IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 3, March 2023

Waste Pineapple Peels Serve as an Effective Catalyst in the Straightforward Synthesis of Certain Benzimidazole

Yashwant Gaikwad[3], Manas Koli[1], Gurumeet C Wadhawa[3], Paras Koli[2], Mithil Patil[1], Shubham Chuttar[2], Aman Vasav[3], Aditya Salunke[3]

Student Post Graduate, Department of Chemistry, Veer Wajekar ASC College, Phunde, Uran, Raigad[1, 2]

Assistant Professor in Post Graduate Department of Chemistry, Veer Wajekar ASC College, Phunde, Uran, Raigad[3]

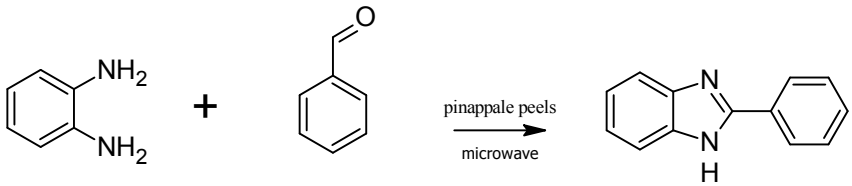
Abstract: *Benzimidazole and its derivatives' biological effects and other properties are quite diverse. They include numerous additional activities as well as anti-parasitic, fungicidal, anti-thelemintic, and other activities. The discarded peels from pineapples were used to create a variety of substituted benzimidazole derivatives because they contain organic acid, which catalyses the process. Excellent yield and great purity are produced by this.*

Keywords: Excellent Yield, Waste Pineapple Peels, and Benzimidazole Derivatives.

I. INTRODUCTION

The benzimidazole ring is found in many antivirals, antimalarial, anti-fungal, antiparasitic, and other medicines and pharmaceutical compounds [10–14]. Imidazole is a very significant and valuable intermediate in the pharmacological and bioactive molecule production [1–9]. 2-Substituted benzimidazole can be made using one of two general approaches [8–19]. The most widely used technique is an o-Phenylenediamine condensation reaction with carboxylic acids or their derivatives, such as nitriles, imitates, or ortho esters [10], when severely acidic conditions, extremely high temperatures, and/or microwave irradiations are present. The other involves the condensation of o-Phenylenediamine with aldehyde and an iterative oxidative cyclocondensation reaction of Schiff bases. [13-19] the creation of benzimidazole has utilised a number of oxidants and catalysts. Although many of these procedures performed well, some of them have one or more drawbacks, such as low yields, the use of volatile or toxic organic solvents, the need for excessive quantities of catalysts or reagents, specialised equipment, or severe reaction conditions. [20-27] Thus, it remains a difficult research task to create a practical, high yielding, and environmentally friendly method for benzimidazole production. We would like to report a straightforward method for producing 2-arylbenzimidazoles by condensation reaction of o-Phenylenediamine and aromatic aldehydes with waste pineapple peels as a catalyst. This method is in line with our research works in the synthesis of this ring system [27-28] and is motivated by the significant biological activity of benzimidazole.

Reaction Scheme



Experimental

The paraffin tube method is used to record experimental melting points. TMS served as the internal standard and CDCl3 served as the solvent as NMR spectra were obtained using a Bruker Advance I 300 NMR spectrophotometer.

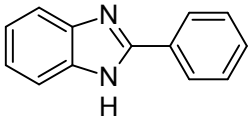
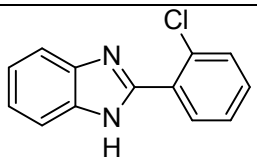
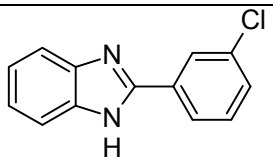
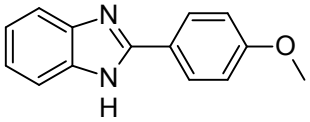
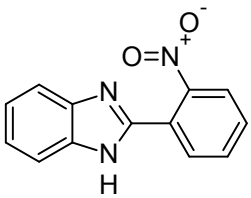
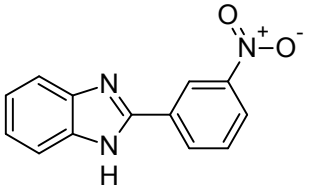
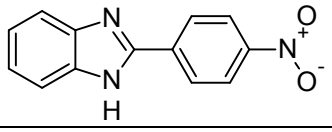
IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 3, March 2023

In Nujol mull, IR spectra were captured using a Shimadzu FTIR spectrophotometer in the frequency range of 4000-450 cm-1. S.d.fine chemicals were used. By using thin layer chromatography, the purity of the chemical was examined on silica gel-G plates.

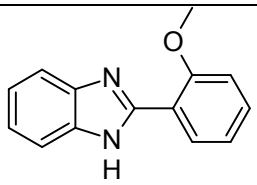
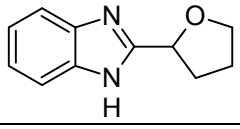
Synthesis of a substituted benzimidazole derivative using an experimental method

Add 3-5 ml of juice from used pineapple peels to a combination of 10 mmol of orthophenyldiamine and 10 mmol of substituted aromatic aldehyde. Exposed to chemical Microwave the reaction for 20 to 50 seconds in 3-5 10-second bursts. Thin-layer chromatography is used to monitor the reaction. Add water after the reaction is finished, extract the product with an organic solvent such dichloromethane, and then purify with silica. Product obtained with a good purity of 85–90%. No adverse effects are observed. Catalyst is salvaged and utilised five to six times.

