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USE OF TEA POLYPHENOLS AS CHROMOGENIC REAGENTS IN THE PAPER CHROMATOGRAPHY OF IRON AND ALUMINIUM

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Aqueous solutions of ferric chloride and alcoholic solutions of aluminium trichloride are generally used as chromogenic sprays in the paper chromatography of polyphenols, due to the formation of coloured flourescent chelates of the metal ions (Cartwright & Roberts 1954a, 1954b). During the present study it was observed that ethyl acetate solution of tea polyphenols can conveniently be used as chromogenic spray in the paper chromatography of iron and aluminium. This chromogenic reagent can detect even very low concentrations of iron and aluminium as compared with the other chromogenic agents reported earlier (Macek 1963).

Black tea leaves can be used for extracting ethyl acetate-soluble polyphenols as it is reported to be a good source (Roberts 1962).

EXPERIMENTAL AND DISCUSSION

Two grammes of dried black tea leaves were extracted with 100 ml of warm water (40°C) for 15 min. The extract was filtered and cooled and the filtrate was repeatedly extracted with three 50 ml portions of ethyl acetate in a separatory funnel. The ethyl acetate extracts were pooled, dried over anhydrous sodium sulphate, and used as chromogenic spray for locating iron and aluminium on the chromatogram.

Twenty five microlitres of a solution containing aluminium sulphate (AR) and ferric sulphate (0.001M with respect to each salt) was spotted at the centre of a Whatman No. 1 Filter disc of 20 cm diameter. The filter disc was then irrigated with butanol: Acetic Acid: Water, 12:3:5 solvent in a closed chamber for 90 min. The filter disc was then removed, dried at room temperature, sprayed with polyphenol solution and air dried. Iron appeared as a violet-coloured band at an Rf value of 0.625. The chromatogram was then heated in a hot air oven at 100°C for 5 min. and observed under ultraviolet light, when aluminium appeared as an intense greenish-yellow fluorescent band at an Rf value of 0.42. No separation of the ions could be achieved with basic or neutral solvent systems. The method is very sensitive and 3 µg of iron (Fe^{3+}) and 1.5 ug of aluminium (Al^{3+}) can easily be detected by this method.

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