

spectroscopy and electron diffraction is described. Here it is shown how a combination of data from several methods can provide a solution when the individual methods cannot give a complete structure. Low-resolution microwave spectroscopy can often provide information about the conformational isomers present in the sample. This is valuable information in many GED studies, and Chapter 15 presents information about this method.

One chapter (Chapter 12) is devoted to the study of molecules with large vibrational amplitudes, while Chapter 8 shows how spectroscopic information can be obtained from electron diffraction. Conformational analysis is an important part of structural studies. Chapter 11 describes how conformational properties are obtained from electron diffraction and how thermodynamic properties like energy and entropy differences between conformers can be obtained by using GED data from several different temperatures.

Chapters 13 and 16 present two methods which are related to GED, namely EXAFS (extended X-ray absorption fine structure) and gas-phase X-ray diffraction. EXAFS can reveal the environment of a single element in a material and is primarily used with polycrystalline materials and with liquids, solutions and glasses. Gas-phase X-ray diffraction is today mostly used to investigate the electron distribution in atoms and molecules.

Part B is concerned with structural information obtained for selected classes of compounds. Boron and silicon compounds are treated in the first chapter. About 70% of the published structures are included and used to discuss problems and trends of stereochemical interest. In Chapter 2, more than 350 nitrogen and phosphorus compounds are reviewed, while oxygen and sulfur compounds are the subject of Chapter 3. The results for a large number of fluorine derivatives are discussed in Chapter 4, and comparisons between structural parameters of similar or analogous compounds are presented. Attempts are made to rationalize these parameters or trends on the basis of simple models such as polar effects or VSEPR theory. The structures and conformational equilibria in saturated (Chapter 5) and unsaturated (Chapter 6) organic molecules are thoroughly presented and several valuable tables of results are given. A separate chapter on benzene derivatives (Chapter 7) presents information on skeletal distortions of the benzene ring caused by substitution. Chapter 8 reviews the molecular structure of about 120 organometallic compounds determined by GED. Organic derivatives of main-group metals in groups 1, 2, 12, 13 (except boron) and 14 (except silicon) have been included. The last of the nine selected classes reviews the molecular structures of metal halides.

Part B is concluded by a chapter on the interaction of theoretical chemistry with GED, written by one of the

leading experts on theoretical chemistry. Included is a description of how a molecular structure can be determined from quantum theory and how sufficient accuracy can be attained. Also presented is a description of how a molecular force field can be obtained from quantum theory, and the chapter is concluded with 'projections for the near future.'

*Stereochemical Applications of Gas-Phase Electron Diffraction* is a good presentation of a valuable technique. The combined use of GED and data from other sources has been well described. Structural information has been reviewed for several classes of compounds, and empirical trends and interpretation of structural variations have been presented. Most of these reviews stop at about 1985, so the editing and printing process seems to have taken somewhat of a long time. Even if the primary goal has been to present the GED method and possibilities to non-specialists, electron diffractionists will also undoubtedly make diligent use of the books, because of their breadth of information, which is otherwise spread over a large number of publications. The books should be of interest for everybody working with molecular structures and for users of molecular structural data. The books should be found on the shelves of all good chemistry libraries.

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#### Book Received

*The following book has been received by the Editor. Brief and generally uncritical notices are given of works of marginal crystallographic interest; occasionally a book of fundamental interest is included under this heading because of difficulty in finding a suitable reviewer without great delay.*

**Modern crystallography. IV. Physical properties of crystals.** By L. A. SHUVALOV. Pp. xviii + 583. **Springer series in solid state sciences 37.** Berlin: Springer-Verlag, 1988. Price DM 198.00. A review of this book, by K. Simon, has been published in the September 1989 issue of *Acta Crystallographica*, Section A, page 659.