Book Reviews

Kinetics of Precipitation. By ARNE E. NIELSEN, University of Copenhagen. The Macmillan Co., 60 Fifth Ave., New York 11, N. Y. 1964. x + 153 pp. 14.5 × 22 cm. Price, $6.00.

The author has apparently done extensive work in the field of precipitation from supersaturated solutions of sparingly soluble inorganic salts, involving mechanisms of precipitation, crystal growth, and the kinetics of the numerous possibilities involved. The book, although consisting of a total of only 153 pages is highly packed with information in a concise, coherent, systematic theoretical description and interpretation of the phenomenon of precipitation, based on available experimental data, and utilizing mechanisms that represent well-recognized happenings in crystal growth. The treatment of the subject is quite complete, although each section is very brief and mathematical, with derivations and explanations reduced to the bare minimum. The text, however, is filled with many graphs and diagrams to illustrate the points in question. Moreover, an extensive bibliography is included to supply needed details and information to the interested reader. Obviously the book is not intended for beginners in the field, although it would be very useful to acquaint such persons with the numerous aspects of the subject, and any particular phase could then be expanded through a study of the references supplied. To fully appreciate the book, the reader should be well versed in mathematics, thermodynamics, and kinetics.

The author ties up free energy, surface tension and affinity with geometric shape, particle size, and degree of supersaturation, to give some appraisal of the probability of the formation of embryos. An example is given which shows that a doubling of concentration can change the probability of forming a critical embryo from one in 3×10^{14} years to ten every second. The kinetics of nucleation is next treated, with many equations presented to cover the various possibilities. The rate of crystal growth is then discussed in terms of the controlling factor in each case, such as diffusion, nucleation, which can affect either linear or two-dimensional growth, and dislocation. To illustrate the latter, it can be seen that instead of growing along the crystal face, a screw dislocation can cause spiral growth which can give rise to millions of layers. In addition, dislocations can be produced by bending and breaking of thin plates or needles, and interlocking when branches meet, etc. Chapter 6 treats compound growth mechanisms, wherein it is shown that more than one controlling factor may be present either concurrently or with one being predominant during the first phase and replaced by the other later on.

Precipitation is next discussed in terms of homogeneous nucleation, the presence of heteronuclei, mixing rate, the use of a generating process such as precipitating barium sulfate, generating the sulfate ion by the reaction between persulfate and thiosulfate, and continuous flow precipitation. A discussion of secondary growth, seeding and dissolution, and particle shape, completes the amazing amount of material treated with the surprisingly small number of pages in the volume.

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Molecular Pharmacology. The Mode of Action of Biologically Active Compounds. Volume 1. Edited by E. J. ARIENS, Department of Pharmacology, Faculty of Medicine, University of Nijmegen, The Netherlands. Academic Press Inc., 111 Fifth Ave., New York 3, N. Y. 1964. xix + 503 pp. 16 × 23.5 cm. Price $17.00.

This book, which is subtitled "The Mode of Action of Biologically Active Compounds," is primarily a discussion of drug-receptor interactions. In the first quarter of the book, drug distribution, absorption, excretion, and metabolism are considered briefly. The general principles that are applicable to this part of the biological activity of drugs are discussed so that the reader gets a broad view of the field and some insight into the unsolved problems and paradoxes. Frequent references to more detailed discussions of these subjects greatly enhance the value of this portion of the book. For the reader uncommitted to general pharmacology as a way of life, this may easily prove to be the most profitable portion of the text.

The major portion of the book is devoted to a careful discussion of the interaction of drugs with receptors. Receptors are defined operationally as the part of a cell or effector system that receives a drug or transmitter substance. The intensity of a drug effect depends on the affinity of the drug for the receptor and the intrinsic activity of the drug. For more than a decade, the Nijmegen group has been developing mathematical expressions that describe the various classes of drug-receptor interaction. "The relation between the fraction of receptors occupied by the drug and the concentration of the drug in the biophase is assumed to obey the mass action law or the adsorption isotherm of Langmuir." Expressions for the activity of competitive and noncompetitive antagonists are proposed. These models have been tested, usually in isolated tissue bath, and many of the data are in accord with predictions. This type of theoretical approach provides valuable insights toward the understanding of experimental findings in structure–activity-relation studies. The fact that these data can be predicted on the basis of changes in affinity and intrinsic activity raises intriguing questions such as: "What is the physico-chemical basis of varying intrinsic activity?"

The authors are careful to point out that the uses of the term "receptor" underlines our ignorance of detail despite the advance in our understanding of broad principles.

The book can be considered as a valuable status report which defines well our current understanding of drug tissue interactions and provides the basis for future progress. As in all such attempts, there are some disturbing features. One cannot but be concerned about the state of the science when the decision between an occupation theory of drug-receptor interaction and a rate theory may depend upon whether one chooses to use a light isotonic lever or a frontal writing auxotonic lever. Many readers may find the middle 200 pages somewhat difficult going and be somewhat upset by the recurring phrase ". . . and it is then easy to derive the theoretical dose-response curve." We can nonetheless recommend this as a thought-provoking volume.

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