

Presentation of Annual Progress Report (2021-2022)

under

DBT Star College Scheme



**Department of Chemistry
RKMVC College**

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Titles

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New Practical Introduced & Performed in Undergraduate Syllabus

Name of the Experiment	Paper	Semester
Determination of heat of neutralization of a strong acid by a strong base	C - II (LAB)	UG Semester - 1
Determination of heat of solution of oxalic acid from solubility measurement	C - II (LAB)	UG Semester - 1
Determination of K_{eq} for $KI + I_2 = KI_3$, using partition coefficient between water and CCl_4	C - V (LAB)	UG Semester - 3
Effect of ionic strength on the rate of Persulphate – Iodide [$K_2S_2O_8 + KI$] reaction	C– X (LAB)	UG Semester - 4
pH-metric titration of acid (mono- and di-basic) against strong base (say, NaOH)	C – X (LAB)	UG Semester - 4
Determination of Critical Micelle Concentration (CMC) of a surfactant from surface tension measurements	C – XIV (LAB)	UG Semester - 6
Determination of pH of unknown buffer, spectrophotometrically	C – XIV (LAB)	UG Semester - 6
Spectrophotometric determination of CMC of a surfactant	C – XIV (LAB)	UG Semester - 6

New Practical Introduced & Performed in Undergraduate Syllabus

Name of the Experiment	Paper	Semester
Synthesis and spectroscopic characterizations of Cis and trans $K[Cr(C_2O_4)_2(H_2O)_2]$	C - VIII (LAB)	UG Semester – 1V
Synthesis and spectroscopic characterizations of Potassium trisoxalatoferrate(III)	C - VIII (LAB)	UG Semester – 1V
Synthesis and spectroscopic characterizations of Tris(ethylenediamine) nickel(II) chloride	C - VIII (LAB)	UG Semester – 1V
Synthesis and spectroscopic characterizations of $[Mn(acac)_3]$ and $Fe(acac)_3$ (acac = acetylacetonate)	C - VIII (LAB)	UG Semester – 1V
Extraction of caffeine from tea leaves	C – XII (LAB)	UG Semester - 5
Preparation of Methyl Orange	C – XII (LAB)	UG Semester - 5

New Practical Introduced & Performed in Undergraduate Syllabus

Name of the Experiment	Paper	Semester
Synthesis of ZnO (an inorganic pigment)	DSE-4 (LAB)	UG Semester - 6
Determination of free acidity in ammonium sulphate fertilizer.	DSE-4 (LAB)	UG Semester - 6
Estimation of Calcium in Calcium ammonium nitrate fertilizer.	DSE-4 (LAB)	UG Semester - 6
Estimation of phosphoric acid in superphosphate fertilizer.	DSE-4 (LAB)	UG Semester - 6
Analysis of Cement.	DSE-4 (LAB)	UG Semester - 6
Synthesis and spectroscopy of Gold and Silver Nanoparticles using Turkevich Method	DSE-4 (LAB)	UG Semester - 6
Preparation and characterization of nanoparticles of gold using tea leaves	DSE-3 (LAB)	UG Semester - 6
Use of enzymes as catalysts : Benzoin condensation using Thiamine Hydrochloride as a catalyst instead of cyanide.	DSE-3 (LAB)	UG Semester - 6

New Practical Introduced & Performed in Undergraduate Syllabus

Name of the Experiment	Paper	Semester
Alternative Green solvents: Extraction of D-limonene from orange peel using liquid CO ₂ prepared from dry ice.	DSE-3 (LAB)	UG Semester - 6
Solvent free, microwave assisted one pot synthesis of phthalocyanine complex of copper (II).	DSE-3 (LAB)	UG Semester - 6
Photoreduction of benzophenone to benzopinacol in the presence of sunlight.	DSE-3 (LAB)	UG Semester - 6
Determination of dissolved oxygen in water.	DSE-5 (LAB)	UG Semester - 6
Determination of Chemical Oxygen Demand (COD)	DSE-5 (LAB)	UG Semester - 6
Determination of Biological Oxygen Demand (BOD)	DSE-5 (LAB)	UG Semester - 6
Estimation of total alkalinity of water samples (CO ₃ ²⁻ , HCO ₃ ⁻) using double titration method.	DSE-5 (LAB)	UG Semester - 6

