.gov.in

भारत सरकार / Govt. of India
Trombay, Mumbai-400085

Abstract

Hydrogen is widely recognized as a clean and sustainable energy carrier, with potential applications across transportation, industry, and energy storage. Alkaline water electrolysis is one of the established processes and employed to generate hydrogen by splitting water molecules using a potassium hydroxide (KOH) solution as the electrolyte and applying an electric current between two electrodes. The alkaline water electrolysis coupled with green energy is simple, cost-effective, and environmentally friendly process for large-scale production of green hydrogen. However, the hydrogen gas produced from this process may contain small amounts of impurity such as oxygen and moisture. The oxygen content in hydrogen stream can be removed by using catalytic recombination reaction process in which it reacts with oxygen in the presence of a catalyst for high-purity hydrogen applications. The reproducibility data have been generated by conducting runs at room temperature using lab scale alkaline water electrolyzer with variation of current from 1 to 10 ampere and vice versa for performance study. The experiment shows appreciable reproducibility characterization data because voltage versus current density lines follow each other. In addition important applications of hydrogen, deuterium is the isotope of hydrogen and main ingredient in nuclear fusion reactions. It can be produced and further polished by using alkaline heavy water electrolyzer and catalytic D_2 - O_2 recombiner reactors respectively. The exothermic nature of recombination reaction may cause the deactivation of the catalytic pellets due to localized sintering effect. The experiments have been conducted in the temperature range from room temperature (RT) to 70 °C to perform wet D_2 - O_2 recombination reaction on hydrophobic Pt based catalyst in presence of water for estimation of apparent reaction parameters, which are essential in the process design and scale up of catalytic recombiner. It is observed that the temperature effect on wet recombination reaction is negligible due to presence of additional mass transfer resistance of water film, which decreases the catalytic activity. The experimental data on reproducibility in lab scale alkaline water electrolyzer and on D_2 - O_2 wet recombination reaction may be useful for design and scale up of electrochemical and catalytic recombination reactors.

A Project Report
on
WATER CHEMISTRY FOR POWER PLANTS:
WITH SPECIFIC REFERENCE TO SUPERCRITICAL
BOILERS

*Submitted in partial fulfilment of the requirement for award of degree of
Bachelor of Technology in Chemical Engineering*

Submitted by

Ramesh Kumar

22021142



Guide

Nakka Ramesh
Sr. Manager (RLI)
REGIONAL LEARNING INSTITUTE,
NTPC, SIPAT

DEPARTMENT OF CHEMICAL ENGINEERING
School of Studies of Engineering & Technology
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)
(A Central University Established by the Central University Act 2009 No. 25 of 2009)

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REGIONAL LEARNING INSTITUTE, NTPC, SIPAT

क्षेत्रीय ज्ञानार्जन संस्थान, एनटीपीसी, सीपत
CERTIFICATE OF VOCATIONAL TRAINING - 2025

व्यावसायिक प्रशिक्षण प्रमाण पत्र - 2025

THE CERTIFICATE IS AWARDED TO

RAMESH KUMAR

VT Roll No - VT25CHEM009

Branch - CHEMICAL ENGINEERING

Name of College/Institute - GURU GHASIDAS VISHWA VIDYALAYA, BILASPUR

For satisfactorily completing Vocational Training at NTPC, Sipat, Bilaspur for a period of four weeks from 16/06/2025 to 15/07/2025. The participant has successfully completed the course and has also completed the project assigned to him/her as part of this course. We wish him/her a bright and successful future.



DATE -19/07/2025

Ref No. RLI/SIPAT/VT/CERT/2025/VT25CHEM009

Nakka Ramesh
Sr. Manager (RLI)

KV Prasad
GM & Head (RLI-Simulator)

SUMMER INTERNSHIP REPORT

AT

NATIONAL THERMAL POWER
CORPORATION(SIPAT)



ON

TYPES OF CHEMICALS USED IN POWERPLANTS, SAFETY AND WASTE
MANAGEMENT PRACTICES.

