

A review: Different approach of bioactive pyrimidobenzothiazoles synthesis

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ABSTRACT

Due to structural specificity, heterocyclic compounds such as pyrimidobenzothiazoles are unique with biological activities and can be utilize as potential pharmaceutical material. Pyrimidobenzothiazoles are well-known agents for different activities such as antihypertensive anti-inflammatory, analgesic, antitumor, antiviral, antihypotensive, antimalarial, antimicrobial, and anticancer, make them more leader in their class. At present, benzothiazoles and their derivatives attracted the scientific community. The present work is a review of the newest work carried out by researchers in the finding and synthesis of new biological active pyrimidobenzothiazoles.

KEY WORDS: Anticancer, Antimicrobial, Antiviral, Benzothiazoles, Pyrimidobenzothiazoles, Solvent-free conditions

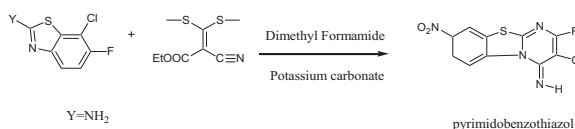
INTRODUCTION

A most important section of organic compounds characterizes by the fact that few atoms in their molecules are attached in rings having at least one atom other than carbon. In heterocyclic compounds, cyclic part indicates at least one ring structure should be present, whereas the prefix hetero refers to the non-carbon atoms in the ring. Major class of heterocycles is those having five or six member rings with a heteroatom such as nitrogen, sulfur, and oxygen.^[1-5] Heterocycles constitute a major part of vitamins, natural products, drugs, biomolecules in biotic components, and bioactive compounds employ as antidiabetic, anti-inflammatory, insecticidal, antitumor, herbicidal, antibiotic, fungicidal, anti-HIV, antidepressant, and antimicrobial agents. Except this, they have been found as a key component in different synthetic agrochemicals and pharmaceuticals.^[6-20] Particularly systems containing benzothiazoles, pyrimidine or fused rings attract interest as potential biologically active compounds. Many pyrimidobenzothiazoles derivatives are used antiviral, antidiabetic, insecticidal, antitumor, herbicidal, antibiotic, fungicidal, antidepressant, and antimalarial, some of which have found application in pharmaceutical/medicinal fields.^[21-40] Consequently, considerable interest has been developing in researchers for the synthesis of above heterocycles by efficient new

methods. The present work is a review of the newest work carried out by researchers in the finding and synthesis of new biological active pyrimidobenzothiazoles.

REVIEW OF LITERATURE: SYNTHESIS METHOD OF PYRIMIDOBENZOTHAZOLES

A series of heterocyclic compounds: Pyrimido[2,3-b] benzothiazole was synthesized by a convenient and effective method and antimicrobial activities were compared with standard drug streptomycin with excellent results. Pyrimido benzothiazole derivatives were synthesized by the use of multi-component reactions approach as an attractive and efficient strategy based one-pot reactions. Rate of the reactions in this approach is fast as compared to traditional methods. Pyrimido [2,1-b].^[1,3] benzothiazole was prepared through heating a mixture of substituted benzothiazole and substituted malononitrile separately with aromatic compounds containing active methylene group, respectively, with anhydrous potassium carbonate(catalytic amount) and dimethylformamide. Synthesized compounds were tested for antibacterial activity and found right agents.^[41-43]



New bioactive pyrimido benzothiazole derivatives were synthesized by the laccase-catalyzed domino

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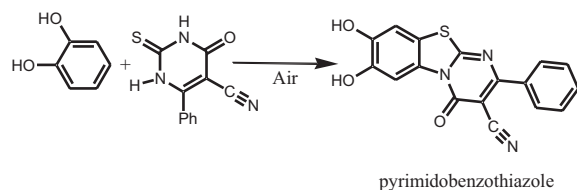
ISSN: 0975-7619

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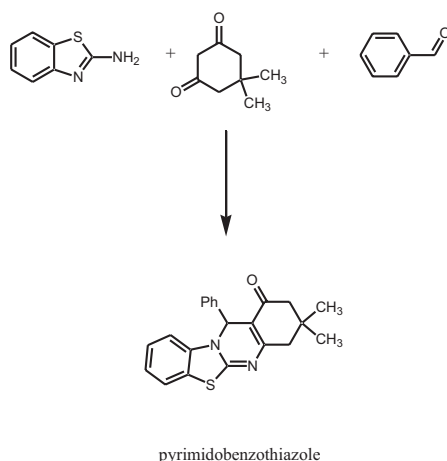
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Received on: 27-10-2017; Revised on: 24-11-2017; Accepted on: 17-12-2017

