Intensification of ethylene glycol production process

This study aims to generate an alternative design for ethylene glycol production process focusing on a reduction of operating cost and emissions. To achieve this, the phenomena-based method for process intensification was applied. 3 stages of process intensification were performed. First, the base-case design was obtained, resulting in the production of ethylene glycol via two steps: ethylene oxidation synthesis followed by ethylene oxide hydration to produce ethylene glycol. Feasibility of the design was verified and the process was rigorously designed using a computer process simulation program. In the second stage, the base-case design was analysed through economic evaluation and environmental impact analysis to identify the process “hot spots” and determine targets for improvement. In the last stage, the phenomena-based method for process intensification was applied to determine more sustainable solutions. As the result of intensification method, membrane separation was suggested and applied to the design. With the operation of the new equipment, the ethylene glycol production process was improved for 54.51 percent in terms of energy consumption.

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