2018-19 (24) Mane sir.

(175)

Journal of Pharmaceutical, Chemical and Biological Sciences
ISSN: 2348-7658
CODEN: JPCBBG
December 2018 - February 2019; 6(4):311-319
Online available at https://www.jpcbs.info

Research Article

Microwave Assisted Synthesis of Tetrahydrobenzo[b]Pyrans *Via* One Pot Multicomponent Reaction Using [Et_3NH][HSO_4] as Ionic Liquid Catalyst

Vishal U. Mane[2,4], Satish M. Chavan[4], B. R. Choudhari [3], Dhananjay V. Mane[1]*

[1]Professor & Regional Director, Yashwantrao Chavan Maharashtra Open University, Nashik (MS), India
[2]Department of Chemistry, Shri Chhatrapati Shivaji College, Omerga, Dist. Osmanabad (MS), India
[3]Principal and Head, Dept. of Chemistry, SSVP's College Shindkheda, Dhule (MS) India
[4]Department of Chemistry, RNC Arts, JDB Commerce, NSC Science College, Nashik (MS) India

*CORRESPONDING AUTHOR
Dhananjay V. Mane, Yashwantrao Chavan Maharashtra Open University, Nashik (MS), India.
Email: dvmane11@gmail.com

ARTICLE INFORMATION
Received July 14, 2018
Revised December 11, 2018
Accepted December 16, 2018
Published January 28, 2019

ABSTRACT
The utility of Ionic Liquids (ILs) for the environmentally benign synthesis of heterocyclic compounds found important for due to their unique chemical and physical properties viz. low vapor pressure, recyclability, controlled miscibility, high thermal and chemical stability. The synthesis of 2-amino-5,6,7,8-tetrahydro-7,7-dimethyl-4-(3, 4-substituted phenyl)-5-oxo-4H-chromene-3-carbonitrile or tetrahydrobenzo[b]pyran derivatives were successfully synthesized via one pot multicomponent cyclocondensation reaction of aromatic aldehydes, dimedone and malononitrile utilizing triethylamine hydrogen sulphate [Et_3NH][HSO_4] as ionic liquid catalyst under solvent free and microwave irradiation method. The reaction was carried to study the optimization of reaction conditions. It was observed that the reaction was best finished when 20 mol% of [Et_3NH] [HSO_4] ionic liquid catalyst, solvent free and MWI conditions are utilized. The ionic liquid catalyst was recycled for three cycles. Our method represents highly efficient, cheap reusable catalyst and environmentally benign greener protocol for the synthesis of chromene-3-carbonitrile or tetrahydrobenzo[b]pyran derivatives under solvent-free conditions.

KEYWORDS: Tetrahydrobenzo[b]pyran; ionic liquid [Et_3NH] [HSO_4]; microwave irradiation; green protocol

INTRODUCTION
A vast number of chromene heterocycles with significant pharmaceutical potential have been derived from natural sources. Few of them are currently used in clinical trials or as potent drugs. The dihydropyran type natural product crolibulin and the pharmaceutical HA14-1 showed anticancer properties [1], antibacterial rhodomyrtone [2], the gastric antisecretory agent [3] and hyperxanthone E antitumor agent [4]. Cancer cells grow faster, apoptosis inducing agents act on cancer cells to restrict their abnormal growth and cell division. The 4-aryl-*4H*-chromenes are potent apoptosis (controlled cell death) inducing agents [5]. Cai *et al* [6] developed anti-cancer drugs using 4-aryl-4*H*-chromenes. By varying substituents synthetically on the aryl ring, at C-4 they found that *4H*-chromene 1 showed better activity against human lung tumor xenograft (calu-6) [7]. 4-Aryl-4H-chromene with an electron donating group like

coprecipitation preparation and applications in synthesis of 4*H*-chromene-3-carbonitrile scaffolds. Ultrason Sonochem 2015; 26: 229-240.

