even up to 2001, and the text can also be accessed through a 15-page subject index. The *Handbook of Combinatorial Chemistry* is highly recommended to all who are interested in this subject.

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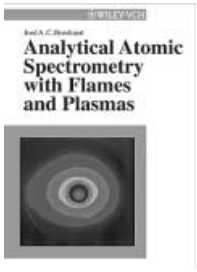
Analytical Atomic Spectrometry with Flames and Plasmas. Edited by *José A. C. Broekaert*. Wiley-VCH, Weinheim 2002. 364 pp., hardcover € 89.00.—ISBN 3-527-30146-1

Atomic spectroscopy and spectrometry are some of the oldest methods for structural and quantitative analysis, and their origins can be traced back to the fundamental work of Kirchhoff, Bunsen, and Fraunhofer. Atomic spectrometry in particular has undergone rapid developments in the last 10–15 years as a result of the introduction of new methods of excitation and detection, resulting not only in greatly improved detection sensitivity but in a widespread transition from monoelement to multielement analysis. Consequently, no analytical laboratory that is engaged in elemental analysis can nowadays afford to be without methods such as ICP-OES and ICP-MS.



J. A. C. Broekaert has performed a valuable service in writing this comprehensive monograph on the developments that have been achieved in these techniques and the prospects for the future. The structure of the book follows the classical pattern for works on analytical methods, with a clear distinction between the discussion of excitation sources (arc discharges, sparks, flames, graphite cuvettes, plasmas, glow discharges, laser microplasmas) and that of the methods for detecting the resulting excitation and/or ionization (by absorption, emission, fluorescence, or mass spectrometry). Against that systematic background the book then goes on to describe how the different combination possibilities are achieved in practice.

After considering the various methods for preparing and introducing the sample (pneumatic or ultrasonic atomization, hydride techniques, thermal or electrothermal vaporization, slurry techniques, ablation, sputtering, etc.), the author discusses the many different methods for determining elements, with their theoretical background, and describes their practical implementation, their range of applications, and the potential for further development. The overall result is a comprehensive monograph with a thoroughly systematic arrangement of the contents, supported by over 600 literature references, providing a wealth of information for practicing analysts in scientific fields.

The last two chapters are concerned with sample preparation and with comparisons between atomic spectroscopy and other methods. These are less convincing than the rest of the work. They give the impression of additions that have not been completely thought out, as they do not take into account the principles of the "analytical process", and fail to address differences in the nature of analytical problems and sample materials. These should be omitted from future editions, since a thorough discussion of how the methods described here are to be incorporated into overall analytical strategies falls outside the aims and scope of this monograph.

Sometimes points of detail are not explained as clearly as one would wish, and consequently there are many instances where the reader may need to refer to the original publications. For example, the rather brief treatment of Laser enhanced ionization (LEI) spectroscopy does not include a discussion of the differences between the use of continuous-wave and pulsed lasers. However, the book's main defect is the outdated layout. The bland and monotonous appearance of the text, without the use of emphases or visual structure, is uninteresting and detracts considerably from the experience of reading it. Also the figures deserved better preparation to improve their appearance.

However, these criticisms do not diminish the good scientific content of this excellent and comprehensive monograph, but only detract from the experience of working with it.

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Karl Marx und Friedrich Engels. Naturwissenschaftliche Excerpte und Notizen. Band 31, Mitte 1877 bis Anfang 1883. Issued by the International Marx–Engels Foundation, edited by *Anneliese Griese, Friederun Fessen, Peter Jäckel* and *Gerd Pawelzig*. Oldenbourg & Akademie Verlag, Berlin 1999. 1055 pp., hardcover € 158.00.—ISBN 3-05-003399-1

It is beyond question that Karl Marx (1818–1883) ranks as one of the greatest prolific writers (and prolific readers) of all time, as he left behind no less than 21600 pages of printed text, and notes on nearly every field of science in the margins of 35000 pages of books, not to mention the many thousands of letters that he wrote. There have been several attempts to systematically classify, evaluate, and annotate this enormous (and still not yet fully revealed) lifetime's work. There was an initial attempt in the 1920s, then in the 1970s work began in the GDR on compiling a "Marx-Engels-Gesamtausgabe" (MEGA), of which 40 volumes had already appeared by 1989, the famous "Blue Volumes", which also found their way into the bookshelves of many West German students. That project might have ended completely with the fall of European socialism as an established state entity, but in 1990 the Amsterdam Institute for Social History and the Karl-Marx-Haus of the Friedrich Ebert Foundation together set up the International Marx–Engels Foundation (IMEF), which then took on the responsibility for a third attempt at producing a MEGA version, with the detailed work being undertaken by a special working party of the Berlin–Brandenburg Academy of Sciences. Of the planned 114 volumes (expected completion date

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2030!), 45 have now appeared, including Volume 31 which is reviewed here, and which collects together Marx's writings on the natural sciences, mainly on chemistry.

