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An In-Depth Investigation of the Green Synthesis of Benzimidazole Derivatives

Smita Tandale[2], Gurumeet C Wadhawa[3], Kshitij Gurav[1], Mithil Patil[1], Sanket Gawand[1],AdityaSalunke[3], Shubham Holkar[2]

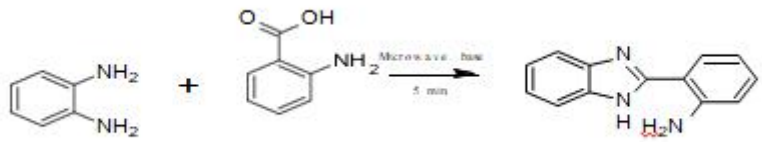
Student Department of Chemistry, Veer Wajekar ASC College, Phunde, Uran, Raigad[1]
Head and Associate Professor Post Graduate Dept. of Chemistry, Veer Wajekar ASC College, Phunde, Uran, Raigad[2]
Assistant Professors Post Graduate Department of Chemistry, Veer Wajekar ASC College, Phunde, Uran, Raigad[3]

Abstract: *The use and applications of heterocyclic compounds in medicinal chemistry are expanding since they are present in a wide range of organic molecules. The structural similarity of benzimidazole to nucleotides, including the adenine base of DNA and a component of vitamin B12, makes it a common ingredient in the production of pharmaceuticals and research chemicals. The use of transition metallic nanoparticles as a catalyst in the production of benzimidazole derivatives is the subject of this work.*

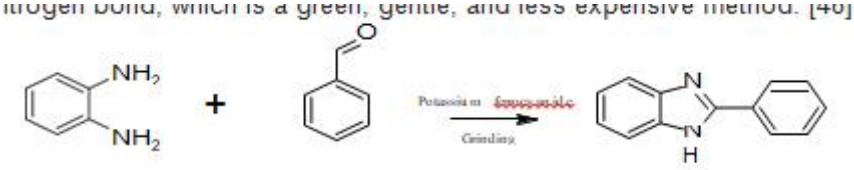
I. INTRODUCTION

Among the terms used in this field are benzimidazole, medicinal chemistry, o-phenylenediamine, metallic oxide, and nanoparticles.Anticancer, (1) anticonvulsant, (2) antidepressant, (3) antihistamine, (4) antifungal, (5) antihypertensiveanti-allergic and anthelmintic [7[8,9,10]The outcomes of [11] were found in benzimidazole derivatives. The organic behaviour of this basic component in molecules has been well described. Antihelmintic tablets made from several of them are frequently used (for example, thiabendazole, mebendazole, and albendazole). [13] It has also been demonstrated that benzimidazole-2-thiol and its derivatives exhibit important biological characteristics, such as proton pump inhibitory activity. In order to treat stomach and duodenal ulcers, antiulcer medications [15] and potassium Histamine-H2 receptor antagonists are currently utilised widely. Proton pump inhibitors have recently grown in popularity because they effectively reduce the amount of gastric acid produced by blocking the H=ok-ATPase enzyme, which is mostly present in the parietal cells of the stomach.

1] In the presence of Fe/MgO, anthranilic acid combines with ophenylenediamine at room temperature to create benzimidazole. This method is characterised by mild conditions, a rapid reaction time, a reusable catalyst, and large-scale synthesis. The catalyst retains its effectiveness when used repeatedly. [16]



2] With the help of the steel coordination complex K4[Fe(CN)6] as a catalyst and a reaction of 1, 2-diamine with aldehydes, benzimidazoles were successfully synthesised in high yields. The system was operated in a solvent-free setting by oxidising the carbon-nitrogen bond, which is a more cost-effective, gentle, and ecologically benign method.[17]



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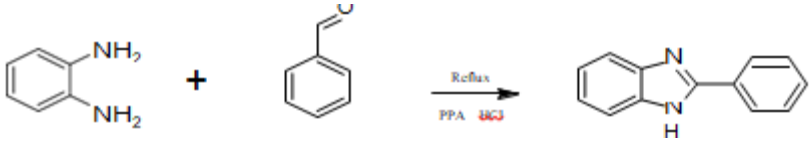
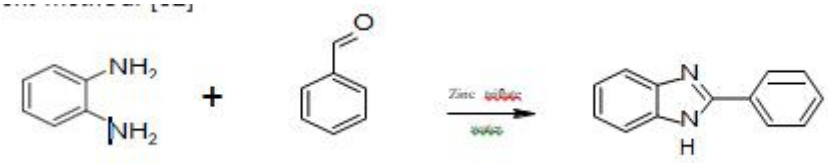
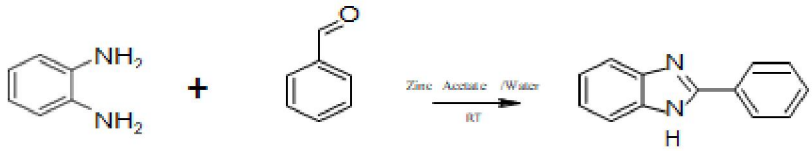
3] A chain of 2-substituted benzimidazoles was successfully synthesised by condensation of ophenylenediamine with substituted acids in the presence of cyclizing agents like PPA/HCl. In a recent study, it was found that the reliable Cyclocondensation method of cycling may be employed to create 2-substituted benzimidazoles.[18]



