

Book review

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GMELIN HANDBOOK OF INORGANIC CHEMISTRY, 8th Edition, Fe, ORGANO-IRON COMPOUNDS, Part B3, MONONUCLEAR COMPOUNDS 3, J. Füssel, A. Slawisch, H. M. Somer and C. Siebert, volume authors, A. Slawisch, chief editor, 1979, iv + 262 pages, DM 587; \$ 328.80. Part C2, BINUCLEAR COMPOUNDS 2, R. Froböse, P. Hübener, O. Koch and R. M. Reinisch, volume authors, U. Krüerke, chief editor, 1979, iv + 196 pages, DM 482, \$ 265.10. Gmelin-Institute für Anorganische Chemie der Max-Planck-Gesellschaft zur Förderung der Wissenschaften and Springer-Verlag, Berlin/Heidelberg/New York.

The many organometallic, inorganic and organic chemists whose research deals in one way or another with iron carbonyls and their derivatives will be pleased to have these two newest additions to the Gmelin Handbook organoiron series on their library shelves. Part B3 deals exclusively with one compound: iron pentacarbonyl, the key compound in the development of organoiron carbonyl chemistry. Included in the coverage are the preparation of  $\text{Fe}(\text{CO})_5$ , its general physical, mechanical and thermal properties, its optical, electrical and magnetic properties, its spectroscopic properties (NMR, Mössbauer, IR and Raman, visible and UV, photoelectron, X-ray absorption) and its molecular structure and bonding. All this takes 61 pages of the book. The remaining three-quarters of the textual material gives an excellent account of the chemistry of iron pentacarbonyl: solubility properties, electrochemistry, thermolysis, mass spectroscopy, photolysis and radiolysis, followed by the many chemical reactions of  $\text{Fe}(\text{CO})_5$ , clearly organized according to type of reactant, applications chemistry, analytical aspects and physiological effects. Finally, the last brief section deals with complexes of type  $(\text{OC})_5\text{Fe}\cdot\text{nD}$ ,  $[(\text{OC})_5\text{FeX}] \text{X}$  and the  $[\text{Fe}(\text{CO})_6]^{2+}$  ion. Even a reader with some experience in iron carbonyl chemistry will regard with some wonder this account of the manifold reactivity of iron pentacarbonyl and the wide variety, often surprising, of organoiron complexes and organic products which such reactions can produce.

Part C2 covers  $\text{Fe}_2(\text{CO})_8$ , the  $[\text{HFe}_2(\text{CO})_8]^-$  and  $[\text{Fe}_2(\text{CO})_8]^{2-}$  anions,  $\text{Fe}_2(\text{CO})_9$  and dinuclear complexes with or without Fe-Fe

bonds, with ligands bonded to the iron atoms by two or three carbon atoms. Among the compounds included in this volume,  $\text{Fe}_2(\text{CO})_9$  has received the most study since it is a versatile and very reactive starting material in organoiron carbonyl chemistry. Although it is easily prepared, its chemistry is much less developed than that of the commercially available  $\text{Fe}(\text{CO})_5$ . Nevertheless, some 40 pages are required to present the many diverse chemical conversions of  $\text{Fe}_2(\text{CO})_9$ . The more complicated dinuclear complexes discussed in the later parts of this volume contain ligands which are bonded to one or both of the iron atoms by two or three carbon atoms, and, in many cases, heteroatoms contained in the ligand are involved in the bonding to iron as well. These ligands are of quite varied type and structure, and the classification of these complexes into the appropriate category must have given the authors many a headache. It is possible that the reader will have trouble finding a specific complex within this classification system, but he will receive much help from the empirical formula and ligand formula indexes which conclude the volume. Once the complex has been located, however, the reader, as usual, will find a thorough account of all available data: preparation, physical, structural and spectroscopic properties, and chemical reactions. Formulas and figures are used liberally to clarify structure and chemistry. Tabular presentation of information is used where appropriate.

Both books are written in German with the exception of the section on the spectroscopies of  $\text{Fe}(\text{CO})_5$  in Part B3, which is in English. As in all Gmelin Handbook volumes, English translations of the preface, the table of contents, chapter titles and section headings are provided.

The literature coverage appears to be thorough. In both volumes it is complete through the end of 1977, but we are told that in some cases more recent data have been considered.

Both books are excellent additions to their respective series and we look forward to further volumes.

Department of Chemistry  
Massachusetts Institute of Technology  
Cambridge, Massachusetts 02139 (USA)

Dietmar Seyferth