New Photochemical Reaction of 6-Azido-1,3-dimethyluracil with Acyl Halides to give 5-Acylamino-6-chloro-1,3-dimethyluracils

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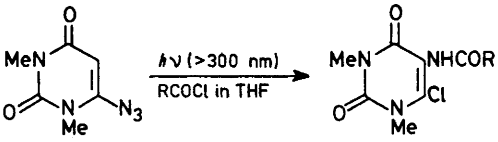
Summary Irradiation of 6-azido-1,3-dimethyluracil (**1**) in the presence of acyl halides gives 5-acylamino-6-chloro-1,3-dimethyluracils (**2**), compounds which have been used in synthesis of fervenulin (**3**).

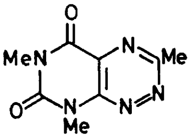
We have recently reported that the photolysis of 6-azido-1,3-dimethyluracil (**1**) in the presence of alkylamines gave 6-alkylamino-5-amino-1,3-dimethyluracils *via* a nitrene intermediate.[1] This photochemical transformation provided a new procedure for the introduction of a nitrogen unit into the 5-position of uracils and has been exemplified by the one-step synthesis of lumazines and fervenulins.[2]

We now describe a new type of functionalization of C-5 and C-6 of uracils by the photolysis of (**1**) in the presence of acyl halides, giving 5-acylamino-6-chloro-1,3-dimethyluracils (**2**), which are convenient intermediates for preparation of biologically interesting fused pyrimidines such as xanthines and fervenulins.

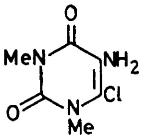
Thus, a solution of (**1**) (0·011 M) and acetyl chloride (0·022 M) in tetrahydrofuran (THF) was irradiated with a 100 W high-pressure mercury arc lamp through a Pyrex filter under nitrogen for 3 h. After evaporation of the solvent *in vacuo*, the residue was poured into 20 ml of water and kept at room temperature for 24 h. The solution was then neutralized with 10% aqueous $NaHCO_3$ and extracted with chloroform. The organic layer was dried and evaporated to give 5-acetylamino-6-chloro-1,3-dimethyluracil (**2a**), m.p. 164—165 °C, in 70% yield. The structure of (**2a**) was confirmed by elemental analysis and spectral data. The ultimate proof of the structure of (**2a**) was provided by its conversion into 3-methylfervenulin (**3**). Thus, treatment of (**2a**) with hydrazine hydrate in refluxing ethanol for 2 h afforded 3-methylfervenulin (**3**)[3] in 80% yield.



(1) (2)



(3)



(4)

Similar irradiation of (**1**) (0·011 M) with other acyl chlorides (0·022 M) in THF gave the corresponding 5-acylamino-6-chlorouracils (**2b**—**e**)† in high yields (Table).

Table. Photochemical formation of 5-acylamino-6-chloro-1,3-dimethyluracils (**2**) from the acyl chlorides RCOCl

Product	R	M.p./°C	% Yield
(**2a**)	Me	164—165	70
(**2b**)	Et	160—162	82
(**2c**)	Ph	234—235	75
(**2d**)	$PhCH_2$	187—189	77
(**2e**)	CH_2Cl	161—163	54

When (**1**) was irradiated in THF containing 10% hydrochloric acid, 5-amino-6-chloro-1,3-dimethyluracil (**4**) was obtained in 45% yield, m.p. 118—120 °C (lit.,[4] 120—121 °C).

The mechanism of the present reaction is still under study, but we think it involves nucleophilic attack by acyl halide on an azirine intermediate as discussed previously.[5]

(*Received*, 27*th January* 1978; *Com.* 084.)

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† All new compounds gave satisfactory elemental analyses and spectral properties consistent with the assigned structures.

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