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ORGANIC SYNTHESIS

Volume

1

Open-Chain Saturated Compounds

by **VARTKES MIGRDICHIAN**

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REINHOLD PUBLISHING CORPORATION

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PREFACE

The task of presenting the art of chemistry, its methods, processes and techniques, has been performed with eminent distinction by capable hands in excellent treatises almost from the beginning of the science, and initiates of this branch of knowledge owe much to the self-sacrificing labors of these men. Emphasis has, however, almost always been placed in these works on techniques and on processes of fundamental nature, though detailed treatments of outstanding value of certain specialized subjects have been offered in some of them. Texts dealing with special aspects of chemical synthesis are not lacking, and reviews of progress appear regularly both in the strictly synthetic field and in fields in which synthesis plays a prominent role. The searching chemist can supplement the knowledge obtained from these texts with that to be found in fine reviews available in such periodicals as the *Chemical Reviews*, *Quarterly Reviews*, etc. With such rich sources on hand the chemist, it may be assumed, should have no difficulty in getting at facts, until one fully grasps the magnitude of the task involved. One can indeed become well acquainted with any given branch of chemistry with the aid of the existing literature, but often only at the cost of an immense and prolonged effort, and only a few achieve mastery even in a limited field.

In view of this situation many a chemist has, no doubt, keenly felt the lack of a comprehensive work dealing adequately with the entire subject of organic synthesis. It was with the hope of satisfying this need that I undertook the preparation of the present work—with no illusions about the magnitude and difficulties of the task, which would have been beyond the capabilities of one individual were it not for the host of general treatises, special monographs and general reviews already alluded to. I wish to acknowledge, with due gratitude to the authors of these works, my indebtedness to these sources. While these sources have been the mainstays in the task, in many cases original articles have been consulted for supplementary information.

Meeting the requirements of the serious organic chemical research worker has been the primary objective, but the problems faced by those who at one time or another may have occasion to undertake organic synthetic work of some magnitude have not been lost sight of, and it is hoped that the book will adequately meet the needs of all engaged in organic synthesis. Completeness has been set as a goal, and I have tried to satisfy the justified expectation that all newer developments receive due attention.

Thanks are due to Mrs. Alice Booth who graciously typed nearly the entire manuscript, and to Dr. R.B. Booth, and many others, who kindly proofread the manuscript. Thanks are due also to the American Cyanamid Company authorities for their generous attitude toward the publication of this work. I wish, finally, to express my appreciation of the efforts of the Reinhold Publishing Corporation for assuring the generally excellent workmanship displayed in publishing the book.

Greenwich, Connecticut
January, 1957

V. Migrdichian

ORGANIZATION AND SCOPE OF THE BOOK

The arrangement of the subject matter of this work will be evident on inspection of the table of contents. The system adopted approximates that usually followed in organic chemistry texts and offers the advantages of compactness of presentation, adequate flexibility and logical sequence. General principles and basic facts have received special attention because of their indisputable importance, and exceptions to these rules have been pointed out. General methods of preparation have been fully described, and where a general procedure was lacking, descriptions of representative special methods have been given. Specific examples of synthesis have been cited if the importance of the particular compound warranted, or when the method presented a deviation from the *general procedure*.

Important reactions are discussed in detail and every effort has been made to make their treatment complete in all essentials. The effect of structural variations on the course of a reaction has been pointed out, and any exceptional behavior has been indicated. Known side reactions have been discussed because of their bearing on the course of the principal reaction. Basic processes of halogenation, nitration, etc., have received extensive and complete treatment.

The location of certain of the subjects calls for comment. When a reaction gives rise to compounds of one class only, there will be general agreement that it should be treated in connection with that class of compounds. Such a clear-cut basis of choice does not exist with, for example, the Friedel-Crafts reaction, or the Grignard reaction. In such cases the author has chosen to treat the reaction in connection with the class of compounds which is the most essential component of the reaction.

The relative space allotted to a given subject has been determined by the volume of essential information available. It is fair to assume that the extent of such information in the chemical literature is an indication both of the importance of the subject and of the apparent interest it has attracted. Anticipation of a subject not yet discussed, which is ever a matter of annoyance to the reader, could not always be avoided despite the good intentions of the author; for this he will beg the reader's forbearance.

