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# AMIDINATION OF CYCLOHEPTATRIENONES via HYDRIDE REPLACEMENT : A REGIOSPECIFIC SYNTHESIS OF FUNCTIONALIZED 1,3-DIAZAAZULENES

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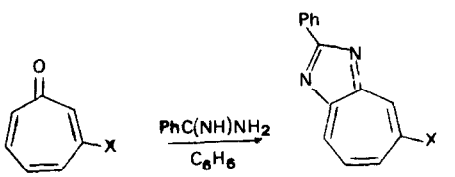
Recently new regiospecific syntheses of both aminotropones (via hydride replacement by amines on deactivated cycloheptatrienones[1]) and 1,3-diazaazulenes (by amidine condensation with cycloheptatrienones carrying a mobile substituent at $C_2$[2]) have been made available.

It would be interesting if the two above processes could be combined in a novel synthesis of 1,3-diazaazulenes by condensation of amidines with cycloheptatrienones via hydride replacement. We report that this approach has been successful, the new synthesis being complementary to that above[2] both in regard to regiospecificity and because functionalized 1,3-diazaazulenes can be obtained. Thus, 3-methoxytropone (1a), 0.1 M, and benzamidine, 0.4 M, were

Scheme




(1)

a X = $OCH_3$
b X = $SCH_3$
c X = H

(2)

a X = $OCH_3$
b X = $SCH_3$
c X = H

refluxed in benzene for 22h to give 5-methoxy-2-phenyl-1,3-diazaazulene $(2a)^+$ as an oil (picrate m.p. 208-209°) in ca. 40% yield (Scheme).

Similarly, 3-methylthiotropone (1b), 0.03 M, and benzamidine, 0.15 M, in benzene at room temperature for 65 h gave 5-thiomethoxy-2-phenyl-1,3-diazaazulene $(2b)^+$ as an oil (picrate m.p. 196-197°) in ca. 50% yield (Scheme).

The above procedure could also be applied to tropone itself, albeit with

a poor yield. In fact, tropone (1c), 0.2 M, and benzamidine, 0.44 M, in benzene at room temperature for 4 h gave 1,3-diazaazulene (2c)[2] in a ca. 6% yield which could not be raised on prolonged reaction times, whilst with higher reaction temperatures no diazaazulene could be isolated.

Because of the notorious resistance of cycloheptatrienones to carbonyl condensations,[3] the above processes are best viewed as a hydride replacement by the amidine ( possibly the hydride being abstracted by a cycloheptatrienone molecule because, in our hands, yields never exceeded 50%) followed by a proximity effect-aided carbonyl condensation. There is, in fact, some parallelism with the amination of cycloheptatrienone.[1] Thus, amination of 1a at $C_7$ has already been reported[1] and it has now been found that also 1b, 0.02 M, can be aminated at $C_7$ by piperidine, 1.2 M, in benzene at 100° during 4 h with ca. 50% yield to give 2-piperidino-6-methylthiotropone as an oil (picrate m.p. 175-176°).[+] Moreover, also tropone (1c), 0.2 M, has been found to react with piperidine, 4 M, in benzene at room temperature to give 2-piperidinotropone[4] in a ca. 18% yield.

However, such a parallelism breaks down with 3-dimethylaminotropone which, in spite of the close similarity of electronic properties of the dimethylamino group to the methoxy group, which are reflected in the facile amination of 3-dimethylaminotropone at $C_7$,[1] resisted amidination by benzamidine in benzene at 100° during several hours. Clearly a delicate balance of factors govern these multistage reactions.

We are currently investigating the scope of the above processes for natural product synthesis.

ACKNOWLEDGMENTS

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FOOTNOTES

[+]Satisfactory elemental analyses, n.m.r., i.r., mass, and u.v. spectra were obtained. In particular, detailed structural proof was obtained on irradiation at the methyl group.

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