

**APPLICATION OF TEMPERATURE DEPENDENCES  
OF SATURATED VAPOR PRESSURE FOR THE ANALYSIS  
OF PHASE DIAGRAM EVOLUTION OF A SOLVENT MIXTURE**

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The choice of methods for liquid mixtures separation is determined by their phase equilibrium diagram structure and its evolution upon variation of external parameters. An important role in the analysis of vapor–liquid equilibrium diagram evolution is played by the mutual course of temperature dependences of saturated vapor pressure ( $P = f(T)$  dependences) of components and azeotropes as well as information about the presence/absence of Bancroft points of different kinds on these dependences. The latter makes it possible to identify the presence of different azeotropes in the systems and to determine the concentration ranges of their existence [1].

The work is devoted to the analysis of vapor–liquid equilibrium diagram evolution of the methyl ethyl ketone (MEK) – isopropyl alcohol (IPA) – n-heptane (H) system on the basis of the  $P = f(T)$  dependences of components and azeotropes.

The  $P = f(T)$  dependences of the components and azeotropes of the MEK–IPA–H system were obtained and analyzed in this work. The characteristics of Bancroft points of different kinds were identified, which made it possible to conclude that the system satisfies the condition for the mandatory presence of a ternary azeotrope. In a computational experiment, we established its type (unstable node), which is consistent with the data [2]. On the basis of  $P = f(T)$  dependences the full concentration range of its existence was determined and an analysis of the phase diagram evolution over a wide pressure range was carried out, confirmed by means of mathematical modeling.

It was found that increasing or decreasing the pressure relatively to the atmospheric value reduces the number of separation regions and, consequently, simplifies the distillation flowsheet. The MEK–H azeotrope, according to the  $P = f(T)$  dependences existing over a wide range of external parameters, imposes restrictions on the complete separation of the mixture at any pressure. This necessitates special separation methods based on the principle of redistribution of concentration fields. The results of the carried out analysis are the basis for the further development of separation flowsheets of MEK–IPA–H industrial mixture.

It should be noted that either a ternary azeotrope of the unstable node type or two ternary azeotropes of the saddle and unstable node types may be implemented in systems with a set of Bancroft points and an order of their achievement similar to the MEK–IPA–H system, maintaining the same sequence of formation and disappearance of binary azeotropes [3].

1. T.M. Kushner et al., *Theor. Found. Chem. Eng.* 1998, 32 (1), 28.
2. C. Ma et al., *J. Chem. Technol. Biotechnol.* 2022, 97 (9), 2557.
3. T.V. Chelyuskina, D.O. Tabakov, *Theor. Found. Chem. Eng.* 2026, 60 (2).