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NEWS

Book review

Elektrochemische Energiespeicher, Band 1
F. Beck and K-J. Euler, VDE Verlag, Berlin and Offenbach, 1984, 460 pp. (clothbound)

This, the first of two volumes, is sub-titled 'Principles, and aqueous batteries'. The second volume deals with non-aqueous and molten-salt batteries; it is not known, at the time of writing, whether the second volume has been published.

In the summary on the rear cover, the authors suggest that these two volumes contain the first full description of both the classical and more novel battery systems and though this is a bold claim, it does indeed seem a valid one. The reviewer could think of no significant new development which was not treated here.

In its treatment, the book takes very little for granted. There is a most readable introduction, emphasizing the economic importance of batteries; indeed, the conclusion is that we simply could not do without them. There follow two chapters on the thermodynamic and kinetic principles which follow a path well trodden by previous authors of books on electrochemistry and fuel cells. The fourth chapter 'Aqueous systems with electrodes of the second type' discusses water itself as an electrolyte and continues the thermodynamic treatment of the preceding chapters. It then deals with lead–acid and alkaline batteries in great detail concluding with a discussion of silver–zinc and other alkaline battery systems. The breadth of treatment given is little short of amazing. The construction of the cells, the manufacturing processes involved, the charge–discharge characteristics – all are discussed in significant detail. These are aspects of importance for the 'battery man'. For the scientist, there are equally rewarding treatments of the porous electrode, mass transport in the pores, potential mapping, experimental techniques of special use in battery research and a wealth of valuable information on morphological matters. The fifth and final chapter 'Aqueous systems with electrodes of the first order', is every bit as thorough, dealing as it does with the overall characteristics of the zinc electrode, then going on to consider the various couples based on zinc and metal oxides. Thus alkaline–oxide systems, acid or alkaline–oxide systems, zinc–halogen batteries, air-breathing cells, fuel-cells and redox cells are all discussed, concluding with a nicely-headed section on 'Exotic aqueous systems'.

One can only say firstly 'Its all in there', and secondly, contrast the admirable level of scholarship in this volume, with the succession of rather lightweight books on batteries which emerged in the middle sixties, usually written by those actually in the industry. Of course, in covering the topic in such breadth there have to be omissions, and while hydrodynamics are treated, with explanations of laminar and turbulent flow and the appropriate empirical formulae, there was no room to delve into entry effects. In the same way, the pronouncement that transition between the two regimes takes place at a Reynolds number of 2000, though a good rule-of-thumb, is not inevitably true. From industrially based authors of battery books, one would not expect (and does not get) the depth of theory provided here. This might be compensated for, where such authors use their superior industrial know-how. Inevitably, the heavy hand of proprietary secrecy is lowered, with the result that such authors rarely provide strong treatments on either count. In this case, the authors have clearly gone out of their way to secure an acceptable level of technological, as opposed to scientific, input. Only an actual manufacturer, striving to learn the secrets of his competitors, will be disappointed in this respect.

All of us have our pet likes and dislikes, laying emphasis on this or that aspect of a scholarly work of this kind. Simply to record that chapter five alone embodies 752 references (263 for chapter 4) gives some idea of the thoroughness with which the authors have approached their task. One facet of this which seemed worthwhile was the very thorough description of the countless 'variations on a theme' which have been played around the basics of the lead–acid battery.

Without knowing the price of this book, the reviewer would recommend it without qualifica-

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tion to those whose business is in batteries or those who want to learn more about what batteries can do, how they work, or the state-of-play in battery-related research. The book is a fine tribute to Professor Beck, whose contributions to pure and applied electrochemistry need no further endorsements. It will be a lasting memorial to Professor Euler whose sad and early death prevented him from seeing the project to its completion.

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