

SYNTHESIS OF NITROGEN- AND OXYGEN-HETEROCYCLES USING KETENE-S,N-ACETALS

Hiroki Takahata, Keiko Moriyama, Akira Anazawa, Tomoko Nakajima,
Yasunori Banba, and Takao Yamazaki

Faculty of Pharmaceutical Sciences, Toyama Medical & Pharmaceutical
University, 2630 Sugitani, Toyama 930-01, Japan

Ketene-S,N-acetals derived from tertiary thioamides are interesting α -alkyl-thio substituted enamines. We have been interested in exploring their synthetic utility as the intermediates for heterocycles.

I. Synthesis of Monothiouracils.

Addition of ethoxycarbonyl isothiocyanate to the ketene-S,N-acetals gives 1:1 adducts, which appear to be attractive new synthetic equivalents of 1,5-dicarbonyl compound. The 1:1 adducts are cyclized by reaction with primary amines as bis-nucleophiles affording monothiouracil derivatives.

II. Synthesis of 4-Quinolones.

Reaction of ketene-S,N-acetals with isatoic anhydrides as dipolarophilic synthon gives 4-quinolones.

III. Syntheses of Benzofurane, Benzoxapine, and Benzolactone derivatives.

Reaction of ketene-S,N-acetals with 1,4-quinones affords benzofurans, which have ketene-O,N-acetal components. Therefore, ring-expansion of benzofurans with dimethyl acetylenedicarboxylate gives benzoxapines. In addition, Michael addition of Michael acceptors to benzofurans is carried out to afford 3-substituted benzofurans, which are hydrolyzed to furnish benzolactones (2-coumaranones). Ketene-S,N-acetal is regarded new synthetic equivalent of double enamine.