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EDITED BY

E. JOSEPHY † AND F. RADT

Volume 13

TRICYCLIC COMPOUNDS

Series III

CARBOISOCYCLIC CONDENSED COMPOUNDS

ELSEVIER PUBLISHING COMPANY, INC.

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ORGANIC CHEMISTRY

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E. JOSEPHY & A. RABT

Volume 13

TRICARBONIC COMPOUNDS

Series III

CARBONIC ACID DERIVATIVES

ELSEVIER PUBLISHING COMPANY, INC.

NEW YORK - AMSTERDAM

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GENERAL OUTLINE OF THE PLANNING OF THE ENCYCLOPÆDIA AND INDICATIONS TO FACILITATE ITS USE

Elsevier's Encyclopaedia of Organic Chemistry has been compiled on the basis of the carbon skeleton. Compounds whose carbon-skeleton is broken by other atoms*, e.g., esters, ethers, alkyl-, and acyl-derivatives of amines, hydrazines, etc., are described as derivatives of the corresponding carboxylic acid, hydroxy-, amino-, and hydrazino-compounds, etc., generally under the component which is latest in order of systematic sequence; acetyl-, benzoyl-, phthaloyl-, toluenesulphonyl-, and similar derivatives, however, are dealt with under the corresponding hydroxy- or N-compound. As far as possible, derivatives of any given substance have been grouped together, maintaining at the same time the systematic classification by cross references, or by repetition where necessary. Compounds which contain a six-membered ring as well as one of the rings described in Vol. 4 are dealt with in the latter volume. Thus, for example, phenylcyclopropane will be found with the homologues of cyclopropane in Vol. 4, and not, as a cyclopropyl derivative of benzene, in Vol 5.

Aliphatic compounds (Vols. 1-3) and compounds with the ring systems described in Vols. 4 and 12-18 have been arranged in the same manner as the compounds with six-membered rings in Vols. 5-10. The polycyclic non-condensed compounds of each ring system are also arranged in the same manner as those of the 6-ring range (see Vol. 11), and immediately follow the respective metal compounds of the ring system in question. Accordingly,

* This does not refer to heterocyclic compounds.

examples for the following general rules can be limited to benzene compounds.

1. Compounds differing only in their degree of saturation are described in immediate succession.

2. Functional groups in the side chain have precedence over similar functional groups in the nucleus; e.g., benzyl alcohol, bis-hydroxymethyl-benzene, etc. precede phenol.

3. Hydrocarbons and compounds having the same functional groups are arranged according to the number of side chains, compounds with one side chain preceding those with two side chains, etc.

4. Compounds containing the same functional group only once are followed by those compounds which, in addition, contain a functional group treated earlier in the system. After these substances are listed the compounds in which the first-named functional group is represented twice. Hence we have the sequence: phenol and its homologues — monohalogenophenols — dihalogenophenols, etc. — nitrophenols — halogenonitrophenols — aminophenols — halogenaminophenols — nitroaminophenols — halogenonitroaminophenols — hydroxybenzyl alcohol, etc.; dihydroxybenzenes — halogenodihydroxybenzenes, etc. In accordance with this, phenolsulphonic acid will be found in Vol. 10, and not with the hydroxy-compounds in Vol. 7.

5. In the case of tautomers preference has been given to that formulation which most adequately interprets the principal reactions of the compound. In each case, however, a cross reference was inserted, at that place where the alternate tautomeric form belongs in the system.

6. Anhydrides of dicarboxylic acids should be looked for under the latter, not under the heterocyclic compounds with 1 O. Methylene ethers of dihydroxy-compounds are considered as derivatives of the latter, not as heterocyclic compounds with 2 O; thus, piperonal, for example, will be found in Vol. 8.

7. Natural products whose constitution has not been elucidated completely but whose carbon skeleton is known to some extent are dealt with immediately following all other compounds with

the same skeleton. Other natural products are described in connection with the first product of known composition obtained in their degradation. These natural products which are scattered through the various volumes of the Encyclopaedia are systematically collected in the Group Index in Vol. 19.

The above instructions, if carefully followed, will in every case ensure a quick decision as to the volume in which to look for a particular compound. Once the right volume has been chosen, it is easy to find the compound wanted, either by consultation of the alphabetical index and the formula index at the end of the volume, or with the aid of the table of contents of the volume or of the individual skeleton systems. After the completion of the whole work, every compound described in the literature may be found irrespective of its systematic location by means of the General Subject Index (Vol. 19) and the General Formula Index (Vol. 20).

