438i Computer-Assisted Optimization of Hplc Separation for Simultaneous Quantification of Substrates and Products in Microbial Fermentation

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Monitoring of microbial fermentation requires quantification of substrates and products in the culture medium. Simultaneous separation, identification, and quantification of medium componenets by HPLC provide a fast and convenient assay, but is not always possible due to peak overlaps. This problem can be solved by optimizing the operating conditions to achieve the best peak separation. This work describes optimization of HPLC separation for a set of twenty-five compounds representative of carbohydrates, organic acids, alcohols, and medium components present in Escherichia coli fermentations. Temperature and sulfuric acid concentration in the mobile phase are optimized for the Bio-Rad HPX-87H ion-exclusion chromatography column, using factorial design and retention modeling, as well as previously proposed alternative global resolution function S and iterative stochastic search (ISS) algorithm for optimum identification (J. Chromatogr. A. 2005, 1070, 89-101). A computer program (OPTIMIZE) was written for the end user to perform customizable, automated optimization for HPLC separation. Several examples of HPLC separation problems are solved and presented.