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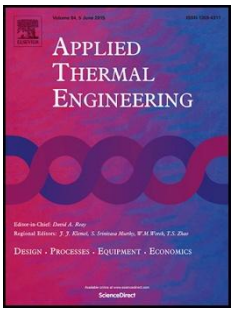

Title: Aluminium fumarate and CPO-27(Ni) MOFs: Characterization and Thermodynamic Analysis for Adsorption Heat Pump Applications.

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Aluminium fumarate and CPO-27(Ni) MOFs: Characterization and Thermodynamic Analysis for Adsorption Heat Pump Applications.

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Highlights:

- CPO-27(Ni) and aluminium fumarate were investigated for adsorption heating, cooling and desalination applications.
- Both MOFs have high potential in adsorption applications.
- The optimum desorption temperature, for the CPO-27(Ni) is higher than 90^{o}C and for aluminium fumarate is 55-70^{o}C.
- CPO-27(Ni) outperforms aluminium fumarate at low evaporation temperature (5^{o}C).
- Aluminium fumarate outperforms CPO-27(Ni) at high evaporation temperature (20^{o}C).

Abstract

Metal-Organic Framework (MOF) materials are new porous materials with high surface area, pore size and volume, and tunable pore geometry thus providing high adsorption capacity. Currently, limited MOF materials with high water adsorption capabilities and hydrothermal stability are available on a large scale. Two MOF materials namely CPO-27(Ni) and aluminium fumarate have been identified to have a high hydrothermal stability, high water uptake of 0.47 $g_{H2O}.g_{ads}^{-1}$ and 0.53 $g_{H2O}.g_{ads}^{-1}$ at a relative pressure of 0.9 and are commercially available.

This work aims to measure the water adsorption characteristics of these two MOF materials in terms of isotherms, kinetics and cyclic stability. Also the thermodynamic cycle performance of such materials based on their equilibrium adsorption data was investigated under different operating conditions for various adsorption applications such as heating, cooling and water desalination.