

# **The role of sodium nitrate in solar panels**





## Overview

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Most CSP plants utilize a mixture of sodium nitrate and potassium nitrate, commonly referred to as solar salt. This specialized mixture enables operational temperatures exceeding 500 degrees Celsius, thereby maximizing thermal efficiency. Is solar salt a pure molten nitrate?

In this section we will review the thermophysical and thermochemical properties of these mixtures and of the pure molten nitrates in order to compare it. The Solar Salt is a mixture of  $\text{NaNO}_3$  /  $\text{KNO}_3$  containing 60% by weight of sodium nitrate.

Does solar salt stabilize nitrite?

Table 1. Thermophysical properties of considered molten salt as HTF and/or TES in CSP. NA, not available. Bonk et al. , recently, revealed that Solar Salt has stabilized nitrite content of 5 mol% during the described time at 560 °C under open atmosphere.

Which nitrate is used for thermal energy storage in CSP?

For those reasons, many works in the literature about thermal energy storage in CSP have focused on the  $\text{KNO}_3$  -  $\text{NaNO}_3$  nitrate mixture (42-58 mol%), known as solar salt, whose commercial availability is widespread, is often used as storage media in the present-day, and is occasionally employed as HTF.

What is nitrate molten salt used for?

Anyone you share the following link with will be able to read this content: Provided by the Springer Nature SharedIt content-sharing initiative Nitrate molten salts are extensively used for sensible heat storage in Concentrated Solar Power (CSP) plants and thermal energy storage (TES) systems.

Which nitrate is best for molten salt energy storage?

Based on the comparison of salt characteristics presented in Table 1.3, the 60%/40% sodium/potassium nitrates present, for now the most interesting



option for molten salt energy storage. However other options will be considered, such as, the addition of Nano silica to the salt mix in order to improve its specific heat capacity by 30% or more.

How much nitrate does a CSP plant use?

This even larger thermal stability range fits the requirements of Concentrated Solar Power (CSP) plants which, as a consequence, use nitrate molten mixtures as a heat storage medium. By 2030, it is estimated a usage of  $\approx 1.8 \times 10^9$  tons of nitrate mixtures in CSP plants 1.



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### [\(PDF\) Effects of sodium nitrate concentration on thermophysical](#)

The study shows how an increase in the proportion of sodium nitrate for a 26 new binary solar salt to 78-22wt.%, produces an increase in the heat capacity of the mixture by 27 reducing the ...

### [Thermostatic properties of nitrate molten salts and their solar and](#)

By combining classical molecular dynamics and differential scanning calorimetry experiments, we present a systematic study of all thermostatic, high temperature properties of ...



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This research examines the behaviour of these different molten nitrate mixtures, with the goal of improving the solar salt used currently as an energy storage fluid in CSP plants.

### [Manufacture, distribution, and handling of nitrate salts for solar](#)

Based on their low cost and attractive physical properties, molten sodium/potassium nitrate salts have been shown to be one of the most



cost-effective fluids for heat absorption and thermal ...



### [Analysis of Different Types of Heat Transfer Fluids for ...](#)

The chosen molten salts for this report primarily consist of binary, ternary or quaternary mixtures containing alkali and alkaline earth metal nitrates, like sodium, potassium, lithium, caesium, ...

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1. Introduction patchable electricity and in the future, may assist in decarbonizing and prolonging the life-time of coal-fired power plants. The operating temperature range of commonly used ...



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