

cyclotrimerization, linear oligomerization, and telomerization of 1,3-dienes, as well as the cooligomerization of 1,3-dienes with olefins and alkynes and the preparation of macrocyclic polyenes. The authors state, "It is doubtful whether a mechanistically better understood family of reactions exists in the whole of transition metal catalysis" and go on to demonstrate the accuracy of their statement, by discussing in detail the mechanisms of these reactions. The polymerization of butadiene, isoprene and related dienes, and copolymerization of dienes is considered in chapter four.

In contrast to the preceding chapters which deal with catalytic processes, chapter five discusses primarily the coupling of organic halides by stoichiometric amounts of zero valent nickel complexes. Thus the coupling of allylic halides to form biallys, the cross coupling of allylic and nonallylic halides, the coupling of nonallylic halides, and the reactions of  $\pi$ -allylnickel complexes with aldehydes, ketones, epoxides, and quinones are detailed. In many of these cases the mechanistic aspects of the reactions are little studied and poorly understood, and the discussion is, by necessity, more speculative. This chapter also treats the nickel-catalyzed reaction of organic halides with Grignard reagents.

The final chapter discusses carbonylation reactions involving nickel complexes. The carbonylation of alkynes, alkenes, olefins, alcohols, ethers, esters, aldehydes, and amines both by the stoichiometric reaction of these substrates with nickel carbonyl, and the catalytic processes involving nickel salts and an atmosphere of carbon monoxide are presented in detail. This material is followed by a consideration of the nickel promoted carbonylation of organic halides. Specifically, the reaction of allyl halides with carbon monoxide, and with carbon monoxide and alkynes or olefins to produce a variety of cyclic carbonyl compounds is treated in detail. The carbonylation of alkyl, aryl, and vinyl halides, carbonylations involving organolithium reagents and decarbonylation reactions are also presented in this final chapter.

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*Gmelin Handbook of Inorganic Chemistry. New Supplement Series. Vol. 16. Organonickel Compounds, Part 1* (vi + 419 pages, DM 694, \$ 298.50); *Vol. 17. Organonickel Compounds, Part 2* (viii + 402 pages, DM 618, \$ 252.20); *Vol. 18, Index for Parts 1 and 2* (129 pages, DM 198, \$ 81.20), A. Slawisch, Volume Editor-in-Chief, Gmelin-Institut für Anorganische Chemie und Grenzgebiete der Max-Planck-Gesellschaft zur Förderung der Wissenschaften, Springer-Verlag, Berlin/Heidelberg/New York, 1975.

Organometallic chemists specializing in organonickel chemistry are well served indeed by the review literature. A recent two volume book by Jolly and Wilke provides an excellent review of all aspects of this area, and now we have a complete, up-to-date compendium of all known organonickel com-

pounds in three new volumes of the Gmelin Handbook which nicely complements the Jolly—Wilke book.

The general organization of the Gmelin organonickel volumes follows that established in earlier volumes of the Gmelin series on organometallic compounds\*. The system is explained clearly in the preface (in English as well as in German) and is easily understood.

Volume 16 includes those mononuclear organonickel compounds whose largest carbon ligand is bound to nickel via one or two carbon atoms. Volume 17 continues with mononuclear organonickel compounds whose largest carbon ligand is bound to nickel via three or more carbon atoms and with compounds containing more than one nickel atom. The rather slim Volume 18 brings two indexes: an empirical formula index and a ligand index whose construction is explained in the volume preface.

The literature coverage is complete through 1973 for both of the organonickel volumes, but extends, in many instances, to more recent literature (to mid-1974 for Part 2 and mid-1975 for Part 1). An introductory section brings a long list of general references, mostly books, book chapters and reviews, and each main section introduction brings additional references to pertinent reviews. References to specific compounds are given at the end of each subsection. This leads to much duplication of references but serves the useful purpose of making it easy for the reader to find the reference he is looking for. The cited literature includes journal articles, patents, theses and conference reports.

Everything known about a given compound is presented: preparation, physical and spectroscopic properties, structural information (with useful figures), chemical transformations, applications and catalytic properties and biological properties. Much of the data is given in tabular form. The coverage of nickel tetracarbonyl requires 107 pages. The information given on the physiological and toxicological properties and the biochemistry of this important compound and on the hazards associated with its use are especially useful.

These books will be very useful to all chemists who deal with organo-transition metal compounds in any way. They would be even more useful if they were published in the English language rather than in German. The preface, the table of contents and chapter and section headings are given in English translation, which helps. However, a large majority of the users and potential users of this series of Gmelin volumes would prefer to have the whole book in English.

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\*This organization is discussed in our review of the Gmelin organovanadium and organochromium volumes; cf. *J. Organometal. Chem.*, 34 (1972) C59.