BOOK REVIEWS

Vybrané problémy z teórie tuhých látok. (Selected Problems of the Solid State Theory). By *V. Ilkovič*. VEDA (Publishing House of the Slovak Academy of Sciences), Bratislava, 1984. Pp. 280, price Kčs 36.

The aim of the book is, according to the author's foreword,

a) to help the reader to comprehend the (conceptual and mathematical) apparatus of solid state quantum mechanics by solving appropriate problems;

b) to help the reader to study the papers on solid state theory.

The book is actually a collection of 149 solved problems. It is to be understood as a supplement or extension to the monograph *Teória tuhých látok* (Theory of Solids) by *Ľ. Hrivnák, V. Bezák, J. Foltin,* and *M. Ožvold,* edited by VEDA in 1978. The most important chapters of the monograph are followed and illustrated by a number of examples.

The first chapter "Stationary electron states in a crystal" (57 problems) deals with basic crystallographic concepts and the behaviour of an electron in periodic fields.

The chapter "Equilibrium electron distribution in metals and semiconductors" (17 problems) concerns the calculation of Fermi energy and the electron and hole concentration.

The chapter "Crystal lattice oscillations. Phonons" contains 14 solved problems for linear, simple two-dimensional and the simplest cubic structures.

Chapter IV "Thermal properties of a crystal lattice. Application of the harmonic and anharmonic approximation" (12 problems) illustrates the calculation of thermodynamic quantities (*e.g.* free energy, inner energy, specific heat, entropy) and of thermal expansion for several kinds of model oscillators.

The fifth chapter "Magnetic properties" (29 problems) is oriented mainly on the calculation of magnetization, magnetic susceptibility and on the applications of the spin wave concept under various approximations.

In the last chapter "Electric conductivity of metals and semiconductors" 20 problems are solved concerning the models of mechanisms of electron and hole conductivity and the calculation of electron energy variations.

The book should be useful mainly for students of physics, probably not so much for students of chemistry.

The first part on crystallographic concepts, which might be one of the most interesting for chemists, contains several mistakes and misprints. For example, the author does not always differentiate the elementary and the conventional unit cell of a crystal. The formula for the unit cell volume on p. 62 is not correct. There are some mistakes in its derivation, too. The "standard" interchange in using the term "crystal lattice" or even "crystalline lattice" instead of "crystal structure", when speaking of distribution of atoms, is repeated here.

Despite of this more or less formal inaccuracy, I believe, the book will be helpful, especially in connection with the monograph mentioned above, to all, who try to understand more deeply, how the physical properties of solids depend on their electronic and crystal structure.

D. Mikloš

Chemické tabulky pro střední průmyslové školy chemické a s chemickým zaměřením. (Chemical Tables for Vocational Chemical Schools and Schools with Chemical Orientation.) Second Edition. By *J. Vohlídal* and coworkers. Nakladatelství technické literatury (Publishing House of Technical Literature), Prague, 1985. Pp. 333, price Kčs 24.

The publication which was approved by the Ministry of Education as instructional text for the use in vocational chemical schools contains a set of tables from the region of inorganic, organic, physical, and analytical chemistry. The book is divided into five chapters. The first chapter is devoted to the international system of units, *i.e.* the SI system. The authors state the fundamental quantities and the corresponding units, definitions of the fundamental and complementary units, allowed decadic factors and prefixes, some derived quantities and units of the SI system, permanently allowed secondary units, and forbidden units according to *ČSN 01 1300*. As the publication ought to serve mainly for the students of secondary schools, the mention of the symbols of quantities and especially the example of their comparison as an introduction to the presentation of quantities and their units is very useful from the didactic point of view. The second chapter deals with properties of the elements. Instead of traditional tabulation, the authors write individual elements in the sections containing the values of selected physicochemical constants with other data on their properties, which practically represents the full characterization of elements with the modern view on structure. The reader finds all necessary data on single place, which eliminates the possibility of mistake. The third chapter is concerned with properties of the compounds arranged in alphabetical order irrespective whether the compounds are inorganic or organic, which is logical and practical for rapid orientation in the tables. Like for the elements, particular sections are reserved for individual compounds. The physicochemical quantities listed in 34 tables are comprised in the fourth chapter. These tables contain the structural characteristics of chemical bonds of groups and selected substances, thermodynamic, electrochemical, optical, and electrical properties of substances, properties of aqueous solutions of substances, buffer solutions and other data used for teaching process as well as in laboratory practice. At the beginning of this chapter there is a register enabling the user to get prompt information. The final fifth chapter brings a list of symbols of quantities (in alphabetical order), units, and used abbreviations.