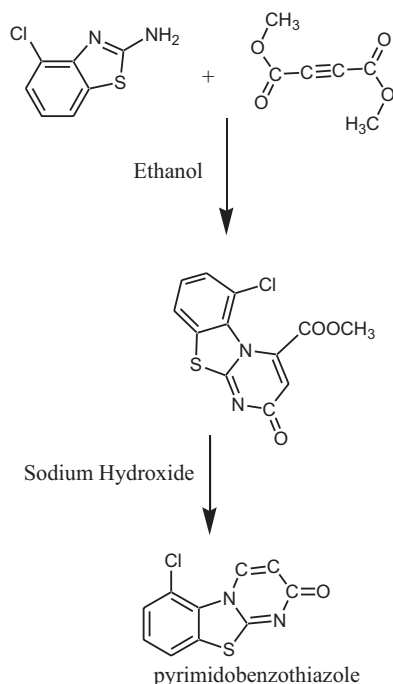
reaction between catechols and substituted pyrimidine carbonitriles with aerial oxygen (oxidant).^[44]



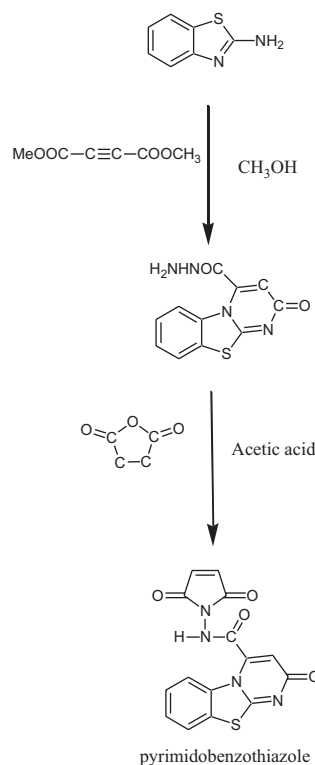
A new convenient approach was used in the synthesis of pyrimidobenzothiazoles derivatives with nonsolvent conditions. In this approach catalyst is recovered, and the process is more eco-friendly. Synthesized compounds base moiety is known for their antimicrobial activities. This method is found suitable for a sustainable approach.^[45]



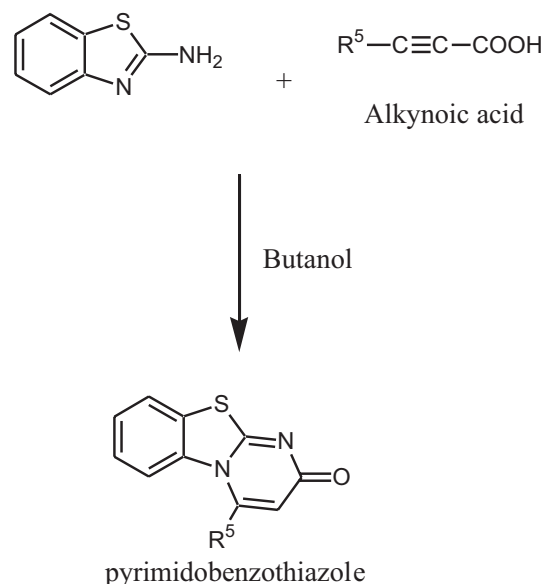
The synthesis of benzothiazoloquinazoline and new pyrimido benzothiazole derivatives with their evaluation for anticancer and antiviral activities has been carried out. Most of the synthesized compounds are biological active.^[46]



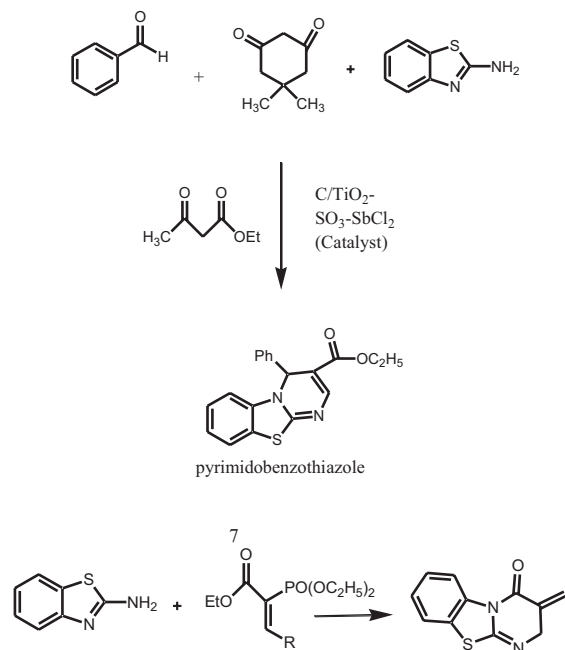
Preparation of bioactive pyrimidobenzothiazoles and substituted benzothiazoles with characterization through various techniques such as infrared (IR), ultraviolet, and nuclear magnetic resonance was done. Selected compounds were screened for their antitumor activity by the National Cancer Institute, USA.^[47]



