Pergamon

Tetrahedron Letters 39 (1998) 6227–6228

TETRAHEDRON LETTERS

A New Method for Preparing *N*-Acyloxaziridines via Tandem *O, N*-Addition of Hydroxamic Acids to Methyl Propiolate.

Kyukwan Zong, Seung Il Shin and Eung Kul Ryu*

Bioorganic Science Division, Korea Research Institute of Chemical Technology
P.O. Box 107, Yusong, Taejon 305-600, Korea

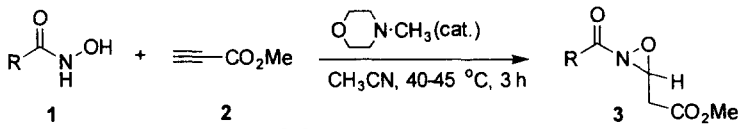
Received 20 May 1998; revised 13 June 1998; accepted 19 June 1998

Abstracts: N-Acyloxaziridines were prepared from a tandem O, N-addition of hydroxamic acids to metyl propiolate in the presence of 4-methyl morpholine as a catalyst in good to excellent yields.

Oxaziridines have a variety of synthetic uses in modern organic synthesis, including the eletrophilic amination of amines,[1b,2] α-hyroxylation of carbonyl compounds,[1c] oxidations,[3] and rearrangements.[1] However, their synthetic methodologies are quite limited up to date. The major routes toward synthesis of oxaziridines involve the oxidation of an imine with *m*-CPBA or Oxone and the electrophilic amination of carbonyl compounds by treatment of *N*-chloroalkylamines or *N*-alkylhydroxylamine-*O*-sulfonic acids.[1] Here we wish to report a facile synthesis of *N*-acyloxaziridines via an unprecedented route.

A variety of hyroxamic acids were prepared according to the method developed by Prabhakar group with slight modification.[4] The selective *N*-acylation of hyroxylamine was achieved by treatment of acyl chlorides with hydroxylamine in sodium bicarbonate solution of ether/water (9:1) in 80-95% yields. The minor *O*-acylated products were easily removed by recrystallization or a flash chromatography on silica gel.

The reaction of hydroxamic acid and methyl propiolate in the presence of a catalytic amount of 4-methyl morpholine gave *N*-acyl substituted oxaziridines in good to excellent yields (86-95%). The results are summerized in **Table.**

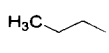
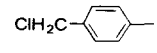
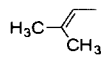
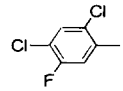


Scheme.

The ring proton in oxaziridines appears at 6.20-6.60 ppm as a triplet and two α-protons of methyl ester group appear at 2.90-3.00 ppm as a doublet. A plausible mechanism to account for the above observations may be suggested that the hydroxyl group of hydroxamic acid is first added to methyl propiolate in a fashion of conjugated 1,4-addition and subsequent intramolecular cyclization by the amino group to provide the *N*-acyloxaziridines. It may be expected that the hydroxyl group is more nucleophilic than the amino group having *N*-acyl group.

0040-4039/98/$ - see front matter
PII: S0040-4039(98)01281-7

Table. Synthesis of *N*-Acyloxaziridines **3**

Entry	Compounds	R	Yields (%)[a,b] 3	Entry	Compounds	R	Yields (%) 3
1	**3a**		92	5	**3e**		90
2	**3b**		91	6	**3f**		92
3	**3c**		86	7	**3g**		90
4	**3d**		95	8	**3h**		89

a) Isolated yields after silica gel chromatography; b) All oxaziridines have satisfactory spectroscopic data on ^{1}H NMR, IR, MS (20eV), and HRMS.

In conclusion, *N*-acylated oxaziridines were synthesized from the reaction of hydroxamic acids and methyl propiolate via the unprecedented procedure and further study utilizing this method is undergoing.

Acknowledgment: We wish to thank the Ministry of Science and Technology for financial support.

References and Notes:

1. For reviews of oxaziridines: (a) Davis, F. A.; Sheppard, A. C. *Tetrahedron* **1989,** *45,*5703-5742. (b) Andreae, S.; Schmitz, E. *Synthesis* **1991,** 327-341. (c) Davis, F. A.; Chen, B. *Chem. Rev.* **1992,** *92,* 919-934. (d) Davis, F. A.; Reddy, R. T. in "*Comprehensive Heterocyclic Chemistry II*"; Katritzky, A. R.; Rees, C. W.; Scriven, E. F. V. Eds.; Pergamon Press: Oxford, 1996; Vol 1A, pp 365-413. (e) Schmitz, E. in "*Advances in Heterocyclic Chemistry*"; Katritzky, A. R.; Boulton, A. J. Eds.; Academic Press: New York, 1979; Vol 24, pp 63-83. (f) Padwa, A.; Murphree, S. S. in "*Progress in Heterocyclic Chemistry*"; Suschitzky, H.; Gribble, G. W. Eds.; Pergamon Press: New York, 1996; Vol 8, pp 62-65.
2. Vidal, J.; Guy, L.; Stérin, S.; Collet, A. *J. Org. Chem.* **1993,** *58,* 4791-4793.
3. Sandrinelli, F.; Perrio, S.; Beslin, P. *J. Org. Chem.* **1997,** *62,* 8628-8627.
4. Santos, P. F.; Lobo, A. M.; Prabhakar, S. *Synth. Commun.* **1995,** *25,* 3509-3518.
5. A typical procedure for the preparation of **3d**; To a solution of phenyl hyroxamic acid (0.90 g, 6.56 mmol) and methyl propiolate (0.72 g, 8.56 mmol) in dry acetonitrile (15 mL) was added 4-methyl morpholine (66 mg, 0.66 mmol) at room temperature. The reaction mixture was stirred for 4 h and then concentrated under reduced pressure. The residue was diluted with ether (30 mL) and the etheral solution was washed with water, brine and dried over $MgSO_4$. The crude product was purified by column chromatography on silica gel (hexane/ethyl acetate = 3 : 1) to afford the products **3d** as a colorless oil. Spectroscopic data for **3d** are as follow; colorless oil, ^{1}H NMR ($CDCl_3$) δ 7.84-7.75 (m, 2H), 7.53-7.38 (m, 3H), 7.50 (t, J = 4.9 Hz, 1H), 3.78 (s, 3H), 2.97 (d, J = 4.9 Hz, 2H); FTIR (thin film) 3010.2, 2955.5, 2881.0, 1743.4, 1642.8, 1622.6, 1576.4, 1499.1, 1400.5, 1368.7, 1330.5, 1287.6, 1198.4, 1117.2; MS (20eV) m/z (rel intensity) 222[(M+1)$^+$, 3.1], 221 (M$^+$, 9.7), 204 (7.0), 148 (14.3), 122 (3.44), 121 (11.5), 120 (37.7), 119 (27.6), 105 (100), 104 (21.3), 103 (99.4), 101 (5.6); HRMS calcd for $C_{11}H_{11}NO_4$ 221.0688, found 221.0686.