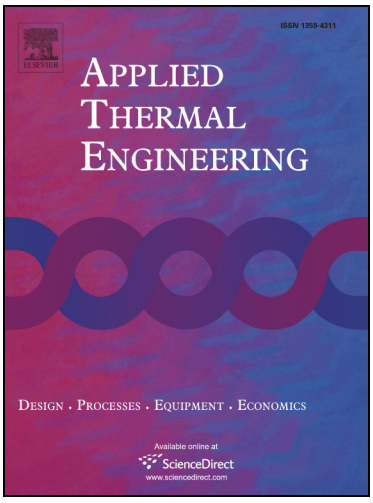

Research Paper

Experimental study on the Effect of adsorber with three shapes of conductive material on Performance of Adsorption Refrigeration Tube using Activated Carbon/ethanol pair

Ali.A. Abdel Aziz, S.I. Hatab, M. Moawed, A.E. Zohir, Nabil M. Berbish

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Experimental study on the Effect of adsorber with three shapes of conductive material on Performance of Adsorption Refrigeration Tube using Activated Carbon/ethanol pair

Ali. A. Abdel Aziz*, S.I. Hatab, M. Moawed*, A. E. Zohir** and Nabil M. Berbish*

*Department of Mechanical Engineering, Faculty of Engineering at Shoubra, Benha University, 11629 Cairo, Egypt.

** Mechanical Engineering Department, Tabbin Institute for Metallurgical Studies, Cairo,Egypt

* Corresponding author: Tel: +201151700122

Email: ali.ali@feng.bu.edu.eg

alyaccuracy@yahoo.com

Abstract

One of the most important priorities in adsorption solar refrigeration system is to increase the adsorption capacity of adsorbents. Therefore, the present work aims to improve the heat and mass transfer characteristics of adsorbent that provide a new compact adsorber that used as a main part of adsorption refrigeration system. An experimental analysis on heat and mass transfer in adsorption refrigeration tube (ART) was carried out using activated carbon/ethanol as working pair. A transient technique is employed to describe the system development of pressure, temperature, and uptake of adsorption/desorption refrigeration cycle for different cases of charcoal/ ethanol pair with three shapes of conductive materials. Highly conductive fins and slices made of aluminum were placed within activated carbon in the adsorber structure for intensifying heat exchange between the adsorbent and the adsorption bed surface during heating and cooling processes. The experiments conducted at 82 ^{o}C and 5 ^{o}C generation and evaporation temperatures, respectively. The maximum coefficient of performance is 0.635 for compact adsorber equipped internally with four zigzag fins in radial direction. The coefficient of performance belongs to adsorber with aluminum slices, four straight fins, and pure charcoal (absence of fins or slices) values are 0.586, 0.543, and 0.50, respectively. The specific cooling effects for adsorber with slices, zigzag fins, pure charcoal, and straight fins are 139, 99.4, 68.3, and 61.4 kJ/kg, respectively. The higher the heat transfer rate, the