

ELSEVIER'S ENCYCLOPÆDIA *of*

ORGANIC CHEMISTRY

Edited by F. RADT

Series III

CARBOISOCYCLIC CONDENSED COMPOUNDS

Volume 14

SUPPLEMENT

**TETRACYCLIC AND HIGHER-CYCLIC COMPOUNDS
EXCEPT STEROIDS AND TRITERPENES**

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ELSEVIER'S ENCYCLOPEDIA

of

ORGANIC CHEMISTRY

FOUNDED BY

(The late) E. JOSEPHY AND F. RADT

ELSEVIER'S ENCYCLOPÆDIA

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PREFACE

The present Supplement to Volume 14 covers the literature from 1937 to 1946*, and runs in continuity with the Main Volume which treats the literature up to and including 1936. Since the appearance of the Main Volume, work has been intensively pursued especially in the field of the poly-isocyclic compounds; this refers not only to the steroids, but also above all to those compounds which have been investigated by virtue of their established or supposed carcinogenic action. The Supplement has thus assumed such proportions as to necessitate its division into two parts. The volume first appearing contains all tetra- and higher-isocyclic compounds with the exception of the steroids and triterpenes, which will form the contents of the second part.

To give an idea of the extent of the literature of the years 1937-1946 in relation to the whole of the literature up to 1937, it may be of value here to quote the number of the pages devoted to the description of several ring systems in the Main Volume and in the Supplement: 1,2-benzanthracene, 14 and 130; benzanthrene, 18 and 64; chrysene, 13 and 80; cholanthrene, 2 and 37; 1,2;5,6-dibenzanthracene, 4 and 31; 3,4-benzopyrene, 2 and 64.

This expansion is to some extent occasioned by the fact that the Supplement, in contrast to the Main Volume, embraces patents.

In the period for which the literature is covered by the Supplement, not only have ring systems already known in 1937 been further investigated, but also quite new systems have been described; the number of ring systems has during this 10-year period undergone a 60 % increase, as may be seen from the following table:

* Investigations which involve a change of structure of substances previously described in the literature are — as is the practice in the Encyclopædia — taken into consideration up to the latest possible date.

NUMBER OF KNOWN POLY-ISOCYCLIC RING SYSTEMS

	Before 1937	Added 1937-46	Total
Tetracyclic	61	17	78
Pentacyclic	72	38	110
Hexacyclic	42	41	83
Heptacyclic	25	21	46
Octacyclic	10	12	22
Nonacyclic	14	9	23
Deca- and higher-cyclic	9	7	16
	233	145	378

Summaries of all the ring systems known up to 1946, including those described in the Main Volume, are to be found at the appropriate places in the Supplement (see "Contents", p. VII). In other summaries also (e.g. methylchrysenes, p. 246 S; carcinogenic properties of 1.2-benzanthracene derivatives, p. 104 S) are combined all the data relating to the periods for which the literature is covered by both the Main and Supplementary Volumes; the same applies to the subject and formula indexes.

Most ring systems are introduced by a detailed schematic survey of the various methods of formation of the nucleus concerned; these sections on "Formation of the Nucleus" relate likewise to both Main and Supplementary Volumes; in the first place the occurrence in nature and in technical products (coal-tar, lignite-tar, etc.) is dealt with, next syntheses from systems with fewer carbon atoms, then formation by rearrangement of systems with an equal number of carbon atoms, and finally formation by degradation from more complicated systems.

Page numbers followed by an "S" refer to the Supplement; those without an "S" refer to the Main Volume.

We are pleased to offer here our thanks, already expressed in detail in the Main Volume, for the assistance rendered to us, by virtue of the loan of books and periodicals, by the *Koninklijke Akademie van Wetenschappen*, Amsterdam, and by various departments and laboratories of the Universities etc. of Amsterdam and other places in Holland, and to various commercial enterprises.

It is a pleasure to acknowledge our indebtedness to the many authors who helped us to clear up contradictions in the literature.

