Zeolite solar container experiment

Can zeolites store thermal energy?
In particular,using the heat of adsorption of water on zeolites to store thermal energy has shown promising results[10,11]. Zeolites can be "charged" by heating and drying and thermal energy can be recovered at a later time by exposing the dried zeolites to moist air during a "discharging" phase.

How does thermal energy affect zeolite 13X?
When thermal energy is supplied,the temperature of zeolite 13X increases,heat is absorbed for water desorption in the pores (primarily latent cooling; 346.6 kJ/kg-carrier),and liquid water dissolves ammonium nitrate crystals (secondary endothermic reaction cooling; 1386 kJ/kg-carrier).

Can zeolites be charged in lightweight containers?
These results show the potentialof charging zeolites in lightweight containers at distributed point sources at a temperature of 200°C,and then transporting and storing the charged zeolites to a reactor with an adsorbent bed at a central location where the heat can be recovered and utilized.

Is zeolite suitable for sorption heat storage?
The experimental characterization of a commercially-available zeolite for sorption heat storage has been carried out and reported. The considered zeolite,13X type,has been chosen for its suitabilityto long-term thermal energy storage even after multiple hydration/dehydration cycles.

Can zeolites be stored outside a discharging unit?
The approach involved charging zeolites through heating in an oven and storing them externally from the reactor used for the thermal energy recovery process. This method of charging and storing zeolites outside the discharging unit holds practical implications for mobile heat storage applications.

What is zeolite hydration?
The considered zeolite,13X type,has been chosen for its suitability to long-term thermal energy storage even after multiple hydration/dehydration cycles. Three different liquid sorbates have been analyzed for the zeolite hydration,namely distilled water,ethanol and a 30:70%wt. ethanol-water mixture.

Abstract This paper presents a novel experimental work for cooling photovoltaic panels using water saturated zeolite/activated alumina. Different system configurations, with 4 different zeolite ...

In this study, for the first time, the synthesis of zeolites 4A and 13X from natural sources (Kankara kaolin) and the mixture optimization for solar adsorption refrigeration application ...

This study investigates the enhancement of dewatering efficiency in High-Density Polyethylene High Integrity Container (HDPE-HIC) systems for radioactive waste management by ...

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In this work, we report the experimental characterization of working pairs made of various liquid sorbates (distilled water, ethanol and their mixture) and a 13X zeolite sorbent at ...

In this paper, the design, construction and results of test as well as numerically simulation of a solar powered zeolite 4A-water adsorption refrigeration were presented. The performance of the designed ...

The objective of this study therefore was to investigate the use of solar energy in regenerating the zeolite adsorbent. In this study, solar energy regeneration of three zeolite sizes as 1/2x1/4, 4x8 and 6x14 ...

In this work, four zeolite-bearing materials (three naturally occurring and one of synthetic origin) were considered for thermal energy capture and storage. Such materials can store thermal energy as heat ...

Although natural zeolites are already utilized in many areas, further research into their various types and properties could transform them into high-value products with additional applications in existing ...

Subsequently, a zeolite 13X STES system was built to conduct charging and discharging experiments. Based on the derived analytical solution, the fluid temperature at different ...

Solar powered adsorption refrigeration contains only three major components (container of adsorbents, condenser and evaporator) and functions as follows. The adsorbent is packed in a ...

In order to explore the application of solar energy in heat storage and heating, a set of solar-powered open cycle system of heat storage was proposed to investigate experimentally the thermal utility of ...

In this paper, the storing solar energy principle of zeolites is discussed, the contrast study of natural zeolites to the 13X synthetic zeolite was made, and the conclusion showed that natural zeolites can ...

During experiments the radiation and the temperatures of the glass, of the solar absorber and of the zeolite are measured with thermal resistors. The evaporator vessel is made of glass and the ...

Interfacial solar evaporation is a promising approach for sustainable water purification. However, its large-scale implementation is limited by complex fabrication methods and salt accumulation issues. ...

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 ...

The more reliable zeolite-based photocatalysts with high photocatalytic activity under visible or sunlight irradiation should be extensively investigated. Additionally, we highlight the ...

The zeolite 13X/water pair has a low regeneration temperature (120-180 °C) that is compatible to the

temperatures provided by evacuated tubes solar collectors and a good sorption ...

Herein, a solar evaporator with high salt resistance and efficient heavy metal wastewater treatment is designed using commercial artificial zeolite as matrix, modified zeolite (MZ), ...

This paper describes the use of sandblasting waste (SW) and solar panel waste glass (SPWG) as raw materials in the hydrothermal synthesis of Linde-type A zeolite (zeolite A) with ...