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The Boric Acid System was Utilized as a Catalyst in a Simple, Rapid, One-pot Synthesis of Substituted Benzimidazole under the Right Circumstances

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Abstract: *Without the use of a solvent, aryl aldehydes and o-phenylenediamine were used to efficiently synthesise benzimidazole derivatives in a single pot at ambient temperature. requiring the employment of motor and pristle grinding. the ease of the technique and work-up, larger scale synthesis, very low yields, and incredibly fast reaction times at a reasonable price.*

Keywords: Sodium Hydroxide, Iodine, Benzimidazoles, Aryl Aldehydes, and Acetonitrile.

I. INTRODUCTION

An increasing number of physiologically active substances, such as antibacterial [1, 2], antiviral [3, 4], antifungal [5, 6], antimicrobial [7, 8], anti-most cancers [7, 8], and diabetic tablets [5], contain the benzoxazole and benzimidazole moiety. Albendazole and mebendazole are anthelmintic medications with benzimidazole structural components. Contrarily, the nonsteroidal anti-inflammatory drug flunoxaprofen's intermediate ring structure, benzoxazole, is a herbal compound [6–9]. Several techniques have been devised [10–11] for the high-temperature synthesis of benzimidazole and benzoxazole derivatives employing a variety of starting materials and catalysts. Unfortunately, these methods have some shortcomings, including slow response times, the usage of pricey and corrosive chemical compounds, [12-19] the employment of environmentally hazardous catalysts because herbal solvents are used, and high temperatures with little yield. The purpose of this study is to use boric acid as a catalyst in pristle and mortar in order to get around all of the aforementioned limitations. owing to our excitement for the enjoyment of amateur heterocyclic chemistry. A number of chemical processes, such as hydroxycarboxylic acid esterification [12], aza Michael [13], thia Michael [14], addition, and bromination [15-21], have been shown to benefit from the use of the water-soluble catalyst boric acid. [22-28] We describe a technique for creating benzimidazole derivatives with an incredibly high yield in a quick reaction time and with a straightforward work-up utilising a boric acid catalyst.

II.EXPERIMENTAL

Many analytical methods, including 1H NMR, mass spectroscopy, and IR spectroscopy, were used to determine the structures of this medication. To gather IR data, the SIMADZU-FTIR-8400 was employed. DMSO- was used as the solvent to acquire the 1H NMR spectra using a BRUKER Advance-III (400 MHz) spectrometer. The generated substance was confirmed to be consistent with all of the analytical records.

Example

10 mili moles of o-Phenylenediamine and 10 mili moles of aromatic aldehyde are ground for long enough in a pristle and mortar with 2 mg of boric acid acting as a catalyst to create substituted Benzimidazole. TLC is used to track the reaction. After the reaction is finished, the reaction mass is diluted with cold water to extract the crude product. The crude product is then purified using column chromatography with hexane: ethyl acetate as the cellular segment.

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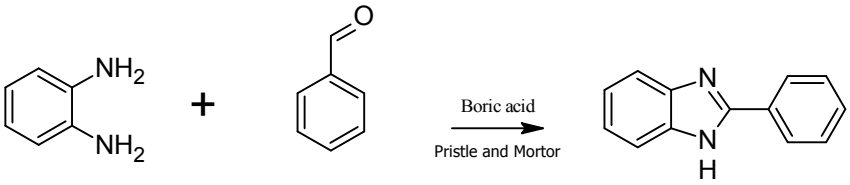
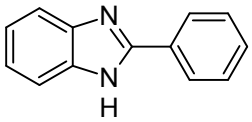
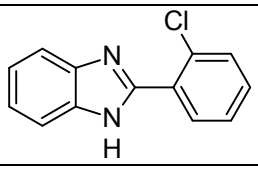
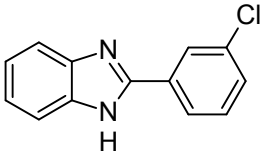
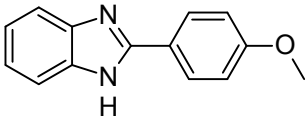
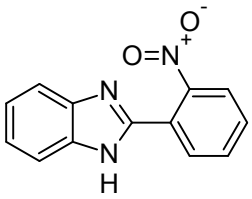
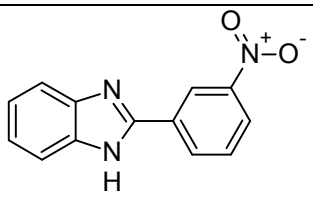
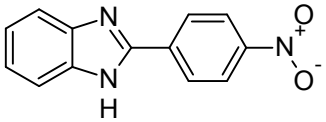
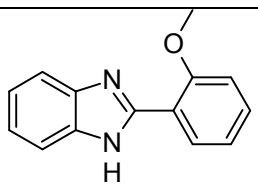
Reaction Scheme.



Observation Table

Sr. No	Aromatic Group	Time (Min)	(%)Yield	MP (0C)
1.		06	86	294
2.		07	87	136
3.		06	90	227
4.		06	90	224
5.		06	96	252
6.		06	90	300
7.		06	97	302
8.		08	60	265

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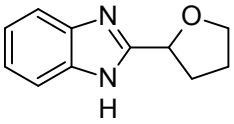
9.		09	86	283

III. CONCLUSION

By condensation of o-Phenylenediamine with aryl aldehydes at room temperature, we developed a dependable, highly effective, and practical one-pot synthesis method for the production of therapeutically significant benzimidazole derivatives. It is a practical and appealing approach for creating a variety of benzimidazole derivatives due to the rapid reaction times and good yields. The machine's simplicity of operation is highly alluring because it offers a variety of packages for spontaneous synthesis.

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