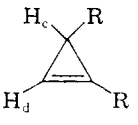
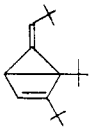
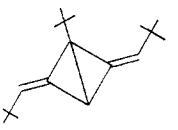
of structures loosely accommodating the above data can be entertained. Of these, save for the [2.2.0]-bicyclohexa-2,5-diene system, all feature one or two three-membered rings; and except for two cases (alkylidenecyclopropanes VII and VIII), all are cyclopropene types (VI). Other investigators[10]



VI



VII



VIII

have measured the chemical shifts of various hydrogens on the latter ring system, with the finding that a proton (H_c) on the saturated ring carbon appears at 8.6–8.7 τ, while a hydrogen (H_d) on the double bond falls at 3.0–3.4 τ. The proton resonances of the photo hydrocarbon lie distinctly outside these ranges and, beyond that, are reasonable for the proposed structure (V) (cyclobutene exhibits an olefinic proton peak at 4.03 τ and methylene resonance at 7.46 τ, $J = 0 \pm 0.2$ cps.).[8] As a possibility, structure VII is photochemically sound[5] and might be considered consistent with the physical data described above; however, thermal conversion to starting benzenoid material of VII or of its valence tautomer, tri-*t*-butylfulvene, seems unlikely.[11] Structure VIII appears even less plausible, both on the grounds of photochemical improbability as well as expected non-reversion to aromatic precursor. Thus anticipated structure V remains as the most acceptable of the various candidates.

Experiments on the preparation and detection of Dewar benzene itself will be presented later.

Acknowledgment.—The authors are grateful to Dr. C. Hoogzand, European Research Associates, Brussels, for a gift of one gram of tri-*t*-butylbenzene; to the Petroleum Research Foundation for financial support; and to Dr. A. Storni for valuable assistance.

(10) For example, G. L. Closs and L. E. Closs, *J. Am. Chem. Soc.*, **83**, 1003 (1961), and personal communications from Prof. Closs.

(11) J. H. Day, *Chem. Rev.*, **53**, 179 (1953).

(12) National Institutes of Health Predoctoral Fellow.

UNIVERSITY OF WISCONSIN
DEPARTMENT OF CHEMISTRY E. E. VAN TAMELEN
MADISON, WISCONSIN S. P. PAPPAS[12]

RECEIVED AUGUST 13, 1962

BOOK REVIEWS

Crystallometry. By P. TERPSTRA, D. Sc., Sometime Professor of Crystallography and Mineralogy in the University of Groningen, and L. W. CODD, M.A. Academic Press Inc., 111 Fifth Avenue, New York 3, N. Y. 1961. xv + 420 pp. 18.5 × 25.5 cm. Price, $12.00.

Crystallometry is the quantitative examination of crystals with an optical goniometer to determine the angles between the faces. The data are then summarized in the form of projections and face pole figures. Terpstra and Codd have prepared a detailed volume on this topic written in a textbook style. However, the authors also intended that the book prove useful in a self teaching program. The present English version constitutes a second edition of an earlier Dutch version, first published in 1954.

Crystallometry is presented in great detail. The authors appear to have taken scrupulous care not to stray into adjacent disciplines even when these techniques are closely related to crystallometry and in fact may be considered as extensions of the optical technique. The style is easy to follow, it is almost chatty in many places. There are numerous excellent figures (273). The book seems to have been very carefully edited; the authors made good use of bold-face type in calling attention to significant conclusions. They also prepared many tabular summaries, and worked out selected problems in detail to illustrate the techniques which could be used at the different stages of the development of the subject. There is no overabundance of reference. However, those which have been included were carefully selected and should prove useful to the reader; references to literature include some papers which appeared in 1960. At the end of the book, the authors have assembled a chapter of significant questions and included the answers. The typography of the book is excellent and the paper and binding are of high quality. The English edition has been modernized in several respects. W. L. Bond's technique, based on matrix algebra, for reducing crystallographic data to a form required for plotting projections has been included. Detailed descriptions are given of modern goniometers. In Chapter 4 the elements of crystal symmetry are described and a useful compilation of the various notations is presented. No proofs were included.

The basic limitation of this book is that it is so narrow in scope. The authors sing the praises of crystallometry with evangelical fervor, although they recognize this narrowness. In several places (p. 129 and p. 162) they call attention to the limitation of the method but nonetheless laud a preoccupation with one aspect of the optical examination of crystals. Why is the goniometer to be preferred to the polarizing microscope for the identification of crystals? If one is concerned with the symmetry of a crystal, why not establish whether it is optically isotropic and why not attempt to measure the indices of refraction? The book would have been much more useful were some of the excessive details of crystallometry replaced by brief discussions of methods for the determination of crystal densities and simple tests for judging whether a crystal is piezo or pyroelectric. The authors do mention these techniques as additional and helpful devices which occasionally must be "dragged in" to establish the crystal symmetry. One concession to other techniques is a final chapter of ten pages on the use of Laue diagrams for plotting stereographic projections. The question remains whether it is proper to give students such a distorted impression.

DEPARTMENT OF CHEMISTRY
CORNELL UNIVERSITY S. H. BAUER
ITHACA, NEW YORK

Thermodynamics. Second Edition. By GILBERT NEWTON LEWIS and MERLE RANDALL. Revised by KENNETH S. PITZER, Professor of Chemistry, University of California, Berkeley, and LEO BREWER, Professor of Chemistry, University of California, Berkeley. McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 36, N. Y. 1961. xii + 723 pp. 16.5 × 23.5 cm. Price, $12.50.

The first edition of Lewis and Randall was many books in one. It was a text book, a guide book, a prospectus to lure both the young and the adult chemist, a hand-book for setting up and for using a system of bookkeeping, a table of all entries in the book, and a case book of the authors'