World Academy of Science, Engineering and Technology
International Journal of Energy and Environmental Engineering
Vol:16, No:12, 2022

Performance Evaluation of Adsorption Refrigerating Systems

Authors : Nadia Allouache, Omar Rahli

Abstract : Many promising technologies have been developed to harness the sun's energy. These technologies help in economizing energy and environmental protection. The solar refrigerating systems are one of these important technologies. In addition to environmental benefits and energy saving, adsorption refrigerating systems have many advantages such as lack of moving parts, simplicity of construction and low operating costs. The work aimed to establish the main factors that affect the performances of an adsorption refrigerating system using different geometries of adsorbers and different adsorbent-adsorbate pairs. The numerical modeling of the heat and mass transfer in the system, using various working pairs, such as: activated carbon-ammonia, calcium chlorid-ammonia, activated carbon fiber- methanol and activated carbon AC35-methanol, show that the adsorber design can influence the system performances; The thermal performances of system are better in the annular configuration case. An optimal value of generating temperature is observed in annular adsorber case for which the thermal performance of the cooling system is maximal. While in the plate adsorber, above a certain value of generating temperature, the performance of the system remains almost constant. The environmental conditions such as solar radiation and pressure have a great influence in the system efficiency, and the choice of the working pair depends on the environmental conditions and the geometry of the adsorber.

Keywords : adsorber geometry, numerical modeling, optimal environmental conditions, working pairs.
Conference Title : ICESD 2022 : International Conference on Energy and Sustainable Development
Conference Location : Istanbul, Türkiye
Conference Dates : December 20-21, 2022