Finally, the following points should be observed:

a. The year of publication and the name of the first author are given after each item of information; in cases where several statements regarding one compound are taken from the same paper, the reference is given after the last statement. The full references are listed at the end of short sections.

b. The more important systems are preceded by a detailed survey of the various methods of formations of the nucleus concerned. First their occurrence in nature and in technical products (coal tar, lignite tar, etc.) is dealt with. This is followed by syntheses from systems with fewer carbon atoms, and then by methods of formation by degradation of more complicated systems.

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In this volume the literature up to and including 1936 has been consulted and the literature concerning the structure of compounds up till 1947

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TABLE OF ABBREVIATIONS EMPLOYED IN THE TEXT

[α]	specific rotation ($[\alpha]_{\text{D}}^{20}$, for 20° and sodium light)	Bz	benzoyl (BzCl, benzoyl chloride)
abs.	absolute	ca.	about
absorpt.	absorption	cal.	calorie(s)
Ac	acetyl (AcCl, acetyl chloride; Ac ₂ O, acetic anhydride)	calcd.	calculated
acet. ac.	acetic acid	c.c.	cubic centimeter(s)
addn.	addition	cf.	compare
alc.	alcohol, alcoholic	cm.	centimeter(s)
alk.	alkaline	coeff.	coefficient
alkali	caustic alkali	compd.	compound
alky.	alkalinity	compn.	composition
Am	amyl	conc.	concentrated
amp.	ampere(s)	concn.	concentration
amt.	amount	cond.	conductivity
anhyd.	anhydrous	condens.	condensation
approx.	approximate, approximately	const.	constant
aq.	aqueous	contg.	containing
assoc.	associate(s)	cor.	corrected
assocd.	associated	corresp.	corresponding
assocn.	association	crit.	critical
asym.	asymmetrical	cryst.	crystalline, crystals
at.	atom, atomic	crystd.	crystallized
atm.	atmosphere(s), atmospheric	crystn.	crystallization
at. wt.	atomic weight	d	density (d_4^{13} , specific gravity at 13° referred to water at 4°)
Å.	Ångström unit(s)	dec.	decomposed, decomposition
av.	average	deriv.	derivative
b.	(followed by a figure denoting temperature) boils at, boiling at	det.	determine
bacteriol.	bacteriological	detd.	determined
biol.	biological	detn.	determination
b.p.	boiling point	diazotd.	diazotized
		diazotn.	diazotization
		dil.	dilute

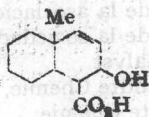
dild.	diluted	ma.	milliampere(s)
diln.	dilution	max.	maximum, maxima
dissoc.	dissociate(s)	Me	methyl (MeOH, methanol)
dissocd.	dissociated	meth.	methyl alcoholic
dissocn.	dissociation	mg.	milligram(s)
distd.	distilled	min.	minimum; also minute(s)
distg.	distilling	mixt.	mixture
distn.	distillation	ml.	milliliter(s)
elec.	electric, electrical	mm.	millimeter(s)
e.m.f.	electromotive force	m μ	10 ⁻⁶ mm. (10 Å.)
equil.	equilibrium	mmt.	moment
equiv.	equivalent	mol.	molecule, molecular, mole
Et	ethyl (Et ₂ O, ethyl ether)	mol. wt.	molecular weight
evap.	evaporate	m.p.	melting point
evapd.	evaporated	mv.	millivolt(s)
evapg.	evaporating	n	index of refraction (n_D^{20} , for 20° and sodium light)
evapn.	evaporation	N	normal (as applied to concn.)
examn.	examination	neg.	negative
expt.	experiment	no.	number
exptl.	experimental	occ.	occurrence
extrd.	extracted	opt. act.	optically active
extrg.	extracting	org.	organic
extrn.	extraction	oxid.	oxidized
fluoresc.	fluorescence	oxidn.	oxidation
fmn.	formation	p.	page
f.p.	freezing point	pathol.	pathological
g.	gram(s)	petrol.ether	petroleum ether
H ₂ SO ₄	conc. sulphuric acid	Ph	phenyl
hr.	hour	pharmacol.	pharmacological
hydrol.	hydrolysis	phys.	physical
hydrol.	hydrolysed	physiol.	physiological
inorg.	inorganic	pos.	positive
insol.	insoluble	powd.	powdered
isoln.	isolation	pp.	pages
kg.	kilogram(s)	ppt.	precipitate
kg.-cal.	kilogram calorie(s)	pptd.	precipitated
kv.	kilovolt(s)	pptg.	precipitating
kw.	kilowatt(s)	pptn.	precipitation
l.	liter(s)	Pr	propyl
lb.	pound(s)	prepd.	prepared
M.	molar	prepg.	preparing
M	(with subscript) molecular	prepn.	preparation
m.	(followed by a figure denoting temperature) melts at, melting at; also meter(s)	prim.	primary
		prod.	product
		pyr.	pyridine

