

Sustainable Process Synthesis–Intensification

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ABSTRACT

This presentation will introduce the concept of process intensification together with the different scales at which process intensification may be performed. That is, the unit operation scale, the task scale and the phenomena scale. The drivers for applying process intensification are presented with examples of well-known intensified unit operations. The mathematical description of process intensification in relation to process synthesis is considered and a systematic and efficient numerical solution approach for the complex numerical problem is proposed. The roles of process integration and process intensification related to process improvements are considered and the distinction between process intensification and process integration is highlighted together with different methods available for performing process intensification related to process design/improvement. Also, the role of sustainable process intensification in process design is presented, highlighting how process intensification methods, analogous to computer-aided molecular design, can be used to incorporate existing intensified equipment into the design of new processes and for the generation of novel, intensified unit operations. Potential computer-aided tools that have been used for performing process intensification in the open literature are also presented. Finally, suggestions are proposed for future research and development for process intensification related to process design.