Gurukul International Multidisciplinary Research Journal (GIMRJ)*with* International Impact Factor 8.357
Peer Reviewed Journal
https://doi.org/10.69758/GIMRJ/2504I5VXIIIP0059

e-ISSN No. 2394-8426
Monthly Issue
APR-2025
Issue–IV, Volume–XIII

SYNTHESIS AND CHARACTERIZATION OF SOME PYRAZOLINE DERIVATIVES

C. M. Shahakar*[1], V. S. Jagtap[2]
Department of Chemistry,
S.P.M. Science and Gilani Arts, Commerce College Ghatanji[1,2]
Email: chetanshahakar0904@gmail.com
vjagtap.ytl@gmail.com

Abstract: In present study, the synthesis of pyrazoline derivatives by the reaction of chalcones with phenyl hydrazine hydrochlorides in ethanol under reflux conditions in good yields.All the prepared compound were characterized by spectral studies.

Keywords: pyrazoline, chalcone, phenyl hydrazine, spectral analysis

INTRODUCTION

The prevalence of pyrazoline core in biologically active molecules has stimulated the need for and efficient way to make the heterocyclic lead. Pyrazoline have attracted and attention and medicinal chemists for both with regard to heterocyclic chemistry and the pharma logical activities associated with them. The chalcones are most commonly synthesized via Claisen-Schmidt reaction of an aromatic aldehyde with acetophenones, which undergo cyclization reaction with phenyl hydrazine hydrochlorides in ethanol to synthesized pyrazoline derivatives. Pyrazoline are an important class of heterocyclic compounds containing two nitrogen atoms in the five membered ring and are reported to haveanti-inflammatory[1-2],antibacterial[3], antioxidant[4], antimicrobial[5-6],Pyrazoline products nitrogen heterocycles consider rich electron (neutrophil) which help to show a significant part in the various biological activities[7-8], anticancer activity[9-10],Antimalarial activity[11].A popular method for synthesizing these chemicals involves the reaction of aromatic ketones and aldehydes in the presence of base. These compounds in this process and can be converted into 2-pyrazolines by utilizing cyclizing agent such as acetic acid[12]. Due to these properties,pyrazolines have garnered interest in medicinal chemistry for drug development.

EXPERIMENTAL

Materials and methods

All the reagents and solvent used were of laboratory grade.The synthesis of new products was monitored by TLC. Melting points were determined by Thieles tube method. The IR spectra were recorded on a Shimadzu instrument using KBr pellets.^{1}HNMR spectra were recorded on Brucker Avance 400Mhz spectrophotometer using DMSO-d6 as solvent and TMS as internal standard (chemical shift are express ppm).

Synthesis of ligands

The compounds were synthesized in two steps:

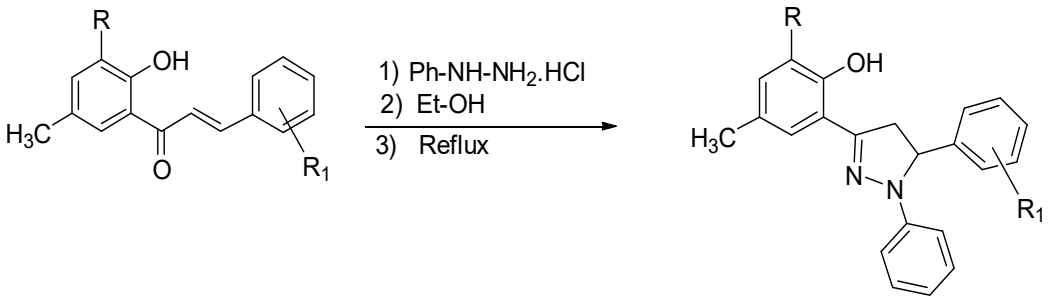
Step I: Synthesis of Chalcone

A Mixture of 0.01 mol 2-hydroxy-3-nitro-5-methyl acetophenone and 0.01 chloro-

substitutedaldehydeandindole3-carboxyadehyde were taken in ethanol. 20% NaOH solution added slowly and stirred at room temperature for 4-5h. The mixture was kept overnight and then it was poured into crushed ice and acidified with dilute hydrochloric acid. It was filtered, dried in hot air oven and weighed. The crude product was further purified using ethanol.