qual.	qualitative
quant.	quantitative
rac.	racemic
recrystd.	recrystallized
recrystn.	recrystallization
red.	reduced
redn.	reduction
ref.	references
resp.	respectively
rn.	reaction
sapon.	saponification
sapond.	saponified
sapong.	saponifying
satd.	saturated
satg.	saturating
satn.	saturation
sec.	second(s), secondary
sepd.	separated
sepg.	separating

sepn.	separation
sol.	soluble
soln.	solution
soly.	solubility
sp.	specific
sp. gr.	specific gravity
spectr.	spectrum
subl.	sublimes
subln.	sublimation
subst.	substance
sym.	symmetrical
synth.	synthesis
temp.	temperature
tert.	tertiary
v.	volt(s)
vac.	vacuum
vol.	volume
w.	watt(s)
wt.	weight

FORMULAS

In the structural formulas a single line always means a single bond; e.g., the formula



represents

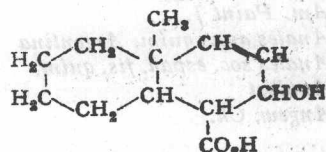


TABLE OF PERIODICALS

ABBREVIATED TITLE

Acta Acad. Aboensis, Math. Phys.
Acta Brevia Neerland.

Acta Lit. Sci. Univ. Hung.

Acta Phys. Polon.

Acta Phytochim.

Acta Univ. Latviensis, Kim.

Fakult. Serija

Am. Ch. J.

Am. Dyestuff Repr.

Am. J. Cancer

Am. J. Med. Sci.

Am. J. Obstet. Gynecol.

Am. J. Pharm.

Am. J. Physiol.

Am. Paint J.

Anales asoc. quim. Argentina

Anales soc. españ. fís. quim.

Analyst

Angew. Ch.

Ann.

Ann. Acad. Sci. Fennicae

Ann. chim.

Ann. chim. applicata

Ann. combustibles liquides

Ann. jardin bot. Buitenzorg

Ann. phys.

Ann. Physik

Ann. soc. sci. Bruxelles

Ann. zymol.

Annual Reports

Apoth. Ztg.

Arb. kais. Gesundh.

Arch. expil. Path. Pharmacol.

Arch. expil. Zellforsch.

Arch. ges. Physiol.

FULL TITLE

Acta Academiae Aboensis, Mathematica et Physica

Acta Brevia Neerlandica de Physiologia, Pharmacologia, Microbiologia, e.a.

Acta Litterarum ac Scientiarum Regiae Universitatis Hungaricae Francisco-Josephinae. Sectio Chemica, Mineralogica et Physica

Acta Physica Polonica

Acta Phytochimica (Japan)

Acta Universitatis Latviensis, Kimijas Fakultates Serija

American Chemical Journal

American Dyestuff Reporter

American Journal of Cancer

American Journal of the Medical Science

American Journal of Obstetrics and Gynecology

American Journal of Pharmacy

American Journal of Physiology

American Paint Journal

Anales de la asociación química Argentina

Anales de la sociedad española de física y química

The Analyst

Angewandte Chemie, before 1932 Zeitschrift für angewandte Chemie

Annalen der Chemie, Justus Liebigs

Annales Academiae Scientiarum Fennicae

Annales de chimie, before 1914 Annales de chimie et de physique

Annali di chimica applicata

Annales de l'office national des combustibles liquides

Annales du Jardin botanique de Buitenzorg

Annales de physique

Annalen der Physik, before 1900 Annalen der Physik und Chemie (Poggendorff; Wiedemann)

Annales de la société scientifique de Bruxelles

Annales de zymologie

Annual Reports on the Progress of Chemistry, London

Apotheker Zeitung

Arbeiten aus dem Kaiserlichen Gesundheitsamte

Archiv für experimentelle Pathologie und Pharmacologie

Archiv für experimentelle Zellforschung

Archiv für die gesamte Physiologie des Menschen und der Tiere (Pflügers)

