

SEPARATION SCIENCE & ENGINEERING

充碳塑料管壳式增湿-去湿淡化装置及过程: 模拟和实验研究

成怀刚, 王世昌

Chemical Engineering Research Center, State Key Laboratory of Chemical Engineering, School of Chemical Engineering and Technology, Tianjin University, Tianjin 300072, China

收稿日期 修回日期 网络版发布日期 接受日期

摘要 The modelling and experimental investigation of a thermally coupled humidification-dehumidification desalination process using a carbon-filled-polypropylene shell-tube column are presented. A heat/mass transfer model is established to study the correlation among productivity, thermal efficiency, physicochemical parameters (gas/liquid phase temperature, heat/mass transfer coefficient, Reynolds number etc.), and operating conditions (the temperature of feed water, the flow rates of external steam, feed water, and carrier air); at the same time, the effects of operating conditions on the productivity and thermal efficiency of the column are investigated both theoretically and experimentally, which indicate that the optimum flow rates of external steam, feed water, and carrier gas are 0.18, 60, and 10kg/h-1, respectively, and the higher the feed water temperature ($\leq 95^{\circ}\text{C}$) is, the greater the productivity and the thermal efficiency will be. Furthermore, performance comparison with the previous study shows that the condensate productivity of this carbon-filled-plastic column is not lower than that of the copper column, which demonstrates the practicability and feasibility of applying such a plastic column to the humidification-dehumidification desalination process.

关键词 [desalination](#) [humidification-dehumidification](#) [carbon-filled-polypropylene](#) [simulation](#)

分类号

DOI:

Modelling and experimental investigation of humidification- dehumidification desalination using a carbon-filled-plastic shell-tube column

CHENG Huaigang, WANG Shichang

Chemical Engineering Research Center, State Key Laboratory of Chemical Engineering, School

of Chemical Engineering and Technology, Tianjin University, Tianjin 300072, China

Received Revised Online Accepted

Abstract The modelling and experimental investigation of a thermally coupled humidification-dehumidification desalination process using a carbon-filled-polypropylene shell-tube column are presented. A heat/mass transfer model is established to study the correlation among productivity, thermal efficiency, physicochemical parameters (gas/liquid phase temperature, heat/mass transfer coefficient, Reynolds number etc.), and operating conditions (the temperature of feed water, the flow rates of external steam, feed water, and carrier air); at the same time, the effects of operating conditions on the productivity and thermal efficiency of the column are investigated both theoretically and experimentally, which indicate that the optimum flow rates of external steam, feed water, and carrier gas are 0.18, 60, and 10kg/h-1, respectively, and the higher the feed water temperature ($\leq 95^{\circ}\text{C}$) is, the greater the productivity and the thermal efficiency will be. Furthermore, performance comparison with the previous study shows that the condensate productivity of this carbon-filled-plastic column is not lower than that of the copper column, which demonstrates the practicability and feasibility of applying such a plastic column to the humidification-dehumidification desalination process.

Key words [desalination](#); [humidification-dehumidification](#); [carbon-filled-polypropylene](#); [simulation](#)

通讯作者:

成怀刚 jiswang@tju.edu.cn

作者个人主页: 成怀刚; 王世昌

扩展功能

本文信息

▶ [Supporting info](#)

▶ [PDF](#) (291KB)

▶ [\[HTML全文\]](#) (0KB)

▶ [参考文献](#)

服务与反馈

▶ [把本文推荐给朋友](#)

▶ [加入我的书架](#)

▶ [加入引用管理器](#)

▶ [引用本文](#)

▶ [Email Alert](#)

▶ [文章反馈](#)

▶ [浏览反馈信息](#)

相关信息

▶ [本刊中 包含“desalination”的
相关文章](#)

▶ 本文作者相关文章

· [成怀刚](#)

· [王世昌](#)