

## Modeling the Effect of Scale Deposition on Heat Transfer in Desalination Multi-Effect Distillation Evaporators

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**Abstract :** In Multi-Effect Distillation (MED) desalination evaporators, the scale deposit outside the tubes presents a barrier to heat transfers reducing the global heat transfer coefficient and causing a decrease in water production; hence a loss of efficiency and an increase in operating and maintenance costs. Scale removal (by acid cleaning) is the main maintenance operation and constitutes the major reason for periodic plant shutdowns. A better understanding of scale deposition mechanisms will lead to an accurate determination of the variation of scale thickness around the tubes and an improved accuracy of the overall heat transfer coefficient calculation. In this paper, a coupled heat transfer-calcium carbonate scale deposition model on a horizontal tube bundle is presented. The developed tool is used to determine precisely the heat transfer area leading to a significant cost reduction for a given water production capacity. Simulations are carried to investigate the influence of different parameters such as water salinity, temperature, etc. on the heat transfer.

**Keywords :** multi-effect-evaporator, scale deposition, water desalination, heat transfer coefficient

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