Heterocyclic Letters
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GRAPHICAL ABSTRACT

Paper-1	Heterocyclic Letters 15: iss.-3 (2025), 465-470

Enantiospecific Synthesis of (-) (*2S, 3S*)-2-Amino-3,4-hydroxybutyric Acid from β-Lactam

Ram Naresh Yadav[1] and Bimal Krishna Banik*[2]

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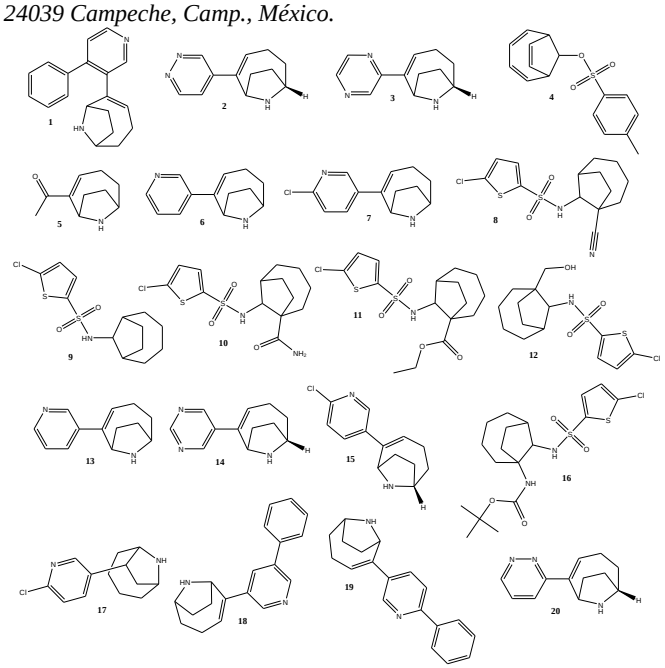
We report the synthesis of unnatural isomers of (-) (*2S, 3S*)-2-amino-3,4-hydroxybutyric acid featuring as prevalent structural motifs of polyoxins a plant-derived antibiotic based on reductive cleavage of N-(CO) bond of lactam ring as the key reaction followed by other desired chemical manipulations.

Paper-2	Heterocyclic Letters 15: iss.-3 (2025), 471-484

Physicochemical properties involved in the interaction of twenty byciclo[4.2.1] derivatives with akt1 protein.

Alvarez-Ramirez Magdalena, Rosas-Nexticapa Marcela, Cauich-Carrillo Regina, Melgarejo-Gutierrez Montserrat, Figueroa-Valverde Lauro.

Laboratory of Pharmaco-Chemistry, Faculty of Chemical Biological Sciences, University Autonomous of Campeche, Av. Agustín Melgar s/n, Col Buenavista C.P. 24039 Campeche, Camp., México.



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Paper-3 | Heterocyclic Letters 15: iss.-3 (2025), 485-494

An efficient ionic liquid mediated microwave assisted synthesis of pyrazoles characterization and its biological properties

[a]R. N. Gaikwad, [b]A. V. Sapkal, [a]B. N. Chate

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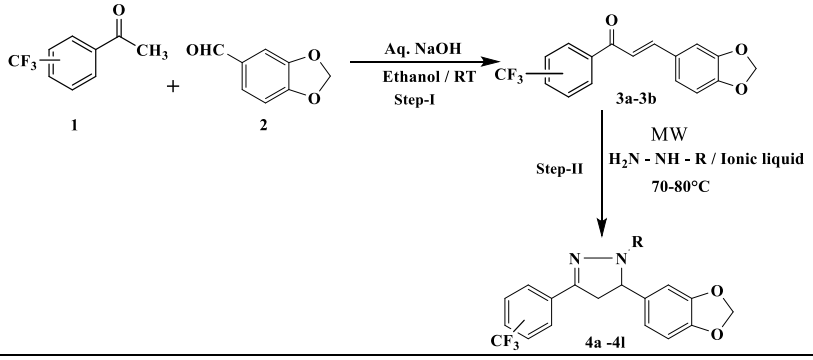
[a]Department of Chemistry, Sanjivani College, Chapoli, Dist: Latur Maharashtra, India 413-513.
[b]Department of Chemistry, PhulsingNaikMahavidyalaya, Pusad, Dist: Yavatmal, Maharashtra, India 445-216.

