SYNTHESIS OF BENZO[g]QUINOLINE DERIVATIVES

VIII*. 1,2,3,4-TETRAHYDROBENZO[g]QUINOLIN-4-ONE IN THE FISCHER AND FRIEDLÄNDER REACTIONS

A. F. Bekhli and N. P. Kozyreva

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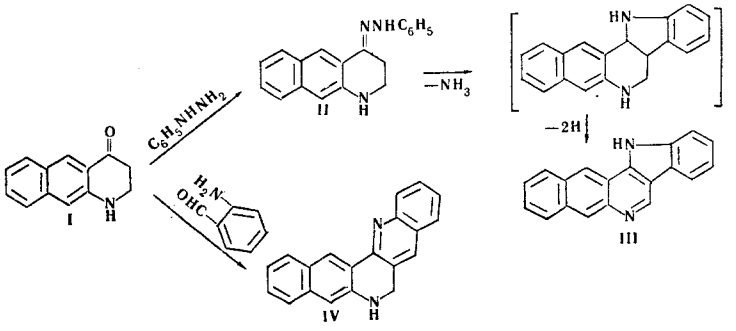
On the basis of the Fischer and Friedländer reactions with 1,2,3,4-tetrahydrobenzo[g]-quinolin-4-one, the possibility has been shown of passing from derivatives of benzo[g]-quinoline to more complex polycyclic systems – indolo[3,2-c]benzo[g]quinoline and 6,7-dihydroquinolino[3,2-c]benzo[g]quinoline. The IR spectra of the compounds obtained are given.

The Fischer and Friedländer reactions of various cyclic keto amines have been studied previously [2-4]. We have investigated these reactions with 1,2,3,4-tetrahydrobenzo[g]quinolin-4-one (I) [5]. When the phenylhydrazone of I (II) was heated in 20% sulfuric acid, a Fischer indole rearrangement took place, accompanied by the oxidation of the dihydro derivative first formed and its conversion into indolo[3,2-c]-benzo[g]quinoline (III).

The IR spectrum of III has a band at 3320 cm^{-1} (ν_{NH}), bands at 1655-1630, 1610, and 1575 cm^{-1} corresponding to the stretching vibrations of the ring, and also bands at 1350, 1245, 1010, and 945 cm^{-1}, which are characteristic for indoles [6].

In addition to the main reaction mentioned, the partial hydrolysis of II with the liberation of I takes place. Compound I reacts readily with o-aminobenzaldehyde, forming 6,7-dihydroquinolino[3,2-c]benzo[g]-quinoline (IV).



The IR spectrum of IV has a band at 3410 cm^{-1} (ν_{NH}) and also a characteristic group of bands of the stretching vibrations of an aromatic ring at 1637, 1608, and 1565 cm^{-1}.

*For Communication VII, see [1].

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The results obtained show that 1,2,3,4-tetrahydrobenzo[g]quinolin-4-one reacts similarly to other cyclic ketones in the Fischer and Friedländer reactions.

EXPERIMENTAL

The Phenylhydrazone of I (II). A mixture of 8 g (0.04 mole) of I in 10 ml of ethanol, four drops of glacial acetic acid, and 4.2 g (0.04 mole) of phenylhydrazine was heated at the boil and stirred for 1 h 30 min, and then the precipitate that had deposited was filtered off. The yield of II was 9.6 g (83%), mp 165-166°C (aqueous ethanol). Small, lustrous, golden yellow crystals. Found, %: N 14.3. $C_{19}H_{17}N_3$. Calculated, %: N 14.6.

Indolo[3,2-c]benzo[g]quinoline (III). A mixture of 5.7 g of II and 57 ml of 20% H_2SO_4 was heated in the boiling water bath with stirring for 30 min. The precipitate that had deposited was filtered off, washed with water, treated with ammonia, and again washed with water. The yield of III was 3.0 g (57%), cream-colored powder melting above 360°C (aqueous ethanol). Methanolic and dioxane solutions have a red-violet fluorescence. Found, %: C 84.5; H 5.1; N 10.8. $C_{19}H_{12}N_2$. Calculated, %: C 85.0; H 4.5; N 10.4. When the acid filtrate was made alkaline, 1.2 g of I, mp 120-121°C (aqueous ethanol) was obtained.

6,7-Dihydroquinolino[3,2-c]benzo[g]quinoline (IV). In a current of nitrogen, 1.9 g (0.016 mole) of freshly prepared o-aminobenzaldehyde and 8 ml of a 10% solution of caustic soda was added to a solution of 3.2 g (0.016 mole) of I in 70 ml of ethanol, and the mixture was left at room temperature in a nitrogen atmosphere for 48 h, after which 30 ml of water was added and the precipitate that deposited was filtered off and washed with aqueous ethanol. The yield of IV was 3.7 g (82%), mp 223-224°C (acetone), lustrous, bright yellow crystals. Found, %: C 85.0; H 5.2; N 9.9. $C_{20}H_{14}N_2$. Calculated, %: C 85.1; H 5.0; N 9.9.

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