The publication contains many data which were missing in older tables previously used in schools. The international system of SI units which is generally obligatory according to *ČSN 01 1301* is consistently observed.

The reviewed publication by *J. Vohlídal* and coworkers represents a valuable aid not only for laboratory and theoretical instruction in secondary schools with chemical orientation, but also for general chemical public.

Š. Kohút

Průmyslová organická chemie — důležité suroviny a medziprodukty. (Industrial Organic Chemistry — Important Raw Materials and Intermediates.) By *K. Weissermel* and *H.-J. Arpe*. Nakladatelství technické literatury (Publishing House of Technical Literature), Prague, 1984. Pp. 420, price Kčs 60.

In spite of considerable amount of information available in patent and producers' literature, there is a lack of monographs and good textbooks in the field of industrial organic chemistry and technology all over the world. It is quite understandable because technological and chemical-engineering research and development are expensive and, consequently, their results, including detailed data about technological processes, are carefully kept secret. Therefore, it is too difficult to select reliable information from a large amount of various, often contradictory data published not only on prospective and current technologies but even about those mastered on industrial scale long ago. This task in a considerable part of industrial organic chemistry has been successfully fulfilled by prominent scientists of Hoechst Co. in the present book, the second edition of which (*Industrielle Organische Chemie*) was published in German and English versions by Verlag Chemie, Weinheim, 1978.

The book consists of 14 chapters, while the additional Chapter 15 contains instructive, easy to survey schemes of processes and reactions, dealt with in the book, definitions of terms, characteristics of chemical reactions, and references.

In the individual chapters the authors discuss questions of supply with energy, raw materials, and basic products in industrial organic synthesis on a relatively small space but rationally and eruditely. Further, they pay attention to olefins, acetylene, diolefins, syntheses with carbon monoxide, products of ethylene oxidation, alcohols, vinyl halides, and vinyl oxy derivatives. Thereafter, components for production of polyamides, products based on propylene, isolation and utilization of aromatics, particularly products produced from benzene as well as by oxidation of xylenes and naphthalene, are presented.

It is evident that the authors are familiar with many processes of industrial organic synthesis presented in the book. Remarkable are also some of their forecasts on development of technological processes. The translators have mastered their role quite satisfactorily, though some "non-chemical" paragraphs could have been translated more freely and thus more appropriately (*e.g.* p. 241 paragraph 3 from below). Evidently on their account are some mistakes even in technical information, *e.g.* on p. 78 line 15 from below, instead of "chemical cracking" should have been "thermal cracking"; p. 80 line 2 from below, instead of "sulfones" should have been "sultones"; p. 88 paragraph 3 line 2, instead of "more valuable" should have been "cheaper" (acetylene is still valuable but more expensive); p. 94 line 12 from below, instead of "butanediol" should have been "butinediol"; p. 186 line 10 from below, instead of "to hydrogenate" should have been "to reduce" (for instance in the case of pentaerythritol only reduction is used); p. 301 to paragraph 4 from above: "tetrapropylene is formed by oligomerization of propene and propene-containing gases, respectively".

Omitting on p. 72 the method for isolation of isobutylene from the refined fraction C_4 through formation of the intermediate *tert*-butyl alcohol by selective hydration of isobutylene on cation-exchangers, as correctly indicated on p. 249, has to be considered a further inaccuracy of the book (missing are also pp. 177 and 179). On p. 75 the following incorrect statement can be found: Terminal olefins are formed also on dehydrogenation of unbranched paraffins. In fact, practically only internal straight-chain olefins are formed. Terminal olefins can be obtained from them only by subsequent processes (metathesis, ethenolysis).

On p. 134 paragraph 4 a modification would be advisable, *i.e.* that the selectivity to ethylene oxide in current processes reaches more than 75 %. In Chapter 9 the valuable 1,1,1-trichloroethane should have been not missing. On p. 211 paragraph 4 it is desirable to

set right that by hydrogenation of phenol on palladium cyclohexanone is formed selectively. The older process with nickel catalyst resulted in cyclohexanol which was dehydrogenated on zinc to cyclohexanone.

