

structure). This is not the best format for presenting reactivity and mechanism. This notwithstanding, the current volume can stand comparison with the earlier excellent volumes of the Gmelin Handbook.

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*Gmelin Handbook of Inorganic and Organometallic Chemistry, Eighth Edition, System Number 13 B, Boron Compounds, Fourth Supplement, Vol. 3a, Boron and Nitrogen*

Edited by J. Faust (Gmelin Institute Frankfurt am Main Germany) and K. Niedenzu (University of Kentucky, Lexington, Kentucky, USA)

and Vol. 4, Boron and Cl, Br, I, S, Se, Te, Carboranes  
 Edited by K.-C. Buschbeck (Hanau am Main, Germany) and K. Niedenzu, Springer, Berlin, 1991, xv + 263 pages, DM1390, ISBN 3-540-93635-1 and xx + 322 pages, ISBN 3-540-93629-7

Even in these days of computer data bases keeping abreast of the literature remains a daunting task for any research chemist. Fragmentary publication is specifically encouraged by the worldwide use of numbers of publications and citations as performance indicators. Inevitably important developments occur at the boundaries between traditional research areas: new journals proliferate at the same time as library resources are restricted in both higher education and industry at a time of deep economic recession. The compiling of reviews in book or data base form thus remains an important and necessary task for the scientific community.

The Gmelin Institute is pre-eminent in this field. The resources which it deploys and the standards which it sets are unmatched, yet even here there are some elements and their compounds, or 'systems' as they are called in the jargon, where publication of the Gmelin volume lags far behind that of the original literature. This cannot however be said about System Number 13. The literature on boron compounds up to 1972–1976 was comprehensively covered in 20 volumes. There were three supplements covering literature up to 1977 (3 volumes), up to 1980 (2 volumes) and up to 1984–1988 (4 volumes). The two volumes reviewed here are the first of the Fourth Supplement.

Volume 3a, Boron and Nitrogen, has been written by Professor A. Meller (Institut für Anorganische Chemie, Universität Göttingen). Over half (149 pages) is devoted to boron nitride and the remainder (96

pages) to boron–nitrogen compounds containing hydrogen and/or hydrocarbon groups: more boron–nitrogen compounds will be covered in Volume 3b. Literature for the period 1984–1988 has been thoroughly reviewed with a few references to more recent work. The astonishing amount of new work on boron nitride indicates its importance as a ceramic with three well-characterised crystalline forms or as an additive in multiphase advanced ceramics. It is now recognised that the properties of many materials in bulk or as fibres or films depend crucially on the processes involved in their manufacture and that it is necessary to investigate and understand the chemistry involved at each stage. Other boron–nitrogen compounds discussed in this volume include triaminoboranes  $B(NRR')_3$ , boranes with two boron-bonded nitrogen atoms, borazines  $(BXNY)_3$ , a range of boron–nitrogen heterocycles, and monoaminoboranes e.g.  $R_2BNR'_2$ .

Volume 4 is dedicated to Dr. Günther Breil who has served on the advisory board of the Gmelin Institute since 1970 and as its chairman since 1985. Professor Meller reviews the literature from 1984–1988 on boron–chlorine (75 pages) boron–bromine (33 pages) and boron–iodine compounds (9 pages). There is still a considerable amount of new work detailing properties and reactions of quite simple compounds, particularly donor–acceptor complexes which find applications in the manufacture of semiconductors and as polymerisation catalysts. Boron–sulfur (50 pages), boron–selenium (6 pages) and boron–tellurium compounds (2 pages) are reviewed by Professor G. Heller (Institut für Anorganische und Analytische Chemie, Freie Universität, Berlin). Much of the discussion is on chemistry of boron–sulfur heterocycles but there are also references to work on simple compounds such as  $(RS)_2NBX_2$  without boron–sulfur bonds. The final section of the book (145 pages) written by Professor T. Onak (Department of Chemistry, California State University, Los Angeles) reviews the chemistry of the carboranes up to 1988 with a systematic account of compounds containing 1–40 boron atoms. The range of work published in the four year period shows that research in this area is still extremely active: routes to many of the theoretically possible structures are being discovered and more carboranes will doubtless be characterised in the future.

