The temperature limits for ketene production from acetylacetone[5] in yields above 10% are 610° and 650°. The maximum yield of 16.7% was obtained at 635°, in which experiment the diketone was introduced at a rate of 2–2.5 cc. per minute. At 585° and at 700° the yields were less than 5%. In the various runs, between one-tenth and four-tenths of the original volume of acetylacetone suffered decomposition into gaseous products. The condensate was largely acetylacetone, but in addition it contained small amounts of lower- and of higher-boiling material. There was a tendency, both with acetylacetone and to a less extent with pinacolin, for much material to condense in the end of the combustion tube before reaching the condenser. This difficulty was eliminated by heating that portion of the tube gently with a free flame.

With pinacolin, the first two runs at 605° and at 665° gave such insignificant yields of ketene that the acetanilide was not worked up in either case. It was introduced at the rate of 3 cc. per minute. At these temperatures, more than two-thirds of the pinacolin was recovered. At 705°, most of the pinacolin was decomposed into gaseous products when it was introduced at 1 cc. per minute. The yield of ketene was between 1.5 and 2%.

With diacetyl, yields of ketene which ranged bewteen 10.8 and 14.5% were produced at 605–625°. This is considerably below the temperature (700°) found to be best for ketene production from acetone, but about the same as that from acetylacetone. At more elevated temperatures, the yield dropped considerably. For example, at 675° the yield was observed to be 3.3%.

The similarity of the decomposition of these two diketones, one alpha and one beta, is quite marked. There was no evidence that other ketenes than ketene itself were formed in these pyrogenic reactions.

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NEW BOOKS

Les Actualités de Chimie Contemporaine. (**Current Chemistry.**) Published under the direction of A. HALLER, Professor of the Faculty of Sciences, at the University of Paris. Vol. III. By A. ORÉKOFF, P. PASCAL, FRÉDÉRIC SWARTS, CH. COURTOT, G. DUPONT and R. LOCQUIN. Librairie Octave Doin, 8, place de l'Odéon, 1925. 326 pp. 14 figs. 12 × 19 cm. Price, unbound, 12 francs.

This book, the third volume of a series, presents six essays by the authors above mentioned upon these respective subjects: The Theory of Variable Affinity; Diamagnetism and Chemical Constitution; The Significance of Atomic Constants; The Chemistry of Indene; Different Turpentine Oils; The Dialkyl Ethinyl Carbinols.

The first volume (1922) presented articles upon gas warfare, micro-analysis, catalysis, biochemical synthesis, strength of bonds, naphthalene, the cetenes and the complex salts of iridium.

The second volume (1924) presented articles upon micro-analysis, atomic structure, molecular refraction and dispersion, anthraquinone, mydriatics and myatics and optical rotation.

[5] Some preliminary work on the pyrogenic decomposition of acetylacetone was performed by Mr. S. J. Wayo.

The eighteen authors are professors in various universities of France (and Belgium) and their fifty-page articles are special lectures given before the division of organic chemistry at the Sorbonne. The subjects are of current interest to organic chemists and reflect the attitude of modern French chemists. The interrelation of organic and physical chemistry is often demonstrated. The bibliography is generally well covered, including work done in the United States, and there is a preponderance of German references. The reviewer was particularly delighted with the article by Orékoff because of its clear and charming style.

Although the editor, Professor Haller, has written none of the articles, he has given to the work the endorsement of his prestige as Dean of the Science Faculty of the Sorbonne.

RESTON STEVENSON

Crystals and the Fine-Structure of Matter. By FRIEDRICH RINNE, Professor of Mineralogy in the University of Leipsic. Translated by WALTER S. STILES. E. P. Dutton and Company, 681 Fifth Avenue, New York, 1925. ix + 195 pp. Portraits and 203 figs. 22.5 × 14.5 cm. Price $4.20.