In Partial Fulfilment of the Requirement for Award of Degree of
Bachelor of Technology of the 4th Year in Chemical Engineering

Submitted By: -

Rangari Tejus(22021143)

Under the Guidance of: -

Mr. Nakka Ramesh



DEPARTMENT OF CHEMICAL ENGINEERING

GURU GHASIDAS VISHWADIYALAYA

BILASPUR(C.G).495009

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INDIAN OIL CORPORATION LIMITED BARAUNI REFINERY

SUMMER TRAINING (FROM 24.05.25 TO 25.06.25)



Indian Oil Corporation Limited

INDUSTRIAL TRAINING REPORT

Submitted To:

Manager
Learning & Development IOCL
Barauni

Submitted By:

Raushan Kumar (22021144)



Department of Chemical Engineering

Guru Ghasidas Central University Bilaspur Chattisgarh-495009



रिफ़ाइनरीज प्रभाग
Refinery Division

इंडियन ऑयल कॉर्पोरेशन लिमिटेड
बराउनी रिफ़ाइनरी, बाक्सर : बराउनी ऑयल रिफ़ाइनरी,
जिला : बेगूसराय, बिहार - 851114
Indian Oil Corporation Limited
Barauni Refinery, P.O. : Barauni Oil Refinery,
Distt. : Begusarai, Bihar - 851 114
वेबसाइट : www.iocl.com
ई-मेल : baraunirefinery@indianoil.in
दूरभाष : 06243-240159 / 240110
फ़ैक्स : 06243-240150 / 240278



ISO 9001, 14001 & OHSAS 18001 Certified Refinery

Ref. No.: L&D/VT/2025/048

Dated: 25th June, 2025

This is to certify that Mr. Raushan Kumar, Roll No. 22021144 a Chemical Engineering student from Institute of Technology, Guru Ghasidas University, Bilaspur (C.G.) has gone through the Industrial Training at Indian Oil Corporation Limited, Barauni Refinery from 27th May to 25th June 2025.

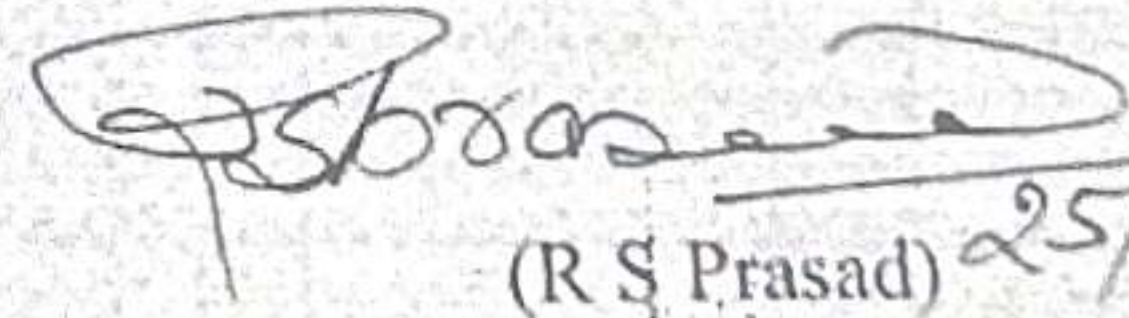
During the training period, Mr. Raushan Kumar was given exposure to various functions of the Production Department of Barauni Refinery including Industrial Safety.

Mr. Raushan Kumar took keen interest in learning the important aspects of different functions through interaction, manual study, onsite visit, workshop learning and demonstrated his inquisitive approach of continuous learning.

He has demonstrated desired discipline and punctuality during the training period and submitted a project report upon successful completion of his internship.

Barauni Refinery wishes Mr. Raushan Kumar a bright academic career and success in his future endeavor.

For and on behalf of Barauni Refinery


(R S Prasad) 25/06/25

Dy General Manager (EMS, MS, L&D)

राधे श्याम प्रसाद

RADHE SHYAM PRASAD

उप महाप्रबंधक (प्र. सेवाएँ, अधिगम एवं विकास)

Dy. General Manager (MS, L&D)

इंडियन ऑयल कॉर्पोरेशन लिमिटेड

INDIAN OIL CORPORATION LTD.