New Practical Introduced & Performed in Undergraduate Syllabus



Equipment Purchased under DBT Star College Scheme & Used for Laboratory Experiments

Name of the Equipment
pH meter
Potentiometer
Colorimeter
Visible Spectrometer
Conductivity meter
Digital Automatic Polarimeter
Micro centrifuge
Digital Precision Balance

Equipment Purchased under DBT Star College Scheme & Used for Laboratory Experiments

Name of the Equipment
Hot Air Oven
Variable Volume Micropipette
Magnetic Stirrer
Temperature controlled water bath
DO Meter
BOD Incubator
COD condenser
MW Oven with magnetic stirrer and condenser

Equipment Purchased under DBT Star College Scheme & Used for Laboratory Experiments

Standard Operating Procedure (SOP)

STANDARD OPERATING PROCEDURE

Visible Spectrophotometer (Colourimeter) in the PHYSICAL CHEMISTRY Laboratory

Description of the Process:

Measurement of the Absorbance (A) [or percentage Transmittance (%T)] of a coloured solution of a compound and utilizing the data for determination of Molar Extinction Coefficient (ϵ) of that compound.

Personal Protective Equipment:

Protective clothing: Apron

Protective eyewear: Safety glasses

Sample Preparation Procedure:

Either by dissolving required amount of sample (weighed by using high precision balance) in required amount of solvent OR by quantitative dilution of a standard, more concentrated solution of that compound.

Using Visible Spectrophotometer (Colourimeter) [Model SYSTRONICS Colorimeter 112]

1. Switch on the machine at least 10 minutes prior to the use of the apparatus.
2. Set the "Abs/%T" switch to "%T" mode
3. Set the proper filter required for the particular compound using λ_{max} value.
4. Ensure that nothing is inserted in the sample holder chamber.
5. Rotate the "Set 100" knob clockwise to maximum
6. Rotate the "Set 0" knob clockwise so that the screen reads "0"
7. Pour the solvent (which has been used to dissolve the compound) into the solution holder (fill the solution holder approximate at least two-third its volume); wipe the surface of the solution holder with tissue paper; place the solution holder in the sample holder chamber.
8. Rotate "Set 100" knob till the screen reads "100".
9. Take out the solution holder; discard the solvent; rinse the sample holder with little amount of solution at least 2 times and discard the sample; pour the solution into the solution holder (fill the solution holder approximate at least two-third its volume); wipe dry the surface of the solution holder with tissue paper; place the solution holder in the sample holder chamber. Note the reading (%T = ?) and write it on the laboratory notebook.
10. Repeat the process (step - 9) for other solutions also

STANDARD OPERATING PROCEDURE

CALORIMETER in the PHYSICAL CHEMISTRY Laboratory

Description of the Process:

Measurement of the amount of heat evolved (or absorbed) during a Chemical Reaction (such as neutralization reaction between acid and base) or a Physical Process (such as dissolution of a solute in a liquid solvent)

Personal Protective Equipment:

Protective clothing: Apron, shoes

Protective eyewear: Safety glasses

Sample Preparation Procedure:

Either by dissolving required amount of sample (weighed by using high precision balance) in required amount of solvent or by quantitative dilution of a standardized, more concentrated solution of that compound.