On p. 298 line 3 from below, instead of "isothermally" more truthful would be "autothermally". On p. 312 paragraph 2, instead of "α-cumylenephenol or α-cumenephenol" the names "*p*-cumylphenol or 4-cumylphenol" (4-(1,1-dimethylbenzyl)phenol) would be more proper. Dimers of α-methylstyrene are also important components.

The remarks presented by no means lessen the value of the book, regarding its rich content. Some of them follow from the fact that the Czech translation was issued rather late, which is understandable. It is, however, comforting that the layout of the book is relatively good. Undoubtedly, it will deserve appreciation by a large family of organic chemists, technologists, students, and, moreover, it may be a source of valuable information also to economists and workers in the field of energy production.

V. Macho

Základy užité jaderné chemie. (The Principles of Applied Nuclear Chemistry.) By *V. Majer, P. Beneš, A. Gosman, K. Kratzer,* and *A. Zeman.* Nakladatelství technické literatury (Publishing House of Technical Literature)—Alfa Publishers, Prague—Bratislava, 1985. Pp. 232, price Kčs 25.

The university textbook is in fact the second part of the distinguished Professor *Majer*'s textbook on nuclear chemistry (*Základy jaderné chemie* — The Principles of Nuclear Chemistry, Nakladatelství technické literatury (Publishing House of Technical Literature), Prague, 1981) written in cooperation with *P. Beneš, A. Gosman, K. Kratzer,* and *A. Zeman,* all of them experienced lecturers from the Department of Nuclear Chemistry, Technical University in Prague.

The book gives the theoretical concepts and many useful practical examples illustrating the nuclear methods in chemistry and also in physics, geology, biology, and technology. Chapter One gives a concise review of the application techniques and principles and comprises the biological effects of radiation and geochronological methods. General features of isotope (including stable isotopes) and radioactive indication are given in Chapter Two. The third chapter is somehow off the line, dealing with trace chemistry of radioactive nuclides as an introduction to radio-release and distribution phenomena (nevertheless, when connected with the problems of pure materials and "carrier-free" radionuclide production it would become very topical). The nuclear technique in general and physical chemistry and in analytical chemistry make up about 40 % of the contents and cover the use of isotopes for determination of physicochemical parameters in diffusion processes, complex equilibria, isotope exchange and chemical dynamics, electrochemistry, catalysis and also in isotope dilution analysis, radio-reagent methods, activation analysis and other interaction techniques of analysis and testing, including Mössbauer spectrometry. Though there are touched all modern application areas, few of the examples, not counting the "classics", are somehow out of date and surpassed by the present state of art, and quotation of more modern and instructive works seems to be missing, especially from the field of biochemistry. References consist of

carefully selected list of monographs, textbooks, proceedings, reviews, and also original papers. In Appendix concise tables of often used isotopes data are given.

Certainly, the book presents interest not only for students, but for everybody who will look for inspiration in this, sometimes forgotten by chemists but far from being exploited, area of methodological and experimental approach.

F. Macášek

Ložiska fosilních paliv. (Deposits of Fossil Fuels.) By *M. Dopita, V. Havlena,* and *J. Pešek.* Nakladatelství technické literatury (Publishing House of Technical Literature)—Alfa Publishers, Prague—Bratislava, 1985. Pp. 264, price Kčs 26.

The book, dealing with coal, crude oil, and natural gas, is a work of foremost Czechoslovak specialists in the field of geology and mining of fossil fuels. It is divided into six chapters.

The first chapter (23 pp.) is concerned with formation of fossil fuels from biomass. However, opinions on possible abiogenetic origin of some crudes and natural gases are not neglected in the part discussing the theory of crude oil formation.

The second chapter (27 pp.) is devoted to physical, chemical, and technological properties of fuels. The sections dealing with macropetrography and micropetrography of coal are uptodate-comprehended and their practical significance also for coal processing is outlined. Classification of coal has been treated in detail. In the case of lignites, classification to hard brown coal and soft brown coal (the first one mainly in Czechoslovakia and the second one in GDR), important from technological point of view, would desire attention. Since there is no unique classification of crudes, it is advisable to classify crude oils in the future by using a triangular diagram (V. Veselý, *Chemistry and Technology of Crude Oil I,* Bratislava, 1963).