बराउनी रिफ़ाइनरी, बेगूसराय-851 114 (बिहार)

BARAUNI REFINERY, BEGUSARAI 851 114 (BIHAR)

Barauni Refinery - *In harmony with nature*

पंजीकृत कार्यालय : जी-9, अली यावर जंग मार्ग, बान्द्रा (पूर्व), मुम्बई-400 051, महाराष्ट्र (भारत)

Regd. Office: G-9, Ali Yavar Jung Marg, Bandra (East), Mumbai-400 051, Maharashtra (India)

CIN - L 23201 MH 1959 GOI 011388

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Guru Ghasidas Vishwavidyalaya, Bilaspur (495009)

Summer Internship Report (NTPC Sipat)



Water Chemistry for Power Plants: with specific Reference to Supercritical Boilers



Submitted by

Ravi Ranjan Kumar

Roll No.22021145

Enrollment No. GGV/22/01545

Guided by

Mr. Nakka Ramesh

(Additional General Manager
and Head at NTPC RLI)

DEPARTMENT OF CHEMICAL ENGINEERING

School Of Studies Engineering & Technology

GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)

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

July 2025



REGIONAL LEARNING INSTITUTE, NTPC, SIPAT
क्षेत्रीय ज्ञानार्जन संस्थान, एनटीपीसी, सीपत
CERTIFICATE OF VOCATIONAL TRAINING - 2025
व्यावसायिक प्रशिक्षण प्रमाण पत्र - 2025

THE CERTIFICATE IS AWARDED TO
RAVI RANJAN KUMAR

VT Roll No -VT25CHEM012

Branch - CHEMICAL ENGINEERING

Name of College/Institute - GURU GHASIDAS VISHWAVIDYALAYA,BILASPUR

For satisfactorily completing **Vocational Training at NTPC, Sipat, Bilaspur** for a period of four weeks from 16/06/2025 to 15/07/2025. The participant has successfully completed the course and has also completed the project assigned to him/her as part of this course. We wish him/her a bright and successful future.



DATE -19/07/2025

Ref No. RLI/SIPAT/VT/CERT/2025/VT25CHEM012

Nakka Ramesh
Sr. Manager (RLI)

KV Prasad
GM & Head (RLI-Simulator)

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Indian Institute of Science Education and Research

Bhopal-462066



INTERNSHIP REPORT

Submitted in partial fulfillment for

the requirement of degree of

Bachelor of Technology

in

Chemical Engineering

Submitted by

Sadhana Mall(22021147)

Under the guidance of

Dr. Akshay Modi(Assistant Professor)



Department of Chemical Engineering

School of Studies in Engineering and Technology,

Guru Ghasidas Vishwavidyalaya Bilaspur, Chhattisgarh

June 2025

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भारतीय विज्ञान शिक्षा एवं अनुसंधान संस्थान भोपाल
Indian Institute of Science Education and Research Bhopal
(Established by Ministry of Education, Govt. of India)
Bhopal By-pass Road, Bhauri, Bhopal – 462066, Madhya Pradesh, INDIA

Internship Certificate

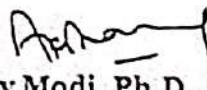
06th July 2025

This is to certify that Ms. Sadhana Mall, a B.Tech. student in Chemical Engineering from the Guru Ghasidas Vishwavidyalaya Bilaspur, Chhattisgarh, has successfully completed the Summer Internship on the project "Estimation of Molecular Weight Cut-off of PAN-based Membranes".

The internship was conducted under my supervision in the Department of Chemical Engineering at the Indian Institute of Science Education and Research (IISER) Bhopal, India, from 26th May 2025 to 06th July 2025.

During the internship, she demonstrated commendable dedication and enthusiasm while testing the molecular weight cut-off of PAN-based membranes. While she initially faced some challenges in adapting to experimental procedures, Sadhana steadily adapted to the laboratory environment and aligned herself with the assigned tasks. Over time, she completed the experiments responsibly and with growing confidence. Overall, her performance was noteworthy.

I am confident that Ms. Sadhana Mall will excel in all her future endeavours. I extend my best wishes to her for continued success and a bright future.


Akshay Modi, Ph.D.

Assistant Professor,
Department of Chemical Engineering,
Indian Institute of Science Education and Research Bhopal,
Bhopal – 462066, Madhya Pradesh, India
Phone No.: +91-755-2692619
Email: akshaymodi@iiserb.ac.in
Webpage: <https://che.iiserb.ac.in/read-more-content/faculty-read-more/akshaymodi>

**Report
On
Internship Training Programme
(OIP-2025)
CHEMICAL PROCESS TECHNOLOGY**

Submitted in Partial Fulfilment of the Requirements for the mandatory Industrial Internship training Programme