ABBREVIATED TITLE	FULL TITLE
<i>Arch. intern. pharmacodynamie</i>	Archives internationales de pharmacodynamie et de thérapie
<i>Arch. ital. biol.</i>	Archives italiennes de biologie
<i>Arch. Path.</i>	Archives of Pathology
<i>Arch. Pharm.</i>	Archiv der Pharmazie
<i>Arch. sci. phys. nat.</i>	Archives des sciences physiques et naturelles, Genève
<i>Arkiv Kemi Mineral. Geol.</i>	Arkiv för Kemi, Mineralogi och Geologi
<i>Atti accad. Lincei</i>	Atti della reale accademia dei Lincei
<i>Atti accad. Torino</i>	Atti della reale accademia delle scienze di Torino
<i>Atti Congr. naz. chim. pura applicata</i>	Atti del congresso nazionale di chimica pura ed applicata
<i>Beitr. ch. Physiol. Pathol.</i>	Beiträge zur chemischen Physiologie und Pathologie
<i>Ber.</i>	Berichte der deutschen chemischen Gesellschaft
<i>Ber. deut. pharm. Ges.</i>	Berichte der deutschen pharmazeutischen Gesellschaft
<i>Ber. ges. Physiol. expil. Pharmakol.</i>	Berichte über die gesamte Physiologie und experimentelle Pharmakologie
<i>Ber. Schimmel & Co.</i>	Bericht der Schimmel & Co. Aktien-Gesellschaft Miltitz Bz. Leipzig über ätherische Öle, Riechstoffe usw.
<i>Berzelius-Jahresber.</i>	Jahresberichte über die Fortschritte der physischen Wissenschaften 1822-'41, Jahresberichte über die Fortschritte der Chemie 1842-'51 von Jacob Berzelius
<i>Biochem. J.</i>	The Biochemical Journal
<i>Biochem. Z.</i>	Biochemische Zeitschrift
<i>Boll. chim. farm.</i>	Bollettino chimico-farmaceutico
<i>Boll. lega Ital. lotta contro cancro</i>	Bollettino della lega Italiana per la lotta contro il cancro
<i>Bot. Ztg.</i>	Botanische Zeitung
<i>Brennstoff-Ch.</i>	Brennstoff-Chemie
<i>Brit. J. Exptl. Path.</i>	British Journal of Experimental Pathology
<i>Brit. Med. J.</i>	British Medical Journal
<i>Bul. chim. soc. română stiinte</i>	Buletinul de chimie pură si aplicată societatea română de stiinte
<i>Bul. chim. soc. române chim.</i>	Buletinul de chimie pură si aplicată al societății române de chimie
<i>Bul. soc. chim. România</i>	Buletinul societății de chimie din România
<i>Bul. soc. stiinte Bucuresti</i>	Buletinul societății de stiinte din Bucuresti, România
<i>Bul. soc. stiinte Cluj</i>	Buletinul societății de stiinte din Cluj
<i>Bull. acad. imp. sci. St. Ptersbourg</i>	Bulletin de l'académie impériale des sciences
<i>Bull. acad. roy. méd. Belg.</i>	Bulletin de l'académie royale de médecine de Belgique
<i>Bull. acad. sci. U.R.S.S.</i>	Bulletin de l'académie des sciences de l' Union des Républiques Soviétiques Socialistes, Classe des sciences mathématiques et naturelles
<i>Bull. assoc. franç. cancer</i>	Bulletin de l'association française du cancer
<i>Bull. Ch. Soc. Japan</i>	Bulletin of the Chemical Society of Japan
<i>Bull. Imp. Inst.</i>	Bulletin of the Imperial Institute
<i>Bull. Inst. Phys. Ch. Research</i>	Bulletin of the Institute of Physical and Chemical Research (Tokyo)
<i>Bull. intern. acad. polon.</i>	Bulletin international de l'académie polonaise des sciences et des lettres, Classe des sciences mathématiques et naturelles, before 1919 Bulletin international de l'académie des sciences de Cracovie
<i>Bull. Jardin bot. Buitenzorg</i>	Bulletin du Jardin botanique de Buitenzorg
<i>Bull. sci. acad. roy. Belg.</i>	Bulletin de la classe des sciences, académie royale de Belgique
<i>Bull. sci. pharmacol.</i>	Bulletin des sciences pharmacologiques