Using the Calorimeter

1. Determine the Water Equivalent of the calorimeter.
 - a. Pipette out measured amount of distilled water and transfer it to the calorimeter; wait for a few minutes to allow it to attain thermal equilibrium; measure the temperature (t_1 °C).
 - b. Take approximately 100 mL of water in a beaker and heat it to approximately 30°C – 60°C. Now transfer measured amount of warm water to another dry beaker. After approximately 1-2 minute, measure the temperature (t_2 °C) and immediately transfer the water to the calorimeter (already containing measured amount of water) at one go. Stir well and wait for 1 – 2 minute and then measure the temperature (t_3 °C). Using this data, determine the water equivalent of the calorimeter.
2. Now discard the liquid; then wipe the calorimeter dry with a tissue paper and use the apparatus for the next experiment (Determination of Heat of Neutralization for a Strong Acid – Strong Base reaction).
3. Measurement of the amount of heat evolved (or absorbed) during a Chemical Reaction (such as neutralization reaction between acid and base) or a Physical Process (such as dissolution of a solute in a liquid solvent)
4. Pipette out measured amount of one reactant and transfer into the dry calorimeter; similarly pipette out measured amount of the other reactant and transfer into a dry beaker. After 1 – 2 minutes (once the thermal equilibrium is attained), measure the temperature of both the solutions (one kept in the calorimeter and the other solution kept in a beaker. The temperature should be same in both cases (t_4 °C).
5. Now pour the solution from the beaker into the calorimeter at one go, stir well and after 1 – 2 minutes (so that thermal equilibrium can be attained) measure the temperature of the solution in the calorimeter (t_5 °C). [For exothermic reaction, $t_5 > t_4$; for endothermic reaction $t_5 < t_4$].
6. Using water equivalent of the calorimeter, t_1 and t_5 , calculate the heat of evolved / absorbed during the chemical reaction OR the physical process.

Equipment Purchased under DBT Star College Scheme & Used for Laboratory Experiments



Interdisciplinary/Interdepartmental Projects under DBT Star College Scheme

ACHARYA P C RAY JOURNAL CLUB

An Initiative of the Department of Chemistry
under the DBT STAR COLLEGE SCHEME

Dear Students,

Warm welcome to the ACHARYA P C RAY JOURNAL CLUB.

This is an initiative taken by the Department of Chemistry, RKMVC College under the DBT STAR COLLEGE SCHEME aiming at the blending of the knowledge of text book chemistry with the advanced research in modern chemistry.

We also believe that you will certainly enjoy this short but effective time.

Greetings and Best wishes.

TO DO WORKS

(A)

1. Group distribution and group wise Mentor has been mentioned in the following table. Please follow it carefully.

2. One student from each group (marked in RED) will be group representative and communicate the information from their respective Sir (mentor) to the other members of their own group.

3. Students of each group will study/go through the study material(s) which will be given to them by the mentor.

4. Students of each group will discuss the study materials among themselves to have the ideas/knowledge on the topic.

5. Then EACH STUDENT of EACH GROUP will make A SHORT WRITE-UP (i.e. Project Report) based on their study material. For writing the project report, the students can make use the Computers of College (by strictly following Covid protocol

students can make use the Computers of College (by strictly following Covid protocol and as will be advised from the college/department) or computers of their friends as and when necessary.

6. COPY OF THE PROJECT REPORT (PDF FILE) HAS TO BE SUBMITTED AT THE END OF THIS SHORT-TERM PROJECT.

Project Submission Deadline: 15th January, 2022 (15/01/2022)

7. The Write-up will be of maximum 5-6 pages.

8. A STANDARD WRITE-UP FORMAT WILL BE GIVEN TO EACH GROUP in due time and Guidelines for writing the Project Report will be discussed in due time.

TO DO WORKS

(B)

✦ A topic (selected by mentor) will be given to each group. The students of each group will search the Websites of the Chemistry Department of some reputed institutes of our country like IISc, IITs, IISERs, IACS etc. and will make a list of the Faculty Members of those Institutes who are actively engaged in research on that particular topic.

✦ THIS LIST WILL be of 1-2 PAGE ONLY.

✦ This List will be ONE per GROUP i.e. Each Group will make only one List.

