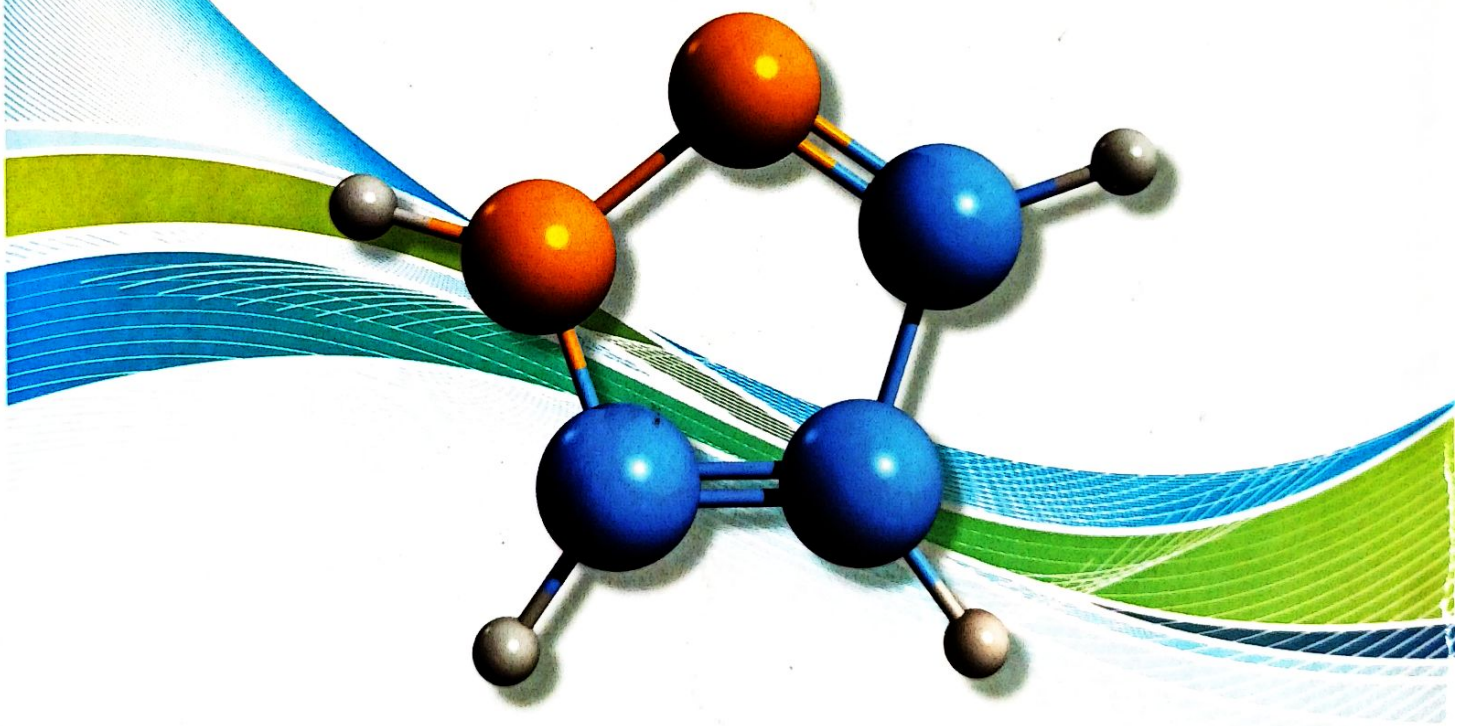
CHEMISTRY RESEARCH AND APPLICATIONS

Pyrazole

Preparation and Uses



Dilipkumar Pal
Editor

NOVA

Library of Congress Cataloging-in-Publication Data

Names: Pal, Dilipkumar, 1971- editor. Title: Pyrazole : preparation and uses / Dilipkumar Pal (editor), Associate Professor, Department of Pharmaceutical Sciences, GURU GHASIDASH VISHWAVIDYALAYA (A Central University), Koni, Bilashpur, India.
Description: New York : Nova Science Publishers, [2020] | Series: Chemistry research and applications | Includes bibliographical references and index. | Summary: "This book has comprehensively reviewed the latest information on pyrazoles, their preparations and uses. It provides extended ideas on pyrazole and its derivatives including their synthesis, chemistry, structure activity relationship (SAR) and therapeutic applications. The health promoting properties of these pyrazoles are discussed in this book with different therapeutic applications of pyrazole scaffold. Topics related to pyrazole and its analogues as potential anticancer, anti-angiogenesis, antiviral, antioxidative, anti-convulsive, anthelmintic, anti-inflammatory, antidiabetic agents are described in this book in detail. Furthermore, current status and future prospects of pyrazole moiety in drug discovery, importance of it in plant systems, its relevance in neurological drug discovery, its potency as herbicidal and antimicrobial agents have been enumerated through different chapters. In a summary, this book is a valuable resource for research scholars, academics, students, industrialists and subject experts working in the multidisciplinary fields like medicinal chemistry, synthetic chemistry, biochemistry, pharmacology, natural product chemistry and other related areas in the field of pyrazole derivatives drug discovery and research"-- Provided by publisher. Identifiers: LCCN 2020031403 (print) | LCCN 2020031404 (ebook) | ISBN 9781536182507 (hardcover) | ISBN 9781536183801 (adobe pdf)
Subjects: LCSH: Pyrazoles. Classification: LCC QD401 .P9918 2020 (print) | LCC QD401 (ebook) | DDC 547/.593--dc23
LC record available at https://lccn.loc.gov/2020031403
LC ebook record available at https://lccn.loc.gov/2020031404

