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Synthesis, spectral analysis and antimicrobial activities of pyrazole and pyrazolone derivatives

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ABSTRACT

In the present investigation different pyrazole & pyrazaolone derivatives have been synthesized compounds. The synthesized compounds were characterized and tested for antibacterial activity against Echerichia coil, Pseudomonas aeruginasa, Staphylococcus aureus.& Bacillus.

Keywords: Investigation, pyrazole, pyrazolone, derivatives, anti-bacterial activity.

INTRODUCTION

The pyrazolone is an important compounds which are found in various pharmaceutically active compounds due to their versatile biological activity, including antioxidant[1-2], antibacterial[3], anticancer[4], antimalarial and several other pharmacological action like antifungal[6] and antidiabetic[7]. pyrazoles and its derivatives are well known compounds having their diverse biological activities. They also have been known to exhibit antimicrobial, analgesics, anticancer, antitubercular, antidepressant anticonvulsant and herbicidal properties. The pyrazole ring is present as the core in a variety of leading drugs like celebrex, Viagra, Ionazlac, Rimonabant and Difenamizole etc. pyrazole ring have found use as building blocks in organic synthesis for designing pharmaceutical and agrochemical and as bifunctional ligands for metal catalysis. In the present study, we have synthesized substituted pyrazolone and pyrazole derivative as an antimicrobial agent [2].

MATERIALS AND METHODS

The chemicals used for synthesis of compounds were analytical grade and used without further purification.

Synthesis of compounds 1(a-c)
Substituted Aldehydes (0.01 mole) and phenyl hydrazine (0.01 mole) was dissolve in methanol. A few drops of sulphuric acid were added to reaction mixture, and solution was warmed. The precipitate was formed. The crude product was filtered off, wash with methanol dried. The synthesized compounds **1(a-c)** were recrystalized using ethanol.

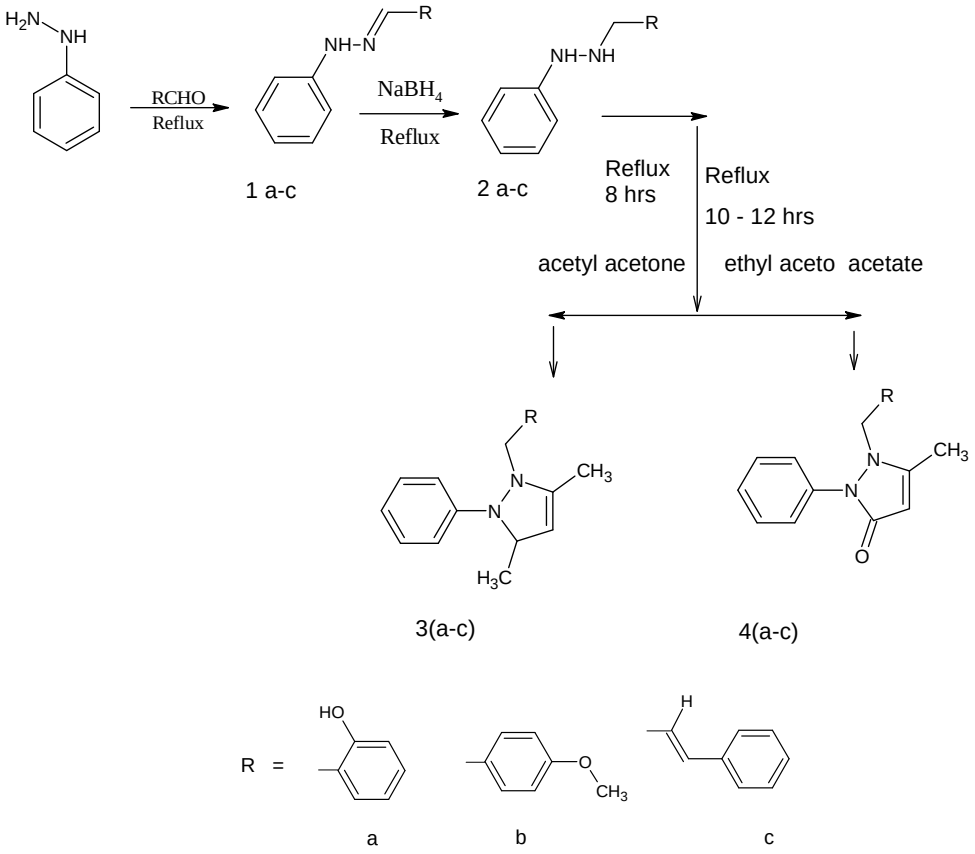
Synthesis of compounds 2(a-c)
The synthesized compounds **1(a-c)** (0.044 moles) were dissolve in mixture of 30 ml methanol and 3 ml of water taken in two necked round bottom flask with constant stirring on oil bath. The reaction mixture was heated up to 40-50 C. sodium borohydride (0.044 moles) was added in fraction over a period of 1-2 hrs and further stirred

for 1-2 hrs. After stirring reaction mixture was refluxed for 1 hrs and poured into ice water to obtained precipitate of **2(a-c).** It was filtered off, wash with water and dried. Precipitate was recrystalized by using ethanol.

Synthesis of compounds 3(a-c)
The synthesized compounds (0.1 mole) **2(a-c)** were refluxed with acetyl acetone (0.1 mole) in ethanol for 8-10 hrs. Reaction was monitored by TLC. Reaction mixture was cooled and poured into the crushed ice to obtained yellow colored precipitate. Dark yellow colored precipitate was refluxed in methanol and charcoal for 30min to remove colored impurities. Charcoal was separated out by filtration and filtrate was concentrated to obtained light yellow precipitate of **3(a-c)** recrystalized from ethanol

Synthesis of compounds 4(a-c)
The synthesized compounds (0.1 mole) **2(a-c)** were refluxed with ethyl acetoacetate (0.1 mole) in 15ml ethanol for 10-12 hrs on water bath. Reaction was monitored by TLC. Excess of ethanol was removed under reduced pressure and crude sticky product was wash with hexane. The solid product was passed through a column of silica gel (100-200 mesh) by using Chloroform: Methanol 8:2 as an eluent.

