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Participation of substituents at the *ortho* position of aryl groups in the rearrangements of 5-chloro-3-aryl-2,1-benzisoxazoles

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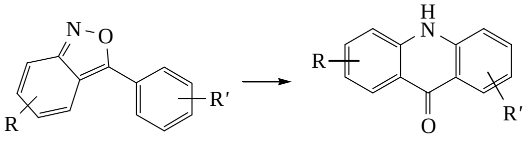
The substituent at the *ortho* position of the aryl groups of 5-chloro-3-aryl-2,1-benzisoxazoles is responsible for the ability of these structures to undergo rearrangements into acridinones under various conditions.

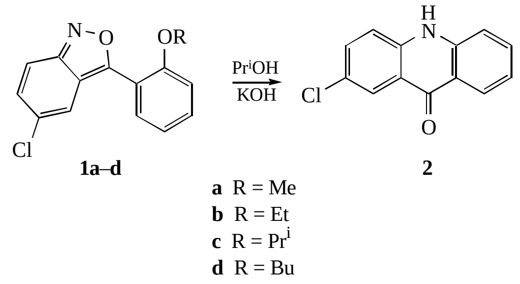
The preparative rearrangements of 2,1-benzisoxazoles (anthranyls) into acridinones at elevated temperatures or under the action of sodium nitrite in concentrated sulfuric acid were described.[1,2] The photorearrangements of 3-aryl-2,1-benzisoxazoles in acidic, neutral and alkaline media also result in acridinones, however, with very low yields.[3–5] Under these conditions, the substituents of the 3-aryl group remain unaffected:



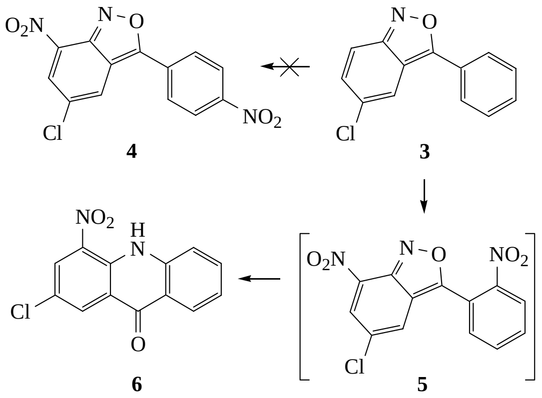
The rearrangements of 5-(R)-3-(2,6-dimethylphenyl)-2,1-benzisoxazoles occur by the migration of methyl substituents at the 2- and 6-positions of the aryl group to give a mixture of isomeric acridinones in low yields.[6]

Here we report that 5-chloro-3-(2-alkoxyphenyl)-2,1-benzisoxazoles **1a–d** were converted into the same product, 2-chloro-9,10-dihydro-9-acridinone **2**,[†] by heating under reflux in a mixture of propan-2-ol and KOH (Scheme 1). The structure of compound **2** was confirmed by ^{1}H NMR and IR spectroscopy, mass spectrometry and elemental analysis.[‡]

Under similar reaction conditions, 5-chloro-3-phenylanthranyl and 5-chloro-3-aryl-2,1-benzisoxazoles, which contain alkoxy groups at *meta* and *para* positions of the aryl fragment, did not undergo rearrangement into corresponding acridinones. These facts undoubtedly indicate the participation of *ortho*-alkoxy groups of the aryl fragment in the rearrangement. Furthermore, the conversion of 5-chloro-3-(2-alkoxyphenyl)-2,1-benzisoxazoles **1** into acridinone **2** was also observed on boiling in decane.[§] However, the heating of compounds **1** in propan-2-ol did not lead to the formation of acridinone **2**.