ABBREVIATED TITLE	FULL TITLE
<i>Bull. sect. sci. acad. roumaine</i>	Bulletin de la section scientifique de l'académie roumaine
<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 et Recueil des travaux chimiques belges
<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. pharm. Bordeaux</i>	Bulletin des travaux de la société de pharmacie de Bordeaux
<i>Bull. soc. vaudoise sci. natur.</i>	Bulletin de la société vaudoise des sciences naturelles
<i>C. A.</i>	Chemical Abstracts
<i>Can. J. Research</i>	Canadian Journal of Research
<i>Ch. Met. Eng.</i>	Chemical and Metallurgical Engineering
<i>Ch. News</i>	Chemical News
<i>Ch. Reviews</i>	Chemical Reviews
<i>Ch. Trade J.</i>	Chemical Trade Journal
<i>Ch. Umschau Fette, Öle</i>	Chemische Umschau auf dem Gebiete der Fette, Öle, Wachse und Harze
<i>Ch. Weekbl.</i>	Chemisch Weekblad
<i>Ch. Ztbl.</i>	Chemisches Zentralblatt
<i>Ch. Ztg.</i>	Chemiker-Zeitung
<i>Chemistry & Industry</i>	Chemistry & Industry
<i>Chimie & industrie</i>	Chimie & industrie
<i>Collection Czechoslov.</i>	Collection of Czechoslovak Chemical Communications
<i>Color Trade J.</i>	Color Trade Journal; since 1923 Color Trade Journal and Textile Chemist
<i>Compt. rend.</i>	Comptes rendus hebdomadaires des séances de l'académie des sciences
<i>Compt. rend. soc. biol.</i>	Comptes rendus hebdomadaires des séances de la société de biologie et de ses filiales et associées
<i>Compt. rend. trav. labor. Carlsberg</i>	Comptes-rendus des travaux du laboratoire Carlsberg
<i>Crell's Ch. Ann.</i>	Chemische Annalen für die Freunde der Naturlehre, Arzneigelahrtheit, Haushaltungskunst und Manufacturen: von D. Lorenz Crell
<i>Current Science</i>	Current Science
<i>Dermatol. Wochschr.</i>	Dermatologische Wochenschrift
<i>Deut. Apoth. Ztg.</i>	Deutsche Apotheker Zeitung
<i>Deut. Arch. klin. Med.</i>	Deutsches Archiv für klinische Medizin
<i>Deut. med. Wochschr.</i>	Deutsche medizinische Wochenschrift
<i>Elektroch. Z.</i>	Elektrochemische Zeitschrift
<i>Endocrinology</i>	Endocrinology
<i>Endokrinologie</i>	Endokrinologie
<i>Farben-Ztg.</i>	Farben-Zeitung
<i>Gazz.</i>	Gazzetta chimica italiana
<i>Ges. Abhandl. Kenntnis Kohle</i>	Gesammelte Abhandlungen zur Kenntnis der Kohle
<i>Giorn. chim. ind. applicata</i>	Giornale di chimica industriale ed applicata
<i>Helv.</i>	Helvetica Chimica Acta
<i>Helv. Phys. Acta</i>	Helvetica Physica Acta
<i>Ind. Eng. Ch.</i>	Industrial and Engineering Chemistry, before 1923
<i>Ind. Eng. Ch. Anal. Ed.</i>	Journal of.... Industrial and Engineering Chemistry, Analytical Edition
<i>Indian Forest Records</i>	The Indian Forest Records
<i>Indian J. Med. Research</i>	Indian Journal of Medical Research
<i>Indian J. Phys.</i>	Indian Journal of Physics

ABBREVIATED TITLE

FULL TITLE

Industria Chimica
Jahresber. Ch.

Industria Chimica
Jahresbericht über die Fortschritte der Chemie und
verwandter Teile anderer Wissenschaften

Jahresber. Pharm.

Jahresbericht der Pharmazie

J. Am. Ch. Soc.

Journal of the American Chemical Society

J. Am. Med. Assoc.

Journal of the American Medical Association

J. Am. Pharm. Assoc.

Journal of the American Pharmaceutical Association

J. Applied Ch. U.S.S.R.

Journal of Applied Chemistry U.S.S.R.

