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SYNTHESIS OF 4-CARBOXY-2,3-DIHYDROFURO(2,3-b)QUINOLINE

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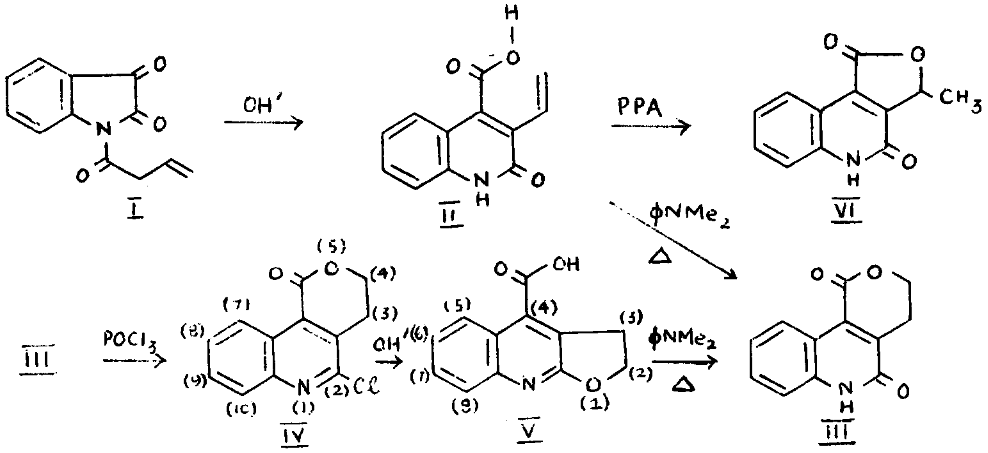
It has been observed[1] that 3-(1'-propenyl)2-quinolones readily yield 2-methyl-2,3-dihydrofuro(2,3-b)quinolines on treatment with polyphosphoric acid whereas 3-vinyl-2-quinolones do not afford the corresponding dihydrofuroquinolines under the same conditions[2].

In this communication, we report a novel synthesis of 4-carboxy-2,3-dihydrofuro(2,3-b)quinoline (V), utilising the hitherto unknown 4-carboxy-3-vinyl-2-quinolone (II)



The sodium derivative of isatin, on condensation with vinylacetyl chloride in refluxing benzene, yielded the N-(vinyl-acetyl)-isatin (I) which, on treatment with aq. alkali, underwent a smooth Pfitzinger reaction to give the acid II (m.p. > 330°, 65% based on the isatin not recovered). Catalytic hydrogenation of II afforded 3-ethyl-4-carboxy-2-quinolone m.p.305-307° dec (95%), (lit mp 285°) identical with an authentic sample[3]. Treatment of II with CH_2N_2 gave the methyl ester IIb, m.p 149-150° whose structure was confirmed by I.R. and N.M.R. data.

Lactonisation of II with polyphosphoric acid produced only the γ-lactone VI, m.p. 330° (95%). I.R.(KBr) 2.95 μ (—NH), 5.7 μ (C=O γ-lactone), 6.02 μ (C=O, amide).

The desired δ-lactone III m.p.323-325° decomp, was obtained in 60% yield by heating II with dimethylaniline under reflux for 3 hrs. I.R.(KBr) 2.95 μ (—NH), 5.81 μ (C=O), 6.02 μ (amide).

Reaction of III with $POCl_3$ gave the chloro lactone IV which underwent a facile ring opening and cyclization when refluxed with aq. KOH to give V (60%) m.p.255-266.* Esterification (CH_2N_2) gave the methyl ester, m.p.109-110° (89%).

Attempted decarboxylation of the acid V in boiling dimethylaniline resulted in the formation of δ-lactone III in 60% yield.

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(All the compounds reported in this communication gave satisfactory elemental analysis and their spectral data were compatible with structures given.)

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*The acid V seems to undergo a slow thermal transformation near its melting point. From tlc analysis we could find no evidence for the formation of the decarboxylated product when V was heated neat or as its potassium salt.