Reaction Scheme



RESULTS AND DISCUSSION

Spectral characterization of final compounds
Compound 3a: 2-[(3,5-dimethyl-2-phenyl-2,3-dihydro-1*H*-pyrazol-1-yl)methyl]phenol:
IR (KBr, cm^{-1}): 1412.70 (C=C), 1246.71 (C-N), 1495.57 (N-N), 2875.88 (CH_3, stret)

Compound 3b: 1-(4-methoxybenzyl)-3,5-dimethyl-2-phenyl-2,3-dihydro-1*H*-pyrazole
IR (KBr, cm^{-1}): 1612.58 (C-O), 1451.25 (C=C), 1253.69 (C-N), 1480.0 (N-N), 2848.94 (CH_3,stret)

Compound 3b: 3, 5-dimethyl-2-phenyl-1-[(2*E*)-3-phenylprop-2-en-1-yl]-2,3-dihydro-1*H*-pyrazole
IR (KBr, cm^{-1}): 1484 (C=C), 1278.25 (C-N), 1486.8 (N-N), 2935.57 (CH_3,stret)

Compound 4a: 1-(2-hydroxybenzyl)-5-methyl-2-phenyl-1,2-dihydro-3H-pyrazol-3-one
IR (KBr, cm^{-1}): 1700.27 (C=O), 1442.57 (C=C), 1263.29 (C-N), 1491.03 (N-N), 2905.51 (CH_3, strer)

Compound 4b: 1-(4-methoxybenzyl)-5-methyl-2-phenyl-1,2-dihydro-3*H*-pyrazol-3-one
IR (KBr, cm^{-1}): 1680 (C=O), 1442.57 (C=C), 1263.29 (C-N), 1491.03 (N-N), 2905.51 (CH_3, stret)

Compound 4c: 5-methyl-2-phenyl-1-[(2*E*)-3-phenylprop-2-en-1-yl]-1,2-dihydro-3*H*-pyrazol-3-one
IR (KBr, cm^{-1}): 1700.27 (C=O), 1442.57 (C=C), 1263.29 (C-N), 1491.03 (N-N), 2905.51 (CH_3, strer)

Table: 1 Physical properties of synthesized compounds

Compound	Molecular Formula	Molecular Weight	Yield (%)	M.P. ^{0}(C)	R_f	Solvent System
3a	$C_{18}H_{20}N_2O$	280.36	64	130-132	0.60	A
3b	$C_{19}H_{22}N_2O$	294.39	74	161	0.62	B
3c	$C_{20}H_{22}N_2$	290.40	51	154	0.74	A
4a	$C_{17}H_{16}N_2O_2$	280.32	81	139-140	0..81	B
4b	$C_{18}H_{18}N_2O_2$	294.34	45	85-90	0.90	A
4c	$C_{19}H_{18}N_2O$	290.35	79	135-140	0.89	B

A: Chloroform: Methanol 6:4 B: Chloroform: Methanol 7:3

Biological Activity:
All Synthesized compounds were screened for antimicrobial activity against *Echerichia coil, Pseudomonas aeruginasa, and Staphylococcus aureus. & Bacillus* with the use of disc diffusion method. The zones of inhibition values were determined. Table: 2 shows data obtained from the biological activities of synthesized compounds.

Table No. 2: Biological Activity

Compound	Zone of inhibition (mm)			
	E coil.	***S.aureus***	***P.seudomonos***	***Bacillus***
3a	11	12.5	-	10
3b	-	22	10.5	14
3c	-	-	11	11
4a	-	-	-	10
4b	-	8.5	-	8.5
4c	-	15	10	12

CONCLUSION

The in-vitro antimicrobial activity of compounds 3a-c and 4a-c were determined by disc diffusion method. The results are summarized in table: 2 from the table it is cleared that compound 3b and 4c could inhibit three of then four bacteria selected for the test, whereas compound 4a was least effective. E coil was inhibited by compound 3a. Bacillus was inhibited by all the compounds. The greatest antimicrobial activity was observed by 3b on *Staphylococcus aureus*.

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REFERENCES

[1]Vogel, S., ohmayer,S., Brunner, G., Heilmann, j. *Bioorg. Med. Chem.*, **2008** 16,4286-4293.
[2] Babasaheb, P.B., Sachin,A.P, Rajesh,N.G., Balaji,L.K, Balwant, S.H, Santosh, N.K, Shivkumar,SJ, *Bioorg,med.chem.*, **2011**,20,730-733
[3] Thakkar A, Joshi K. Synthesis, *Eur. J. Chem.* **2010**.,*7*: 1396-1406.

[4] Mahmoud M, Ramiz M, Ibrahim S. J. *Chin. Chem. Soc.* **2011**.,58: 6.
[5] Liu, M; Wilairat. P; Cropft, S.L; Tan A.L.C; Go.M.L. *Cure. Med.chem.* **2009**, 12,483-499.
[6]Zeba, N.S; Mohammaed, M.T.N; Anis, A; Asad, U.k; *Bioorg. Med. Chem.. Lett.* **2011**, 21, 2860-2865.
[7] Shrivastav M, Abhilasha V, Sushant K. *Indian J. chem*. **2005**; 47: 1555-1558.