

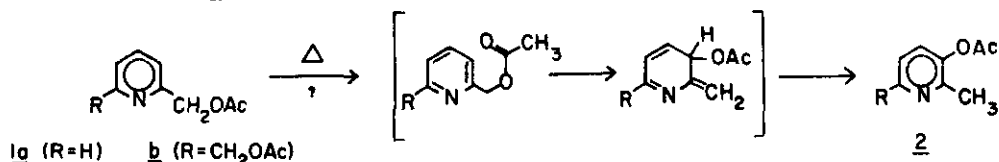
AN ANOMALOUS DEALKYLATION-ACYLATION OF *N,N*-DIALKYLANILINESGeorge R. Newkome* and Xia Yuanjiao¹

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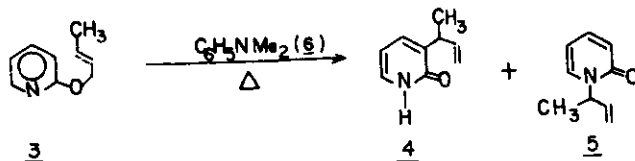
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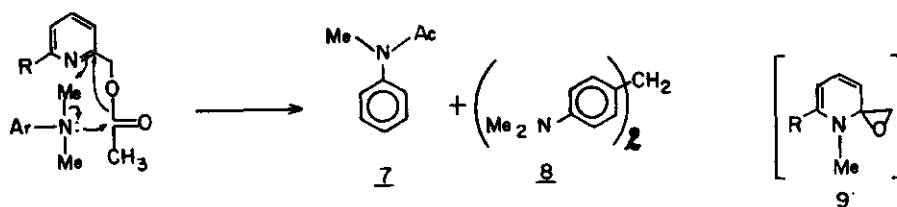
Abstract. *N,N*-Dialkylaniline undergoes a thermal *N*-dealkylation and acylation in the presence of 2-acetoxypyridines.

Activation of α -methyl groups on electron-deficient heterocyclic compounds can best be accomplished by the treatment of α -methyl-*N*-oxides with acetic anhydride^{2,3}, from which the α -acetoxymethyl derivatives along with minor amounts of ring substituted isomers⁴ can be obtained. Few rearrangements in heterocyclic chemistry have been as extensively studied as this particular reaction, known as the Boekelheide Rearrangement. During our studies to functionalize the α -methyl moiety on diverse heterocycles, it appeared that the ring acetoxymethyl isomers were generated from the subsequent rearrangement of the α -acetoxymethyl precursor, thus we attempted the thermolysis of 2-acetoxymethylpyridines (**1**) in order to evaluate this concept.

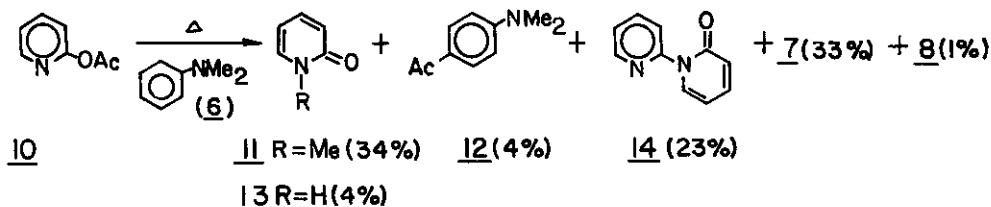


When **1** was pyrolyzed at temperatures up to 240°C, none of the anticipated rearrangement products (e.g. **2**) were detected. At temperatures in excess of 240°C, **1** underwent extensive decomposition and added acetate ion had no obvious effect. Since the related 2-crotyloxypyridine (**3**) rearranges smoothly to **4** and **5** at 250°C in *N,N*-dimethylaniline (**6**)⁵, pyrolysis of **1** (**a** or **b**)⁶ in **6**, as solvent, gave the unexpected *N*-methylacetanilide (**7**) along with *bis*-(dimethylaminophenyl)methane (**8**; 10%; mp 84°C, lit.⁷ mp 84-86°C). Ring acetoxymethyl product(s), e.g. **2**, were not detected. Mechanistically, albeit naively, nucleophilic attack of the amine at the carbonyl group of the acetoxymethyl group, followed by *N*-methylation can be envisioned. The resultant intermediate **9** subsequently can undergo a cyclopropylcarbinyl-type rearrangement to afford ethereal products. In order to simplify the reaction course, 2-acetoxypyridine [**10**; bp 58°C (0.8mm), lit.⁸ bp 74-76°C (0.9mm)] was heated (255°C) in *N,N*-dimethylaniline (**6**) resulting in the generation of an equal within experimental error ratio of **7** and *N*-methylpyridinone (**11**). Other degradation products such as: **12** [mp 93-96°C, lit.⁹ mp 90°C] via *p*-acetylation of **6** and loss of 2-pyridinone (**13**), and *N*-2-pyridinyl-2-pyridinone (**14**; mp 52°C, lit.^{10c} mp





55°C) by the self-condensation of 10¹⁰, followed by loss of acetic anhydride. The necessity of pyridine N-electrons was supported by the fact that benzyl acetate does not transfer the acetyl group under comparable conditions.



Anilines	Acetanilides (%); Mp/Bp.
H, <u>N,N</u> -DiMe	H, <u>N</u> -Me (35%); Mp 98-100°C (lit. ¹¹ mp 98-101°C)
3, <u>N,N</u> -TriMe	3, <u>N</u> -DiMe (42%); Mp 75-76°C (lit. ¹² mp 75-76°C)
4, <u>N,N</u> -TriMe	4, <u>N</u> -DiMe (41%); Mp 79-80°C (lit. ¹³ mp 80°C)
4-Cl- <u>N,N</u> -DiMe	4-Chloro- <u>N</u> -Me (47%); Mp 91-92°C (lit. ¹⁴ mp 92-93°C)
4-MeO- <u>N,N</u> -DiMe	4-Methoxy- <u>N</u> -Me (48%); Mp 55-56°C (lit. ¹⁴ mp 51-53°C)
H, <u>N,N</u> -DiEt	H, <u>N</u> -Et (32%); Mp 50-50°C (lit. ¹⁵ mp 51°C)
4-Me- <u>N,N</u> -DiEt	4-Me- <u>N</u> -Et (43%); bp 220°C (lit. ¹⁶ bp 222°C)

Although the reaction conditions were not herein maximized, this one-step demethylation-acylation sequence demonstrated by these heterocyclic acetoxy compounds may have overall general synthetic utility^{17,18}.

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