BOOK REVIEW

Electron Distributions and the Chemical Bond. Edited by Philip Coppens & Michael B. Hall. Plenum Publishing Corporation, New York, 1982. 479 pages, 17 X 26 cm, 55.00.

This volume is an attractive survey of well-written articles on theoretical and experimental charge density analysis and represents the proceedings of a symposium held in Atlanta (USA, 1981). This book presents the theoretical and experimental information necessary for understanding the role of charge densities in chemical bonding; the general idea of collaboration between theoretical and experimental chemists is well documented. It is divided into six sections, the first of which deals with basic concepts of charge density analysis. Theoretical (wave functions, Hamiltonian operator, reduce density matrices etc.) and experimental (Fourier transform, X-ray structure factors, X–X, X–N electron density maps, space partitioning etc.) approaches are developed.

The second section describes some theoretical aspects in relation to electron density: density functional theory, quantum model of coherent diffraction and influence of relativity on molecular electron density. The other sections give a detailed description of electronic charge densities in semiconductors, metallic solids, silicates, transition metal complexes, organometallic compounds, binuclear complexes, cumulenes and small ring compounds. Section 6 is devoted to electrostatic properties from X-ray diffraction data and also to electron distribution by X-ray photoelectron spectroscopy. The authors show a real knack for descriptions and explanations to the mathematically less sophisticated reader although it is principally devoted to people directly involved in research.

My personal hope is that this book contribute to greater diffusion of this relatively new technique in countries where at the moment it is almost non-existent (as in Italy). I hope also that people working in the nearby areas (theoreticians, crystallographers, solid-state physicists) can be brought together in order to understand and contribute to this field. In fact, the experimental electron density maps are now determined as precisely as the more-sophisticated quantum-chemical computations.

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