References to original articles have been selected with the object of enabling the reader to secure the details of matters discussed and to make possible the acquisition of a good grounding in the subject under consideration. References to related subjects have been included with the latter objective in view. Outstanding reviews of the subject matter discussed have been cited.

Many a reaction presents considerable industrial interest. Discussions relating to industrial applications, however, lie beyond the scope of the present treatise, and only the briefest mention could be made of some of the more important industrial developments having their basis in certain reactions. Theoretical developments of the last few decades have had a great impact in the field of chemical synthesis, and their importance cannot be overestimated. However, theoretical discussions are beyond the scope of this work. Reaction mechanisms receive mention only when well-nigh complete agreement exists on their essential correctness.

The index assumes particular importance in a book of this character, in which of necessity a given subject receives repeated mention in various connections. A complete index is invaluable as a means for locating descriptions of general procedures, methods of preparation of specific compounds, or references to the preparation of compounds. Efforts have not, therefore, been spared to make the index complete in every respect.

The scope of the present two volumes encompasses all reactions excepting the majority of those leading to the formation of heterocyclic bodies. The compilation of a third volume to deal with the latter is contemplated.

The few abbreviations employed in the text are those in general usage and commonly understood. *Temperatures given throughout the book are in degrees centigrade.*

ABBREVIATIONS OF NAMES OF PERIODICALS

<i>Abhandl. braunschweig Wiss. Ges.</i>	Abhandlungen der braunschweigischen Wissenschaftlichen Gesellschaft
<i>Acta Chem. Scand.</i>	Acta Chemica Scandinavica
<i>Acta Chim. Acad. Sci. Hung.</i>	Acta Chimica Academiae Scientiarum Hungaricae
<i>Am. Chem. J.</i>	American Chemical Journal
<i>Am. J. Pharm.</i>	American Journal of Pharmacy and the Sciences Supporting Public Health
<i>Am. J. Sci.</i>	American Journal of Science
<i>Anales asoc. quím. argentina</i>	Anales de la asociación química argentina
<i>Anales fís. y quím. (Madrid)</i>	Anales de física y química (Madrid); formerly Anales de la sociedad española de física y química
<i>Anales real soc. españ. fís. y quim (Madrid)</i>	Anales de la real sociedad española de física y química (Madrid)
<i>Angew. Chem.</i>	Angewandte Chemie
<i>Ann.</i>	Liebigs Annalen der Chemie
<i>Ann. Acad. Sci. Fennicae</i>	Annales Academiae Scientiarum Fennicae
<i>(No abbreviation)</i>	Annales de l'institut Agronomique de Moscou
<i>Ann. chim.</i>	Annales de chimie (Paris)
<i>Ann. chim. applicata</i>	Annali di chimica applicata
<i>Ann. chim. phys.</i>	Annales de chimie et de physique
<i>Ann. phys.</i>	Annales de physique
<i>Ann. Reports on Progress Chem. (Chem. Soc. London)</i>	Annual Reports on the Progress of Chemistry (Chemical Society of London)
<i>Ann. Rev. Biochem.</i>	Annual Review of Biochemistry
<i>Ann. sci. univ. Jassy</i>	Annales scientifiques de l'université de Jassy
<i>Ann. univ. Lyon</i>	Annales de l'université de Lyon

