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A Novel Method for Synthesis of Pyrazolines and Pyrazoles

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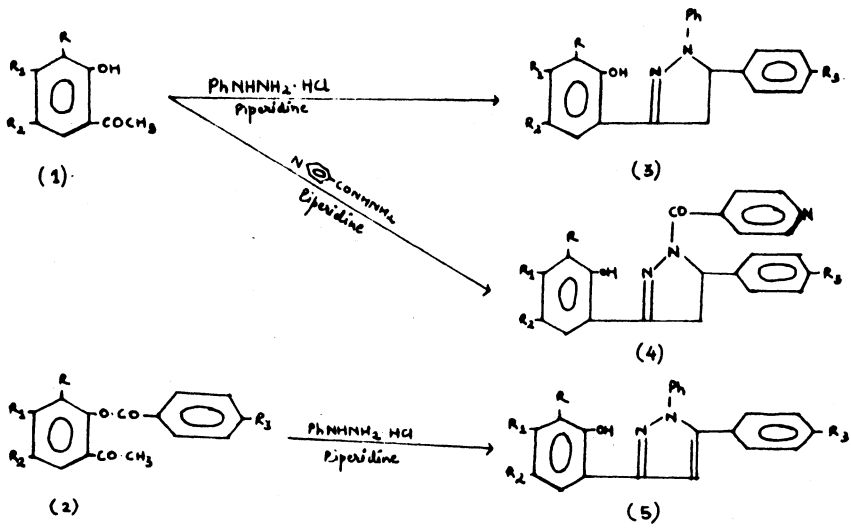
Some new 3,5-diaryl pyrazolines and 3,5-diaryl pyrazoles have been synthesized by a novel method by short route. 3,5-Diaryl-1-pyridoyl pyrazolines (4) were synthesized by the reaction of 2-hydroxy acetophenones (1) with isoniazid in alcohol medium containing a little piperidine. 2-hydroxy acetophenones (1) on reacting with phenyl hydrazine hydrochloride in alcohol medium containing a little piperidine produces 3,5-diaryl-1-phenyl pyrazolines (3). 2-Aroyl acetophenones (2) with phenylhydrazine hydrochloride in alcohol medium containing a little piperidine produces 3,5-diaryl-1-phenyl pyrazoles (5). Structures of these compounds have been established by spectral analysis (IR, UV and NMR).

INTRODUCTION

Chalcones, flavones, β-diketones and flavanones are reported[1–4] to react with hydrazines, phenylhydrazines to furnish pyrazoline and pyrazole derivatives respectively. Reaction of hydrazine on chromone, thiochromone or flavone is a method for the synthesis of 3,5-diaryl pyrazoles. Chalcones are reported[6] to react with substituted hydrazines to obtain 3,5-diaryl pyrazolines. From the references we have not observed the synthesis of 3,5-diaryl pyrazolines directly from 2-hydroxy acetophenones and the synthesis of 3,5-diaryl pyrazoles directly from 2-aroyloxy acetophenones. It was therefore thought of interest to use such short routes for the synthesis of pyrazolines and pyrazoles. Pyrazole derivatives possess diverse biological activities[7]. Pyrazoles have been reported to possess pharmacological activities and anticancer activities[8]. Besides the traditional interest in pyrazole derivatives which have been the basis of numerous dyes and drugs, a number of pyrazole anaesthetics have recently been discovered[9]. Pyrazoline derivatives have been found to be effective insecticide[10] and antiinflammatory, bactericidal, pharmaceutical and fungicidal agents[11, 12].

The present work deals with the synthesis of 3,5-diaryl pyrazolines (3, 4) from 2-hydroxy acetophenones (1) and 3,5-diaryl pyrazoles (5) from 2-aroyloxy acetophenones (2) in alcohol medium containing a little piperidine.



EXPERIMENTAL

Melting points are uncorrected. IR spectra were recorded on Perkin Elmer 577 (4000–200 cm^{-1}). NMR spectra were recorded on Bruker AC 300 NMR spectrophotometer at 300 MHz in $CDCl_3$. UV-VIS spectra were recorded on Hitachi 320 UV-VIS spectrometer.