Fluorinated Pyrazoles and its derivatives have evolved as crucial scaffolds in medicinal chemistry due to their diverse biological activities, and pharmaceutical properties. The series of pyrazoles and its derivatives typically involves the cyclocondensation of hydrazine's with α, β-unsaturated carbonyl compounds under microwave irradiation in the presence of ionic liquid. The structure of the synthesized compounds was confirmed using IR, ^{1}H NMR, and LC-MS, and they were examined for antibacterial and antifungal activity. The major characteristics of this technique include operational simplicity, short reaction times, mild reaction conditions, and high yield. Importantly, NMPyTs (ionic liquid) can undergo up to three recycle runs without any noticeable loss of catalytic activity.



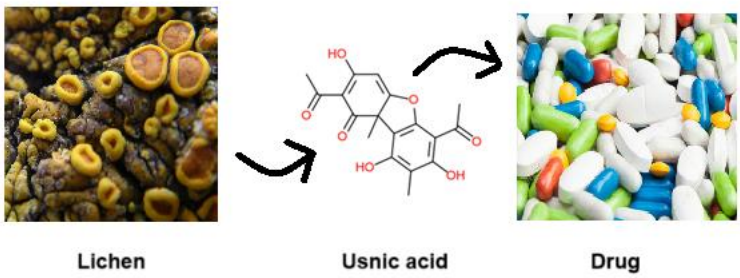
Paper-4 | Heterocyclic Letters 15: iss.-3 (2025), 495-515

Analysing ADME properties of usnic acid and its analogues in silico study

A.Olimathi[1], L. Akilandeswari[1*] and P. Kalpana[2]

[1]Department of Chemistry, Sri Sarada College for Women, Salem – 636 016, Tamilnadu, India
[2]Department of Chemistry, K.L.E.Society's Science and Commerce College, Navi Mumbai – 410 218, Maharashtra, India
[*]E-mail : akikarsri2008@gmail.com

Usnic acid and its derivatives from lichens possess good drug-likeness and have positive nuclear receptor interaction values which show a part in gene creation and may have an impact on reproduction and anti-carcinogenic properties.



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Paper-5 | Heterocyclic Letters 15: iss.-3 (2025), 517-522

Synthesis of polycyclic chrysene-imidazole derivatives and evaluation of their antimicrobial activity

Alpesh T. Shiyani*, Suranjana V. Mayani* , NavnathShinde, Dharmesh Shah.

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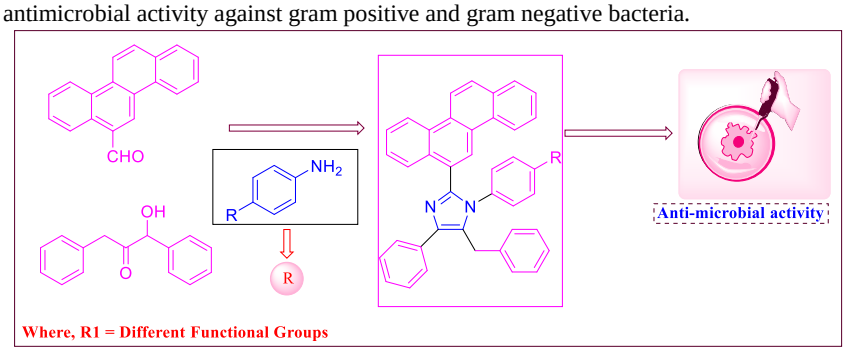
Email:shiyani_alpesh72@yahoo.comSurajana.mayani@marwadieducation.edu.inNavnath1983@gmail.comdgshah68@gmail.com

We are interested in synthesis and developing the chemistry of Chrysene-Imidazole derivatives. For this different aromatic amine, 6-Chrysenecarboxaldehyde, Benzoin product ,ammonium acetate and PEG 400 to yields the respective Chrysene-Imidazole derivatives. The structures of the synthesized compounds were confirmed by Physico-chemical test and spectral techniques, representative samples were screened for their antimicrobial activity against gram positive and gram negative bacteria.



