Book Reviews

Corrosion, Thin Films, Glasses, Sensors ...

DECHEMA Corrosion Handbook, Vol. 3. Edited by *D. Behrens*. VCH Verlagsgesellschaft, Weinheim 1988. ix, 282 pp., bound, DM 775. – ISBN 3-527-26654-2

The DECHEMA Corrosion Handbook is a completely new English edition of the DECHEMA Werkstoff-Tabelle and describes the corrosion properties of metallic, inorganic non-metallic, organic and composite materials in different corrosive media. The third volume summarizes the corrosion in acid halides, amine salts, bromides, bromine, carbonic acids and lithium hydroxide, the literature being cited approximately up to 1985.

The general layout of the third volume is identical to the previous ones. Again, the contents are clearly arranged and it is therefore easy for the user to find the desired information quickly. A criticism of the earlier volumes was the rather frequent statement of electrode potentials without any reference system. In the third volume, most of the potentials mentioned in the text, figures or tables refer explicitly to different reference systems (standard hydrogen electrode, standard calomel electrode) although in the chapters concerning bromide (p. 115, 116, Table 12), carbonic acids (Figs. 17, 44, 45) and lithium hydroxide (Fig. 1) the reference system is missing. A list of all reference electrodes used in the Corrosion Handbook, should be included into the introduction, citing their potentials versus the Standard Hydrogen Electrode.

Chapter 1 discusses corrosion properties in acid halides. The introduction to this chapter is very extensive and makes up half of the chapter. Different acid halides are described in detail, including their chemical properties, technical importance and corrosivity with respect to different materials. Then, a detailed description of the corrosion properties of the individual materials with respect to the different acid halides is given. The discussion of the properties of the corrosion system, the medium (introduction), as well as the material is clearly arranged for the reader, despite the overlap in the information provided in the introductory and the later part of the chapter. At the end of this chapter, informative tables summarize the usability of the individual materials in varying concentrations of the different acid halides.

Chapter 2 summarizes the corrosion properties of materials in amines. The short introduction touches only slightly the major importance of amines as inhibitors, and a detailed discussion of the adsorption properties of inhibitors, their technological use and the dangers accompanied with their use (e.g. localized corrosion, if the inhibitor concentration is too low, H-embrittlement in certain solvents) is missing. In the second part of this chapter a detailed description of the corrosion properties of the different materials in solvents containing amines is given. The inhibiting properties of the individual amines are discussed in detail, with special emphasis on their use as vapor-phase-inhibitors in order to inhibit the atmospheric corrosion of Cu and Fe.

Chapters 3 and 4 summarize the corrosion induced by bromides and bromine. In this context, especially the localized corrosion induced by bromides is of importance. The first part of chapter 3 gives a short introduction to the topic, but the determination of pitting potentials by potentiostatic and potentiodynamic experiments is described insufficiently as is the determination of repassivation potentials (although repassivation potentials are mentioned on p. 115). In addition, there is no discussion of the importance of corrosion potentials with respect to pitting potentials nor one on cathodic currents, which have to balance the anodic dissolution of the metal in pits in order to allow pitting corrosion to occur.

Chapter 5 is concerned with corrosion in carbonic acid with special emphasis on the corrosion of Cu and steel in CO_2 containing tap-water. The well written introduction provides the reader with a lot of information concerning the physical properties of CO_2 containing water, water hardness and the electrochemical principles of the corrosion in this system. The general background which is provided in this introduction, is complementary to the detailed description of the individual corrosion properties which are presented in the following part of the chapter. The latter parts are well written, providing lots of information on the corrosion of materials in CO_2 containing media. Techniques mentioned (CERT-test, Fig. 32), should have been explained in more detail for the non-specialist users of the handbook. Figures 44 & 45 discuss pitting corrosion and repassivation, using techniques and terms which have been introduced in chapter 3. It would have been much better to summarize such important techniques and corrosion mechanisms in an individual chapter than to distribute this type of information widely throughout the book. The last chapter is devoted to lithium hydroxide, and is in general well written.

Overall, as a reference book, the third volume of the DECHEMA Corrosion Handbook is highly recommended to anyone working as an engineer or scientist in the corrosion area.

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Ionized-Cluster Beam Deposition and Epitaxy. Edited by *T. Takagi*. Noyes Publications, Park Ridge, NJ, USA 1988. viii, 231 pp., bound, US $ 48. – ISBN 0-8155-1168-X

The various techniques for ion-assisted deposition of thin films composed of metals, semiconductors, insulators, magnetic materials, composites etc. are of great importance for application in industrial production as well as for fundamental studies in research laboratories. This volume, of the series Materials Science and Process Technology, deals with the deposition of thin films by means of beams composed of