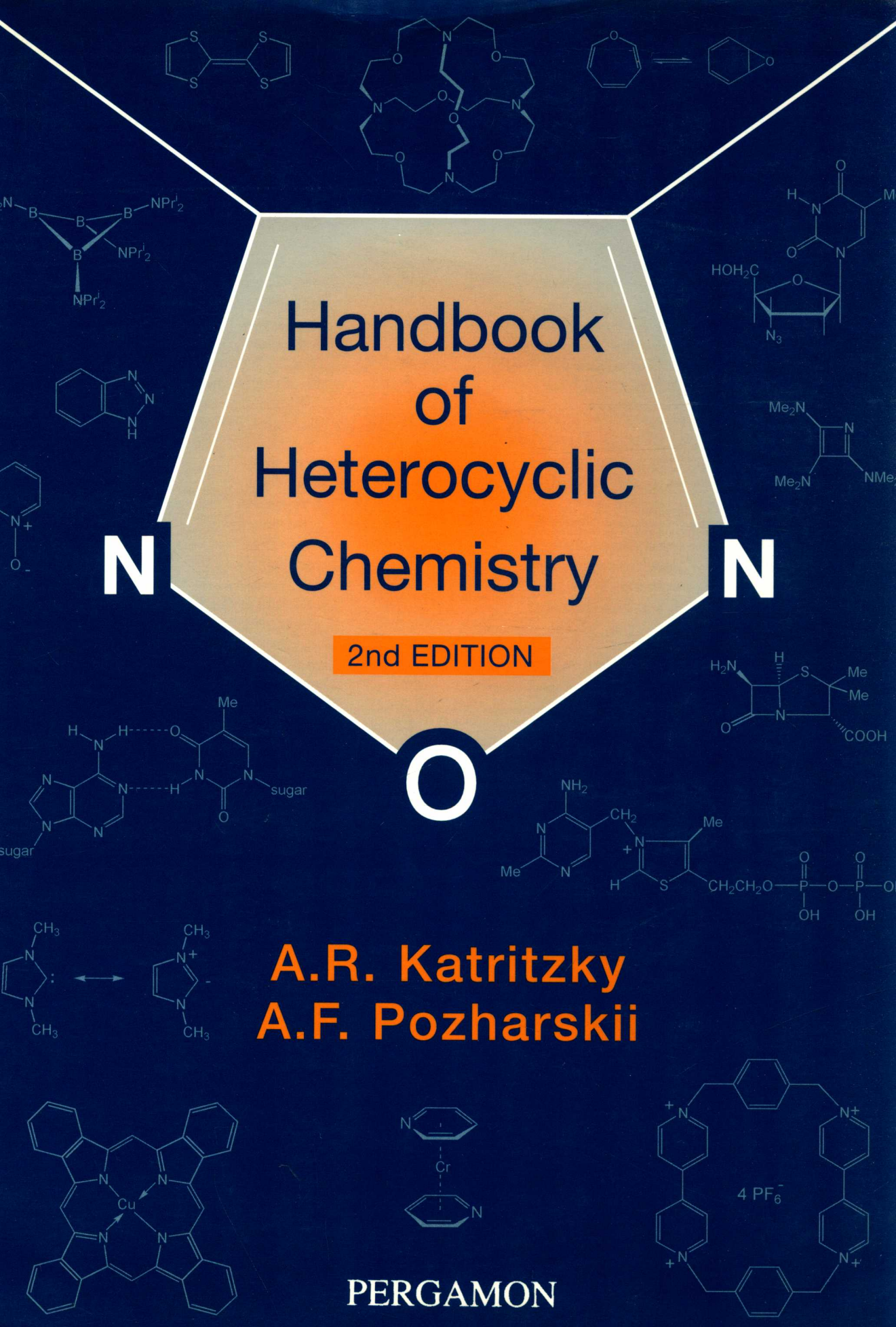


Handbook of Heterocyclic Chemistry

2nd EDITION

A.R. Katritzky
A.F. Pozharskii

PERGAMON



HANDBOOK OF HETEROCYCLIC CHEMISTRY

SECOND EDITION 2000

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University of Florida, USA

ALEXANDER F. POZHARSKII

University of Rostov, Russia

2000



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JOURNAL CODES FOR REFERENCES