Paper-6 | Heterocyclic Letters 15: iss.-3 (2025), 523-530

An efficient cerium sulphate promoted synthesis of bioactive benzimidazoles

A.V. Nakhate[a] , S. V. Shinde[b]* , R. D. Suryawanshi[c] , J. S. Godse[d] , R. P. Pawar[c]*

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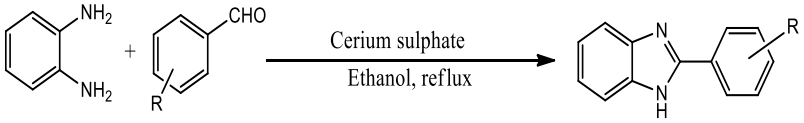
[b]Department of Chemistry, Pratibha Niketan College, Nanded – 431604 (Maharashtra), India.
[c]Department of Chemistry, Shiv Chhatrapati College, Aurangabad – 431003 (Maharashtra), India.
[d]Department of Engineering Science, Hi-Tech Institute of Technology, MIDC Waluj, Aurangabad-431136 (Maharashtra), India.
Corresponding author E-mail: rppawar@yahoo.com, balashinde09@gmail.com.

A new group of modified benzimidazoles were made from o-phenylenediamine and aromatic aldehyde in ethanol at high heat with cerium sulphate ($Ce(SO_4)_2$) acting as a helper. It provides several advantages over existing approaches. Medicine uses benzimidazoles due to their antituberculosis, antimalarial, antihistamine, antibacterial, antiviral, antidiabetic, anticancer, antifungal, anti-inflammatory, analgesic, and anti-HIV effects. Benzimidazole molecules may have medicinal uses. Because of its pharmacophore relevance and numerous biological functions, benzimidazole synthesis must be efficient. Effective synthesis is required to create novel medications that are resistant to existing chemotherapies. Modern benzimidazole synthesis uses nano-sized metal catalysts to combine o-phenylene diamines with aldehydes without using any solvents. Cerium (III) salts improve heterocyclic structure synthesis, which fascinates chemists. It was these salts that helped make nitrogen heterocycle bonds, oxygen analogues, seven-membered rings, and mixed heterocyclic features.



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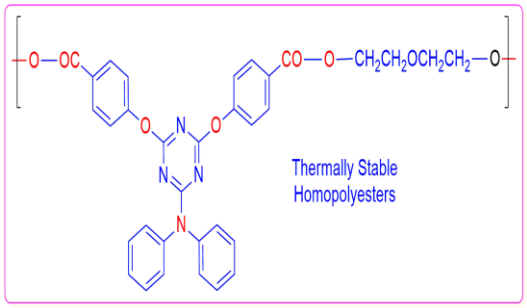
Paper-7	Heterocyclic Letters 15: iss.-3 (2025), 531-539

Synthesis, Characterization and thermal analysis of s-triazine based novel homopolyesters

Bharati Patel[a*] and Purvesh Shah[b]

[a*]*Shri Maneklal. M. Patel Institute of Sciences and research, KSV, Gandhinagar*
[b]*Department of Chemistry, K. K. Shah Jarodwala Maninagar Science College,Ahmedabad*
E-mail : purvesh234184@gmail.com

The novel polyesters were synthesised by polycondensation reaction of 4,4'-((6-(diphenylamino)-s-triazine-2,4-diyl)bis(oxy))dibenzoyl chloride and various aromatic/aliphatic diols. Synthesized novel polyesters were characterized by various techniques like, solubility, density, viscosity, spectral study and thermal analysis. All the homopolyesters illustrates reasonable thermal stability, which signifies that the materials can be considered as high-performance materials. They had a reduced viscosity 0.9 - 0.1 g/dl, which points out that high molecular weight range need for excellent mechanical and thermal properties. Activation energy (Ea) is also verified from thermograms.

