Journal of Organometallic Chemistry, 347 (1988) C12–C15
Elsevier Sequoia S.A., Lausanne – Printed in The Netherlands

Book reviews

Molten Salt Techniques, Volume 3; edited by D.G. Lovering and R.J. Gale, Plenum Press, New York and London, 1987, xvii + 349 pages, $59.50. ISBN 0-306-42504-1.

Although books whose principal concern is molten salt chemistry are not apparently de rigueur for the organometallic chemist, this volume and *Adv. Molten Salt Chemistry Volume 6* (the subject of the following review) certainly will repay the adventurous inorganic chemist handsomely for his interest. That is not to say that the whole volume will be of interest, it clearly will not. This book is an edited compilation volume containing five chapters (not including the introduction, which is rather cheekily designated as Chapter 1). Of these, two chapters ("Cryolite Systems" (D. Bratland, 32 pages, 63 refs.) and "Reference Electrodes for Molten Electrolytes" (N.Q. Minh and L. Redey, 183 pages, 544 refs.)) will be of little relevance to the organometallic chemist, even though the latter chapter is an invaluable and indispensable addition to the literature for all electrochemists. Of much greater general interest is Susan Biggin's excellent chapter (27 pages, 35 refs.) on neutron diffraction. This difficult subject is one of growing importance to the coordination chemist, and this chapter combines a concise but lucid treatment of the essential theory with an expert's view of the practical aspects of the subject. Thus, the topics of sample selection, sample preparation, furnace selection, and data analysis are discussed in some detail, as well as the more serious and mystifying question of how to apply for beam time, and the problems caused by isotopes being delayed by Customs! This chapter is well illustrated by helpful real examples, and cannot be too highly recommended.

Of the remaining two chapters, I approached the one entitled "Dry Boxes and Inert Atmosphere Techniques" (D.E. Bartak, 28 pages, 35 refs.) with the most interest: after all, this is a subject of prime importance to all synthetic chemists at the forefront of their field, whether working with molten salts or air-sensitive organometallics. However, it must be said that this is a very disappointing chapter. For a start, the article is US-centric (Faircrest, the major suppliers of quality British dry boxes, are not included in the table of manufacturers' addresses *). Much more seriously, the article is full of serious errors, making it an unreliable source of advice. What confidence can be maintained in the opinions of an author who states that "a simple test for water vapour in the atmosphere of a box is the placement of a few crystals of $TiCl_4$ in an open dish". It may be cold in North Dakota, but the melting point of $TiCl_4$ is $-24°C$! That is not to say that this chapter does not have good points of practical advice, but it could have been so much better. Much more

* To correct this omission, the full address is Faircrest, 6 Rising Sun Industrial Estate, Blaina, GWENT NP3 3JW, Great Britain. Tel. no. (0495) 290591.

rewarding, and so much better written, is the chapter on the actinides (J.G. Reavis, 67 pages, 186 refs.). This article says more in seven pages on glove-boxes than Bartak's whole review! Topics covered in this excellent review include availability of actinides, health and safety procedures, glove-box methods, materials problems, microtechniques, techniques for purification of multigram quantities of actinides and their salts, metal preparation and purification, measurements of physical properties, electronic absorption spectra, and electrochemistry. The chemistry centres on metal halides, but other systems are also discussed.

Thus, overall, this is a very useful volume, and extremely good value for money (< £0.10 per page). It is type-set, well produced, and well illustrated with line diagrams (the quality of the photographs is less impressive). The really excellent chapters by Biggin, Reavis, and Minh and Redey are worth the cover price alone, and so I would recommend this book to all chemistry libraries and private purchasers, despite its flaws. It is to be hoped that the editors will commission another article on dry boxes, and publish it in a future volume.

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Advances in Molten Salt Chemistry, Vol. 6; edited by G. Mamantov, C.B. Mamantov and J. Braunstein, Elsevier, Amsterdam, Oxford, New York and Tokyo, 1987, xii + 350 pages, $114.50, Dfl. 295.00. ISBN 0-444-42822-4.

As noted in the previous review, although molten salt chemistry appears at first glance to be a highly specialized area, it contains a good deal to interest the coordination and organometallic chemist, if they take the trouble to look. Of course, they will find that much is as they expected, but it is the unexpected that will reap the rewards. The volume under review illustrates this point well. It is an edited compilation of four disparate reviews, and as for any such volume, any reader will only find one or two of direct interest. Thus, the organometallic chemist will find little to excite in the articles entitled "Aluminium Electrolysis — Electrolyte and Electrochemistry" (J. Thonstad, 54 pages, 162 refs.) and "The Chemistry and Electrochemistry of Magnesium Production" (G.J. Kipouros and D.R. Sadoway, 83 pages, 137 refs.), and even less in Klemm's tour de force on ionic mobilities (72 pages, 173 refs.). Indeed these articles, each excellent in its own right, will only serve to reinforce the common view of molten salt chemistry as an area reserved for the industrialist and the electrochemist, and of no possible interest to the synthetic chemist.

It is the final and longest review in this volume, "Organic and Organometallic Reactions in Molten Salts and Related Melts" (R.M. Pagni, 136 pages, 200 refs.) which is the pearl hiding within the oyster. Although the chapter is, not surprisingly, arranged according to solvent (including molten salts based on aluminium(III) chloride, pyridinium halides, tetraalkylammonium tetraalkylborates, metal nitrates, metal chlorides, etc.), it encompasses a tremendous range of organic and organometallic chemistry. Some of the organic reactions discussed include the Scholl reaction,