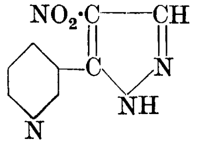
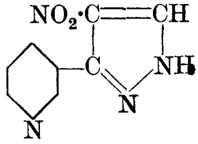
416. 4-*Nitro*-5-(3-*pyridyl*)*pyrazole, a New Oxidation Product of Nicotine. Part II. Methylation Products.*

By HAROLD KING.

DURING the preparation of nicotinic acid by oxidation of nicotine with nitric acid, Gough and King (J., 1931, 2968) observed the regular formation of a by-product in 5% yield, the properties of which agreed with that of a 4-nitro-5-(3-pyridyl)pyrazole (I) or its tautomeric form (II).

(I.)

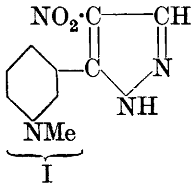


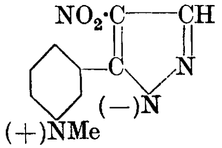


(II.)

This nitropyrazole was stable to permanganate oxidation, but the corresponding aminopyrazole readily gave nicotinic acid. With a view to rendering the pyridine nucleus susceptible to oxidation, and thus opening the way to the isolation of a nitropyrazolecarboxylic acid, the methylation products of this nitropyrazole have been examined. When it is treated with methyl iodide it yields 4-*nitro*-5-(3-*pyridylmethiodide*)*pyrazole* (III), from which alkali liberates a crystalline colourless hydrated base, which on dehydration becomes bright primrose-yellow. To the anhydrous base the structure of an imino-betaine is ascribed (IV), and the colourless hydrated base may be the quaternary ammonium hydroxide corresponding to (III).

(III.)

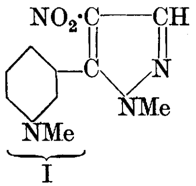


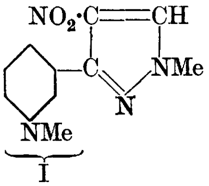


(IV.)

If, however, methyl iodide is allowed to react with the *silver* salt of 4-nitro-5-(3-pyridyl)pyrazole, two isomeric monomethyl methiodides are formed, one in much larger quantity than the other. Unlike the previously described methiodide, neither of these salts is changed by alkali. Their constitutions (V) and (VI) correspond to the tautomeric forms of the pyrazole nucleus.

(V.)





(VI.)

The results obtained on methylation of 4-nitro-5-(3-pyridyl)-pyrazole are thus in agreement with the constitution previously assigned to this substance.

Action of Methyl Iodide on 4-*Nitro*-5-(3-*pyridyl*)*pyrazole.*—Nitropyridylpyrazole (2·0 g.) was digested in MeOH (25 c.c.) with MeI (5 c.c.) for several hr.

A cryst. *methiodide* (3·0 g.), m. p. 257° (decomp.), separated, and from the mother-liquor on concn. a second crop (0·25 g.). The product crystallised from 4 vols. of boiling H_2O in needles, m. p. 257° (decomp.). It also crystallises in plates of the same m. p. [Found : N(micro), 16·8; I, 38·0. $C_9H_9O_2N_4I$ requires N, 16·9; I, 38·2%]. The *base*, liberated by NaOH, crystallised from 15 vols. of H_2O in colourless needles, m. p. 287° (decomp.) [Found : loss at 100°, 12·0; reabsorption at room temp., 11·85; N(micro), 24·1. $C_9H_8O_2N_4,1\frac{1}{2}H_2O$ requires H_2O, 11·7; N, 24·2%]. When dried at 100°, the base becomes bright primrose-yellow, and on exposure to a moist atmosphere returns to the colourless condition. It was converted into the corresponding *methochloride*, m. p. 290° (decomp.), which separated in plates from 16% HCl [Found : N(micro), 23·2, 23·6. $C_9H_9O_2N_4Cl$ requires N, 23·3%]. The *picrate* crystallised in thin prisms, m. p. 212° (decomp.) [Found : N(micro), 22·0. $C_9H_8O_2N_4,C_6H_3O_7N_3$ requires N, 22·6%].

Action of Methyl Iodide on Silver 4-Nitro-5-(3-pyridyl)pyrazole.—Nitropyridylpyrazole (1·9 g.) was dissolved in 2*N*-NH_3 (75 c.c.) and treated with $AgNO_3$ (2·0 g. in 10 c.c. H_2O). The gelatinous ppt. became transformed into a microcryst. powder (3·2 g.) in a few hr. (Found : Ag, 36·7. $C_8H_5O_2N_4Ag$ requires Ag, 36·3%). The *silver* salt was digested in methyl-alc. suspension with excess of MeI for several hr., H_2O added, and the org. solvents removed by distillation. The hot aq. liquor was decanted, and the residual solid extracted by treatment with several portions of hot H_2O. The combined extracts on concn. gave a *methiodide A* (2·0 g.), m. p. 271—272°, crystallising in large thin yellow plates. It also occurs in leaflets with a bronze-green appearance [Found : N(micro), 16·7, 16·2; C(micro), 34·7; H, 3·5; NMe, 8·0. $C_{10}H_{11}O_2N_4I$ requires N, 16·2; C, 34·7; H, 3·2; 2NMe, 8·6%]. This methiodide is unchanged by NaOH aq. The original mother-liquors deposited an isomeric *methiodide B* (0·5 g.), m. p. 224—225°, which crystallised in columns and cubes, unchanged by NaOH aq. [Found : N(micro), 16·0; C(micro), 34·4; H, 3·4; NMe, 7·6. $C_{10}H_{11}O_2N_4I$ requires N, 16·2; C, 34·7; H, 3·2; 2NMe, 8·6%].

NATIONAL INSTITUTE FOR MEDICAL RESEARCH,
HAMPSTEAD.
[*Received, October 3rd*, 1932.]