

CRIV-I 67-0389

the temperature increases (see Table IV) indicates, then, an increase in the relative order of the water molecules upon leaving the environment of other solvent molecules and entering the electrostatic fields of the ions.

The curves in Figure 9 were constructed from results calculated by using eq 5 to evaluate $\log K_{sp}$ at several constant ionic strengths up to 6 *m* and at temperatures up to 300°. These solubility products, each at constant *I*, were considered to show the same temperature dependence as $\ln K_{sp}^\circ$ in eq 10. After sets of the four parameters for several given ionic strengths were determined, values for $\Delta G'$, $\Delta H'$, $\Delta S'$, and $\Delta C_p'$ (which correspond to the changes in the thermodynamic

quantities when 1 mole of calcium hydroxide solid dissolves in a solution of ionic strength *I*) were calculated in the same manner used in the calculation of the thermodynamic quantities for the standard state (zero ionic strength). The curves at 350° represent extrapolated results since the experimental results at this temperature appear inconsistent with those at the lower temperatures. The dashed curve for the average $\Delta C_p'$ from 0 to 350°, shown in Figure 9, is the arithmetic mean for this temperature range.

Acknowledgment. The authors express their gratitude to Professors John E. Ricci, New York University, and James W. Cobble, Purdue University, for their helpful discussions.

The Reduced Equation of State of Argon and Xenon

by I. Crivelli and F. Danon¹

Facultad de Ciencias Exactas y Naturales, University of Buenos Aires, Buenos Aires, Argentina
(Received January 31, 1967)

A comparison of the compressibility factors of argon and xenon reduced in terms of the Kihara intermolecular core model potential is presented. It is found that corresponding-states behavior is better obeyed by using the Kihara rather than the Lennard-Jones potential. The results of this paper indicate that the assumption of the pairwise additivity of the potential seems to be valid within the range covered by the presently available experimental data.

In a recent article,² we showed that the second virial coefficient and the viscosity coefficient at low pressures of argon, krypton, and xenon can be correlated on a corresponding states basis by the use of the Kihara core model intermolecular potential Φ as given by

$$\Phi = \epsilon_K \left[\left(\frac{\rho_0}{\rho} \right)^{12} - 2 \left(\frac{\rho_0}{\rho} \right)^6 \right] \quad (1)$$

where ϵ_K is the minimum of the potential which occurs at ρ_0 . The intermolecular separation ρ is defined as the shortest distance between the outer surface of the cores. This equation is valid for $\rho \geq d$ where *d* is the diameter of the spherical core. For smaller values

of ρ , $\Phi = \infty$. Results obtained by using eq 1 are much more satisfactory than those obtained by using the (12-6) Lennard-Jones (L-J) function.

Levelt³ has made a careful study of the compressibility factor of argon and xenon and has shown that the PV/RT isotherms of argon may be transformed into the compressibility isotherms of xenon by multiplying by scale factors, which are ratios of potential param-

(1) To whom correspondence and requests for reprints should be sent at the Department of Chemistry, Massachusetts Institute of Technology, Cambridge, Mass. 02139.

(2) F. Danon and J. C. Rossi, *J. Phys. Chem.*, **70**, 942 (1966).

(3) J. M. H. Levelt, *Physica*, **26**, 361 (1960).