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Synthesis and Spectral Analysis of Some Representative Pyrazoline Derivatives

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ABSTRACT: In the present investigation, we designed and synthesized a series of (*E*)-1-(2-hydroxyphenyl)-3-(1,3-diphenyl-1*H-pyrazol-4-yl*)prop-2-en-1-one derivatives by aldol condensation followed by the reaction of hydrazine hydrate. The entire synthesized compound have been Characterized by ^{1}HNMR, Mass and IR spectral studies.

Keywords: Pyrazoline, Hydrazine hydrate, Spectral, derivatives.

INTRODUCTION: Pyrazoline[1] were well known and important nitrogen containing five membered heterocyclic compound and several method have been work out for its preparation. Following pyrazoline derivative have been found to posses considerable biological activities. It has several prominent effects, such as antimicrobial, anti-microbacterial, anti-inflammatory, anti-analgesic and antidepressant activities[2]. A huge number of 2-pyrazoline using various synthetic method for its preparation have been described in the chemistry literature. Most widely used procedure were based on the reaction of α,β- unsaturated aldehyde and ketone with hydrazine. However a series of specially substituted representatives have been synthesized rarely. For this reason the aim of our present study was to synthesized systematically substituted 2-pyrazoline derivative for the study of its antimicrobial activity in future.[3, 4]Among the method used for preparation of pyrazolines condensation of substituted chalcones[4] with hydrazine and its derivatives were commonly employed. 2-pyrazolenes conveniently prepared by treatment of α β unsaturated carbonyl compounds with hydrazine reagents in acidic medium. Pyrazole moiety containing compounds are associated with bactericidal[5], antiinflammatory[6] and hepatoprotective[7] activities. 2-(1,3-Diphenyl-1*H*-pyrazol-4-yl)-3-chlorochromones[8] reported by us earlier were found to be associated with excellent antibacterial and antifungal activities. Nitrogen containing heterocyclic compounds[9] like pyrazolines have received considerable attention in recent years due to their biological activities like anti- inflammatory,[10] analgesic, anticonvulsant,[11] and antidiabetic.[12] Pyrazolines and their derivatives are also reported to possess antiprotcolytic,[13] antibacterial, antifungal and antiviral[14] activities. Many substituted pyrazolines are known to possess acaricidal[15] activities and are used in the treatment of cerebral edema.[16] 1-Phenyl-2-pyrazolines are found to be useful as antioxidants.[17]

MATERIALS AND METHODS:

Preparation of ester: 1 mole of phenol and 1.2 mole of Ac_2O were taken in dry conical flask; add 15 ml of dry pyridine. Keep it for overnight at room temperature, then poured the content over crushed ice containing 5-10 drop of conc. HCl. Separated organic layer from separating funnel wash with 1% ice cold solution of NaOH again wash with water for 2-3 time then dry over sodium sulphate, purify by distillation pure ester was collected.

Preparation of O-Hydroxy acetophenone: Take (1.25 mole) of anhydrous $AlCl_3$ in dry RBF equipped with air condenser then add (1 mole) above ester to the flask, within few minute vigorous reaction will set up. After few minute HCl fumes formation will take place then heat the reaction mixture in oil bath at 130-150^0 c. Then keep the flask in ice bath add to it water containing ice product will separate in 1-2 hrs. Filter the product recrystallized from aq. alcohol.

Preparation of Chalcone: Equimolar amount of (0.005 mole) O-hydroxy-acetophenone and (0.005 mole) pyrazole aldehyde were taken in 100 mL RBF

with 25 mL of ethanol to this add 2 gm KOH and resulting reaction was monitored by TLC. After completion of reaction mixture was poured over crushed ice and acidify with conc. HCl solid thus obtained were separate by filtration and recrystalization from proper solvent to get Chalcone. The compound synthesized was analyzed by spectral data.

