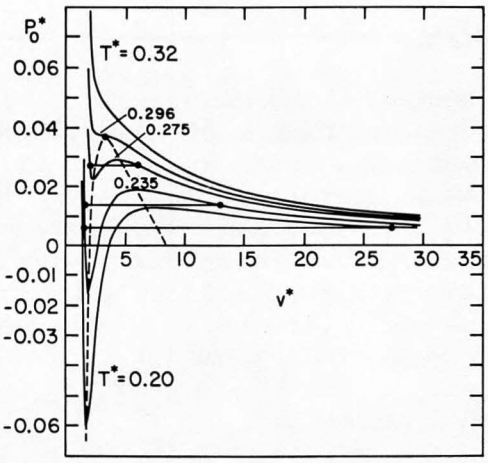

FIGURE 1. Pressure-volume isotherms of a Van der Waals fluid. $P^* \equiv Pb^2/a$, $V^* \equiv V/Nb$, and $T^* \equiv bkT/a$. At the critical point $T^* = 0.296$.

the effects of molecular repulsion (through b) and the effects of molecular attraction (through a). Liquid-liquid phenomena are also sensitive to the relative magnitudes of the attractive energy parameters ($a_{\alpha\alpha}/a_{\beta\beta}$).

In liquid-liquid equilibria one can often simplify the thermodynamic theory by assuming that the molecules are restricted to lattice sites. Such a restriction removes pressure from the problem, equates the Gibbs and Helmholtz free energies, and yields such well-known models as the regular solution model for low molecular weight molecules and the Flory-Huggins model for mixtures of low and high molecular weight molecules. [12] Most of the patterns of phase behavior observed in nature can be explained with the VDW theory and/or the lattice models. However, even with adjustable parameters in the models hydrogen-bonded fluids, unlike the others, are particularly resistant to quantitative predictions.

CONCLUDING REMARKS

AS ILLUSTRATED BY THE material outlined above, one of the key concepts of the course structure is the development of a molecular theoretical basis that not only leads to an understanding of the molecular origins of thermodynamic behavior but also to semiempirical formulas which can be exploited quantitatively to predict thermodynamic properties of real systems. In addition to the topics outlined in this article, we also discuss the molecular theory of fluid microstructures,* the theory of intermolecular forces, quantum principles, and statistical mechanical ensemble theory. Fluid structure is treated in an elementary fashion in the first quarter course, the advanced theory being reserved to the next quarter. We strive to balance the modern and the traditional elements of the subject, the rigorous and the useful results, and the mathematical and the physical understanding of the phenomena of the field. □

*This will be the subject of a subsequent paper by Professor Davis in *CEE*. Editor

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ChE news

ZWIEBEL APPOINTED CHAIRMAN

Dr. Imre Zwiebel has been appointed Chairman of the Department of Chemical and Bio Engineering at Arizona State University, effective July 1, 1979.

RICE APPOINTED HEAD

Dr. Richard G. Rice has been appointed Professor and Head of the Chemical Engineering Department at Montana State University, effective August 1, 1979.