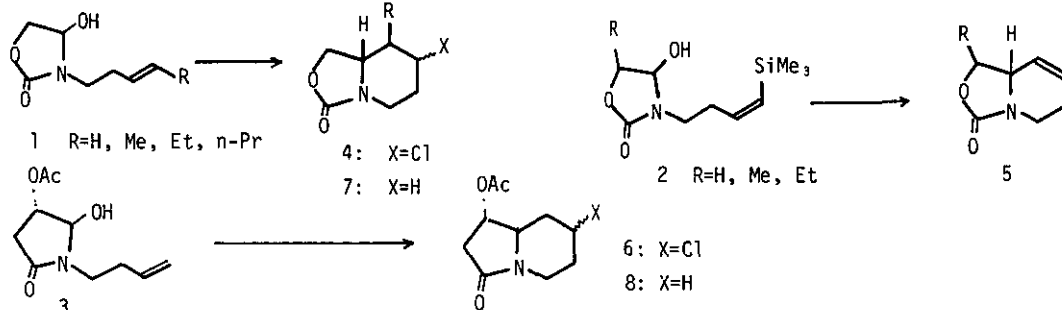


SYNTHESIS OF N-HETEROCYCLES THROUGH N-ACYLIMINIUM
ION AND N-ACYLIMINIUM RADICAL INTERMEDIATES

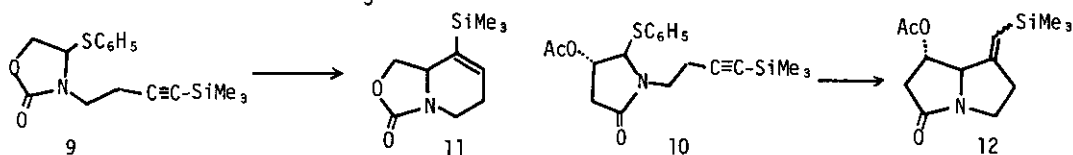
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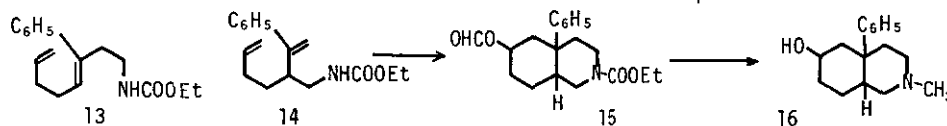
Several kinds of heterocyclic compounds were prepared by cyclization of N-acyliminium ion and N-acyliminium radical intermediates. Cyclization of 1-3 with TiCl_4 afforded 4-6, respectively. Reduction of 4 and 6 with Bu_3SnH in the presence of AIBN gave 7 and 8, respectively.



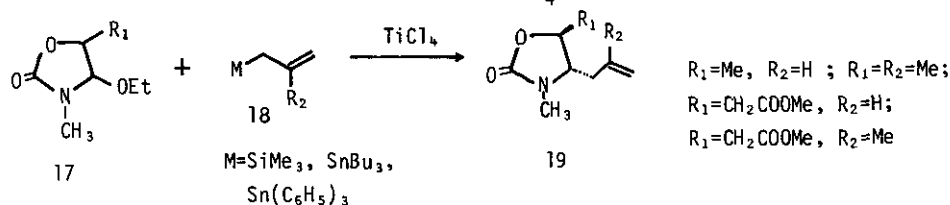
Cyclization of 9 and 10 with Bu_3SnH in the presence of AIBN yielded 11 and 12, respectively.



Cyclization of 13 and 14 with paraformaldehyde in formic acid gave the cis-fused 6-hydroxy-4a-phenyldecahydroisoquinoline (15), reduction of which with LiAlH_4 afforded 16.



Allylation of 17 with 18 in the presence of TiCl_4 gave 19 with high stereoselectivity.



$\text{R}_1 = \text{Me}, \text{CH}_2\text{COOMe}$

$\text{R}_2 = \text{H}, \text{Me}$