

Industrial ice slurry cold energy storage

What is ice slurry used for?

Ice slurry is widely used in food transport and cold energy supplies. In summary, cold energy storage with ice slurry materials has significant potential in the fields of cold chains and cold energy supplies. The State Council of China recently released an announcement regarding the cold chain development of the "14th Five-Year Plan".

What is slurry cold storage?

Currently, key research on slurry cold storage mainly focuses on ice slurry and hydrate slurry. Studies indicate that when the IPF is between 20%-25%, the flow resistance of ice slurry is similar to that of frozen water, but the cold storage capacity is several times that of frozen water under the same conditions.

Why is ice slurry used in Mobile Cold energy storage?

Typically, PCMs are utilized in mobile cold energy storage because the latent heat is significantly greater than sensible heat. Ice slurry is an excellent PCM for mobile cold-energy storage as it is inexpensive, convenient, nontoxic, and environmentally friendly. Ice slurry is widely used in food transport and cold energy supplies.

Why does ice slurry have a high energy storage density?

Ice slurry has a high energy storage density because of the latent heat of fusion of its ice crystals. It also has a fast cooling rate due to the large heat transfer surface area created by its numerous particles.

What is the carrier liquid of ice slurry?

The carrier liquid of tap water ice slurry is water, and that of the binary ice slurry is an additive solution. In mobile cold storage, it is necessary to maintain a relatively balanced ice packing factor (IPF) of the ice slurry to prevent it from premature melting, which would lead to a loss of cold energy.

Can ice slurry be used as a cold storage medium?

Ice slurry can also be used as a cold storage medium in various vessels without built-in refrigeration systems such as ice slurry cooled trolleys, trucks or fishing boats.

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In addition, during formation of SCH slurry for cold energy storage and transport, the mass fraction of the ionic salt used for generating the SCH slurry is usually in the range of 10-30 wt% (see Fig. 3 a and Fig. 4 a) depending on the specific cooling temperature targeted. One economic factor that need to be considered for large-scale ...

Keywords: Ice slurry; Ice mass fraction; Flow; Pressure drop 1. Introduction Ice slurry has been recognized as a promising crystalline energy carrier for cold energy storage. In fact, it is particularly related to its pumpable feature, high latent heat and high energy density [1,2]. Besides, ice slurry systems

However, cold storage media have disadvantages that have prevented them from becoming widely implemented. Chilled water has a low energy storage density, 4.18 kJ kg⁻¹ for per degree temperature drop, which necessitates large storage volumes of CTES. Storing ice requires a dedicated glycol chiller. It is expensive and relatively inefficient.

Thermal Energy Storage (TES) is the term used to refer to energy storage that is based on a change in temperature. TES can be hot water or cold water storage where conventional energies, such as natural gas, oil, electricity, etc. are used (when the demand for these energies is low) to either heat or cool the storage water.

In some applications ice slurry can be made during periods of no demand and be stored for later use. Both the high energy storage density and the pumpable delivery of ice slurry to the cooling loads make it possible to achieve significant reductions in the size of tanks, pumps, piping, and chillers (Kasza et al., 1986, Kasza et al., 1988, Kasza and Choi, 1987).

The cold energy of the ice slurry is the cold energy stored only in the ice slurry region ($0 \leq g_s \leq 0.3$), and it is computed by solving Eq. (9) only in the ice slurry region. On the other hand, the total cold energy of the CTES is the cold ...

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