THERMODYNAMICS-BASED DESIGN AND SYNTHESIS FROM SOLUBILITY TO OPTIMUM PROCESS

Workshop at the ISIC 18
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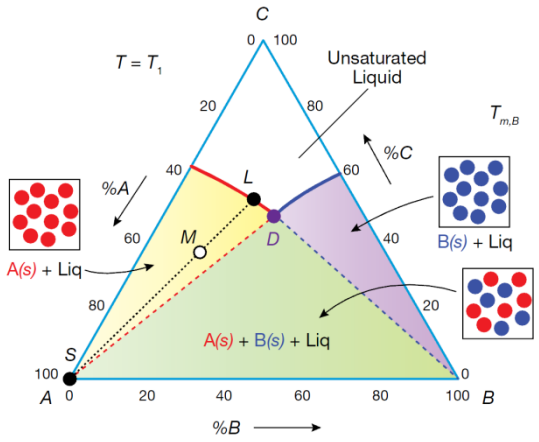
Purpose and Objective

Crystallization is gaining importance in the chemical industry, especially in the isolation and purification of pharmaceuticals and other fine chemicals. Since many of these compounds cannot be separated by distillation and the processing cost can be prohibitively high for separations by chromatography, crystallization is typically the best choice. However, developing a crystallization process is a challenging problem in itself. The mixture to be separated often involves multiple components, and the solids can be present in various polymorphic forms or as compounds, adducts, and solvates. Thermodynamic models and calculation techniques for solid-liquid equilibrium (SLE) are not as well developed as their vapor-liquid counterparts. Systematic design tools, similar to the well-known residue curve maps for distillation system design, were absent. As a result, many scientists and engineers still deal with the development of crystallization processes on a trial and error, case-by-case basis.

This course provides an in-depth overview of an integrative approach for crystallization development – using models to analyze the SLE behavior of the system, validating the model using relevant experimental data, and systematically synthesizing a crystallization process based on the SLE behavior. Starting with fundamental issues such as solubility and physical properties, we will discuss the relevant theories, methods, experimental techniques, and software tools that have been used in many industrial applications for developing an optimum crystallization process. Various examples will be provided to illustrate this approach (see for example Wibowo, Chem. Eng. Progr. March 2011, 21-31).



What can you expect to learn?

- How to analyze solubility and SLE phase behavior for the purpose of conceptual design of crystallization processes
- How to use the knowledge of SLE phase behavior in synthesizing crystallization processes and defining the optimum processing conditions
- How to integrate synthesis, analysis, and experimental effort in developing crystallization processes
- How to solve practical industrial problems using the latest technology for synthesis and development of crystallization processes.