**Submitted by:
SAGAR RAJ
GURU GHASIDAS VISHWAVIDYALAYA**

Dates: 5th June to 15th July, 2025
Indian Institute of Chemical Engineers(IIChE)
Dr. H. L. Roy Building, Jadavpur University Campus,
188 Raja Subodh Chandra Mullick Road, Kolkata 700 032
www.iiche.org.in / iichehqfb@gmail.com/director.ti@iiche.org.in

Certificate from the IICChE

This is to certify that **SAGAR RAJ** from **GURU GHASIDAS VISHWAVIDYALAYA** successfully completed online summer internship programme in our organization. The matter embodied in this report is a genuine to the best of our knowledge and belief and has not been submitted before, neither to this Institute nor to any other organization for the fulfilment of the requirement of any course of study. During her internship tenure in IICChE, we found her as a hardworking, sincere, and diligent person and her behaviour and conduct was good. We wish her all the best for her future endeavour.



Chief Coordinator, OIP-2025

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**Report
On
Internship Training Programme
(OIP-2025)
Chemical Process Technology**

Submitted in Partial Fulfilment of the Requirements for the mandatory Industrial Internship training programme

**Submitted by:
Sakshi Kumari
Guru Ghasidas Vishwavidyalaya**

Dates: 5th June to 15th July, 2025

Indian Institute of Chemical Engineers(IIChE)

Dr. H. L. Roy Building, Jadavpur University Campus

188 Raja Subodh Chandra Mullick Road, Kolkata 700 032

www.iiche.org.in / iichehgfb@gmail.com / director.ti@iiche.org.in

Certificate from the IChE

This is to certify that **Sakshi Kumari** from **GURU GHASIDAS VISHWAVIDYALAYA** successfully completed online summer internship programme in our organization. The matter embodied in this report is a genuine to the best of our knowledge and belief and has not been submitted before, neither to this Institute nor to any other organization for the fulfilment of the requirement of any course of study. During her internship tenure in IChE, we found her as a hardworking, sincere, and diligent person and her behaviour and conduct was good. We wish her all the best for her future endeavour.



Chief Coordinator, OIP-2025

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A Project Report

On

**Design of Cryogenic Distillation Cascade for high purity
Oxygen production**

**Submitted in Partial Fulfilment of the Requirement for Award of
Degree of Bachelor of Technology in Chemical Engineering**

Submitted by

Sakshi Priya

Under the Guidance of

Shri Krunal A.Mistry,

Scientific Officer-F,

Heavy Water Division,

Bhabha Atomic Research Centre



Bhabha Atomic Research Centre,

Government of India,

Trombay, Mumbai 400085

ABSTRACT

The separation of atmospheric air into its primary components—nitrogen (N_2) and oxygen (O_2)—is fundamental to various industries including steel manufacturing, medicine, and chemical synthesis. Due to the very close boiling points of N_2 (-195.8°C) and O_2 (-183.0°C), cryogenic distillation is the most viable and scalable method for achieving high-purity separation. This project focuses on the design and simulation of a cryogenic distillation cascade using Aspen Plus software, targeting the production of:

- Nitrogen with $>95\%$ purity
- Oxygen with $\geq 99.99\%$ purity

The study involved simulating a distillation cascade. The simulation results helped optimize key process variables such as number of stages, reflux ratios, and operating pressures. Furthermore, energy integration techniques like heat exchangers and expansion valves were considered to enhance efficiency.

This report provides an end-to-end perspective—from thermodynamic principles and process configuration to simulation results and future development pathways. The study concludes that this method is both technically and economically feasible for industrial-scale air separation applications.



सत्यमेव जयते

Government of India
Bhabha Atomic Research Centre

Certificate

This is to certify that **Ms. Sakshi Priya** has successfully completed her Practical training and orientation working on the project "**Design of Cryogenic distillation cascade for High purity Oxygen production**" for the partial fulfillment of Degree of Bachelor of Technology in Chemical Engineering. This work was carried out under my supervision during the period of May-2025 to June-2025.