<i>Anz. Akad. Wiss. Wien</i>	Anzeiger der Akademie der Wissenschaften in Wien
<i>Arch. Pharm.</i>	Archiv der Pharmazie und Berichte der deutschen pharmazeutischen Gesellschaft
<i>Arch. sci. phys. et nat.</i>	Archives des sciences physiques et naturelles (Archives des sciences (Geneva))
<i>Arhiv. Hem. i Farm.</i>	Arhiv za Hemiju i Farmaciju (Arhiv za Hemiju i Technologiju)
<i>Arkiv Kemi Mineral. Geol.</i>	Arkiv för Kemi, Mineralogi och Geologi; since 1949 Arkiv för Kemi
<i>Atti accad. Lincei</i>	Atti della reale accademia dei Lincei
<i>Atti accad. nazl. Lincei, Classe sci. fis. mat. e nat.</i>	Atti della accademia nazionale dei Lincei Rendiconti, Classe di scienze fisiche matematiche e naturali
<i>Atti accad. sci. Torino</i>	Atti della accademia delle scienze di Torino
<i>Atti accad. sci. Torino, Classe sci. fis. mat. e nat.</i>	Atti della reale accademia delle scienze di Torino, Classe di scienze fisiche matematiche e naturali
<i>Australian J. Sci. Ber.</i>	Australian Journal of Science, The Berichte der deutschen chemischen Gesellschaft; changed with Vol. 80, No. 1 (Jan., 1947) to Chemische Berichte
<i>Ber. deut. pharm. Ges.</i>	Berichte der deutschen pharmazeutischen Gesellschaft
<i>Ber. Schimmel & Co. Akt.-Ges.</i>	Bericht der Schimmel & Co. Aktien-Gesellschaft über ätherische Oele, Riechstoffe, usw.
<i>Biochem. J.</i>	Biochemical Journal, The (London)
<i>Biochem. Z.</i>	Biochemische Zeitschrift
<i>Biochim. et Biophys. Acta</i>	Biochimica et Biophysica Acta (Amsterdam)
<i>Brennstoff-Chem.</i>	Brennstoff-Chemie
<i>Brit. Ass. Advance Sci. Rep.</i>	British Association for the Advancement of Science, Report
<i>Brit. Med. J.</i>	The British Medical Journal
<i>Bull. Acad. roy. Belg.</i>	Bulletin de la classe des sciences, Académie royale de Belgique
<i>Bull. acad. sci. Russ.</i>	Bulletin de l'académie des sciences de Russie
<i>Bull. Chem. Soc. Japan</i>	Bulletin of the Chemical Society of Japan

<i>Bul. Chim. Soc. Chim. România</i>	Buletinul de Chimie Pură și Aplicată Societatea de Chimie din România
<i>Bull. acad. sci. URSS</i>	Bulletin de l'académie des sciences de l'URSS
<i>Bull. classe sci. Acad. Roy. Belg.</i> (no abbreviation)	Bulletin de la classe des sciences, Académie royale de Belgique
<i>Bull. intern. acad. polon.</i>	Bulletin of the Chemical Society Bulletin international de l'académie polonaise des sciences et des let- tres
<i>Bull. soc. chim.</i>	Bulletin de la société chimique de France
<i>Bull. soc. chim. Belg.</i>	Bulletin de la société chimique de Belgique
<i>Bull. soc. chim. biol.</i>	Bulletin de la société de chimie biologique
<i>Bull. soc. ind. Mulhouse</i>	Bulletin de la société industrielle de Mulhouse
<i>Bull. soc. nat. Moscou</i>	Bulletin de la société des natura- listes de Moscou
<i>Bur. Standards J. Research</i>	Bureau of Standards Journal of Re- search; changed with Vol. 13, No. 1 (July, 1934) to Journal of Research of the National Bureau of Standards
<i>Can. Chem. J.</i>	Canadian Chemical Journal; changed with vol. 5, Jan. 1921, to Canadian Chemistry and Metallurgy
<i>Can. J. Research</i>	Canadian Journal of Research
<i>Chem. Eng. News</i>	Chemical and Engineering News
<i>Chem. Eng. Progr.</i> (no abbreviation)	Chemical Engineering Progress
<i>Chem. Ind. (Düsseldorf)</i> (no abbreviation)	Chemische Zeitschrift Chemische Industrie (Düsseldorf)
<i>Chem. Listy</i>	Chemistry & Industry; formerly a part of Journal of the Society of Chem- ical Industry; issued as a separate journal beginning Jan., 1937
<i>Chem. Met. Eng.</i>	Chemické Listy (Ústřední) výzkumu a technického rozvoje (Ústřední ústav chemický)
<i>Chem. News</i>	Chemical and Metallurgical Engineer- ing
<i>Chem. Obzor</i>	Chemical News and Journal of Indus- trial Science, The Chemický Obzor

