

**Report of Chemistry Olympiad Exposure Camp
CESME, HBCSE
(Under PMMMNMTT scheme of MHRD)**

(Conducted at Department of Chemical Sciences,
Tezpur University, Tezpur, Assam)
Date: November 10 - 13, 2019



**Homi Bhabha Centre for Science Education
Tata Institute of Fundamental Research
November 2019**

As a part of Centre of Excellence in Science and Mathematics Education (CESME-HBCSE), the teacher development (TD) workshop for chemistry teachers teaching at secondary and higher secondary level was organized at Tezpur University, Assam from November 10 – 13, 2019.

Background

The Chemistry Olympiad Exposure Camp, conducted as part of CESME (HBCSE) activities under PMMMNMTT scheme of MHRD at Tezpur University was aimed at presenting enriching experiences about teaching-learning of chemistry to in-service teachers by engaging them with problem-solving, both in the theoretical and experimental domains.

The International Chemistry Olympiad program has a rich tradition of problem-solving both in theoretical and experimental domains. The problems developed as a part of the Chemistry Olympiad program, both at national and international levels have relevance for the chemistry education at school and colleges much beyond the competitions. The Olympiad problems often present novel contexts to a learner, wherein one needs to identify relevant concepts to arrive at solutions for the same. This process not only helps a learner make connections of the concepts to different real situations but also instills confidence in them regarding the significance of knowledge gained as a part of her/his education process. Currently, sustained engagement with such problem solving is not integral to our curricula and the teaching-learning processes in the schools.

At the higher secondary level, laboratory experiments are also an important component that needs to be harnessed for enriching learners' understanding of chemical systems. However, often these experiments/activities lack contextual reference and are conducted mechanically. As a result, learners fail to develop deeper insights about experimental practices integral to chemistry and their utility in real scenarios.

Brief description about the workshop

The workshop had four kinds of sessions: problem-solving sessions in- a) theory and b) experimental domains; plenary sessions on some of the core chemistry topics, and a panel discussion about creating opportunities for problem-solving at the local level.

The theoretical sessions were centred around solving two past problems from Indian National Chemistry Olympiad (INChO) national round. Problem one was related to the chemistry of organic compounds responsible for the sweet earthy smell coming from the soil after the first rain (titled *When Rain meets the Soil*) and problem two was related to hydrogen bonding and water of crystallization.

The experimental sessions at the workshop consisted of experiments related to i) synthesis of an antibacterial compound and ii) analysis of an abrasive powder sample by titration. The first experiment used hydrolysis as the concept for synthesis of an organic compound, using simple reagents whereas for the second, acid-base chemistry concepts formed the basis for the analysis of an abrasive powder sample. The aim of the design and the post-laboratory questions in these experiments was to provide opportunities for discussion of underlying concepts and procedural understanding about the experiments. The participating in-service teachers conducted the

experimental trials in the laboratory and also discussed the difficulties and challenges faced while performing the trials. The data obtained by the teachers were gathered so as to arrive at inferences.

In addition, two lecture-cum-discussion sessions were conducted on-

- i) Crystallization and crystal structures
- ii) Atomic structure.

The panel discussion involved several members of the Chemistry Department of Tezpur University and from HBCSE discussing on how different kinds of problem-solving activities can be initiated in the schools.

Representative feedback from participants:

Written feedback was collected from all the participants and also from organizers at Tezpur University. Some of the qualitative statements given in the feedback form were as follows:-

“We can make the already existing experiments more interesting by modifying them to teach them more than what could be with previous experiments”

“The camp helped to motivate the students about practicals and provide opportunities for critical thinking enabling them for retention of knowledge”

“This camp is helping me in changing my perception about the way of experiments that are designed in my school. Now it becomes easier for me”

Feedback from organizers, Tezpur University:

Regarding academic content

“Academic contents are good. All the things are based on basic laboratory practical techniques. After this camp, trainers will apply his/her knowledge in their schools to make science practical more interesting. Motivation plays an essential role in hands-on-science always in a classroom laboratory-this is an important skill that we have gained from this camp”

“Very rich, informative and highly useful”

Regarding challenges faced in the organization of the camp

“Motivating the teachers for joining the camp, motivating the teachers to upgrade themselves”

“Number of participants”

Annexure A: List of teacher participants (14 teachers across Assam)

