Houben-Weyl

Methods of Organic Chemistry

Additional and Supplementary Volumes to the 4th Edition
Editorial Board: K.H. Büchel, J. Falbe, H. Hagemann, M. Hanack, D. Klamann, R. Kreher, H. Kropf, M. Regitz, E. Schaumann

Vol. E 10 a

Organo-Fluorine Compounds

Fluorinating Agents and Their Application in Organic Synthesis

Publication Year
1998

ISBN (Print)
978-3-13-218004-8

Thieme

METHODS OF
ORGANIC CHEMISTRY

METHODS OF ORGANIC CHEMISTRY

(HOUBEN-WEYL)

ADDITIONAL AND SUPPLEMENTARY VOLUMES TO THE 4TH EDITION

GEORG THIEME VERLAG STUTTGART · NEW YORK

VOLUME E 10a

ORGANO-FLUORINE COMPOUNDS

Editors

B. Baasner
BAYER AG, Leverkusen / Germany

H. Hagemann
BAYER AG, Leverkusen / Germany

J.C. Tatlow
Birmingham / Great Britain

Authors

J.L. Adcock
Knoxville, TN / USA

R.E. Banks
Manchester / Great Britain

A. Bulan
Leverkusen / Germany

J. Burdon
Birmingham / Great Britain

K.O. Christe
Edwards AFB, CA / USA

W. Dmowski
Warsaw / Poland

G.G. Furin
Novosibirsk / Russia

U. Groß
Berlin / Germany

D. Hage
Catoosa, OK / USA

G.B. Hammond
North Dartmouth, MA / USA

M.M. Kremlev
Kiev / Ukraine

R.J. Lagow
Austin, TX / USA

B. Langlois
Lyon / France

D. Meshri
Catoosa, OK / USA

R. Miethchen
Rostock / Germany

R. Perry
Manchester / Great Britain

D. Peters
Rostock / Germany

K. Pohmer
Leverkusen / Germany

R.L. Powell
Runcorn / Great Britain

M.H. Rock
Copenhagen / Denmark

S. Rozen
Tel Aviv / Israel

St. Rüdiger
Rangsdorf / Germany

G. Siegemund
Hofheim, Taunus / Germany

J. Stölting
Leverkusen / Germany

L.R. Subramanian
Tübingen / Germany

J.C. Tatlow
Birmingham / Great Britain

T. Tojo
Kagawa-Ken / Japan

K. Ulm
Burghausen / Germany

N. Watanabe
Kyoto / Japan

L.M. Yagupolskii
Kiev / Ukraine

Yu.L. Yagupolskii
Kiev / Ukraine

M. Zupan
Ljubljana / Slovenia

19 99

GEORG THIEME VERLAG STUTTGART · NEW YORK

This book mentions numerous commercial and proprietary trade names, registered trademarks and the like (not necessarily marked as such), patents, production and manufacturing procedures, registered designs and designations. The Editors and Publishers wish to point out very clearly that the present legal situation in respect of these names or designations or trademarks must be carefully examined before making any commercial use of the same. Industrially produced apparatus and equipment are included to a necessarily restricted extent only and any exclusion of products not mentioned in this book does not imply that any such selection of exclusion has been based on quality criteria or quality considerations. This reference work has been written by experts. The user must be advised that the handling of chemicals and microorganisms carries possible risks. Additional dangers might theoretically occur through quantities being incorrectly given. The authors, editors and publishers took the utmost care that the quantities and experimental details described reflected the current state of the art of science when the work was published. The authors, editors and publishers take no responsibility as to the correctness of the content. Every user is strongly advised that it is their own responsibility to carefully check whether quantities, experimental details or other information are correct from their own understanding as a scientist. In cases of doubt, the user is advised to seek the opinion of an expert in the field, the publishers, the editors or the authors. When using the information described herein, the user is ultimately responsible for their own actions and consequences arising thereof.

Die Deutsche Bibliothek – CIP-Einheitsaufnahme

Methoden der organischen Chemie / (Houben-Weyl). –
Stuttgart ; New York : Thieme. –
Teilw. begr. von Eugen Müller und Otto Bayer. – Teilw. begr. von Eugen Müller ... Fortgef. von Heinz Kropf. – Erw.- und Folgebd. zur 4. Aufl. hrsg. von K.H. Büchel ...
Teilw. u.d.T.: Methods of organic chemistry

Additional and suppl. vol. to the 4th ed.
Vol. E 10a. Organo fluorine compounds /
ed. B. Baasner ... Authors J.L. Adcock. –
1999

Library of Congress Card No.: applied for

Date of publication 21.12.1998

Typesetting and printing: Tutte Druckerei GmbH, D-94121 Salzweg-Passau

ISBN 3-13-218004-1

Preface

Organo-fluorine compounds have become increasingly important in the last 50 years, as synthetic routes to them have been developed; very few occur naturally. Their chemical behavior covers the entire range from inertness to high reactivity and their physical properties show unique features. These characteristics have led to many specialist uses in various fields particularly as inert fluids, polymers (e.g., Teflon), elastomers, surfactants, surface treatment agents, and fire extinguishers. These properties are also very important in biological and medicinal applications (e.g., the pharmaceutical Prozac and the fluoroquinolone antibiotics) and agriculture (e.g., Trifluralin).

Houben-Weyl Vol. E 10 Organo-Fluorine Compounds is a critical survey of the academic and patent literature, organized in a systematic and structured way.

In Volume E 10a, an introduction section details the history of the subject (including the role played by F. Swarts), an outline of nomenclature, physical and physicochemical properties, elemental analysis, structure determination, toxicity, and applications of these extraordinarily interesting compounds. This is followed by Section A which details the diverse range of fluorinating agents used to make C–F bonds, covering everything from hydrogen fluoride to high valence oxidizing metal fluorides. In Volume E 10b described in detail in Section B are methods for the synthesis of fluorinated compounds from organo-fluorine precursors (the building block approach), while in Section C are outlined general reactions and reactivity of organo-fluorides. Those familiar with the Houben-Weyl series will know that in 1962 a volume (5/3) detailing methods for the preparation of organo-fluorine compounds, written in German, was first published and it is still cited as a source of information even today. Houben-Weyl Vol. E 10 Organo-Fluorine Compounds is written in the same tradition by leading experts in the field and will prove to be an invaluable tool for the student and researcher alike well into the next millennium.

Special thanks are due to all the authors who wrote their chapters with dedication and care and who have shown a lot of perserverance with this project. Moreover we are indebted to the editorial staff at Georg Thieme Verlag and all their technical coworkers for their support and help throughout each stage in the production of this volume.

Bernd Baasner
Leverkusen

Hermann Hagemann
Leverkusen

John Colin Tatlow
Birmingham

December 1998

Contents to all Volumes

Table of Contents

Volume E 10a