Tetrahedron Letters No.31, pp. 3755-3757, 1966. Pergamon Press Ltd.
Printed in Great Britain.

THE CONDENSATION OF ISOQUINOLINIUM SALTS WITH AROMATIC ALDEHYDES

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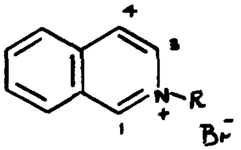
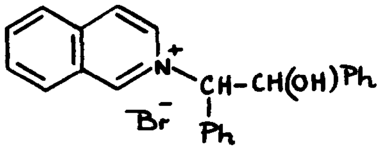
(Received 2 June 1966)

In 1935 Krohnke[1] reported that benzaldehyde condensed with 2-benzylisoquinolinium bromide (1, R = $CH_2C_6H_5$), in the presence of alkali, to yield, after acidification with HBr, an alcohol, formulated as (2). Since it is probable that the pseudobase (3, R = $CH_2C_6H_5$) is formed from (1) and the alkali, it seemed to us that a more likely structure for Krohnke's compound is (5, R = $CH_2C_6H_5$), formed as indicated in (3) ⟶ (4) ⟶ (5), the pseudobase behaving as an enamine.



(1)



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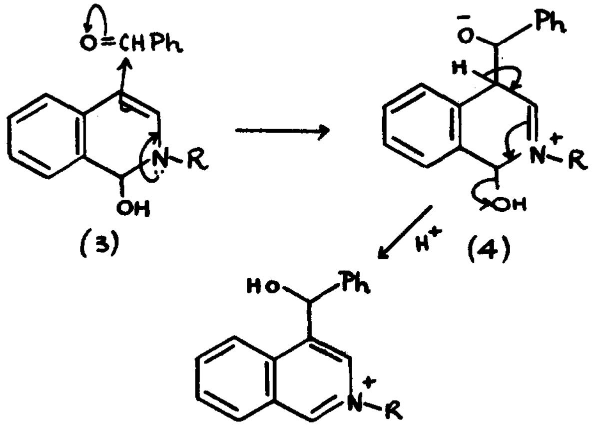
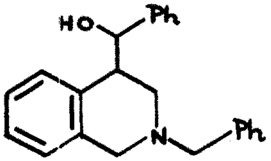
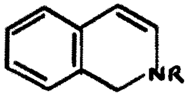


(3) (4) (5)

Krohnke's original directions were repeated and a quaternary bromide, m.p. 218° was isolated as described. The N.M.R. spectrum[2] of this compound (measured in trifluoracetic acid with TMS as an internal reference) was found to be diagnostic for structure (5). In particular one proton singlets at 9.7 ppm and 8.9 ppm are characteristic for the C_1 and C_3 hydrogens respectively of an isoquinolinium ion. Since the C_3—hydrogen appears as a singlet, the C_4 position must be substituted; the benzylic methylene group absorbs as a sharp singlet at 6.0 ppm (and at 6.4 ppm in (1, R = $CH_2C_6H_5$) itself). Reduction of Krohnke's compound with sodium borohydride gave the alcohol[3] (6), m.p. 116°. We had previously shown[4] that the interaction of 2-methyl-1,2-dihydroisoquinoline (7, R = CH_3) with aromatic acid chlorides yield the 4-acyl derivatives (8, R = CH_3), and that reduction of these products with lithium aluminium hydride give the saturated alcohols (9). The interaction of 2-benzyl-1,2-dihydroisoquinoline (7, R = $CH_2C_6H_5$) and benzoyl chloride gave (8, R = $CH_2C_6H_5$; Ar = C_6H_5) and this, on reduction with LAH resulted in material identical with (6).



(6)



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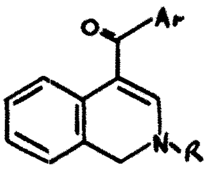

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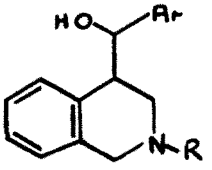

(9)

In view of our interest in 1,2-dihydroisoquinoline chemistry and C_4-substituted isoquinoline derivatives, we are examining the scope of this reaction in more detail.

REFERENCES

1. F. Krohnke, Ber., 1935, 68, 1351.
2. A Varian A.60 spectrometer was used.
3. Satisfactory analyses were obtained for all compounds reported.
4. M. Sainsbury, S. F. Dyke and A. R. Marshall, Tetrahedron, 1966, in the press.