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Performance Investigation of MOF-Ethanol Based Adsorption Cooling Cycle

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Abstract: *Adsorption cooling systems employs benign refrigerants and could be driven by solar energy or waste heat. Therefore, they are a feasible alternative to vapor compression cooling systems. This paper investigates the performance of metal-organic framework (MOF) ethanol based adsorption cooling cycle. Adsorption isotherms of ethanol onto MOF of type MIL-101 -Cr have been measured experimentally using a magnetic suspension balance for temperatures ranging from 30 to 70 °C and within pressure up to 20 kPa. Then, the experimental data were fitted using Toth adsorption isotherms equation. The coefficient of performance (COP) and specific cooling effect (SCE) were then calculated for evaporation and cooling temperatures of 10 and 30 °C, respectively. The experimental results show that COP attains 0.70 and SCE increases with the increase of heat source temperature and attains 225 kJ per kg of adsorbent at temperature of 80 °C which makes this pair suitable for solar cooling application.*

Keywords: adsorption; ethanol; cooling cycle metal organic framework; solar powered.