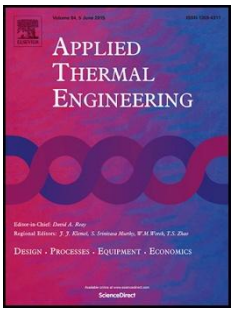
Accepted Manuscript



Title: A heat transfer correlation for transient vapor uptake of powdered adsorbent embedded onto the fins of heat exchangers

Author: Ang Li, Kyaw Thu, Azhar Bin Ismail, Kim Choon Ng

PII: S1359-4311(15)00977-1
DOI: http://dx.doi.org/doi: 10.1016/j.applthermaleng.2015.09.057
Reference: ATE 7049

To appear in: *Applied Thermal Engineering*

Received date: 20-6-2015
Accepted date: 20-9-2015

Please cite this article as: Ang Li, Kyaw Thu, Azhar Bin Ismail, Kim Choon Ng, A heat transfer correlation for transient vapor uptake of powdered adsorbent embedded onto the fins of heat exchangers, *Applied Thermal Engineering* (2015), http://dx.doi.org/doi: 10.1016/j.applthermaleng.2015.09.057.

A HEAT TRANSFER CORRELATION FOR TRANSIENT VAPOR UPTAKE OF POWDERED ADSORBENT EMBEDDED ONTO THE FINS OF HEAT EXCHANGERS

Ang Li, Kyaw Thu, Azhar Bin Ismail, Kim Choon Ng*

Highlights

- Detailed study on transient heat transfer of an adsorbent coated heat exchanger.
- Adsorbent-adsorbate interaction contributes 75% of the total thermal resistance.
- Transient local heat transfer deviates from the overall value due to thermal mass.
- A correlation for the transient local adsorption heat transfer coefficient.

ABSTRACT

We present a detailed study on the transient heat transfer phenomena of powdered-adsorbent mixed with an organic binder for adherence to the fins of a heat exchangers. The transient performance of such an adsorbent-heat exchanger configuration has significant application potential in the adsorption desalination plants and chillers but seldom addressed in the literature. An experiment is designed to measure the heat transfer for several adsorption temperatures under a single vapor component environment. Analysis on the experimental data indicates that the adsorbent-adsorbate interactions contribute about 75% of the total thermal resistances throughout the uptake processes. It is found that the initial local adsorption heat transfer coefficients are significantly higher than the average values due primarily to the thermal mass effect of the adsorbent–adsorbate interaction layers. From these experiments, a correlation for the transient local adsorption heat transfer coefficients is presented at the sub-atmospheric pressures and assorted application temperatures.

KEYWORDS

*Correspoinding author, E-mail : mpengkc@nus.edu.sg; and Kim.NG@kaust.edu.sa