

Njegomir Radić, Lea Kukoč Modun

Uvod u analitičku kemiju

[Introduction to Analytical Chemistry]

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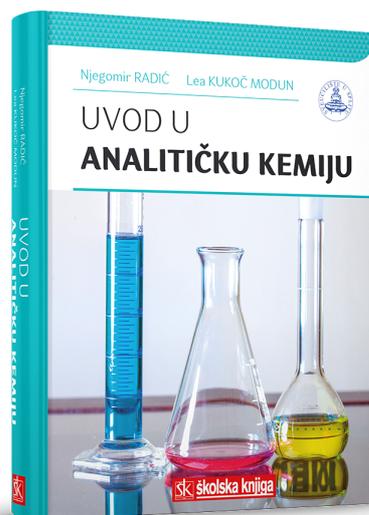
THERE are not many textbooks in analytical chemistry in Croatian language, and even less by Croatian authors. Therefore, this one is an exceptionally valuable book, covering basic analytical chemistry for university undergraduate students of all fields dealing with chemistry (chemistry, pharmacy, technology, agronomy, medicine, etc.).

Introduction to Analytical Chemistry consists of *Introduction*, *Chapters* (19 chapters), *Appendices* (8 appendices) and *Index*.

Introduction is a must-read part of the book because it elucidates the authors' philosophy of analytical chemistry, thus enabling better understanding of the written material.

Chapters 1–5 define basic terms and calculations used in analytical chemistry, including elementary statistics, stoichiometry, activity and activity coefficient, and chemical equilibria. *Chapters 6–11* deal with titrimetric determinations based upon homogenous equilibria including acid-base reactions, complex forming reactions and redox equilibria. The second part of the textbook is based upon heterogeneous equilibria. Thus, *Chapters 12–18* contain detailed explanations of heterogeneous equilibria, gravimetric analysis, precipitation titrations, extraction, chromatography and ion exchange and *Chapter 19* deals with kinetic methods. Each chapter includes many numerical examples with detailed solutions explaining the theoretical part. At the end of each chapter, there is a series of problems with the solutions given in the *Appendix*.

Appendices include *Glossary of Terms*, *Acid Dissociation Constants*, *Complex Forming Constants at 25 °C*, *Standard Reduction Potentials*, *Solubility Product Constants*, *Solution of Problems*, *Literature Overview* and *Periodic Table of Elements*.



According to the *Introduction*, the main goal of analytical chemistry is the determination of sample composition and the fractions of the individual components in the sample. The textbook is conceptually based upon the contemporary European approach to analytical chemistry, where the classical division to qualitative and quantitative analytical chemistry is not satisfying anymore, therefore they are united by homogenous and heterogeneous equilibria, and kinetic methods. (Authors thereby look up to the European textbook: R. Kellner, J. M. Mermet, M. Otto, M. Valcarcel, H. M. Widmer, *Analytical Chemistry*, 2nd Ed. Wiley-VCH, Weinheim, 2004.) The program of analytical chemistry at the Faculty of Chemistry and Technology in Split has been executed according to this philosophy since the academic year 2012/2013.

As a connection between the formerly divided qualitative and quantitative analytical chemistry, authors introduce a new tool – vertical diagram. It is presented in the chapter dealing with chemical equilibria, and is used throughout the book when necessary. Vertical diagram is based upon equilibria data, and is used for prediction of predominant chemical species under defined experimental conditions in all, and especially complex analytical systems. Although it cannot replace systematic qualitative analysis in experimental part of analytical chemistry education, it is a very good linkage between it and the background of quantitative determinations.

As an excellent innovation, the textbook offers the systematic application of *Microsoft Excel*. Since almost every computer has the *Excel* program, which is not particularly easy to use but has enormous possibilities, it really must finally be included into the teaching of solving complex numerical problems. Authors have solved all examples and problems which needed such an approach by means of *Excel*. At the same time, they explained every step in the process. Complex calculations in *Chapter 5* are performed by computer function GOAL SEEK.

Furthermore, the book presents another excellent innovation for problem solving. As previously stated, all the examples are solved in detail in the textual part, with explanations, and all the problems have final numerical and/or textual solutions in the *Appendix*. In addition, the authors and the publisher have provided another great new

possibility. Procedures and solutions for all examples and problems are available for free download at the publisher's site <https://www.skolskiportal.hr/uvod-u-analiticku-kemiju>.

The additional value of the textbook is given within the theoretical discussion of various analytical methods where several illustrations of their application in real life can be found. Emphasis is put on human health and ecology. For example, authors discuss certain drugs, physiological buffers, atmosphere, acidic rain and marble, teeth, etc. Analytical chemistry is a part of everyday life, and this textbook gives some general guidelines in that direction which makes the book more acceptable for students of various future professions (chemistry, pharmacy, technology, agronomy, medicine, etc.).

Last but not least, the layout and graphic design of this textbook are excellent. The text is well organized on pages, colours are discreet but emphasizing, figures are well-defined and labels for navigation through the text and the problems are clearly visible.

Finally, all things considered, the new textbook *Introduction to Analytical Chemistry* by Njegomir Radić and Lea Kukoč Modun can be highly recommended for teaching analytical chemistry at the undergraduate level to university students of all fields dealing with chemistry. Hopefully, it will be accepted by all the universities in Croatia.

Vlasta Allegretti Živčić