

was found that 2-HANO is also a sensitive reagent for copper(II).

Reagent	Molar absorptivity l. mol ⁻¹ cm ⁻¹ ($\times 10^3$)
Orthohydroxy acetophenone oxime ⁸	3.4
<i>n</i> -Pentyl-2-pyridylketoxime ¹	2.7
Phenyl 2-(6-methylpyridyl) ketoneoxime ¹	10.8
6-Methyl-2-pyridinecarboxamide-oxime ¹	7.2
Salicylaldoxime (<i>n</i> -amyl acetate) ¹	7.2
2-Hydroxy-1-acetonaphthone-oxime	5.1
2,4-Dihydroxyvalerophenone-oxime	0.16

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SYNTHESIS AND PHYSIOLOGICAL EVALUATION OF A THIAZOLIDINEDIONE AND ITS AZODERIVATIVES FROM NINHYDRIN

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NINHYDRIN has been used to synthesise a variety of heterocyclics¹⁻³ and to estimate amino acids. Quinoxaline derivatives are known to possess insecticidal and acaricidal activity⁴. Several thiazolidinediones are reported to exhibit a good spectrum of biological activity⁵⁻⁸. These reports prompted us to undertake the synthesis of a 2,4-thiazolidinedione 2-azine (III) containing 11*H*-indeno[1,2-*b*] quinoxalin-11-one moiety and its aryl azoderivatives (IV) starting from II.

The starting materials 11*H*-indeno[1,2-*b*] quinoxalin-11-one (I) and 11*H*-indeno[1,2-*b*] quinoxalin-11-one thiosemicarbazone were prepared according to our earlier procedure⁹.

11*H*-indeno[1,2-*b*]quinoxalin-11-one thiosemicarbazone (II) on interaction with either chloroacetyl chloride or chloroacetic acid in the presence of anhydrous ethanol and dry pyridine gave the cycloproduct 2,4-thiazolidine dione 2-azine (III) containing 11*H*-indeno[1,2-*b*]quinoxalin-11-one which on further reaction with diazotised substituted sulphanilamides furnished the corresponding *p*-(2,4-dioxo-5-thiazolidinyl)azo]benzene sulphonamide 2-azine containing 11*H*-indeno[1,2-*b*]quinoxalin-11-one (IV). The products (III & IV) obtained have been confirmed by analytical and spectral (IR, PMR and mass) data.

2,4-Thiazolidinedione 2-azine containing 11*H*-indeno[1,2-*b*]-quinoxalin-11-one (III):

A mixture containing II (0.01 mol) and chloroacetyl chloride or chloroacetic acid (0.01 mol) in anhydrous ethanol (10 ml) and dry pyridine (10 ml) was refluxed for 6 hr and poured into crushed ice with constant stirring. The product separated was filtered, dried and purified from DMF, m.p. 250°C, yield 70% (Found: C, 61.88; H, 2.98; N, 20.10; C₁₈H₁₁N₅O₂ requires C, 62.62; H, 3.18; N, 20.29%). IR (nujol, ν cm⁻¹) 3400 (-NH-), 1710 (amide C=O), 1600 (ν CN); PMR (δ , pyridine-d₅), 7.5-8 (8H, m, aromatic), 2.20 (2H, s, -s-CH₂-), 8.55 (s, 1H, -NH-); mass: *m/z* 345 (M⁺,

5°), 250 (52°), 217 (100°), 190 (34°) and 104 (20°).

p-(2,4-Dioxo-5-thiazolidinyl)azo]benzene sulphonamide 2-azine containing 11H-indeno[1,2-b]quin-oxalin-11-one (IVa):

Sulphanilamide (0.025 mol) dissolved in aqueous acetic acid (8%, 25 ml) was diazotised with NaNO₂ (0.25 g in 30 ml) in an ice bath. The resulting diazosolution was added gradually with stirring to a previously cooled thiazolidine dione (0.025 mol) in aqueous NaOH (2%, 25 ml), kept in an ice bath. After the addition, the mixture was stirred mechanically for 1 hr during which the azo compound separated out. It was filtered and crystallised from acetone, m.p. 270°C, yield 60% (Found: C, 53.98; H, 2.98; N, 21.20; C₂₄H₁₆N₈O₃S₂ requires C, 54.55; H, 3.03; N, 21.21 %); IR: 3410 (-NH-), 1700 (amide C=O), 1460 (-N=N-), 1380 (ν_{sy} SO₂); PMR (δ, DMSO-d₆): 7.50-8.00 (12H, m, aromatic), 8.40 (s, 1H, -CONH-), and 9.00 (s, 2H, SO₂NH₂).

The characterization data of azoderivatives (IVa-f) are listed in table 1. All the compounds synthesised were screened for their antifungal activity against *Curvularia lunata* and *Dreschlera halodes* by following glass slide humid chamber method¹⁰. Compounds III and IVc were effective against both the fungi at a dose level of 120 µg/ml and 360 µg/ml. Compounds IVa and

IVb have no fungicidal activity, while the remaining compounds were intermediate in their activity.

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Table 1 Characterization Data of IV

Compound*	R	m.p. (°C)	Yield %	Mol formula (Cryst from)
IVb		238	70	C ₂₅ H ₁₈ N ₁₀ O ₃ S ₂ (methanol)
IVc		230	62	C ₂₈ H ₁₈ N ₁₀ O ₃ S ₂ (Aq DMF)
IVd		280	78	C ₃₀ H ₂₂ N ₁₀ O ₃ S ₂ (AcOH)
IVe		260	72	C ₃₀ H ₂₂ N ₁₀ O ₃ S ₂ (AcOH)
IVf		>320	66	C ₃₃ H ₂₂ N ₁₀ O ₃ S ₂ (Aq alcohol)

* All the compounds gave satisfactory analysis for C, H & N.

A SIMPLE COLORIMETRIC METHOD FOR DETERMINATION OF CARBOFURAN AND BENDIOCARB IN FORMULATIONS

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CARBOFURAN (Furadan, 2,3-dihydro-2,2-dimethyl-7-benzofuranyl methyl carbamate) and bendiocarb (1,3-benzodioxol-4-ol, 2,2-dimethyl-methyl carbamate) are extensively used as insecticides and the former is highly toxic to mammals¹. Carbofuran is also used as a nematocide. The residues of these insecticides cause air and water pollution. Hence there is a demand for simple and rapid analytical procedure for the detection and determination of levels of residues in air and water environments. Colorimetric procedures for the determination of carbofuran in water have been reported²⁻⁵. In these methods carbofuran had been hydrolysed under alkaline conditions and the resulting