Electron spectroscopy

Electron Spectroscopy: Theory, Techniques and Applications. Vol. 1. Edited by C. R. Brundle and A. D. Baker. Pp. xv+459. (Academic: New York and London, 1977.) £24; \$46.90.

A MAJOR EFFORT to survey the present situation in electron spectroscopy has been undertaken by some of its more prominent explorers under the editorship of Drs C. R. Brundle and A. D. Baker. The material is distributed in three volumes, the first of which is now ready. To get a balanced impression of the total work one would have to await the other two volumes, since much basic and important material is still left to be treated in these forthcoming volumes. Already, after going through the first volume, one is, however, in a good position to see that this work will become an indispensable source of knowledge for all investigators in the field.

After an introduction to electron spectroscopy by the two editors, the present many-electron theory of photoelectron emission is reviewed by R. L. Martin and D. A. Shirley. The authors have themselves contributed a good deal to some of the conceptual parts of the theory for electron emission processes. After reading this and the next chapter by W. L. Jolly—treating his equivalent cores approximation—the reader should have obtained a good understanding of some of the main topics, which underlay most applications. W. C. Price, well known as an authority in ‘classical’ ultraviolet photon spectroscopy for molecules before photoelectron spectroscopy had appeared and also as one who has given distinct impetus to present-day photoelectron spectroscopy, treats the latter as applied to small molecules. Particularly interesting is his discussion as to why previous emission and absorption photon spectroscopy failed to reproduce the molecular electron level systems. He concludes his chapter thus: “In the brief period in which it has been developed, photoelectron spectroscopy has had phenomenal success in revealing the electronic structure of matter in a particularly direct way. Chemists can see the orbital structure of even fairly large molecules and no longer have to rely on the predictions of theoreticians. Future advances in the study of solids, adsorbed species, etc., can confidently be predicted to yield information on the nature and functions of the electrons involved. It is also clear that the subject will provide a happy hunting ground

for the physicist as well as the chemist for many years to come.”

It is gratifying to see that indeed many chemists are already on the hunting ground and with most rewarding results. One of the great hunters is no doubt E. Heilbronner who, together with his colleague J. P. Maier in the next chapter, gives many illustrative examples from his rich scientific experience in the field of organic chemistry. A corresponding account from inorganic chemistry is amply given by R. L. DeKock, written, according to the editors’ preface, during his stay in Beirut during “the troubled period of civil strife in Lebanon!”

High temperature studies of ultraviolet-excited electron spectra from

halides is treated by one of the pioneers in this advanced form of the spectroscopy, J. Berkowitz, and the volume ends with a chapter on two-parameter coincidence experiments by M. E. Gellender and A. D. Baker. This technique, as pointed out by the authors, is more tedious than the usual electron spectroscopy but is instead applicable to, for example, ions of chosen excitation energies.

The applications of electron spectroscopy are expanding rapidly and already there is a problem to keep abreast with achievements in various fields. The present high quality volume is most helpful in this respect.

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World food supply problem

World Food Resources: Actual and Potential. By Michael Allaby. Pp.vii+418. (Applied Science: London, 1977.) £15.

THIS ‘popular’, readable, fact-packed book is presumably aimed at the ‘informed layman’. But much of it should interest the scientist, agriculturalist or economist who wishes to see his speciality in better perspective. After an introductory chapter, comes a useful chapter (2) on population and on (economic as distinct from biological) food demand, followed by two chapters on regional nutritional status, the cost of ‘modernising’ farming, the ‘green revolution’, soils, water and fertilisers (3 and 4). Two historical chapters (5 and 6) are too UK-based to be useful. There then follow helpful chapters (7–9) about ‘advanced’ farming and its dependence on non-solar energy inputs, on its genetic vulnerability, on its ecological side-effects, and about alternative farm technologies.

An interesting chapter (10) on fish is followed by one (11) on land reform, rural employment, farm credit, and so on, and the *possible* (reviewer’s italics) means of raising incomes and food production. Nevertheless, “we cannot be certain that those most in need of food will receive it” (p357). The final chapters (12 and 13) are politico-economic and examine the likelihood that effective international trade, aid and monetary devices would help to secure food for the under-fed, for example, by making phosphatic fertiliser available to poor countries.

Allaby, if not pessimistic, is doubtful about the likelihood of positive international action (chapter 13). But such doubts, one feels, are challenges to

those scientists and agriculturalists who are, for instance, seeking techniques to make available to crop plants the phosphate that is now immobilised in the soil, or to raise the lysine content of maize or sorghum, or to devise more productive farming systems (for example, the work at the International Institute of Tropical Agriculture, Ibadan, Nigeria). Allaby fails, it seems, to appreciate the scope for increasing, by relatively inexpensive means, the efficiency of human food chains. A major function of those trying to raise such efficiency should be, one feels, to make food production and consumption in poor countries as biologically independent as possible both of income gradients and of international squabbles, ideological differences, economic collapses and weather disasters.

The book as a whole lacks editorial discipline: chapter titles could be less ‘slick’ and more descriptive; more subtitles in the text would help the reader; not all the many tables are necessary although some of them, it must be said, are not available elsewhere in printed form. The references are inconsistently presented (some on tables, some at chapter ends, some in the Bibliography) and at least one is missing. Finally, many of the frequent acronyms are not defined or are enigmatic except to those who just happen to know, for example, that FAO/IWP means the Indicative World Food Plan (IWP) issued by the United Nations Food and Agricultural Organisation (FAO) in 1970.

This is a readable and useful, but sometimes diffuse, confusing and perhaps unduly pessimistic contribution on the world food supply problem. A much shorter, more disciplined version would be of greater use to the scientific community. **A. N. Duckham**

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