The 1980 Pittsburgh Conference: A Special Instrumentation Report

Flower power may be as strong in the 1980's as it was in the 1960's. The 31st annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy this year left Cleveland, its home for the past 12 years, and moved to Atlantic City, largely because of a continuing conflict in scheduling with the Cleveland Flower Show. The conference organizers have not yet made a commitment for the site of next year's show, but it now seems to be a toss-up between Atlantic City and Atlanta, with Atlanta nearly a sure bet for the following year. Pittsburgh is not in the running because it does not have adequate facilities. The meeting itself, meanwhile, was saturated with the circus atmosphere of Atlantic City: light airplanes towed banners reading "Nuts to Nernst!" and the like along the boardwalk; slot machines, drawings, and other contests popped up in a significant fraction of the booths; and meeting attendees were apparently as ready to drop their money in the instrument booths as other Atlantic City visitors were to drop theirs in the busy casinos. Because of the large amount of demolition and new casino construction near the convention center, there were many complaints about the lack of nearby hotel rooms and good restaurants for the 16,032 registered participants; what rooms and meals were available were very expensive. If they couldn't find a place to go for lunch or dinner, though, the participants then had more time to visit the 1056 booths (114 more than 1979) occupied by 458 exhibitors (89 more than last year). Many of the exhibitors were foreign companies trying to increase their share of the affluent American market and, in fact, many of the most sophisticated, most expensive high-performance instruments were manufactured abroad. The proportion of foreign participants also seemed to increase, although final figures are not yet available. Among the newcomers were a delegation of five scientists from the People's Republic of China; a delegation from the U.S.S.R. canceled its scheduled visit, however, presumably because of the Afghanistan problem. On the floor, there appeared to be a large number of cosmetic changes in instruments, changes attributed by one manufacturer to an increased importance of subjective factors—above and beyond performance—in the evaluation of instruments. One manufacturer's representative even admitted candidly that his company had changed the color of its instrument cabinets from the traditional but cold blue and gray to warmer "earth tones" because of the increasing number of women with purchasing power in laboratories. Microprocessor controls, real-time data-handling systems, and other software were also more abundant this year, and manufacturers seemed to be placing an increased emphasis on service capabilities. On the whole, it seems unlikely that anyone who attended the Pittsburgh Conference this year could have crapped out.

Options for Preparative and Analytical HPLC

"Divide and conquer" would be an apt description of high-performance liquid chromatography (HPLC). In HPLC a solution containing two or more compounds is first separated into its constituents by passage under pressure through the chromatographic column. Then the concentrations of the components are determined by means of (usually) an optical technique, such as measurement of refractive indices, optical absorption, or fluorescence emission. In analytical work, chemists tend to be more interested in the identification of the components and the determination of their concentrations. The separation part of the process is thus a necessary part but not the main object of the exercise. A second kind of HPLC is called preparative or, simply, prep LC. The objective of prep LC is the isolation of substantial quantities of one or more of the constituents for subsequent use in some other analytical technique, in preparing intermediates for organic syntheses, in producing chemically pure standard materials, and so forth. The Pittsburgh Conference had several new instruments for both types of liquid chromatography.

The newest prep LC instrument was from the Du Pont Company. Du Pont calls its machine a high-performance preparative liquid chromatography (HPPLC) system, presumably because it is in many respects an analytical system scaled up to handle larger quantities of material and therefore retains many of the properties of an analytical system, high resolution in particular. Resolution is determined in part by the width of peaks in the chromatogram. Peak width is measured by a parameter called the number of theoretical plates per meter; Du Pont's HPPLC system is claimed to have a value of 32,000 plates per meter.

The penalty for maintaining a high resolution, admits David McClemens of Du Pont, is that the rate at which material can be separated (throughput) is reduced, since the two factors tend to be inversely related. The HPPLC system can process separations ranging from a few milligrams to several grams in a single run of a half hour or less. The normal mode of operation would be to develop a separation method (choice of column packing material and solvents) on an analytical system. Then, since the two types of instruments are so similar, the same method can be used on the HPPLC system. Throughput is determined by how widely spaced the peaks in the chromatogram are and the desired purity. Throughput can be adjusted upwards by increasing the amount of sample loaded into the column until the peaks just begin to overlap.

How important the relatively low throughput of the Du Pont system is apparently depends on the application. McClemens says that a few milligrams of highly purified material can be worth its weight in gold in some instances and that trace impurities that lower resolution prep LC instruments would never catch

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