Observation Table

Sr. No	Aromatic Group	Time Seconds	(%)Yield	MP (0C)
1		75	85	290
2		60	90	134
3		60	95	229
4		95	95	221
5		60	95	254
6		60	96	301
7		60	95	303

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 3, March 2023

8		95	70	267
9		80	50	285

II.DISCUSSION

We have created a green synthesis methodology for benzimidazole derivatives. Waste pineapple peels are being used as a catalyst. Orthophenyl diamine and aromatic aldehydes condense together as a result of the various types of acids present in them. produced with good yield and purity.

ACKNOWLEDGMENT

All Authors are Thankful to the Principal of College Dr. P. G. Pawar sir and the RayatShikshan Sanstha for Providing the Support for Research work.

REFERENCES

[1]. Fokas, D.; Li, J.; Yu, L.; Baldino, C. M. Synthesis 2005, 1, 0047.
[2]. Songnian, L.; Lihu, Y. Tet. Lett. 2005, 46, 4315.
[3]. Wang, Y.; Sarris, K.; Sauer, D. R.; Djuric, S. W. Tet. Lett. 2006, 47, 4823.
[4]. Benincori, T.; Sannicolo, F. J. Het. Chem. 1998, 25, 1029.
[5]. Bourgrin, K.; Loupy, A.; Soufiaoui, M. Tetrahedron 1998, 54, 8055.
[6]. Ben-Alloum, A.; Bakkas, S.; Soufiaoui, M. Tet. Lett. 1998, 39, 4481.
[7]. Das, B.; Holla, H.; Shrinivas, Y. Tet. Lett. 2007, 48, 61.
[8]. Shinde, D. B.; Nagawade, R. R. Ind. J. Chem. Sec.B 2007, 46B, 349.
[9]. Zhang, Z. H.; Li, T.S.; Li, J. J. Monatsh. Chem., 2007, 138 (1), 89.
[10]. Du, L. H.; Wang, Y. G. Synthesis 2007, 5, 675.
[11]. Bahrami, k.; Khodaei, M. M.; Kavianinia, I. Synthesis 2007, 4, 547.
[12]. Salehi, P.; Dabiri, M.; Zolfigol, M. A.; Otokesh, S.; Baghbanzadeh, M. Tet. Lett. 2006, 47 (15), 2557.
[13]. Ma, H.; Han, X.; Wang, Y.; Wang, J. Heterocyclic 2007, 71(8), 1821.
[14]. Kokare, N. D.; Sangshetti, J. N.; Shinde, D. B. Synthesis, 2007, 18, 2829.
[15]. Lin, S.; yang, L. Tet. Lett. 2005, 46(25), 4315
[16]. Dubey, P. K., &Venkatanarayana, M. PEG-600. Green Chemistry Letters and Reviews, 2010. 3(4), 257-261.
[17]. Reddy, Y. T., Reddy, P. N., Koduru, S., Damodaran, C., & Crooks, P. A. Bioorganic & Medicinal Chemistry, 2010, 18(10), 3570-3574. 4.
[18]. Mathew, S., Divia, N., Radhakrishnan Nair, T. D., & Haridas, K. R. Indian Journal of Chemistry. Section B, Organic Including Medicinal, 2010,49(10), 1389. 5.
[19]. Sharma, S., Ameta, S. C., & Sharma, V. K. A Green Chemical Approach. In Proceedings of the World Congress on Engineering and Computer Science 2010 (Vol. 2), 20-22.
[20]. Hashem Sharghietal Journal of Heterocyclic Chemistry Volume 45, Issue 5 September/October 2008 Pages 1293–1298
[21]. J S Yadav, etal Canadian Journal of Chemistry, 2008, 86, 124-128.
[22]. Patil, D.D., Deshmukh, A.K., and Wadhava, G.C., Diuretic activity of root and bark of erythrina indica lam.. International Journal of Pharmaceutical Sciences and Research. 2011; 2 (7), 1811-1813

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 3, March 2023

[23]. S. S. Nayak, N. A. Mirgane, K. B. Pathade, V. S. Shivankar and G. C. Wadhawa. "Phytochemical analysis, antioxidant and anti-inflammatory activity of leaves and bark of Ceropegiarollae Hemadri," Plant Sci. Today, 8(3), 2021, 425–428. https://doi.org/10.14719/pst.2021.8.3.906

[24]. Gaikar, P. S., Shivankar, V. S., Patil, P. A., Chavan, A. U., &Wadhawa, G. C. (2021). Preliminary Phytochemical Analysis and Antioxidant, Anti-Inflammatory Activity of DiclipteraGhaticaSantapau. Int. J. of Aquatic Science, 12(2), 4973-4980.

[25]. N. A. Mirgane, A. Chandore, V. Shivankar, Y. Gaikwad and G. C. Wadhawa, "Phytochemical Study and Screening of Antioxidant, Anti-inflammatory TyphoniumFlagelliforme," Res. J. Pharm. Technol., 14(5), 2021, 2686–2690.

[26]. Patil, Dinanath D., Gurumeet C. Wadhava, and Arun K. Deshmukh. "One Pot Synthesis of Nitriles from Aldehydes and Hydroxylamine Hydrochloride Using Ferrous Sulphate in DMF under Reflux Condition." Asian Journal of Chemistry 24.3 (2012): 1401.

[27]. Patil DD, Mhaske DK, Wadhawa GC. Green Synthesis of 3,4dihydropyrimidinone using ferrous sulphate as recyclable catalyst, Journal of Pharmaceutical Research and Opinion, 2011; 1(6): 172–174.

[28]. Nayak, Shubhada S., et al. "Green synthesis of the plant assisted nanoparticles from Euphorbia neriifolia L. and its application in the degradation of dyes from industrial waste." Plant Science Today 8.2 (2021): 380-385.