Cloud physics

Microphysics of Clouds and Precipitation. By H. R. Pruppacher and J. D. Klett. Pp.706. (D. Reidel: Dordrecht, The Netherlands, 1978.) Dfl. 85; $39.

DURING the past decade the major emphasis in cloud physics has been directed away from fundamental microphysical processes—which had hitherto largely dominated the evolution of the subject, and in which progress had been based primarily upon laboratory investigation—to field investigations of larger-scale effects, in which the cloud dynamics are recognised to play a central role. This change of approach has been dictated in part by the development of superior experimental techniques—radar, optical particle samplers, high-speed data processing systems, and so on—and in part by the recognition that the major obstacle to progress has been the absence of comprehensive and reliable observational data. Accordingly, the publication of a textbook devoted exclusively to microphysical processes might appear at first sight to be somewhat anachronistic. In fact, however, I feel that this comprehensive and rigorous critical analysis of current understanding of the physics of the multitude of processes which form the basis of the subject, will be of invaluable assistance to research workers. The classic text in this field for two decades has been Mason's massively authoritative *The Physics of Clouds* (Clarendon Press, Oxford, 1957) but an enormous amount of material has been published since the second edition of this work appeared in 1971, and the small number of generally excellent monographs that have been produced in the intervening years have been insufficiently detailed to take full account of this new work.

The range, tenor and emphasis of the book can readily be appreciated by studying the titles of the chapters which follow the short historical review: microstructure of atmospheric clouds and precipitation (the only chapter concerned predominantly with field observations); the structure of water substance; equilibrium between water vapour, water, aqueous solutions and ice in bulk; surface properties of water substance; equilibrium behaviour of cloud drops and ice particles; homogeneous nucleation; the atmospheric aerosol; heterogeneous nucleation; hydrodynamics of single cloud and precipitation particles; cooling of moist air; mechanics of the atmospheric aerosol; diffusion growth and evaporation of water drops and ice crystals; cloud particle interactions—collision coalescence and breakup; growth of cloud drops by collision and coalescence; microphysics of ice particle-drop interactions; the electrical state of the atmosphere and its effect on cloud microphysics. In addition, there is a series of useful, mathematically rigorous and sometimes novel appendixes, on more specialised topics.

A feature of this book is the consistent attempt to provide a critical appraisal of published work. In general, these analyses are penetrating and balanced. Another impressive aspect is the bibliography which contains about 2,000 papers, concerning research carried out up to 1978.

A disadvantage of the analytical, microphysical approach adopted by the authors is that although individual topics are critically examined a broader overview of the status of areas of cloud physics is not consistently presented. The emphasis on the physics rather than the dynamics and raw data is a deliberate and defensible policy which, however, is not uniformly successful. For example, the important research leading us towards a solution of the problem of thunderstorm electrification has been in the field—the laboratory and theoretical studies on which the authors have concentrated attention are of secondary consequence. These limitations—if valid—are minor, however, and there is little doubt that this impressive book will be of central importance to cloud physicists and scientists working in related fields.

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Inorganic analysis

Vogel's Textbook of Quantitative Inorganic Analysis. Fourth edition. Revised by J. Bassett, R. C. Denney, G. H. Jeffery and J. Mendham. Pp.925. (Longman: London and New York, 1978.) £14.

This fourth edition of 'Vogel' by four members of the late Dr Vogel's staff is considerably different from the previous versions that served as the standard textbook of quantitative inorganic analysis for several generations of British chemists. It uses SI units throughout, but in line with the recommendations of the Analytical Division of IUPAC it retains the concept of 'the equivalent' and the 'normal' solution, where it is more convenient and less ambiguous so to do. This is sound common sense in an era that spans the old and the new systems of nomenclature, and it serves the needs of a wide range of chemists and of industrial and academic requirements. The authors are to be congratulated on their pragmatic approach which may, of course, be denigrated by the pundits on either side, but which is eminently sensible at the present time.

Inevitably the new edition shows signs of fairly drastic pruning in the area of classical gravimetric and titrimetric analysis in the sense that the number of alternative classical procedures has been considerably reduced. The methods that have been retained are generally, in the reviewer's opinion, those that are most useful both on a practical analytical basis and for the purpose of training the next generation of students how to undertake the elements of classical analysis that are still much used in industry and are likely to be required for many years to come. The decision to expand the section on sampling procedures is doubly welcome as all too many textbooks ignore this vital function without which most analyses are virtually pointless.

A new chapter has been devoted to thermoanalytical procedures and the one on infrared analysis which featured in the third edition has been deleted. This has allowed considerable expansion in other areas of spectrochemistry, for example, atomic absorption and emission spectrography, and a new chapter has been added on gas chromatography. The new arrangement of the material in the section on electroanalytical chemistry is also a considerable improvement on the previous edition. There have also been some changes in the extremely useful appendices that have always characterised Vogel, for example, the omission of 'chemical factors' and the little used five-figure logarithms, though the four-figure tables are still there to help the chemist with his *p*H calculations.

Taken all round Vogel is still an excellent book and, in this reviewer's opinion at least, the authors have got the balance right. It contains a very useful blend of the best of classical and neo-classical techniques with the basis of many modern instrumental techniques set out in a way that the student can assimilate readily and follow subsequently with the selected list of references and recommendations for more advanced or detailed reading. The balance between theoretical background and laboratory practice is probably much better than it was even in the previous editions. The book is neatly printed and set out, there are