

Tools of the Trade

Analytical Terminology and the Orange Book—The Resources at the End of the Rainbow

by Roger M. Smith

How do you describe an analytical method, or name the new chemical that you have just assayed, or report the units of the measurement? Where do you turn for the definitions? You need to use *terms* and *names* that are clear and unambiguous and can be understood worldwide. In other words, you need the resources of the IUPAC “Color Books”: Gold, Orange, Blue, Red, Green, Purple, White, and Silver—not quite a rainbow leading to a pot of gold, but in this case the compendia of the accumulated agreements of the world’s chemists, providing the *terminology* and *nomenclature* of chemistry.

For analytical chemists, the principal tool of the trade, or source of terms, is the *Compendium of Analytical Nomenclature*, the so-called Orange Book, named because of the color of its cover. Originating in 1978, it was most recently updated with a third edition in 1997,¹ and was subsequently converted (and updated with additional terms) to an online version by David Moore in 2002.² Strictly speaking, the title should now be updated to *Compendium of Analytical Terminology*, not nomenclature, since the latter term is now reserved for the rules for naming chemical structures. In addition to definitions and terms, the Orange

Book also describes the different meanings of terms and expands on basic expressions.

As a test, ask yourself if you can readily define the following terms in the context of analytical chemistry; if you cannot then check the Orange Book online.² Some are more obvious than others.

- Stokes shift
- supercritical fluid
- selective
- stripping
- difference between a spectrograph, spectrometer, and spectroscope
- when to use a chiral selector

The process of defining a term is a major and continuing part of the activity of the Analytical Chemistry Division Committee of IUPAC and its task groups. The process usually starts with the need to stabilize the terminology for a new and expanding area, or to clarify ambiguities that have arisen over time in an established field, typically because of conflicting usages by different research groups.

A task group of experts in the field is formed by the division. This group will meet (often on numerous occasions) and prepare a draft proposal, which is acceptable to all the members. They then take this draft through a sequence of consultations with representatives of all interested parties, including journal editors and the chemical community at large. The various comments and suggestions are used to generate a provisional recommendation, which is then submitted via the IUPAC website for public review³ (such as the recent review of Metrological Traceability of Measurement Results in Chemistry). At the same time, the recommendations are assessed by the Interdivisional Committee on Terminology, Nomenclature and Symbols. Finally, when all parties are in agreement, the approved, revised, or new terminology is published as IUPAC Recommendations in the official journal of IUPAC *Pure and Applied Chemistry*.



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These newly approved terms and descriptions are then available and ready to be added to a future updating of the online Orange Book. In many cases, the terms will also be added to the *Compendium of Chemical Terminology* (the Gold Book), which is now also available in an online version.⁴ Analytical chemists also need to be aware of the content of other color books, especially *Quantities, Units, and Symbols in Physical Chemistry*⁵ to ensure the correct usage of units and abbreviations.

The most important step is for the analytical community to adopt and then use the IUPAC recommended terms in everyday practice, in publications, journal articles, books, lectures, and other presentations. Journal editors, referees, and editorial boards play an important role in ensuring that contributors employ the correct terminology and avoid older, superseded, or ambiguous expressions. When changes are recommended, general acceptance is often rapid. For example, when, in 1993, the terminology of chromatography replaced “capacity factor (k')” by “retention factor (k)”

and standardized the definition of “plate number” as N (not n), the new terms were adopted rapidly and, except in older textbooks, the archaic terms are now rarely seen. 

References

1. *Compendium of Analytical Nomenclature (definitive rules 1997)*, 3rd edition Inczedy, J.; Lengyel, T. and Ure, A.M (Editors) Blackwell Science, 1998 [ISBN 0-86542-6155]
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5. *Quantities, Units, and Symbols in Physical Chemistry*, 3rd edition, Cohen, E.R., Cvitaš, T., Frey, J.G., Holmström, B., Kuchitsu, K., Marquardt, R., Mills, I., Pavese, F., Quack, M., Stohner, J., Strauss, H.L., Takami, M. and Thor, A.J. RSC Publishing, Cambridge 2007

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