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The Microwave Assisted Rapid and Efficient Synthesis of Azlactones

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Abstract:- A simple and extremely fast and high yielding protocol gives the azlactone under microwave irradiation. azlactone reaction offers the simple workup, high yield, easy and simple purification and economically available catalyst .

Keywords:- *Sodium Hypophosphite, Benzoylaminoethanoic Acid, Aldehyde, Microwave, Green.*

I. INTRODUCTION

Heterogeneous catalysts are always prominent over the homogenous counterparts in terms of environmental friendly, easy and simple in operation to get better result. In recent time green approach of synthesis with solvent free medium or solvent medium, heterogeneous solid acid-base catalysts, nanopartical have received more importance in organic transformations. The uses of simple, cheap and easily available non hazardous catalyst help formation of high yield. Now a day One pot synthesis approaches has open new arena for the development of quick and efficient target complex synthesis. Furthermore heterocyclic systems exhibit wide range of significant pharmaceutical properties.

An oxazoles and oxazolones are important scaffold in drug discovery; it contains N and O in five member ring Oxazolone and its derivatives are show wide use in medical and pharma industry. Oxazol are imp intermediates in the synthesis of antimicrobial or anti inflammatory compound.

In 1893 F. Erlenmeyer introduced the Erlenmeyer synthesis when aldehyde react with N-acetylgycine and acetic anhydride with small amount of sodium acetate ,a simple condensation reaction gives azlactones [1]. Recently some new catalyst compound include such as ZnO [2], $(NH_4)_2HPO4$[3], $ZnCl_2$ [4], Al_2O_3[16] etc, but above method having problem such as hazardous material , long reaction time and low yield

The microwave dielectric heating shows its utility in synthesis , to accelerate the organic reaction. This method is more effective then thermal heating. It improve the purity of product also enhance the chemical yield in short reaction time.

In this paper we are using sodium hypophosphite as catalyst under solvent free condition using microwave process.

II. EXPERIMENTAL

- *Experimental Section*

All chemical were purchased from Merck, sdfcl were commercially available and were used as received without further purification. The melting points were measured by open capillary method incorrectly. IR data collected on (range 4000-400)). NMR Data recorded in DMSO –d6 as solvent by Bruker Avance Neo 500 MHz spectrometer. The reaction were carried out in a domestic microwave oven (onida-MO 20CJS26S) at 800 watt.

- *General Procedure Foe the Synthesis of Azolactone*

The appropriate aldehyde (1mmol), Benzoylaminoethanoic acid (1.1 mmol) , acetic anhydride (3.3.mmol) and sodium hypophosphite (5 mol %) were taken in Erlen Meyer flask i.e.conical flask capped with funnel. After that flask placed in a microwave oven and it irradiated at 260 watts for 4- 6 min.(table -1) After irradiation , the mixture was cooled to room temperature and then it wash with cold water. Finally the crude product was recrystalized from 95 % ethanol, gives yellow solid precipitated known as azlactone.

- *Reaction*

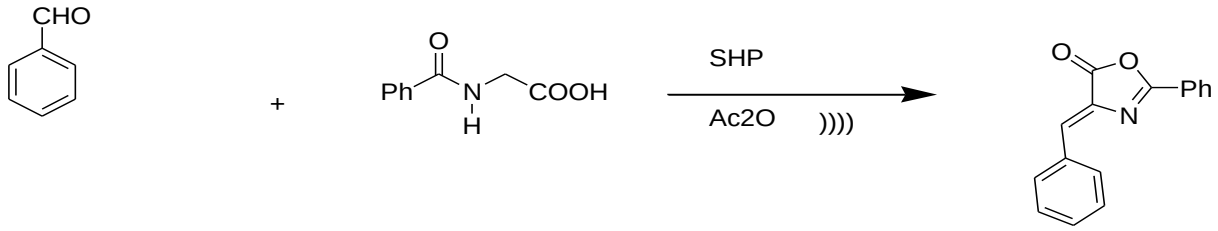

Fig 1:- Synthesis of Azolactone from aldehyde , Benzoylaminoethanoic acid, acetic anhydride and sodium hypophosphite under microwave irradiation