Scheme 1



Scheme 2

An attempt to form dinitro-2,1-benzisoxazoles derivative **4** by nitrating 5-chloro-3-phenyl-2,1-benzisoxazole **3** in accordance with a described procedure[7] gave instead 2-chloro-4-nitro-9,10-dihydro-9-acridinone **6**[¶] (Scheme 2). This reaction occurred in moderate yields under various nitrating conditions. An analysis of published data and experimental results led us to the assumption that 5-chloro-7-nitro-3-(2-nitrophenyl)-2,1-benzisoxazole **5** was an intermediate in this reaction, which was converted into acridinone **6**. This assumption was supported by published data[8] on the photorearrangements of 3-(2-nitrophenyl)-2,1-benzisoxazoles into corresponding acridinones. According to Christudhas *et al.*,[8] an attack of the photoexcited nitro group occurred at the C-3 position of the 2,1-benzisoxazole.

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[†] A mixture of 0.5 g (10 mmol) of potassium hydroxide, 2 mmol of **1a–d** and 10 cm^3 of propan-2-ol was heated in a water bath for 3 h. After cooling, the reaction mixture was poured into 250 cm^3 of water; the resulting precipitate was filtered off, dried and recrystallised from dimethylformamide. Yields of **2**: 91% (from **1a**), 87% (from **1b**), 81% (from **1c**) and 78% (from **1d**).

[‡] ^{1}H NMR spectra were measured on a Bruker AC-300 spectrometer at 300.13 MHz in [$^2H_6$]DMSO, HDMS as an internal standard. IR spectra were recorded on a SPECORD M-80 instrument (suspensions in Vaseline oil). Elemental analysis was performed using a CHN-1 analyser. Mass spectra were measured on an MX-1310 instrument.

2: mp > 300 °C. ^{1}H NMR, δ: 8.26 (d, 1H, H-3, *J* 10 Hz), 8.16 (d, 1H, H-1, *J* 2 Hz), 7.58 (d, 1H, H-4, *J* 10 Hz), 7.72–7.78 (m, 2H, H-8 and H-6), 7.55 (m, 1H, H-5), 7.28 (m, 1H, H-7), 11.79 (s, 1H, NH). IR, ν/cm^{-1}: 3304 (N–H), 1628 (C=O). MS, *m/z*: 229 [M$^+$], 201 [M$^+$ – CO], 194 [M$^+$ – Cl]. Found (%): C, 67.79; H, 3.37; N, 5.92. Calc. for $C_{13}H_8ClNO$ (%): C, 67.98; H, 3.50; N, 6.10.

[§] 2 mmol of **1a–d** in 10 cm^3 of decane was refluxed for 2 h. The crystals precipitated from the solution were filtered off and dried. Yields of **2**: 82% (from **1a**) and 80% (from **1b**).

[¶] A nitrating agent (HNO_3 or NO_2) was added to 0.5 g (2.2 mmol) of compound **3** in a solvent on cooling. The mixture was stirred for 1 h. The resulting precipitate was separated by filtration, washed with water and recrystallised from propan-2-ol–dimethylformamide (3:1). Compound **6** (0.45 g, 75% yield) was obtained.

6: mp > 300 °C. ^{1}H NMR, δ: 12.39 (s, 1H, NH), 8.95 (d, 1H, H-3, *J* 2.4 Hz), 8.47 (d, 1H, H-8, *J* 8 Hz), 8.15 (d, 1H, H-1, *J* 2.4 Hz), 7.84 (d, 1H, H-5, *J* 8 Hz), 7.61–7.71 (m, 2H, H-6 and H-7). IR, ν/cm^{-1}: 3330 (N–H), 1670 (C=O), 1510 (ν_{as} NO_2), 1350 (ν_s NO_2). MS, *m/z*: 274 [M$^+$], 244 [M$^+$ – NO], 228 [M$^+$ – NO_2]. Found (%): C, 56.73; H, 2.45; N, 10.12. Calc. for $C_{13}H_7ClN_2O_3$ (%): C, 56.85; H, 2.57; N, 10.20.

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