The Rate of Glycerol Absorption by Ion Exchange Resins

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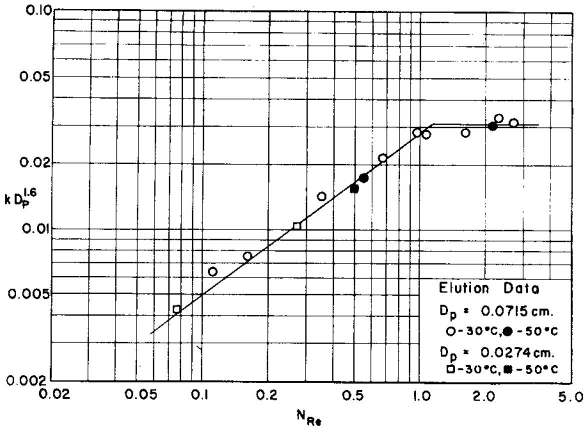

Fig. 1. Correlation of data from saturation experiments.

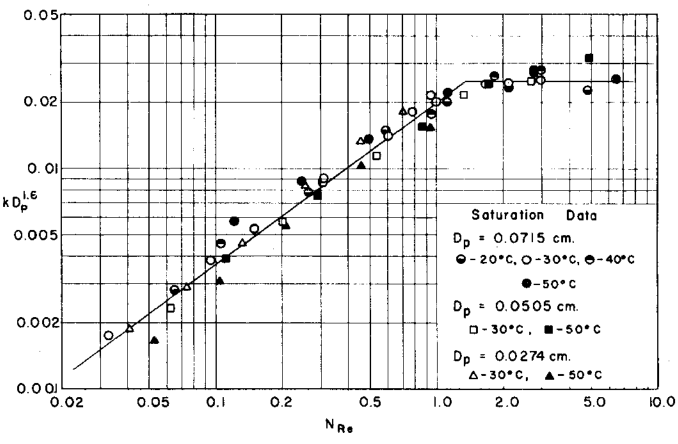

Fig. 2. Correlation of data from elution experiments.

Studies of the rate of absorption of glycerol from aqueous solutions by packed beds of ion exchange resin have recently been reported (*1*, *2*). In particular, Vassiliou and Dranoff (*2*) showed that the rate of absorption and desorption of glycerol in beds of amberlite IR-120 resin could be described by a linear rate equation containing an unknown mass transfer coefficient k. They studied the effect of Reynolds number on k in a limited number of experiments and also noted differences between k values for saturation and elution and an effect due to resin particle size. The present work was undertaken to obtain more complete and extensive data, including the effects of Reynolds number, temperature, and particle size on the transfer coefficient.

The detailed analysis of the transient operation of a packed bed during the saturation and/or elution cycle has been presented previously (*2*, *3*) and is therefore not repeated here. Suffice it to say that a linear rate equation of the form

$$\frac{\partial q}{\partial t} = k\,(K_a C - q) \qquad (1)$$

is combined with appropriate material balances and initial conditions to yield equations which predict the familiar breakthrough curves encountered in such operations. Comparison of these theoretical curves and those measured experimentally then makes possible the estimation of the appropriate k values.

EXPERIMENTAL

The absorption of glycerol from dilute water solutions (approximately 6.5 wt. % glycerol) was carried out in a standard glass chromatographic col-

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INFORMATION RETRIEVAL

Key Words: Heat Transfer-8,9, Liquid-Metal-5, Mercury-5, Sodium-5, Nack-5, Pipes-10, Annuli-10, Rod Bundles-10, Turbulent-8, Diffusivity-8, Eddy-8, Nusselt Number-7, Prandtl Number-6, Peclet Number-6, Reynolds Number-6, Eddy Transport-8, Internal Flow-8, Laminar-8, Convection-8.

Abstract: An equation is developed for evaluating the ratio of the eddy diffusivity of heat transfer to that for momentum transfer for use in estimating heat transfer coefficients for liquid-metals. This ratio is given as a function of two dimensionless groups: the Prandtl number and the ratio of eddy diffusivity of momentum transfer to kinematic viscosity. The equation gives eddy diffusivity ratios, which when incorporated in the usual semiempirical equations for estimating liquid-metal heat transfer coefficients, bring theoretical predictions and experimental results into good agreement for flow through pipes, annuli, and rod bundles.

Reference: Dwyer, O. E., **A.I.Ch.E. Journal, 9,** No.2, p. 261 (1963).

Key Words: Equation of State-8, Density-8, Argon-4, Gaseous and Liquid Substances-8, PVT Data-10.

Abstract: Available PVT data for argon were utilized to develop isochoric relationships between the normalized pressure and normalized temperature in the form of third-degree polynomials. The dependence of the coefficients of the polynomials on reduced density was established. These relationships permit the calculation of densities for argon and substances of similar nature (nitrogen, oxygen, carbon monoxide, and methane) for reduced temperatures less than 2.81° and reduced pressures up to 50 through a trial-and-error procedure. For argon, an average deviation of 1.29% and a maximum deviation of 3.66% resulted from a comparison between calculated and reported values.

Reference: Costolnick, John J., and George Thodos, **A.I.Ch.E. Journal, 9,** No. 2, p. 272 (1963).

ERRATUM

The article, "The Laminar-Turbulent Transition for Flow in Pipes, Concentric Annuli, and Parallel Plates," by Richard W. Hanks, which appeared on page 45 of the January, 1963, issue of the *A.I.Ch.E. Journal*, was omitted from the table of contents.