Kel...
1/7/25

श्री कrunal Mistry
Scientific Officer-F
Heavy Water Division,
Bhabha Atomic Research Centre

वैज्ञानिक अधिकारी
Scientific Officer
भारी पानी प्रभाग
Heavy Water Division
भारत परमाणु अनुसंधान केन्द्र
Bhabha Atomic Research Centre
प्लॉट नं. ४०००-०८५५
मुंबई-४००००८

Report On Internship Training Programme (OIP-2025) Chemical Process Technology

Submitted in Partial Fulfilment of the Requirements for the mandatory Industrial Internship
training Programme

Submitted by:
Sandeep kumar
Guru Ghasidas Vishwavidyalaya



Dates: 5th June to 10th July, 2025

Indian Institute of Chemical Engineers(IIChE)

Dr. H. L. Roy Building, Jadavpur University Campus,
188 Raja Subodh Chandra Mullick Road, Kolkata 700 032
www.iiche.org.in / iichehqfb@gmail.com/director.ti@iiche.org.in

OIP-2025

Preface

Objectives of Online Internship Program

- Assist the student's development of employer-valued skills such as teamwork, communications and attention to learn Engineer's responsibilities and ethics.
- Enhance and/or expand the student's knowledge of a particular area(s) of skill.
- Expose the student to professional role models or mentors who will provide the student with support in the early stages of the internship and provide an example of the behaviours expected in the intern's workplace.
- To familiarize with various materials, processes, products and their applications along with relevant aspects of technology and troubleshooting.
- To gain experience in writing technical report/project.

Course Outcome

- Provides basic idea of different real life industrial processes, problems, trouble shooting, decision making and preventive maintenance techniques and professional culture of industry, work ethics and attitudes in industry. The different live situation, trouble shooting and modern technological application.
- Provides course materials to the students for reference (in PDF format). The study materials have been shared with the students through IChE for its record.
- Improves to deal with the assignments which has been given for the solution / conceptual ideas based on discussion during the tutorial classes.
- Helps to understand the importance of the application of modern tools for the industrial automation / up-gradation / scale-up.
- Develops conceptual theory in the regular class room discussion and its application in real-life industrial problem resolution.
- Gives primary idea to analyse Case studies based on real life application.



Internship Programme - 2025

Duration 05.06.2025 to 10.07.2025
IIChE Training Institute (IIChE-TI)

Dr. H. L. Roy Building , Jadavpur University Campus, Kolkata 700032

CERTIFICATE OF COMPLETION
The certificate is hereby awarded to

Sandeep Kumar

from Guru Ghasidas Vishwavidyalaya

Who has successfully completed the INTERNSHIP PROGRAMME on the subject **Chemical Process Technology (CPT)** following all necessary criteria of the institute with "B".

Registrar IIChE

Chief Coordinator & Director IIChE-TI

Certificate ID: OIP/2025/B2/39/43

Email: iichehgfb@gmail.com / 9830752111

Date of Issue: 07.22.2025

GURU GHASIDAS VISHWAVIDYALAYA
BILASPUR - 495009



Summer

Internship Report

Internship From NTPC Sipat



On

Demineralization of water in power plants

Submitted by
Saurabh raj(22021152)

Guided by
Mr. Nakka Ramesh

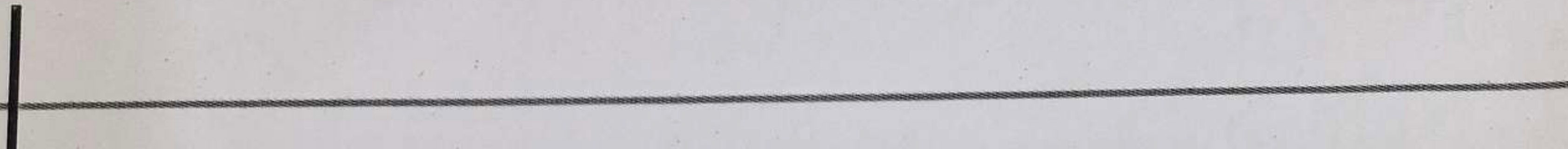


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 - Problems Caused by Dissolved Salts
 - The Impact of Scaling and Corrosion
3. Sources of Raw Water and Pre-treatment Processes
 - Common Raw Water Sources
 - Initial Water Pre-treatment
4. Demineralization Plant Process Flow Diagram (PFD)
5. Detailed Explanation of Plant Components
 - Raw Water Storage and Pumps
 - Filtration Units (Multimedia and Activated Carbon)
 - Cation and Anion Exchangers
 - Degasser Tower and Sump
 - Mixed Bed Polishing Unit
6. Important Operating Parameters and Water Quality Control
 - Conductivity
 - pH Value
 - Total Dissolved Solids (TDS)
 - Flow Rate and Pressure Drop
 - Silica Content and Temperature
 - Feed Water Quality Requirements
7. Safety Precautions and Emergency Protocols
 - Chemical Handling and Personal Protective Equipment (PPE)
 - General Best Practices and Ventilation
 - Emergency Measures and Response
8. Future Scope and Technological Innovations
 - AI-Based Smart Monitoring
 - IoT and Mobile App Control