Annexure B: Timetable

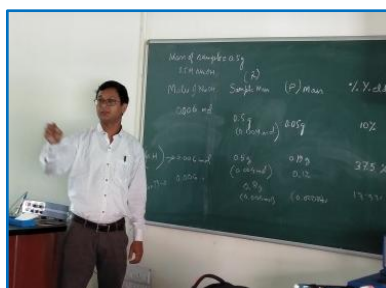
Theoretical and Problem-Solving sessions



Teachers conducting trials of experiments in the lab



Discussions after laboratory session



Annexure A: List of Teacher Participants

No.	Name	Gender	Institution
1	Binod Rajkhowa	M	Kamarbandha HS School, Golaghat, Assam
2	Daisy Mahanta	F	Tezpur Bengali Boys HS School, Tezpur
3	Debajit Ghosh	M	Dibrugarh Bengali High School, Dibrugarh
4	Gauri Prasanna Bharali	M	Madhabdev High School, Lakhimpur, Assam
5	Jahnabi Deka	F	Krishnaguru College of Science and Technology, Barpeta, Assam
6	Jumi Das	F	K.V, Central University, Tezpur
7	Manab Bharali	M	Government Gurdon HS School, Nalbari, Assam
8	Moni	F	K.V, Central University, Tezpur
9	Naba Kanta Pegu	M	Rengam Champara High School, North Lakhimpur, Assam
10	Nabanita Doul Baruah	F	Kaliabor HS School, Silghat, Assam
11	Pranjal Borah	M	Kuthari HS School, Nagaon, Assam
12	Rupjyoti Kalita	M	Matrix Junior College, Nagaon
13	Sangita Bharali	F	Puthimari Higher Secondary School, Sonaswar, Assam
14	Udayjyoti Borah	M	Namdeuri HS School, Jorhat, Assam

Annexure B: Timetable
Exposure Camp for Chemistry Olympiad, Tezpur University
November 10 - 13, 2019

Day	Sessions			Lunch (1:00pm - 2:00 pm)	Sessions	
Nov 10, Sun	9:30 - 10:30 AM Welcome and Introduction to Chemistry Olympiad (AJT & IDS)		11:00 -1:00 PM Solving INChO Problem- (AG)		2:00 - 2:45 PM Discussion on INChO Problem (AG)	3:00 – 5:30 PM Lab 1 – Synthesis(AG, IDS)
Nov 11, Mon	9:00 -10:15 AM Lab 1 Discussion (IDS and AG)	10:30 -12:00 AM Lecture 1 Crystallization (BS)	12:00 – 1:00 PM Lab 2 Introduction (IDS)		2:00 - 4:00 PM Lab 2 -Titration (AG, IDS)	4:30 – 5:30 PM Lab 2 – Discussion (AG and IDS)
Nov 12, Tue	9:00 - 10:00 AM Lab 2 Discussion (AG and IDS)	10:00 -11:30 AM Lecture 2- Atomic Structure (RCD)	11:45 -1:00 PM Solving INChO Problem (PP)		2:00 - 3:30 PM Solving INChO problem contd. (PP/AG)	4:00 – 5:30 PM Chemistry Learning resources (IDS)
Nov 13, Wed	9:00- 10:30 AM Multiple Choice Questions (MCQs) for Understanding misconceptions (AG)	11:00 AM – 12:30 PM MCQs contd. (AG)	12:30 - 1:30 PM Panel Discussion: Creating local opportunities for problem-solving (AJT)			

List of Resource persons at the workshop

Resource Persons (non-HBCSE)	Resource Persons (HBCSE)
Pradeep Phukan (Gauhati University)	Ankush Gupta
Ramesh C Deka (Tezpur University)	Indrani Das Sen
Bipul Sharma (Tezpur University)	
Ashim J Thakur (Tezpur University)	

Dr. Ruli Borah, Dr. Utpal Bora, Dr. Swapan K. Duloi, and Dr. Robin K Dutta from Tezpur University helped a lot in the smooth organization of the workshop and contributed to the sessions.

Ms. Mursaleen Shaikh, Ms. Krupa Subramaniam and Mr. Shreyank Mandavkar were involved with the conduction of trials of the experiments at HBCSE laboratory.

Dr. Ashim J Thakur from Tezpur University was the local coordinator for the workshop. The technical assistants at the chemistry laboratory, Mr. Biplob Ozah and Mr. Sankur Phukan and two PhD students Mr. Raktim Abha Saikia and Mr. Rajarshi Bayan at Tezpur University helped in technical preparations for the laboratory sessions.