Available online on 15.05.2016 at http://jddtonline.info

Journal of Drug Delivery and Therapeutics

An International Peer Reviewed Journal

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RESEARCH ARTICLE

SYNTHESIS AND ANTIOXIDANT ACTIVITY OF THE 2-METHYL BENZIMIDAZOLE

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Received 19 March 2016; Review Completed 12 April 2016; Accepted 12 April 2016, Available online 15 May 2016

ABSTRACT

2-methyl benzimidazole is a heterocyclic organic compound having an important pharmacophoric group which is used in medicinal industry. o- Phenyldiamine was treated with acid in the presence of polyphosphoric acid and other solvents. The presence of specific group was determined by FTIR spectroscopy. The obtaining compound was screened by the antioxidant activity by using the DPPH method.

Key words: 2- methyl benzimidazole, o- phenyldiamine, antioxidant activity, DPPH method.

1. INTRODUCTION

Benzimidazole is an important heterocyclic aromatic organic compound having important pharmacophore and a privileged structure in medicinal chemistry. It is a Bicyclic in nature which consists of an imidazole ring containing two nitrogen atom at adjacent position fused to benzene ring ^{1,2,3}.



Figure 1: Structure of Benzimidazole ring

Benzimidazole derivatives is used in different ways such as analgesic^{4,5,6}, anti-inflammatory^{5,6,7,8}, antibacterial⁹, antifungal¹⁰, antiviral^{11,12}, anti-helmenthic ¹³, anticonvulsant^{14,15}, anticancer^{16,17}, antiulcer¹⁸ antihypertensive¹⁹. Firstly benzimidazole was synthesised by Hoebrecker in 1872, who obtained 2,5(or 2,6)-dimethylbenzimidazole by the using of 2-nitro-4-methylacetanilide ^{20,21}.

2. MATERIALS AND METHOD

2.1 Materials

The FT-IR spectroscopy of samples was carried out FT-IR Spectrometer in the 400- 4000 cm-1 region. Melting points were recorded in a hot stage melting point apparatus. All the reactions and the purity of products were monitored using thin- layer chromatography (TLC) on aluminium backed plates coated silica gel, with hexane-ethyl acetate mixture & chloroform- ethyl acetate mixture, visualizing the spots under ultraviolet light and iodine chamber. All the chemicals were taken sigma Aldrich campany.



Figure 2: Synthesis of 2, 5 (or 2,6)-dimethylbenzimidazole

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2.2 General procedure for synthesis of 2- methyl benzimidazole

2-methyl benzimidazole was synthesized by using ophenylenediamine was treated with 90% acetic acid. The mixture was heated in a water bath for sufficient time and temperature. After cooling above mixture was treated with 10% sodium hydroxide solution until the mixture was just alkaline to litmus. The crude Benzimidazole was collected and rinse with ice cold water. The crude precipitate was pressed thoroughly on the filter paper and washed with ice cold water and then purified ²¹.

2.3 Antioxident activity

DPPH Assay- The radical scavenging ability of synthesized compounds and the ascorbic acid (standard) was tested on the basis of radical scavenging effect on a DPPH free radical. Different concentrations (20, 50, 100, 200, and 400 μ g/mL) of compounds and standard were prepared in methanol. In clean and labeled test tubes, 2mL of DPPH solution (0.002% in methanol) was mixed with 2mL of different concentrations of compounds and standard separately. The tubes were

incubated at room temperature in dark for 30minutes, and the optical density was measured at 517nm using UV-Visible Spectrophotometer. The absorbance of the DPPH control was also noted.

The scavenging activity was calculated using the formula: scavenging activity (%) = (absorbance of control – absorbance of sample / absorbance of control) \times 100. 22

3. RESULT AND DISCUSSION

3.1 General procedure for synthesis of 2- methyl benzimidazole

In a 500ml RBF 12.5gm of o-phenylenediamine was treated with 11.25gm of 90% acetic acid. The mixture was heated in a water bath at 100°C for 2 hours. After cooling, 10% sodium hydroxide solution was added slowly with through mixing by rotation of the flask until the mixture was just alkaline to litmus. The crude Benzimidazole was collected with suction in a 75mm Buchner funnels. Ice cold water is used to rinse all solid out of the reaction flask. The crude precipitate is pressed thoroughly on the filter washed with ice cold water and then purified.



o-phenylenediamine

Figure 3: synthesis of 2- methyl benzimidazole

Interpretation- solid, shiny brown color, yield 6.8gm (71.57%), melting point 175° C, IR (KBr) wavelength (cm-1) N-H 3385, C-H 3026, C-N 1273 aromaticity around 900.

3.2 Antioxidant activity

The antioxidant activity at different concentrations 20, 50, 100, 200, and 400μ g/ml, of the synthesized compound and ascorbic acid was tested on the basis of the radical scavenging effect of the stable DPPH free radical assay. The obtained results were recorded in Table. In this study, the absorbance was found to increase with the dose of compound and standard.

Table 1: Scavenging Activity of Different Concentration in %.

S.No.	Scavenging activity of different concentration (µg/ml)				
	20	50	100	200	400
Control	80.51	86.34	91.74	94.39	97.68
Test	88.08	90.09	90.23	91.38	93.88

CONCLUSION

Benzimidazole is an important heterocyclic pharmacophoric moiety for the discovery of new drugs. The synthesis of the benzimidazole moiety was achieved by using polyphosphoric acid. The obtaining compound was characterised by using thin layer chromatography, FTIR, NMR and Mass reports. The synthesized compound was screened by antioxidant activity.

ACKNOWLEDGMENT

I would also like to thank Professor Dr. Neerupma Dhiman of Amity Institute of Pharmacy, Amity University for his moral support and I would also like to thank Dr. Tanveer Naved (Acting Principal) of Amity Institute of Pharmacy, Amity University for his moral support & provided us facilities and for providing laboratory facilities to carry out research work.

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How to cite this article: Saini S, Mittal A, Kumar G, Synthesis and antioxidant activity of the 2-methyl benzimidazole, Journal of Drug Delivery & Therapeutics. 2016; 6(3):100-102