

than the present IBM 704. Another interesting computer investigation is reported on by Pekeris who reduces the solution of certain special cases of the Boltzmann equation to the solution of an ordinary differential equation. Although this method was anticipated by Boltzmann himself, little progress could be expected without at least present computing facilities. Another interesting set of papers, one by Van Hove and one by Ono relates to recent work in the development of perturbation theory to general order. The most significant applications of this approach have only more recently been given by Gell-Mann, Brueckner, and others. There are many other papers in this collection, on developments in the statistical basis of Onsager's relations for irreversible processes in solid-state transport phenomena, on an application to nuclear fission, and on diffusion processes.

It is interesting to read this volume as a progress report on current work. However it does suffer the defect of containing papers too short to convey an adequate summary of work. Further, it seems that the editor was either too efficient in cutting down the discussion sections, or the participants were especially laconic. In either case the discussion adds little to the papers.

Germanium: Supplement. System No. 45 of Gmelin's Handbook of Inorganic Chemistry (8th Revised Edition). 576 pp. Verlag Chemie, GmbH, Weinheim, Germany, 1958. Clothbound \$80.88; paperbound \$79.68. Reviewed by H. A. Liebafsky, General Electric Research Laboratory.

A CHEMIST naturally feels at least mild misgivings about introducing physicists to *Gmelin*, the Bible of the inorganic chemist. Fortunately, this is an introduction not to the whole of this Bible—only to the supplementary volume on germanium, to which the physicists have made major contributions.

Because germanium is the first of the two elements that are making history as semiconductors, the book under review deals mainly (pp. 132–454) with solid-state physics. Let us turn first to electrical properties. For germanium free of barrier layers, the topics discussed are: intrinsic semiconduction, defect conduction, impurity band conduction, and surface phenomena. Still under electrical properties, we have for germanium with barrier layers: the rectifier, transistors, and diode and transistor technology. The photoelectric properties are given similarly complete treatment. When the table of contents for the 62-page "Hauptband" was prepared, the importance of germanium to the physicist was unknown. The corresponding table of the 576-page "Ergänzungsband" has had to accommodate the new material in the old format, and the result is a little puzzling at first sight.

Physicists may be surprised at the completeness with which *Gmelin* covers the relevant literature, a quality chemists have come to take for granted. One gets a feeling for this completeness by looking through the

volume for the Purdue Semiconductor Research Reports, of which there are a good many. The literature of chemistry is covered to the end of 1953; that of physics to the end of 1954; occasional references are as late as 1957.

Reviewers of the many earlier *Gmelin* volumes, which are devoted mainly to chemistry, have worn out the obvious superlatives. The present volume is a fit companion of the others. Two of my physicist colleagues, expert in the field of semiconductors, share my high opinion of the work. Let us simply say with Marlowe: "Infinite riches in a little room." Of course, riches thus assembled are costly and demand the exercise of good judgment for their proper use.

The Gmelin-Institut für Anorganische Chemie und Grenzgebiete seems with this volume to have adopted solid-state physics as a "Grenzgebiet". Be that as it may: the present volume is evidence that an enforced unification of disciplines is upon us. Consider germanium. The inorganic chemist charged with preparing it pure may see in his mind's eye a pile of unpromising dirt that contains traces of the element. He is profoundly thankful that germanium tetrachloride can be purified by distillation, and makes this the key step in his process. At the other extreme, the theoretical physicist charged with understanding germanium as a semiconductor sees the element as a congregation of nuclei with each of which are associated 32 electrons. He is profoundly grateful that this many-body problem can be discussed as the interaction of an electron with a one-dimensional crystal lattice. The present volume is a connecting link between the work of two such men.

Let us hope that physicists will adopt this volume. It may prepare them for the future, which is likely to bring even more extensive volumes on silicon and on the various semiconducting compounds. If the day of organic semiconductors ever comes, Beilstein,* forbidding even to many chemists, looms ahead!

Soviet Research in Crystallography. Chemistry Collection No. 5. Translated by Consultants Bureau, Inc. Vol. 1, 394 pp., paperbound \$100.00; Vol. 2, 236 pp., paperbound \$30.00. Consultants Bureau, Inc., New York, 1958. 2-vol. set \$115.00. Reviewed by R. A. Pasternak, Stanford Research Institute.

RECENT Soviet achievements in many areas of technology are undoubtedly accompanied by similar progress in basic research. This reviewer, therefore, approached Consultants Bureau's translation *Soviet Research in Crystallography*, which contains articles published during the period 1949 to 1955, with considerable curiosity and expectations. His disappointment could not have been greater. Apparently Consultants Bureau gives a very broad meaning to the term "crystallography". Many articles were included in the collection merely because they dealt with crystalline substances and, one might suspect, because they were available

* Beilstein's *Handbuch der Organischen Chemie*, Springer-Verlag, in about 100 volumes and far behind the current literature.