Book Review

Elements of Inorganic Photochemistry. G. J. Ferraudi, Wiley Interscience, New York, 1988, pp. 248, £32.50.

Photochemistry is a natural phenomenon as old as the world, but a relatively new branch of science. The quantum model of light, which is essential to the understanding of photochemical reactions, was elaborated early in this century, but only about 25 years ago it became clear that an electronically excited state, obtained when a ground state molecule absorbs a photon of suitable energy, is a new chemical species with properties that can be very different from those exhibited by the corresponding ground state molecule. In the following years there has been an extraordinary growth in the study of photochemical processes, and inorganic chemistry (in particular, coordination chemistry) has given a determinant contribution to this growth. It is therefore somewhat surprising that only three books on inorganic photochemistry have been published, and all of them before 1980 (V. Balzani and V. Carassiti, *Photochemistry of Coordination Compounds,* 1970; A. W. Adamson and P. D. Fleischauer (eds.), *Concepts of Inorganic Photochemistry,* 1975; G. L. Geoffroy and M. S. Wrighton, *Organometallic Photochemistry,* 1979). There is, indeed, a strong need for new books in this area and Ferraudi's volume is therefore welcome.

In the last 15 years the development of inorganic photochemistry has been so large that a systematic and exhaustive coverage of the field is a very difficult task. For a book of less than 200 pages (excluding the six appendix sections) a drastic selection of topics was of course imperative (incidentally, it should be noticed that a recent review article on the photochemistry and photophysics of Ru(II)–polypyridine complexes has the same size as this book!).

The choice of the authors was in favour of spectroscopic principles and kinetic treatments that are considered essential for understanding inorganic photochemistry, at the expense of descriptions and discussions of real photochemical processes. A simple glance at the pages of the book clearly shows that the number of mathematical equations by far outnumbers the number of chemical reactions.

The nature of light and the quantum mechanical basis of the interaction between light and molecules (including radiative and radiationless decay of excited states) are treated in detail. Much space is given to the description of experimental techniques for generation and detection of short lived intermediates and to the kinetic aspects of such processes. A table of four pages that collects rate constants of radical reactions and redox potentials and absorption maxima of radicals will certainly be most useful to the research workers dealing with flash photolysis (and pulse radiolysis). The Mulliken concept of charge transfer complexes, the Jørgensen treatment of charge transfer bands in coordination compounds, and the models for charge transfer to solvent transitions are reviewed. The chapter on ligand field photochemistry is almost entirely dedicated to the mechanisms of photosubstitution reactions of Cr(III) complexes, with a detailed description of the Vanquickenborne–Ceulemans model. A final, brief chapter reports some fundamental photoreactions of organometallic compounds. Six appendix sections on conversion factors, character tables for symmetry groups, vibrational motions, chemical bonding in complexes, calculation of charge transfer energies, and Born cycles for charge transfer processes complete the book. Several mistakes and misprints can be noticed, beginning with the preface where a wrong title is attributed to one of the previous books on the same subject. Occasionally the abbreviations used are not explained and the symbols given in the Figures are different from those used in the text. Several non-English names are wrongly spelt.

The book will certainly be useful to beginners but it should be made clear that it does not give an up to date view of the state of the art in inorganic photochemistry, such as, for example, that offered by the October 1983 issue of the *Journal of Chemical Education.* The most important topic of the last ten years, namely the bimolecular electron transfer reactions involving excited states, is hardly mentioned, and recent interesting trends (e.g., the study of supermolecular systems) are ignored.

Vincenzo Balzani