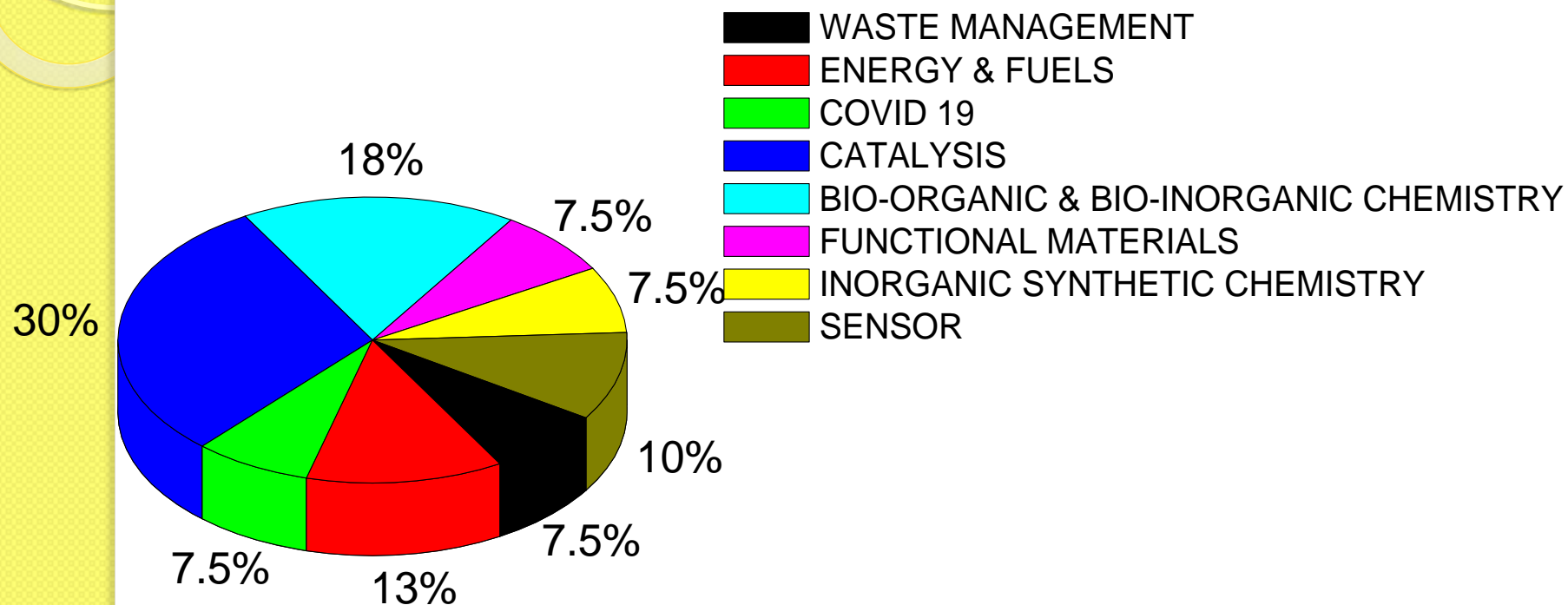
✦ COPY (PDF FILE) OF THIS REPORT (LIST) HAS TO BE SUBMITTED FROM EACH GROUP AT THE END OF THIS SHORT-TERM PROJECT.

✦ A STANDARD FORMAT of the LIST MAKING WILL BE GIVEN TO EACH GROUP in due time.

Interdisciplinary/Interdepartmental Projects under DBT Star College Scheme

Group	Student Names (with their Roll Number)	Mentor
A	1. Hrshik Hazra -239 2. Surojit Jana-2455. 3. Swarnu Rano -251	CKB Sir (Allotment – 3 students)
B	1. Deepanjan Patra-261 2. Bikram Pal-216 3. Soumyodip Mandal-231	RS Sir (Allotment – 3 students)
C	1. Sayan Samanta- 211 2. Bodhisattwa Mandal -222 3. Subho Ghosh-234	RP Sir (Allotment – 3 students)
D	1. Sunan Singha-209 2. Soumadeep Sur-219 3. Subhrajit Dey - 226	TG Sir (Allotment – 3 students)
E	1. Sudip Chakraborty-232 2. Tathagata Chakraborty-215 3. Roni Ukil-244 4. Subrata Pal-255	SB Sir (Allotment – 4 students)
F	1. Atrajo Nandy- 210 2. Tunir Kilikdar- 206 3. Samir Sarkar- 265 4. Sagnik Pal- 237	BD Sir (Allotment – 4 students)
G	1. Dwijadas Hati - 212 2. Subhankar Das - 249 3. Akshay Man - 256 4. Santu Dhal - 254	DJ Sir (Allotment – 4 students)
H	1. Satadru dutta-229 2. Soumyadip parya-218 3. Tanmoy das-220 4. Saurav sahoo-221	BM Sir (Allotment – 4 students)
I	1. Subhradeb Chakraborty-260 2. Akash Adhikary-2675. 3. Tanmay Das-247 4. Prabir Mandal-258	KM Sir (Allotment – 4 students)
J	1. Kishor Biswas- 253 2. Subhajit Pal- 213 3. Hriday das-250 4. Sk aksar ali-259	SSN Sir (Allotment – 4 students)
K	1. Kishore Das-243. 2. Rounak Golder - 235. 3. Ayan Basu- 266 4. Samir Samanta - 233	SSR Sir (Allotment – 4 students)

