Extension of The Thermal and Photochemical Reactions of Enamides

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In the course of our study on the reaction of enamides, the cyclization reaction of N-nicotinoylenamine with and without an electron-attracting group on the pyridine ring has been examined under photochemical, thermal, and acylating conditions, respectively.

Upon irradiation or thermolysis, N-nicotinoylenamines (1c and d) with an electron-attracting group underwent smooth cyclization to give the 2,7-naphthyridines (6c and d) as a major product, while acylation with benzoyl chloride resulted in the formation of 1,6-naphthyridines (7c and d) as a major product.

By employing the photochemical and thermal cyclizations of N-(5-acetyl)nicotinoylenamine (11), total synthesis of a new benzo[a]pyrido[3,4-g]quinolizine alkaloid, alamarine (9a), is accomplished.

Acylation of the methylaminocrotonates (15a and b) with two molar amount of nicotinoyl chloride afforded the 3-carboxy-1,6-naphthyridin-4-one skeleton (18a and b) which has an analogous structure of nalidixic acid, a powerful antibacterial agent.

As an extension of the enamide cyclization under acylating condition, intermolecular reaction between indole and 4-substituted pyridine derivatives in the presence of the acid chloride afforded the 2-indolyl-1,2-dihydropyridines (20a, b, c, and d) in comparable yields which could be a potential intermediate for the synthesis of the indole alkaloids. Thus, a new synthesis of an antitumor alkaloid olivacine is established by employing the newly developed carbazole synthesis from the above intermolecular reaction.