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Axial laminar flow of a non-Newtonian fluid in an annulus, McEachern, Donald W., **A.I.Ch.E. Journal, 12,** No. 2, p. 328 (March, 1966).

Key Words: A. Estimating-8, Predicting-8, Fluid Flow-9, 8, 4, Flow-9, 8, 4, Fluids-9, Non-Newtonian-0, Ellis Model-0, 10, Laminar-0, Axial-0, Isothermal-0, Annulus-9, Conduits-9, Annular-0, Curves-9, 8, Flow Curves-9, 8, Motion-9, Calculating-8, Viscosity-2, 9, 7, Flow Rate-1, 6, Pressure Drop-1, 6, Polymer Solutions-9.

Abstract: The equation of motion is solved for steady axial laminar isothermal flow of an Ellis model fluid in a conduit of annular cross section. Tables are presented which may be used to obtain flow curves for annular flow of fluids whose Ellis parameters are known. The Ellis fluid predictions are compared with experimental data on dilute polymer solutions flowing in annuli. Ellis fluid predictions of flow curves are also compared to those predicted by the generalized Newtonian fluid and the power law fluid.

A theory of withdrawal of cylinders from liquid baths, White, David A., and John A. Tallmadge, **A.I.Ch.E. Journal, 12,** No. 2, p. 333 (March, 1966).

Key Words: A. Entrainment-8, 4, Films-9, Liquids-9, Cylinders-9, 10, Oils-9, Withdrawal-10, 8, 9, 4, Theory-8, Predicting-8, 4, Calculating-8, 4, Flux-2, 9, 7, Quantity-2, 9, 7, Radius-1, 6, Viscosity-1, 6, Surface Tension-1, 6, Goucher Number-1, 6, Capillary Number-1, 6, Rate-1, 6, Speed-1, 6, Theoretical-0, Experimental-0.

Abstract: A theory of the amount of liquid entrained by cylinders upon withdrawal from liquid baths is derived for a wide range of cylinder radii. The theory is based on matching curvatures for static and dynamic menisci. Predicted values are expressed as the effect of the dimensionless wire radius (Goucher number) and dimensionless withdrawal speed (capillary number) on the dimensionless flux. The theory is verified experimentally. Deviations, which are noted at high capillary numbers, indicate that the theory is a plug flow or low-speed theory.

Binary physical adsorption of argon and nitrogen on fixed beds of activated silica gel, Camp, David T., and Lawrence N. Canjar, **A.I.Ch.E. Journal, 12,** No. 2, p. 339 (March, 1966).

Key Words: A. Mass Transfer-8, 9, Adsorption-8, 9, Gases-1, 9, Mixtures-1, Argon-1, 2, Nitrogen-1, 2, Binary-0, Fixed Beds-9, Silica Gel-5, Activated-0, Velocity-6, Concentration-6, Length-6, Rate-7, 2, Amount-7, Diffusion-6, Internal Mass Transfer-6, Calculating-8, Diffusion Coefficient-2.

Abstract: Physical adsorption of binary mixtures of argon and nitrogen on fixed beds of silica gel is studied for various gas concentrations, gas velocities, and bed lengths. Possible factors controlling the rate of mass tranfer are considered. Data are correlated with integrated diffusion and integrated kinetic models and with differential rate expressions.

Bubble shapes in nucleate boiling, Johnson, M. A., Jr., Javier de la Pena, and R. B. Mesler, **A.I.Ch.E. Journal, 12,** No. 2, p. 344 (March, 1966).

Key Words: A. Analyzing-8, Examining-8, Measuring-8, Shapes-9, 8, 7, Bubbles-9, Water-9, Nucleate Boiling-4, Heat Transfer-4, Photography-10, High Speed-0, Rate-6, Growth-9, 6, Size-6, Contact Diameter-6, Delay Time-6, Surface Tension-6, Inertia-6.

Abstract: An explanation of the differently shaped bubbles observed growing on a surface during nucleate boiling of water is presented. Measurements of bubble dimensions and growth rates obtained by high-speed photography are analyzed. The relative importance of the inertial and surface tension forces is computed and the differences in shapes among bubbles are explained on the basis of the relative importance of these forces. It is also reported that delay time, contact diameter, rate of growth, and size of the bubble at departure are important factors closely related to bubble shape.

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one is faced with a nonlinear partial differential equation, one can find in concurrent form standard techniques, worked out examples, explicit literature citations, and helpful hints. The writing is generally clear, interesting and helpful; the author has clearly taken great care with proofreading and preparation of the index. An enormous amount of painstaking effort has gone into collecting together and interpreting a wide variety of subject material in a rapidly moving field. The author is to be congratulated for his successful execution of a difficult assignment.

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Chemical Reaction Engineering. Proceedings of the Third European Symposium, J. Hoogschagen, Editor, Pergamon Press, New York (1965). vi 326 pages, $20.00.

It is always difficult to review a book such as the present one, which is a collection of papers presented at a symposium. Anyone working in this field is certainly cognizant of the existence of the first two Chemical Reaction Engineering Symposia and this one is of the same type. The papers are concerned with recent research performed by the authors and so are not meant to constitute current reviews in the various areas. The exception to this is the "final review" by van Krevelen in which he again shows his great skill in giving an organized, overall view of how the papers presented at the meeting fit into present knowledge in chemical reaction engineering.

The theme of the meeting was "Confrontation of Science and Practice in Process Development" and the volume contains many examples of the application of chemical reaction engineering to real industrial problems. The First and Second Symposia both contributed many distinctively new and novel approaches to problems (possibly because of a backlog of work), but this aspect is somewhat lacking in the Third. This was probably within the framework of the theme, but perhaps a meeting more balanced between new ideas and reflections on applications would be desirable.

Rather than attempt the impossible task of reviewing each paper, a discussion of the contents will be given. There are six sessions. The first is

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"Commercial Processes" where examples of design and performance of large-scale processes are given. The second on "Laboratory and Pilot Plant Studies" shows several successful small-scale studies of a variety of process types. Next is "Reactors" in which detailed investigations of mixing, contacting, and reaction in specific reactors are presented, and the fourth session on "Chemical and Physical Phenomena" considers basic work in the same areas. Papers in "Commercial Processes" involve case studies of several examples of complicated modern systems. The final session on "Mathematical Models and Process Optimization" contains examples of simulation and practical considerations in the optimization of real plants.

In summary, the Third Symposium on Chemical Reaction Engineering consists mostly of many examples of the successful application of more or less known principles to real problems. The volume certainly belongs in every chemical library, although the price will probably prohibit many personal purchases unless one has great interest in one of the particular processes discussed.

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