The "chemical manuscripts" compilation is neither an essay on chemistry nor a textbook on the subject. Instead it is a collection of extracts from the works of many chemists and authors of textbooks who greatly influenced the development of the subject in the second half of the 19th century. These include Lothar Meyer, Henry Roscoe, and Carl Schorlemmer (described as "the first chemist who was a socialist, and the first socialist who was also a chemist"). But one cannot evaluate this book as a collection of key concepts and a summary of the chemistry of the period, one can only recognize its existence and marvel at the untiring diligence of Marx in putting together these notes, which touch on a wide range of topics including metals, acids and bases, many inorganic substances, hydrocarbons, carboxylic acids, amines, carbonyl compounds, carbohydrates, fats, etc.

Why did Marx write down this great collection of facts, which must probably be regarded as an aid to his own learning process, and why did he devote so much effort to the task? We do not know, since he did not incorporate these studies into his later writings. What was the source of the fascination that the natural sciences, especially chemistry, held for him? Firstly, Marx emphasized repeatedly that philosophy was inconceivable without taking into account the contribution of the exact sciences. He was especially impressed by the factual nature of chemistry and by its freedom from metaphysical ideas. Furthermore, that science in particular provided many examples of quantities being transformed into (new) qualities, which is well known to be one of the central ideas in Marx's work. And lastly Marx, as a very keen observer of changes in society, saw the rapidly changing subject of chemical science and the spectacular growth of industrial chemistry as a sort of enormous political and economic laboratory in which important processes were occurring, in particular the development of methods of production not seen before.

Now, when the political implementation of Marx's ideas has been abandoned, it is increasingly recognized that he was one of the world's great polymaths, for whom there was no conflict between the natural sciences and the humanities. Glancing through the pages and chapters of this book, one cannot avoid wondering whether present-day philosophers have such a profound knowledge of aspects of chemistry as Marx had, or whether they would be willing to take the trouble to acquire it. The conversion of materials into new forms is just as important for society now as it was then, and if anything it has become more so. But despite that, present-day authors are not accorded the same degree of credit for their achievements, as is evident, for example, in the comments of Sloterdijk on genetic engineering and molecular biology.

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Agglomeration Processes. Phenomena, Technologies, Equipment. By *Wolfgang Pietsch*. Wiley-VCH, Weinheim 2002. 614 pp., hardcover € 259.00.—ISBN 3-527-30369-3

Agglomeration is such a widespread and frequently used phenomenon that we are often not consciously aware of it, for example, in its roles in wet sand, concrete, bread, coal briquettes, medications in the form of pressed tablets, moldings in the "green" state (namely, before heat treatment to form ceramics), muesli bars, etc. The aim of this book is to provide a comprehensive and up-to-date survey of industrial agglomeration techniques and their applications.

The author begins with an introduction to the properties of agglomerates and the special features of different technologies, then describes various types of equipment for agglomeration and their special characteristics. The main emphasis is on industrial applications rather than on the underlying science. The topics covered include the fundamental principles of agglomeration, agglomeration by roll-forming, by deposition, by compression, and by melting and sintering processes, the design of equipment, process development, and the planning of plant layouts. The processes and equipment are described in thorough detail, with many diagrams and photographs, and the lists of equipment manufacturers are an especially impressive and useful feature. The 340 entries are clearly arranged under appropriate headings, and include full addresses with telephone and fax numbers. Firms who will manufacture equipment to order are also listed, which is a useful addition. Anyone engaged in practical work involving agglomeration will find this a uniquely valuable reference source on equipment.

On the other hand, the scientist interested in the subject will find nothing that is new or instructive in the theoretical part, especially as the examples do not provide enough background information or literature references. In this connection it is disturbing to find that many of the figures, which have evidently been taken from the original publications, are not accompanied by enough detailed information. Sometimes there is no explanation of terms appearing in a figure, so that a reader with little previous knowledge will fail to understand the point, as, for example, in Figure 5.21 relating to the Hamaker constant which is involved in the attractive force between small particles. As another example, Figure 5.53 is intended to show typical length scales for certain systems, but the associated comments are unclear and contain information that is simply wrong: mechanical processes are not capable of reducing particles to subnanometer dimensions, nor do macromolecules with dimensions less than 0.1 nm exist, and the radii of atoms are in the order of femtometers. A beginner in the field of agglomeration, especially if he or she does not have a basic knowledge of mechanical processing methods (e.g., from *Mechanische Verfahrenstechnik* by H. Rumpf), will have great difficulties in trying to understand this bulky work. To gain a deeper understanding of the theory of particle – par-

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