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GREEN ROUTE FOR BENZIMIDAZOLE SYNTHESIS USING *SYZYGIUM CUMINI* WATER EXTRACT

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## ABSTRACT

In recent years environmental pollution is major concern arising globally. To full fill human needs we are running factories, industries and all other possible ways, which leads to pollution. Pharma Industry is one of the major industry, which is continuously trying to develop new product for human health. Benzimidazole is one organic compound widely used in all fields of chemical and pharma industry. In current research project we are trying to synthesize benzimidazole molecules using biocatalyst. Biocatalysts are the one which are obtaining from natural resources and they show same effect as other chemical compounds. Biocatalyst proposed here are WESC - water extract of *Syzygium Cumini* (White jamun).

Keywords: Green Route, bio-catalyst, benzimidazole, *Syzygium Cumini*

## INTRODUCTION

In recent years environmental pollution is major concern arising globally. In COVID pandemic situation of 2020 we peoples lock down into homes, most of the activities were stop and this was the time when lowest pollution in all fields were observed. Air quality, Water quality, river water quality was surprisingly developed to excellent level. To full fill human need we are running factories and all other possible ways, which leads to pollution. Chemicals used are one of those factors which affect the environment. Pharma Industry is one the major sector of industry, which is continuously trying to develop new product for human health. Benzimidazole is one organic compound widely used in all fields of chemical and pharma industry. Benzimidazole has versatile application in pharmaceutical industry. Benzimidazole used in antihypertensive<sup>1</sup>, anti-inflammatory<sup>2</sup>, anticancer<sup>3</sup>, antifungals<sup>4</sup> and many other applications. There are many researchers who employed various methods and catalyst for synthesis of benzimidazole. Most of the catalyst are again a chemical like Acetic Acid<sup>5</sup>, K<sub>4</sub>[Fe(CN)<sub>6</sub>]<sup>6</sup> and polyphosphoric acid<sup>7</sup> and many more.

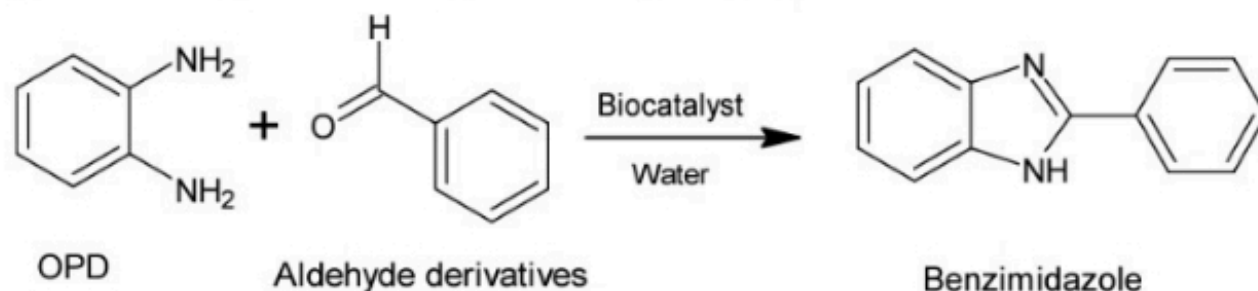
In current research paper we are trying to synthesize benzimidazole molecules using biocatalyst. Biocatalyst is the one which are obtaining from natural resources and they show same effect as other chemical compounds. Over regular chemical advantage of biocatalyst is that they are biodegradable, cheap, easily available and safer to use. Some of the research used some fruit juices for benzimidazole synthesis like coconut juice, orange juice, citrus limetta juice<sup>8</sup>. Biocatalyst proposed here are WESC - water extract of *Syzygium Cumini* (White jamun).

## RESEARCH METHODOLOGY

**Preparation of Water Extract of *Syzygium Cumini*:** *Syzygium Cumini* (White jamun) fruits were washed with deionised water and cut into pieces, about 50 gm of white jamun fruit pieces were squeezed into beaker and stirred for half an hour. Obtain liquid slurry was filtered with filter paper and separated into beaker.

**Benzimidazole Synthesis:**

Benzaldehyde (0.01mol), O-phenyl diamine (0.01 mol) and catalytical amount of WESC - water extract of *Syzygium cummini* were mixed together in water as a solvent, reaction refluxed and monitored for completion using TLC. After completion of reaction product was separated, recrystallized and dried.



**RESULT AND DISCUSSION**

Derivative preparation list with different solvents with their reaction time, yield

| Sr. No. | Aldehyde Derivatives | Solvents | Biocatalyst | Time (min) | Yield (%) |
|---------|----------------------|----------|-------------|------------|-----------|
| 1       | Benzaldehyde         | Water    | WESC        | 45         | 83%       |
| 2       | Benzaldehyde         | Ethanol  | WESC        | 50         | 81%       |
| 3       | Benzaldehyde         | Methanol | WESC        | 48         | 84%       |
| 4       | Salicylaldehyde      | Water    | Lemon       | 65         | 80%       |
| 5       | Salicylaldehyde      | Ethanol  | Lemon       | 60         | 80%       |
| 6       | Salicylaldehyde      | Methanol | Lemon       | 61         | 83%       |

Benzimidazole characterized on the basis of spectral technique

IR values: 1600, 1636, 2900, 3436  $\text{cm}^{-1}$ .

NMR Values: 7.20-7.23 (m, 2H), 7.49-7.62(m, 5H), 8.20-8.21 (m, 2H), 12.96 (s, 1H, D<sub>2</sub>O exchangeable).

**CONCLUSION**

Here we have reported new catalyst for benzimidazole synthesis, from its purity and yield we can conclude its possible to use such *Syzygium cummini* as biocatalyst. Biocatalyst for organic synthesis will reduce the hazardous chemical catalyst use. Biocatalyst will also helpful in cost cutting for reaction setup.

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**REFERENCES**

1. Radhika H. Datani, Suvarna G. Kini, Journal of Computational Methods in Molecular Design, 2012, 2 (4), 149-157.
2. Anna Nikalje, Mangesh Ghodke, World Journal of Pharmacy and Pharmaceutical Sciences, 2013, 3(2), 1311-1322.
3. Kapuriya Kaushik, Ganure Ashok, Universal Journal of Pharmacy, 2013, 02 (03), 57- 62.
4. Hament Panwar, Ranjana Dubey, Nidhi Chaudhary and Tilak Ram, Der Pharma Chemica, 2013, 5(6), 192-200.
5. Davood Azarifar, Mojgan Pirhayati et al., J. Serb. Chem. Soc., 2010, 75 (9) 1181–1189.
6. Kabeer A. Shaikh et al., Org. Communication, 2012, 5(1), 12-17.
7. B.N.B. Vaidehi, Int, J. Pharma Bio Sci, 2012, July, 3(3), 26-31.
8. S. Gulathi et.al., Chudhari Chran singh agriculture university, Haryana.