Estimating fugacity of a raw material for bio-ETBE

【Module Learning Objectives】

- Estimation of fugacity coefficient and fugacity based on the generalized correlations

【Associated Sections in Selected Textbooks】

- Introduction to Chemical Engineering Thermodynamics [1] Sec. 11.7

【Associated Web Modules】

- None

【Process Background and Problem】

The European Union has set challenging targets for European refiners by increasing the minimum biofuel content in fuels to 5.75% by 2010. As a result, refiners are investing in process units to produce biofuels, such as bio-ETBE (ethyl tertiary butyl ether), which is produced by the etherification of bio-ethanol and isobutylene [2].

In the chemical industry, studying thermodynamic properties helps better define a system. Having more accurate parameters for a system helps increase the productivity and efficiency of a process. Estimate the fugacity of isobutylene, a raw material in the production of bio-ETBE, as a gas based on the generalized correlations, or Eqn. (11.67) in [1]:

(a) At 280 °C and 20 bar;   (b) At 280 °C and 100 bar.

Bibliography

[1]   J. M. Smith, H. C. Van Ness, and M. M. Abbott, *Introduction to chemical engineering thermodynamics*. McGraw-Hill, 2005.
[2]   K. L. Rock and M. Korpelshoek, "Increasing refinery biofuels production," *Catalysis*, 2008.