Amsterdam, July, 1951.

F. RADT

GENERAL SURVEY

SERIES I. ALIPHATIC COMPOUNDS

- Vol. 1. Hydrocarbons, halogen, and nitrogen compounds
- „ 2. Hydroxy- and keto-compounds
- „ 3. Carboxylic acids, S-, Se-, Te-, P-, As-, and metal compounds

SERIES II. CARBOISOCYCLIC NON-CONDENSED COMPOUNDS

- Vol. 4. Compounds with 3, 4, 5, 7 or more ring-members
- „ 5-11. Compounds with 6 ring-members

A. MONOCYCLIC SIX-MEMBERED RING COMPOUNDS

- „ 5. Hydrocarbons and halogen compounds
- „ 6. Nitro-, nitroso-, hydroxylamino-, amino-, hydrazino-, diazo-, azo-, azoxy-, triazeno-, triazo-, and other nitrogen compounds
- „ 7. Hydroxy-compounds
- „ 8. Keto-compounds
- „ 9. Carboxylic acids
- „ 10. S-, Se-, Te-, P-, As-, and metal compounds

B. POLYCYCLIC NON-CONDENSED SIX-MEMBERED RING COMPOUNDS

- „ 11. Biphenyl, diphenylmethane, etc.; terphenyl, triphenylmethane, etc.; compounds with 4 phenyl groups, etc.

SERIES III. CARBOISOCYCLIC CONDENSED COMPOUNDS

- Vol. 12. Bicyclic compounds
- „ 13. Tricyclic compounds
- „ 14. Tetra- and higher-cyclic compounds

SERIES IV. HETEROCYCLIC COMPOUNDS

- Vol. 15. Heterocyclic compounds with 1 N
- „ 16. Heterocyclic compounds with 2 and more N
- „ 17. Heterocyclic compounds with 1 and more O
- „ 18. Heterocyclic compounds with N and O; with S, Se, or other elements

GENERAL INDEXES

- Vol. 19. General Subject Index and Group Index
- „ 20. General Formula Index

* This does not refer to heterocyclic compounds.

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 répétition 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 — halogenoaminophenols — 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 has been inserted at that place where the alternative 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 connexion with the first product of known composition obtained in their degradation. These natural products which are scattered throughout 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 formation 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, then formation by rearrangement of systems with an equal number of carbon atoms, and finally by methods of formation by degradation of more complicated systems.

TABLE OF ABBREVIATIONS EMPLOYED IN THE TEXT

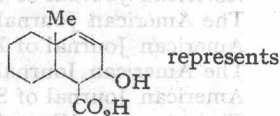
[α]	specific rotation ($[\alpha]_{D}^{20}$, for 20°)	ca.	about
Å	Angström unit(s)	cal.	calorie(s)
abs.	absolute	calcd.	calculated
absorpt.	absorption	c.c.	cubic centimetre(s)
Ac	acetyl (AcCl, acetyl chloride; Ac ₂ O, acetic anhydride)	cf.	compare
addn.	addition	cm.	centimetre(s)
alc.	alcohol, alcoholic	coeff.	coefficient
alk.	alkaline	compd.	compound
alkali	caustic alkali	compn.	composition
Am	amyl	conc.	concentrated
amp.	ampere(s)	concn.	concentration
amt.	amount	cond.	conductivity
anh.	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
av.	average	D	Debye unit (10^{-18} e.s.u. × cm.)
b.	(followed by a figure denoting temperature) boils at, boiling at	d	density (d_4^{15} , specific gravity at 15° referred to water at 4°)
bacteriol.	bacteriological	dec.	decomposed, decomposition
biol.	biological	deriv.	derivative
b.p.	boiling point	det.	determine
Bu	n-butyl	detd.	determined
Bz	benzoyl (BzCl, benzoyl chloride)	detn.	determination
		dextroroty.	dextrorotatory
		diazotd.	diazotized
		diazotn.	diazotization
		dil.	dilute

