

Book review

Metal-to-metal bonded states of the main group elements; by M.J. Taylor, Academic Press, London, New York, San Francisco, 211 pages, 1975, \$15.25.

Dr. Taylor has provided a thorough coverage of a broad subject area which is available nowhere else and has done so within 166 pages of text and 900 references dating up to December 1973. The elements considered are the metals and semimetals of the post-transition Groups II–VI, that is Zn, Cd, Hg, Ga, In, Tl, Sn, Pb, Sb, Bi, Se, Te, plus Mg and Al. The author covers not only the homonuclear metal–metal bonded states of each element but also the heteronuclear examples, first, where both metals are included in the subject matter of the text and second, those species which involve the main group element bonded to a transition metal. The last category has been the subject of other recent reviews and so is covered more briefly; nonetheless, activity in the heteronuclear field is large and occupies somewhat more than 25% of the present text. The coverage appears to be quite comprehensive, the citations including even transient intermediates in electrochemistry and in discharges, products of gamma radiation in glasses, and high temperature species in the gaseous and molten states. There is even a five-page appendix listing additional classified references and titles which appeared primarily in 1973 and 1974. Few readers will not be pleasantly surprised at the breadth of the material available concerning the stated area of metal–metal bonding. A review such as this is certainly an excellent way to become acquainted with the unsolved problems in an area.

The presentation is thorough but does not provide any particularly new principles or elements of systemization. Although this reviewer would have welcomed some critical separation of fact from unsubstantiated speculation in the literature, others may feel such an approach is not appropriate or possible when covering such a variety of experimental observations and interpretations. The text appears to be quite free of both typographical and scientific errors, although some confusion does creep in regarding acid–base effects and conduction processes in the less familiar area of molten salts. Finally the author includes a brief appendix regarding a somewhat “off beat” but growing area of research involving directed metal–metal bonding and “ionic” components in intermetallic phases, many of which involve these same main group elements in combination with an alkali metal. Unfortunately the author does mix up these so-called Zintl phases with the solute compositions generated from some of the same phases on incongruent solution in liquid ammonia. The latter inevitably exhibit compositions (and presumably anion structures) which are quite unrelated to those which occur in the condensed alloy systems.