

Report of the ad-hoc Working Group on the mole to the 31st CCQM meeting

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The Terms of Reference for the CCQM-ah-WG-mole:

- To review and update, as required, the *mise-en-pratique* for the definition of the mole;
- To provide advice to the CCQM about the mole, and units for chemistry and biology, ensuring overall consistency and harmonisation;
- To provide information and advice on the mole, and units for chemistry and biology, to a wide range of stakeholders.

1 Activities during the last year

1.1 *Mise-en-pratique* for the definition of the mole in the SI

A major activity of the WG during the past year was the completion of [Version 2](#) of the *mise-en-pratique* for the definition of the mole, which was published in May 2025 following CCQM approval. An accompanying paper has been published that explains the motivations for, and nature of, the changes introduced: <https://doi.org/10.1007/s00769-025-01668-4>.

1.2 Update to the SI Brochure

[Version 3.02](#) of the 9th Edition of the SI Brochure was produced in August 2025, including some technical updates relevant to chemical and bioanalytical metrology. The new version:

- Updated the value of the dalton, reflecting the 2022 CODATA recommended value;
- Updated the list of binary prefixes following IEC 80000-13:2025 (robi, 2⁹⁰ and quebi, 2¹⁰⁰);
- Made minor editorial improvements to support consistency and digitalisation;
- Updated the licence to the Creative Commons Attribution 4.0 International (CC BY 4.0).

Furthermore each edition of the SI Brochure now has a separate DOI and landing page, with the 9th Edition's page including a version history, greatly improving citation and referencing of the SI Brochure.

1.3 Communications on the mole and the Avogadro constant

The mole arguably remains one of the least well-understood SI base units among many audiences. This can result in questions being raised about the benefits of its inclusion in the SI. It is important therefore that the WG, and indeed the wider CCQM community, continues

proactive communications to: explain the importance and correct use of the mole within the SI; clarify the distinction between the Avogadro constant and the Avogadro number; promote coherent and consistent use of chemical and bioanalytical units across CCQM and stakeholder communities. Recent examples of articles promoting the benefits of the mole within the SI include: <https://doi.org/10.1088/1681-7575/ae0e78>, <https://doi.org/10.1515/pac-2025-0540>.

1.4 Task Group on Terms, Quantities and Units for Bioanalytical Measurement (TG-TQUB)

Progress in the last year has included:

- A stakeholder consultation phase and literature review exercise has been conducted;
- This produced a long list of units and quantities of interest in each bio WG area;
- The rationalized list has formed the basis of a first draft document – in the style of an ISO/IEC 80000 – intended eventually to provide guidance within CCQM. This will soon be circulated to the wider TG for feedback;
- A full database is also being curated, and will eventually also be published, containing full examples and references for the units and quantities listed;
- Separate questionnaires for each bio WG are being prepared and will be circulated to stakeholders, to understand their approach to the use of units and quantities in their technical areas.

2 Activities planned for the coming year

2.1 Task Group on Terms, Quantities and Units for Bioanalytical Measurement

- Refine and circulate WG-specific stakeholder questionnaires, and incorporate feedback;
- Complete rationalisation and formatting of the harmonised list of units and quantities;
- Finalize a full draft ISO 80000-style document, and circulate the to the TG for feedback;
- Finalise the supporting database of examples and references.

2.2 Ongoing communication and engagement

The WG will continue to support communications on the mole and the Avogadro constant, provide technical input for unit and quantity representations in the SI Reference Point and the wider SI Digital Framework, and assist CCQM WGs in applying consistent usage of the SI in chemistry and biology.