dild.	diluted	lb.	pound(s)
diln.	dilution	M.	molar
dispn.	dispersion	M	(with subscript) molecular refraction
dissoc.	dissociate(s)	m.	(followed by a figure denoting temperature) melts at, mel- ting at; also metre(s)
dissocd.	dissociated	ma.	milliampere(s)
dissocn.	dissociation	max.	maximum, maxima
distd.	distilled	Me	methyl (MeOH, methanol)
distg.	distilling	meth.	methyl alcoholic
distn.	distillation	mg.	milligram(s)
elec.	electric, electrical	min.	minimum; also minute(s)
e.m.f.	electromotive force	mixt.	mixture
equil.	equilibrium	ml.	millilitre(s)
equiv.	equivalent	mm.	millimetre(s)
Et	ethyl (Et ₂ O, ethyl ether)	mμ	10 ⁻⁶ mm. (10 Å)
evap.	evaporate	mmt.	moment
evapd.	evaporated	mol.	molecule, molecular, mole
evapg.	evaporating	m.p.	melting point
evapn.	evaporation	mutarotn.	mutarotation
evoln.	evolution	mv.	millivolt(s)
examn.	examination	n	index of refraction (n_D^{20} for 20° and sodium light)
expt.	experiment	N	normal (as applied to concn.)
exptl.	experimental	neg.	negative
extrd.	extracted	no.	number
extrg.	extracting	obtd.	obtained
extrn.	extraction	occ.	occurrence
fluoresc.	fluorescence	opt. act.	optically active
fmn.	formation	org.	organic
f.p.	freezing point	oxid.	oxidized
fwd.	followed	oxidn.	oxidation
g.	gram(s)	p.	page
γ	microgram(s)	Pat.	Patent; see Table of Periodi- cals under country of issue
H ₂ SO ₄	conc. sulphuric acid	pathol.	pathological
hr.	hour	petrol. ether	petroleum ether
hydrol.	hydrolysis	Ph	phenyl
hydrold.	hydrolysed	pharmacol.	pharmacological
inorg.	inorganic	phys.	physical
insol.	insoluble	physiol.	physiological
isold.	isolated	pos.	positive
isoln.	isolation	powd.	powdered
°K.	°Kelvin	pp.	pages
kg.	kilogram(s)	ppt.	precipitate
kg.-cal.	kilogram calorie(s)		
kv.	kilovolt(s)		
kw.	kilowatt(s)		
l.	litre(s)		
laevoroty.	laevorotatory		

pptd.	precipitated	satd.	saturated
pptg.	precipitating	satg.	saturating
pptn.	precipitation	satn.	saturation
Pr	propyl	sec.	second(s), secondary
prepd.	prepared	sepd.	separated
prepg.	preparing	sepg.	separating
prepn.	preparation	sepn.	separation
prim.	primary	sol.	soluble
priv. comm.	private communication	soln.	solution
prod.	product	soly.	solubility
pyr.	pyridine	sp.	specific
qual.	qualitative	sp. gr.	specific gravity
quant.	quantitative	spectr.	spectrum
rac.	racemic	sq. in.	square inch
recrystd.	recrystallized	subl.	sublimes
recrystn.	recrystallization	subln.	sublimation
red.	reduced	subst.	substance
redn.	reduction	sym.	symmetrical
ref.	references	synth.	synthesis
resoln.	resolution	temp.	temperature
resp.	respectively	tert.	tertiary
rn.	reaction	unsatd.	unsaturated
rotn.	rotation	v.	volt(s)
roty.	rotatory	vac.	vacuum
sapon.	saponification	vol.	volume
sapond.	saponified	w.	watt(s)
sapong.	saponifying	wt.	weight

REPRODUCTION OF STRUCTURAL FORMULAE

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



represents

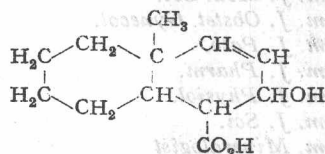


TABLE OF PERIODICALS

ABBREVIATED TITLE

Abhandl. deut. Bunsen Ges.
Acta Acad. Aboensis, Math. Phys.
Acta Brevia Neerland.

