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Book Review

Electrons in Fluids. The Nature of Metal–Ammonia Solutions. Edited by J. Jortner and N. R. Kestner. Springer, Berlin, 1973, xii + 485 pp. Price: £18.28.

At certain times, those who study the behaviour of metal–ammonia solutions, theoreticians and experimentalists alike, meet at the Colloque Weyl and together attempt to define the true nature of metal–ammonia solutions. This book is a record of the proceedings of Colloque Weyl III held in Upper Gallilee, Israel, June 19 - 23, 1972. There are thirty eight contributions, spanning optical, magnetic and electrical properties in dilute solutions, through the intermediate concentration range, to concentrated solutions, and excess electrons in dense vapours.

The book provides an excellent survey for those seeking to discover for the first time observations and models pertaining to metal–ammonia systems, and to the active worker each contribution withholds much to provoke fresh thought. Naturally there is some variation in style amongst the contributions and to my own taste I much enjoyed articles by N. R. Kestner on the theory of electrons in polar fluids, by J. L. Dye on metal solutions in amines and ethers together with the related paper by L. M. Dorfman and F. Y. Jou treating optical phenomena in ethers and binary liquid systems, the presentations of J. V. Acrivos, S. F. Meyer and T. H. Geballe on superconducting metal–ammonia complexes, and of T. David, W. Glaunsinger, S. Zolotov and M. J. Sienko treating Strange Magnetic Behaviour and Phase Relations of Metal–Ammonia Compounds, with the superbly illustrated discussion by P. M. Rentzepis on ultrafast optical processes as a highlight. The concluding comment by U. Schindewolf describing 'spin-off' in terms of the new heavy water plant and a cheap process for disposing of cyanide waste closes the book on a note of social relevance.

Two technical points might be mentioned. Firstly, the discussion by N. R. Kestner on the stability of the dielectron species $(e_2^{=})_{am}$ within the adiabatic semi-continuum model is now misplaced. Both the s.c.f. and adiabatic semi-continuum models as applied to $(e_2^{=})_{am}$ suggest that the di-electron species is stable relative to two one-electron species. Secondly, concerning the search for Raman scattering centres in dilute metal–ammonia solutions, the theoretical values given by Copeland, Kestner and Jortner of 25 - 75 cm^{-1} for the vibrational frequency, leading to a study over a range 0 - 4000 cm^{-1} with particular care in the region 0 - 100 cm^{-1}, are known now to be subject to a numerical error. A revised value of about 174 cm^{-1} is considered to be correct for the ground state (N. R. Kestner, personal communication). As Lepoutre and his co-workers remark 'No new bands appeared, and we could not detect any difference between the spectrum of pure NH_3 and that of the $K–NH_3$ solution'. B. L. Smith and W. H. Koehler similarly failed to detect any band.

In June of this year, Colloque Weyl IV will be opened at East Lansing, Michigan, when once more it is to be anticipated that 'the impression that metal–ammonia solutions always yield unexpected and interesting data', a view noted by K. Ichikawa and J. C. Thompson, will be strengthened. Meanwhile, this volume which is well printed and expensive may be strongly recommended for study.

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