For explanation of the reference system, see p. 5

ABC	Agric. Biol. Chem.	CHEC-II	Comp. Heterocycl. Chem., 2 nd edition
ACH	Acta Chim. Acad. Sci. Hung.	CI(L)	Chem. Ind. (London)
ACR	Acc. Chem. Res.	CJC	Can. J. Chem.
AC(R)	Ann. Chim. (Rome)	CL	Chem. Lett.
ACS	Acta Chem. Scand.	COS	Comp. Org. Synth.
ACS(A)	Acta Chem. Scand., Ser. A	CPB	Chem. Pharm. Bull.
ACS(B)	Acta Chem. Scand., Ser. B	CPH	Chem. Phys.
AF	Arzneim.-Forsch.	CPL	Chem. Phys. Lett.
AG	Angew. Chem.	CR	C.R. Hebd. Seances Acad. Sci.
AG(E)	Angew. Chem., Int. Ed. Engl.	CR(B)	C.R. Hebd. Seances Acad. Sci., Ser. B.
AHC	Adv. Heterocycl. Chem.	CR(C)	C.R. Hebd. Seances Acad. Sci., Ser. C.
AJC	Aust. J. Chem.	CRV	Chem. Rev.
AK	Ark. Kemi	CS	Chem. Scr.
ANY	Ann. N.Y. Acad. Sci.	CSC	Cryst. Struct. Commun.
AP	Arch. Pharm. (Weinheim, Ger.)	CSR	Chem. Soc. Rev.
APO	Adv. Phys. Org. Chem.	CZ	Chem.-Ztg.
AX	Acta Crystallogr.	DIS	Diss. Abstr.
AX(B)	Acta Crystallogr., Part B	DIS(B)	Diss. Abstr. Int. B
AX(C)	Acta Crystallogr., Part C	DOK	Dokl. Akad. Nauk SSSR
AQ(C)	An. Quim.	E	Experientia
B	Biochemistry	EGP	Ger. (East) Pat.
BAP	Bull. Acad. Pol. Sci., Ser.	EUP	Eur. Pat.
BAU	Bull. Acad. Sci. USSR, Div. Chem. Sci.	FES	Farmaco Ed. Sci.
BBA	Biochim. Biophys. Acta	FOR	Fortschr. Chem. Org. Naturst.
BBR	Biochem. Biophys. Res. Commun.	FRP	Fr. Pat.
BCJ	Bull. Chem. Soc. Jpn.	G	Gazz. Chim. Ital.
BEP	Belg. Pat.	GEP	Ger. Pat.
BJ	Biochem. J.	GEP(O)	Ger. Pat. Offen.
BJP	Br. J. Pharmacol.	H	Heterocycles
BKS	Bull. Korean Chem. Soc.	HC	Chem. Heterocycl. Compd. [Weissberger-Taylor series]
BMS	Bioorg. Med. Chem. Lett.	HCA	Helv. Chim. Acta
BRP	Br. Pat.	HOU	Methoden Org. Chem. (Houben-Weyl)
BSP	Bull. Soc. Chim. Belg.	IC	Inorg. Chem.
BSF	Bull. Soc. Chim. Fr.	ICA	Inorg. Chem. Acta
BSF(2)	Bull. Soc. Chim. Fr., Part 2	IJC	Indian J. Chem.
C	Chimia	IJC(B)	Indian J. Chem., Sect. B
CA	Chem. Abstr.	IJS	Int. J. Sulfur Chem.
CAR	Carbohydr. Res.	IJS(B)	Int. J. Sulfur Chem., Part B
CB	Chem. Ber.	IZV	Izv. Akad. Nauk SSSR, Ser. Khim.
CBR	Chem. Br.	JA	J. Am. Chem. Soc.
CC	J. Chem. Soc., Chem. Commun.	JAP	Jpn. Pat.
CCA	Croat. Chem. Acta	JAP(K)	Jpn. Kokai
CCC	Collect. Czech. Chem. Commun.	JBC	J. Biol. Chem.
CCR	Coord. Chem. Rev.		
CHE	Chem. Heterocycl. Compd. (Engl. Transl.)		
CHEC	Comp. Heterocycl. Chem., 1 st edition		

