



# Updated Terminology of Separation Methods

## 50 Years of Separation Terminology

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The final and most important stage in any research project is to communicate your results to a wider world, without that step your work has no value, no-one else can learn from it or use the information to advance analytical chemistry. A critical part of that dissemination is that the reader can understand what you have done and that you have reported methods and conclusions in an unambiguous language, using terms and descriptions that are widely understood.

There are two aspects to these aims, any compounds and their sources used in the separation or analytes must be clearly defined, which is helped by using the IUPAC Nomenclatures for organic compounds, inorganic compounds or polymers. The second necessity is that the analytical methods and equipment are unambiguously described in sufficient detail so that the work can be reproduced in another laboratory.

This desire to bring a systematic approach to the terms used in separation science has been an important interest of *Chromatographia* since its second issue 50 years ago [1]. The trilingual text by Bayer and co-workers started with the observation, which is still valid today. “A nomenclature

valid for all the important chromatographic methods comes into being naturally only through necessity. A common nomenclature system, however, is desirable in view of the combined application of different chromatographic methods in theoretical and practical evaluation and especially in the translation of technical papers.” Later that year an additional paper on terms for thin layer chromatography was added by Stahl [2]. A subsequent comment by Deans [3] in the journal pointed out that “The desirability of having standard nomenclature and procedures in chromatography wherever possible is obvious. As well as making communication between chromatographers easy, it is important for specification methods which form part of legal contracts. A list of standard nomenclature, no matter how important the issuing authority is, is only of use if it is accepted and used by the practising chromatographers”. Although “terminology” is now the preferred description for methods with “nomenclature” being reserved for the names of compounds, the same sentiments and need for accurate and unambiguous communication are true today.

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**Nomenclature in Chromatography.**  
**Nomenklatur in der Chromatographie.**  
**Nomenclature pour la chromatographie.**

**A Suggestion/Ein Vorschlag/Une proposition**

A nomenclature valid for all the important chromatographic methods comes into being naturally only through necessity. A common nomenclature system however is desirable in view of the combined application of different chromatographic methods in theoretical and practical evaluation, and especially in the translation of technical papers.

Every nomenclature system should be correct, logical, simple and easy to remember. For historical reasons however most systems are compromises between tradition, necessity reason and point of view.

The result of a nomenclature discussion is published be-

prepared by  
 E. Bayer, P. Chovin, E. Cremer, D.R. Deans, F. Geiss,  
 G. Guiochon, I. Halász, D. Jentsch, R. Kaiser, J. Lebbe,  
 G. Machata, R.L. Munier, H. Oster, A. Prevot, L. Rohrschneider, G. Schay, G. Schomburg, E. Stahl, L. Szepešy,  
 J. Tranchant.

Eine für alle wesentlichen chromatographischen Methoden zugleich gültige Nomenklatur entsteht naturgemäß erst, wenn dafür ein Bedürfnis vorliegt. Die kombinierte Anwendung unterschiedlicher chromatographischer Methoden bei der theoretischen und praktischen Auswertung, vor allem aber bei der Übersetzung von fachlichen Mitteilungen, läßt jetzt eine gemeinsame Nomenklatur wünschenswert erscheinen.

Jede Nomenklatur soll richtig, logisch, einfach und einprägsam sein. Aus geschichtlichen Gründen aber ist eine Nomenklatur meist ein Kompromiß zwischen Tradition, Notwendigkeit, Ansicht und Einsicht.

This task subsequently became the responsibility of Analytical Division of International Union of Pure and Applied Chemistry (IUPAC) and after a number of proposals and drafts, a comprehensive paper was prepared by Leslie Ettre and published in *Pure and Applied Chemistry* in 1993 [4]. He gave a detailed explanation in *Chromatographia* [5] and outlined the significant changes from then current usage.

Unlike the 1993 recommendations which were written in the earliest days of LC and had a bias towards GC methods, there are few significant changes in the new recommendations but they represent a consolidation and coordination between the different branches of separation science. For example, the expression UPLC is now included, reflecting

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## New, Unified Nomenclature for Chromatography

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His work and subsequent supplements adding new methods, such as supercritical fluid, became the basis of the separation entries in the *Compendium of Analytical Nomenclature*, commonly known as the Orange Book, which was published by IUPAC in 1998 [6].

Since then separation science has expanded and more methods and techniques have been developed and earlier this year an updated "Terminology for Separation Methods" was published by IUPAC in *Pure and Applied Chemistry* [7] (and is available on-line with open access) as a precursor to a major revision of the Orange book. This revised and updated compilation brings together the earlier recommendation papers with subsequent recommendations for newer methods, into a single collection covering gas, supercritical fluid, and liquid chromatography, ion-exchange, chiral and size exclusion separation, electrically driven analytical separations and field flow fractionation methods.

the now widespread use in liquid chromatography of small particles in a narrow bore column and some of the original terms have been revised to cover both gas and liquid chromatography and additional terms to fill gaps in the previous terminology have been added. The emphasis is on terms that are in widespread analytical chemistry use and are needed to facilitate the exchange of results and methods.

One of the expectations of most journal editors and publishers is that authors will use IUPAC Nomenclature to name chemicals and IUPAC Terminology for the terms and expressions in submissions. However, although separation scientists are generally good at following the IUPAC terms, some obsolete expressions still appear surprisingly frequently in submissions. To remind authors, capacity factor  $k'$ , is now a deprecated term, and was formally replaced by retention factor  $k$  in the IUPAC terminology in 1993. Similarly, the use of the term Normality  $N$  for concentration was

discouraged by IUPAC in the 1979 Orange book, because of its ambiguity, and the preferred and recommended term is molarity *M*.

Another area where authors need to be careful is the expression of accuracy and reproducibility. Very frequently papers quote unrealistic values for calibration data often giving as many significant figures as the computer or calculator can generate, when in reality the significance is defined by the accuracy with which measurements can be made reproducibly, standards can be weighed out or diluted. If the standards are only known and quoted to two significant figures then that limits the accuracy of any subsequent determination. Finally, almost all word processors have the ability to spell check and grammar check a document—USE it. Even if your native language is not English you can usually override your normal spell checker language and avoid simple mistakes and ambiguities.

## References

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