
Key Words: A. Radiation Chemistry-8, Radiolysis-8, Reaction Kinetics-8, Rate Constants-8, Mathematical Model-8, Oxidation-8, 9, Radiolytic-0, Liquid Phase-0, Cyclohexane-1, Oxygen-1, Cyclohexanol-1, 2, Cyclohexanone-1, 2, Carbon Dioxide-2, Water-5, Gamma-Radiation-10, Radiation Dose-6, Concentrations-7.

Abstract: A study was made of the radiolytic oxidation of cyclohexane in aqueous solution using cobalt-60 gamma-radiation. The major products identified were cyclohexanol and cyclohexanone. A simplified kinetic model based on competition by the various solutes in the system for a single primary radical species produced by radiolysis of the solvent molecules is developed.


Key Words: Gradient Technique-8, Lagrange Multiplier-8, Optimization-8, Complex Chemical Plant-4, Multistage Optimization Techniques-8, 10, Recycle System-9, Branching System-9, Programming Techniques-10.

Abstract: The gradient technique and Lagrange multiplier are used to obtain the optimum of complex chemical plants. The advantage of this approach is its ability to handle nearly all types of complex stages in a natural way. This approach is used to solve a heterogeneous complex chemical process with recycle. It is shown that although there are many different iteration loops, the convergence rate is fast even with rough starting values and only 0.3 min. is needed to obtain the optimum operating conditions.

The effects of internal mass transfer on the hydrogenation of benzene over nickel-alumina catalyst, Jiracek, Frantisek, Josef Horak, and Josef Pasek, AIChE Journal, 15, No. 3, p. 400 (May, 1969).

Key Words: A. Experimental-0, Reaction Kinetics-7, 8, Catalytic Reactions-9, Hydrogenation-7, 8, Benzene-1, Hydrogen-1, Cyclohexane-2, Recycle Reactor-10, Gas Phase-5, Reaction Order-7, Activation Energy-7, Internal-0, Mass Transfer-6, Diffusion Coefficient-8, Temperature Difference-7, Thermostats-10.

Abstract: The influence of mass transfer on the reaction kinetics, within the porous structure of a catalyst, is investigated during the hydrogenation of benzene. The temperature range for a nickel catalyst at atmospheric pressure is 99 to 160°C. The rate equation and the apparent activation energy on a cylindrical catalyst pellet (4.5 mm. in diameter and 5.3 mm. in height) and on the catalyst particles (0.5 to 0.63 mm. in diameter) are evaluated. The effect of internal diffusion on the dependence of the reaction rate on the temperature, and on the partial pressures of benzene and hydrogen is satisfactorily explained by means of theoretical relations. The values of the effective diffusion coefficient of benzene are compared by calculating the kinetic data and temperature difference in the cylindrical pellet.


Key Words: A. Filtration-8, Filtration Resistance-7, 8, Compressible Cake-9, Differential Equation-6, 7, 10, Relative Solid-Liquid Velocity-8.

Abstract: The definition of filtration resistance is modified by considering relative solid-liquid velocity. The internal flow mechanism in a filter cake is re-examined in view of the movement of solids during compression. Under conditions of short filtrations (seconds to minutes duration) involving concentrated slurries, the velocity of solids is shown to be comparable to the velocity of the liquid. A differential equation is proposed for flow through compressible cakes in which the pressure gradient is assumed proportional to the difference in average velocities of the liquid and solid rather than to the average velocity of the liquid alone. An improved definition of the average filtration resistance is developed on the basis of the new flow equation.

Free tear sheets of the information retrieval entries in this issue may be obtained by writing to the New York Office.

(Continued on page 478)