

97% yield to give **10**. Although the newly introduced hydroxyl groups have the incorrect stereochemistry (cis to the oxygen bridge rather than trans), we decided to use this molecule to test the reductive elimination procedure necessary for the preparation of the β,γ -unsaturated ester in the real system (**4** \rightarrow **5**). It was gratifying to observe that treatment of **10** with sodium in THF at 25 °C effected clean reductive elimination to afford the olefinic triol **11** in 78% yield. We believe this to be the first report of an opening of a furan cycloadduct to give an oxygenated non-aromatic product.

Although the N-unsubstituted lactam **9g** could be cleaved by Mukaiyama's procedure⁷ (N-nitrosation, followed by reaction with

(15) Chromatography of **9a** gave a fraction that was an approximately 1:1 mixture of diastereomers. Heating this mixture at 100 °C caused a very slow isomerization of the exo to the endo isomer (presumably via retro-Diels-Alder followed by cyclization) which did not proceed to the 5:1 ratio even after several days. This is additional evidence for a kinetic preference for the endo isomer.

hydroxide ion, and mild acid hydrolysis), an oxidation is still required to produce the desired acetyl group, as in **5**. The overall sequence could be significantly shortened as follows. Reaction of 2-acetyl-5-methylfuran **6a** with 2-aminoethanol produced in 79% yield the aminal **12**, which could be acylated with acryloyl chloride or β -chloroacryloyl chloride to give **13a,b** in 68% and 62% yield, respectively. Cyclization of **13a,b** at 110 °C for 1.5 and 3.5 h, respectively, gave a 90% yield of **14a,b**, each as a single diastereomer, most likely the α -methyl compound shown. Therefore disubstitution at the benzylic center also increases the rate of cyclization vs. the unsubstituted case.

The conversion of compounds such as **9** and **14** into intermediates, e.g., **5**, for the synthesis of the avermectins is currently under investigation.

Acknowledgment. We thank the Agricultural Research Division of the American Cyanamid Co. for financial support and helpful discussions.

Additions and Corrections

Polymer Films on Electrodes. 14. Spectral Sensitization of n-Type SnO₂ and Voltammetry at Electrodes Modified with Nafion Films Containing Ru(bpy)₃²⁺ [*J. Am. Chem. Soc.* 1984, 106, 7371-7380]. MAHADEVAIYER KRISHNAN, XUN ZHANG, and ALLEN J. BARD*

Figures 8 and 9 were transposed in printing. They should appear as follows:

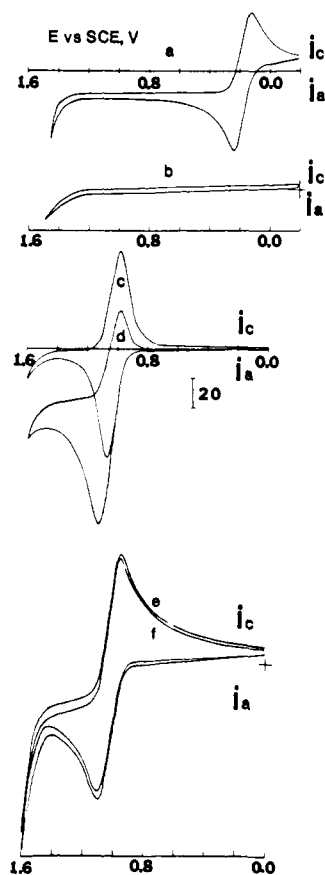


Figure 8. Cyclic voltammetry in 0.1 M KCl at 10 mV/s: (a) SnO₂ electrode in 1 mM K₄Fe(CN)₆; (b) SnO₂/NAF ($d = 0.4 \mu\text{m}$) in 1 mM K₄Fe(CN)₆; (c) SnO₂/NAF, Ru(bpy)₃²⁺ in base electrolyte ($d = 0.3 \mu\text{m}$); (d) same electrode as (c) with 1 mM K₄Fe(CN)₆ added to the solution; (e) SnO₂/NAF, Ru(bpy)₃²⁺ thick film electrode in base electrolyte; (f) same electrode with 1 mM K₄Fe(CN)₆ added to the solution.

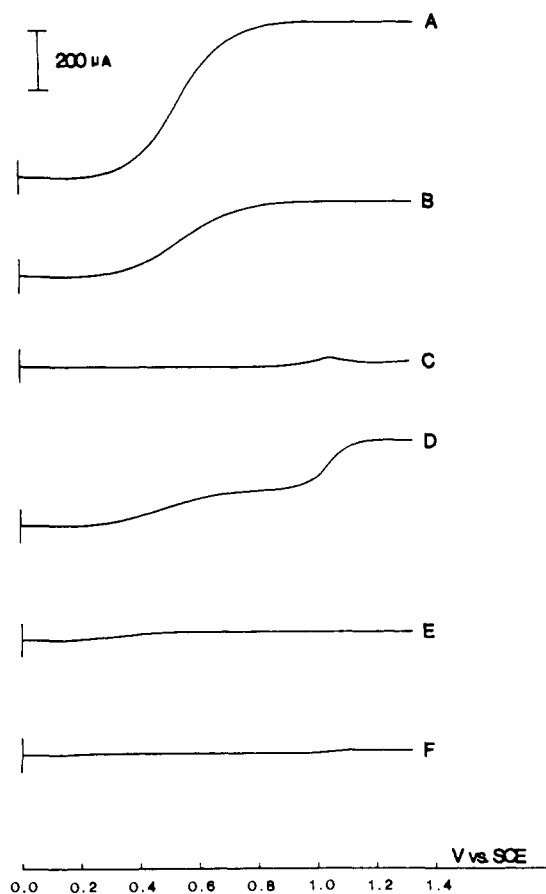


Figure 9. Voltammetry at GC RDE in 0.1 M Na₂SO₄ at scan rate 5 mV/s and rotation rate 1000 rpm: (A) bare GC RDE with 1 mM hydroquinone; (B) GC/NAF ($d = \sim 0.3 \mu\text{m}$) with 1 mM hydroquinone; (C) GC/NAF, Ru(bpy)₃²⁺ ($d = \sim 0.3 \mu\text{m}$) in base electrolyte alone; (D) GC/NAF, Ru(bpy)₃²⁺ ($d = \sim 0.3 \mu\text{m}$) with 1 mM hydroquinone; (E) GC/NAF ($d = \sim 3 \mu\text{m}$) with 1 mM hydroquinone; (F) GC/NAF, Ru(bpy)₃²⁺ ($d = \sim 3 \mu\text{m}$) with 1 mM hydroquinone.