30. Shirini F, Abedini M, Zarrabzadeh S, Seddighi M. Efficient synthesis of 4*H*-pyran derivatives using a polymeric catalyst based on PVP. J Iran Chem Soc 2015; 12(12): 2105-2115.
31. Wasserscheid P, Keim W. Ionic Liquids-New "Solutions" for Transition Metal Catalysis. Angew Chem Int Ed 2000; 39(21): 3772-3789.
32. Wasserscheid P, Welton T. Outlook. In, Wasserscheid P, Welton T, eds. Ionic Liquids in Synthesis, Wiley-VCH Verlag GmbH & Co. KGaA, 2002; p 348.
33. Yue C, Fang D, Liu L, Yi TF. Synthesis and application of task-specific ionic liquids used as catalysts and/or solvents in organic unit reactions. J Mol Liq 2011; 163(3): 99-121.
34. Gupta MM, Gupta Rajnikant, Gupta VK. Salicyldimine-based Schiff's complex of copper (II) as an efficient catalyst for the synthesis of nitrogen and oxygen heterocycles. New J Chem 2015; 39: 3578-3587.
35. Isambert N, Duque MMS, Plaquevent JC, Genisson Y, Rodriguez J. Multicomponent reactions and ionic liquids: a perfect synergy for eco-compatible heterocyclic synthesis. Chem Soc Rev 2011; 40:1347-1357.
36. Kaneda K, Mizugaki T. Development of *concerto* metal catalysts using apatite compounds for green organic syntheses. Energy Environ Sci 2009; 2: 655-673.
37. Zhang W. Green chemistry aspects of fluorous techniques- opportunities and challenges for small-scale organic synthesis. Green Chem 2009; 11: 911-920.
38. Candeias NR, Branco LSC, Gois PMP, Afonso CAM, Trindade AF. More Sustainable approaches for the synthesis of N-based heterocycles. Chem Rev 2009; 109(6):2703-2802.
39. Weng J, Wang C, Li H, Wang Y. Novel quaternary ammonium ionic liquids and their use as dual solvent-catalysts in the hydrolytic reaction. Green Chem 2006; 8(1): 96-99.
40. Z N Siddiqui, K Khan. $[Et_3NH][HSO_4]$-Catalyzed Efficient, Eco-Friendly, and Sustainable synthesis of quinoline derivatives via knoevenagel condensation. ACS Sustainable Chem Eng 2014; 2(5): 1187-1194.
41. Ghatole AM, Lanjewar KR, Gaidhane MK, Hatzade KM. Evaluation of substituted methylcyclohexanone hybrids for anti-tubercular, anti-bacterial and anti-fungal activity: Facile syntheses under catalysis by ionic liquids. Spectrochim Acta A Mol Biomol Spectrosc 2015; 151:515-524.
42. Shaikh MH, Subhedar DD, Khan FAK, Sangshetti JN, Shingate BB.$[Et_3NH][HSO_4]$-catalyzed one-pot, solvent-free synthesis and biological evaluation of α-amino phosphonates. Res Chem Inter 2016; 42(5): 5115-5131.
43. Mane VU, Choudhari BR, Mane DV. Tetra-*n*-butyl ammonium fluoride (TBAF) catalyzed convenient synthesis of 2-arylbenzothiazole in aqueous media. Chem Biol Interface 2017; (7) 1: 48-56.
44. Subhedar DD, Shaikh MH, Nawale L, Yeware A, Sarkar D, Shingate BB. $[Et_3NH][HSO_4]$ catalyzed efficient synthesis of 5-arylidene-rhodanine conjugates and their antitubercular activity. Res Chem Inter 2016; 48(8): 6607-6626.

Cite this article as:
Vishal U. Mane, Satish M. Chavan, B. R. Choudhari , Dhananjay V. Mane. Microwave Assisted Synthesis of Tetrahydrobenzo[b]Pyrans *Via* One Pot Multicomponent Reaction Using $[Et_3NH][HSO_4]$ as Ionic Liquid Catalyst. J Pharm Chem Biol Sci 2018; 6(4):311-319