REGIONAL LEARNING INSTITUTE, NTPC, SIPAT
क्षेत्रीय ज्ञानार्जन संस्थान, एनटीपीसी, सीपत
CERTIFICATE OF VOCATIONAL TRAINING - 2025
व्यावसायिक प्रशिक्षण प्रमाण पत्र - 2025

THE CERTIFICATE IS AWARDED TO

SAURABH RAJ

VT Roll No - VT25CHEM052

Branch - CHEMICAL ENGINEERING

Name of College/Institute - GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR

For satisfactorily completing Vocational Training at NTPC, Sipat, Bilaspur for a period of four weeks from 16/06/2025 to 15/07/2025. The participant has successfully completed the course and has also completed the project assigned to him/her as part of this course. We wish him/her a bright and successful future.



Nakka Ramesh

Nakka Ramesh
Sr. Manager (RLI)

KV Prasad

KV Prasad
GM & Head (RLI-Simulator)

Ref No. RLI/SIPAT/VT/CERT/2025/VT25CHEM052



**GURU GHASIDAS VISHWAVIDYALAYA
BILASPUR - 495009**

Summer Internship Report

Internship From NTPC SIPAT



On
HOW TO ACHIEVE ZERO LIQUID DISCHARGE IN POWER PLANTS

Submitted by

**Shambhavi Kumari
(22021153)**

Guided by

Mr. Nakka Ramesh

DEPARTMENT OF CHEMICAL ENGINEERING

School Of Studies Engineering & Technology

GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)

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

July 2025

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REGIONAL LEARNING INSTITUTE, NTPC, SIPAT
क्षेत्रीय ज्ञानार्जन संस्थान, एनटीपीसी, सीपत
CERTIFICATE OF VOCATIONAL TRAINING - 2025
व्यावसायिक प्रशिक्षण प्रमाण पत्र - 2025

THE CERTIFICATE IS AWARDED TO
SHAMBHAVI KUMARI

VT Roll No -VT25CHEM024

Branch - CHEMICAL ENGINEERING

Name of College/Institute - GURU GHASIDAS VISHWAVIDYALAYA,BILASPUR

For satisfactorily completing **Vocational Training at NTPC, Sipat, Bilaspur** for a period of four weeks from 16/06/2025 to 15/07/2025. The participant has successfully completed the course and has also completed the project assigned to him/her as part of this course. We wish him/her a bright and successful future.



DATE -19/07/2025

Ref No. RLI/SIPAT/VT/CERT/2025/VT25CHEM024

Nakka Ramesh
Sr. Manager (RLI)

KV Prasad
GM & Head (RLI-Simulator)

**Report
On
Internship Training Programme
(OIP-2025)
DESIGN and Simulation of Distillation column
Using MATLAB**

Submitted in Partial Fulfilment of the Requirements for the mandatory Industrial Internship
training Programme

Submitted by:
SHIVAM KUMAR
Guru Ghasidas Vishwavidyalaya



Dates: 5th June to 10th July, 2025

Indian Institute of Chemical Engineers(IIChE)

Dr. H. L. Roy Building, Jadavpur University Campus,
188 Raja Subodh Chandra Mullick Road, Kolkata 700 032
www.iiche.org.in / iichehqfb@gmail.com/director.ti@iiche.org.in



Certificate from the Mentor

This is to certify that **SHIVAM KUMAR** has completed the project titled **DESIGN and Simulation of Distillation column Using MATLAB** under my supervision during the period from **05/06/25** to **10/07/24** which is in partial fulfillment of requirements for the award of the **B.Tech** and submitted to Department **Chemical Engineering Faculty of Technology** of **Indian Institute of Chemical Engineers & Department Chemical Engineering Faculty of Technology** of **Indian Institute of Chemical Engineers**

Signature of the Mentor

Date:

Acknowledgment

I take this opportunity to express my deep gratitude and sincerest thanks to my project mentor, **Mr. SOUMYADIP SARKAR** for giving the most valuable suggestions, helpful guidance, and encouragement in the execution of this project work.