The Gmelin practice is to publish the indexes to volumes such as these separately when publication of the full supplement is complete so there are no indexes here. This is perhaps a pity since the cost ensures that there will be few complete sets even in libraries. For those who do have these meticulously researched and superbly written volumes there are however clear tables of contents for each volume. Others can access

information on individual compounds through the computer searches which are now available.

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*Gmelin–Durrer Metallurgy of Iron, Vol. 12, Future of Iron- and Steelmaking*

Edited by P Nilles (Centre de Recherches Metallurgiques, Liège, Belgium), Springer, Berlin, 1991, Vol. 12a xxii + 270 pages, Text, Vol 12b xviii + 262 pages, Illustrations, English and German Subject Index. Not available separately. DM3038. ISBN 3-540-93644-0

We have come to regard the Gmelin Handbook of Inorganic and Organometallic Chemistry as a superbly organised archive where the past development of the subject is painstakingly and comprehensively documented. It comes as something of a shock therefore to find a pair of volumes, part of System No. 59 Iron, entitled ‘The Future of Iron- and Steelmaking’. This completes the fourth edition of the Gmelin–Durrer Metallurgy of Iron, brings together the subjects of the previous volumes, takes stock of present trends in iron- and steelmaking and boldly projects these as far as the next millenium.

The introduction explains that in 1928 the Gmelin Institute approached Robert Durrer to edit the volumes on the Metallurgy of Iron. Since there was at that time no comprehensive text available it was agreed that the Gmelin volumes should be much broader in scope than those of most other elements and that an attempt should be made to integrate fundamental science and basic chemistry on the one hand with industrial practice on the other. The first three editions were published in 1930–33, 1942 and 1943: the twelve-volume fourth edition has appeared over the period 1964–1992. Inevitably with such a long-running project there have been several principal editors. In this final volume Paul Nilles of the Centre de Recherches Metallurgiques in Liège and Walter Lippert of the Gmelin Institute have commissioned authors from the International Iron and Steel Institute in Brussels, the Verein Eisenhüttenleute in Düsseldorf and a team from industry – mainly Voest Alpine Stahl in Linz and Thyssen Stahl AG in Duisberg. The result is a fascinating up-to-date account of the industry as a whole: after looking at the trees in the earlier volumes, we now view the wood. It is customary in the financial pages of the newspapers to denigrate the “rustbelt” iron and steel industry, but with a world

production of between 700 and 800 million tonnes per year, slowly shifting from “industrialised” to “developing” countries, the industry represents an enormous capital and human investment and has widespread economic and environmental impact. The subjects discussed in Volume 12a (the accompanying diagrams appear separately in Volume 12b) reflect present day concerns and are of interest far beyond chemistry and metallurgy. They include: steel and the economy, energy input and resources, environmental control – state of the art and future demands, air protection, the Greenhouse Effect, dioxin formation, waste disposal, technological development (with 170 pages much the largest section providing a summary and critical assessment of the processes discussed in previous volumes), quality criteria and control, education and professional qualifications.

These valuable books will be prohibitively expensive for most libraries: at more than DM3000 only the most affluent institutions will be able to afford them. This is particularly sad since all who work in or with the iron and steel industry – managers, technologists, researchers, teachers, students, economists and journalists – will find them stimulating, authoritative, and also full of interesting information and new insights.

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*Gmelin–Durrer Metallurgy of Iron, Vol. 10, Practice of Steelmaking 4, Ingots, Castings, Powder Metallurgy*

Edited by H. Hiebler (Institut für Eisenhüttenkunde, Montanuniversität Leoben, Austria), Springer, Berlin, 1991, Vol. 10a xvi + 209 pages, text, Vol. 10b, xi + 182 pages, Illustrations, English and German Subject Index. Not available separately. DM2247. ISBN 3-540-93643-2

The twelve volumes of Gmelin–Durrer ‘Metallurgy of Iron’ published between 1964 and 1992 are incorporated into the eighth edition of the Gmelin Handbook of Inorganic and Organometallic Chemistry as part of System No 59 ‘Iron’. They constitute a monumental account of a subject which despite its roots in antiquity continues to develop through the application of new scientific research to long established industrial practices.

Volumes 10a and 10b review the literature up to 1990 but a glance at the references at the end of each section shows that most come from the 1980’s - indicat-