

## **OPTIMUM DESIGN OF AN ADSORBENT BED OF ADSORPTION REFRIGERATION SYSTEM FOR HIGHEST SPECIFIC COOLING POWER**

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### **Abstract**

In this study, the effect of geometrical parameters of a rectangular bed which are the length, height, diameter of adsorbent particle, minimum and maximum temperatures of adsorption cycle on the performance of an adsorbent bed are numerically investigated to find a proper adsorbent bed design for the Highest Specific Cooling Power (SCP). The governing equations which are mass conservation, motion and energy equations for the adsorbent bed and mass transfer equations for the adsorbent particle with appropriate initial and boundary conditions are solved and the distributions of temperature, concentration and pressure for entire bed are found and then the values of SCP are calculated. Based on the Taguchi method, L<sub>9</sub> orthogonal array is chosen to reduce the numerical runs from 81 to 9. Three different level for each investigated parameter are considered and the best adsorbent bed design with SCP of 229.15 W/kg is found. The results showed that the adsorbent particle radius and the maximum and minimum temperature difference in the cycle have the most and the least effect on the performance of an adsorbent bed.