Continuation of
JOURNAL CODES FOR REFERENCES

JC	J. Chromatogr.	OS	Org. Synth.
JCC	J. Coord. Chem.	OSC	Org. Synth., Coll. Vol.
JCI	I. Chem. Inf. Comput. Sci.	P	Phytochemistry
JCO	J. Comput. Chem.	PAC	Pure Appl. Chem.
JCP	J. Chem. Phys.	PC	Personal Communication
JCR(M)	J. Chem. Res. (M)	PH	'Photochemistry of Heterocyclic Compounds', ed. O. Buchardt, Wiley, New York, 1976
JCR(S)	J. Chem. Res. (S)		
JCS	J. Chem. Soc.	PHA	Pharmazie
JCS(C)	J. Chem. Soc. (C)	PHC	Prog. Heterocycl. Chem.
JCS(D)	J. Chem. Soc., Dalton Trans.	PIA	Proc. Indian Acad. Sci.
JCS(F1)	J. Chem. Soc., Faraday Trans. 1	PIA(A)	Proc. Indian Acad. Sci., Sect. A
JCS(P1)	J. Chem. Soc., Perkin Trans. 1	PJC	Pol. J. Chem.
JCS(P2)	J. Chem. Soc., Perkin Trans. 2	PMH	Phys. Methods Heterocycl. Chem.
JGU	J. Gen. Chem. USSR (Engl. Transl.)	PNA	Proc. Natl. Acad. Sci. USA
JHC	J. Heterocycl. Chem.	PS	Phosphorus Sulfur
JIC	J. Indian Chem. Soc.	QR	Q. Rev., Chem. Soc.
JMC	J. Med. Chem.	RCR	Russ. Chem. Rev. (Engl. Transl.)
JMR	J. Magn. Reson.	RRC	Rev. Roum. Chim.
JOC	J. Org. Chem.	RTC	Recl. Trav. Chim. Pays-Bas
JOM	J. Organomet. Chem.	S	Synthesis
JOU	J. Org. Chem. USSR (Engl. Transl.)	SA	Spectrochim. Acta
JPC	J. Phys. Chem.	SA(A)	Spectrochim. Acta, Part A
JPO	J. Phys. Org. Chem.	SAP	S. Afr. Pat.
JPR	J. Prakt. Chem.	SC	Synth. Commun.
JPS	J. Pharm. Sci.	SH	W. L. F. Armarego, 'Stereochemistry of Heterocyclic Compounds', Wiley, New York, 1977, parts 1 and 2
JSP	J. Mol. Spectrosc.		
JST	J. Mol. Struct.	SL	Synlett
K	Kristallografiya	SR	Sulfur Reports
KFZ	Khim.-Farm. Zh.	SST	Org. Compd. Sulphur, Selenium, Tellurium [R. Soc. Chem. series]
KGS	Khim. Geterotsikl. Soedin.	SUL	Sulfur Letters
LA	Liebigs Ann. Chem.	T	Tetrahedron
M	Monatsh. Chem.	TA	Tetrahedron: Asymmetry
MC	Mendelev Communcations	TAL	Talanta
MI	Miscellaneous [book or journal]	TCA	Theor. Chim. Acta
MIP	Miscellaneous Pat.	TH	Thesis IJC(B)
MRC	Magn. Reson. Chem.	TL	Tetradron Lett.
MS	Q. N. Porter and J. Baldas, 'Mass Spectrometry of Heterocyclic Compounds', Wiley, New York, 1971	UKZ	Ukr. Khim. Zh. (Russ. Ed.)
		UP	Unpublished Results
N	Naturwissenschaften	URP	USSR Pat.
NAT	Nature	USP	U.S. Pat.
NEP	Neth. Pat.	YZ	Yakugaku Zasshi
NJC	Nouv. J. Chim.	ZAAC	Z. Anorg. Allg. Chem.
NKK	Nippon Kagaku Kaishi	ZC	Z. Chem.
NMR	T. J. Batterham, 'NMR Spectra of Simple Heterocycles', Wiley, New York, 1973	ZN	Z. Naturforsch.
		ZN(A)	Z. Naturforsch., Teil A
		ZN(B)	Z. Naturforsch., Teil B
OM	Organometallics	ZOB	Zh. Obshch. Khim.
OMR	Org. Magn. Reson.	ZOR	Zh. Org. Khim.
OMS	Org. Mass Spectrom.	ZPC	Hoppe-Seyler's Z. Physiol. Chem.
OPP	Org. Prep. Proced. Int.	ZPH	Zh. Phys. Khim.
OR	Org. React.	ZPK	Zh. Prikl. Khim.

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Foreword to Second Edition of "Handbook of Heterocyclic Chemistry"

In the fourteen years since the first edition of this Handbook (Handbook-I) was published much has happened. In particular, "Comprehensive Heterocyclic Chemistry-II" (CHEC-II) has been published, updating "Comprehensive Heterocyclic Chemistry" (CHEC), on which the first edition of the Handbook was based. In view of the very large volume of heterocyclic chemistry which has appeared, it was essential to thoroughly revise and update the Handbook for its second edition.

In this endeavor the original author of Handbook-I has been joined by Alexander Pozharskii of the University of Rostov, Russia. We have adopted for Handbook-II (for the most part) the arrangement and classification of Handbook-I. However, a large amount of new material has been added, most of which has been taken from the 10 volumes of CHEC-II. In many instances we have utilized pieces of actual text and structural schemes directly from CHEC-II. Because of the close relationship to CHEC and to CHEC-II, the Foreword, Introduction to CHEC-II and Short Contents of both CHEC and CHEC-II are reprinted as part of the "Part I: Preliminaries" of Handbook-II. Just as for Handbook-I, the organization of Handbook-II follows that of the CHEC and CHEC-II rather closely except in the case of ring synthesis, and Chapter 1.3 of the "Handbook" describes these divergencies.

The authors of the Handbook-II have many acknowledgments to make for help. We particularly thank Charles Rees, Eric Scriven and John Zoltewicz who have read the work in its entirety. We are most grateful for the technical assistance from Ms. Hong Wu, Dr. Olga V. Denisko, Dr. O. V. Dyablo, Dr. A. V. Gulevskaya, Mr. S. Kakasyev and Ms. V. N. Stepanova and to Dr. Linde Katritzky for her constant support.

The updating required to produce Handbook-II has not been an easy one, and we are quite aware that there are numerous deficiencies. Many hard decisions had to be made to keep the overall length within reasonable bounds. The choice of what to put in and what to leave out was often difficult, and we have probably overlooked many important contributions that should have been included. Despite our best efforts, undoubtedly errors remain and we, the authors, take full responsibility for them.

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