Interdisciplinary/Interdepartmental Projects under DBT Star College Scheme



Interdisciplinary/Interdepartmental Projects under DBT Star College Scheme

Interdisciplinary Projects

Materials Chemistry

- ☐ Wet-Chemical Synthesis of Copper (I) Metallogel
- ☐ Synthesis of porous nanostructures for water purification

Indrajit Saha and Debaree Adhikari

M.Sc Students (IIT Kanpur)

Interdisciplinary/Interdepartmental Projects under DBT Star College Scheme

Interdepartmental Projects

- ❖ Preparation of Primary and Secondary Standard Solutions**
- ❖ Basic understanding of volumetric estimation using Titration**
- ❖ Quantitative estimation of Acid, Base, Hardness of Water employing Titrimetric Analysis**
- ❖ Detection of Some Common Metal Ions including Heavy Metal Ions (Pb^{2+} , Cd^{2+} , Bi^{3+} , Cu^{2+} etc) in Solid and Solution**

Workshops & Seminars under DBT Star College Scheme

Title	Speaker	Date
Seminar “Amino Acids and Trisubstituted Methanes (TRSMs) as Versatile Synthon: Rays of Hope for Autophagic Cell death and Tuberculosis respectively?”	Prof. Dr. Gautam Panda Scientist – F Senior Principal Scientist CSIR-CDRI	8th May, 2021
Seminar “Water, Water everywhere Understanding how water plays important role in Life and Nature”	Prof. Biman Bagchi IISc Bangalore	16th July, 2021
Induction Programme “The Status of Chemistry Research in India: From P. C. Ray to the Present”	Prof. V. Chandrasekhar Centre Director TIFR Hyderabad	15th September, 2021
Job Oriented Programme “The Art of Science Communication”	Dr. Manas Pratim Das Program Executive All India Radio Kolkata	12th February, 2022

Workshops & Seminars under DBT Star College Scheme

Title	Speaker	Date
Seminar “Regulatory mechanisms of eukaryotic gene expression and genome integrity with implications in disease pathogenesis and therapeutic development”	Prof. Suresh R. Bhaumik Department of Biochemistry & Molecular Biology Southern Illinois University	22nd March, 2022
“NMR in Life and Science”	Prof. Tapas Mal NMR Director The Pennsylvania State University, USA	28th March, 2022

Faculty Improvement Programme Initiated under DBT Star College Scheme

Programme	Department	Date
“Organic Reactions in Water” by Dr. Chandrakanta Bandyopadhyay Associate Professor & HoD, Department of Chemistry, RKMVC College	Bethune College Department of Chemistry All Faculty members of the department of the college joined this programme	24th May, 2021

Visits to Industry & Important Labs of National Eminence

Geological Survey of India (Park Street Campus)

**A Group of 15 students and 3 Teachers from the
Department of Chemistry, RKMVC College visited
GSI, Kolkata on
2nd November, 2021**

Visits to Industry & Important Labs of National Eminence



Visits to Industry & Important Labs of National Eminence



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Visits to Industry & Important Labs of National Eminence

Outcome of the Visit

- ❖ **Exposure to a Lab of National Eminence.**
- ❖ **Exposure to different High Precision Analytical Instruments used for geochemical samples analyses.**
- ❖ **One-to-one interaction with eminent scientists of GSI.**
- ❖ **Hands on training for samples analyses.**
- ❖ **Understanding the chemical process and analytical techniques for samples analyses.**
- ❖ **Preparing a survey report.**
- ❖ **Motivation and acquiring ideas for becoming a geochemist in future.**

