PARAMETRIC SENSITIVITY STUDY OF MULTI-COMPONENT

 ADSORPTION FROM FINITE BATH

BY

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ABSTRACT

A comprehensive computer study of the most important physical, chemical and geometric parameters, on which the design of any multi-component adsorption systems relies, was performed. In the analysis, the sensitivity of an adsorption model with respect to the model parameters was evaluated. The mathematical model utilized, was developed by Mansour (1979). The model takes into account internal, external diffusional resistances, and film resistance. Equilibrium between liquid and solid phases was described by a non-linear Fritz-Schluender isotherm.

The theoretical transient bath concentration profiles were obtained for the cases of adsorption of single, binary and ternary systems. The numerical solution for the binary-solute system, was found to be in a good agreement with previously published experimental results.

The parametric study was applied to a binary-solute system which has been shown to match corresponding experimental results, and the studied parameters were: effect of competitive adsorption, size and porosity of carbon particles, porosity of carbon bath, adsorption rate constants, pore and solid diffusivities, film-mass transfer coefficients, and fluctuations in the initial solutes concentration.

It was shown that the computer programs used in this study are flexible enough to be easily used for any number of components of any adsorption system.