J. Bact.

Journal of Bacteriology

J. Biochem.

The Journal of Biochemistry (Japan)

J. Biol. Ch.

The Journal of Biological Chemistry

J. Ch. Education

Journal of Chemical Education

J. Ch. Physics

The Journal of Chemical Physics

J. Ch. Soc.

Journal of the Chemical Society (London)

J. Ch. Soc. Japan

Journal of the Chemical Society of Japan

J. chim. phys.

Journal de chimie physique et revue générale des
colloïdes

J. Chinese Ch. Soc.

Journal of the Chinese Chemical Society

J. Exptl. Biol.

Journal of Experimental Biology

J. Exptl. Med.

Journal of Experimental Medicine

J. Exptl. Zool.

The Journal of Experimental Zoology

J. Gen. Ch. U.S.S.R.

Journal of General Chemistry U.S.S.R.

J. Gen. Physiol.

Journal of General Physiology

J. Indian Ch. Soc.

Journal of the Indian Chemical Society, vols. 2—4

J. Indian Inst. Sci.

The Quarterly Journal of...

Journal of the Indian Institute of Science

Journal of Industrial and Engineering Chemistry, see
Industrial and Engineering Chemistry

J. Lab. Clin. Med.

Journal of Laboratory and Clinical Medicine

J. Optical Soc. Am.

Journal of the Optical Society of America

J. Org. Ch.

Journal of Organic Chemistry

J. Path. Bact.

Journal of Pathology and Bacteriology

J. pharm. Belg.

Journal de pharmacie de Belgique

J. pharm. chim.

Journal de pharmacie et de chimie

J. Pharmacol.

Journal of Pharmacology and Experimental Thera-
peutics

J. Phys. Ch.

Journal of Physical Chemistry

J. Phys. Ch. U.S.S.R.

Journal of Physical Chemistry U.S.S.R.

J. phys. radium

Journal de physique et le radium

J. Physiol.

Journal of Physiology

J. physiol. path. gén.

Journal de physiologie et de pathologie générale

J. pr. Ch.

Journal für praktische Chemie

J. Proc. Roy. Soc. N. S. Wales

Journal and Proceedings of the Royal Society of New
South Wales

J. Roy. Soc. W. Australia

Journal of the Royal Society of Western Australia

J. Russ. Phys. Ch. Soc.

Journal of the Russian Physical-Chemical Society

J. Soc. Ch. Ind.

Journal of the Society of Chemical Industry

J. Soc. Ch. Ind. Japan

Journal of the Society of Chemical Industry of Japan

J. Soc. Dyers Colourists

Journal of the Society of Dyers and Colourists

Kgl. Norske Vidensk. Selsk. Skrifter

Kongelige Norske Videnskabers Selskabs, Skrifter

Klin. Wochschr.

Klinische Wochenschrift

Kolloid-Beihefte

Kolloid-Beihefte; before 1931 Kolloidchemische
Beihefte

Kolloid-Z.

