Synthesis of 9-Alkylacridine Derivatives

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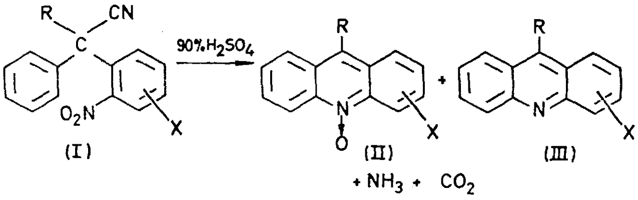
Summary *o*-Nitrophenyl derivatives of phenylalkanenitriles when dissolved in 90% H_2SO_4 undergo cyclization to 9-alkylacridine derivatives.

Recently we described direct nitroarylation of phenylalkane nitriles with *o*- and *p*-chloronitrobenzene and their derivatives in the presence of conc. aqueous NaOH and $PhCH_2NEt_3Cl$.[1] We now report the cyclization of the *o*-nitroaryl derivatives into acridines.



The *p*-nitroarylated nitriles undergo normal hydrolysis with conc. H_2SO_4 yielding the corresponding amides and acids. However, under these conditions the *o*-nitroaryl derivatives (I) behave differently. Thus (I; R = Et) reacts exothermically when dissolved in 90% H_2SO_4 with evolution of CO_2,† to give products which show strong fluorescence. On the basis of elemental analysis, spectral data, and comparison with authentic samples, the products were identified as the acridine derivatives (II; R = Et), m.p. 160 °C and (III; R = Et),[2] m.p. 121 °C. The reaction is general and can be applied to the nitriles (I; R = Me or Ph and X = Cl or Me). The combined yields of the acridine derivatives are high, generally *ca.* 90%, with *ca.* 5% of (III). The mixture can be reduced with PCl_3 or PBr_3 giving the individual 9-alkylacridine or oxidised with peracids[4] to the *N*-oxides. Alternatively the components can be separated by column chromatography or preparative t.l.c.

The key step in this cyclization is probably attack of the protonated nitro-group on the aromatic ring, similar to that occurring partially in the synthesis of *o*-nitrodiphenylmethane from *o*-nitrobenzyl chloride and benzene with $AlCl_3$ catalyst, which gives a small amount of acridine *N*-oxide as a by-product.[5]

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† Reaction at 50 °C for 2—4 h; the mixture was then cooled and poured on ice.

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