

is a strong indication that the final equilibrium tangent is **a** rather than **b** or **c** of Figure 4. These comments are only guidelines for Figures 3 and 4—see [6], Figure 5, for a different case involving double pairs of IP. The only rule is that no true equilibrium tangent may cut the Gibbs' curve at any composition.

We are presently working on procedures to extend this algorithm to ternary and higher component systems.

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## REFERENCES

- J. M. Smith and H. C. Van Ness, *Introduction to Chemical Engineering Thermodynamics*, Fourth Ed., p. 450, McGraw-Hill (1987).
- S. I. Sandler, *Chemical and Engineering Thermodynamics*, pp. 451-453, Wiley (1977).
- H. C. Van Ness and M. M. Abbott, *Classical Thermodynamics of Non-Electrolyte Solutions*, pp. 382-390, McGraw-Hill (1982).
- M. Modell and R. C. Reid, *Thermodynamics and Its Applications*, Second Ed., p. 247, Prentice-Hall (1983).
- J. S. Rowlinson and F. L. Swinton, *Liquids and Liquid Mixtures*, Third Ed., Butterworths (1982).
- L. E. Baker, A. C. Pierce and K. D. Luks, *Soc. Pet. Eng. J.*, 22, 731, (1982).
- M. L. Michelsen, *Fluid Phase Equil.*, 4, 1, (1980); 8, 1, (1982); 8, 21, (1982); 16, 57, (1984); 23, 181, (1985); 30, 15, (1986); 33, 13, (1987).
- L. X. Nghiem and Y.-K. Li, *Fluid Phase Equil.* 17, 77, (1984).
- L. X. Nghiem, Y.-K. Li and R. A. Heidemann, *Fluid Phase Equil.*, 21, 39, (1985). □

## REVIEW: Reactor Engineering

Continued from page 7.

California Professional Engineers exam. Some involve new technologies (semiconductor processing, biotechnology) and some require numerical solutions. In several chapters excellent problems on critiques of journal articles are given.

A series of accompanying interactive programs for personal computers is available on floppy disks, though they must be purchased separately from the University of Michigan. These are interesting problems that can be used as homework assignments since they provide the student a coded grade. Students find the programs to be both fun and helpful for learning reactor design.

A few aspects of the book could be improved. As done in essentially all reactor design texts, fractional conversion is used as a dependent variable and solutions start with an integrated form of the design equation. A more general approach, which is more easily extended to multiple reactions and complicated reactors, would be to use flow rates and number of moles as dependent variables and start with the differential form of the design equation. The energy balances in Chapter 8 are complicated by using variable heat capacities and symbols for several types of heat capacities. In Chapter 6, the rate of reaction is incorrectly shown as being proportional to the square of the total site concentration on the catalyst surface. Also, as done in many texts, more significant figures are given in the solutions to the example problems than are justified by the data presented.

In summary, this is an excellent undergraduate text for reactor design and it will likely be adopted by a large number of departments. It could also be used as a graduate text if supplemented. □

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