<i>Chem. Products</i>	Chemical Products and Chemical News
<i>Chem. Revs.</i>	Chemical Reviews
<i>Chem. Trade J.</i>	Chemical Trade Journal and Chemical Engineer
<i>Chem. Weekblad</i>	Chemisch Weekblad
<i>Chem. Zentr.</i>	Chemisches Zentralblatt
<i>Chem. Ztg.</i>	Chemiker-Zeitung mit dem Sonderteil, Die Chemische Praxis, und der Beilage, Chemische-technische Übersicht
(no abbreviation)	Chimie & Industrie (Paris)
<i>Collection Czech Chem. Commun.</i>	Collection of Czech Chemical Communications; suspended with Vol. 11, No. 12 (1939), resumed publication in 1947 with title Collection Czechoslov. Chem. Commun. (Collection of Czechoslovak Chemical Communications)
<i>Color Trade J.</i>	Color Trade Journal
<i>Compt. rend.</i>	Comptes rendus Hebdomadaires des séances de l'académie des sciences
<i>Compt. rend. acad. sci. URSS</i>	Comptes rendus de l'académie des sciences de l'U.R.S.S.
<i>Compt. rend. trav. lab. Carlsberg, Sér. chim.</i>	Comptes rendus des travaux du laboratoire Carlsberg, Série chimique
<i>Contrib. Inst. Chem. Nat. Acad. Peiping</i>	Contributions from the Institute of Chemistry, National Academy of Peiping
<i>Dansk Tids. Farm.</i>	Dansk Tidsskrift for Farmaci
<i>Deut. med. Wochschr.</i>	Deutsche medizinische Wochenschrift
(no abbreviation)	Die Chemie
(no abbreviation)	Experientia
(no abbreviation)	Fette u. Seifen
<i>Fortsch. chem. Forsch.</i>	Fortschritte der chemischen Forschung
<i>Fortsch. Chem. org. Naturstoffe</i>	Fortschritte der Chemie organischer Naturstoffe
<i>Fortsch. Chem. Phys. u. phys. Chem.</i>	Fortschritte der Chemie, Physik und physikalischen Chemie
<i>Gazz. chim. ital.</i>	Gazzetta chimica italiana
<i>Ges. Abhandl. Kenntnis Kohle</i>	Gesammelte Abhandlungen zur Kenntnis der Kohle
<i>Giorn. chim. ind. appl.</i>	Giornale di chimica industriale ed applicata
<i>Helv. Chim. Acta</i>	Helvetica Chimica Acta

<i>Ind. Chemist</i>	Industrial Chemist and Chemical Manufacturer, The
<i>Ind. chim. belge</i>	Industrie chimique belge
<i>Ind. Eng. Chem.</i>	Industrial and Engineering Chemistry
<i>Ind. Eng. Chem. Anal. Ed.</i>	Industrial and Engineering Chemistry, Analytical Edition
<i>Iowa State Coll. J. Sci.</i>	Iowa State College Journal of Science
<i>Jahresb.</i>	Jahresbericht über die Fortschritte der Chemie (Liebig-Kopps)
<i>Jahresber. Pharm.</i>	Jahresbericht der Pharmazie
<i>J. Am. Chem. Soc.</i>	Journal of the American Chemical Society
<i>J. Am. Pharm. Assoc.</i>	Journal of the American Pharmaceutical Association
<i>J. Applied Chem. U.S.S.R.</i>	Journal of Applied Chemistry (U.S.S.R.)
<i>J. Biol. Chem.</i>	The Journal of Biological Chemistry
<i>J. Chem. Ind. (U.S.S.R.)</i>	Journal of Chemical Industry (U.S.S.R.); same as Zhur. Khim. Prom. (Zhurnal Khimicheskoi Promyshlennosti)
<i>J. Chem. Soc.</i>	Journal of the Chemical Society (London)
<i>J. Chem. Soc. Japan</i>	Journal of the Chemical Society of Japan
<i>J. Chinese Chem. Soc.</i>	Journal of the Chinese Chemical Society
<i>J. Gasbeleucht.</i>	Journal für Gasbeleuchtung und verwandte Beleuchtungsarten sowie für Wasserversorgung; discontinued under this name in 1920; followed by Das Gas- und Wasserfach
<i>J. Gen. Chem. U.S.S.R.</i>	Journal of General Chemistry (U.S.S.R.); now Zhur. Obshchei Khim. (Zhurnal Obshchei Khimii)
<i>J. Indian Chem. Soc.</i>	Journal of Indian Chemical Society
<i>J. Indian Inst. Sci.</i>	Journal of Indian Institute of Science, A and B
<i>J. Inst. Petroleum</i>	Journal of the Institute of Petroleum
<i>J. Org. Chem.</i>	Journal of Organic Chemistry, The
<i>J. pharm. chim.</i>	Journal de pharmacie et de chimie
<i>J. Pharm. Soc. Japan</i>	Journal of the Pharmaceutical Society of Japan
<i>J. Phys. Chem.</i>	Journal of Physical Chemistry, The
<i>J. Physiol. Chem.</i>	Journal of Physiological Chemistry