Acta Chem. Scand.
Acta Dermatol.

Acta Forestalia Fennicae
Acta Lit. Sci. Univ. Hung.
Sect. Chem. Mineral. Phys.

Acta Lit. Sci. Univ. Hung. Sect.
Sci. Nat.

Acta Med. Scand.
Acta Physicochim. U.R.S.S.
Acta Phys. Polon.
Acta Phytochim.
Acta Polon. Pharm.
Acta Univ. Latviensis, Kim.
Fakult. Serija

Akust. Z.
Am. Ch. J.
Am. Dyestuff Reprtr.
Am. Gas Assoc., Proc.

Am. Gas J.
Am. J. Botany
Am. J. Cancer
Am. J. Hyg.
Am. J. Med. Sci.
Am. J. Obstet. Gynecol.
Am. J. Path.
Am. J. Pharm.
Am. J. Physiol.
Am. J. Sci.
Am. Mineralogist
Am. Paint J.
Am. Perfumer Essent. Oil Rev.
Am. Rev. Tuberc.
Anales asoc. quim. Argentina
Anales fis. quim.
Anales soc. cient. argentina

FULL TITLE

Abhandlungen der deutschen Bunsen-Gesellschaft
 Acta Academiae Aboensis, Mathematica et Physica
 Acta Brevia Neerlandica de Physiologia, Pharmacologia, Microbiologia, e.a.

Acta Chemica Scandinavica
 Acta Dermatologica (Dermatologia, Syphilidologia et Urologia) (Japan)

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

Acta Litterarum ac Scientiarum Regiae Universitatis Hungaricae Francisco-Josephinae. Sectio Scientiarum Naturalium

Acta Medica Scandinavica
 Acta Physicochimica U.R.S.S.
 Acta Physica Polonica
 Acta Phytochimica (Japan)
 Acta Poloniae Pharmaceutica
 Acta Universitatis Latviensis, Kimijas Fakultates

Serija
 Akustische Zeitschrift
 American Chemical Journal
 American Dyestuff Reporter
 American Gas Association, Proceedings of the Annual Convention

American Gas Journal
 American Journal of Botany
 The American Journal of Cancer
 The American Journal of Hygiene
 American Journal of the Medical Sciences
 American Journal of Obstetrics and Gynecology
 The American Journal of Pathology
 American Journal of Pharmacy
 The American Journal of Physiology
 American Journal of Science
 The American Mineralogist
 American Paint Journal
 The American Perfumer and Essential Oil Review
 The American Review of Tuberculosis
 Anales de la asociación química Argentina
 Anales de física y química (Madrid)
 Anales de la sociedad científica argentina