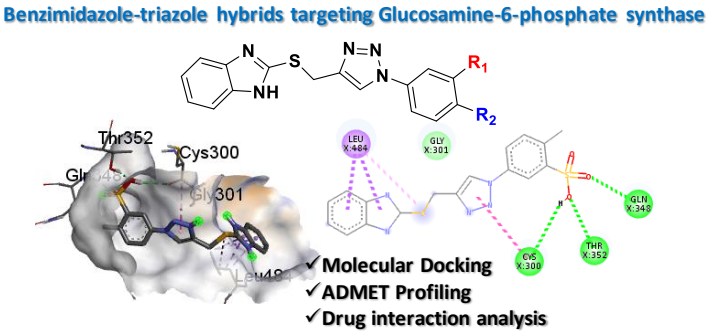


Paper-8	Heterocyclic Letters 15: iss.-3 (2025), 541-554

Identification of benzimidazole-triazole hybrids as glucosamine-6-phosphate synthase recognition through *in silico* studies

[1]Uzma Khan, [2]Hemlata Nimesh and [3]Souvik Sur*

[1]*Department of Chemistry, Faculty of Engineering, Teerthanker Mahaveer University, Moradabad, Uttar Pradesh-244001, India*
[2]*Amity Institute of Pharmacy, Amity University, Sector-125, Noida-201313, Uttar Pradesh, India*
[3]*Research and Development Center, Teerthanker Mahaveer University, Moradabad, Uttar Pradesh-244001, India*
Corresponding author Email Address: drsouvik.engineering@tmu.ac.in



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Paper-9	Heterocyclic Letters 15: iss.-3 (2025), 555-569

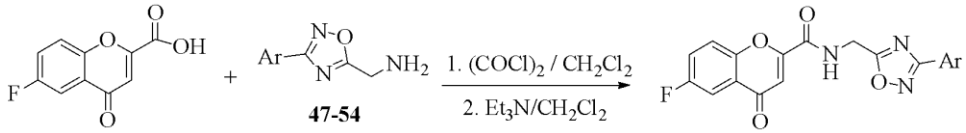
Synthesis, molecular docking and biological evaluation of 1,2,4-oxadiazole amides of chromone-2-acid and chromone-3-acid

M. Vijaya Bhargavi*[a], M. Sumakanth[b]

**E-mail: mvijayabhargavi@gmail.com*
[a,*] *HOD, Department of Chemistry, Associate Professor, RBVRR Women's College of Pharmacy, Osmania University, Hyderabad, 500007 India*
[b] Principal, Professor, RBVRR Women's College of Pharmacy, Osmania University, Hyderabad, 500007 India

A series of 1,2,4-oxadiazole amides of 6-Fluoro-chromone-2-acid and chromone-3-acids are synthesized from an efficient and straightforward procedure from the reaction of 6-Fluoro-chromone-2-acid and chromone-3-acid with 1,2,4-oxadiazole amines.

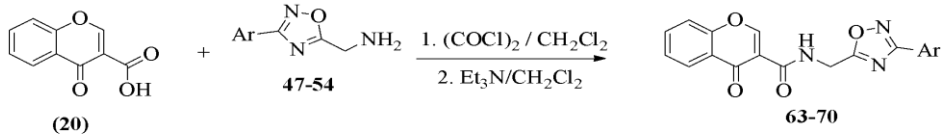
Synthesis of 1,2,4-oxadiazole amides of 6-fluoro-chrmone-2-acid ***(55-62):***



(19) **55-62**

47, 55) Ar = Benzyl
48, 56) Ar = Phenyl
49, 57) Ar = 2-Methoxy phenyl
50, 58) Ar = 2-Chloro phenyl
51, 59) Ar = 4-Methyl phenyl
52, 60) Ar = 4- Methoxy phenyl
53, 61) Ar = 4-Fluoro phenyl
54, 62) Ar = 4-Cyano pyridyl