<i>J. prakt. Chem.</i>	Journal für praktische Chemie
<i>J. Proc. Roy. Soc. N.S. Wales</i>	Journal and Proceedings of the Royal Society of New South Wales
<i>J. Russ. Phys.-Chem. Soc.</i>	Journal of the Russian Physical-Chemical Society
<i>J. Soc. Chem. Ind. London</i>	Journal of the Society of Chemical Industry (London)
<i>J. Soc. Dyers Colourists</i>	Journal of the Society of Dyers and Colourists, The
<i>J. Soc. Org. Synth. Chem. Japan</i>	Journal of the Society of Organic Synthetic Chemistry, Japan
<i>J. Tenn. Acad. Sci.</i>	Journal of the Tennessee Academy of Science
<i>J. Tex. Inst.</i>	Journal of the Textile Institute, The
<i>J. Univ. Bombay</i>	Journal of the University of Bombay
<i>Khim. Farm. Prom.</i>	Khimiko-Farmatsevticheskaya Promyshlennost
<i>Kolloidchem. Beih.</i>	Kolloidchemische Beihefte
<i>Kolloid-Z.</i>	Kolloid-Zeitschrift
<i>Konink. Akad. Wetenschap Amsterdam</i>	Koninklijke Akademie van Wetenschappen te Amsterdam
<i>Mem. Coll. Sci. Univ. Kyoto</i>	Memoirs of the College of Science, University of Kyoto
<i>Mem. Proc. Manchester Lit. Phil. Soc.</i>	Memoirs and Proceedings of the Manchester Literary and Philosophical Society (Manchester Memoirs)
<i>Mem. reale accad. nazl. Lincei, Classe sci. fis. mat. e nat.</i>	Memorie della reale accademia nazionale dei Lincei, Classe di scienze, fisiche, matematiche e naturali
<i>Monatsh.</i>	Monatshefte für Chemie und verwandte Teile anderer Wissenschaften
<i>Nachr. Ges. Wiss. Göttingen</i>	Nachrichten der Gesellschaft der Wissenschaften zu Göttingen (1923)
<i>Nachr. kgl. Ges. Wiss. Göttingen</i>	Nachrichten von der königlichen Gesellschaft der Wissenschaften zu Göttingen
<i>Naturaliste can.</i>	Naturaliste canadien, Le
<i>(no abbreviation)</i>	Nature
<i>Naturwiss.</i>	Naturwissenschaften
<i>Norske Forh.</i>	Det Kongelige Norske Videnskabers Selskabs, Forhandlinger
<i>Notiz. chim. ind.</i>	Notiziario chimico-industriale; name changed with Vol. 4, No. 1 (Jan., 1929) to L'Industria chimica

