Adsorption Columns

Die Chromatographische Adsorptionsmethode: Grundlagen, Methodik, Anwendungen. Von Prof. Dr. L. Zechmeister und Dr. L. v. Cholnoky. Pp. xi+231. (Wien: Julius Springer, 1937.) 14.40 gold marks.

WHEN Tswett, to whom the authors of this book refer as "genialer russischer Botaniker", first used the chromatographic absorption method for the separation of chlorophyll *a* from chlorophyll *b*, he was probably quite conscious of having introduced at least a novel application of physical phenomena that themselves may have been already known to many. He can, however, have had no conception of the extraordinary variety of compounds to the separation of which the method was to be applied in the following thirty years; indeed the very existence of these compounds was in many instances unknown in Tswett's time.

The adsorption of a solute upon a solid insoluble in the solvent of the solution had been recorded many times, and even used as a means of separation, when Tswett conceived the idea of making the solution flow in one direction—vertically downwards—through a column of the adsorbent, so that the adsorbed material might afterwards be desorbed, or 'eluted', by the same or some other more suitable solvent.

The solutes then arrange themselves in a series of bands, the distance of which from the top of the column is primarily determined by the 'adsorption potential' of the solute, the less easily adsorbed being found in the lower band. By the subsequent use of other suitable solvents, the bands may be 'developed', that is, the distance between them is increased, so that the column can then be cut, and the bands separated mechanically from each other. Alternatively, the principle of the 'liquid chromatogram' may be employed; in this application, the undeveloped bands are washed out *seriatim* into different containers, by using an eluent with solvent properties suitably related to the adsorption potentials of the materials in the various bands.

It is of more than historical interest to note that one of Tswett's original columns consisted of sucrose, his solvent being a suitable organic liquid. We have come to-day to think of adsorbents so much in terms of acid clays, alumina, calcium carbonate or hydroxide, and so on, that we are apt to forget the relativity of adsorbent, solvent and adsorbate.

The first, or general part of this book is divided into two chapters, on fundamental principles and methods respectively. The special, or second, part is divided into three chapters, covering in turn natural colouring matters (including chlorophyll, prophyrins, carotenoids, naphthaquinone and anthraquinone dyes, flavones, pterines, anthocyanins, etc.), synthetic or artificial colouring matters, and various colourless or slightly coloured substances—among which occur terpenes, glycosides and aglycones, alkaloids, vitamins, enzymes, and so on.

The information given about the application of chromatographic methods to such diverse substances is remarkably complete for a volume with only 190 pages of text (the rest of the book consists of a table of contents, some plates of photographic records, a bibliography with nearly 400 references, and both author and subject indexes). Moreover, the value of the book is further enhanced by some unusual tables, "thrown in", as it were, with a pound of chromatography. The complete list of carotenoids of known constitution, with their formulæ, in order of their adsorption-potentials, and, later, the list of all known carotenoids and derivatives, with their sources, show where the authors' personal special interests have lain, but there are no other signs of predilection in the book.

Since chromatography is essentially a method of *analysis*, it is rather surprising that analytical chemists have so far made very little use of it. In this book, the authors have only been able to cite a few isolated applications, as for example to the detection of falsification in the colour of wines, and even here the method is qualitative only, or at best semi-quantitative. When, however, the analyst has to separate two solid substances the chemical constitutions of which are sufficiently close to make separation by precipitation or crystallization either incomplete or impossible, precision chromatography would seem to offer a possible technique, provided the substances are reasonably stable in solutions of appropriate strength.

This admirable and comprehensive monograph by Prof. Zechmeister and Dr. v. Cholnoky, of the University of Pecs, both well-known exponents of chromatography, to the literature of which they have themselves made valuable contributions, is about as good as such a book can be. Clearly produced, logically arranged, painstaking in its presentation of detail, exhaustive in its citation of examples—it is the complete handbook for the practising or would-be chromatographer. An English edition is urgently needed.

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