Kolloid-Zeitschrift

Lancet

The Lancet

ABBREVIATED TITLE	FULL TITLE
<i>Landw. Vers.-Sta.</i>	Die landwirtschaftlichen Versuchs-Stationen
<i>Medizin und Chemie</i>	Medizin und Chemie
<i>Med. Klinik</i>	Medizinische Klinik
<i>Mem. accad. science Bologna</i>	Memorie dell' accademia delle scienze dell' istituto di Bologna
<i>Mem. Coll. Sci. Kyoto</i>	Memoirs of the College of Science Kyoto Imperial University
<i>Mikrochemie</i>	Mikrochemie
<i>Monatsh.</i>	Monatshefte für Chemie und verwandte Teile anderer Wissenschaften
<i>Münch. med. Wochschr.</i>	Münchener medizinische Wochenschrift
<i>Nachr. Ges. Wiss. Göttingen, math.-phys. Klasse</i>	Nachrichten von der Gesellschaft der Wissenschaften zu Göttingen, mathematisch-physikalische Klasse
<i>Nature</i>	Nature (London)
<i>Naturwiss.</i>	Die Naturwissenschaften
<i>Natuurw. Tijdschr.</i>	Natuurwetenschappelijk Tijdschrift
<i>Neues Repert. Pharm.</i>	Neues Repertorium für Pharmazie
<i>Oesterr. botan. Ztschr.</i>	Oesterreichische botanische Zeitschrift
<i>Org. Synth.</i>	Organic Syntheses
<i>Parfumerie moderne</i>	La Parfumerie moderne
<i>Perfumery Essential Oil Record</i>	The Perfumery and Essential Oil Record
<i>Petroleum Z.</i>	Petroleum, Zeitschrift für die gesamten Interessen der Mineralöl-Industrie und des Mineralöl-Handels
<i>Pharm. Acta Helv.</i>	Pharmaceutica Acta Helvetiae
<i>Pharm. J.</i>	The Pharmaceutical Journal; before 1895 The Pharmaceutical Journal and Transactions
<i>Pharm. Weekbl.</i>	Pharmaceutisch Weekblad
<i>Pharm. Zentralh.</i>	Pharmazeutische Zentralhalle
<i>Pharm. Ztg.</i>	Pharmazeutische Zeitung
<i>Philippine J. Sci.</i>	The Philippine Journal of Science
<i>Philos. Mag.</i>	Philosophical Magazine
<i>Philos. Trans. Roy. Soc. London</i>	Philosophical Transactions of the Royal Society London
<i>Phot. Korr.</i>	Photographische Korrespondenz
<i>Phys. Rev.</i>	The Physical Review
<i>Physics</i>	Physics
<i>Physik. Ber.</i>	Physikalische Berichte
<i>Physik. Z.</i>	Physikalische Zeitschrift
<i>Physik. Z. Sowjetunion</i>	Physikalische Zeitschrift der Sowjetunion
<i>Physiol. Rev.</i>	Physiological Reviews
<i>Planta</i>	Planta
<i>Poggendorff's Ann.</i>	see <i>Ann. Physik</i>
<i>Proc. Am. Pharm. Assoc.</i>	Proceedings of the American Pharmaceutical Association
<i>Proc. Imp. Acad. Japan</i>	Proceedings of the Imperial Academy Japan
<i>Proc. Indian Acad. Sci.</i>	Proceedings of the Indian Academy of Sciences
<i>Proc. Indiana Acad. Sci.</i>	Proceedings of the Indiana Academy of Science
<i>Proc. Kon. Akad. Wet. Amsterdam</i>	Proceedings of the Koninklijke Akademie van Wetenschappen te Amsterdam
<i>Proc. Nat. Acad. Sci.</i>	Proceedings of the National Academy of Sciences U.S.A.
<i>Proc. Phys. Soc. London</i>	Proceedings of the Physical Society London
<i>Proc. Roy. Soc. London</i>	Proceedings of the Royal Society London
<i>Proc. Roy. Soc. Queensland</i>	Proceedings of the Royal Society of Queensland
<i>Proc. Soc. Exptl. Biol. Med.</i>	Proceedings of the Society for Experimental Biology and Medicine

ABBREVIATED TITLE

FULL TITLE

<i>Proc. Trans. Roy. Soc. Canada</i>	Proceedings and Transactions of the Royal Society of Canada
<i>Przemysl Chemiczny</i>	Przemysl Chemiczny
<i>Quart. J. Exptl. Physiol.</i>	Quarterly Journal of Experimental Physiology
<i>Rec. trav. chim.</i>	Recueil des travaux chimiques des Pays-Bas
<i>Rend. ist. lombardo sci.</i>	Rendiconti reale istituto lombardo di scienze e lettere
<i>Rend. sem. fac. sci. reale univ. Cagliari</i>	Rendiconti del seminario della facoltà de scienze della reale università di Cagliari
<i>Repert. Pharm.</i>	Repertorium für die Pharmazie
<i>Rev. gén. colloides</i>	Revue générale des colloides
<i>Revue gén. mat. color.</i>	Revue générale des matières colorantes de la teinture, de l'impression et des apprêts
<i>Roczniki Chemji</i>	Roczniki Chemji
<i>Schweiz. Apoth. Ztg.</i>	Schweizerische Apotheker Zeitung
<i>Schweiz. med. Wochschr.</i>	Schweizerische medizinische Wochenschrift
<i>Schweiz. Wochschr. Ch. Pharm.</i>	Schweizerische Wochenschrift für Chemie und Pharmazie
<i>Sci. Papers Inst. Phys. Ch. Research</i>	Scientific Papers of the Institute of Physical and Chemical Research, Tokyo
<i>Science</i>	Science
<i>Scientia Pharm.</i>	Scientia Pharmaceutica
<i>Silliman's Am. J.</i>	The American Journal of Science and Arts. Conducted by B. Silliman
<i>Sitzber. Akad. Wiss. Wien</i>	Sitzungsberichte der Akademie der Wissenschaften in Wien, mathematisch-naturwissenschaftliche Klasse
<i>Sitzber. Heidelberger Akad. Wiss.</i>	Sitzungsberichte der Heidelberger Akademie der Wissenschaften
<i>Sitzber. königl. böhm. Ges. Wiss.</i>	Sitzungsberichte der königlichen böhmischen Gesellschaft der Wissenschaften
<i>Sitzber. math.-phys. Klasse bayer. Akad. Wiss. München</i>	Sitzungsberichte der mathematisch-physikalischen Klasse der bayerischen Akademie der Wissenschaften zu München
<i>Skand. Arch. Physiol.</i>	Skandinavisches Archiv für Physiologie
<i>Strahlentherapie</i>	Strahlentherapie
<i>Süddeut. Apoth. Ztg.</i>	Süddeutsche Apotheker Zeitung
<i>Therap. Monatsh.</i>	Therapeutische Monatshefte
<i>Trans. Am. Electroch. Soc.</i>	Transactions of the American Electrochemical Society
<i>Trans. Faraday Soc.</i>	Transactions of the Faraday Society
<i>Trans. Roy. Soc. Edinburgh</i>	Transactions of the Royal Society of Edinburgh
<i>Trans. Sci. Ch. Pharm. Inst. (Moscow)</i>	Transactions of the Scientific Chemical-Pharmaceutical Institute (Moscow)
<i>Tumori</i>	Tumori
<i>Verhandl. deut. physik. Ges.</i>	Verhandlungen der deutschen physikalischen Gesellschaft
<i>Verhandl. physic. med. Ges. Würzburg</i>	Verhandlungen der physikalisch-medicinischen Gesellschaft in Würzburg
<i>Versl. Kon. Akad. Wet. Amsterdam</i>	Verslagen der Koninklijke Akademie van Wetenschappen te Amsterdam
<i>Virchow's Arch. path. Anat.</i>	Virchow's Archiv für pathologische Anatomie und Physiologie und für klinische Medizin
<i>Wien. klin. Wochschr.</i>	Wiener klinische Wochenschrift
<i>Wien. med. Wochschr.</i>	Wiener medizinische Wochenschrift
<i>Wiss. Ber. Moskau Staatsuniv.</i>	Wissenschaftliche Berichte der Moskauer Staatsuniversität

