INFORMATION RETRIEVAL*

Gas-liquid mass transfer with a tangentially moving interface: Part I. Theory, Byers, Charles H., and C. Judson King, **AIChE Journal, 13,** No. 4, p. 628 (July,1967).

Key Words: A. Theoretical-0, Movement-6, Interface-9, Mass Transfer-7, 8, Diffusion-7, 8, Gas Phase-9, Liquid Phase-9, Mathematical Model-10, Computer-10, Flow Rate-6, Plastes-9, Parallel-0, Flat-0, Fluid Mechanics-6, Walls-6, Confinement-6.

Abstract: A theoretical investigation has been made of the effect of a moving interface upon gas-liquid mass transfer, where the control of the mass transfer is entirely within the gas phase and where the control is distributed between the two phases.

Gas-liquid mass transfer with a tangentially moving interface: Part II. Experimental studies, Byers, Charles H., and C. Judson King, **AIChE Journal, 13,** No. 4, p. 637 (July, 1967).

Key Words: A. Experimental-0, Movement-6, Interface-9, Mass Transfer-7, 8, Gas Phase-9, Liquid Phase-9, Evaporation-7, 8, Diffusion-7, 8, Diffusivity-7, 8, Ethanol-1, 5, Oxygen-5, Carbon Dioxide-5, Ethyl Ether-1, Helium-5, Diethyl Ether-1, Water-5.

Abstract: A horizontal, rectangular channel of high aspect ratio was built for the study of interphase mass transfer in stratified, laminar gas-liquid flow. Cases were examined where the resistance to mass transfer is confined to the gas phase and where the control is distributed between phases.

The streaming potential fluctuations in a turbulent pipe flow, Liu, Henry, **AIChE Journal, 13,** No. 4, p. 644 (July, 1967).

Key Words: A. Measurement-8, Streaming Potential Fluctuations-9, 8, 7, Velocity-6, Reynolds Number-6, Turbulent-0, Distilled Water-9, Flow-9, Pipe-9, Experimental-0, Electrodes-10, Sublayer-9, Viscous-0, Eddy Convection Velocity-9, Charge-Transport Equation-10, Conductivity-6.

Abstract: Accompanied by a brief theoretical consideration, the results of an experimental study of the streaming potential fluctuations in turbulent pipe flows of distilled water are presented. The dependence of the streaming potential fluctuations on turbulent velocity fluctuations and other parameters as indicated by the theory is determined from the experimental data. Information on the characteristics of turbulent velocity fluctuations in the viscous sublayer near a pipe wall has been inferred from the data.

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* For details on the use of these Key Words and the A.I.Ch.E. Information Retrieval Program, see **Chem. Eng. Progr.,** Vol. 60, No. 8, p. 88 (August, 1964). A free copy of this article may be obtained by sending a post card, with the words "Key Word Article" and your name and address (please print) to Publications Department, A.I.Ch.E., 345 East 47 St., N. Y., N. Y., 10017. Price quotations for volume quantities on request.

(Continued from page 627)

Mixing Theory and Practice, V. W. Uhl and J. B. Gray, Vol. I, Academic Press, New York (1966). 340 pages, $15.50.

This book is a very comprehensive summary of some 400 papers published in recent years. Each chapter is written by a different author and each reflects the viewpoint and experiences of the author.

In the main, it takes an "encyclopedic approach," very carefully documenting the many experimental studies and reporting correlation agreements and discrepancies with equal detail. It is a valuable summary for research and development people. There are numerous tables and curves that summarize the coefficients and exponents for a large number of competing equations, so that it will not be easy to find an answer to an operating or design problem. The authors tend to present the original data from many sources, and let the reader do much of the interpretation.

Chapter 2 treats fluid motion and mixing from the standpoint of turbulence and fluid motion in a fluid continuum. The fluid can be either a gas or a liquid. It applies to pipeline flow, but is not readily applicable to conditions in a fluid mixing vessel which would have a fluid interface and a mixing impeller.

Chapter 3 gives a useful summary of power information. A discussion on the propeller pitches used and the nomenclature on the "hand of a propeller" do not represent universal practice. Process performance in a few selected cases is covered from the standpoint of horsepower per thousand gallons required for typical processes with very few restrictions on tank size, tank volume, impeller geometry and impeller size to tank size ratio. This is in marked contrast to the approach taken in Chapter 2 and in later chapters.

Chapter 4 goes into detail on theoretical relations for impeller pumping capacity. The reader has to be careful to note whether the pumping capacity referred to is radial or tangential.

This early emphasis on impeller pumping capacity in the book can give the erroneous impression that pumping capacity is the key to efficiency and mixer performance. The use of "pumping efficiency" in this chapter implies that pumping efficiency is the key to successful mixer performance, which may or may not be the case with a particular application.