Synthesis of 1,2,4-oxadiazole amides of chromone-3-acid ***(63-70):***



(20) **63-70**

47, 63) Ar = Benzyl
48, 64) Ar = Phenyl
49, 65) Ar = 2-Methoxy phenyl
50, 66) Ar = 2-Chloro phenyl
51, 67) Ar = 4-Methyl phenyl
52, 68) Ar = 4- Methoxy phenyl
53, 69) Ar = 4-Fluoro phenyl
54, 70) Ar = 4-Cyano pyridyl

Paper-10	Heterocyclic Letters 15: iss.-3 (2025), 571-575

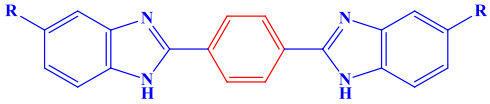
Synthesis and Characterization Of Phenyl Linked Benzo[*d*]Imidazole Derivatives

Azam M. Shaikh*

**Department of Chemistry, "SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben Jivanlal College of Commerce and Economics"-Mumbai-400 056, India*

Email: mohammed.shaikh@mithibai.ac.in

Phenyl linked benzo[*d*]imidazole derivatives



R = -H, -Br, $-NO_2$, $-NH_2$
(1) (2) (3) (4)

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Paper-11	Heterocyclic Letters 15: iss.-3 (2025), 577-583

Iodine Catalysed Synthesis of Quinoline Frameworks *Via* Tandem Cyclization

R. L.Satyanarayana[a], N. Prudhvi Raju[a*],K. Pavan Krishna[a], Kiran Manda[b], B.Jagan Mohan Reddy [c], G. Rama Swamy [d]

[a]Department of Chemistry, B.V. RAJU College, Bhimavaram,AP-534202,India.
[b]Department of Chemistry, Shri Vishnu College of Pharmacy College, Bhimavaram,AP-534202,India.
[c]Department of Chemistry, Adikavi Nannaya University,Rajamahendravaram,AP-533296,India
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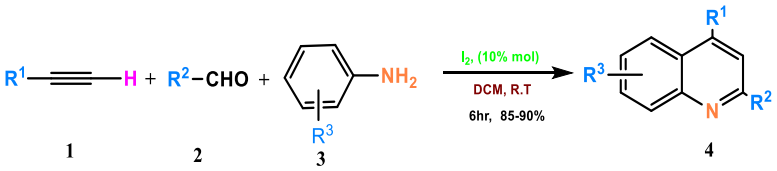
**CorrespondingAuthor E-mail: prudhvi115@gmail.com*

-catalyzed three component tandem cyclization reactions of aldehydes, terminal alkynes, and primary amines have been developed. The processes can provide adiverse range of quinoline derivatives in good yields from simple starting materials

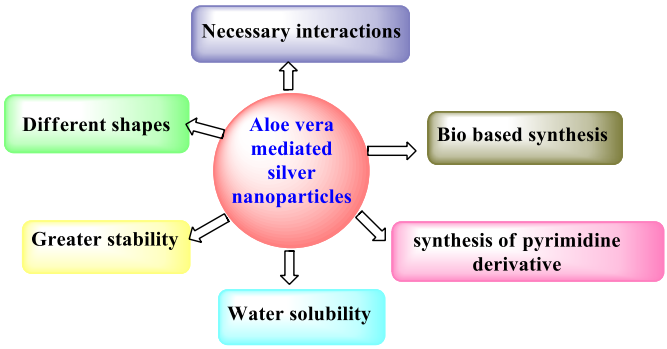


Paper-12	Heterocyclic Letters 15: iss.-3 (2025), 585-591

Potential of aloe vera mediated silver nanoparticles in the synthesis of pyrimidine derivative and investigating the green chemistry metrics

Jai Shri Kaur, Preeti Singh *

Department of Chemistry, Faculty of Science, Swami Vivekanand Subharti University, Meerut 250005, U.P. India. Email: preetisingh121002@gmail.com



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Paper-13 | Heterocyclic Letters 15: iss.-3 (2025), 593-604

Characterization, multicomponent synthesis, and antimicrobial evaluation of new pyrrolo [2, 3-d]-pyrimidine derivatives with hydrazone moiety