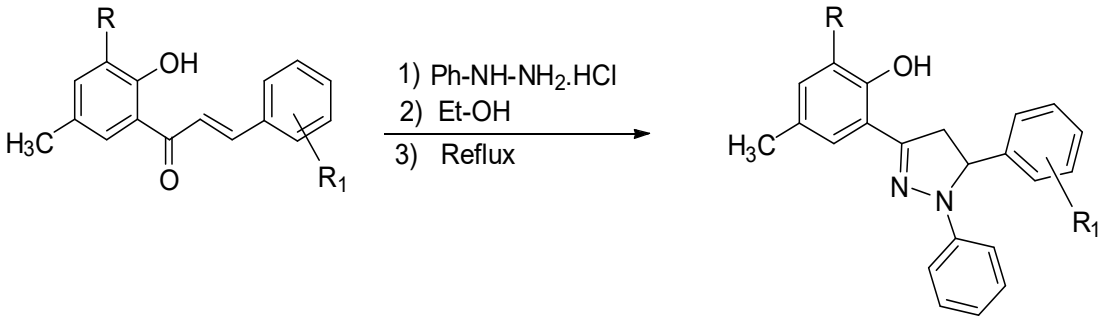
Step II:Synthesis of 2-pyrazoline derivatives

A solution of synthesized chalcone(0.01mol) and Phenyl Hydrazine Hydrochloride (0.02mol) were dissolved in ethanol (25ml). The reaction mix. was refluxed for 1.5hrs. The reaction mix. Was cooled and decomposed it into ice-cold water. The product precipitates were refined, laundered with distilled water and re-crystallized from ethanol to get the product.



Ligand	R	R_1
a	$-NO_2$	2-Cl

Scheme 1: Synthesis of Pyrazoline (a)

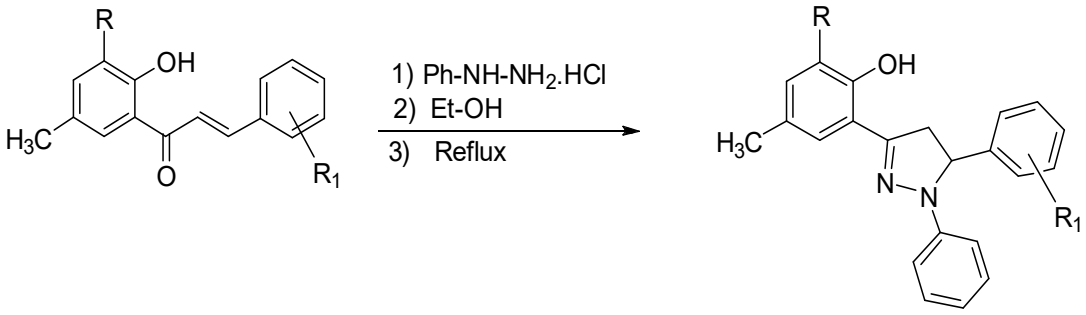


Ligand	R	R_1
b	$-NO_2$	3-Cl

Scheme 2: Synthesis of Pyrazoline (b)

Gurukul International Multidisciplinary Research Journal (GIMRJ)*with* International Impact Factor 8.357
Peer Reviewed Journal
https://doi.org/10.69758/GIMRJ/2504I5VXIIIP0059

e-ISSN No. 2394-8426
Monthly Issue
APR-2025
Issue–IV, Volume–XIII



Ligand	R	R_1
c	$-NO_2$	Indole-3-carboxy aldehyde

Scheme 3: Synthesis of Pyrazoline (c)

RESULT AND DISCUSSION

Table: Physical and analytical data of synthesized compounds

Compound	molecular Formula	M.P. (^{0}C)	Yield (%)	Element % Found (Calculated) C	H	N	Cl
a	$C_{12}H_{18}ClN_3O_3$	114	87	64.73	4.40	10.31	8.62
b	$C_{12}H_{18}ClN_3O_3$	130	72	64.74	4.41	10.28	8.62
c	$C_{24}H_{20}N_4O_3$	119	89	69.82	4.89	15.25	----

The structure of newly synthesized compounds was characterized by ^{1}H NMR and IR spectral data

2-(5-(2-chlorophenyl)-1-phenyl-4,5-dihydro-1H-pyrazol-3-yl)-4-methyl-6-nitrophenol