(1) Preparation of 3,5-Diaryl-1-Phenyl Pyrazolines (3a–3j)

Mixture of 2-hydroxy acetophenones (1) 0.01M was refluxed in alcohol (15 mL) containing a little piperidine for about 2 h. Then to it phenylhydrazine hydrochoride (0.02 M) was added and the mixture was further refluxed for about 2 h. Reaction mixture was cooled, diluted with water and acidified with dil. HCl. Solid product obtained was filtered and crystallised from ethanol-acetic acid mixture (Table-1).

IR for compound No. 3b: ν_{max} (cm^{-1}) 1580 ν(C=N), 1420 cm^{-1} ν(—CH_2), 1220 cm^{-1} ν(C—N); NMR: δ 3.6 (S, 3H, —CH_3), 3.8 (S, 3H, —OCH_3), 6.8 (d, 2H, —CH_2), 7.1 (t, 1H, —CH), 6.9–7.5 (m, 12H, —Ar—H), 7.7 (S, 1H, —OH), UV: λ_{max} 320, 360 nm.

(2) Preparation of 3,5-Diaryl-1-Pyridoyl Pyrazolines (4a–4j)

Mixture of 2-hydroxy acetophenones (1) 0.01 M was refluxed in alcohol (15 mL.) containing a little piperidine for about 2 h. Then to it isoniazid (0.02 M) was added and the mixture was further refluxed for about 2 h. Reaction mixture was cooled, diluted with water and acidified with dil. HCl. Solid product obtained was filtered and crystallised from ethanol (Table-1).

IR for compound No. 4b: ν_{max} (cm^{-1}) 1640 ν(C—O), 1580 ν(C=N), 1439 ν(—CH_2), 1280 ν(C—N); NMR: δ 3.0 (S, 3H, —CH_3), 4.0 (S, 3H, —OCH_3), 7.0

(d, 2H, —CH_2), 7.5 (t, 1H, —CH), 7.7-8.7 (m, 11H, —Ar—H), 11.5 (S, 1H; OH); UV: λ_{max} 320, 350 nm.

(3) Preparation of 3,5-Diaryl-1-Phenyl Pyrazoles (5a–5j)

Mixture of 2-aroyloxyacetophenones (2) 0.01 M was refluxed in alcohol (15 mL) containing a little piperidine for about 2 h. Then to it phenyl hydrazine hydrochloride (0.02 M) was added and the mixture was further refluxed for about 2 h. Reaction mixture was cooled, diluted with water and acidified with dil. HCl. Solid product obtained was filtered and crystallised from ethanol-acetic acid mixture (Table-1).

IR for compound No. 5b: ν_{max} (cm^{-1}) 1580 ν(C=N), 1480 ν(Ar—H), 1220 ν(C—N); NMR : δ 3.2 (S, 3H, —CH_3), 3.7 (S, 1H, CH), 3.8 (S, 3H, —OCH_3), 6.7–7.9 (m, 12H, —Ar—H), 9.5 (S, 1H, —OH); UV: λ_{max} 320, 350 mn.

Physical data of all the synthesized compounds are recorded in Table-1.

TABLE-1
PHYSICAL CHARACTERISATION DATA OF SYNTHESISED COMPOUNDS (3a–3j); (4a–4j); (5a–5j)