Shrinath Kusalkar[1], Mahesh More[2], Amol Sangale[3], Parasnath Bele[4]*

[1, 3,4] Dept of Chemistry, Mansarovar Global University, Sehore, (M.P.) – India*
[2]Dept of Chemistry, Dr. A.P.J. Abdul Kalam University, Indore (M.P)-452016, India.
***Corresponding Author: -** Parasnath Bele, Mansarovar Global University, Sehore, (M.P.) – India*
***Corresponding Author mail Id:** Parasnathbele2013@gmail.com*

The novel compound pyrrolo [2, 3-d], a series of pyrimidine derivatives (**2a-i**) containing a physiologically active hydrazone moiety was produced and subsequently evaluated for their antibacterial efficacy. The assignment of structures for the synthesized compounds is determined through the utilization of various analytical techniques, including infrared spectroscopy (IR), proton nuclear magnetic resonance spectroscopy (^{1}H NMR), and mass spectrometry (MS). The synthesized compounds exhibited antibacterial and antifungal properties, as evidenced by their minimum inhibitory concentration (MIC) values ranging from 50–250 µg/mL. The species that exhibited the highest level of resistance were *Escherichia coli* (MCC 2412), *Staphylococcus aureus* (MCC 2408), *Bacillus subtilis* (MCC 2010), *Pseudomonas aeruginosa* (MCC 2080), *Saccharomyces cerevisiae* (MCC 1033), and *Candida albicans* (MCC 1439). The antimicrobial screening results indicate that all the compounds examined had substantial activity, with several compounds demonstrating greater efficacy compared to the reference drugs employed (*ciprofloxacin* and *fluconazole*).

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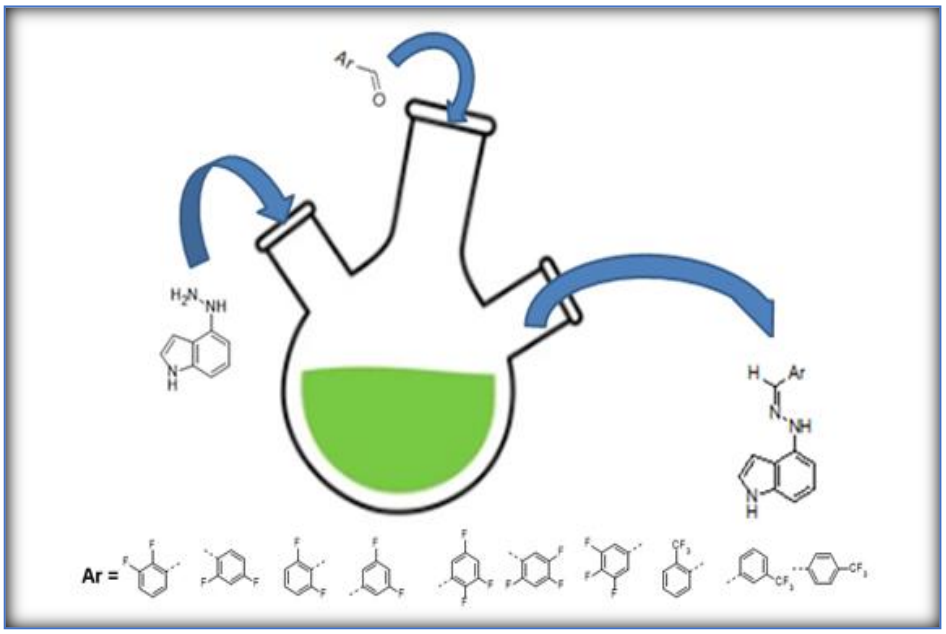

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Paper-14 | Heterocyclic Letters 15: iss.-3 (2025), 605-609

Biomedical applications of zinc oxide nanoparticles from moringa oleifera (drummstick) leaves extract

