An Easy Route to Dibenz[*c,e*]azepines *via* Nitrile Ylide Cyclisation: the Electrocyclic Equivalent of a Bischler–Napieralski Reaction

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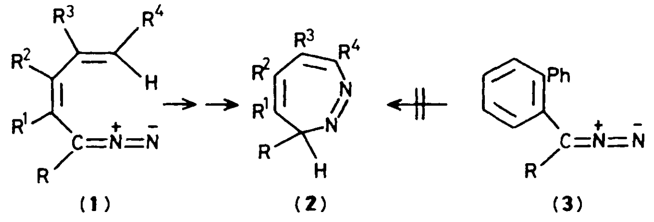
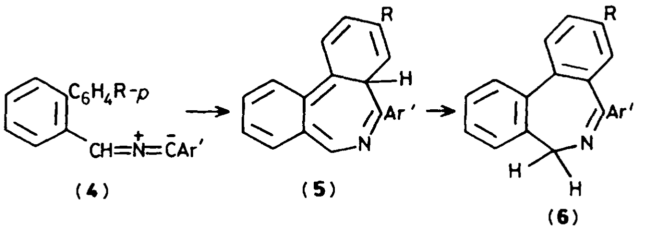
N-(2-Arylbenzyl)benzimidoyl chlorides (**9**) are converted into dibenz[*c,e*]azepines (**6**) by treatment with potassium t-butoxide, *via* cyclisation of nitrile ylides (**4**).

Recent work has established that the 1,7-cyclisation of diene-conjugated 1,3-dipolar intermediates can provide effective routes to a variety of monocyclic and fused seven-membered heterocyclic systems such as azepines,[1,2] diazepines,[3,4] triazepines,[5] and oxepines.[6] This communication is concerned with the reactions of systems of types (**3**) and (**4**) in which both α,β- and γ,δ-double bonds of the diene are aromatic. In earlier work on diazo compound cyclisations it was found that systems incorporating a benzene or heteroaromatic ring in the α,β- or γ,δ-position, for example (**1a**)[7] and (**1b**),[8] cyclised to give benzo-fused 1,2-diazepines (**2a**) and (**2b**), respectively, but that the inclusion of *two* aromatic rings as in (**3**) (or thiophene-containing analogues) completely precluded cyclisation: such diazo compounds reacted only *via* loss of nitrogen to give carbene-derived products.[9] We now report that, in contrast, nitrile ylides (**4**), of the same type as (**3**), undergo rapid cyclisation to provide an easy and effective new route to the dibenz[*c,e*]azepine system (**6**)† (Scheme 1 and Table 1). Examples of this system are known to be useful as anxiolytics.[10] The nitrile ylides (**4**) were generated at 0 °C or room temperature by the reaction of the imidoyl chlorides (**9**) with potassium t-butoxide in tetrahydrofuran; their presence was indicated in some cases by a transient purple colour. An attraction of this route is the ease of preparation of the amide



(**1**) (**2**) (**3**)

a; $R^1 R^2$ = $[CH{=}CH]_2$
b; $R^3 R^4$ = $[CH{=}CH]_2$



(**4**) (**5**) (**6**)

Scheme 1

Table 1. Yields of dibenzazepines (**6**).

(6)	R	Ar′	Yield (%)
a	H	Ph	69
b	Cl	Ph	77
c	Cl	o-ClC$_6$H$_4$	72
d	Cl	o-FC$_6$H$_4$	65
e	Cl	3,4-(MeO)$_2$C$_6$H$_3$	78

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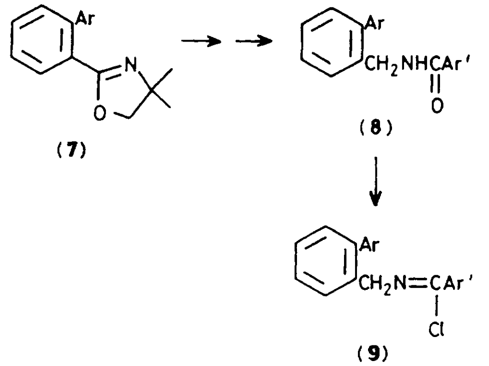
† The products had lit.[10] m.p.s for known examples (**6a**, **b**, **d**) or were identified by elemental analysis and n.m.r. spectroscopy.



Scheme 2

precursors (**8**) by conventional methods under mild conditions, for example as shown in Scheme 2 utilising as the key step Meyer's oxazoline route to biaryls[11] (**7**) followed by conversion of the oxazoline ring into CHO, CH=NOH, CH_2NH_2, and $CH_2NHCOAr'$. The imidoyl chlorides (**9**) were prepared by conventional routes[12] or by the use of dimethylformamidinium chloride as reagent (prepared *in situ* by reaction of thionyl chloride with *N*,*N*-dimethylformamide). This synthesis thus permits the incorporation of a wide range of substituents into the dibenzazepine ring and the 7-aryl group (Ar').

Overall the conversion of the amide (**8**) into the dibenzazepine (**6**) is equivalent to a Bischler-Napieralski-type reaction, but is achieved under very mild conditions. It apparently proceeds *via* an electrocyclic aromatic substitution process which is intrinsically less sensitive to the polar influence of substituents in the aromatic ring under attack than the Bischler-Napieralski reaction which involves electrophilic substitution.

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