Published by Nova Science Publishers, Inc. † New York

CONTENTS

In: Pyrazole: Preparation and Uses
Editor: Dilipkumar Pal

ISBN: 978-1-53618-250-7

Chapter 8

PYRAZOLE MOIETY AS A SOURCE OF NATURAL PRODUCTS

Dilipkumar Pal[1,*], Souvik Mukherjee[1], Om Prakash Panda[2], Sitansu Sekhar Nanda[3] and Dong Kee Yi[3]

[1]Department of Pharmaceutical Sciences, Guru Ghasidas Viswavidyalaya (A Central University), Bilaspur, Chhattisgarh, India
[2]Centurion University of Technology and Management, Odisha, India.
[3]Department of Chemistry, Myongji University, Yong in, South Korea

ABSTRACT

A large number of structurally diverse natural compounds containing azole nucleus constitute an important class of biologically active heterocycles that are gaining more attention in the field of medicinal chemistry. Among azoles, pyrazoles are rarely found in nature probably due to difficulty in the formation of N-N bond by living organisms. However, they exhibit numerous biological activities, including anti-diabetic, antiviral, anticancer, anti-inflammatory, antibacterial and antifungal activities.

The present review is an attempt to understand the chemistry along with medicinal importance of pyrazole containing natural products reported till date which would certainly help the scientific community to bring further developments in the isolation and synthetic methodologies for pyrazole based novel bioactive compounds.

Keywords: Pyrazole, natural products, watermelon seed, withanolides, synthetic molecules

* Corresponding Author's E-mail: drdilip2003@yahoo.co.in.

1. INTRODUCTION

Natural products are chemical substances found in nature that exhibit a wide range of important biological activities and are being used in the design and discovery of the target based drugs in the pharmaceutical field. A natural product can be considered as such or can be prepared by total synthesis if it displays some promising biological and other activities. Most of the prescription drugs (w70%) are either originally natural products or natural product based biomimetic compounds possessing different kinds of heterocyclic ring systems which are mainly extracted from four types of natural sources, plants, animals, microbial and marine [1].

Among heterocycles, Pyrazole derivatives are an important class of nitrogen-containing five-membered heterocyclic compounds that have attracted much more attention in recent time due to their usefulness in the field of drug discovery and agricultural research. It has also been found that various substituted Pyrazoles are used as chelating and extracting reagents for many metal ions [2].

Moreover, these derivatives are used as starting material for the construction of condensed heterocyclic systems and represent an interesting template for combinatorial chemistry.

They are rarely found in nature probably due to difficulty in the formation of NeN bond by the living organisms but still, a plethora of research publications during last decade further shows the increasing interest of synthetic as well as medicinal chemists providing their wide applications in different fields [3-10].

1.1. Chemistry of Pyrazole

Pyrazole is an organic compound with the formula $C_3H_3N_2H$. It is a heterocyclic compound having five-membered rings composed of three carbon atoms and two adjacent nitrogen atoms. It contains two double bonds within the nucleus, imparting an aromatic character, a weak base, with pK_b 11.5 and pKa of conjugated acid 2.49 at 25^0C. IUPAC Name of Pyrazole is 1H-Pyrazole or popularly known as 1,2-Diazole. The molecular weight of Pyrazole is 68.08g/mol, boiling point and melting point found to be 186-188^{0}C and 66 - 70^{0}C respectively [11].

The solubility of Pyrazole in water is about 1g/ml, but it is much less soluble in organic solvents like chloroform, ether, alcohol etc [12]. In the year of 1883, the great German chemist Ludwig Knorr (2nd December 1859 - 4th June 1921) developed Pyrazole". The main reaction of Pyrazole synthesis involves the "Reaction of hydrazine or substituted hydrazine with 1, 3-dicarbonyl compounds to provide a Pyrazole or Pyrazolone ring system.