A lab-scale MED dealing with salinity wastewater: the study of optimal operation schemes and parameters

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Received 11 May 2014; Accepted 18 April 2015

\textbf{ABSTRACT}

Multi-effect distillation (MED) system with a top brine temperature lower than 70\textdegree{}C, is one of the most successful desalination technologies. In this paper, a lab-scale vertical tube MED system was performed for salinity wastewater desalination of petrochemical enterprises, and five salinity wastewater treatment schemes including different combinations of evaporator types were investigated. As a result, the falling-falling-climbing (FFC) system was considered as the optimal scheme. Then, the operation parameters including the feedwater salinity, temperature, flow rate, and the fresh steam flow rate were further optimized. The results indicated that the CR and gained output ratio (GOR) would rise up by increasing effect numbers, fresh steam flow rate, and feedwater temperature. While CR and GOR would fall down with the increase of the feedwater salinity and flow rate. Therefore, the optimal operation parameters were experimentally determined as follows: the feedwater with salinity of 0.6\%, flow rate of 75 kg/h, and temperature of 45\textdegree{}C, and fresh steam flow rate of 17 m\textsuperscript{3}/h. The maximum CR and GOR were up to 5.08 and 4.13, respectively.

\textbf{Keywords:} Multi-effect distillation; Petrochemical enterprises; Salinity wastewater; Operation schemes; Operation parameters

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