try is discussed briefly. Finally, it is suggested that the toxicity of injected lanthanum salts is explainable on the basis of the phosphatase action of the metal in splitting ATP, AMP, sugar phosphates, etc., and a similar action of newly formed monomolecular silicic acid is suggested to explain the mechanism of toxicity of silica in silicosis.

This chapter is well written and presents material of considerable interest that is not well known to biochemists in general. It appears to the reviewers that a careful study of the chapter would be very worthwhile for those interested in the role of metals in metallo-enzyme catalysis.

Chapter 5 entitled *Enzymatic Reactions in the Synthesis of the Purines* by John M. Buchanan and Standish C. Hartman is divided into two principal sections, the first part comprising a detailed and well authenticated account of purine synthesis from the standpoint of the individual enzymes and substrates involved, and the second part dealing with the details of mechanism of certain of the reactions, such as the formation of glycineamide ribotide from A.T.P., glycine and phosphoribosyl amine. A "concerted" mechanism is proposed wherein the reactants are held on the enzyme surface in the proper orientation so that the proper groups can interact directly without previously having to form bonds with groups in the enzyme. The enzyme is described as a polyfunctional catalyst with template properties. Simultaneous acid and base catalysis is involved. The authors might have included reference to Michaelis regarding the role of the protein component in enzyme catalysis (L. Michaelis, in "Currents in Biochemical Research," D. E. Green Ed., Interscience Publishers, Inc., New York, N. Y., 1946, p. 225, *et seq.*), and to Laidler (K. J. Laidler, "Introduction to the Chemistry of Enzymes," McGraw-Hill Book Co., Inc., New York, N. Y., 1954, p. 165 *et seq.*) regarding simultaneous and acid–base catalysis.

Aside from the inclusion of a small amount of possibly irrelevant material this chapter in the opinion of the reviewer is extremely well written and is a contribution of a high order of excellence.

Chapter 6 entitled the *Enzymic Synthesis of Pyrimidines* by Peter Reichard is constructed in the style of the first part of the preceding chapter. Details of the paths of synthesis of the pyrimidines, the pyrimidine nucleosides, and the pyrimidine nucleotides are presented in a lucid and authoritative manner. Although new ideas on reaction mechanism are not presented, this chapter in the opinion of the reviewers is also excellent.

Chapter 7 entitled *The Biosynthesis and Function of the Carotenoid Pigments* by T. W. Goodwin contains much material of a physiological nature on the synthesis of carotinoid pigments in various plants and lower organisms of the plant kingdom, including bacteria. Although the chemistry of carotinoid synthesis is discussed as such, it appears to the reviewer that the chapter because of the inclusion of much biological material may be of somewhat more interest to the plant physiologist than to the biochemist. Some of the discussion concerning chemical factors affecting the synthesis of carotinoid pigments do not seem to contribute greatly to an understanding of what is occurring. Some statements are made which appear to be only very weakly supported, such as a statement indicating an attachment of carotinoid to protein. An occasional inappropriate expression occurs such as "an ultrasonic sunflower mutant."

In spite of the above remarks it must be stated that the author of this chapter has approached the problem of carotinoid biosynthesis on a very broad basis, attempting to bring all possible types of information to bear on the problem, and although the analysis does not appear to contribute many ideas for future research, the material included appears to constitute a valuable review of what is known in the field.

Chapter 8, by F. M. Huennekens and M. J. Osborn, entitled *Folic Acid Coenzymes and One-Carbon Metabolism*, is an authoritative review concerned chiefly with the role of folic acid and its active coenzyme derivatives in the transfer of 1-carbon fragments. The chapter starts with the chemistry of folic acid and related compounds, proceeds to the coenzyme derivatives and the biosynthesis of these compounds, and finally takes up in detail the role of the folic acid coenzymes in metabolic reactions. There is a slight overlap of material in chapter 5 with the material in this chapter. The chapter is well organized and well written and in the opinion of the reviewers is an excellent contribution.

In considering the Vol. 21 of "Advances in Enzymology" as a whole it appears to the reviewers as being a very worthwhile publication. The authors have been well selected, they have done their work with care and thoroughness, and the editing has been very good. Typographical errors are very rare. The book will undoubtedly prove to be a worthwhile addition to the libraries of those interested in enzymology and metabolism.

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Gmelins Handbuch der Anorganischen Chemie. Achte Völlig Neu Bearbeitete Auflage. Silicium. Teil C. Organische Silicium-verbindungen. System-Nummer 15. E. H. ERICH PIETSCH, Editor. Verlag Chemie, G.m.b.H., (17a) Weinheim/Bergstr., Pappelallee 3, Germany. 1959. xii + 501 pp. 17.5 + 25.5 cm. Price, Kart. DM 276. —; Geb. DM 281. —.