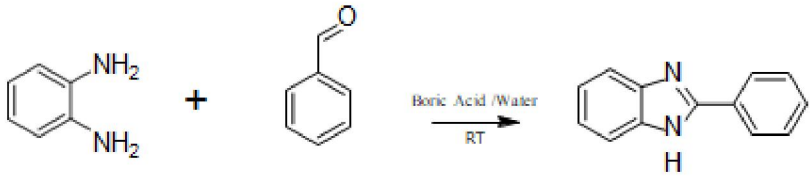
4] synthetic compounds of benzimidazole In the one-pot synthesis of two-substituted benzimidazole derivatives from o-phenylenediamine and substituted aldehydes in ethanol, zinc triflate was used as an effective catalyst at reflux temperature. The current approach offers a number of benefits, including its methodology, high product yields, and the catalyst's dependability.[19]



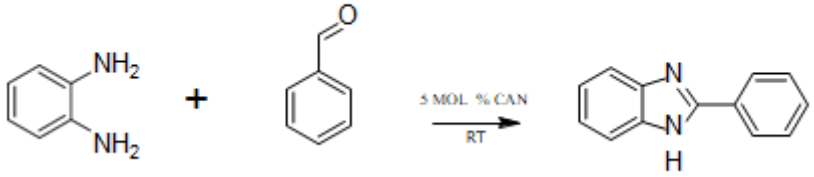
5]At room temperature, substituted ophynelinediamine, aldehyde derivatives, and a catalytic quantity of zinc acetate were combined to create benzimidazoles derivatives. The reaction is selective at mild, neutral, and solventfree conditions, and the method's use of a readily available, reasonably priced catalyst makes it appealing.



6] O-phenylenediamine, aldehydes, and ketones were used in a one-pot reaction with water at room temperature and boric acid to create two-substituted benzimidazoles or benzopines. The strategy conveyed the goods with excellent yields and was demonstrated to be both practical and environmentally friendly.[20]



7] Ophenylenediamine, aldehydes, and ketones were used in a onepot reaction with water at room temperature and boric acid to create two-substituted benzimidazoles or benzopines. The strategy conveyed the goods with excellent yields and was demonstrated to be both practical and environmentally friendly.[21]



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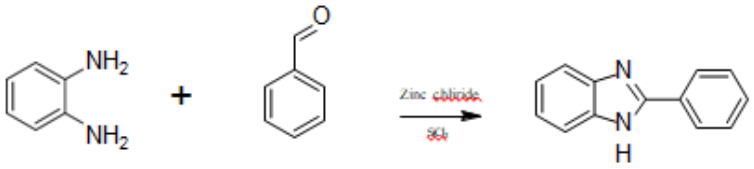
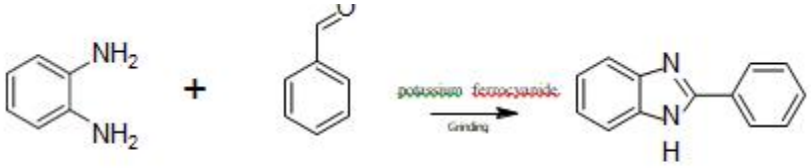
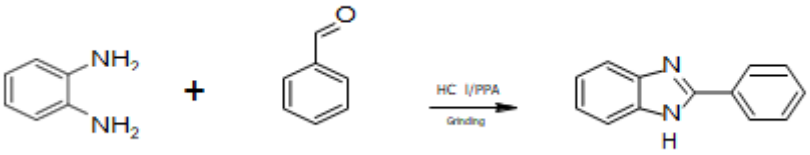
8] The synthesis of benzimidazole derivatives in PPG from o-phenylenediamine and aldehydes was greatly assisted by zinc chloride. The synthesis of benzimidazole with a high yield involves the use of a catalyst. Furthermore featured are the solvent machine's recovery and effective use. Also, this sustainable method is ideal for large-scale applications due to how easy it is to set up and perform the purifying tasks.



9] By reacting 1,2-diamine with aldehydes, the steel co-ordinate complex K4[Fe(CN)6] was successfully employed as a catalyst to successfully synthesise benzimidazoles in high yields. The carbon-nitrogen bond was oxidised in a solvent-free atmosphere to complete the system. The method is less expensive and environmentally damaging.



10] The synthesis of a series of two-substituted benzimidazoles proved successful. Under microwave or solvent-free conditions, benzimidazoles were synthesised by condensation of ortho-phenylenediamine with substituted acids in the presence of ring-remaining Polyphosphoric acid/HCl [21-23]



II.CONCLUSION

We have Described the simple method for the synthesis of the benzimidazole derivatise. We have also described the green approach for the synthesis.

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