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REACTION OF DIAMINOFURAZANE WITH NINHYDRIN

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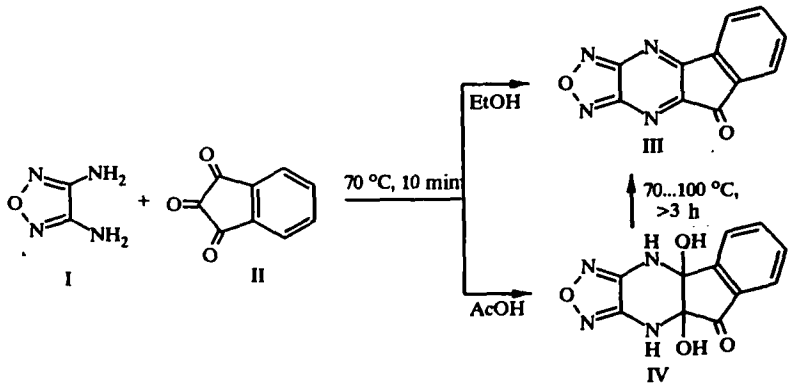
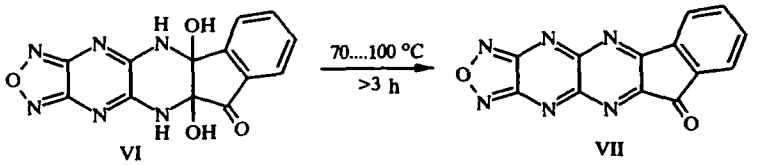
Previously, the structure 5-oxoinden[1,2-*e*]furazano[3,4-*b*]pyrazine (III) was ascribed to the product of the reaction of diaminofurazane (I) with ninhydrin (II) by analogy with similar reactions of other carbonyl compounds [1].



I II III IV

We have now shown that compounds (I) and (II) react under the conditions described in acetic acid to give compound IV, the structure of which has been confirmed by elemental analysis, IR and ^{1}H NMR spectroscopy. When compound IV is heated in ethanol, dimethylformamide or sulfuric acid it is converted into product III, identical to a sample synthesized previously [1]. These results confirm that in the previous work [1], compound IV was formed from the reaction of compounds I and II but that it lost water on recrystallization from ethanol to give compound III.

The reaction of 5,6-diaminofurazano[3,4-*b*]pyrazine (V) reacted analogously with ninhydrin to give product (VI) which was converted to compound VII on heating in ethanol, DMF, or sulfuric acid. The conversion VI → VII occurred considerably more slowly than the conversion IV → III.



VI VII

4*a*,9*b*-Dihydroxy-5-oxoindano[2,3-*e*]furazano[3,4-*b*]-4,4*a*,9*b*,10-tetrahydropyrazane (IV). Yield 83%. M.p. 260-270°C (dec). IR spectrum: 3472 (NH), 3280 (OH), 1744 (C=O), 1616 (C=N), 1144 cm^{-1} (C–O). ^{1}H NMR spectrum (DMSO): 8.52 (1H, s, OH), 8.31 (1H, s, OH), 7.8-7.6 (4H, m, H_{arom}), 6.92 (1H, s, NH) and 6.75 ppm (1H, s, NH). Found, %: C 50.6, H 3.0, N 21.4. Calc. for $C_{10}H_8N_4O_4$, %: C 50.8, H 3.1, N 21.5.

5*a*,10*b*-Dihydroxy-6-oxo-indano[2,3-*g*]furazano[3,4-*b*]pyrazino[4,5-*b*]-5,5*a*,10*b*,11-tetrahydropyrazine(VI). Yield 85%. M.p. 229-230°C (dec.). IR spectrum: 3648, 3368 (NH), 3304, 3248 (OH), 1712 (C=O), 1648 (NH), 1604 (NH), 1148 (OH), 1128 cm^{-1}. ^{1}H NMR spectrum (DMSO): 10.10 (1H, s, OH), 9.82 (1H, s, OH), 7.9-7.6 (4H, m, H_{arom}), 7.25 (1H, s, NH) and 7.15 ppm (1H, s, NH). Found, %: C 50.9, H 2.4, N 27.2. Calc. for $C_{13}H_8N_6O_4$, %: C 50.0, H 2.6, N 26.9.

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6-Oxoindeno[2,3-*g*]furazano[3,4-*b*]pyrazino[4,5-*b*]pyrazine (VII). Yield 87%. M.p. > 300°C (dec.). IR spectrum: 1720 cm^{-1} (C=O). ^1H NMR spectrum (DMSO): 8.25-7.30 ppm (4H, m, H_{arom}). Found, %: C 56.1, H 1.8, N 30.2. Calc. for $C_{13}H_4N_6O_2$, %: C 56.5, H 1.5, N 30.4.

REFERENCE

1. A. V. Eremeev, V. G. Andrianov, and I. P. Puskunova, Khim. Geterotsikl. Soedin., No. 5, 613 (1978).