Analytical Chemistry Challenge for Secondary Students (2025/26)

Science Education Section, EDB

9 Jan 2026

Outline

- **Introduction of the Competition**
- Arrangement of Phase 1 Preliminary Heat
- Details and Assessment of Phase 1 and 2
- Q&A Session

Introduction

- Organised by Science Education Section, EDB and Department of Chemistry, HKBU
- Promote students' engagement and interest in chemistry
- Enhance students' experimental skills, scientific inquiry and problem-solving ability

Aims

- enable students to demonstrate and improve their chemical knowledge, skills, and aptitude through practical analytical experiments;
- strengthen students' ability to safely handle materials and chemicals, design experimental procedures, manipulate apparatus, and make accurate observations;
- develop students' skills in scientific inquiry and data analysis;
- facilitate students to appreciate the role and significance of analytical chemistry in solving real-world problems; and
- support inquiry-based, hands-on learning of chemistry in schools.

Phase 1 and Phase 2 of the Competition

01. Application

- School enrollment
- Submission of student teams' list (at least 2 weeks before the Preliminary Heat)

02. Phase 1: Preliminary Heat

- In-house preliminary heat to select the best-performing team of each school
- Submission of results

03. Shortlisting Assessment

- A written assessment for the best-performing teams of schools
- 15 student teams to be shortlisted

04. Phase 2: Final Competition

- Final competition for the shortlisted 15 student teams

School Application

- All secondary schools (government, aided and DSS)
- S4-S6 students studying chemistry
- By completing the application form from **EDBCM No.4/2026 (Annex 9)** or on the EDB website
- **Deadline: 3 February 2026 (Tuesday)**

Webpage

EDBCM

Submission

Before the preliminary heat:

<u>Submission of student teams' list [Entry Form]</u>

- 4 to 15 teams for each school
- Each team consists of 2-3 students
- **Deadline: 2 weeks before the date of preliminary heat**
- > 15 teams or < 4 teams want to participate in?

Eligibility for Participation:

To encourage the participation of new students in each school year, students who participated in the Preliminary Heat of the Challenge in the previous school year **are generally not eligible** to participate again.

Exceptional Arrangements:

Under the following circumstances, the organisers may consider making exceptional arrangements to allow students to participate in the challenge again in the 2025/26 school year:

(a) the school adopts an experiment in the Preliminary Heat of the 2025/26 school year which is different from that used in the 2024/25 school year; and

(b) the student concerned was not selected in the 2024/25 school year to proceed to the Shortlisting Assessment.

The school may nominate the student to participate again only **if both of the above conditions are met**.

Submission (Cont.)

After the preliminary heat:

Submission of student results with evidences

- Student attendance and score list with information of the best-performing team (in excel)
- Scanned student teams' worksheets with marking (in pdf)
- Photos (group / team photos; experimental setup; students conducting experiments)

Timeline

3 Feb 2026
- Application Deadline

23 Feb – 17 April 2026
- Phase 1: Preliminary Heat

May 2026
- Shortlisting Assessment

Jun – July 2026
- Phase 2: Final Competition

Outline

- Introduction of the Competition
- **Arrangement of Phase 1 Preliminary Heat**
- Details and Assessment of Phase 1 and 2
- Q&A Session

Phase 1: Preliminary Heat

- Conducted in schools' **own** science/chemistry laboratories
- **Students in teams of 2 or 3** will conduct an assigned experiment focused on analytical chemistry in daily life and complete a related worksheet.
- The experiment may involve common techniques of analytical chemistry included in the Chemistry curriculum, such as **volumetric and qualitative analyses, thin layer chromatography and colorimetry.**
- Conducted during **23 Feb – 17 April 2026, for 2 hours**

Phase 1: Preliminary Heat

- Responsible teacher needs to **select a best-performing team** from their school with reference to the marking scheme of the corresponding experiment.
- The best-performing team will
  - receive an award certificate
  - become eligible for the shortlisting assessment
- Other teams will receive a participation certificate.

Preliminary Heat - preparation

- 6 sets of experiments tasks for teachers' selection
- Teachers **should only choose 1** out of 6 experiments for the Preliminary Heat
- Schools **shall NOT alter** the experimental procedures and result tables in the manuals provided.


Experiment Tasks from last year	New Experiment Tasks
Exp 1: Acid-base Titration of Vinegar	Exp 4: Acid-base Titration of Baking Soda Household Cleaner (重曹)
Exp 2: Iodometric Back Titration of Vitamin C	Exp 5: Food Colorant in Beverages using Colorimetry
Exp 3: Determine of Alcohol Content	Exp 6: Food Colorant in Candies using TLC

Preliminary Heat – preparation (Cont.)