The effect of impeller speed on blend time is going to depend upon the role impeller head plays in the entraining action of the jet as well as the role it plays in the degree of blending obtained. The fact that different blending studies have shown a different depen-

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A theoretical analysis of some interrelationships and mechanisms of heat and mass transfer in dispersions, Gal-Or, Benjamin, and Vernon Walatka, **AIChE Journal, 13,** No. 4, p. 650 (July, 1967).

Key Words: A. Heat Transfer-8, 7, Mass Transfer-8, 7, Dispersions-9, Holdup-6, Residence Time-6, Surface Active Agents-6, Viscosity-6, Particle Size-6.

Abstract: Some of the main interrelationships that govern heat and mass transfer in dispersions are considered. Qualitative and quantitative analyses of the effects of holdup, average residence time, surface active agents, viscosity, and average particle size on transfer rates are made.

On a tracer method for evaluating catalytic kinetic data, Kuo, James C. W., and James Wei, **AIChE Journal, 13,** No. 4, p. 657 (July, 1967).

Key Words: A. Reaction Kinetics-8, Kinetics-8, Catalytic Reactions-9, Heterogeneous-0, Radioactive Tracers-10, Monomolecular Reactions-9, Isothermal-0, Divergence Theorem-10, Diffusivity-8, Reactant-9, Catalyst-9.

Abstract: This paper presents theoretical studies of a method of using a radioactive tracer technique to evaluate the kinetic data of heterogeneous catalytic reactions that are coupled with a Knudsen type of pore diffusion. By superimposing a transient radioactive tracer response over the steady state concentration profile in the catalyst particle, one can establish an implicit relation between the total amount of radioactive components diffused out of the particle and the kinetic data of the reaction system.

A correlation for pressure drop in two-phase cocurrent flow in packed beds, Sweeney, D. E., **AIChE Journal, 13,** No. 4, p. 663 (July, 1967).

Key Words: A. Pressure Drop-8, 7, Flow-9, Two-Phase-0, Cocurrent-0, Packed Beds-9, Single Phase-10, Gas Phase-5, Liquid Phase-5, Density-6, Viscosity-6, Velocity-6.

Abstract: A correlation has been developed from considerations of single-phase flow behavior to predict pressure drop across packed beds for two-phase cocurrent flow. The correlation does not require one of the assumptions made in previous correlations. The only empiricism involved in the use of this correlation is that required in correlating single-phase pressure drops through packed beds.

Transition and film boiling from horizontal strips, Kesselring, R. C., P. H. Rosche, and S. G. Bankoff, **AIChE Journal, 13,** No. 4, p. 669 (July, 1967).

Key Words: A. Heat Flux-8, 7, Fluctuations-8, Temperature-8, 9, Surface-8, Transition Boiling-8, 9, Film Boiling-8, 9, Freon 113-9, Strips-9, 10, Stainless Steel-9, Horizontal-0, Width-6.

Abstract: Measurements of heat flux and surface temperature fluctuations are reported for transition and film boiling of Freon 113 from flattened horizontal stainless steel tubes. The strip width is found to have a definite effect upon the heat flux in the film boiling regime.

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dence upon the impeller speed should be expected.

The summary of all the different blending equations requires a great deal of perserverance and experience to be useful. One of the conclusions, that the power per unit volume required for blending increases with the square of the tank diameter, is not experienced in practice.

Chapter 5 on heat transfer is very complete. It still leaves the reader with many choices for exponents and constants.

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Advances in Chemical Engineering, Vol. 6, Thomas B. Drew, John W. Hoopes, Jr., and Theodore Vermeulen, Ed., Academic Press, New York (1966). 455 pages, $17.50.

A well-written treatment of *Diffusion-Controlled Bubble Growth* is presented by S. G. Bankoff of Northwestern University. Specifically excluded are cavitation bubbles and bubbles formed by gas injection through submerged orifices. Included are bubbles formed during boiling of pure or two-component liquids, gas bubbles formed by dissolution from supersaturated liquid solutions, and bubbles formed during electrolysis. The mathematical treatments are thorough and up-to-date. A good selection of experimental data is given. The author concludes that the theory for the growth of isolated bubbles is well established; important future advances must come in the experimental area.

"The convective flow which occurs spontaneously in evaporating liquids is one of the most spectacular performances that nature has hidden from our view." Thus begins *Evaporative Convection,* written by John C. Berg, Andreas Acrivos, and Michel Boudart while at the University of California in Berkeley. This review is a case study beginning with the theoretical work of Marangoni (1870) and the experiments of Thomson (1882) and Benard (1900). Natural convection driven by both density differences and surface tension differences is considered. The fluid layers are thin enough for the depth to be important. A good selection of photographs illustrates the various circulation patterns, and the specialized optical techniques are described. The mathematical derivations are summarized. The main problem today is to handle mathematically the nonlinear aspects of the differential equations. Until then it is not possible to state what structure exists at steady state (squares, hexa-