

Landolt-Börnstein

Structure Data of Free Polyatomic Molecules Landolt-Börnstein, Group II: Volume 25A: Inorganic Molecules Edited by K. Kuchitsu, 360 pp., DM 3190, US \$ 1772 published by Springer-Verlag, Berlin and Heidelberg, 1998, ISBN 3-54061713-2

Determining molecular structure is at the heart of modern chemistry. The Landolt-Börnstein series on 'Structure data of free polyatomic molecules' are a set of reference volumes containing a compilation and critical appraisal of precise quantitative data on the molecular structure (bond lengths, bond angles, dihedral angles of internal rotation, etc.) of some 3600 molecules, in the gas phase, taken from papers published over the last 35 years. I know of no comparable collection of data on gas-phase molecular structures. It is a mammoth achievement, beautifully produced, and is altogether a volume to which every practicing chemist will wish to have access.

The first of these volumes, Landolt-Börnstein II/7, was published in 1976, and contained structure data published on some 600 molecules from 1960 to 1974. This was followed by volumes II/15, II/21, and II/23 published in 1987, 1992, and 1995, adding later data, eventually covering the period up to 1993. The new volume II/25 will extend the coverage to data published in 1994 and 1995, but in addition it will include a review of all the data published in the earlier volumes -from 1960 to 1995. Volume II/25 will, be published as four sub-volumes, II/25A to D, the first of which is now published and is reviewed here covering inorganic molecules (defined as those containing no carbon atoms). Volumes B, C and D will appear at intervals over the next two years; they will cover organic molecules containing one or two carbon atoms, three or four carbon atoms, and five or more carbon atoms, respectively. Each of the four volumes will include data on about 900 molecules.

The entries have all been carefully and professionally edited. Each gives the molecular point group, with a small perspective drawing of the molecule, followed by a table of structural data (distances in Ångstroms, angles in degrees) with uncertainties, plus information on the experimental method (mainly either microwave or infrared spectroscopy, or gas electron diffraction), and references to the original papers, plus further notes where appropriate concerning the method of analysis. The uncertainties are typically a few thousandths of an Ångstrom. Many weakly bound complexes are included (such as Ar... HCl, the HF dimer, etc.); polymers of the H<sub>2</sub>O molecule up to the trimer

are included, although Saykally's most recent results on the structure of the higher polymers are post-1995. The inorganic molecules are ordered alphabetically according to their gross stoichiometric formulae, also alphabetically ordered. Organic molecules in volumes B, C and D are ordered according to the Hill system. Each volume is also accompanied by a compact disk of the entire volume which may be read on a PC using the Adobe Acrobat system, allowing the full use of search facilities, and enabling one to print any page -with the drawings exactly as in the original volume. There is a 25 page introduction to the whole volume, which is an excellent summary of the problems of structure determination and the different methods of measurement and analysis, leading to the slightly different representations of molecular geometry denoted as  $r_0$ ,  $r_s$ ,  $r_z$ ,  $r_\alpha$ ,  $r_g$ ,  $r_m$ , and  $r_e$ . However for the reader

who requires less precise data there is no difficulty in extracting information without reference to the introduction.

It is possible to find criticisms, but it would be carping. I have found very few errors, and they are all trivial. The book is clearly expensive, but it is essential in any chemical library, and many scientists will wish to find the money to have a copy on their own bookshelf. To me the book is

fascinating, because it is a history of my scientific life -I find in it all the molecules that I have worked on and have loved. I am lost in admiration for the editor, Kozo Kuchitsu, and his colleagues, who have done so much to produce this beautiful volume.

Ian Mills, September 1998