

An Elegant Synthesis of Pyrano-Bisquinaldines

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A solution of 4-hydroxy-2-methylquinoline in 2% sodium hydroxide, when treated with vinyl acetate, yielded pyrano-bisquinaldine. The structures of these compounds have been characterized by their spectral and analytical data.

Key Words: Synthesis, Spectral, Pyrano-bisquinaldines.

INTRODUCTION

Quinolines have occupied a unique place in synthetic organic chemistry due to their wide spectrum of interesting biological and pharmacological properties¹⁻⁵. Recent literature proves ring annelated quinoline systems showing their enhancement towards the antimicrobial agents.⁶⁻¹⁶ A few procedures in this regard are available in the recent reviews.¹²⁻¹⁵ At this juncture, in order to enhance the biological study prospects of the quinoline ring systems, we aimed towards the synthesis of 7-methyl-(7H)-pyrano-[2,3-c; 5,6-c']-bisquinaldines.

EXPERIMENTAL

Melting points were determined using Boetius micro-heating table and Mettler-FP5 melting apparatus and are uncorrected. IR spectra were recorded on Shimadzu-8201 FT instrument as KBr disc and only noteworthy absorption levels were listed. ¹H-NMR spectra were recorded on an AMX-400 MHz spectrometer in CDCl₃ solution; chemical shifts are expressed in ppm (δ) relative TMS, coupling constants (J) in Hz and signal multiplicities are represented by s (singlet), d (doublet), q (quartet) and m (multiplet). Mass spectra were determined on a Jeol-300 mass spectrometer at 70 eV. CHN analyses were carried out on Carlo-Erba 106 and Perkin-Elmer Model 240 analyzers.

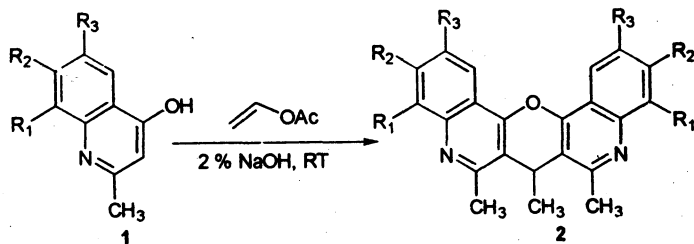
Typical procedure

4-Hydroxy-2-methylquinoline **1a** (0.002 mol) was dissolved in 2% sodium hydroxide; the solution was stirred at room temperature. To this solution vinyl acetate (0.002 mol) was added in portions, while stirring was continued for 30 min. The solid separated from the reaction mixture was filtered, dried and purified by recrystallization in CHCl₃ : CH₃OH (1 : 1) solutions **2a**. Similar experimental steps were repeated for its derivatives **1b-f** and their details are listed in Table-1.