Compound No.	R	R_1	R_2	R_3	Yield (%)	m.p. (°C)	Molecular formula	N% found (calc)
3a	H	H	CH_3	H	68	182	$C_{22}H_{20}N_2$	8.1 (8.5)
3b	H	H	CH_3	OCH_3	62	153	$C_{23}H_{22}N_2O_2$	7.3 (7.8)
3c	Br	H	CH_3	H	65	171	$C_{22}H_{19}N_2OBr$	6.1 (6.8)
3d	Br	H	CH_3	OCH_3	71	156	$C_{23}H_{21}N_2O_2Br$	6.0 (6.4)
3e	H	CH_3	H	H	76	115	$C_{22}H_{20}N_2O$	8.2 (8.5)
3f	H	CH_3	H	OCH_3	72	158	$C_{23}H_{22}N_2O_2$	7.6 (7.8)
3g	CH_3	H	H	H	75	176	$C_{22}H_{20}N_2O$	8.1 (8.5)
3h	CH_3	H	H	OCH_3	60	198	$C_{23}H_{22}N_2O_2$	7.3 (7.8)
3i	H	H	H	H	65	164	$C_{21}H_{18}N_2O$	8.4 (8.9)
3j	H	H	H	OCH_3	62	172	$C_{22}H_{20}N_2O_2$	8.0 (8.1)
4a	H	H	CH_3	H	72	185	$C_{23}H_{10}N_3O_2$	11.0 (11.3)
4b	H	H	CH_3	OCH_3	76	150	$C_{24}H_{21}N_3O_3$	10.1 (10.5)
4c	Br	H	CH_3	H	81	175	$C_{23}H_{18}N_3O_2Br$	9.2 (9.3)
4d	Br	H	CH_3	OCH_3	78	240	$C_{24}H_{19}N_3O_3Br$	8.3 (8.8)
4e	H	CH_3	H	H	85	178	$C_{23}H_{19}N_3O_2$	11.1 (11.3)
4f	H	CH_3	H	OCH_3	82	162	$C_{24}H_{21}N_3O_3$	10.2 (10.5)
4g	CH_3	H	H	H	71	260	$C_{23}H_{19}N_3O_2$	11.0 (11.3)
4h	CH_3	H	H	OCH_3	70	137	$C_{24}H_{21}N_3O_3$	10.3 (10.5)
4i	H	H	H	H	65	220	$C_{22}H_{17}N_3O_2$	11.6 (11.8)
4j	H	H	H	OCH_3	67	137	$C_{23}H_{19}O_2N_3$	10.4 (10.9)

Compound No.	R	R_1	R_2	R_3	Yield (%)	m.p. (°C)	Molecular formula	N% found (calc)
5a	H	H	CH_3	H	76	120	$C_{22}H_{18}N_2O$	8.1 (8.5)
5b	H	H	CH_3	OCH_3	78	116	$C_{23}H_{20}N_2O_2$	7.3 (7.8)
5c	Br	H	CH_3	H	67	162	$C_{22}H_{17}N_2OBr$	64. (6.9)
5d	Br	H	CH_3	OCH_3	65	148	$C_{23}H_{19}N_2O_2Br$	6.1 (6.4)
5e	H	CH_3	H	H	72	155	$C_{22}H_{18}N_2O$	8.2 (8.5)
5f	H	CH_3	H	OCH_3	82	124	$C_{23}H_{20}N_2O_2$	7.5 (7.8)
5g	CH_3	H	H	H	80	210	$C_{22}H_{18}N_2O_2$	8.3 (8.5)
5h	CH_3	H	H	OCH_3	71	180	$C_{23}H_{20}N_2O_2$	7.1 (7.8)
5i	H	H	H	H	85	162	$C_{21}H_{16}N_2O$	8.7 (8.9)
5j	H	H	H	OCH_3	73	148	$C_{22}H_{18}N_2O_2$	8.0 (8.1)

REFERENCES

1. A.E. Sammour and M. HD Elkasaby, *J. Chem. Un. Arab Repub.*, **12**, 1 (1969).
2. F. Kally, G. Jonzso, I. Koezoo, *Tetrahedron*, **21**, 19 (1965).
3. A. Schonberg nad M.M. Sidky, *J. Am. Chem. Soc.*, **75**, 5128 (1953).
4. K.T. Borkhade and M.G. Marathey, *Indian J. Chem.*, **10**, 48 (1972).
5. W. Baker, J.B. Horborne and W.D. Ollis, *J. Chem. Soc.*, 1303 (1952).
6. M.M. Chincholkar and V.S. Jamode, *Indian J. Chem.*, **178**, 510 (1977).
7. M.S.R. Murthy, E.V. Rao and P. Ranganathan, *Indian Drugs*, **22**, 1 (1985); M.S.R. Murthy, D.V. Rao and E.V. Rao, *J. Pharma. Science*, **45**, 131 (1983); C.W. Noell and C.C. Cheng, *J. Med. Chem.*, **12**, 545 (1969).
8. V.S. Jolly, G.D. Arora and Preeti Talwar, *J. Inaian Chem. Soc.*, **67**, 1001 (1990).
9. M.D. Nisbet, *J. Chem. Soc.* (1938).
10. Karmer, Karl, J. McGregor and E. Harrison, *Chem. Abstr.*, **90**, 82064u (1979).
11. S.P. Sschar and A.K. Singh, *J. Indian Chem. Soc.*, **62**, 142 (1985).
12. J.P. Durza, J.P. Joseph and S. Burnstun, U.S. us 4 360 680 (Cl 548362 Co7D 231/06) (1982).

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