NOTE

Synthesis and Antibacterial Activity of 1,4-Quinoxaline Derivatives

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1,4-Quinoxaline derivatives are synthesized by condensing ophenylene diamine ard isatin. These are characterized on the basis of IR, NMR and mass spectral data. The final compounds were evaluated for antibacterial activity by taking Staphylocccus aureus as test organism.

Key Words: 1,4-Quinoxaline derivatives, Synthesis, Antibacterial activity.

Quinoxaline or benzopyrazine is the product formed by the spontaneous condensation of aromatic o-diamines and 1,2-dicarbonyl compounds¹. These derivatives are widely used because their synthesis takes place easily in good yield². The development in the field of chemotherapy has led to a renewed interest in the quinoxalines with their potential values as pharmaceuticals. 2-[4]-chloro-2-quinoxalinyl-1-oxy| phenoxy an propionic acid is found to be active antitumor agent going under clinical trial.

Synthesis of 1,4-quinoxaline derivatives: Equimolar quantities of isatin or bromo/nitro isatin derivatives and o-phenylene diamine/4-nitrophenylene diamine (Table-1) were refluxed in alcohol for 2 h. The contents were cooled down to separate out the solid. The compound was filtered out and recrystallised from a mixture of ethanol and chloroform.

Synthesis of 6-bromo isatin: The isatin was dissolved in glacial acetic acid and an excess of bromine added to it with continuous stirring until solids separate out. The resultant product was filtered out and recrystallised from ethanol (60%), m.p. 225°C.

$$R_1 \xrightarrow{N} O \xrightarrow{NH_2} R_2 \xrightarrow{R_1} N \xrightarrow{N} N$$

Isatin

o-Phenylene diamine

1,4-Quinoxaline

 $R_1 = H$, Br or NO_2

 $R_2 = H \text{ or } NO_2$

I,

If

NO₂

 NO_2

Н

 NO_2

9.75

9.50

DERIVATIVES DERIVATIVES						
Compd.	R ₁	R ₂	m.f.	m.p. (°C)	Diameter of zone of inhibition (mm)	
					50 μg/mL	100 μg/mL
I _a	Н	Н	C ₁₄ H ₉ N ₃	298	8.00	9.75
I _b	Н	NO_2	$C_{14}H_8N_4O_2$	308	9.00	9.75
I _c	Br	Н	$C_{14}H_8N_3Br$	318	8.50	9.50
I_d	Br	NO ₂	$C_{14}H_7N_3O_2Br$	312	8.75	9.75

TABLE-1
CHARACTERISATION DATA AND ANTIBACTERIAL ACTIVITY OF QUINOXALINE
DERIVATIVES

Test organism: S. aureus, Solvent: DMF, Standard amikacin: 30 µg/mL (zone of inhibition = 20 mm).

322

320

8.75 9.00

 $C_{14}H_8N_4O_2$

 $C_{14}H_7N_5O_4$

Synthesis of 6-nitro isatin: To isatin, a mixture of nitric acid and sulphuric acid (3:1) was added with continuous stirring until solids separate out. The product was filtered out and recrystallised with a mixture of chloroform and ethanol, 60%, m.p. 220°C.

Characterisation of 2',3'[b]-indolyl-1,4-quinoxaline (1a): IR (cm⁻¹): 1615 ν (C=C), 1410 ν (C=N); ¹H-NMR (δ): 7.55 (4H, m, Ar—H), 8.13 (4H, m, Ar—H), 10.5 (1H, s NH); MS: 219 (M⁺), 217 (100%), 191, 164, 129, 91, 75.

Characterisation of 2',3'[b]-6-nitroindolyl-1,4-quinoxaline (1b): IR (cm⁻¹) 1619 ν (C=C), 1559 ν (NO₂), 1410 ν (C=N); ¹H-NMR (δ): 7.50 (2H, m, Ar—H), 7.7 (2H, m, Ar—H), 7.9 (1H, m, Ar—H), 8.13 (2H, m, Ar—H), 10.0 (1H, s, NH); MS: 264 (M⁺), 263 (100%), 236, 209.

Antibacterial activity: The final compounds were evaluated for antibacterial activity by cup-plate method at a concentration of 50 and 100 μ g/mL against the test organism, *Staphylacoccus aureus*. The zone of inhibition was compared with standard amikacin (30 μ g/mL). The results so obtained are recorded in Table-1.

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