Energy Saving by Heat-Integrated Distillation Train in Azeotropic Distillation Following Acetic Acid Synthesis Process

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Acetic acid is widely used for the source of petrochemical and fine chemical. It is usually produced by methanol carbonylation, hydrocarbon oxidation, and acetaldehyde oxidation. Methanol carbonylation process is the most well-known technology which produces acetic acid as reaction with CO and methanol in vapor-liquid contact type reactor. In addition, excess water is added for the stable activity of iridium catalyst. After acetic acid production reaction is finished, separating acetic acid from water is the prime concern. Azeotropic distillation with isobutyl acetate as an entrainer, which forms a new ternary system with water and acetic acid is the one of the most frequently used method. However, in most cases, this excess water gives rise to colossal distillation column duty, which causes massive cost. So far, several solutions have been proposed to reduce the duty such as multi-effect distillation and vaccum distillation. In this research, a new methodology called "heat-integrated distillation train" is proposed which can reduce the column duty. Quantitative comparison with existing research results will be conducted in enery and cost by using process simulator Aspen HYSYS v8.4.