Lectures Delivered by Speakers in Topical Areas

Title	Speaker	Date
<p>“Amino Acids and Trisubstituted Methanes (TRSMs) as Versatile Synthon: Rays of Hope for Autophagic Cell death and Tuberculosis respectively?”</p>	<p>Prof. Dr. Gautam Panda Scientist – F Senior Principal Scientist CSIR-CDRI</p>	<p>8th May, 2021</p>
<p>“Water, Water everywhere Understanding how water plays important role in Life and Nature”</p>	<p>Prof. Biman Bagchi IISc Bangalore</p>	<p>16th July, 2021</p>
<p>“The Status of Chemistry Research in India: From P. C. Ray to the Present”</p>	<p>Prof. V. Chandrasekhar Centre Director TIFR Hyderabad</p>	<p>15th September, 2021</p>
<p>“Regulatory mechanisms of eukaryotic gene expression and genome integrity with implications in disease pathogenesis and therapeutic development”</p>	<p>Prof. Suresh R. Bhaumik Department of Biochemistry & Molecular Biology Southern Illinois University</p>	<p>22nd March, 2022</p>

Outreach Activities

RAMAKRISHNA MISSION VIVEKANANDA CENTENARY COLLEGE

Rahara, Kolkata, 700118

One-Day Promotion of Science Workshop for School Students

Outreach Program

Under

DBT-STAR College Scheme

Date: 23rd February, 2022, Wednesday

PROGRAMME SCHEDULE

10:30 am-11:00 am	Inaugural Session (Venue: R. K. Hall - I)
11:00 am-01:00 pm	Lab Visit
01:00 pm-01:30 pm	Lunch (Venue: Physics Gallery)
01:30 pm-04:30 pm	Lab Visit
04:30 pm-05:00 pm	Valedictory Session and Certificate Distribution (Venue: R. K. Hall - I)

LAB ALLOTMENT

DEPARTMENT	11:00-12:00	12:00-01:00	01:30-02:30	02:30-03:30	03:30-04:30
BOTANY	A	B	C	D	E
ZOOLOGY	B	C	D	E	A
PHYSICS	C	D	E	A	B
CHEMISTRY	D	E	A	B	C
MATHEMATICS	E	A	B	C	D

