ABSTRACTS AND KEY WORDS

Methods of estimating the thermodynamic properties of halogenated ethylene compounds, Beckwith, William F., and Raymond W. Fahien, Chem. Eng. Progr. Symposium Ser. No. 44, 59, p. 75 (1963).

Key Words: Property, Thermodynamic-2, Entropy-2, Heat Capacity-2, Normal Boiling Point-2, Statistical Mechanics-4, Group Contribution Method-8, Tetraiodoethylene-9, Halogenated Ethylenes-9, Wave Numbers-1, Interatomic Distances-1.

Abstract: A group contribution method was devised to estimate the ideal gas thermodynamic properties of halogenated ethylene compounds. The method, which is based on the statistical mechanical equations, divides the total property into contributions due to translation motion, vibrational motion, and external rotational motion. The method was used to predict the properties of tetraiodoethylene. Values of entropy, heat capacity, critical properties, normal boiling point, interatomic distance, and wave numbers for the halogenated ethylene compounds are tabulated.

The specific heat of a natural gas and methane at 69 and 103 atmospheres, Hujsak, K. C., H. R. Froning, and C. S. Goddin, Chem. Eng. Progr. Symposium Ser. No. 44, 59, p. 88 (1963).

Key Words: Natural Gas-1, Methane-1, Specific Heat-8, Pressure-6, Temperature-6, Calorimeter-10, Prediction-9, Extrapolation-9.

Abstract: Specific heats at constant pressure (C_p) of a natural gas and pure methane were measured at 69 and 103 atm. at temperatures between $-20°$ and 80°F. in a flow calorimeter. Several prediction methods based on PVT relationships and an equation of state were found to reliably predict specific heats of these gases at these conditions. Published extrapolations of experimental data were found to contain large errors.

Thermodynamics of solutions: VIII. An improved equation of state, Redlich, Otto, and A. K. Dunlop, Chem. Eng. Progr. Symposium Ser. No. 44, 59, p. 95 (1963).

Key Words: Equation of State-1, Compressibility Factor-1, Fugacity-1, Fugacity Coefficient-1, Gaseous Mixtures-1, IBM 7090-10, Computer-10, Thermodynamics-1.

Abstract: An improvement of the equation of state of Redlich and Kwong furnishes the compressibility factor, fugacity, and fugacity coefficient(s) for single components or gas mixtures. Required data are the temperature, pressure, and composition in addition to the critical temperature and pressure and the acentric factor ω of Pitzer et al for each of the components. Use of an IBM-7090 for the calculations is desirable.

Vapor-liquid equilibrium in the helium-nitrogen system, Buzyna, George, Robert A. Macriss, and Rex T. Ellington, Chem. Eng. Progr. Symposium Ser. No. 44, 59, p. 101 (1963).

Key Words: A. Natural Gas-1, Helium-2, Nitrogen-3, Cryogenic-5, Phase Equilibrium-6, Distillation-7, Design-8, Column-10. B. Natural Gas-1, Helium-2, Nitrogen-3, Cryogenic-5, Temperature-6, Pressure-5, Phase Composition-7, Thermodynamics-8, Phase Apparatus-9, Phase Apparatus-10.

Abstract: Helium is recovered from natural gas using phase equilibrium behavior at cryogenic temperatures. Experimental vapor-liquid equilibrium data for the helium-nitrogen system are given for $-233°$ to $-320°$F. and 170 to 1,000 lb./sq. in. abs. Disagreements in literature data are reconciled. Significant detail is added to liquid-phase information important to cycle design regarding helium lost in waste nitrogen separator bottoms.

The integral isobaric heat of vaporization of mixtures, Stein, Fred P., and Joseph J. Martin, Chem. Eng. Progr. Symposium Ser. No. 44, 59, p. 112 (1963).

Key Words: Heat of Vaporization-8, Latent Heat-8, Integral Isobaric-8, Isopropyl Alcohol-8, Water-8, Acetone-8, Latent Heat Equation-10, Enthalpy-8, Binary Mixtures-8.

Abstract: The integral isobaric heats of vaporization of the isopropyl alcohol-water system and the acetone-water system have been measured in an adiabatic flow calorimeter at atmospheric pressure. The data obtained have been used to construct accurate enthalpy-concentration diagrams for the systems studied and to serve as the criteria for evaluating methods of predicting integral isobaric heats of vaporization. An equation has been developed which relates the integral isobaric heat of vaporization to the heat of vaporization of the pure components at the bubble-point temperature of the mixture, the ideal-gas specific heats of the pure component, and the bubble-and-dew-point temperatures of the mixture.

k_Ga = gas-phase mass transfer coefficient for physical absorption, lb.-moles/hr. cu. ft. atm.
$(k_Ga)_{r,v}$ = gas-phase mass transfer coefficient for absorption with a rapid chemical reaction at high liquid-phase reactant concentrations or for vaporization, lb.-moles/hr. cu. ft. atm.
K_Ga = overall mass transfer coefficient, lb.-moles/hr. cu. ft. atm.
k_La = liquid-phase mass transfer coefficient for physical absorption, lb.-moles/hr. cu. ft. (lb.-mole/cu. ft.)
L = average superficial liquid rate, lb./hr. sq. ft.
P = total pressure, atm.
y_1 = mole fraction of solute in entering gas
y_2 = mole fraction of solute in leaving gas

ERRATA

The ordinate scale (hydrogen sulfide capacity) in Figure 7 of the article "Adsorption of Normal Paraffins and Sulfur Compounds on Activated Carbon" by R. J. Grant, Milton Manes, and S. B. Smith, which appeared on page 403 of the July, 1962, issue of the *A.I.Ch.E. Journal* should be multiplied by a factor of ten.

In Equation (12) of the article "Mass Transfer and Effective Interfacial Areas in Packed Columns" by Fumitake Yoshida and Tetsushi Koyanagi, which appeared on page 309 of the July, 1962, issue of the *A.I.Ch.E. Journal,* $\left(\frac{\mu_L}{\rho_L D_L}\right)^{1/2}$ is missing before

$$\left(\frac{d_p^3\, g\, \rho_L^2}{\mu_L^2}\right)^{-1/6}$$

The captions for Figures 1 and 2 of the article "The Rate of Glycerol Absorption by Ion Exchange Resins" by Richard P. Griffin and J. S. Dranoff, which appeared on page 283 of the March, 1963, issue of the *A.I.Ch.E. Journal,* should read as follows: Figure 1. Correlation of data from elution experiments; Figure 2. Correlation of data from saturation experiments.