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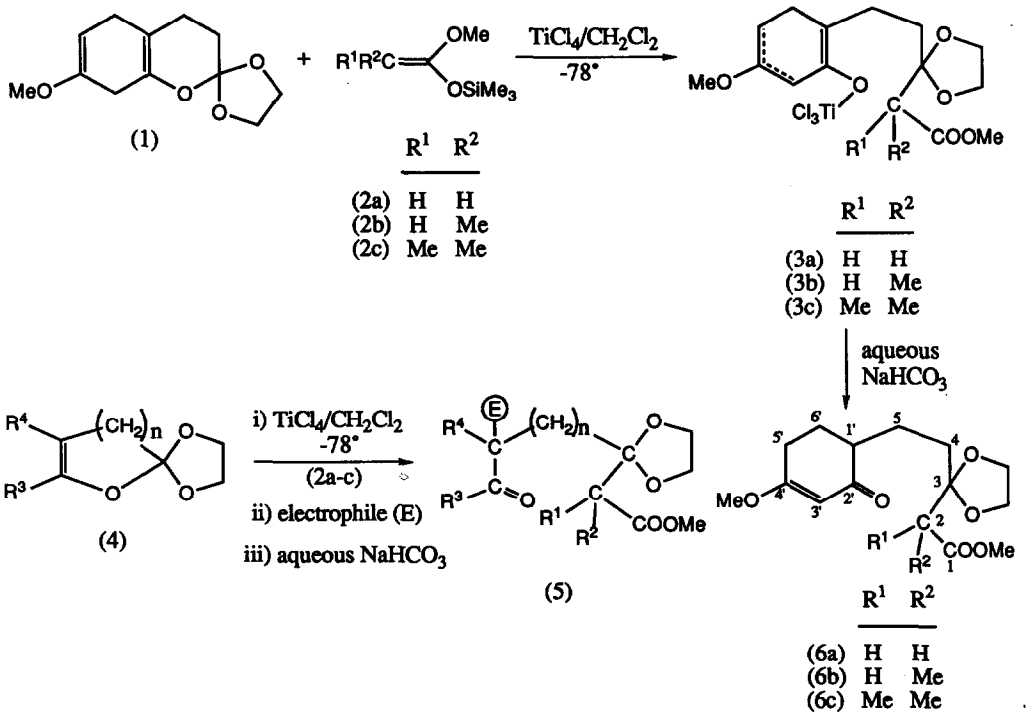
ENOLIC ORTHO ESTERS. V.[1] REGIOSPECIFIC GENERATION OF DIKETO ESTER MONOACETALS BY REACTION OF AN ENOLIC ORTHO ESTER WITH KETENE SILYL ACETALS

D.J. Collins*, M. Dosen and A.G. Jhingran

Department of Chemistry, Monash University, Clayton, Victoria 3168

Abstract: Reaction of the enolic ortho ester (1) with the ketene silyl acetals (2a-c) in dichloromethane in the presence of titanium tetrachloride at low temperatures gave the respective keto acetal esters (6a-c) via the titanium enolates (3a-c).

The Lewis acid catalysed reaction of enolic ortho esters with various nucleophiles has potential for the generation of a range of useful polyfunctional intermediates.[1-4] In Part II of this series we described [3] the tandem nucleophilic/electrophilic dimethylation of an enolic ortho ester similar to (1). We have also reported [4] that lithium aluminium hydride reduction of an enolic ortho ester can generate a keto acetal via an aluminium enolate. Depending on the nature of the Lewis acid used to promote nucleophilic attack, the enolate generated (cf. 3a-c) might be exploited by reaction *in situ* with suitable electrophiles. In this communication we describe Lewis acid catalysed reactions of the enolic ortho ester (1) with the ketene silyl acetals (2a-c) to give the diketo ester monoacetals (6a-c).



Treatment of a solution of the enolic ortho ester (1) [2] (0.28 g, 1.25 mmol) in dichloromethane at -78° under dry nitrogen with titanium tetrachloride (0.214 g, 1.26 mmol) gave a dark orange-brown mixture; after 10 min the ketene silyl acetal (2a) [5] (0.183 g, 1.25 mmol) was added dropwise during 5 min and the mixture was stirred at -78° for 2 h. It was allowed to warm up to 0° during 1 h, then quenched by addition to ice-cold sodium bicarbonate solution. Chromatography of the product over silica gave 51% of the pure diketo ester monoacetal (6a) which showed λ_{max} 248 nm (ε 10,670), ν_{max} (film) 1730, 1640, 1610 cm^{-1}. ^1H n.m.r. δ (300 MHz, $CDCl_3$) 1.41-2.23, m, H4,4,5,5,1',6',6'; 2.41-2.47, m, H2,2; 2.68, apparent s, H5',5'; 3.68, s, OMe; 3.69, s, OMe; 3.99, m, OCH_2CH_2O; 5.32, s, H3'. ^{13}C n.m.r. δ (50 MHz, $CDCl_3$) 23.30, t, C5; 26.29, t, C6'; 27.77, t, C5'; 34.96, t, C4; 42.47, t, C2; 44.97, d, C1'; 51.78, q, OMe (ester); 55.65, q, OMe (vinylogous ester); 65.15, t, OCH_2CH_2O; 101.81, d, C3'; 109.23, s, C3; 170.00, q, C1; 177.51, s, C4'; 201.05, s, C2'. The mass spectrum was also consistent with structure (6a). Similarly, reaction of the enolic ortho ester (1) with the ketene silyl acetals (2b) [5,6] or (2c) [5] gave the keto acetal esters (6b) or (6c) in 40% and 60% yields, respectively. The yields of (6a-c) have not been optimized.

Before work-up the reaction mixtures presumably contain the trichlorotitanium enolates (3a-c); these might be exploited, either directly, or after replacement of one or more chlorine atoms by other ligands. Work in progress using enolic ortho esters of the general type (4) is aimed at *in situ* utilization of derived enolates analogous to (3a-c) in various tandem eactions to give compounds (5). Even without tandem exploitation of enolates, there is considerable scope for the use of enolic ortho ester synthons (4) for the generation of a variety of polycarbonyl compounds in which one potential keto (or aldehyde group cf.[4]) is regiospecifically generated as an acetal function.

All new compounds were fully characterized and gave satisfactory microanalyses.

Acknowledgement

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References

(1) Part IV of this series: Collins, D.J., Jhingran, A.G. and Rutschmann, S.B., *Aust. J. Chem.*, 1989, **42**, 1769.

(2) Collins, D.J., Downes, L.M., Jhingran, A.G., Rutschmann, S.B. and Sharp, G.J., *Aust. J. Chem.*, 1989, **42**, 1235.

(3) Collins, D.J. and Rutschmann, S.B., *Aust. J. Chem.*, 1989, **42**, 1447; corrigendum, *ibid.*, 2298.

(4) Collins, D.J., Downes, L.M. and Kyriakou, M., *Aust. J. Chem.*, 1989, **42**, 1617.

(5) Ainsworth, C., Chen, F. and Yu-Neng Kuo, *J. Organomet. Chem.*, 1972, **46**, 59.

(6) Burlachenko, G.S., Baukov, Yu.I. and Lutsenko, I.F., *J. Gen. Chem. USSR*, 1972, **42**, 379.

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