- Each participating school will receive a set of resource materials for all experiments:
  - Guiding notes, students' handouts, teacher notes, experimental video clips
  - Study notes on the mathematical concepts of data processing in analytical chemistry (for teachers' reference)
- Teacher can share the **Guiding Notes of the selected experiment** to their students for reference and preparation. **But the experimental procedures of the selected experiment shall not be disclosed to students.**

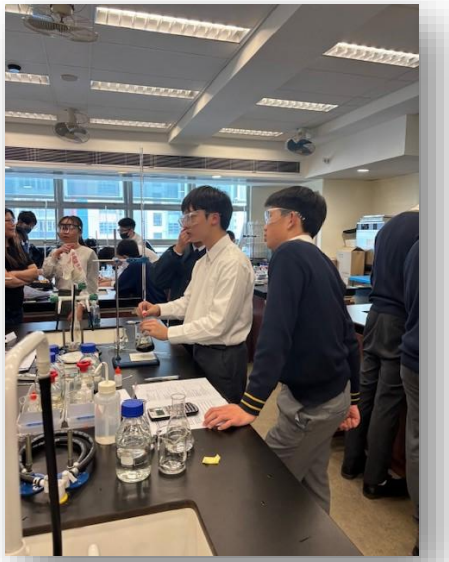
Preliminary Heat – preparation (Cont.)

- Teachers may **provide supports**, such as practice questions, tutorial session(s), and/or practical session(s), to familiarise students and prepare them for the Preliminary Heat.
- Teachers shall ensure that all participating students **receive the same supports.**
- All teams from the same schools must **conduct the same experiment** within **the same time slot** to ensure fairness.

Tips for schools

A. Logistics (Scheduling, venue)

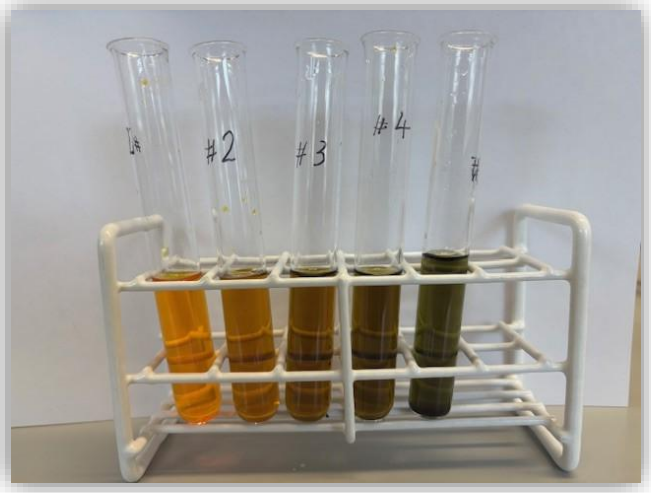
- Prepare the venue, chemicals and materials at least two weeks in advance (e.g. purchasing KHP / absolute ethanol, sourcing autopipettes from biology lab, etc.)
- Schedule the heat at a feasible time slots (2 hours; after-school session / school holiday)
- Arrange for **all participating teams to work at the same venue simultaneously** to ensure comparability
- For after-school sessions: If teams finish early and submit their worksheets, schools may consider granting **early dismissal** (subject to teachers' discretion)



Tips for schools (Cont.)

B. Teacher preparation & Pre-lab (Teachers' tasks to complete beforehand)

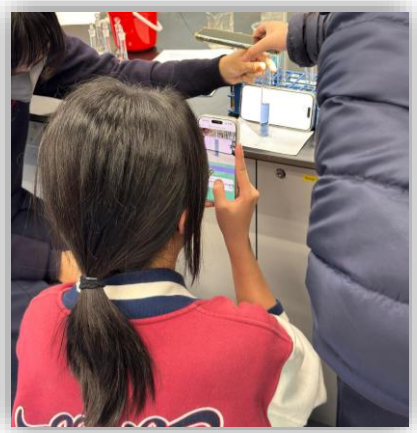
- Experiment preparation: Conduct a pre-lab trial to establish a reference value for the selected sample, which will be used to check student accuracy.
- Sample preparation: Verify sample consistency and select appropriate working samples. (e.g. avoid Vitamin C supplements with calcium salts to prevent a side reaction with H_2SO_4)
- Use of apparatus: e.g. be aware that inconsistent results can arise from incorrect autopipette technique.