ABBREVIATED TITLE	FULL TITLE
<i>Anales soc. españ. fs. quim.</i>	Anales de la sociedad española de física y química
<i>Analyst</i>	The Analyst
<i>Angew. Ch.</i>	Angewandte Chemie; before 1932 Zeitschrift für angewandte Chemie; between 1942 and 1944 incl. Die Chemie
<i>Ann.</i>	Annalen der Chemie, Justus Liebig's
<i>Ann. Acad. Sci. Fennicae</i>	Annales Academiae Scientiarum Fennicae
<i>Ann. acad. sci. tech. Varsovie</i>	Annales de l'académie des sciences techniques à Varsovie
<i>Ann. Applied Biol.</i>	The Annals of Applied Biology
<i>Ann. Botany</i>	Annals of Botany
<i>Ann. chim.</i>	Annales de chimie; before 1914 Annales de chimie et de physique
<i>Ann. chim. anal. chim. appl.</i>	Annales de chimie analytique et de chimie appliquée et Revue de chimie analytique réunies
<i>Ann. chim. applicata</i>	Annali di chimica applicata
<i>Ann. combustibles liquides</i>	Annales de l'office national des combustibles liquides
<i>Ann. faculté sci. Marseille</i>	Annales de la faculté des sciences de Marseille
<i>Ann. fals.</i>	Les annales des falsifications et des fraudes
<i>Ann. inst. anal. phys.-chim. (U.S.S.R.)</i>	Annales de l'institut d'analyse physico-chimique (U.S.S.R.)
<i>Ann. inst. Pasteur</i>	Annales de l'institut Pasteur
<i>Ann. jardin bot. Buitenzorg</i>	Annales du Jardin botanique de Buitenzorg
<i>Ann. méd. légale</i>	Annales de médecine légale de criminologie, police scientifique, médecine sociale, et toxicologie
<i>Ann. mines & carburants</i>	Annales des mines & carburants
<i>Ann. Philosophy</i>	Annals of Philosophy
<i>Ann. phys.</i>	Annales de physique
<i>Ann. Physik</i>	Annalen der Physik; before 1900 Annalen der Physik und Chemie (Poggendorff; Wiedemann)
<i>Ann. Rept. Agr. and Hort. Research Sta., Long Ashton, Bristol</i>	The Annual Report of the Agricultural and Horticultural Research Station (The National Fruit and Cider Institute), Long Ashton, Bristol
<i>Ann. sci. École normale</i>	Annales scientifiques de l'École Normale Supérieure
<i>Ann. sci. univ. Jassy</i>	Annales scientifiques de l'université de Jassy
<i>Ann. soc. sci. Bruxelles</i>	Annales de la société scientifique de Bruxelles
<i>Ann. Surgery</i>	Annals of Surgery
<i>Ann. univ. Lyon</i>	Annales de l'université de Lyon
<i>Ann. zymol.</i>	Annales de zymologie
<i>Annual Reports</i>	Annual Reports on the Progress of Chemistry, London
<i>Apoth. Ztg.</i>	Apotheker Zeitung
<i>Arb. biol. Reichsanstalt Land- u. Forstw.</i>	Arbeiten aus der biologischen Reichsanstalt für Land- und Forstwirtschaft, Berlin-Dahlem
<i>Arb. kais. Gesundh.</i>	Arbeiten aus dem Kaiserlichen Gesundheitsamte
<i>Arb. Pharm. Inst. Univ. Berlin</i>	Arbeiten aus dem Pharmazeutischen Institut der Universität Berlin
<i>Arb. physiol. u. angew. Entomol.</i>	Arbeiten über physiologische und angewandte Entomologie aus Berlin-Dahlem
<i>Arb. Reichsgesundh. Arbeitsschutz</i>	Arbeiten aus dem Reichsgesundheitsamte Arbeitsschutz, Unfallverhütung, Gewerbehygiene. Sonderausgabe des Reichsarbeitsblattes
<i>Arch. Dermatol. Syphilol.</i>	Archives of Dermatology and Syphilology
<i>Arch. Dermatol. u. Syphilis</i>	Archiv für Dermatologie und Syphilis
<i>Arch. expil. Path. Pharmakol.</i>	Archiv für experimentelle Pathologie und Pharmakologie

ABBREVIATED TITLE

Arch. exptl. Zellforsch.
Arch. farmacol. sper.
Arch. fisiol.
Arch. ges. Physiol.

Arch. Hyg. Bakt.
Arch. Internal Med.
Arch. intern. pharmacodynamie

Arch. ital. biol.
Arch. Math. Naturvidenskab
Arch. néerland. physiol.

Arch. Path.
Arch. Pharm.
Arch. phys. biol.

Arch. Schiffs- u. Tropen-Hyg.

Arch. sci. phys. nat.

Arch. Surg.

Arch. wiss. u. prakt. Tierheilk.

Arkiv Hem. i Farm.

Arkiv Kemi Mineral. Geol.

Asphalt u. Teer, Strassenbautech.

Astrophys. J.

Atti accad. Italia, Rend.

