

Title: State-of-the-art technologies for separation of azeotropic mixtures

Author/Authors: Taha H. Mahdi, Arshad Ahmad, Mohamed Mahmoud Nasef, Adnan Ripin

Abstract: Azeotropic separation technologies have been classified broadly into two major categories, i.e., distillation and membrane processes. Because normal distillation has limitations for azeotropic mixtures, enhancements have been proposed that either introduce a third component serving as an entrainer in extractive and azeotropic distillation processes or apply a pressure swing distillation system. Among the membrane processes, pervaporation was reported to be most promising for azeotropic separations. More recently, an approach known as process intensification has been proposed for combining multiple processes into single units such as a dividing wall distillation column or exploiting sonication phenomena to break an azeotrope in an ultrasonic distillation system. This article reviews the state-of-the-art technologies covering all the separation techniques mentioned here. Existing techniques are appraised, and technology gaps are identified. Based on these insights, areas for further development are suggested, aiming at satisfying the process objectives by inherently safer, environmentally benign and economically more attractive techniques.