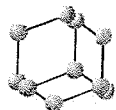
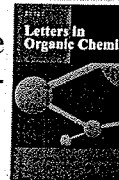


## RESEARCH ARTICLE

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SCIENCE

# 1-Ethyl-3-Methylimidazolium Cyanoborohydride Catalyzed Solvent Free Microwave Assisted One Pot Multicomponent Synthesis of Tetrahydrobenzo[*b*]Pyran Derivatives



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## ARTICLE HISTORY

Received: August 03, 2020  
Revised: November 22, 2020  
Accepted: November 25, 2020

DOI:  
10.2174/1570178618666210405151600



CrossMark

**Abstract:** We present a facile and environmentally benign protocol for the synthesis of tetrahydrobenzo[*b*]pyran derivatives *via* multicomponent condensation of dimedon, malononitrile and different aromatic aldehydes in the presence of 1-ethyl-3-methylimidazolium cyanoborohydride ([EMIm][BH<sub>3</sub>CN]) as catalyst under microwave irradiation. The one-pot synthesis, facile solvent-free condition and good isolated yield illustrate the utility of this green approach. The structural features are derived using analytical tools, including Fourier Transform Infrared Spectroscopy (FT-IR) and <sup>1</sup>H and <sup>13</sup>C Nuclear Magnetic Resonance (NMR) Spectroscopy. Electronic synthesis of tetrahydrobenzo[*b*]pyran derivatives by using catalytic action of 1-ethyl-3-methylimidazolium cyanoborohydride has been used to obtain maximum yield.

**Keywords:** Tetrahydrobenzo[*b*]pyran, microwave irradiation, solvent free, ionic liquid, FT-IR, TLC.

## 1. INTRODUCTION

Chemistry promptly is attentive to developing reactions and competent methodologies that are sustainable and eco-friendly. It is crucial to consider principles of green chemistry, paying through application of strategies that shift towards a sustainable chemical industry [1]. In conclusion, there have been foremost concerns about waste minimization and sustainability, as there are considerable current issues involving environmental aspects [2]. As of now, the multicomponent reactions are executed in ionic fluids, which possess enormous advantages in addition to being environmentally benign [3, 4]. They have been portrayed as a green medium that is safe for the environment [5] due to which nowadays, their utilization in chemical industry has become particularly important [6]. In recent times, the applications of ionic liquids to execute multicomponent reactions have been currently cited [7]. Ionic Liquids are salts in a liquid state with exceptionally low vapor pressure. Also, most of the ionic liquids have low combustibility, good thermal stability, electrical conductivity and solvating qualities [8]. For many separation or catalytic processes, the ionic liquids act as reaction medium provided that there is a broad variety of

organic, inorganic and polymeric molecules which have solubility in ionic liquids. The solvating power of ionic liquid depends upon smaller anion and large size of organic cation. The type of cations present in ionic liquids are ammonium, imidazolium, phosphonium, pyrrolidinium, pyridinium and the anions, such as acetate, formate, benzoate, tetrafluoroborate, trifluoromethane sulfonate, nitrate phosphate, hexafluorophosphate, hydrogen sulphate *etc.* are present. For the synthesis of organic molecules use of microwave irradiation [9, 10] is a powerful dielectric heating tool which is a fast, efficient, simple and clean method [11-17]. For the synthesis of different heterocycles, the combination of microwave and ionic liquids is of great interest and proves to be a green protocol [18-20].

The 4*H* benzo[*b*]pyran derivatives possess broad spectrum of biological properties [21] like anticancer, diuretics, anti-coagulant, spasmolytic, anti-anaphylactic activity [22-25]. Besides this, they have other important applications in treating neurodegenerative disease, including Alzheimer disease, Parkinson's disease, Huntington's disease, amyotrophic lateral sclerosis, Down's syndrome, AID's associated dementia as well as for the management of Schizophrenia and myoclonus [26]. The 4*H* benzo[*b*]pyran derivatives are also used as cognitive enhancers. 4*H* pyrans moreover form a structural unit of many natural products [27], different 2-amino-4*H*-pyrans have found applications as a photoactive material [28]. The Polyfunctionalized benzopyrans have a

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