

their R_M values on cellulose and their average molecular weights, suggest that a similar relationship also exists between the R_M values on collagen columns and molecular weight. This has been partly confirmed by Evelyn (unpublished work), who established a direct relation between the average molecular weight of wattle tannin fractions and the proportion of 'irreversibly fixed' tannins in leather tanned with these fractions. Page⁸ has also shown that the stoichiometric relationship of the combination of gelatin with various wattle tannin fractions (obtained by fractional precipitation from aqueous solution with salt) varies from the least soluble to the most soluble fractions. The gradational decrease in the 'gelatin number' he surmised to be due to a decrease in the molecular weight of the tannins and, in relation to our more recent findings, it also emphasizes the importance of the tannins in determining the 'affinity' between tannin and collagen. Peters and Sumner⁷ found a correlation between the molecular weight of aminoanthraquinones and their chemical affinities for cellulose. The lower affinity of monomeric leuco-anthocyanins and catechins (phenolic 'non-tannins'), compared with that of naturally occurring complex leuco-anthocyanins⁹ and polymeric catechins¹⁰ ('tannins'), for hide powder during estimation of tannin appears to be due to the low molecular weight of the former (± 300) in comparison with the latter (550–3,200). Following atmospheric oxidation, other factors, for example, the presence of quinonoid groups, increase their affinity.

The relation between R_M and molecular weight suggests the operation of physical forces between tannins and cellulose or collagen. This appears to be in line with the increasing emphasis on the importance of van der Waals forces between cellulose and various solutes, such as dyes^{7,11}. Tannin mechanisms are, however, exceptionally complex, and hydrogen-bond forces undoubtedly play an important part¹² in the swelling of the hide, in the sorption and desorption of tannins, and possibly also in their fixation to collagen.

On the basis of the above work, it has been found possible to use paper chromatography as a method of interpreting the relative affinities of wattle and quebracho tannins for collagen. Planar 'flavonoid' compounds, for example, flavones, flavanols, anthocyanidins, aurones and chalcones^{9,12}, are exceptions, due to their abnormally high affinity for cellulose in aqueous medium.

DAVID G. ROUX

Leather Industries Research Institute,
Rhodes University,
Grahamstown.
April 11.

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Gas Chromatographic Separation of Meta- and Para-Xylenes in Aromatic Mixtures

THE xylene isomers have resisted all previous attempts at resolution by gas-liquid chromatography. An approach to their separation was made recently by Scott and Cheshire¹, who used a column with a calculated efficiency of 12,000 theoretical plates. Indeed, the chromatogram showed a very slight separation for meta- and para-xylene.

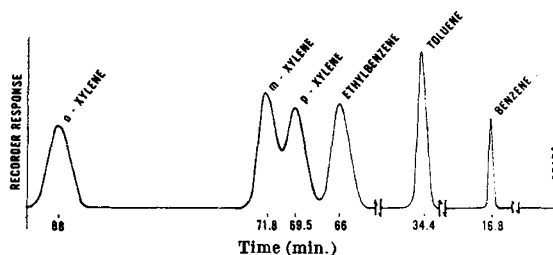


Fig. 1. Chromatogram of mixture of aromatics

The work reported here makes use of an aromatic hydrocarbon as the stationary liquid for effecting this difficult separation. Fig. 1 shows the resolution of a mixture of benzene, toluene, ethylbenzene, ortho-xylene, meta-xylene and para-xylene. Conditions for the separation were as follows:

Instrument	'Model 188' vapour fractometer
Column dimensions	5 m. x 5 mm.
Column temperature	100° C.
Stationary liquid	15 per cent w/w benzyldiphenyl (May and Baker Co.)
Column support	60–80 mesh 'Chromosorb' (Johns-Manville Co.)
Carrier gas	Helium
Carrier gas inlet pressure	59 lb./in. ²
Carrier gas flow	100 cm. ³ /min.
Sample charge	0.005 ml.
No. of theoretical plates	9,500
Time of analysis	93 min.

The specificity of benzyldiphenyl and the high pressure-drop across the column permit the accomplishment of this separation in a reasonable time with columns of standard length and high efficiency. Sample sizes should, of course, be minimized.

ALBERT ZLATKIS

Department of Chemistry,
University of Houston,
Houston, Texas.

LAWRENCE O'BRIEN
PHILIP R. SCHOLLY

Perkin-Elmer Corp.,
Norwalk, Connecticut. May 1.

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Crystal Structure of Chabazite, a Molecular Sieve

THE 'molecular-sieve' properties of chabazite, a zeolite occurring in basaltic rocks, have been studied extensively. Molecules such as argon (diameter 3.84 Å) and methane (4.25 Å) are rapidly sorbed in the dehydrated zeolite; propane (width 4.9 Å) and n-butane are slowly sorbed, while iso-butane (5.6 Å) is excluded. A crystal structure was proposed by Wyart¹ in 1933, which consists of a three-dimensional framework of four- and six-membered rings of (Si,Al)O₄ tetrahedra (Fig. 1a). The rings form two cages per unit cell, the cages sharing six-membered rings which provide apertures of maximum dimension