(no abbreviation)	Oil & Soap; name changed with Vol. 24, No. 1 (Jan., 1947) to Journal of the American Oil Chemists' Society
<i>Oil Gas J.</i>	Oil and Gas Journal, The
<i>Perfumery Essent. Oil Record</i>	Perfumery and Essential Oil Record, The
<i>Pharm. Ztg.</i>	Pharmazeutische Zeitung
(no abbreviation)	Pharmazie, Die
<i>Phil. Mag.</i>	Philosophical Magazine, The
<i>Praktika Akad. Athenon</i>	Praktika tes Akademias Athenon
<i>Proc. Acad. Sci. Amsterdam</i>	Proceedings of the Royal Academy of Sciences of Amsterdam
<i>Proc. Am. Petroleum Inst.</i>	Proceedings of the Annual Meeting American Petroleum Institute
<i>Proc. Imp. Acad. (Tokyo)</i>	Proceedings of the Imperial Academy (Tokyo)
<i>Proc. Indian Acad. Sci.</i>	Proceedings of the Indian Academy of Science
<i>Proc. Iowa Acad. Sci.</i>	Proceedings of the Iowa Academy of Science
<i>Proc. Japan. Acad.</i>	Proceedings of the Japan Academy; formerly Proceedings of the Imperial Academy
<i>Proc. Nat. Acad. Sci. U.S.</i>	Proceedings of the National Academy of Sciences of the United States of America
<i>Proc. Physiol. Soc. Phila.</i>	Proceedings of the Physiological Society of Philadelphia; published in American Journal of the Medical Sciences.
<i>Proc. Roy. Irish Acad.</i>	Proceedings of the Royal Irish Academy
<i>Proc. Roy. Soc. (London)</i>	Proceedings of the Royal Society (London)
<i>Proc. Soc. Exp. Biol. Med.</i>	Proceedings of the Society for Experimental Biology and Medicine
<i>Quart. J. Indian. Chem. Soc.</i>	Quarterly Journal of the Indian Chemical Society
<i>Quart. Revs. (London)</i>	Quarterly Reviews of the Chemical Society, London
<i>Rec. trav. chim.</i>	Recueil des travaux chimiques des Pays-Bas
<i>Refiner Natural Gasoline M.</i>	Refiner and Natural Gasoline Manufacturer

<i>Rend. accad. Lincei</i>	Rendiconti della reale accademia nazionale dei Lincei
<i>Rend. accad. sci. fis. mat. e nat. reale Napoli</i>	Rendiconti dell'accademia di scienze fisiche, matematiche e naturali della società reale di Napoli
<i>Rev. gén. mat. color.</i>	Revue générale des matières colorantes
<i>Ricerca sci.</i>	Ricerca scientifica ed il progresso tecnico nell'economia nazionale, La
<i>Riechstoff Ind. u. Kosmetik</i>	Riechstoff Industrie und Kosmetik
<i>Roczniki Chem.</i>	Roczniki Chemii
<i>(no abbreviation)</i>	Science
<i>Science Reports, Tôhoku Imp. Univ.</i>	Science Reports of the Tôhoku Imperial University
<i>Science Rep. Tokyo Bunrika Daigaku</i>	Science Reports of the Tokyo Bunrika Daigaku (Tokyo University of Literature and Science)
<i>Sci. Papers Inst. Phys. Chem. Res. (Tokyo)</i>	Scientific Papers of the Institute of Physical and Chemical Research (Tokyo)
<i>Sci. Records Leningrad. Univ.</i>	Scientific Records of the Leningrad University
<i>Sitzber. kgl. preuss. Akad. Wiss.</i>	Sitzungsberichte der königlichen preussischen Akademie der Wissenschaften
<i>Svensk Kem. Tid.</i>	Svensk Kemisk Tidskrift
<i>Tech. Rep. Tôhoku Imp. Univ.</i>	The Technology Reports of the Tôhoku University
<i>Trans. Am. Electrochem. Soc.</i>	Transactions of the American Electrochemical Society
<i>Trans. Faraday Soc.</i>	Transactions of the Faraday Society
<i>Trans. Roy. Soc. Can.</i>	Transactions of the Royal Society of Canada
<i>Trans. State Institute (U.S.S.R.)</i>	Transactions of the State Institute of Applied Chemistry (U.S.S.R.)
<i>Umschau</i>	Die Umschau
<i>Univ. Kansas Sci. Bull.</i>	University of Kansas Science Bulletin
<i>Uspekhi Khim.</i>	Uspekhi Khimii
<i>(no abbreviation)</i>	Vitamins and Hormones
<i>Z. anal. Chem.</i>	Zeitschrift für analytische Chemie
<i>Z. angew. Chem.</i>	Zeitschrift für angewandte Chemie
<i>Z. anorg. allgem. Chem.</i>	Zeitschrift für anorganische und allgemeine Chemie

(no abbreviation)

Z. Elektrochem.

Z. Farben-Ind.

Z. ges. Schiess- u. Sprengstoffw.

Zhur. Obshchei' Khim.

