change in any coordinate in Table II is half a standard deviation.

The bond lengths calculated from the atomic coordinates of Table II and Gerloch and Mason's lattice constants, using the Busing and Levy ORFFE program[13] to compute the standard deviations directly from the variance–covariance matrix, are given in Table IV.

Table IV

Bond Lengths[a]

Bond	Length, A	Bond	Length, A
Mo–C(1)	2.20 ± 26	C(1)–C(2)	1.36 ± 50
Mo–C(2)	2.25 ± 39	C(2)–C(3)	1.44 ± 60
Mo–C(3)	2.36 ± 30	C(3)–C(4)	1.48 ± 48
Mo–C(4)	2.34 ± 35	C(4)–C(5)	1.41 ± 48
Mo–C(5)	2.30 ± 39	C(5)–C(1)	1.44 ± 42

[a] See Table II regarding standard deviations.

The Mo–H distance, between Mo at 0, 0.3315, $^1/_4$ and H(6) at −0.2505, 0.9368, 0.2599, is 6.04 A as compared with the 1.2-A distance derived by Gerloch and Mason. H(6) at this position is closer to the symmetry-related Mo at $+(^1/_2{}^1/_2 0)$, with Mo–H = 2.98 A. The validity of Gerloch and Mason's H(6) position assumption has been discussed above.

The standard deviations given in Table IV are uniformly higher than those estimated by Gerloch and Mason. It should be pointed out here that the values in Table IV are indicators of precision, not accuracy, and, in the presence of systematic error such as is almost certainly present in Gerloch and Mason's list of F_o values, the true standard deviations are probably even larger than those given above. The Mo–C bond distances in Table IV agree with those of Gerloch and Mason, within one standard deviation. The C–C bond distances differ by up to 0.08 A, for C(4)–C(5).

We now show that the variation in C–C distance in the cyclopentadienyl ring is not significant. The average C–C bond length is 1.424 A; the maximum difference of a single observation from the average is 0.067 A, for C(1)–C(2). The Student t distribution indicates that we may reject the hypothesis that C(1)–C(2) is different from the average C–C length, at the 95% confidence level. Further, the C–C bond length distribution that Gerloch and Mason had found to be in apparent agreement with their metal–cyclopentadienyl bonding scheme[14] is now in disagreement. It is concluded that Gerloch and Mason's data[3] are not sufficiently accurate to distinguish small differences in C–C bond length.

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(13) W. R. Busing and H. A. Levy, ORNL Report 59-12-3, 1959.

(14) M. J. Bennett, M. B. Churchill, M. Gerloch, and R. Mason, *Nature*, **201**, 1318 (1964).

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Received August 9, 1965

Book Review

Organic Complexing Agents: Structure, Behavior, and Application to Inorganic Analysis. By D. D. Perrin. Interscience Publishers, 605 Third Ave., New York, N. Y. 1964. v + 365 pp. 15 × 23 cm. $12.00.

This volume, the eighteenth in the series on analytical chemistry and its applications edited by P. J. Elving and I. M. Kolthof, "... attempts to present a picture of current chemical theory, more particularly as it relates to reaction between inorganic species and organic reagents. Applications to familiar analytical procedures will be discussed. ... (but) no attempt will be made to encompass practical details of the processes involved." To this end the chapters are concerned with "Chemical Bonds," "Stereochemistry and Stability of Metal Complexes," "Effects of Complex Formation on Oxidation–Reduction Potentials," "Factors Governing the Rates of Formation and Dissociation of Complexes," "Effects of Complex-Forming Species on Cation Concentrations," "Surface Phenomena," "Visible and Ultraviolet Absorption Spectra of Metal Complexes," "Solubility of Complexes," "Extraction into Organic Solvents," "Reactions of Organic Reagents with Inorganic Anions," "Procedures for Detecting and Determining Inorganic Neutral Molecules," "Analytical Properties of the Elements," and finally "On Seeking New Organic Reagents for Use in Inorganic Analysis."

A book of this nature is potentially valuable not only to the analytical chemist, but also to the coordination chemist, whether his interest is purely synthetic or kinetic and mechanistic. Most of the book reads well and is commendably referenced (through 1963). Unfortunately some sections lack the textual cohesiveness which would have resulted from critical comment concerning what is presented as only loosely related experimental evidence. There are also areas in which material is only sketchily referenced, or no references are cited at all. The pedagogical usefulness of the sections on theories of bonding and the spectra of complexes is questionable inasmuch as they are too briefly covered for someone not already familiar with the material, and their inclusion is superfluous for someone who is. It seems that the author had not quite determined to which level of competence he was directing his book when he, in the space of a few pages, introduces without comment the Jahn–Teller effect, defines coordination number, then poorly describes the origin of the Jahn–Teller effect.

In summary, however, the defects are minor in comparison with the value inherent in the fresh approach of this book, containing as it does a large amount of well correlated data.

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BOOKS RECEIVED

January 1966

H. Emeléus and A. G. Sharpe, Editors. "Advances in Inorganic Chemistry and Radiochemistry." Volume 7. Academic Press Inc., 111 Fifth Ave., New York, N. Y. 10003. 1965. vii + 449 pp. $15.50.

P. A. S. Smith. "Open-Chain Nitrogen Compounds." W. A. Benjamin, Inc., 1 Park Ave., New York, N. Y. 10016. 1965. vii + 356 pp. Domestic $19.50; foreign $12.50.

W. E. Dasent. "Nonexistent Compounds." Marcel Dekker, Inc., 95 Madison Ave., New York, N. Y. 10016. 1965. vii + 182 pp. $8.50.