Compound	Aldehydes	Time	Yield	Found mp
5a	C_6H_5CHO	4	80	168-170
5b	4-$MeOC_6H_5CHO$	4	80	154-156
5c	4-Cl-C_6H_5CHO	5	80	184-168
5d	3 $NO_3C_6H_5CHO$	4	80	166-168
5e	Furfural	5	70	168-170
5f	4-MeC_6H_5CHO	5	75	142-144
5g	$N(CH_3)_2C_6H_5CHO$	6	80	210-212

Experimental Table 1:- Synthesis of Azolactone [4-arylidene-2–phenyl-5(4H)-Oxazolones] from various aldehyde

Spectral data for selected product:
Characterization of compounds:

1) ENTRY 5a 4-Benzylidene-2-phenyloxazole-5-one
1H-NMR(500MHz-DMSO d)- δ 8.32 , δ 8.15 , δ 8.14, δ 8.12, δ 7.75, δ 7.66, δ 7.56 , δ 7.52 δ 7.36
13C–NMR–(125MHz-DMSOd6)-δ166.79 ,162.95,133.60,133.25,132.98,131.16,130.65,129.23,128.88,127.89,124.99,

2) ENTRY 5b 4-(4-methoxybenzylidene)-2-phenyloxazole-5-one
1H-NMR(500MHz-DMSO d)- δ 9.87 , δ 8.31, δ 8.10, δ 7.69 , δ 7.65 , δ 7.12 , δ 3.86 , δ 2.52
13 C NMR(125MHz-DMSO d6) – δ 191.21 , δ 166.99 , δ 161.77 , δ 134.47 , δ 133.26, δ 130.49 , δ 128.94 , δ 126.08 , δ 125.20

III. RESULTS AND DISCUSSION

Sodium hypophosphite acts as compelling catalyst with respective to time and yield. When Benzoylaminoethanoic acid gives transformation with acetic anhydride. Same time Sodium hypophosphite react with aldehyde by linking to the oxygen atom which enhancing the activity and leading to decrease reaction time. This effect can be attributed to the carbonyl complexatin by SHP leading to electrophilic assistance during nucleophilic attack.

Consequently sodium hypophosphite (SHP) is a suitable catalyst for synthesis of 5(4H)-oxazolones, due to excellent yield of the products, simple work up with short reaction time.

IV. CONCLUSION

In conclusion, our interest toward the synthesis of oxazolone derivatives by microwave method using sodium hypophosphite as catalyst in solvent free condition. The catalyst use in reaction is cheap and easily available commercially. The one pot three compound reaction show short time period and good yield in solvent free condition by using microwave irradiation.

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CONFLICT OF INTEREST

The author have declared that no conflict of interest exists.

REFERENCES

[1]. Erlenmeyer E. Annalen ,1893 ,275,1-12
[2]. Canan kus, ezgi ugurlu, elcin ozdamar, benay can eke, synthesis and antioxidant pro of new oxazole -5(4H)-one derivatives turk j. pharm sci. 2017;14(2) ;174-178
[3]. Yu.Chuanming, Z.Baocheng ,S Weike , Synth. Commun.2006 ,36 ,3447-3453
[4]. Fozooni s., khoshdast , hassani , H.hamidian synthesis of oxazolone and imidazolone derivatives in presence of H_2O_2promotd fly ash as a novel and efficient catalyst , j sci ,Islamic republic of iran .2017 ,28(3)221-230
[5]. K.gotttwald and seebach, tetrahedron. 1999,55,723-738
[6]. Meiwes , schudock and kretzsxhmar tetrahedron. Asymmetry 1997,8,527-536