S. D. Chavan[a*]; R. D. More[b]; S. P. Moharir[c]

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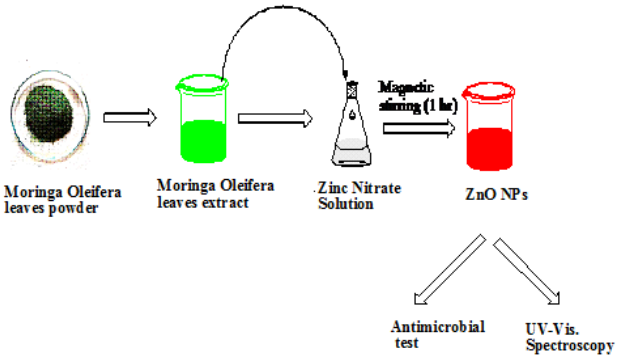
b-Siddharth Arts,Commerce and Science College,Jafrabad-431206,Dist.Jalna,Maharastra.
c-Siddharth Arts,Commerce and Science College,Jafrabad-431206,Dist.Jalna,Maharastra
**E-mail:gaurisunil005@gmail.com*

The current study investigated the synthesis and characterization of Zinc oxide Nanoparticles (ZnONPs) from *Moringa oleifera* (Drummstick) leaves extract to investigate the, antimicrobial, potential of *Moringa oleifera*. The antimicrobial activity of green synthesis ZnO nanoparticle (ZnO NPs) was measured against gram-positive *S.aureus* and gram-negative *E.Coli* . The synthesized ZnO nanoparticles were characterized by UV-Visible.



Paper-15 | Heterocyclic Letters 15: iss.-3 (2025), 611-620

Nano gd_2o_3 is an effective catalyst for the synthesis of benzimidazole derivatives under mild conditions

Sanjog G.Mumbaikar [a],Vishvanath D. Patil [b]*, Vaishnav D. Gharat [c] Tulshidas S. Waghmare [d], Suraj A. Patil [e]

Organic Chemistry Research Laboratory, Department Of Chemistry, C. K. Thakur A.C.S. New Panvel, Raigad, Maharashtra, INDIA

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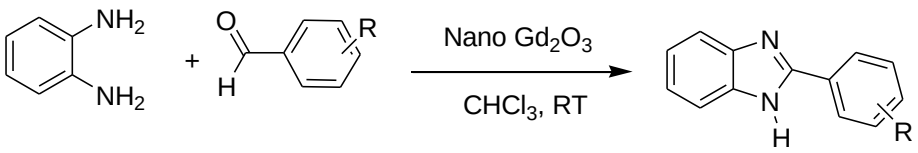
Nano Gd_2O_3 catalyst was used to develop an efficient, green, and simple approach for synthesizing benzimidazole derivatives via the reaction of aldehyde with ortho phenyl diamine. This reusable Nano catalyst effectively catalysed the synthesis of benzimidazole derivatives. Chloroform solvent in reactions is used. It is environmentally benign, and multi-component. The reaction proceed with room temperature in extremely short periods of time. The catalyst and some chosen derivatives were characterized using a variety of techniques, including IR, NMR, XRD, SEM and TEM.



R= H, Cl, NO_2, OH, OCH_3,etc.

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REVIEWS

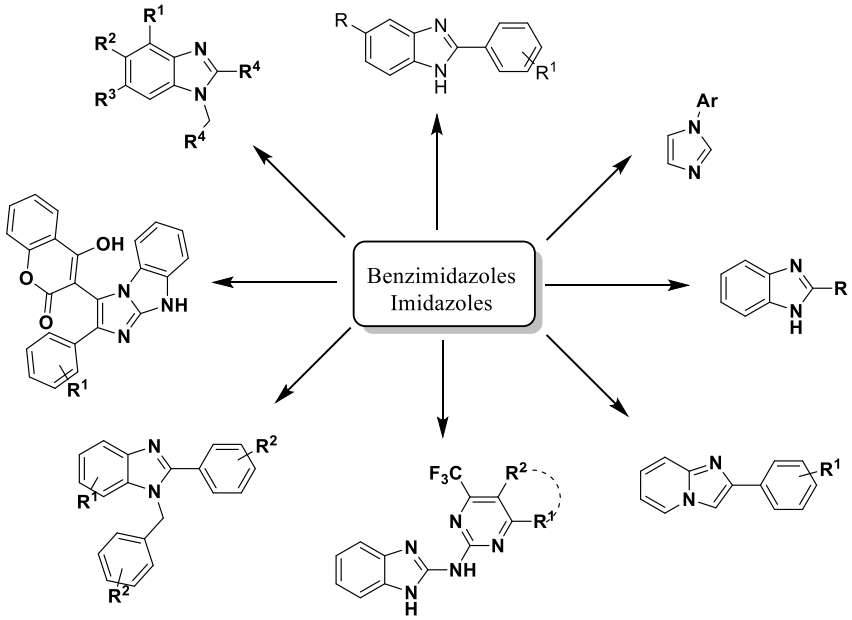
Review No.1	Heterocyclic Letters 15: iss.-3 (2025), 621-638

