

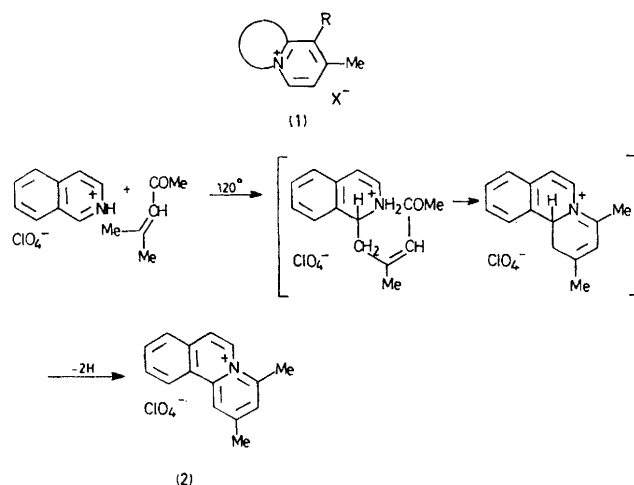
## Annellation of Pyridinium Rings on to Nitrogen Heterocycles

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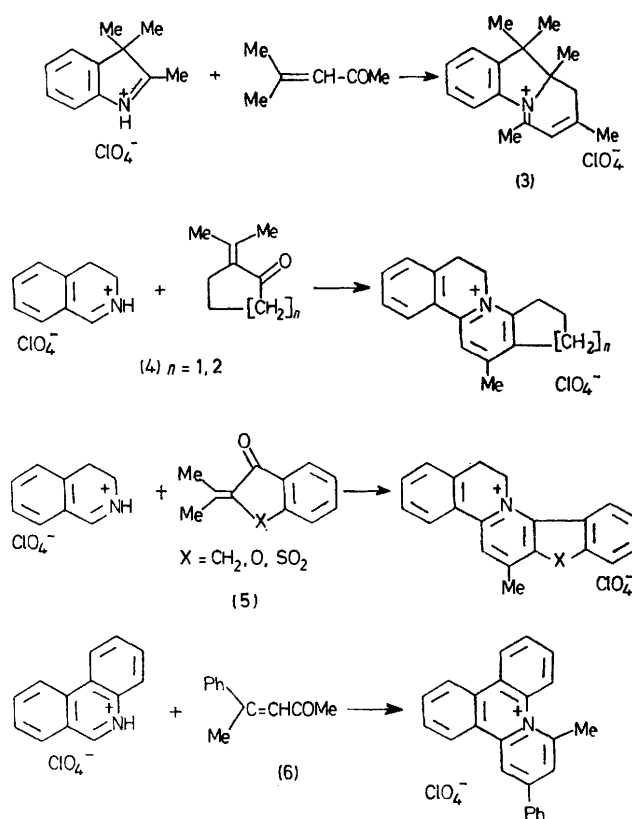
**Summary** Mesityl oxide and related ketones react with protonated nitrogen heterocycles to form fused pyridinium salts.

We recently reported<sup>1</sup> a simple annellation procedure involving the reaction of methyl vinyl ketone with protonated heterocycles in which the ketone contributes three atoms to the fused six-membered ring (1).



We now report a reaction in which four atoms are provided by the ketone to the fused ring. For example, when isoquinolinium perchlorate was heated with mesityl oxide for several hours at 120°, the product isolated in 35% yield was the benzoquinolizinium salt (2). The reaction can be rationalised as involving the addition of one of the isopropylidene methyl groups to the activated double bond of the isoquinolinium ring, ring closure between the nitrogen and the carbonyl group, and spontaneous oxidative aromatisation.

When aromatisation was prevented by a substituent on the double bond of the heterocycle, the dihydro pyridinium salt (3) was isolated. The new reaction may be applied to a wide variety of unsaturated ketones, both open-chain and



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cyclic, as long as they contain at least one methyl substituent in the  $\beta$ -position. Use of the reaction to prepare other ring systems is illustrated by the examples in the Scheme using the cyclic ketones, (4) and (5) and the open chain ketone (6).

The yields obtained in these one-step reactions are in the 20–45% range.†

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<sup>1</sup> D. D. Chapman, J. K. Elwood, D. W. Heseltine, H. M. Hess, and D. W. Kurtz, *J.C.S. Chem. Comm.*, 1974, 647.

† All new compounds gave satisfactory elemental analyses and had spectral properties in agreement with the assigned structures.