In Chapter 3 (6 pp.) the influence of the environment (continental, transient, sea) on deposit-forming conditions is estimated.

The fourth chapter (17 pp.) discusses geological structure of coal and crude oil deposits, structures and types of coal seams and oil traps, their origin and changes as well as accompanying gases and waters.

Chapter 5 (92 pp.) analyzes in detail the Czechoslovak deposits of coal, crude oil, and natural gases in Bohemian massif, Slovak Permian-Carboniferous and Tertiary basins of Moravian and Slovak Carpathians, their quality, mining methods and localities including riskiness and perspective as well as possibility of new discoveries.

Chapter 6 (59 pp.) surveys exploitation and total reserves of coal, crude oil, and natural gases according to the data of World Conference on Energy in Munich, 1980. The current and prospective deposits both in socialist and non-socialist countries have been described in detail. No equal attention is paid to coal and crude oil in some countries (e.g. in China to crude oils).

Numerous graphs, charts, photographs, and tables are to great advantage of the book and so are the suggestions for better utilization of fossil fuel sources, mainly in Czechoslovakia (uranium and germanium from coal, bromine and iodine from deposit waters, helium and argon from natural gas). The terminology has been treated with care.

The nonconventional sources of fossil fuels, e.g. very heavy crudes from the Orinoco belt, asphaltic sands, and oil schistes have not been the subject of this book. They are of no significance to Czechoslovakia but important on a world scale. Therefore, I recommend to include them into a possible second edition of this book.

The book has been intended to geologists and mining engineers in practice as well as in projection and research institutes. Ministry of Education of both Czech and Slovak Socialist Republics approved of using it as a general handbook at Technical Universities, Faculty of Natural Sciences and Mining, respectively.

V. Veselý

Index Nominum 1984. Schweizerischer Apothekerverein, Zürich 1984. 1026 Seiten, Preis Schweiz. Fr. 200.

Das rezensierte Buch gehört zu jener Gruppe von Handbüchern, deren Ziel die übersichtliche Erarbeitung von grundlegenden Angaben über Arzneistoffe ist, die gegenwärtig zur Anfertigung von industriell hergestellten Arzneizubereitungen benutzt werden. Das Handbuch wird in Abständen von zwei Jahren von der Wissenschaftlichen Zentralstelle des Schweizerischen Apothekervereins unter Leitung von Dr. *H. P. Jaspersen* herausgegeben. Im Rahmen der Neuüberarbeitung werden Arzneistoffe, deren Verwendung in der Praxis zurückgegangen ist, gestrichen und neue Arzneistoffe aufgenommen.

Den Hauptteil des Handbuches bilden annähernd 4000 chemische Arzneistoffe und ihre Derivate (alphabetisch nach generischen Bezeichnungen angeordnet). Jedes Kennwort enthält Angaben über den Arzneistoff: generische Bezeichnung, Einordnung in die pharmazeutische Gruppe, chemische Bezeichnung, Strukturformel, Bezeichnungen in einigen bedeutsamen Arzneimittelbüchern, Markenschutznamen von industriell hergestellten Arzneimittelpräparaten, die den entsprechenden Arzneistoff enthalten, einschließlich des Herstellers. Daneben beinhaltet das Handbuch in alphabetischer Reihenfolge auch die Kennwörter der Namen industriell hergestellter Arzneimittelpräparate mit der Nennung des entsprechenden Arzneistoffes. Das angeführte, erarbeitete System ist vollkommen und ermöglicht eine sehr schnelle Information über die Arzneimittel.

Insgesamt werden im rezensierten Handbuch nahezu 4000 chemische Arzneimittel und ihre Derivate angeführt, wobei die Gesamtzahl der Kennwörter, die Synonyme und Bezeichnungen industriell hergestellter Arzneibereitungen inbegriffen, sich um 35 000 bewegt.

Das Handbuch wurde nach und nach eine der gesuchtesten Quellen zur Gewinnung von Informationen über Arzneimittel, und es kann außer Pharmazeuten, Ärzten und pharmazeutischen Chemikern auch weiteren Fachleuten empfohlen werden, die sich mit der Problematik von Arzneimitteln beschäftigen.

V. Špringer