A New Ring Expansion of a Pyrrolo-pyrimidine to a Pyrimido-pyrimidine

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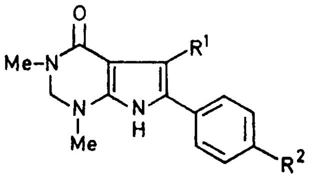
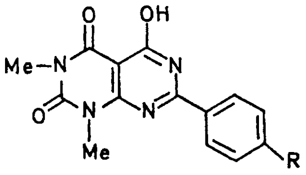
Summary Reaction of 5-amino-1,3-dimethyl-6-phenylpyrrolo[2,3-*d*]pyrimidine-2,4(1*H*,3*H*)-diones with lead tetra-acetate gave 1,3-dimethyl-5-hydroxy-7-phenylpyrimido-[4,5-*d*]pyrimidine-2,4(1*H*,3*H*)-diones.

We report here a novel utilization of lead tetra-acetate which involves ring expansion of pyrrolo-pyrimidines to pyrimido-pyrimidines, which not only is a new type of reaction, but which is applicable to the preparations of other condensed pyrimidine heterocycles.

Treatment of the nitroso-compounds[1] (I)—(III) with sodium dithionite in water afforded the corresponding 5-amino-derivatives (IV),† m.p. 249°, (V), m.p. 250°, and (VI), m.p. 268° in moderate yields.

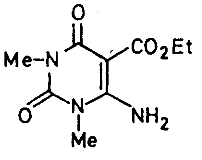


(I) $R^1 = NO$, $R^2 = H$
(II) $R^1 = NO$, $R^2 = Cl$
(III) $R^1 = NO$, $R^2 = Br$
(IV) $R^1 = NH_2$ $R^2 = H$
(V) $R^1 = NH_2$, $R^2 = Cl$
(VI) $R^1 = NH_2$ $R^2 = Br$

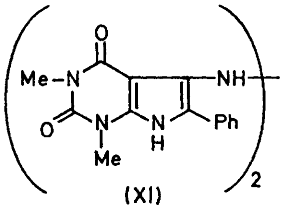


(VII) R = H
(VIII) R = Cl
(IX) R = Br

Heating of the pyrimidindione (IV) with excess of lead tetra-acetate in dimethylformamide or acetic acid at 65° for 3 h, partial evaporation, and dilution with water gave (VII), m.p. > 320° (90%). Its structure was established by comparison with an authentic sample prepared as follows. Heating of 6-amino-1,3-dimethyluracil with ethyl chloroformate in pyridine at 90° for 5 h afforded (X), m.p. 207—208° (80%) which was fused with benzamidine hydrochloride at 300° for 20 min, to give (VII), identical with the foregoing product. Similarly, compounds (V) and (VI) under the same conditions yielded (VIII), m.p. > 320° (86%) and (IX), m.p. > 320° (72%).



(X)



(XI)

Treatment of (IV) in dimethylformamide with diethyl azodicarboxylate gave the hydrazine (XI), m.p. 287—289°.

(*Received*, 17*th January* 1972; *Com.* 060.)

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† Satisfactory analytical and spectral data were obtained for all products.

[1] F. Yoneda, M. Higuchi, M. Kanahori, and K. Senga, *J. Org. Chem.*, submitted for publication.