### SYNTHESIS OF QUINOXALINE-

# AND ISOQUINOLINE-5,8-QUINONES

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We have found that oxidation of 5-amino-6-methoxyquinoxaline (I) or 7-methoxy-8-aminoisoquinoline (III) with Fremy's salt (potassium nitrosyl disulfonate) gives, respectively, 6-methoxyquinoxaline-5,8-quinone (II) and 7-methoxyisoquinoline-5,8-quinone (IV) in satisfactory yields. Quinone IV was previously obtained from III by means of a three-step synthesis in 17% yield [1], whereas the proposed one-step method gives IV in 80% yield.



# EXPERIMENTAL METHOD

5-Nitro-6-methoxyquinoxaline, with mp 202-203° (from benzene), was obtained in 79% yield by nitration of 6-methoxyquinoxaline in sulfuric acid. IR spectrum, cm<sup>-1</sup>: 1620, 1533, and 1506. Found: N 20.3%. C<sub>9</sub>H<sub>7</sub>N<sub>3</sub>O<sub>3</sub>. Calculated: N 20.5%. Hydrogenation of this compound in ethanol over Raney nickel gave the hydrochloride of amine I with mp > 360° (from methanol) in 76% yield. IR spectrum, cm<sup>-1</sup>: 3270, 1644, 1576, 1530, and 1505. Found: Cl 17%. C<sub>9</sub>H<sub>9</sub>N<sub>3</sub>O<sub>3</sub>·HCl. Calculated: Cl 16.8%. The benzoate had mp 155-156° (from benzene). IR spectrum, cm<sup>-1</sup>: 3203, 1639, and 1610. Found: N 15.1%. C<sub>16</sub>H<sub>13</sub>N<sub>3</sub>O<sub>2</sub>. Calculated: N 15.2%.

Oxidation of amine I with two equivalents of Fremy's salt in aqueous  $NaH_2PO_4$  solution gave quinone II in 48% yield as pale-yellow crystals with mp 235-236° (dec., from water). IR spectrum, cm<sup>-1</sup>: 1698, 1657, 1603, 1567, and 1530. Found: C 56.8; H 3.1; N 14.4%.  $C_3H_6N_2O_3$ . Calculated: C 56.9; H 3.2; N 14.7%. Similarly, oxidation of III in aqueous methanol gave quinone IV in 80% yield as gold crystals with mp 215-216° (dec., from ethanol). IR spectrum, cm<sup>-1</sup>: 1678, 1652, 1600, 1582, and 1562 [1]. According to the results of thin-layer chromatography, quinones II and IV did not contain impurities; they also gave a positive test for methoxyquinones with ethyl cyanoacetate. On reaction with morpholine, II and IV were converted to morpholino-5,8-quinones, which were described in [1, 2].

### LITERATURE CITED

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