IR (KBr, cm-1): 3768 (Strong intramolecular H-bonded -OH), 1691.57 (-C=N), 3082.225 (-C-H aromatic), 2226.01 (-C-H aliphatic), 1138.00 (-C-N), 1043.49 (-C-O), 754.17(-C-Cl), 1593.20(-NO_2 asymmetric),1475.54(-C=C),1313.52(-NO_2 symmetric); 1-HNMR(400 MHz,(CDCl3) 2.2 (s, Ar-CH_3), 4.1(t, pyrazoline nucleus), 4.7 (d, pyrazoline nucleus), 4.8 (s,1H, phenolic -OH),7-8.1(m, 11H,Ar-H)

2-(5-(3-chlorophenyl)-1-phenyl-4,5-dihydro-1H-pyrazol-3-yl)-4- methyl-6-nitrophenol

IR (KBr, cm-1): 3741 (Strong intramolecular H-bonded -OH), 1691.57 (-C=N), 3068.7(-C-H aromatic), 2926.01(-C-Haliphatic),1138.00 (-C-N), 1045.49 (-C-O), 752.24(-C-Cl),1539.20(-NO_2 asymmetric),1473.62(-C=C); 1-HNMR(400 MHz,(CDCl3) 2.2 (s, Ar-CH_3), 4.1(t, pyrazoline nucleus), 4.7 (d, pyrazoline nucleus), 4.89 (s,1H, phenolic -OH),7-8.1(m, 11H,Ar-H)

2-(5-(1H-indol-3-yl)-1-phenyl-4,5-dihydro-1H-pyrazol-3-yl)-4-methyl-6-nitrophenol

IR(KBr, cm-1): 3741(Strong intramolecular H-bonded -OH),3385.07(N-H), 3056.10(-C-H aromatic),2926.01(-C-Haliphatic),1249.87(-C-N-stretching),1531.48(-NO_2asymmetric),1450.47 (-C=C-),1342.26(-NO_2 symmetric);1HNMR(400MHz,CDCl3)δ(ppm):2.4(s,Ar-CH_3),2.32(t, pyrazoline nucleus),2.2(d,pyrazoline nucleus),7.8(s,1H,N-H).4.7(s,1H,Phenolic

-OH).6.9-8.4(m, 11H,Ar-H)

CONCLUSION

In Summary, we have described synthesis of pyrazolines compounds derived from substituted chalcones and hydrazine hydrate in ethanol. After that the compounds were purified by crystallization. The structure of the synthesized compounds was established on the basis of spectral data from 1H NMR, IR spectroscopic techniques.

ACKNOWLEDGEMENT

AuthorsarethankfultoPrincipal and Head ofdepartmentofChemistry,S.P.M. Science and Gilani Arts Commerce College Ghatanji, Indiaforproviding researchfacilities to carry out research work.The NMR spectra were recorded at SAIF, Panjab University, Chandigarh.

REFERENCES

1.Sonu Singh, Dr. Pravin Kumar, Dr. Nasiruddin Ahmad Farooqui and Madhukar Prabhash, *International Journal for Multidisciplinary Research*.,2024, 6(6):152-157

2. Zeinab G Younus, Tagreed NA Omar, *Journal of Research in Medical and Dental Science*., 2023,11(01):082-089

3. Mamta Ahuja, Ravi Sethi,*Sci.Revs.Chem.Commun*.,2015, 5(1): 7-12

4. V.Kanchana, L. Mayan, A.Kistan and S.Mohan, *Rasayan J.Chem*., 2024;17(1): 281-287

5. Ahmet Ozdemir, Marmara,*Pharmaceutical Journal*., 2013, 17: 187-192

6. Tok F, Dogan MO, Gurbuz B, Kocyigit-Kaymakçıoglu B,*J Res Pharm*., 2022; 26(5): 1453-1460

7. Yusuf M, Jain P,*Arab J Chem* 2014; 7:553-596.

8. Hadi AA. Synthesis and microbial studies of pyrazoline and its derivatives. Department of chemistry, Fergusson College, Pune University, India, 2012.

9.Istana Chunaifah, Riska Elya Venilita, Putra Jiwamurwa Tjitda, Endang Astuti, Tutik Dwi Wahyuningsih, *Journal of Applied Pharmaceutical Science*.,2024;14(04):063-071

10.Sagar A.Jadhav, Kiran M. Kulkarni, Pramod B. Patil, Vikas R.Dhole, Shitalkumar S.Patil, *Der Pharma Chemical.,*2016;8(3):38-45

11.Linda Ekawati, Beta Achromi Nurohmah, Jufrizal Syahri, Bambang Purwono, *Sains Malaysiana*., 2022;51(10): 3215-3236

12. Seham Y. Hassan, *Molecules.,*2023, 18: 2683-2711