

are models of scientific writing, and can be read with enjoyment by any scientist. C. N. Yang's brief note, "The Mass Formula of  $SU_3$ ", deals with a problem which has since found a reasonably satisfactory solution, whereas Professor Dirac's lecture on the "Foundation of Quantum Mechanics" is concerned with showing that the Heisenberg and Schrödinger pictures do not necessarily provide the same answers in quantum field theory. Both these contributions are really highly technical, although written in a way which obscures this fact. R. Serber's talk on "High Energy Scattering" deals very nicely with the application of optical and diffraction theoretical techniques in this area, and an amusing discourse on "Weather Modification: Prospects and Problems", by G. J. F. McDonald, makes for light reading. Finally, P. Bergmann's talk on "General Relativity in Contemporary Physics" is a non-technical exposition in a somewhat conservative hue.

Turning to the mathematics, things get very tough. Only Chern on "Geometric Structures on Manifolds and Submanifolds" makes any concessions to the non-initiated. Harish-Chandra on "Harmonic Analysis on Semisimple Lie Groups", N. Jacobson on "Forms of Algebras", A. Beurling on "Local Harmonic Analysis", D. C. Spencer on "The Theory of Harmonic Intervals", O. Zariski on "Equisingular Points on Algebraic Varieties", L. V. Ahlfors on "Kleinian Groups", and S. Bochner on "Analytic Measures on Compact Bohr Groups" are contributions moving near the very frontier of mathematical research, and all demand a highly sophisticated level of mathematical education. The tempestuous development of modern pure mathematics towards ever greater generalization and abstraction coupled with extreme precision is here displayed once more, and much hard work will be required before the gap separating these truly marvellous achievements from all the natural sciences is reduced to manageable proportions.

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## METALLURGICAL THERMOCHEMISTRY

### Metallurgical Thermochemistry

By O. Kubaschewski, E. L. Evans and C. B. Alcock. (International Series of Monographs in Metal Physics and Physical Metallurgy, Vol. 1.) Pp. xix+495. (Oxford, London and New York: Pergamon Press, Ltd., 1967.) 75s. net.

REVISED and enlarged, the new edition of this well known book retains the general form and content familiar from the editions of 1955 and 1958. A direct interchange in the previous order of the fourth and fifth chapters, however, now emphasizes the book's dual character. For it essentially comprises two separate but related monographs: the first provides an introduction to the principles and practice of applied thermochemistry, and the second is a convenient collection of thermochemical data relevant to metallurgical problems.

The concise survey of important basic principles and relationships presented in the first chapter has been slightly extended. With the aim of providing a clearer and more logical presentation, occasional modifications have been made in the division and order of the material and in the treatment of some concepts. Brief presentations of some interpolation formulae and atomistic solution models are now included. The latter provide an improved introduction of the concepts of Raoultian, Henrian and regular solution, but the treatments of spinodal decomposition and order-disorder appear somewhat out of context and are insufficiently developed to be of great value.

Although slightly shortened, the chapter surveying experimental methods still provides a comprehensive and once more up to date survey of techniques. Again minor

rearrangements have been made, as, for example, in adopting the contemporary classification of calorimeters as isoperibol, isothermal or adiabatic in character; the newer applications of high temperature adiabatic calorimetry, microcalorimetry and fluorine bomb calorimetry are noted. Developments in the techniques for the measurement of vapour pressures and the extensive application of solid oxide electrolytes for measurements of e.m.f. are also reflected in the review.

Least changed is the chapter dealing with the estimation of thermochemical data, but brief mention is now made of more recent attempts at the empirical estimation of entropies and of the relation of electronegativity to heats of formation.

The pedagogically invaluable fourth chapter, which provides worked examples of the thermochemical treatment of metallurgical problems, has been expanded from eight to thirteen examples. Among the new examples are calculations pertaining to the extraction of nuclear and other metals, the evaporation of ceramic materials, and metal-refractory equilibria at very high temperatures. These and the modified examples of equilibrium diagram calculation appropriately reflect the current and developing interests of metallurgists and demonstrate the importance of thermochemical studies in these fields.

As would be expected after an interval of nine years, perhaps the greatest changes are to be found in the collection of thermochemical data. This monograph within a monograph has been brought up to date (1965) and now runs to 183 pages and lists 661 references to original publications or other reviews of data. The intense experimental activity of past years has resulted in the revision of many of the previous values; a considerable amount of additional information, some from unpublished work, is also incorporated.

The publication of this fourth edition will be appreciated by workers in the field who have come to regard "Kubaschewski" as their normal first source of information on experimental techniques and available thermochemical data. By its clear demonstration that metallurgical thermodynamics is a challenging experimental science, providing a powerful tool for the treatment of real problems, it will also continue to assist in convincing further generations of students that the fundamentals and applications of thermodynamics are subjects meriting their earnest attention.

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## FUROPYRANS AND FUOPYRONES

### Fuopyrans and Fuopyrones

By Ahmed Mustafa. (The Chemistry of Heterocyclic Compounds: a Series of Monographs.) Pp. xii+376. (London and New York: Interscience Publishers, a Division of John Wiley and Sons, 1967.) 135s.

THE publication of a book concerned with the chemistry of oxygen heterocyclic compounds is always very welcome, especially when it fills an interesting and well defined gap in the chemical literature.

The plant phenols are a group of compounds of great interest to certain organic chemists, some of whom give a prominent position to naturally occurring products which have the fuopyrans and fuopyrones as parent compounds. Knowledge of these and related compounds has developed through the structural determinations of products obtained from plants and plant extracts with certain intriguing properties such as their use as an aid in catching fish or as medicinals and insecticides.

The chapters of the book all follow the same general pattern, starting with an introduction to a specific topic followed by a mention of the chemistry of a number of naturally occurring compounds. Accounts dealing with the determination of structure of such compounds are very concise, but include all the relevant degradation