

## **Simulation of fermentation compounds for bioethanol production using different separating agents**

### **ABSTRACT**

This study focuses on the simulation of ethylene glycol (C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>) – glycerol (C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>) and ethylene glycol (C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>) – calcium chloride (CaCl<sub>2</sub>) as separating agents in bioethanol production from fermentation effluent. The entire process was simulated using Aspen HYSYS V7.3 software, but the main focus is the extractive distillation where the mixture compounds were utilised. Response Surface Methodology (RSM) was used to optimise the process variables in extractive distillation column with the separating agent ethylene glycol, temperature, solvent to feed molar ratio and reflux ratio. Non-random two-liquid (NRTL) model was used for activity coefficients of mixture from Aspen properties databank. Results show that both mixture compounds values on solvent to feed molar ratio, reflux ratio and reboiler energy consumption were slightly different as separating agent temperature maintained at 80 °C and ethanol composition in distillate was 99.89 mole%. The separating agents show that better ethanol/water separation with lower energy consumption compared with a well-known single compound such as ethylene glycol. Thus, this study is important to improve extractive distillation column operating conditions by studying the effect of mixture compounds as separating agents in bioethanol production.