BOOK REVIEWS

Industrial Crystallization

Industrial Crystallization from Solutions. By Jaroslav Nyvlt. Translated by Paul Feltham. Pp. 189. (Butterworth: London, July 1971.) £5.50.

CRYSTALLIZATION, the practice of which dates back to antiquity, is one of the major processing techniques of the chemical industry. Yet it is only in recent years that serious attention has been paid to this old established and long neglected unit operation of chemical engineering.

Without doubt, crystallization is an exceedingly complex operation. It is a simultaneous heat and mass transfer process with a strong dependence on fluid and particle mechanics. It takes place in a multi-phase, multi-component system. It is concerned with particulate solids whose size and size distribution, both incapable of unique definition, vary with time. Nucleation and growth kinetics, the governing processes in this operation, can often be profoundly influenced by mere traces of impurity in the system.

It is, perhaps, no wonder that crystallization has been called an art rather than a science. Nevertheless, industrial crystallizers have to be designed and operated, in spite of the fact that the foundations are somewhat insecure. Any publication, therefore, which attempts to increase available knowledge of this complicated subject is more than welcome.

The author is head of the industrial crystallization section at the Czechoslovak Research Institute for Inorganic Chemistry at Usti Nad Labem. The book, which is an extensively revised version of the original 1967 Slovak language edition, is in two parts. The first deals with theoretical analyses of phase equilibria, material and thermal balances, nucleation and crystallization kinetics and growth behaviour in multi-particle systems. Experimental techniques for measuring kinetic data and equilibria are also described. The second part covers the industrial practice of crystallization. Several basic types of crystallizer are described, and pathways leading to the design of these units are explored. A number of useful worked examples are given.

Most of the mathematical models utilized in this book were devised by the author, and it is very interesting to compare and contrast them with those that have been derived in the past decade or so by research workers in the United States and the United Kingdom. In any case, a large proportion of the

author's publications have appeared in Czechoslovakian journals only, so it is most instructive to have this summary of them in the English language. Furthermore, another valuable feature of this book is the fact that it introduces the reader to a considerable amount of virtually inaccessible information published in a wide variety of East European journals.

J. W. MULLIN

Statistical Mechanics

Statistical Mechanics at the Turn of the Decade. Edited by E. G. D. Cohen. Pp. viii+235. (Marcel Dekker: New York, January 1971.) \$12.50; £5.95.

THIS book is a record of the symposium held at North Western University, Evanston, Illinois, in October 1969 to celebrate the seventieth birthday of Professor G. E. Uhlenbeck. It consists of a verbatim record of the eight lectures given at the symposium, and forms a fitting tribute. The style of the lectures is lucid and contrasts favourably with that of the usual formal layout of research publications: they are decidedly readable. I particularly like the way some of the authors review the major work of past papers in their topics with a frank and searching criticism not usually found, and anticipate the direction of further developments in their fields. Each lecture is well referenced, and for the most part they all contain brief (sometimes too brief for the uninitiated) introductions. If the book has to be faulted, it could be said that it is too broadly based, in that I feel that most people working in statistical mechanics and allied fields will find something of interest, but they may not be conversant with the work outlined in many of the sections.

In the section on statistical mechanics and ergodic theory, A. S. Wightman contributes a cohesive and well documented discussion of developments in classical statistical mechanics, including good introductory sections, and remarks on the seeming paradox of microscopic reversibility giving macroscopic irreversibility. He goes on to consider certain Hamiltonian flows and K and S systems in some detail.

The generalization of the Boltzmann equation to higher densities is covered by E. G. D. Cohen in a very well written section outlining the investigations into the density distribution functions for moderately dense gases, incorporating the concepts of multiple particle collisions. The author concludes with

astute remarks on the major difficulties of the problems.

D. Ruelle contributes a short section on the C^* algebra approach to statistical mechanics. Time evolution of quantum systems and, eventually, decomposition equilibrium states are dealt with. Possibly this discussion would be better fitted to a book on quantum mechanics.

The lectures on the Curie point, given by C. Domb, occupies the longest and most readable section of the book, with a comprehensive literature survey. The introductory parts could well be used for undergraduate reading. The principal consideration here is with the position of the attempted reconciliation of the approaches of Onsager and Van der Waals to this transition.

F. J. Dyson provides a good sequel to the talk of Professor Domb with a section on phase transitions in ferromagnets. He considers some interesting and inter-related problems concerning phase transitions for the Ising model of a ferromagnet, and how these relate to the Heisenberg model.

The varying fortunes of the Weiss ferromagnetic theory and the Van der Waals theory of gas-liquid systems, and their status in the light of modern developments are the topics of A. J. F. Siegert's contribution.

P. C. Martin reviews superfluids and superconductors, first describing superfluidity and its thermodynamics and hydrodynamics. He concludes with a discussion of non-equilibrium problems of vortex motion, supercurrent decay and fluctuations near the transition temperature.

Finally, P. C. Hohenberg deals with dynamic phenomena near a critical point. First there is an exposition on the static properties near a critical point as given by Professor Domb; then an interesting, but non-rigorous, approach to dynamic critical phenomena which gives good agreement with experimental results.

J. E. JONES

Fluorine Journal

Journal of Fluorine Chemistry. Edited by H. J. Emeléus and J. C. Tatlow. Pp. 128. (Elsevier: Lausanne, July 1971.) n.p.

The quality of the papers in the first issue of the new quarterly, *Journal of Fluorine Chemistry* is much the same as that found in most learned society journals.

Each paper was carefully scrutinized by one senior referee and by one of the two distinguished editors-in-chief. The