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PREPARATION OF 6-ANILINO-5-DIAZOURACILS AND THEIR CONVERSION INTO INDOLO[2,3-*d*]PYRIMIDINES

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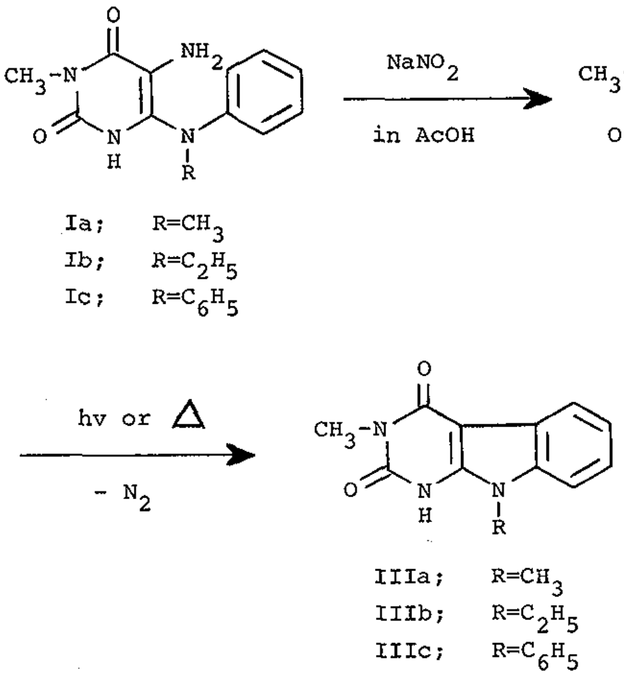
The diazotization of 5-amino-3-methyl-6-(N-substituted-anilino)uracils with sodium nitrite in acetic acid led to the formation of the corresponding stable 5-diazouracils, which were converted into 3-methyl-9-substituted indolo[2,3-*d*]pyrimidine-2,4(1*H*,3*H*)diones by both photolysis and thermolysis.

Stable five-membered diazo heterocycles form an interesting group of compounds.[1] However, little work has yet appeared on the chemistry of six-membered heterocyclic diazo compounds.[2-4] This paper describes a synthesis of stable 6-anilino-5-diazouracils and their conversion into indolo[2,3-*d*]pyrimidines.

5-Amino-3-methyl-6-(N-phenylanilino)uracil (Ic) (m.p. 217°, 95%), prepared by catalytic reduction of 3-methyl-5-nitro-6-(N-phenylanilino)uracil[5] in ethanol over palladium-carbon, was diazotized with sodium nitrite in acetic acid under cooling, followed by dilution with water, caused the separation of stable 5-diazo-3-methyl-6-(N-phenylanilino)uracil (IIc) (m.p. 181° (decomp.), pale yellow prisms from ethanol) in 90% yield. In analogy with the above result, 5-diazo-3-methyl-6-(N-methylanilino)-uracil (IIa) (m.p. 185° (decomp.), pale yellow crystals from ethanol) and 5-diazo-6-(N-ethylanilino)-3-methyluracil (IIb) (m.p. 141° (decomp.), pale yellow crystals from ethanol) were prepared by the diazotization of the corresponding 5-aminouracils *(Ia and Ib)*[6] *in* 95 and 72% yields respectively. The structures of IIa-c were derived on the basis of analytical and spectral data, especially



Ia; R=CH_3
Ib; R=C_2H_5
Ic; R=C_6H_5

IIa; R=CH_3
IIb; R=C_2H_5
IIc; R=C_6H_5

IIIa; R=CH_3
IIIb; R=C_2H_5
IIIc; R=C_6H_5

i.r. spectra (presence of strong absorptions at 2110 cm^{-1} region characteristic of aliphatic diazo compounds and absence of amino absorptions).

Although considerable stable thermally (for example, refluxing IIa in acetic acid for 3 hr gave the starting material unchanged), these 5-diazouracils (IIa-c) were sensitive to light and photochemically decomposed with loss of nitrogen probably to carbenes which undergo the usual addition. The latter property of compounds IIa-c has been utilized for the preparation of the corresponding indolo[2,3-d]pyrimidines. Thus, a solution of IIc (0.2 g) in ethanol (10 ml) was exposed to the direct sunlight[7] (Kumamoto, May, unclouded) at ambient temperature for 5 hr or irradiated by a sunlight lamp (400 W, Toshiba Co.) at 50 cm range for 10 hr to separate 3-methyl-9-phenylindolo[2,3-d]pyrimidine-2,4(1H,3H)dione (IIIc) (m.p. > 360°, colorless plates from dimethylformamide) in almost quantitative yield and in a high state of purity. Similarly, IIa and IIb were converted into the corresponding indolo[2,3-d]-pyrimidines (IIIa) (m.p. > 360°, colorless plates from dimethylformamide) and (IIIb) (m.p. > 360°, colorless plates from dimethylformamide) in 95 and 82% yields respectively. The structures of IIIa-c were established by microanalyses and by their spectral data.

Refluxing IIa-c in dimethylformamide for 5 hr in the dark gave also the indolo[2,3-d]pyrimidines (IIIa-c) in lower yields (average 60%) than by the photolysis. Synthesis of other several kinds of indolo[2,3-d]pyrimidines by the above method is currently under investigation.

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7 Exposure of IIa-c in ethanol to the indirect sunlight for 15 hr gave also IIIa-c in almost the same yields.

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