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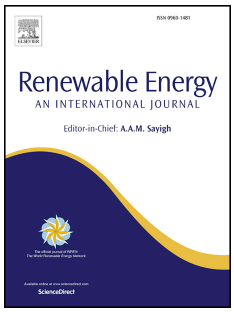

Numerical modelling and investigations on a full-scale zeolite 13X open heat storage for buildings

Frédéric Kuznik, Damien Gondre, Kévyn Johannes, Christian Obrecht, Damien David

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Numerical modelling and investigations on a full-scale zeolite 13X open heat storage for buildings

Frédéric KUZNIK[a,*], Damien GONDRE[a], Kévyn JOHANNES[b], Christian OBRECHT[a], Damien DAVID[b]

[a] *Université de Lyon, INSA–Lyon, CETHIL UMR5008 F–69621, Villeurbanne, France*
[b] *Université de Lyon, Université Lyon 1, CETHIL UMR5008, F-69622, Villeurbanne, France*

Abstract

Thermal energy storage is a key technology for heat management and efficient use of renewable energy production. High-power and high-density heat storage in buildings can be achieved with physisorption. The present work presents a study of a full-scale zeolite 13X open reactor to be integrated in the ventilation system of a dwelling. An original numerical model of the system is developed and validated using various data obtained from eight sets of experiments. The analysis of the energy chain shows that approximately 70% of absorbed energy is converted into useful heat released on discharge. However, approximately half of the total heat is also directly lost at the outlet of the adsorbent bed. The overall system efficiency is 36%.

Keywords: Physisorption; Heat storage; Numerical modelling; Energy analysis; Sankey diagram

*Corresponding author. Phone: +33 472 438 461; Fax: +33 472 438 522
Email address: frederic.kuznik@insa-lyon.fr (Frédéric KUZNIK)