

Thin-layer Chromatography of Plant Extracts

II. Sequential Extraction of Plant Material

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Extraction of plant material with a series of solvents of increasing dielectric constant provides only a rough and partial separation of the substances. A large proportion of the constituents appear in several extracts, and each fraction includes substances with polar properties so different that in thin-layer chromatography some substances remain at the starting-point even if others are moving close to the front.

It is not possible to separate all components of a plant extract in one thin-layer chromatographic procedure. Nevertheless, a few thin-layer chromatographic analyses have been published in which the components of one class of substances have been separated directly from a crude extract.^{1,2} When a general analysis is needed, preliminary fractionation should be run so that a series of completely resolved thin-layer chromatograms can be produced. The fractionation method should be efficacious so that overlapping between adjacent fractions is minimized.

In general plant analysis fractionation has been accomplished by using a series of solvents with increasing polarity, *e.g.*, petroleum ether, diethyl ether, chloroform, ethanol, and water.^{3,4} This study concerns evaluation of sequential extraction for producing fractions suitable for thin-layer chromatography.

In the course of the present investigation, material from various plant species was extracted with several solvents in the order of increasing polarity, selected from a group comprising pentane, diethyl ether, chloroform, wet ether,⁵ tetrahydrofuran, 95 % ethanol, methanol, acetone-ether 1:1, and water.

Examples are shown in Figs. 1 and 2. Most of the substances appear in several extracts, and most of the fractions include substances with polar properties so different that in thin-layer chromatography some constituents

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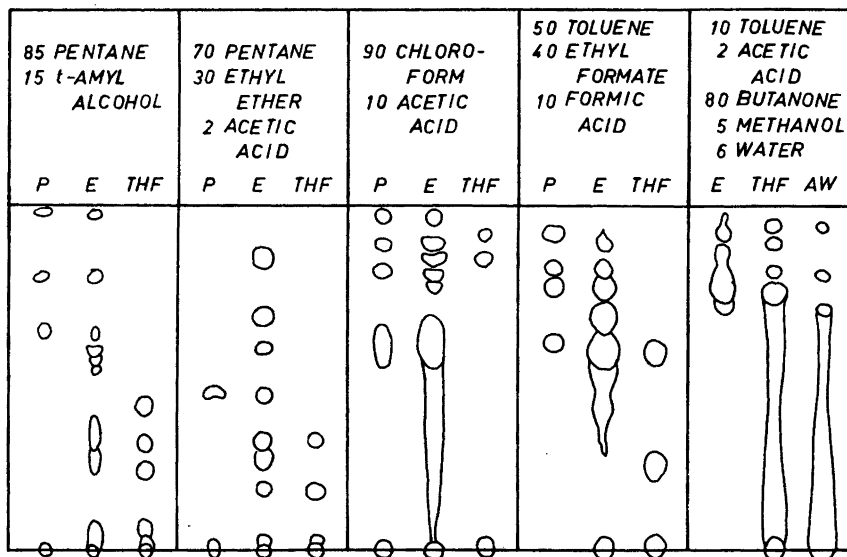


Fig. 2. Thin-layer chromatograms showing overlapping in sequential extraction. Air-dried root bark of *Karwinskia humboldtiana* was extracted with the following series of solvents: pentane (P), moist ether (E), tetrahydrofuran (THF) and a mixture of acetone and water (AW). The extracts were analyzed by thin-layer chromatography, using silica gel G as the adsorbent, and solvent mixtures for the development as indicated above the drawings. Spots were visualized with antimony pentachloride.

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