This book is neither a textbook, a book for popular consumption, nor a treatise requiring highly specialized knowledge in order to be understandable, but apparently is intended for those with a general training in physics and chemistry who are not familiar with the bearing of crystallographic and crystal structure researches on problems in their fields. Although agreeing with Professor Rinne in the great and growing importance of the inter-relations between chemistry, physics and crystallography, the reviewer does not feel that the treatment of the subject in this book is at all comparable with that in other recent publications. Nevertheless, if one cares to read through many pages devoted to such things as proof of the self-evident fact that the properties of crystals differ in different directions, he will find quite a few items of chemical interest, especially in the chapters on "Crystal Growth and Solution," "Chemical Actions on Crystals," and "An Attempt to Form Some Idea of the Course of Chemical Reactions from Observations on Crystals."

Since the whole treatment of the subject matter is based on the results of X-ray researches on crystals, it is surprising to find but a very few crystal structures described, and most of these in a footnote. It is to be hoped that in a future edition this lack will be remedied, perhaps at the expense of less important matter.

The volume is well illustrated with over 200 figures and with portraits of Röntgen, Haüy, Groth, Schoenflies, Federow, Laue, Debye, Scherrer, W. H. Bragg, W. L. Bragg and Tschermak.

MAURICE L. HUGGINS

Gmelins Handbuch der anorganischen Chemie (Gmelin's Handbook of Inorganic Chemistry). Eighth edition. System Number 33, Cadmium. Published by the Deutsche Chemische Gesellschaft, Verlag Chemie, G.m.b.H., Leipzig-Berlin, 1925. vii + viii + 214 pp. 23 figs. 18 × 26 cm. Price, 18 M.

This volume appears to maintain the high standard of excellence shown by the first instalment of this new edition of Gmelin's Handbook now being published under the auspices of the German Chemical Society. It contains, in addition to the text, a wealth of tables recording the physico-chemical properties of cadmium and its compounds, and of diagrams exhibiting the phase rule relationships of the various alloys containing cadmium.

Rheinhold Johow, Emma Haller, Ellen Schoen, Heinrich Boettger and Rudolf Sohmen collaborated with the editor, R. J. Meyer, in the preparation of this volume.

The literature has been covered up to July, 1924.

ARTHUR B. LAMB

Organic Syntheses, an Annual Publication of Satisfactory Methods for the Preparation of Organic Chemicals. Editorial Board, OLIVER KAMM, Editor-in-Chief; ROGER ADAMS, H. T. CLARKE, J. B. CONANT, C. S. MARVEL, F. C. WHITMORE. Vol. IV. John Wiley and Sons, Inc., New York; Chapman and Hall, Limited, London; 1925. vii + 89 pp. 3 figs. 23.5 × 15 cm. Price $1.50 net.

In a review of the first volume of "Organic Syntheses" we predicted that the new venture would meet with such hearty support as to make success a certainty. It is pleasant to note that this prediction has been verified beyond all expectation, the title page of the fourth volume showing no less than fifteen contributors, who supplied the directions for more than half of the preparations.

The editors state in the preface that "it has been found advisable to include preparations which are carried out on a somewhat reduced scale." In all other respects the present number has been constructed on the plan outlined in the first volume. All directions, whether originating in the laboratories of the editors or supplied by contributors, have been "checked" by a member of the editorial board. The fourth volume, therefore, supplies "certified directions" for making the following compounds: acetyl mandelyl chloride, α-amino-*n*-caproic acid, arsono- and arseno-acetic acids, α-bromo-*n*-caproic acid, *n*-butylmalonic ester (ethyl), *o*-chloromercuriphenol, creatinine, cupferron, di-*p*-tolylethane (unsym.), ethyl oxomalonate, ethyl propane-1,1,2,3-tetracarboxylate, glycine, hydroxyhydroquinone triacetate, *o*-iodophenol, ketene, β-methyl-anthraquinone, β-methyl-esculetin, methylene-amino-acetonitrile, nicotinic acid, pentaerythritol, phenylhydroxylamine, *n*-propylbenzene, pyruvic acid, sodium *p*-hydroxyphenylarsonate, *o*-tolunitrile and *p*-tolunitrile, *p*-toluyl-*o*-benzoic acid, tricarballylic acid, triphenylmethane.

E. P. KOHLER