Atti accad. Lincei

Atti accad. Lincei, Mem.

Atti accad. Torino

Atti Congr. naz. chim. pura applicata

Australian Chem. Inst., J. & Proc.

Australian J. Exptl. Biol. Med. Sci.

Australian Pat.

Austrian Pat.

Automobiltech. Z.

Auto-Techn.

Beitr. ch. Physiol. Pathol.

Belg. Pat.

Ber.

Ber. Afdeel. Handelsmuseum

Ver. Kolon. Inst.

Ber. deut. botan. Ges.

FULL TITLE

Archiv für experimentelle Zellforschung
 Archivio di Farmacologia sperimentale e Scienze affini
 Archivio di fisiologia

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

Archiv für Hygiene und Bakteriologie
 The Archives of Internal Medicine

Archives internationales de pharmacodynamie et de thérapie

Archives italiennes de biologie

Archiv for Mathematik og Naturvidenskab

Archives néerlandaises de physiologie de l'homme et des animaux

Archives of Pathology

Archiv der Pharmazie

Archives de physique biologique et de chimie-physique des corps organisés; before 1930 Archives de physique biologique

Archiv für Schiffs- und Tropen-Hygiene, Pathologie und Therapie exotischer Krankheiten

Archives des sciences physiques et naturelles, Genève

Archives of Surgery

Archiv für wissenschaftliche und praktische Tierheilkunde

Arkiv za Hemiju i Farmaciju

Arkiv för Kemi, Mineralogi och Geologi

Asphalt und Teer, Strassenbautechnik

The Astrophysical Journal

Atti della reale accademia d'Italia. Rendiconti della classe di scienze fisiche, matematiche e naturali

Atti della reale accademia dei Lincei. Rendiconti della classe di scienze fisiche, matematiche e naturali; since 1921 Atti della reale accademia nazionale dei Lincei;

since 1946 Atti della accademia nazionale dei Lincei

Atti della reale accademia dei Lincei. Memorie della classe di scienze fisiche, matematiche e naturali

Atti della reale accademia delle scienze di Torino

Atti del congresso nazionale di chimica pura ed applicata

The Australian Chemical Institute Journal & Proceedings

The Australian Journal of Experimental Biology and Medical Science

Australian Patent

Austrian Patent

Automobiltechnische Zeitschrift

Auto-Technik

Beiträge zur chemischen Physiologie und Pathologie
 Belgian Patent

Berichte der deutschen chemischen Gesellschaft; since 1947 Chemische Berichte

Berichten van de Afdeeling Handelsmuseum van de Koninklijke Vereeniging Koloniaal Instituut