ABBREVIATED TITLE	FULL TITLE
<i>Wiss. Veröffentl. Siemens-Konzern</i>	Wissenschaftliche Veröffentlichungen aus dem Siemens-Konzern
<i>Z. anal. Ch.</i>	Zeitschrift für analytische Chemie
<i>Z. ang. Ch.</i>	Zeitschrift für angewandte Chemie, see <i>Angewandte Chemie</i>
<i>Z. anorg. Ch.</i>	Zeitschrift für anorganische und allgemeine Chemie
<i>Z. Biol.</i>	Zeitschrift für Biologie
<i>Z. Elektroch.</i>	Zeitschrift für Elektrochemie und angewandte physikalische Chemie
<i>Z. exper. Path. Therapie</i>	Zeitschrift für experimentelle Pathologie und Therapie
<i>Z. Farbenind.</i>	Zeitschrift für Farbenindustrie; before 1905 Zeitschrift für Farben- und Textilchemie, and Zeitschrift für Farben- und Textilindustrie
<i>Z. f. Ch.</i>	Zeitschrift für Chemie
<i>Z. ges. exper. Med.</i>	Zeitschrift für die gesamte experimentelle Medizin
<i>Z. Immunitätsf.</i>	Zeitschrift für Immunitätsforschung und experimentelle Therapie
<i>Z. klin. Med.</i>	Zeitschrift für klinische Medizin
<i>Z. Krebsforsch.</i>	Zeitschrift für Krebsforschung
<i>Z. Krist.</i>	Zeitschrift für Kristallographie, Kristallgeometrie, Kristallphysik, Kristallchemie
<i>Z. Physik</i>	Zeitschrift für Physik
<i>Z. physik. Ch.</i>	Zeitschrift für physikalische Chemie
<i>Z. physiol. Ch.</i>	Hoppe-Seyler's Zeitschrift für physiologische Chemie
<i>Ztbl. Bakt. Parasitenk.</i>	Zentralblatt für Bakteriologie, Parasitenkunde und Infektionskrankheiten
<i>Z. Untersuch. Lebensm.</i>	Zeitschrift für Untersuchung der Lebensmittel; before 1926 Zeitschrift für Untersuchung der Nahrungs- und Genussmittel
<i>Z. Vitaminforsch.</i>	Zeitschrift für Vitaminforschung
<i>Z. wiss. Mikroskopie</i>	Zeitschrift für wissenschaftliche Mikroskopie und mikroskopische Technik
<i>Z. wiss. Phot.</i>	Zeitschrift für wissenschaftliche Photographie

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