A = RAHARA BHABANATH INSTITUTION FOR GIRLS

B = MADHYAMGRAM HIGH SCHOOL

C = MADHYAMGRAM GIRLS' HIGH SCHOOL

D = GOVT SPONSORED MULTIPURPOSE SCHOOL FOR BOYS TAKI HOUSE

E = SOPEPUR CHANDRACHUR VIDYAPITH

Outreach Activities

Inaugural Session



Outreach Activities

RAHARA BHABANATH INSTITUTION FOR GIRLS



Outreach Activities

RAHARA BHABANATH INSTITUTION FOR GIRLS



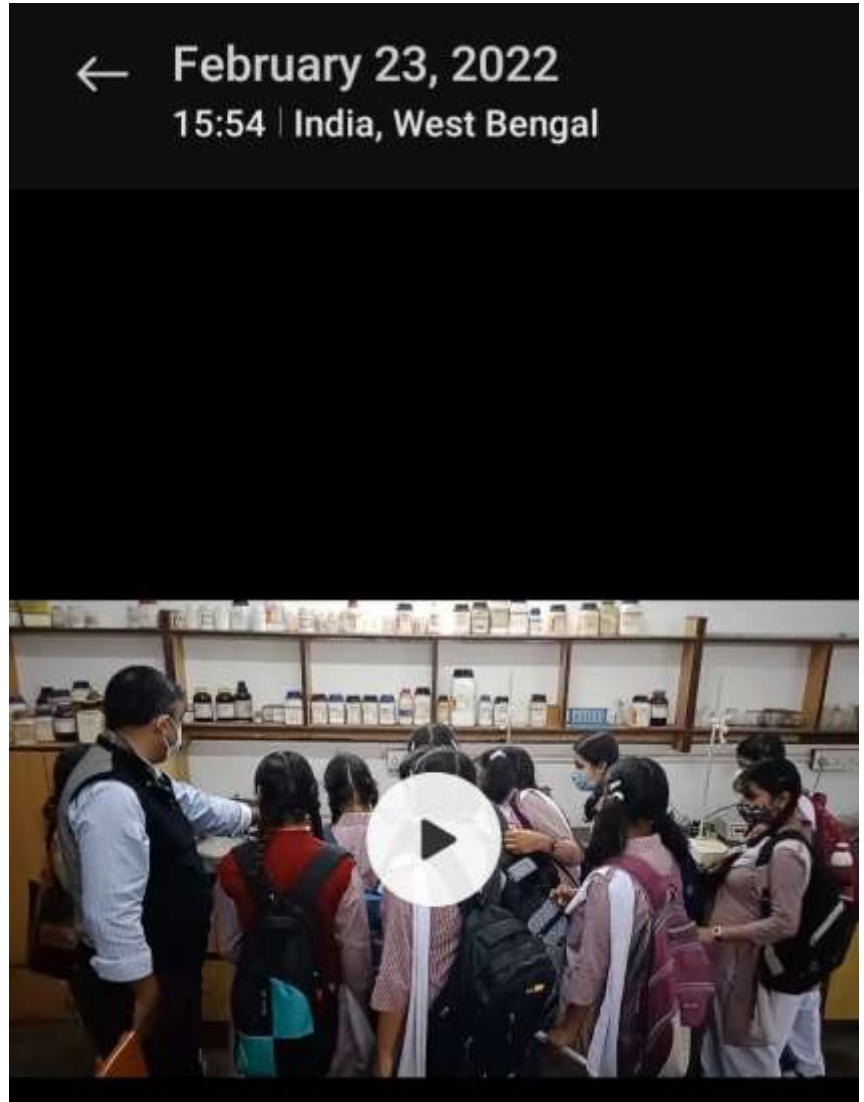
Outreach Activities

MADHYAMGRAM HIGH SCHOOL



Outreach Activities

MADHYAMGRAM GIRLS HIGH SCHOOL



Outreach Activities

MADHYAMGRAM GIRLS HIGH SCHOOL



Outreach Activities

GSMS TAKI BOYS' SCHOOL



Outreach Activities

GSMS TAKI BOYS' SCHOOL



Outreach Activities

SODEPUR CHANDRACHUR VIDYAPITH



Outreach Activities

CONCLUDING SESSION & CERTIFICATE CEREMOINY



Outreach Activities

Outcome of the Outreach Activities

- ❖ **Fifty students and five teachers from five different higher secondary schools visited the five departments of our college and got exposure to the different laboratories and laboratory works.**
- ❖ **Exposure to different Analytical Instruments commonly used for UG practical works.**
- ❖ **One-to-one interaction with eminent teachers of the department.**
- ❖ **Hands on training for some fundamental experiments.**
- ❖ **Understanding the chemical process and analytical techniques for doing experiments.**
- ❖ **Also given exposure to the research works performed in the department.**
- ❖ **Motivation and acquiring ideas for becoming a research scientist in future.**

Training of Lab Manpower



Impact of the Star College Scheme

No. of Students Qualifying Chem(Hons.) in UG level	Admission of Students in MSc/Integrated MSc degree in various academic institutions
100%	IIT Kanpur - 02
	IIT Delhi – 01 (TIFR Hyderabad)
	IIT Kharagpur - 01
	IEST – 06
	Central Universities – 05
	NITs – 02
	Visva-Bharati University – 04
	University of Delhi - 01

Budget Expenditure

Recurring

Item	Rs
Laboratory consumables & Seminars	300000.00
Total	300000.00

Future Activities under DBT STAR College Scheme

- ❖ Minor Projects in advance chemistry research area for undergraduate Students**
- ❖ Academic visit of students to reputed research laboratories and industries**
- ❖ Hands on training of advanced level and sophisticated instruments for students**
- ❖ Exposure to more Interdisciplinary and interdepartmental projects**
- ❖ More Out reach programme/workshops for school students**



DBT STAR College Scheme



Department of
BioTechnology,
Government
of India

सत्यमेव जयते

