

# Sodium hydroxide solar energy storage heating

What is a thermo-chemical heat storage system using an aqueous sodium hydroxide (NaOH) solution?

At Empa, a thermo-chemical heat storage concept using an aqueous sodium hydroxide (NaOH) solution is pursued (working pair NaOH-H<sub>2</sub>O). A first prototype has been built. This paper describes this system and highlights the design and operation-related topics, emphasizing also the vacuum application aspects. 2. Charging and discharging process 2.1.

Can a NaOH-water-based process be used for long-term storage of solar heat?

6. Conclusions and outlook An NaOH-water-based process for long-term storage of solar heat has been analyzed. The process has been demonstrated in a prototype plant with individually vacuumed storage tanks and solution/water vapor heat exchangers unit.

How does a sodium hydroxide heat exchanger work?

The water from the sodium hydroxide solution evaporates; the water vapor is removed and condensed. The condensation heat is conducted into a geothermal probe, where it is stored. The sodium hydroxide solution that leaves the heat exchanger after charging is concentrated to 50 percent again, i.e. "charged" with thermal energy.

How much does sodium hydroxide cost?

Sodium hydroxide is produced across the globe in bulk, as a byproduct part of the alkali chloride process. Normally, bulk price would be around \$150 per ton, or around \$0.75 per kWh as a volumetric storage price for the storage medium. The proposed storage system uses renewable energy to heat the salt using electrical heaters.

How to achieve high solar energy fractions for building heat supply?

To reach high solar energy fractions for building heat supply, several seasonal thermal storage techniques have been developed and tested so far. Besides ground storage techniques, thermo-chemical techniques with high heat storage capacity and virtually no heat losses in the storage state are most promising.

How does a solar heat exchanger work?

The sodium hydroxide solution that leaves the heat exchanger after charging is concentrated to 50 percent again, i.e. "charged" with thermal energy. "This method enables solar energy to be stored in the form of chemical energy from the summer until the wintertime," says Fumey.

The basic concept of the closed sorption heat storage based on sodium hydroxide and water is ... demonstrative projects including absorption and adsorption for long-term solar energy storage. It ...

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heat and mass exchanger unit. ... Apart from the high temperature heat ...

Conversely, if heat energy (collected from the sun, for example) is fed into a solution of sodium hydroxide diluted with water, the moisture readily evaporates and the NaOH solution becomes more ...

For this purpose, the solar-NaOH TCHP system features several of the following novel designs: (1) a double-stage operation to enhance the energy storage density, (2) an integrated design to make full use of solar ...

Keywords: Seasonal thermal energy storage Aqueous sodium hydroxide Surface wetting Ceramic foam Surface texturing 1 Introduction In Europe, around 50% of the energy demand is used for ...

generated from new energy sources into sodium energy allows for timely energy storage and release, ensuring the continuity and reliability of power supply. As illustrated in Figure 2, for ...

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