compound with a group forming part of a side-chain has a similar relative detector response to the isomeric compound which has the group attached to the benzene ring, *e.g.* *n*-propylbenzene has a relative detector response similar to 1,3,5-trimethylbenzene, but 1,2,4-trimethylbenzene, which has a pair of *ortho*-methyl groups, has a lower relative detector response; also, phenol ethers have similar relative detector responses to the isomeric phenols.

The introduction of a hydroxyl or an alkoxyl group into a benzene ring lowers the relative detector response, since phenols and phenol ethers have much lower relative detector responses than would be expected from benzene hydrocarbons of similar molecular weights.

The introduction of a chlorine atom into the ring of a phenol or a phenol ether has little effect on the relative detector response since the chlorophenols and chlorophenol ethers have relative detector responses similar to those expected from the phenols or phenol ethers with similar molecular weights. Chlorobenzene has a relative detector response similar to that expected from a benzene hydrocarbon of similar molecular weight; *m*- and *p*-chlorotoluenes have relative detector responses slightly higher than the expected values.

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An apparatus for elution from paper chromatograms

There is a long-standing need for an easily-constructed and easily-operated apparatus for eluting substances from paper strips with small volumes of solvents, particularly for those solvents which are so volatile that the whole eluting system must be enclosed. Serial equilibration of the whole or dissected paper with aliquots of the solvent in small vessels does not always meet the need, for the resulting solution is dilute and bulky and must often be reduced in volume before the eluted substances can be further treated. Also, for large pieces of paper it is difficult to get complete contact between paper and solvent in a small vessel. The following simple apparatus is offered for eluting with small volumes of the most volatile solvents from large pieces of paper.

Fig. 1 shows the unmounted assembly. A glass tube of suitable length and diameter

to contain the paper to be eluted has a standard-taper socket at the top and a cone at the bottom. The cone that fits the top socket has a closed base and an open top, and a hole is drilled through the wall of the tapered cone at a convenient height above the closed base. (In our apparatus, for the elution of paper strips 9½ × 1 in., the top joint is a B-34, and the bottom one a B-24. The hole is $^1/_8$ in. diameter.) A paper wick of the T-form shown is slotted to one end of the paper strip to be eluted, and the papers placed in the tube in such a way that the T-shaped wick lines the top joint. The cross-bar of the T should project neither above nor below the joint, and the two ends of it should nearly meet around the cone. The cone is fitted into the socket, holding the

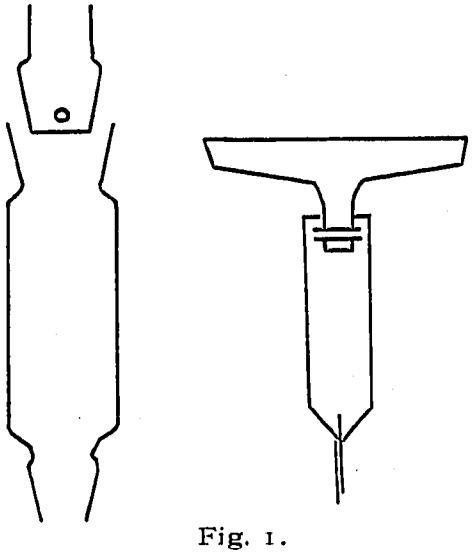

Fig. 1.

paper, and with the drilled hole opposite to the down-stroke of the T-wick. The bottom cone of the tube is fitted into any suitable vessel that is to contain the eluate and, for volatile solvents, this vessel should initially contain a few drops of the eluting solvent to help saturate the atmosphere in the tube. The eluting solvent is poured into the recess of the top cone, whose upper end may be closed with a loose-fitting cork. The solvent spreads from the hole all over the wick and soaks down into the paper at a rate determined by the width of the down-stroke of the wick. For water and solvents of high viscosity, the wick should be of thick (Whatman No. 3) paper; for thinner solvents, Whatman No. 1 paper is suitable.

The main advantages of this method are: (1) the individual assemblies are cheaply and quickly constructed; (2) the apparatus may be left unattended to complete its elution with the volume of solvent measured into the top reservoir; and (3) large numbers of papers may be eluted simultaneously with a minimum of attention. The apparatus has been found to work equally well with water, acetone, alcohol, ether, etc., and all thicknesses of paper up to Whatman No. 3.

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