Learning from the Chemistry Olympiad laboratory

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Introduction

- In 1999, HBCSE initiated the Chemistry Olympiad programme.
- Current structure: Large multi stage programme with several stages of selection culminating in the selection of Indian Team.
- The Orientation cum Selection camp: A final selection round, held every summer at HBCSE, involves experiments along with theory.

Background of the programme

- Higher secondary stage is the most crucial stage in science education in India.
- Students seriously engage with the subject in an academic sense.
- Laboratory component in chemistry education is a complete neglect
- Even meritorious students, competent in chemistry theory have very little exposure to chemistry laboratory.

Background (continued.)

- The Olympiad programme affords a unique opportunity because it equally emphasizes experimental and theory.
- Preparation for international participation clearly demands high quality and rigor in the subject.
- The Olympiad programme has diverse aims; it is not limited to performance in International Olympiads only.
- The Olympiad programme promotes healthy links between scientists and teachers

Aims of the Olympiad Lab Component

- To inculcate laboratory safety culture.
- To heighten awareness of Green chemistry practices.
- To develop understanding of the procedures and skills required in chemistry laboratory.
- To acquaint the students and develop skills with micro-scale equipment.
- To develop reliable assessment tools particularly for the chemistry laboratory.

Chemistry Olympiad Laboratory: Some Distinctive Features

- The Olympiad laboratory covers three principal domains of chemistry:

  Synthesis, Analysis and Kinetics

  There is a variety of experiments involving qualitative analysis, synthesis, titration (all types- complexometric, redox, precipitation and acid-base), experiments involving combination of different types.

- Because of the competitive nature of the activity, the Olympiad experiments cannot be open ended.
- The emphasis is on systematic execution of a complex task, rather than creative learning.
- The experiments for the most part simulate a realistic situation that a chemist faces, rather than a hypothetical situation.

Structure of the Laboratory Component

- Safety and Prevention: emphasis on good laboratory practices (avoiding wastage, spillage of chemicals or breakage of glassware)
- Introductory Context and Principles (preparing the learner about the experiment)
- Questions (record of data, calculations, related to experimental procedure)
- Fe- Experiment.docx

Student assessment in the chemistry Olympiad Laboratory

- The scheme is so designed as to make the assessment meaningful and as objective as possible for a laboratory
- Features of assessment: no double penalty, linear sliding scale, a good distribution of weightage to skills and understanding.
- The assessment is holistic: it tests a whole spectrum of things: procedural understanding, laboratory skills, instrumentation skills, feel for stoichiometry under different reaction conditions.

Our Learning from the Chemistry Olympiad Laboratory

Designing an experiment

Selecting an experiment simple yet with some complexity involved

Merging different areas into one experiment. Parameters involved and which need to be standardized, minimal technical demand, time management

Qualitative analysis: It was designed with a grid structure, identification of salts not only cations or anions

Inorg-qualitative.doc

Organic Synthesis

Quantitative experiments with a small component of Qualitative identification (Iodometric titration along with tests for Iodine and iodide functional group

Synthesis of Derivative along with Quantification

Sensitization towards student pitfalls in the laboratory

Writing equation particularly redox stoichiometric calculations,

Use of significant fiqures

Identifying steps and conditions crucial in the procedure

Skills with respect to synthesis

Involved rate law calculations for kinetics experiment

Pedagogic Outcomes of chemistry Olympiad laboratory

We can and should take the Olympiad laboratory practices to the regular chemistry laboratories:

- Safety
- Prevention of wastage and breakage
- Contextualization
- Standardization
- Adding comprehensive questions: developing understanding of procedures

Teacher Participation

There are annual resource generation camps at HBCSE aimed at exposing teachers to the Olympiad programme. The benefits of the Olympiad programme can in this way be transmitted on a larger scale.

Thank you