[7]. Kitazawa, higuchi, takahashi , t.wada j.phy chem. 1995 ,99,14784-14792
[8]. Monk K.A. ,sarapa D , mohan R.S ,synth commun,2000,30,3167-3170
[9]. Christian spiteri, dougal ritso,amani awaad, j.e. moses j.saudi chem. Soc. Short comm.,2011,15,375-378
[10]. Atkins p w . phy chem. ,6th ed.oxford ,uk 1998.pp928,941
[11]. Doyle m.p. buhro , Davidson , Elliott 1980 lewis acid promoted reaction diazocarbonul comp synthesis and preliminary biology evaluation of the oxazole , tetrahedron let ,46,7355-7357
[12]. Jiang H,huang H,cao , Qi TBHP/I_2 Oxidation for one pot synthesis of polysubstituted oxazole.org let 12,5561-5563
[13]. Yeh v.s.c. recent advances in the total synthesis of oxazole containing natural products , tetrahedron 2004,60,11995-12042
[14]. Wipf p. miller c.p. a new synthesis of highly func. Oxazoles ,j. org. chem.1993, 58,3604-3606
[15]. Turchi .I.J. Oxazole chem. a review of recent advances ind .eng.chem .1981,20,32-76
[16]. Gelmi M L , Cleric F , Melis A. 5(4H)-oxazolones part X: acid and base effects on the translactonization reaction of 4-(2-oxa-alkylidene)-5(4H)oxazolones: new synthesis of 5-alklidene-3-benaoylamino-2(5H)FURANONES, Tetrahedron.1997,53: 1843-1854
[17]. Rani .A, khatri C. and hada R,fly ash supported sc triflate as an active recyclable solid acid catalyst
[18]. P.s. rao and r .v. venkataratnam , Indian j chem. 1994,33,984-985
[19]. Canan kus, ezgi ugurlu, elcin ozdamar, benay can eke, synthesis and antioxidant pro of new oxazole -5(4H)-one derivatives turk j. pharm sci 2017;14(2) ;174-178
[20]. M.A. pasha . v.p. venkataratnam,k.n. venugopala and g.k rao . j. pharm . taxi 2007, 2,264-270
[21]. Cano , alvarez, nicasio, perez p.j. regioselective formation of 2,5 di-substituted oxazoles via copper catalyzedcycloaddition of acy azides and 1- alkynes. J.am. chem..soc.2011,129,12320-12327
[22]. K. takenaka.T.tsuji,j. heterocycl.chem.1996,33,1367-1370
[23]. J.T. Konkel,J.Fan, B.Jayachandran,K.l.Kirk.J.Fluore chem,2002,115,27-32
[24]. Yeh ,V.S.C. recent advances in the total synthese of oxazole-containg natural products, tetrahedron 2004,60,11995-12042
[25]. Kumar A,Makrandi JK.An iodine-mediated green sunthesis of 1,3,4-oxadiazoles using under solvent free conditions using grinding technique ,green chem. Let rev2011,4(1):87-89
[26]. Pasha M A ,Jayashankara K N and Gopal Krishna Rao , ZnO: An efficient catatlyst for the synthesis of 4-arylmethylidene-2-phenyl-5-(4H)-oxazolones having antimicrobial activity, J.of Pharmacology and Toxicology(2007),2:264-270
[27]. Rostami M ,Khosropour A ,MirkhaniV ,Moghadam M, Tangestaninejad S, Mohammadpoor-Baltork , Organic – Inorganic hybrid polyoxometalates :efficient, heterogeneous and reusable catalysts for solvent free synthesis of azlactones. App cat A Gen ,2011,397(12):27-34
[28]. Hooshang Hamidian and Ahmad Momeni Tikdari , syntheisi of unsaturated 5(4H)- oxazolone derivatives in the presence of antimony pentafluorid as catalyst, Asian journal of chemistry , 2007,vol -19,No -2,pp -970-974.