Research advances in the aqueous phase synthesis of imidazoles/benzimidazoles

Yadavalli Venkata Durga Nageswar [a,*], Katla Ramesh[b], Katla Rakhi[c]

[a,*]*Indian Institute of Chemical Technology (IICT), Tarnaka, Hyderabad, Telangana, India,*
[b]*Research Scientist, School of Medicine, University of Virginia, Charlottesville, VA, USA.*
[c]*Organic Catalysis and Biocatalysis Laboratory-OCBL/FACET, Federal University of Grande Dourados-UFGD, Dourados/Itahúm rod. km 12 s/n, 79804-970, Dourados, MS, Brazil.*
**E-mail: dryvdnageswar@gmail.com*

Among the heterocyclic systems imidazole and benzimidazole skeletons are widely distributed amid natural and medicinally relevant molecules such as alkaloids, purines, vitamins and drugs. Imidazole/benzimidazole derivatives played pivotal role in the development of organic chemistry in general, medicinal chemistry and heterocyclic chemistry in particular, over few decades. These scaffolds are used extensively in the design and development of pharmaceutically valuable molecules, and for the applications in biology as well as in material sciences. Even though many protocols have been reported for the synthesis of imidazoles/benzimidazoles, currently much importance is attached to the implementation of eco-friendly strategies. This review describes recent research reports on imidazole/benzimidazole derivatives synthesized in an environmentally benign way.



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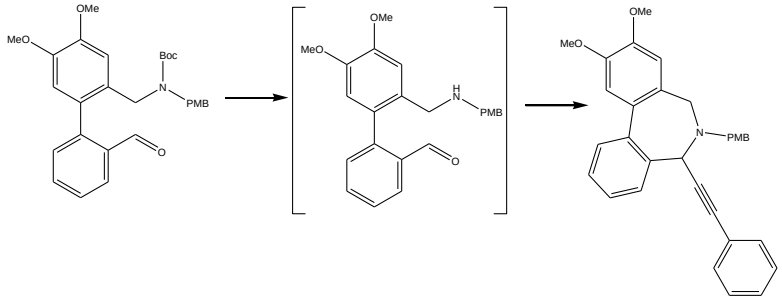
Review No.2	Heterocyclic Letters 15: iss.-3 (2025), 639-648

Review on the microwave-assisted synthesis of some benzo and dibenzoazepine derivatives

Rosas-Nexticapa Marcela, Alvarez-Ramirez Magdalena, Cauich-Carrillo Regina, Figueroa-Valverde Lauro,.

Laboratory of Pharmaco-Chemistry, Faculty of Chemical Biological Sciences, University Autonomous of Campeche, Av. Agustín Melgar s/n, Col Buenavista C.P. 24039 Campeche, Camp., México.



Review No.3	Heterocyclic Letters 15: iss.-3 (2025), 649-656

A review on the synthesis of hexacyclic derivatives using conventional and non-convetional methods

Rosas-Nexticapa Marcela, Alvarez-Ramirez Magdalena, Mateu-Armad Maria Virginia, Cauich-Carrillo Regina, Figueroa-Valverde Lauro

Laboratory of Pharmaco-Chemistry at the Faculty of Chemical Biological Sciences, University Autonomous of Campeche,

This review is reported a straightforward route for synthesis of some hexacyclic derivatives using conventional and non-conventional methods.