Berichte der deutschen botanischen Gesellschaft

ABBREVIATED TITLE	FULL TITLE
<i>Ber. deut. pharm. Ges.</i>	Berichte der deutschen pharmazeutischen Gesellschaft
<i>Ber. Ges. Kohlentechn.</i>	Berichte der Gesellschaft für Kohlentechnik
<i>Ber. ges. Physiol. expitl. Pharmakol.</i>	Berichte über die gesamte Physiologie und experimentelle Pharmakologie
<i>Ber. K. Sächs. Ges. Wiss. Math.-phys. Kl.</i>	Berichte über die Verhandlungen der Königl. Sächsischen Gesellschaft der Wissenschaften zu Leipzig, Mathematisch-physische Klasse; since 1919 Berichte über die Verhandlungen der Sächsischen Akademie der Wissenschaften zu Leipzig, Mathematisch-physische Klasse
<i>Ber. Schimmel & Co.</i>	Bericht der Schimmel & Co. Aktien-Gesellschaft Miltitz Bz. Leipzig über ätherische Öle, Riechstoffe usw.
<i>Ber. ungar. pharm. Ges.</i>	Berichte der ungarischen pharmazeutischen Gesellschaft
<i>Berlin. klin. Wochschr.</i>	Berliner klinische Wochenschrift
<i>Berlin. tierärztl. Wochschr.</i>	Berliner tierärztliche Wochenschrift
<i>Berlin. u. Münch. tierärztl. Wochschr.</i>	Berliner und Münchener tierärztliche Wochenschrift
<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>Biokhimiya</i>	Biokhimiya
<i>Biol. Bull.</i>	The Biological Bulletin
<i>Biol. Zentr.</i>	Biologisches Zentralblatt
<i>Boissiera</i>	Boissiera (Geneva)
<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>Boll. soc. adriatica sci. nat. Trieste</i>	Bollettino della società adriatica di scienze naturali in Trieste
<i>Boll. soc. ital. biol. sper.</i>	Bollettino della società italiana di biologia sperimentale
<i>Bot. Ztg.</i>	Botanische Zeitung
<i>Botan. Gaz.</i>	The Botanical Gazette
<i>Braunkohlenarch.</i>	Das Braunkohlenarchiv
<i>Brennstoff-Ch.</i>	Brennstoff-Chemie
<i>Brit. Assoc. Advancement Sci., Rept.</i>	British Association for the Advancement of Science, Report of the Annual Meeting
<i>Brit. J. Expil. Path.</i>	The British Journal of Experimental Pathology
<i>Brit. J. Ophthalmol.</i>	The British Journal of Ophthalmology
<i>Brit. Med. J.</i>	The British Medical Journal
<i>Brit. Pat.</i>	British Patent
<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. române stiinte</i>	Buletinul societății române de stiinte, Bucuresti-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. Pétersbourg</i>	Bulletin de l'académie impériale des sciences de St. Pétersbourg
<i>Bull. acad. méd.</i>	Bulletin de l'académie de médecine

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<i>Bull. acad. roy. méd. Belg.</i>	Bulletin de l'académie royale de médecine de Belgique
<i>Bull. acad. roy. sci. Belg.</i>	Bulletins de l'académie royale des sciences, des lettres et des beaux-arts de Belgique
<i>Bull. acad. sci. Russie</i>	Bulletin de l'académie des sciences de Russie
<i>Bull. Acad. Sci. United Provinces Agra Oudh, India</i>	Bulletin of the Academy of Sciences of the United Provinces of Agra and Oudh, Allahabad, India
<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. étude cancer</i>	Bulletin de l'association française pour l'étude du cancer
<i>Bull. biol. méd. exptl. U.R.S.S.</i>	Bulletin de biologie et de médecine expérimentale de l'U.R.S.S.
<i>Bull. Ch. Soc. Japan</i>	Bulletin of the Chemical Society of Japan
<i>Bull. classe sci., Acad. roy. Belg.</i>	Bulletin de la classe des sciences, Académie royale de Belgique (Mededeelingen van de Klasse der Wetenschappen, Koninklijke Belgische Academie)
<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. inst. pin</i>	Bulletin de l'institut du pin
<i>Bull. inst. recherches biol. Perm</i>	Bulletin de l'institut des recherches biologiques de Perm
<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. mat. grasses</i>	Bulletin des matières grasses de l'institut colonial de Marseille
<i>Bull. sci. acad. roy. Belg.</i>	Bulletin de la classe des sciences, académie royale de Belgique
<i>Bull. sci. école polytech. Timisoara</i>	Bulletin scientifique de l'école polytechnique de Timisoara
<i>Bull. sci. ind. Roure-Bertrand fils</i>	see <i>Recherches Roure-Bertrand fils</i>
<i>Bull. sci. pharmacol.</i>	Bulletin des sciences pharmacologiques
<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. franç. minéral.</i>	Bulletin de la société française de minéralogie
<i>Bull. soc. ind. Mulhouse</i>	Bulletin de la société industrielle de Mulhouse
<i>Bull. soc. minéral. France</i>	Bulletin de la société minéralogique de France
<i>Bull. soc. naturalistes Moscou</i>	Bulletin de la société des naturalistes de Moscou
<i>Bull. soc. pharm. Bordeaux</i>	Bulletin des travaux de la société de pharmacie de Bordeaux
<i>Bull. soc. roumaine phys.</i>	Bulletin de la société roumaine de physique
<i>Bull. soc. sci. Bretagne</i>	Bulletin de la société scientifique de Bretagne. Sciences mathématiques, physiques, et naturelles
<i>Bull. soc. sci. Bucarest</i>	Bulletin de la société des sciences de Bucarest-Roumanie
<i>Bull. soc. vaudoise sci. natur.</i>	Bulletin de la société vaudoise des sciences naturelles
<i>Bull. Torrey Botan. Club</i>	Bulletin of the Torrey Botanical Club