This eagerly-awaited volume on organic derivatives of silicon is an impressive book which accurately reflects the rapid growth of the various phases of organosilicon chemistry in recent years. Whereas the seventh edition (Gmelin-Kraut, 1912) summarized all of the contemporary information on organic compounds of silicon on a single page, the new eighth edition contains four hundred pages of very compact discussion in which are listed 9,597 specific compounds, each with physical properties and pertinent literature references. In addition, seventy-eight pages are devoted to a summary of the production, properties and structure of the various types of silicone polymers, most of which cannot be described in terms of individual compounds. The result can best be described as a one-volume reference library on organosilicon chemistry, dependably complete through the literature of 1953. As such, it warrants the equally impressive price (approximately $65) for those who work in this field, as well as being a traditional and thoroughly justified "must" for libraries.

The major part of the book is devoted to compounds in which hydrocarbon groups are bound directly to silicon, in keeping with the main emphasis over the past twenty years. This part, the work of Gerhart Hantke and Ulrich Krüerke, takes up the silicon tetraalkyls (10% of the entire book length), the tetraaryls (6.2%), silicon heterocyclics (0.2%), silicon–carbon chains (2.4%), alkylsilanes with Si–H bonds (2.4%), the alkyl and aryl halogenosilanes (14%), the silicon esters of inorganic acids (1.2%), the silanols (8.4%), the alkylalkoxysilanes (2.0%), the linear and cyclic siloxanes (11.2%), the silthianes (0.4%), the silazanes (1.8%), the polysilanes (1.8%) and the silyl–metal compounds (0.4%). The subsequent portion of the book, devoted to compounds without direct Si–C bonds, is the work of Gerhart Hantke and Gerd Huschke. It takes up the esters of orthosilicic acid (7.2% of the total book), the alkoxyhalogenosilanes (4.2%), the alkoxysiloxanes (3.4%) and the aminosilanes (0.9%). The section on silicones, for which Dr. S. Nitzsche of Wacker-Chemie was advisor, takes up the structure of silicone polymers (1.0% of total), methods of production (3.2%), the silicone oils and greases (4.8%), silicone resins (2.4%), silicone rubber (2.0%), antifoams (0.4%) and water-repellent silicone films (0.8%). A comprehensive alphabetical index of fourteen pages follows. The proportionate space devoted to a topic does not necessarily indicate its relative importance, of course, because some topics lend themselves better than others to the presentation of data in tables.

It is pertinent to inquire whether the Gmelin editors ever miss anything, despite their reputation for thoroughness. A considerable number of checks on the part of your reviewer failed to reveal one single juicy omission to write about. In each instance where a bond angle, bond distance, viscosity, surface tension, molecular weight, crystallographic constant, molar refraction or other such specific datum was known, it was given. Infrared and other spectral absorption frequencies also are included, or the spectra themselves are printed. At first there seemed to be a paucity of information on reaction mechanisms and stereochemistry of organosilicon compounds, but further check indicated that this impression arose from the fact that most of the work in these areas has appeared since 1953. Those

mechanisms which had been established by kinetic studies prior to 1953, such as Eaborn's elucidation of the cleavage of $(CH_3)_3SiC_6H_4OCH_3$ by acids, are indeed included. It does appear, however that with the exception of the preparation of some azo dyes, reactions of organic-functional groups with other organic reagents (that is, reactions which are primarily of interest in the organic sense but involve compounds containing one or more atoms of silicon) are given a light treatment. This seems entirely appropriate in a handbook of inorganic chemistry.

The late L. M. Dennis often remarked that the great value of Gmelin's Handbuch lay not just in its being dependably complete (for abstracts and indexes would do as well there, with some additional work), but rather in the fact that it was a *critical* review of all that had been done. The ability of the Gmelin editors to read, absorb, and then organize all the work that had been done in a given area was, he felt, an invaluable and almost inimitable characteristic of the German mind which we should respect and encourage at all times. Your reviewer agrees.

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Marburger Diskussionstagungen. Band 3. Abhängigkeit der Eigenschaften Hochpolymerer von der Vorgeschichte des Materials. Vorträge und Diskussionen der 3 Tagung gehalten zi Bad Nauheim von 22–23 April, 1958. Edited by Prof. Dr. F. HORST MULLER, Marburg/Lahn. Dr. Dietrich Steinkopff Verlag, Holzhofallee 35, Darmstadt, Germany. 142 pp. 19.5 × 26.5 cm. Price, DM. 20. —.

The third volume of the "Marburger Diskussionstagungen" is devoted to the influence of history on the properties of polymeric materials; it contains six presentations (on a total of about 75 pages) each of which is followed by an elaborate discussion (on a total of about 55 pages). Lectures and discussions together provide a very thorough and up to date description of our knowledge concerning the solid state behavior of polymeric systems and of the dependence of this behavior on the structural details of the materials. The Marburger Tagungen are of a character similar to the famous Gordon Research Conferences where the original presentations which are on a high level in their own right, are nevertheless considered only as an initiation for the resulting discussion. In fact, also in this volume, the most interesting results and aspects are found in the discussion remarks which are edited with great skill and care by Professor F. H. Muller, who is the originator and organizer of these meetings. The volume can be highly recommended to anyone who is interested in the mechanical properties of polymers and in their dependence on the prior history of the samples.

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BOOKS RECEIVED

March 10, 1960–April 10, 1960

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