Realizing the second opportunity for chemists to re-think the mole

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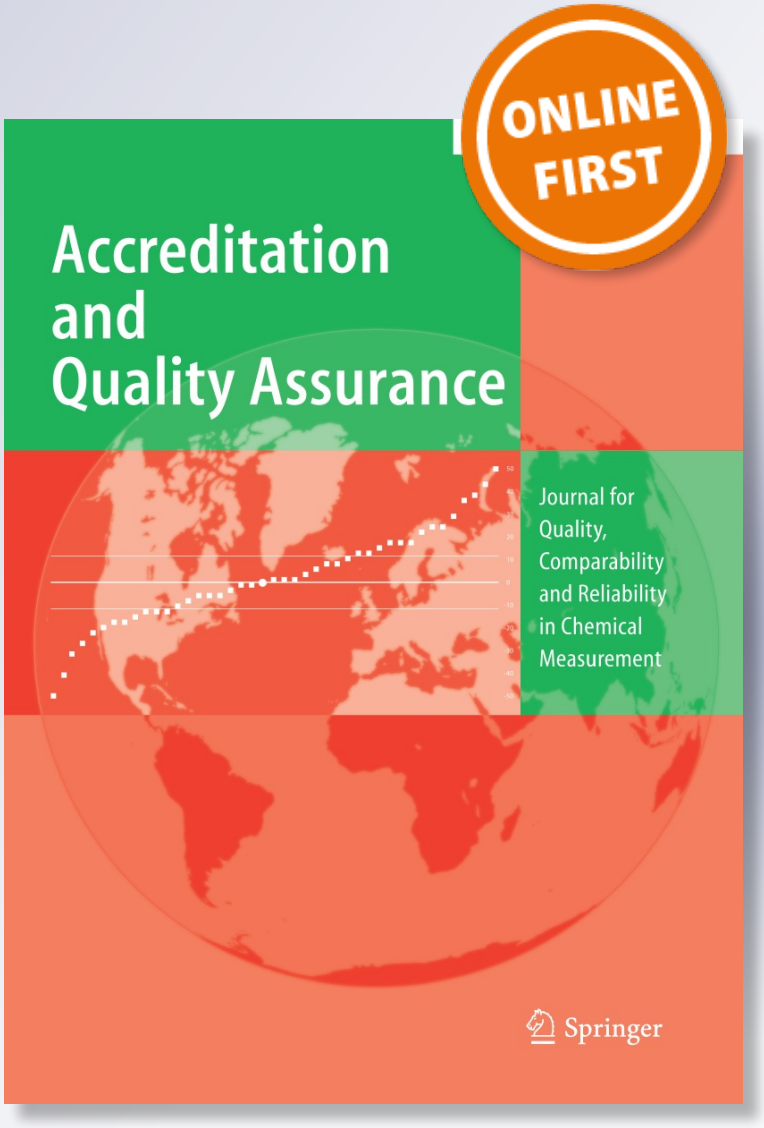

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PAUL'S COLUMN ON MIC

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A project of the International Union of Pure and Applied Chemistry (IUPAC) announced previously [1] has now reached the stage of formal interdisciplinary consultation. The task is: "A critical review of the proposed definitions of fundamental chemical quantities and their impact on chemical communities" and will lead to a formal report. The project is described on the website of the IUPAC [2].

The constitution of the project team is given hereafter:

J Stohner, Secretary IUPAC Division I, Physical and Bio-Physical Chemistry, Task Leader, R Marquardt, President IUPAC Division of Physical and Bio-Physical Chemistry, J Meija, President IUPAC Commission of Isotope Abundances and Atomic Weights, Z Mester, IUPAC Analytical Chemistry Division (ACD), M Towns, IUPAC Commission on Chemical Education, R Weir, President IUPAC Interdivisional Committee on Terminology, Nomenclature and Symbols (ICTNS).

The project group has initiated a procedure to collect opinions and comments from the constituting organizations of IUPAC, i.e., from the National Adhering Organizations (NAOs) [3]. The questionnaire focuses on the current definition of the mole, the new definition of the mole, the current definition of the quantity amount of substance, and the current name of the quantity amount of substance. IUPAC NAOs are asked to reply no later than 1 October 2014. All comments will be used toward formulating an IUPAC Technical Report. Those organizations which will reply will receive an advance draft of this IUPAC Technical Report for further comment and input before it is submitted to *Pure and Applied Chemistry*.

Until recently, the main actors in most discussions of a redefinition of the mole (and of other SI units) have been to a large extent physical chemists and SI Officers in the Consultative Committee for Units (CCU) to the International Committee for Weights and Measures (CIPM) and from there to the General Conference on Weights and Measures (CGPM). Also the Consultative Committee for Amount of Substance—Metrology in Chemistry and Biology (CCQM) devoted some discussion to the topic, most recently with a CCQM Workshop on the mole (April 2014). Unfortunately, analytical chemists did not take very much notice of the ongoing discussions despite the encouragements of the CCQM and the CCU, nor did Chemical Societies: The IUPAC ACD made its first statement to that effect in 2012. So did the IUPAC Commission on Isotope Abundances and Atomic Weights, (CIAAW) in 2011. In 2013, an article was published for the information of the Analytical Chemistry Division of the European Association for Chemical and Molecular Sciences (EuCheMS) [4].

Therefore, all readers of ACQUAL are strongly encouraged to contact their chemical societies as well as their National Adhering Organizations to IUPAC, which meet at the IUPAC Council Meeting of the biennial IUPAC General Assembly (next one: August 2015 in Pusan, Korea), and make their voices and opinions heard and considered (by 1 October 2014). So should EuCheMS.

Finally, all should realize that a fruitful in-depth discussion and redefinition of the unit mole cannot possibly

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take place without a thorough re-examination of the confusing concept "amount of substance," the quantity of which the mole is the unit, and which is so difficult to teach according to many educators in chemistry as reflected in various publications, e.g., in the Journal of Chemical Education. Extensive literature on the matter has been assembled in [5] (two rubriques: "Documents" and "Ed-Ops") as well as in a special issue of this journal [6], but also in the journal *Metrologia* since several years.

As usual, any comment, question, or amendment is welcome, preferably as a contribution to the Discussion Forum of this Journal.

References

1. De Bièvre P (2013) Second opportunity for chemists to re-think the mole. Accred Qual Assur 18:537–540
2. http://www.iupac.org/nc/home/projects/project-db/project-details.html?tx_wfqbe_pi1[project_nr]=2013-048-1-100
3. http://www.iupac.org/fileadmin/user_upload/projects/2013-048-1-100_let2NAOs_140603.pdf
4. Burns DT, Korte EH (2013) The background and implications of the "New SI" for analytical chemists. J Assoc Public Anal 41:28–44
5. http://www.MetrologyBytes.net/
6. De Bièvre P (ed) (2011) The re-definition of the mole must be of high quality, Accred Qual Assur 16:117–174