Science of Synthesis

Hetarenes and Related Ring Systems

Six-Membered Hetarenes with One Nitrogen or Phosphorus Atom

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Science of Synthesis

Science of Synthesis is the authoritative and comprehensive reference work for the entire field of organic and organometallic synthesis.

Science of Synthesis presents the important synthetic methods for all classes of compounds and includes:
- Methods critically evaluated by leading scientists
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- Schemes and tables which illustrate the reaction scope
Category 2
Volume 15

Hetarenes and Related Ring Systems
Six-Membered Hetarenes with One Nitrogen or Phosphorus Atom

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Preface

As our understanding of the natural world increases, we begin to understand complex phenomena at molecular levels. This level of understanding allows for the design of molecular entities for functions ranging from material science to biology. Such design requires synthesis and, as the structures increase in complexity as a necessity for specificity, puts increasing demands on the level of sophistication of the synthetic methods. Such needs stimulate the improvement of existing methods and, more importantly, the development of new methods. As scientists confront the synthetic problems posed by the molecular targets, they require access to a source of reliable synthetic information. Thus, the need for a new, comprehensive, and critical treatment of synthetic chemistry has become apparent. To meet this challenge, an entirely new edition of the esteemed reference work Houben–Weyl Methods of Organic Chemistry will be published starting in the year 2000.

To reflect the new broader need and focus, this new edition has a new title, Science of Synthesis, Houben–Weyl Methods of Molecular Transformations. Science of Synthesis will benefit from more than 90 years of experience and will continue the tradition of excellence in publishing synthetic chemistry reference works. Science of Synthesis will be a balanced and critical reference work produced by the collaborative efforts of chemists, from both industry and academia, selected by the editorial board. All published results from journals, books, and patent literature from the early 1800s until the year of publication will be considered by our authors, who are among the leading experts in their field. The 48 volumes of Science of Synthesis will provide chemists with the most reliable methods to solve their synthesis problems. Science of Synthesis will be updated periodically and will become a prime source of information for chemists in the 21st century.

Science of Synthesis will be organized in a logical hierarchical system based on the target molecule to be synthesized. The critical coverage of methods will be supported by information intended to help the user choose the most suitable method for their application, thus providing a strong foundation from which to develop a successful synthetic route. Within each category of product, illuminating background information such as history, nomenclature, structure, stability, reactivity, properties, safety, and environmental aspects will be discussed along with a detailed selection of reliable methods. Each method and variation will be accompanied by reaction schemes, tables of examples, experimental procedures, and a background discussion of the scope and limitations of the reaction described.

The policy of the editorial board is to make Science of Synthesis the ultimate tool for the synthetic chemist in the 21st century.

We would like to thank all of our authors for submitting contributions of such outstanding quality, and, also for the dedication and commitment they have shown throughout the entire editorial process.

The Editorial Board

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October 2000
This is the seventh volume in the series of nine covering the synthetic chemistry of Hetar-
ены and Related Ring Systems, which make up Category 2 of Science of Synthesis. The
nine volumes are arranged with a progression of structures ranging from smaller to larg-
er ring sizes, and incorporate within their framework increasing numbers and diversity
of heteroatoms. Volume 15 describes the methods for synthesis of six-membered hetar-
enes with one nitrogen or phosphorus atom. It follows the volume dealing with six-mem-
bered hetarenes with one chalcogen, and precedes the volume with sections on six-mem-
bered hetarenes containing two identical heteroatoms. As the present volume deals with
major hetarenes such as pyridines, quinolines and isoquinolines, including the related
pyridinones, quinolinones and isoquinolinones, it is very substantial in size. These rather
mature hetarenes together make up approximately 75% of the volume content. The re-
mainng nitrogen heterocyclic systems: the quinolizinium salts, naphthyridines, acrid-
dines (and acridinones) and phenanthridines (and phenanthridinones) are relatively
short, but no less interesting in their particular ways. The sections on the related phos-
phorus systems are also relatively brief, reflecting the rather recent but nevertheless
growing development of this area.

The syntheses of most of the hetarenes have been the subject of previous volumes of
Houben–Weyl, those with nitrogen heteroatoms appearing in Volumes E 7a and E 7b,
and those with phosphorus heteroatoms appearing in Volume E 1. There are some differ-
ences between the style of Houben–Weyl and Science of Synthesis. The former was
comprehensive in its coverage, while the latter is more selective. Furthermore, the Houb-
ben–Weyl coverage of pyridines, quinolines, isoquinolines, acridines and phenanthri-
dines did not include formal consideration of the related pyridinones, quinolinones, iso-
quinolinones, acridinones and phenanthridinones. While the current authors would
have found the Houben–Weyl accounts of great use as a source of early literature, they
have had to exercise their expert judgment in selecting the most appropriate material
and then organising it, together with newer material, into quite a different kind of cover-
age. Given the inclusion of specific experimental instructions in both series, it is not sur-
prising that some of the Houben–Weyl examples are quite deliberately and sensibly car-
ried over into Science of Synthesis. The “on-line” nature of the access to experimental
methods in Science of Synthesis provides a dramatic technical advance since Houben–
Weyl was published, and promises to be a major benefit of the current series.

I should like to thank all the authors, who have put such an enormous and altruistic
effort into this volume, for the benefit of the synthetic chemical community. They have
shown serious expertise in their fields, sound judgment, great dedication and considera-
ble patience to bring this volume to fruition. They are to be credited with the high level of
scientific quality displayed. In many cases, the vast amount of literature led to more
lengthy initial contributions, which were then carefully pruned to try and reduce the
overall enormity of the volume. I am also indebted to the publishing team at all levels,
for their total professionalism, efficiency, and friendly working style. In particular, I
should like to thank Dr Joe Richmond, who helped me in the planning and organizational
stages, Dr Fiona Shortt de Hernandez, the Managing Editor, and her team, including Lind-
sey Sturdy, Dr. Karen Muirhead and Leigh Murray, who were always available for detailed
advice and help, and finally Dr Kay Greenfield, whose outstanding copyediting played a
major part in delivering the volume as you see it.

Volume Editor

Sydney, November 2004
Volume 15:  
Six-Membered Hetarenes  
with One Nitrogen or Phosphorus Atom

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