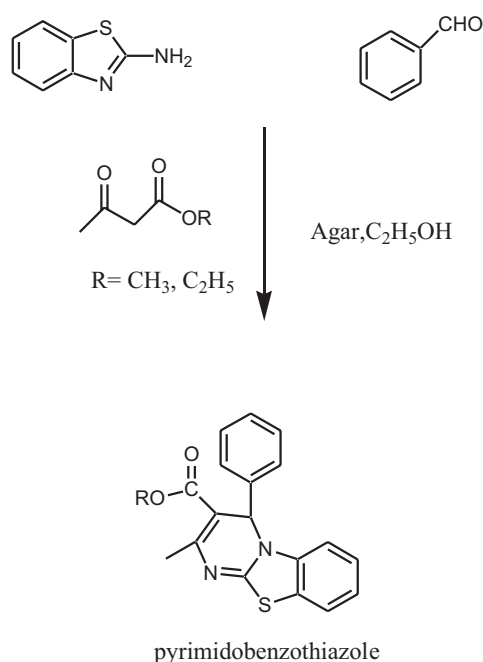
Conjugate addition reaction was used for the preparation of bioactive pyrimidobenzothiazoles through reaction of 2-aminobenzothiazoles acetylenic acid. Synthesis method is an example of convenient procedure as compared to traditional methods. All compounds were examined for antimicrobial activity, shown significant activities with different microbes strain.^[48]



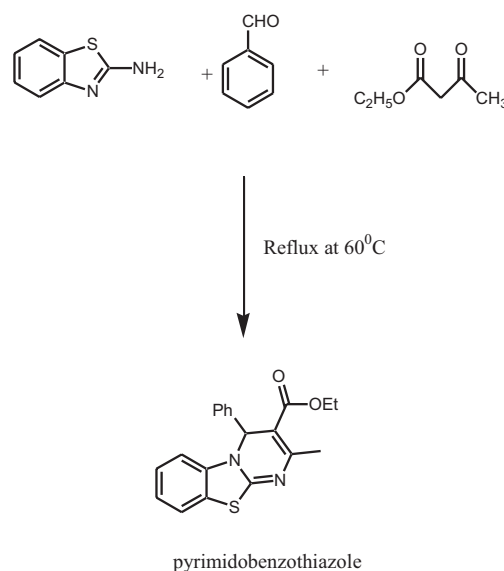
Biological active pyrimido[2,1-b]benzothiazoles and benzoxanthenones were synthesized in solvent-free conditions by the use of a new developed catalyst with different composite and Lewis acid combinations. All synthesized compounds characterized by a various techniques such as IR, FTIR, and XRD.^[49,50]



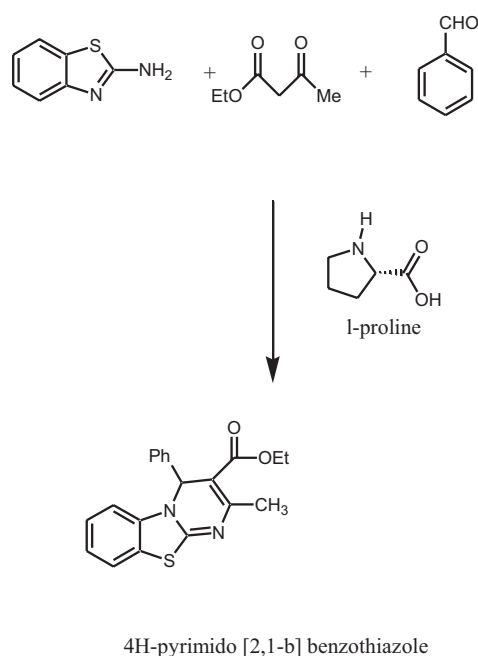
In the presence of agar media, one pot with component: 2-aminobenzothiazole, isatoic anhydride, arylaldehydes, and ethyl-acetoacetate reaction were carried out for the synthesis of bioactive pyrimido benzothiazole. This method is considered as eco-friendly method as compare to traditional method used for the synthesis of pyrimidobenzothiazoles.^[51]



Solvent and solvent-free conditions with different catalysts were used for the synthesis of biological active and potential pharmaceutical material: Substituted pyrimidobenzothiazoles. This method yield of product is excellent as compared to conventional methods. The present studies suggested that acetic acid and metal catalyst obeys different mechanism. Pyrimidobenzothiazoles were prepared by the reaction of acetic acid with 2-aminobenzothiazole, benzaldehyde, followed by ethylacetoacetate.^[52]



L-proline with solvent-free conditions was used for the synthesis of substituted pyrimido benzothiazole by the reaction of 2-aminobenzothiazole, ethylacetoacetate, and aromatic aldehydes, involving convenient and efficient method of synthesis. Antimicrobial and antitumor activity of synthesized compounds have been studied.^[53]



CONCLUSION

On the basis literature exploited in this review article, it has been established that pyrimidobenzothiazoles are supposed as pharmaceutical important biological important compounds.

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Source of support: Nil; Conflict of interest: None Declared