In summary, *Ullmann's Encyclopedia of Industrial Chemistry on CD-ROM* is a user-friendly product that provides quick access to a substantial collection of well-written, informative articles on all aspects of industrial chemistry. The product was easy to install and simple to learn and ran flawlessly. The search engine allows the user to conduct simple or advanced searches with nearly immediate results. Its pricing, however, may preclude libraries or companies with limited budgets from purchasing it.

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Book Reviews

Physical Adsorption; Forces and Phenomena. Series: International series of Monographs on Chemistry. No. 33. By L. W. Bruch, Milton W. Cole, and Eugene Zaremba. ix + 340 pp. $85.00. ISBN 0-19-855638-1.

This book is a monograph on the physics of adsorption on clean, single solid surfaces. A clear understanding of the equilibrium behavior of such adsorbed films has emerged over the last twenty years or so, and a book drawing together this knowledge is timely. Previous influential monographs have included those by Steele (*The Interaction of Gases with Solid Surfaces*, 1974), Dash (*Films on Solid Surfaces*, 1975) and Nicholson and Parsonage (*Computer Simulation and the Statistical Mechanics of Adsorption*, 1982), but these are inevitably somewhat dated now. Experimental work in this area has been much influenced by advances in scattering probes of monolayers and the availability of high vacuum techniques, while on the theoretical side there have been substantial advances in our understanding of dense fluid systems and phase transitions. Much of the book is based on these more recent developments.

The focus of the book is on monolayer physics and its relation to two-dimensional behavior. The emphasis is on simple molecules and surfaces, in particular inert gases adsorbed on graphite, metals, and oxides, but there is some discussion of molecular fluids and multilayer growth on surfaces. Experimental and theoretical work up to 1995 is covered. The coverage of the theory is particularly detailed and very clear; this is hardly surprising since the authors are theoretical physicists. Fluids in pores and chemisorption are not covered, and the coverage of molecular (as opposed to atomic) fluids is brief. Those interested in molecular simulation studies of these systems are likely to be disappointed; simulation work is dealt with in a sub-sub-subsection (5.2.1.6) of only two pages, and is somewhat dated.

The first chapter gives an elementary and helpful overview of monolayer physics, including a description of monolayer and multilayer adsorption, interaction potentials, and experimental techniques. Intermolecular interactions are described in more detail in Chapter 2, with emphasis on interactions between the adsorbate and substrate. Ab initio approaches are described, including density functional theory, followed by a brief account of more empirical potentials. The structure of monolayers is described in Chapter 3. The geometry of monolayer lattices and the definition of commensurate structures are covered, together with a brief survey of orientational structure in molecular films. The theory of monolayer adsorption is covered in Chapters 4 and 5. The simpler theories are covered in Chapter 4: the Langmuir and Brunauer−Emmett−Teller (BET) equations, based on the assumption of identical adsorption sites and no lateral adatom−adatom interactions; equations for two-dimensional systems, including the 2D ideal gas and virial expansion (classical and quantal); topological defects and superfluidity. These simple treatments do not describe phase transitions in the film. More advanced treatments, which include both adsorbate−adsorbate and adsorbate−substrate interactions, are given in Chapter 5. Lattice gas models, including renormalization group mappings and continuum treatments, are described. These more complete treatments make possible a study of the monolayer phase transitions, and examples of these are given together with some discussion of critical exponents and universality. In Chapter 6 the adsorption of inert gases on graphite, metal surfaces (the 111 surfaces of Ag and Pt, and the 100 surface of Pd), and oxides (especially MgO) are described. This is a very useful survey; experimental phase diagrams are given, and the behavior is related to the theory. Several appendices describe the classical thermodynamics of monolayers, derivations of several theoretical formulas, tables of adatom−substrate dispersion energies, and units. The latter appendix is welcome, since chemists, physicists, and engineers working on adsorption frequently use different units.

This book is an authoritative and well-written account of the theory of monolayer films of monoatomic adsorbates, and the relation between theory and experiment, and is likely to prove to be the classic text in this area for some time to come.

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Monosaccharide Sugars. Chemical Synthesis by Chain Elongation, Degradation, and Epimerization. By Zoltan Gyorgydeak and Istvan F. Pelyvas (Lajos Kossuth University, Debrecen, Hungary). Academic Press: San Diego. 1997. xviii + 508 pp. $89.95. ISBN 0-12-550360-1.

Carbohydrate chemistry has played a pivotal role in the development of organic chemistry, in general, because of the unique features of the "simple" carbohydrate molecule. The monosaccharides are probably the most densely functionalized naturally occurring molecules and the most densely packed with chiral centers, and since they are polyols, they are usually difficult subjects to bridle and command in organic syntheses. Thus, most organic chemists approach their tasks with the expectation of accomplishing highly regioselective and stereoselective reactions, while carbohydrate chemists are grateful for modest regioselectivity in most of their nonanomeric reactions, and are thrilled by modest stereoselectivity in their reactions at the anomeric center.

Many textbooks written on carbohydrate chemistry focus on the speculative, mechanistic aspects of carbohydrate chemistry, and the reader is usually left quite unaware of the challenging experimental requirements of the carbohydrate reactions. Most carbohydrate reactions are subject to kinetic or thermodynamic controls, and unless one has had a chance to examine the experimental details of these reactions, all sense of the important manipulation of these important factors is lost, and so too is the excitement of the carbohydrate chemistry.

Drs. Gyorgydeak and Pelyvas have succeeded in producing a landmark text on carbohydrate chemistry not only by carefully reviewing some of the most important areas of synthetic carbohydrate chemistry, but also by allowing the reader to simultaneously assimilate representative examples of the experimental details of the reactions involved. In this single text, almost every important method for the ascending synthesis of monosaccharides from smaller units has been reviewed, and so too have the methods for the stepwise, controlled degradation of monosaccharides.

The authors have succeeded in locating excellent examples of the experimental procedures they wished to highlight, and the span of the references, both old and very recent, will give the reader a feeling of confidence in the authors' grasp and presentation of this complex area. Their limited examination of mechanistic speculations is exactly what one would expect in a text that is obviously focused on synthetic methods, and does not, in any way, detract from the excellence of the effort.

I certainly have not derived as much pleasure from reading a text on carbohydrate chemistry as I have with *Monosaccharide Sugars. Chemical Synthesis by Chain Elongation, Degradation, and Epimerization*. This text will undoubtedly save me many hours of searching the library for both references to important procedures in synthetic carbohydrate chemistry *and* important examples of experimental procedures.

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