I would like to give a special mention to my college. Last but not least I am grateful to all the faculty members of the **Indian Institute of Chemical Engineers** for their support



Internship Programme - 2025

05.06.2025 to 10.07.2025

Indian Institute of Chemical Engineers (IIChE)

Dr. H. L. Roy Building , Jadavpur University Campus, Kolkata 700032

CERTIFICATE OF COMPLETION

The certificate is hereby awarded to

Shivam Kumar

from Guru Ghasidas Vishwavidyalaya, Bilaspur A Central University in Chhattisgarh

Who has successfully completed the INTERNSHIP PROGRAMME on the subject **Matlab and AI-ML in Chemical Engineering (AIML)** following all necessary criteria of the institute with **"A+"**.

OIP Grading System:

A+ Grade: 90% – 100%

A Grade: 75% – 89%

B+ Grade: 65% – 74%

B Grade: 55% – 64%

Registrar IIChE-TI

Dr. Avijit Ghosh
Chief Training Coordinator, OIP

Certificate ID: OIP/2025/B2/72150

Email: iichehgfb@gmail.com / 9830752111

Date of Issue: 07.21.2025

Development and Analysis of ML Models for Prediction of Corrosion rates of Steel based on environmental factors

A Summer Internship Report

Submitted in Partial Fulfilment of the Requirement for Award of Degree of
Bachelor of Technology in Chemical Engineering

Submitted By

Shreyansh Shukla

Under the Guidance of

Dr. Krishnasri V. Kurada

Associate Professor

Department of Chemical Engineering

IIPE Vishakhapatnam



ABSTRACT

Atmospheric corrosion of carbon steel poses significant challenges to infrastructure durability, especially under the influence of environmental factors such as temperature, relative humidity, rainfall, PM2.5, and PM10. This study focuses on developing and comparing machine learning models to predict corrosion rates using these parameters, implemented independently in **MATLAB** and **Python** environments.

The **MATLAB model** employed an adaptive Artificial Neural Network (ANN) architecture trained using the **Levenberg–Marquardt algorithm**, exploring multiple feature subsets. In contrast, the **Python pipeline** emphasized **graphical user interface (GUI) development**, offering user input, prediction, retraining, and interpretability features across various regression models including **MLP Regressor, Random Forest, SVR, and XGBoost**.

Data preprocessing involved missing value removal, outlier filtering (IQR and Z-score), and normalization. Model evaluation used R^2 and MSE in MATLAB, and R^2 , MSE, MAE, and RMSE in Python. The **best MATLAB configuration** achieved an **R^2 of 0.6051**, outperforming the current Python models, which attained a **maximum R^2 of approximately 0.02** due to limited tuning and deep unoptimized architectures.

An important finding was that **reduced feature sets** — particularly **Rainfall, PM2.5, and PM10** — led to better accuracy than full input combinations, highlighting the importance of **feature relevance and noise filtering**.

This project provides a comparative, cross-platform framework for corrosion rate modelling, combining the predictive strength of MATLAB with the user-centric design of Python. It establishes a solid foundation for future improvements in model optimization, cross-validation, and real-time deployment through interactive systems.



INDIAN INSTITUTE OF PETROLEUM AND ENERGY

Main Building, II Floor, AU College of Engineering (A)

Andhra University, Visakhapatnam – 530003

Tel: 0891-2585152, Email: office@iipe.ac.in, Website: www.iipe.ac.in

CERTIFICATE OF INTERNSHIP

This is to certify that Mr. Shreyansh Shukla, a student of Guru Ghasidas Vishwavidyalaya, has successfully completed the Summer Internship program (Online mode) on the research topic titled: **“Development of ML Models for Prediction of Corrosion rates of Steel based on environmental factors”** from 25/05/2025 – 08/07/2025 under my supervision at the Indian Institute of Petroleum and Energy (IIPE), Visakhapatnam.

During this period of internship, he carried out Machine Learning on the **“Development of ML Models for Prediction of Corrosion rates of Steel based on environmental factors”**. This work included the employing machine learning models to analyze corrosion data to correlate process parameters and predict corrosion rate. The project demonstrated proficiency in data pre-processing, algorithm selection, and domain-specific model evaluation. He demonstrated sincerity and completed the assigned tasks with diligence.

I wish him success in all his future endeavours.

Date: 21-07-2025

With best wishes.

