

EDITORIAL

What is the Best Definition for (Bio)Analytical Chemistry?

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One of the simplest definitions for analytical chemistry is "the branch of chemistry concerned with analysis".¹ But what does "analysis" really mean? In the past it was synonymous for decomposition. However, with the rise of new technologies, it is no longer necessary to destroy samples to know their composition. Therefore, the current meaning of analysis refers to the identification and quantification of different analytes without the need for decomposition. However, analytical chemists do not merely provide results; they also develop strategies to measure different chemical properties. Furthermore, they spend an enormous amount of time interpreting the obtained data. Thus, considering the vast variety of works involving analytical chemistry, a more comprehensive definition of the discipline is required.

Analytical chemistry was defined in the second half of the 20th century as "the chemical discipline that gains information on the chemical composition and structure of substances, particularly on the type of species, their amount, possible temporal and spatial changes, and structural relationships between the constituents".² In 1993, the Working Party on Analytical Chemistry (WPAC) of the Federation of European Chemical Societies (FECS) defined analytical chemistry as "a scientific discipline that develops and applies methods, instruments, and strategies to obtain information on the composition and nature of matter in space and time", indicating that the development of methods and instruments is a central part of this science.³ However, some analytical chemists consider that this sort of definition does not entirely reflect the identity and wide scope of analytical chemistry.

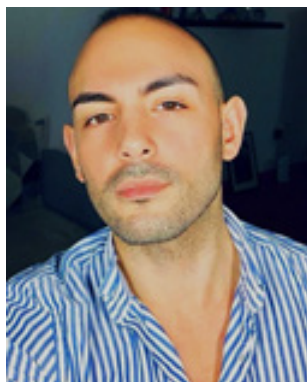
In the year 2000, Professor Miguel Valcárcel proposed a more comprehensive definition for analytical chemistry as "a metrological science that develops, optimizes and applies material, methodological and strategic tools of widely variable nature which materialize in measurement processes intended to derive quality (bio)chemical information of both partial [presence or concentration of bio(chemical) analyte species] and global nature on materials or systems of widely variable nature (chemical, biochemical and biological) in space and time in order to solve scientific, technical and social problems".⁴ This constitutes a very encompassing definition because it includes more complete information that contributes to a deeper characterization and understanding of the discipline, while highlighting the different capabilities and approaches as well as some of the challenges.

So, many definitions can be found in the literature. The truth is that while some definitions express essential aspects of (bio)analytical chemistry and the analytical work, others characterize it in a very concise way. Furthermore, while some authors consider it to be a branch of chemistry independent of other chemical disciplines, others classify it as an autonomous science called analytical sciences.⁴ The important thing is the agreement in the description of the discipline, for example, to obtain information on matter via representative samples; the inclusion of structural information; and the vital role to address

important scientific, economic, and social problems. In the present era, (bio)analytical chemistry boasts an extensive array of methods, techniques, and equipment at its command, enabling it to skillfully orchestrate its instrumental repertoire. As a result, the diverse spectrum of capabilities that (bio)analytical chemistry can attain is remarkably broad.

The Uruguayan (bio)analytical chemistry scene is no stranger to this continuous change and redefinition. In this regard, BrJAC organized a special issue dedicated to the 7th Uruguayan Congress of Analytical Chemistry (CUQA 7), aiming to celebrate the work of all its participants. This issue contains an Interview with Dr. Manuel Miró from the University of the Balearic Islands (Spain), a Point of View written by Dr. Mariela Pistón from Universidad de la República (Uruguay), and a Letter authored by Dr. Ignacio Machado from Universidad de la República (Uruguay). The special issue also features four Articles and two Technical Notes authored by some of the participants. It is imperative to thank all of the reviewers who have participated in this process by giving their time and expertise to evaluate the manuscripts. I hope you enjoy reading about this exciting work within the field of (bio)analytical chemistry.

- (1) Meija, J. The ultimate “analytical challenge”: what is analytical chemistry? *Anal. Bioanal. Chem.* **2009**, 394, 7–8. <http://doi.org/10.1007/s00216-009-2754-4>
- (2) Danzer, K. *Analytical Chemistry: Theoretical and Metrological Fundamentals*. Springer, Berlin, 2007.
- (3) Kellner, R. Education of analytical chemists in Europe. *Anal. Chem.* **1994**, 66, 98A.
- (4) Valcárcel, M. *Principles of analytical chemistry: A textbook*. Springer, Berlin, 2000.



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