Tips for schools (Cont.)

C. Student Pre-Lab Readiness (Procedure Note Disclosed)

- Practice core skills: e.g. accurate pipetting, burette reading, endpoint detection
- Treat all 3 titrations in VA experiment seriously: carefully determine the endpoint starting from the first run
- Review key concepts: e.g. unit conversions, back titration stoichiometry, error analysis, TLC, colorimetry



D. Assessment (Teacher moderation)

- Teachers may **moderate / adjust** to differentiate top teams fairly (e.g. accuracy + precision + completion time)

During the preliminary heat

Chemicals and Apparatus

- Participating schools are responsible for providing all necessary chemicals and apparatus required for the Preliminary Heat.
- All the supplied chemicals and apparatus should meet safety standards and are suitable for the designated experiment.

Laboratory Safety

- Teachers should brief students about necessary safety precautions before the start of the experiment.
- Must observe safety protocols in the laboratory to ensure a safe environment for all participants.

Participating students' role

- Student teams should complete the experiment and the related worksheet.

Expenses

- Participating schools are responsible for acquiring all the chemicals and materials required and all the expenses for organising and conducting the Preliminary Heat in their schools.

After the preliminary heat

- Teachers should **select the best-performing team** from their school with reference to the marking schemes provided / other additional criteria, if deemed necessary.
- Teachers **should NOT change the marking schemes** for the data treatment and precision calculation (if applicable).
- Teachers should keep all the **students' work and submit them, together with the marking sheet**, to the organisers after the competition.
- **The best-performing team will:**
  - receive an award certificate
  - become **eligible for the shortlisting assessment**
- Other teams will receive a **participation certificate**.

Outline

- Introduction of the Competition
- Arrangement of Phase 1 Preliminary Heat
- **Details and Assessment of Shortlisting and Final Competition**
- Q&A Session

SHORTLISTING ASSESSMENT

- A 1-hour written test (**on team basis)**
- Related to **analytical chemistry**
- MCQ, structured and open-ended questions
- in **May 2026 (preferred dates on Saturday)**
- Only for the **best-performing team** from each participating school
- The shortlisted **best 15 teams** will advance to Phase 2

PHASE 2: FINAL COMPETITION

- Design and conduct experiments to solve problems related to analytical chemistry **on team basis**
- Analyse data using scientific principles and critical thinking
- Venue: Laboratory at **HKBU**
- Duration: **3 - 3.5 hours**
- in **June - July 2026 (preferred dates on Saturday)**
- Online training materials will be given to the student teams to prepare for the Final Competition

From Preliminary to Final: Thinking and Acting Like a Scientist

Key Learning Outcomes – Scientific Inquiry Skills

- Deeper analytical processes:
  - ❑ Sample preparation and standardisation
  - ❑ Selecting reagents and procedures
  - ❑ Reporting and justifying results
  - ❑ Identifying and rectifying errors

- Students experience the workflow of professional chemists

From Preliminary to Final: Thinking and Acting Like a Scientist

Key Learning Outcomes – Values and Attitudes

- Students learned to:
  - ❑ Value fair testing, accuracy, and precision
  - ❑ Appreciate careful lab techniques and uncertainty
  - ❑ Exercise honesty and integrity in reporting data
  - ❑ Respect collaboration and evidence-based discussion
  - ❑ Persevere creatively in solving problems
  - ❑ Take initiative to prepare and be open to learn new knowledge

Why should your school participate?

For students:

- **Encourage Participation from All Levels of Learners**: Six experimental tasks with varying levels of difficulty allow teachers to select
- **Hands-On and Minds-On Learning**: A great opportunity for students to engage in **inquiry-based experiments**
- **Low-Pressure Environment**: Students compete in their own school, offering a less stressful setting to shine

For teachers:

- **Easy to Manage**: Ready-made experimental tasks and assessment rubrics are provided, ideal even for teachers new to competitions
- **Reflect on Student Learning**: Gain insights into your students' understanding of chemistry concepts and their ability to apply them

AND ONE MORE...

- Induction Session for enrolled schools
- 12 February 2026 (Thursday)

Application Deadline:
3 Feb 2026 (Tuesday)

Contact

Mr Michael CHAN
(3698 3453 / cdosc22@edb.gov.hk)

Dr Sophia CHENG
(3698 3436 / scdosc2@edb.hk)

Ms TAM NC
(3698 3439 / csosc4@edb.hk)

Hope to see you in Analytical Chemistry Challenge for Secondary Students (2025/26) !