Z. Krist.

Z. Naturforsch.

Z. physik. Chem.

Z. physiol. Chem.

Z. Untersuch. Lebensm.

Z. Ver. deut. Zucker-Ind.

Z. wiss. Phot.

Zeitschrift für Chemie

Zeitschrift für Elektrochemie und
angewandte physikalische Chemie

Zeitschrift für Farben-Industrie

Zeitschrift für das gesamte Schiess-
und Sprengstoffwesen mit der Son-
derabteilung Gasschutz

Zhurnal Obshchei' Khimii (Journal of
General Chemistry)

Zeitschrift für Kristallographie

Zeitschrift für Naturforschung

Zeitschrift für physikalische Chemie

Zeitschrift für physiologische Chemie
(Hoppe-Seyler's)

Zeitschrift für Untersuchung der
Lebensmittel

Zeitschrift des Vereines der deut-
schen Zucker-Industrie

Zeitschrift für wissenschaftliche
Photographie, Photophysik und
Photochemie

ERRATA

- Page 11, line 21: *for alcoxide read alkoxide*
 Page 22, line 19: *for cohoh read composition*
 Page 26, side heading and lines 17 and 19: *for selenoles read selenols*
 Page 53, line 24: *for quire read quite*
 Page 59, line 22: *for galatonic read galactonic*
 Page 79, line 7: *for 1-cllycerol read 1-glycerol*
 Page 85, line 10: *for bulyrates read butyrates*
 Page 87, line 18: *for velicity read velocity*
 Page 108, line 7: *for lenic read linic*
 Page 109, line 23: *for dimerized read dimerizes*
 Page 120, line 23: *for caid read acid*
 Page 128, line 1: *for acid read acids*
 Page 201, line 8: *for monixide read monoxide*; 4th equation: *for $2\text{CH} = \text{C}(\text{OC}_2\text{H}_5)_2$ read $2\text{CH}_2 = \text{C}(\text{OC}_2\text{H}_5)_2$*
 Page 202, line 2: *for minearl read mineral*; line 23: *for accompanies with read accompanied by*
 Page 212, line 21: *for acetyl- read acetylenic*
 Page 220, line 25: *for p-nitrostlibene read p-nitrostilbene*
 Page 225, line 23: *for sulvent read solvent*
 Page 236, line 18: *for pision read position*
 Page 248, line 2: *for Monochloracetone read Monochloroacetone*
 Page 269, line 15: *for caralytically read catalytically*
 Page 291, line 19: *for phosphomolyodic read phosphomolybdic*
 Page 293, line 12: *for substitutes read substituents*
 Page 300, line 23: *for Tye read The*; line 31: *for α -Bromoacetic read α -Bromoacetoacetic*
 Page 301, line 16: *for Hall-Volhard read Hell-Volhard*
 Page 317, line 3 under "Acid": *for Chloracetic read Chloroacetic*
 Page 360, line 36: *for Atropic acid read Atropic acid chloride*
 Page 368, line 7: *for amide read imide*; line 17: *for acids read acid esters*
 Page 392, line 19: *for amides read imides*
 Page 394, line 3: *for hydrazines read hydrazides*
 Page 420, line 10: *for cyanhydrin read cyanohydrin*
 Page 431, line 12: *for end product of diaminotriazine, read end product, diaminotriazine,*
 Page 438, line 1: *for action read reaction*
 Page 443, line 4: *for ehereal read ethereal*
 Page 445, line 20: *for ester read esters*
 Page 454, line 6: *for hydroxyurea read hydroxyisourea*
 Page 474, line 17: *for Beckann read Beckmann*
 Page 482, line 4: *for $(\text{C}_3\text{H}_7)_2\text{NH}\cdot\text{NNO}_2$ read $(\text{C}_3\text{H}_7)_2\text{NH}\cdot\text{HNO}_2$*
 Page 483, last line: *for mjxture read mixture*
 Page 502, line 16: *for acid read acids*
 Page 515, line 25: *for proylene read propylene*
 Page 519, line 18: *for of read with*