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Note

Dichlorodicyanobenzoquinone as a spray reagent for carbazoles

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In connection with the identification of carbazole alkaloids¹ and their degraded products, paper (PC) and thin-layer chromatographic (TLC) methods have been reported^{2,3}, and it was shown that the latter method was the more suitable for the separation and detection of carbazoles from a given mixture. In each instance, the spots were detected by means of their fluorescence under chromatolite or the colour developed after spraying the chromatogram with picric acid. It has recently been shown^{4,5} that dichlorodicyanobenzoquinone (DDQ) or some other benzoquinones could form a charge-transfer complex with aromatic or hetero-aromatic compounds, giving rise to characteristic absorptions in the visible region. Of these substances, DDQ has been used with success as a spray reagent for many aromatic compounds⁶. This paper describes the successful and convenient application of DDQ as a spray reagent for the detection of carbazoles on developed TLC plates.

The carbazoles used were obtained in our laboratory from the sources mentioned in Table I. DDQ was obtained from Aldrich, Milwaukee, Wisc., U.S.A. Thin-layer glass plates of dimensions 20 × 10 cm were prepared using silica gel G as the adsorbent, and the chromatograms were developed in the mixture benzene-chloroform (1:1). After the chromatograms had been developed and dried, they were sprayed with a 0.1% solution of DDQ in carbon tetrachloride. There was an

TABLE I
COLOURS DEVELOPED AFTER SPRAYING CHROMATOGRAMS WITH DDQ

Compound	Source	Colour developed	R _F
Carbazole	Fluka (Buchs, Switzerland)	Green	0.9
3-Methylcarbazole	<i>Clausena heptaphylla</i> Wt. & Arn.	Green	0.8
Mahanimbine	<i>Murraya koenigii</i> Spreng.	Deep green	0.93
Girinimbine	<i>Murraya koenigii</i> Spreng.	Green	0.76
Koenimbine	<i>Murraya koenigii</i> Spreng.	Green	0.65
Murrayazolidine	<i>Murraya koenigii</i> Spreng.	Deep green	0.89
Koenidine	<i>Murraya koenigii</i> Spreng.	Bluish green	0.25
Heptazolidine	<i>Clausena heptaphylla</i> Wt. & Arn.	Green	0.74
Murrayanine	<i>Murraya koenigii</i> Spreng.	Blue	0.35
Murrayacinine	<i>Murraya koenigii</i> Spreng.	Blue	0.35
Glycozoline	<i>Glycosmis pentaphylla</i> (Retz.) DC	Bluish green	0.69
Glycozolidine	<i>Glycosmis pentaphylla</i> (Retz.) DC	Bluish green	0.51

immediate formation of colour on each of the spots, as detailed in Table I. The spots could be detected even when the amount of carbazoles per spot was $0.1 \mu\text{g}$. When picric acid was used as the spray reagent, carbazoles could be detected in the spots at an amount of $10.00 \mu\text{g}$. Our attempts to use chloranil as a spray reagent did not meet with success.

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