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<i>Bull. univ. Asia centrale</i>	Bulletin de l'université de l'Asie centrale
<i>Bur. Standards J. Research</i>	Bureau of Standards Journal of Research
<i>C. A.</i>	Chemical Abstracts
<i>Cancer Research</i>	Cancer Research
<i>Can. J. Research</i>	Canadian Journal of Research
<i>Can. Pat.</i>	Canadian Patent
<i>Caoutchouc & gutta-percha</i>	Le caoutchouc & la gutta-percha
<i>Časopis Českoslov. Lékárnictva</i>	Časopis Československého Lékárnictva
<i>Cellulosechemie</i>	Cellulosechemie
<i>Cereal Chem.</i>	Cereal Chemistry
<i>Ch. Industrie</i>	Die Chemische Industrie
<i>Ch. Met. Eng.</i>	Chemical and Metallurgical Engineering
<i>Ch. News</i>	The Chemical News and Journal of Industrial Science
<i>Ch. Reviews</i>	Chemical Reviews
<i>Ch. Trade J.</i>	The 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>Chem. Age (London)</i>	The Chemical Age (London)
<i>Chem. App.</i>	Chemische Apparatur
<i>Chem. Ind. (Germany)</i>	Die Chemische Industrie
<i>Chem. Industries</i>	Chemical Industries
<i>Chem. Listy</i>	Chemické Listy pro vědu a průmysl
<i>Chem. Zelle u. Gewebe</i>	Chemie der Zelle und Gewebe
<i>Chemist and Druggist</i>	The Chemist and Druggist
<i>Chemistry & Industry</i>	Chemistry & Industry
<i>Chimica e industria (Milan)</i>	La Chimica e l'industria (Milan)
<i>Chimie & industrie</i>	Chimie & industrie
<i>Chinese J. Physiol.</i>	The Chinese Journal of Physiology
<i>Coke Smokeless-Fuel Age</i>	Coke and Smokeless-Fuel Age Incorporating Coal Carbonisation
<i>Col. Ind.</i>	Colour Index (F. M. Rowe), 1st Ed. (1924) with Supplement (1928)
<i>Collection Czechoslov.</i>	Collection of Czechoslovak Chemical Communications
<i>Collegium</i>	Collegium
<i>Colloid Symposium Annual</i>	Colloid Symposium Annual; formerly Colloid Symposium Monograph
<i>Colloid Symposium Monograph</i>	Colloid Symposium Monograph
<i>Color Trade J.</i>	Color Trade Journal; since 1923 Color Trade Journal and Textile Chemist
<i>Communs. Phys. Lab. Univ. Leiden</i>	Communications from the Physical Laboratory of the University of Leiden
<i>Compt. rend.</i>	Comptes rendus hebdomadaires des séances de l'académie des sciences
<i>Compt. rend. acad. sci. U.R.S.S.</i>	Comptes rendus (Doklady) de l'académie des sciences de l'U.R.S.S.
<i>Compt. rend. congr. soc. savantes Paris</i>	Comptes rendus du congrès des sociétés savantes de Paris et des départements
<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. soc. phys. hist. nat. Genève</i>	Compte rendu des séances de la société de physique et d'histoire naturelle de Genève
<i>Compt. rend. trav. labor. Carlsberg</i>	Comptes-rendus des travaux du laboratoire Carlsberg