Dr. Kurada Venkata Krishnasri

Assistant Professor

Department of Chemical Engineering

IIPE Visakhapatnam

Dr. K. V. Krishnasri
Asst. Professor
Dept of Chemical Engineering
Indian Institute of Petroleum & Energy
Visakhapatnam

Recovery Of Metals From Electronic Waste

An Internship Report

In Partial Fulfilment of the Requirement for Award of Degree of
Bachelor of Technology of the 4th Year in Chemical Engineering

Submitted By

Soumyashree (22021157)

Under the Guidance of

Dr. Prateek Khatri

Assistant Professor

(NIT Rourkela)



DEPARTMENT OF CHEMICAL ENGINEERING

NATIONAL INSTITUTE OF TECHNOLOGY, ROURKELA

July 2025



NATIONAL INSTITUTE OF TECHNOLOGY ROURKELA

CERTIFICATE OF COMPLETION

This Certificate is Awarded to

Soumyashree

Guru Ghasidas Vishwavidyalaya

*has successfully completed summer internship program in
Chemical Engineering*

*Conducted from 16th May to 16th June 2025
at Department of Chemical Engineering, NIT Rourkela*

Date: 16/06/2025

Prateek
Dr. Prateek Khatri
Assistant Professor
Department of Chemical Engineering
National Institute of Technology Rourkela
Prof. Prateek Khatri
Supervisor

ABSTRACT

The rapid growth of electronic devices has increased e-waste generation, with integrated circuits (ICs) being a valuable but challenging component to recycle due to their epoxy resin housing. This study investigates pyrolysis as a pre-treatment for ICs, followed by leaching for metal recovery. Pyrolysis at 550–700 °C decomposed nearly 90% of the organic fraction, enabling the separation of a coarser metal-rich fraction and a finer silica-rich fraction. High recoveries were achieved for Cu (~97%), Fe (~89%), Ni (~65%), Pb (~57%), and Ag (~33%) in the coarser fraction. The fine fraction, mainly silica (~87%), was further treated with HNO₃ and Na₂S₂O₃ leaching, where nitric acid achieved almost complete dissolution of Ag and Cu, while thiosulfate offered a selective and eco-friendly route for Ag recovery. The results suggest that pyrolysis combined with leaching is an efficient, sustainable, and low-acid-consuming method for IC recycling, while also providing reusable silica by-products.

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A Internship Report
on
**EXPLORING THE METHODS OF COAL MINING
AND PROCESSING**

In Partial Fulfilment of the Requirement for Award of Degree of
Bachelor of Technology of the 4th Year in Chemical Engineering

Submitted By
Sujit kumar (22021158)

Under the Guidance of
Mr. Anil Mandal



DEPARTMENT OF CHEMICAL ENGINEERING
SCHOOL OF STUDIES OF ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)
May 2025

DECLARATION

We hereby declare that the work presented in this report entitled “ *Exploring the Methods of Coal Mining and Processing...*” in fulfillment of the requirement for the award of the degree of Bachelor of Technology in Chemical Engineering, School of Studies of Engineering & Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) is an authentic record of our own work carried out during our degree under the guidance of “**Mr. Anil Mandal**”

The work reported in this has not been submitted by us for any other degree or diploma.

Name

Roll No.

Signature

Sujit Kumar

22021158

CERTIFICATE

Certified that the Major Project Report entitled “*Exploring the Methods of Coal Mining and Processing*” submitted by Sujit Kumar of B.Tech. 7th Semester, in partial fulfillment of the requirements for the award of degree in Bachelor of Technology (B. Tech) in Chemical Engineering, is according to the students their own investigation carried out by them in the Department of Chemical Engineering, School of Studies of Engineering & Technology, GGV, during the session 2025-26.

Prof. Amit Jain

HoD

Department of Chemical Engineering
SoS of Engineering & Technology, GGV

Mr. Anil Mandal

Coordinator

Bharat coking coal limited,
West Jharia, Moonidih .

ACKNOWLEDGEMENT

We are indebted to **Mr. Anil Mandal** Training Coordinator, for their meticulous guidance, timely assistance, and valuable suggestions throughout the internship work. It is our pleasure to work under their supervision.

We also express our sincere thanks to Prof. **Amit Jain**, Head of the Department, and all the teachers of the Chemical Engineering Department who assisted us directly or indirectly in the successful completion of our internship.

Sujit Kumar(22021158)

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