

SYNTHESIS OF STRAINED HETEROCYCLIC RINGS

I. 2-HYDROXY- β -LACTAMS AND 4-OXAZOLIDINONES BY PHOTOCYCLIZATION OF 2-OXOAMIDES

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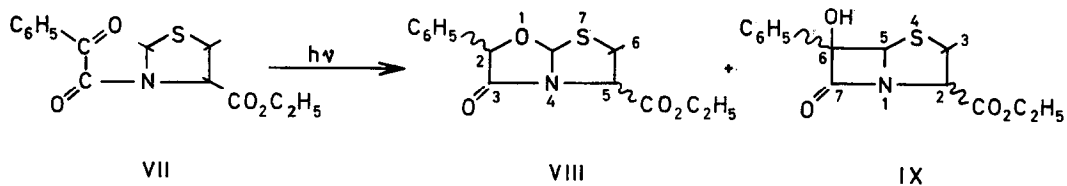
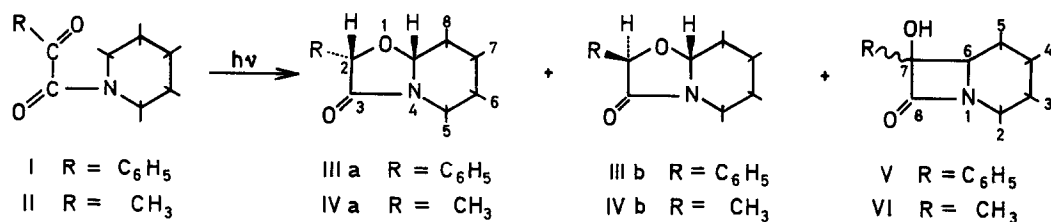
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It has recently been shown that α -diketones may be photocyclized in high yield to hydroxycyclobutanes (1, 2). 2-Oxoesters, however, appear to either decarbonylate or undergo pinacol reduction on irradiation with UV light (3-6). As part of a programme aimed at the synthesis of penicillin derivatives we have investigated the photocyclization of 2-oxoamides, in which insertion reactions could be expected to be facilitated in the positions α to the nitrogen.

The 2-oxoamides I, II and VII have been irradiated, giving in low yield (ca 8 %) the desired β -lactams: 7-hydroxy-7-phenyl-8-oxo-1-azabicyclo [4,2,0] octane (V) (m.p. 148-150°), 7-hydroxy-7-phenyl-8-oxo-1-azabicyclo [4,2,0] octane (VI) (m.p. 138-139°), and 2-ethoxycarbonyl 6-hydroxy-6-phenyl-7-oxo-4-thia -1-azabicyclo [3,2,0] heptane (IX) (m.p. 109-111°). The major products from the irradiations were unexpectedly oxazolidinones, namely the following: hexahydro-2-phenyl-3-oxooxazolo [3,2-a] pyridine, two isomers, III a (m.p. 78-80°, 15 %) and III b (m.p. 83-84°, 21 %), hexahydro-2-methyl-3-oxooxazolo [3,2-a] pyridine, two isomers, IV a (n_D^{20} 1.4853, 30 %) and IV b (n_D^{20} 1.4931, 20 %) and two of the four possible isomers of 5-ethoxy carbonyl-2-phenyl-3-oxothiazolo [2,3-b] oxazole VIII, one having m.p. 54-57° (15 %) and the other m.p. 103-106° (7 %).



The suggested structures of the hydroxy- β -lactams and the oxazolidinones are in agreement with their spectral, analytical and chemical properties, which will be discussed in a subsequent paper.

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