

## Book review

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*Inorganic Electronic Spectroscopy*, 2nd edition; by A.B.P. Lever (*Studies in Physical and Theoretical Chemistry* 33), Elsevier, Amsterdam, etc. 1984, xvi + 863 pages, Dfl. 295 (US\$ 113.50), ISBN 0-444-42389-3.

In 1968, a major publication event occurred; the first edition of Lever's *Inorganic Electronic Spectroscopy* appeared. This book has been for two decades the standard source of reference for anyone working in this field. Remarkably, since that date, no other books dealing with this fundamentally important area of inorganic chemistry have appeared, and the need for the original to be updated has been apparent for many years. I am delighted to be able to report that the second edition surpasses all expectations; it complements, supplements, and expands its progenitor. Indeed, libraries should not relegate the first edition to the stacks, but leave it on the open shelves; it makes a splendid companion, a two-volume set.

In detail, the volume describes one-electron energy levels {with crystal field theory, ligand field theory, molecular orbital theory and the orbital angular overlap model (AOM)}, term diagrams, many-electron energy levels (strong and weak field analysis, the Wigner—Eckart theorem,  $^3J$  symbols and spin—orbit coupling), selection rules, band intensities, vibronic coupling, dichroism and emission spectroscopy, charge-transfer spectra, the electronic spectra of  $d^n$  ions, metal—metal bonding, mixed valence compounds, cyclopentadienyl complexes, and bio-inorganic chromophores, and a final chapter deals with the nephelauxetic and spectrochemical series, AOM parameters, and their chemical significance.

The welcome, and somewhat surprising, feature of this volume is that in addition to the expected definitive coverage of classical coordination complexes, it includes a detailed consideration of the electronic spectroscopy of organometallic compounds. Thus, sections are devoted to binary carbonyls, dinitrogen and dioxygen complexes, metal—metal bonded species and cyclopentadienyl complexes. The only factor that limits the coverage of organometallic compounds is organometallic chemists. The quote Lever directly, "May I, therefore, urge organometallic chemists to report detailed visible and ultraviolet spectra of their organometallic species even if they are unable to assign or understand them. The growth, in the literature, of a body of data (now largely absent) will provide the impetus for theoretical understanding. There can be no doubt that such electronic spectra contain information which can greatly improve our understanding of the electronic structure of organometallic species". I would like to echo this sentiment. Having recently, with my wife, completed a comprehensive survey of the organometallic compounds of ruthenium, I was shocked to note that the number of papers reporting electronic spectral data (even, astoundingly, photochemical papers!) is insignificantly small. Thousands of compounds (many of which took months to prepare, and may never be made again) are incompletely characterised for the

lack of less than an hour spent recording a solution electronic absorption spectrum. So, organometallic chemists, en masse, please, *please*, please, record electronic spectra as routinely as you record NMR and IR spectra. This sad lacuna is now severely limiting an expanded understanding of the bonding in organometallic compounds.

To return to Lever's book, there can be only one significant criticism. The crc produced manuscript (despite the author's proud prefacial comments) is really rather poor quality. In particular, the lines of text are too close together, and subscript and superscript characters from one line frequently clash with those from neighbouring lines, making the text rather difficult to read in places. At a price of ca. £100, the purchaser of this academically outstanding volume should be able to expect an acceptable standard of production. Moreover, the use of square brackets to define discrete molecular or ionic species is entirely random, setting a very poor example to the next generation of graduate students. These factors aside, though, this volume is clearly one of the most important inorganic texts to have been published in recent years. It should be in all chemistry libraries and (despite the cost) in many private collections. We owe the author a debt of gratitude for producing such a learned, definitive, stimulating and useful tome. He has, for a second time, set the standards for another generation of inorganic chemists.

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