TABLE-I
 PHYSICAL AND SPECTRAL DATA OF 2a-f

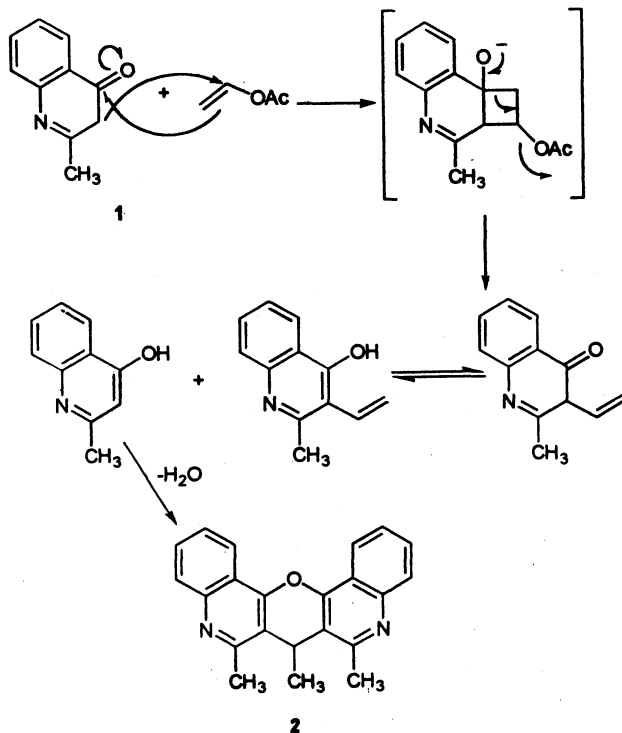
Compd.	m.p. (°C)	Yield (%)	IR ν_{\max} (cm^{-1})	m.f. (m.w.)	Elemental Analysis (%)		$^1\text{H-NMR}$ CDCl ₃ - δ /ppm	
					Calcd.	Found		
2a	161	70	1570 $\nu(\text{C}=\text{N})$	C ₂₂ H ₁₈ N ₂ O [336.397]	C	80.96	80.87	2.5 (s, 6H, 2 × CH ₃)
					H	5.56	5.64	2.7 (d, 3H, CH ₃)
					N	8.58	8.47	7.3 (q, 1H, —CH)
2b	139	72	1572 $\nu(\text{C}=\text{N})$	C ₂₄ H ₂₂ N ₂ O [354.451]	C	81.33	81.28	7.5–8.3 (m, 8H, Ar—H)
					H	6.26	6.15	2.3 (s, 12H, 4 × CH ₃)
					N	7.90	7.97	2.6 (d, 3H, CH ₃)
2c	190	69	1569 $\nu(\text{C}=\text{N})$	C ₂₄ H ₂₂ N ₂ O [354.451]	C	81.33	81.18	7.2 (q, 1H, —CH)
					H	6.26	6.19	7.5–8.2 (m, 6H, Ar—H)
					N	7.90	7.97	2.4 (s, 12H, 4 × CH ₃)
2d	184	59	1576 $\nu(\text{C}=\text{N})$	C ₂₄ H ₂₂ N ₂ O ₃ [386.449]	C	74.60	74.57	2.6 (d, 3H, CH ₃)
					H	5.74	5.81	7.4 (q, 1H, —CH)
					N	7.25	7.30	7.6–8.4 (m, 6H, Ar—H)
2e	213	55	1581 $\nu(\text{C}=\text{N})$	C ₂₄ H ₂₂ N ₂ O ₃ [386.449]	C	74.60	74.67	2.4 (s, 6H, 2 × CH ₃)
					H	5.74	5.69	2.5 (d, 3H, CH ₃)
					N	7.25	7.28	3.9 (s, 6H, 2 × OCH ₃)
2f	151	68	1585 $\nu(\text{C}=\text{N})$	C ₂₂ H ₁₆ N ₂ OCl ₂ [395.287]	C	66.85	66.88	7.1 (q, H, —CH)
					H	4.07	4.10	7.5–8.2 (m, 6H, Ar—H)
					N	7.09	7.09	2.1 (s, 6H, 2 × CH ₃)

Scheme



- 1,2** a: $R_1=R_2=R_3=H$
 b: $R_1=CH_3, R_2=R_3=H$
 c: $R_3=CH_3, R_1=R_2=H$
 d: $R_1=OCH_3, R_2=R_3=H$
 e: $R_3=OCH_3, R_1=R_2=H$
 f: $R_3=Cl, R_1=R_2=H$

Mechanism



Scheme and Mechanism

RESULTS AND DISCUSSION

The reaction between 4-hydroxy-2-methylquinoline and vinyl acetate in 2% sodium hydroxide gave a yellow colored product **2a**. Its melting point is 161°C

(yield 72%). Its IR spectrum showed absorption at 1570 cm^{-1} for the —C=N group. The $^1\text{H-NMR}$ spectrum of the compound showed that a doublet at δ 2.7 for C_7 methyl protons, a quartet at δ 7.2 was accountable to methine proton and a singlet at δ 2.5 for 6,8-methyl protons. All the eight aromatic protons gave an unresolved multiplet between δ 7.5–8.3. The mass spectra showed the molecular ion peak at m/e 314. The elemental analysis (CHN) agreed well with the m.f. $\text{C}_{22}\text{H}_{18}\text{N}_2\text{O}$. All the above spectral data confirmed the structure of compound **2a** as 7-methyl (7H) pyrano-[2,3-c; 5,6-c']-bisquinaldine. The possible mechanistic pathway is shown in the Scheme.

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