

have considerable value for postgraduates. There are few misprints, but the definition of  $\Omega$  spectrum on page 331 is dangerously wrong. Furthermore, the Borsuk/Ulam theorem is not a fixed point theorem, and the definition of chain homotopy on page 110 is a little obscure. This is, nevertheless, clearly the best book on algebraic topology after Spanier's encyclopaedic work and is well worth buying.

Differentiable manifolds is also a subject which is in need of an elementary explanatory treatment. The book by Dr Brickell and Dr Clark is an attempt in this direction, but falls down badly. Chapter one gets off to a dubious start by allowing a function  $f: A \rightarrow B$  to have a domain less than  $A$ . This idiosyncrasy may be fine for sophisticated papers on category theory but is very bad for a textbook designed for undergraduates. For example, this notation means that if  $M$  and  $M'$  are any two manifolds then there is a diffeomorphism  $M \rightarrow M'$ . The second chapter on differentiable manifolds and structures is loosely written and obscures rather than illuminates the subject. As a prelude to the rest of the book this approach is bound to introduce doubts and uncertainties into the minds of those using the volume as a self-tutor. For example, on page eighteen the authors impose various differentiable structures on the set of points which make up a figure of eight in the plane. Of course, this is possible with any set equivalent to the continuum. But what is the point of this exercise? One possible result is that the beginner may think that the figure of eight as a topological space is a differentiable manifold. There is certainly a need for a simple and readable account of this subject but I am afraid that this book does not fit the bill.

R. A. FENN

## Patterns of Wind

*Stratospheric and Mesospheric Circulation.* By A. L. Kats. Translated from the Russian. Pp. v+169. (Israel Program for Scientific Translations: Jerusalem, September 1970. Distributed in the UK by Ann Arbor-Humphrey Science Publishers.) 63s.

THIS book of modest size is concerned with the global stratospheric and mesospheric circulation, but the emphasis is on the tropical circulation on which the author has carried out extensive research. The first three chapters deal with the vertical structure of the wind pattern in the lower stratosphere, that is, up to balloon levels, and the last two chapters deal with the structure in the upper stratosphere and lower mesosphere as revealed by rocket measurements.

The material is wholly descriptive, it contains no mathematical equations and the dynamics of the circulation receive hardly a mention. Remarks such as "the

summer easterlies are pushed downwards by the westerlies" give the impression of belts of wind jostling for position as the seasons change, rather than of dynamic changes resulting from seasonal changes of temperature and pressure distribution. The accounts of the changes of wind with height and season are a little tedious, and I feel that the book should have been written in the reverse order; the statistics of easterly and westerly winds in the first chapter would be seen to fit into a pattern if the quasi-biennial oscillation, dealt with in the second chapter, had been described first. Again, if the equatorial circulation is controlled by the extra-tropical circulation, surely the global circulation should be discussed before the equatorial circulation? A handy book of about 100 pages would result from a rewriting of the book in a more logical order: as it is, it must be judged to be expensive for its size, containing as it does no expensive printing or plates. Much of the material is rather old—for a book originally published in 1968, it is unsatisfactory to illustrate a quasi-biennial oscillation by diagrams spanning the four or five years up to about 1960.

The book is well translated, the diagrams are clear, and references are dealt with in an easy way which does not disturb the flow of the text. There is a good bibliography, nearly half of it devoted to Soviet authors; this and the account of Soviet research in the text are valuable.

R. A. HAMILTON

## Facets of Thermodynamics

*Classical Thermodynamics.* By Arnold Münster. Translated by E. S. Halberstadt. Pp. xiv+387. (Wiley Interscience: London and New York, November 1970.) 120s.

IN the preface to his book, Professor Münster explains that he aimed to present the formal structure of classical thermodynamics in a concentrated form; this he has certainly done. Having set out with this handicap, he is to be complimented on having produced, nevertheless, a text both rigorous and lucid. This work, in an excellent translation by Dr E. S. Halberstadt, is not for the beginner; those who have had some exposure to the subject should benefit from reading this book, but its greatest value must be to the advanced student.

The first third of the book concerns the development of the thermodynamic method from the "facts of experience", that is, the laws of thermodynamics. These are presented both classically, after Joule, Clausius and Carnot, and in the axiomatic manner of Carathéodory. Much of the discussion is presented in terms of generalized thermodynamic quantities which, although demonstrating the power of the thermodynamic method, requires perseverance on the part of the reader.

The balance of the work deals with some specific applications of thermodynamics. The subjects considered are: chemical and phase equilibria, systems in electric, magnetic and gravitational fields, critical phases and higher order transitions, the strain tensor for solids, and electrochemical systems; all the important applications of classical thermodynamics are therefore covered. The discussion on each topic is concentrated; where the subject warrants it, development is in generalized terms, an example being the chapter on critical phases where single and multicomponent fluid, magnetic and other critical situations are all considered together.

This is indeed an excellent book, tying together all the diverse phenomena of chemistry and physics which are amenable to a thermodynamic treatment.

G. SAVILLE

## Structures and Functions

*Structure and Properties of Inorganic Solids.* By Francis S. Galasso. Pp. x+297. (Pergamon: Oxford and New York, July 1970.) 100s; \$13.50.

THIS book goes some way towards satisfying an obvious need. I am aware of no other volume in which modern information about the structure of technologically important materials is collated and described so simply and clearly. The arrangement of the data has been well planned and there is a clear description of each structure, some discussion of its relationship to others, a very extensive list of materials (with references), and a brief account of characteristic physical properties, supplemented occasionally by tables. The diagrams are numerous and clear. On the other hand the perspective drawings are far less helpful than the small diagrams of "layer sequences", and they suffer from the bad fault of terminating everything firmly at the corners of the unit cell—as if a unit cell meant anything as an isolated entity.

Simplicity and clarity are, however, achieved at the cost of a one-sided viewpoint. The author thinks entirely in terms of space filling, and there is a heavy bias towards examples in which the atoms lie in special positions. The reader is never alerted to the significance of tightly bonded groups (for example, coordination polyhedra of small cations) which retain their shape and size even when overall symmetry is lost. The ability to switch from a space-filling approach to a linked-polyhedra point of view as the particular problem demands is essential nowadays and ought to be cultivated from the very outset. It will be a pity if the good qualities of this book blind the unwary reader to the fact that it neglects at least half the story. The book is well produced but expensive.

HELEN D. MEGAW