blue T.S. since the indicator change which is somewhat gradual produces a greater variation in results. Similar titrations using azo violet or thymolphthalein were noted to give sharper end points but in each case a green color was observed at the stoichiometric point. The initial color of these indicators when added to a dimethylformamide solution of oxazepam is yellow and this leads to a green end point instead of the characteristic blue associated with the indicators.

Analysis of commercial 10-mg. oxazepam capsules by the spectrophotometric method gave a value of 97.8 ± 0.6%[2] of the labeled amount. A spectrophotometric approach can be used for analysis of bulk oxazepam provided suitable reference standard material is available for absorbance measurement.

[2] Maximum deviation from the mean value.

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Keyphrases

Oxazepam
UV spectrophotometry–structure
IR spectrophotometry–structure
Potentiometric titration–analysis
Tetrabutylammonium hydroxide–titrant

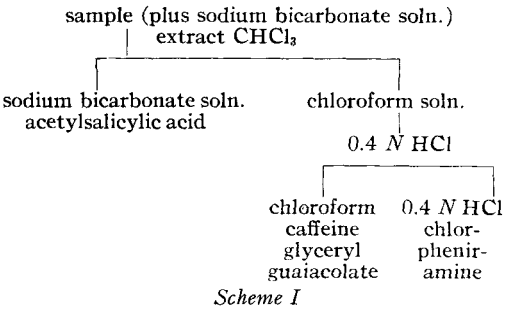
Paper Chromatographic Assay of Glyceryl Guaiacolate in a Pharmaceutical Formulation

By S. AHUJA*

A preliminary extraction scheme, which permits the separation of glyceryl guaiacolate [3-(*o*-methoxy-phenoxy)-1,2-propanediol] and caffeine from acetylsalicylic acid and chlorpheniramine maleate and other tablet excipients, has been developed. The separation of glyceryl guaiacolate and caffeine is achieved by paper chromatography. Glyceryl guaiacolate is then assayed on the basis of its absorbance in the UV region, after elution from paper chromatographic strips.

IN THIS LABORATORY, a simple and specific method was desired for assaying glyceryl guaiacolate in tablets containing glyceryl guaiacolate, acetylsalicylic acid, caffeine, and chlorpheniramine maleate in addition to the usual tablet excipients. Glyceryl guaiacolate can be determined titrimetrically (1, 2) or by gas chromatography of its acetate derivative (3). Giebelmann (4) described paper chromatographic methods (by the ascending technique) for qualitative detection of glyceryl guaiacolate. Since paper chromatography provides a good combination of a simple and specific method, this technique was investigated. This report describes a quantitative method for determination of glyceryl guaiacolate with paper chromatography (by the descending technique) with a newly developed solvent system. This solvent system provides good separations within 3 hr. Successful separation of the various constituents of the formulation is shown in Scheme I.

Glyceryl guaiacolate and caffeine are separated by paper chromatography and glyceryl guaiacolate is assayed spectrophotometrically after elution from paper chromatographic strips.



Scheme I

EXPERIMENTAL

Materials and Methods—An accurately weighed sample (equivalent to 195 mg. of glyceryl guaiacolate) is transferred to a separator. Sodium bicarbonate solution (25 ml. of 4% solution) is added and the separator is shaken well to ensure dissolution of the sample. This solution is extracted with chloroform (30 ml.) and the chloroform extract is transferred to another separator and shaken with 0.4 *N* hydrochloric acid (25 ml.). The chloroform extract is saved for paper chromatographic assay of glyceryl guaiacolate. This process is repeated

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TABLE I—RECOVERIES WITH THE PAPER CHROMATOGRAPHIC METHOD

Batch	mg. Glyceryl Guaiacolate/Tablet—Actual	Found	% Recovery
A	195.0	195.2	100.1
		191.0	98.0
B	195.0	193.6	99.3
		194.0	99.5
C	195.0	195.0	100.0
		193.2	99.1

four more times using fresh portions of chloroform, but using the same 0.4 *N* hydrochloric acid solution. The combined chloroform extracts are diluted to yield a concentration of 1 mg./ml. of glyceryl guaiacolate. One hundred microliters of this extract is placed on paper chromatographic strips[1] (20 in. long) impregnated with the lower phase of the following solvent system: benzene–ethanol–water (2:1:1). Blank strips and strips with a standard solution of the same concentration (1 mg./ml.) are prepared similarly. The strips are allowed to equilibrate for 2 hr. in a tank saturated with the above-mentioned solvent system, and developed with the upper phase of the solvent system (developing time approximately 3 hr.). Glyceryl guaiacolate and caffeine spots are located with a UV lamp (R_f of glyceryl guaiacolate is 0.52, R_f of caffeine, 0.70).

Glyceryl guaiacolate spots from two strips are combined and eluted with 10 ml. ethanol. The absorbance of these solutions is read at 275 mμ with a spectrophotometer and corrected for the paper blank. (The absorbance readings of the sample without correction are generally over 13 times the magnitude of the paper blank reading. Paper blanks and placebos yield absorbance readings of approximately 0.020 units.) The concentration of glyceryl guaiacolate is calculated against the standard, similarly corrected for the paper blank.

[1] Whatman No. 1.

The results for three different batches of glyceryl guaiacolate tablets, with a known concentration of glyceryl guaiacolate, are given in Table I.

CONCLUSIONS

An average recovery of 99.3% (S.D. = ±1.05) may be achieved by the paper chromatographic method of assay described for glyceryl guaiacolate tablets. This method is simple, reliable, and specific. The specificity is achieved by the separation of the desired component by the paper chromatography followed by its determination at the appropriate wavelength in the ultraviolet region. The concentrations of glyceryl guaiacolate estimated were in the order of 195 mg. However, the design of this method permits estimations down to approximately 0.5 mg. of glyceryl guaiacolate or as high as might be desired. Furthermore, this method permits the quantitative determination of the other ingredients present in the formulation, such as acetylsalicylic acid, chlorpheniramine maleate, and caffeine, by the conventional methods.

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Keyphrases

Glyceryl guaiacolate tablets
Caffeine-aspirin-chlorpheniramine-glyceryl guaiacolate formulation
Paper chromatography–separation
UV spectrophotometry–analysis

Colorimetric Assay and Improved Method for Identification of Vancomycin Hydrochloride

By JAMES R. FOOKS, IAIN J. MCGILVERAY, and ROBERT D. STRICKLAND*

Procedures are described for the qualitative and quantitative determination of vancomycin hydrochloride by means of spectrophotometry and thin-layer chromatography. The Folin-Ciocalteau reaction which forms the basis of both procedures is also amenable to the estimation of vancomycin factor A, a commonly occurring impurity.

VANCOMYCIN, an antibiotic obtained from *Streptomyces orientalis* (1), is retained for use against Gram-positive cocci resistant to the more common antibiotics and for treatment of patients allergic to penicillins and cephalosporins (2). The structure of this drug has yet to be fully established, but chemical studies (3–5) have demonstrated the presence of carboxyl, amino, and phenolic groups. Glucose and amino acid fragments have also been identified after partial hydrolysis. Vancomycin as obtained from *S.*

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