Preparation of Pyrazoline: Take 1 mole of Chalcone in 100 ml RBF with 20 ml of ethanol to this reaction mixture add 2 ml hydrazine hydrate and resulting reaction reflux for 4 hrs. Add 1 ml glacial acetic acid then continue refluxing for about 4 hrs. Then resulting reaction was monitored by TLC. After completion of reaction mixture was poured over crushed ice. Solid product is separated out by filtration and recrystallized from proper solvent to get Pyrazoline. The compound synthesized was analyzed by spectral data.

RESULTS AND DISCUSSION: Synthesis of pyrazoline is summarized in scheme-I. The starting compound substituted chalcone was prepared by the claisen-schmidt condensation of a variety of substituted acetophenones with aromatic pyrazole aldehydes in presence of ethanol/KOH.

The chalcones (4a-d) were characterized by IR, ^{1}HNMR, Mass Spectrometry. The ^{1}H NMR spectra of pyrazolines 4b exhibit characteristic feature signals due to the ABX system. The Ha proton which is eclipsed by Hx proton indicates an apparent doublet of doublet at 3.64 with JHaHx ≈ 5.72Hz and JHaHb ≈ 10.88 Hz. The Hb proton shows 3.11 doublet of a doublet with JHbHx ≈ 7.48Hz and 9.12Hz. The Hx proton appeared downfield at δ 5.00 as a doublet of a doublet with JHaHx ≈ 10.40 Hz and JHbHx ≈ 9.60 Hz.

4c: IR(in cm^{-1}) 3130.4 cm^{-1}(O-H), 1645.4 cm^{-1} (C=O),749.31 cm^{-1} C-Cl),1596.3 cm^{-1} C=C),1619.8 (C=C) cm^{-1},

^{1}H NMR:12.59 δ (OH), 6.68 δ (d, 1H), 7.12 δ (d, 1H) 7.34-8.23 δ (m, 12H) Aromatic , 9.40 δ, 2.35 δ,

MASS:M/2 (m+1) (m+2)= 414, 416.

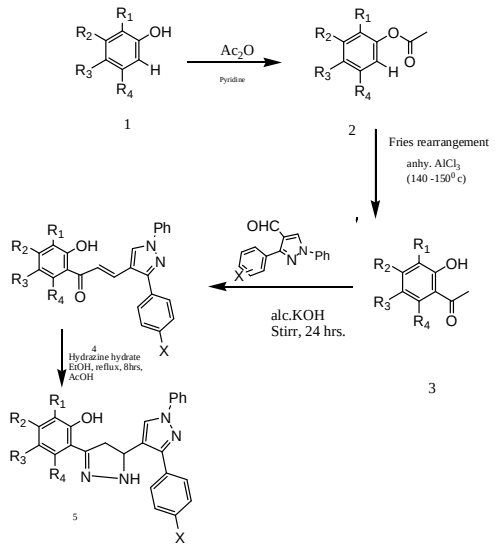
5c: IR(in cm^{-1}) 3358.2 cm^{-1} (-NH), 751.0 cm^{-1} (C-Cl), 1601.0 cm^{-1} (C=C), 3137.0 cm^{-1} (-O-H)

^{1}H NMR: 2.24 δ (s, 3H) ,3.11 δ (dd, 1H),3.64 δ (dd, 1H) 6.18-8.25 δ m13H) ,8.25 δ (s,1H), 10.94 δ, 5.00 δ (dd , 1H).

MASS- M/Z: (m+1) (m+2)= 428, 430.

Table I: Characterization data.

Compound	Substituent				Physical constant (M. P.) in ^{0}C	Yield In %
	R_1	R_2	R_3	R_4		
4a	H	H	CH_3	H	165	68
4b	Cl	H	Cl	H	202	58
4c	H	H	Cl	H	180	63
4d	H	H	Br	H	173	67
5a	H	H	CH_3	H	210	61
5b	Cl	H	Cl	H	222	51
5c	H	H	Cl	H	200	59
5d	H	H	Br	H	188	61



[Scheme1]

CONCLUSION: A simple, efficient and general method has been developed for the synthesis of pyrazoline derivatives. The preparation of titled compound has satisfactory structure which was confirmed by spectral tools. We had obtained the good yield. In future we are going to screen its biological activities.

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