Liquid cooling energy storage dehumidification

What is liquid-desiccant assisted dehumidification and cooling system?
Abstract: Liquid-desiccant assisted dehumidification and cooling system has been proved to be an effective method to extract the moisture of air with relatively less energy consumption,especially compared with conventional vapor compression system.

Does the LD dehumidification system integrate with an evaporative cooling technology?
The focus of this research is to address recent studies on the LD dehumidification system integrated with an evaporative cooling technology, which is outlined below. The DEC is used with the dehumidifier for improving the performance of the dehumidification system.

How is dehumidified air cooled?
After dehumidification,if further sensible cooling is needed,it is obtained by passing the dehumidified air through evaporative cooling,vapor-compression,or any other cooling system. TABLE 3.

What are evaporative cooling and dehumidification devices?
In previous multi-stage evaporative cooling and dehumidification systems, dehumidification devices represented by desiccant wheels , liquid desiccants [5, 13], and evaporative coolers were often used as air pretreatment or recovery devices.

What is a liquid desiccant dehumidifier?
The liquid desiccant system is the best option to handle the latent load of air,and it reduces the wastage of electric energy by utilizing low-grade energy,such as; solar energy,industrial waste,and geothermal energy. The best way to improve liquid desiccant dehumidifier performance is to combine it with evaporative cooling technologies.

What is a heat pump based liquid desiccant air dehumidification system?
In 2013,Zhang and Zhang et al. developed a heat pump driven hollow fiber membrane-based liquid desiccant air dehumidification system,as shown in Fig. 20. In Zhang and Zhang's system,the simultaneous heating and cooling of the salt solution were realized with a heat pump system to improve energy efficiency.

The system is capable of using as its source of power low-grade solar heat, of the type obtainable from low-cost flat plate collectors, and has a potential to provide both cooling ...

It is a ratio between the unit cooling capacity to the consumed thermal energy in the liquid desiccant cooling system. ... The results of the analysis showed that better dehumidification and cooling can be obtained by using low air flow rate (mass transfer will be increased because of the more air-desiccant contacting time) and large channel ...

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The use of liquid cooling systems for energy storage is increasing rapidly, and the risk of condensation in battery compartments must be given due consideration. Traditional dehumidification air conditioners require a lot of space, and semiconductor dehumidification equipment has poor dehumidification effects, making it difficult to completely ...

The sorption thermal storage can be conveniently integrated with the absorption chiller (Ibrahim et al., 2017, Khas, 1982, Xu et al., 2011) or the liquid desiccant cooling system (Coca-Ortegón et al., 2016, Kessling et al., 1998), because solution can be utilized as both working pair and energy storage medium.

With lower regeneration temperature (60~90 °C) and a capacity of energy storage, liquid desiccant dehumidification is considered as the development direction of novel ...

The main components of the liquid desiccant air-conditioning systems are absorber, regenerator, liquid desiccant storage tank, and sensible cooling units. ... Islam MR, Alan SWL, Chua KJ (2018) Studying the heat and mass transfer process of liquid desiccant for dehumidification and cooling. Appl Energy 221:334-347.

According to the International Energy Outlook, the global cooling energy demand may increase from 850 to 3350 GW, which can double the CO 2 emissions in the time frame of 2016 to 2050 [2]. Therefore, it is essential to use an energy-efficient and eco-friendly AC system to meet the increased energy demand with reduced emissions.

Kessling et al. [53] searched on energy storage for desiccant cooling systems and developed an experimentally liquid desiccant cooling system (LDC S) which are especially suitable for solar energy applications. Special absorption processes are necessary to achieve an optimal air dehumidification and simultaneously a high energy storage capacity.

Under the trend of energy saving worldwide, the A/C system incorporated with dehumidification and evaporative cooling technology has drawn great research attentions in recent years [4], [5], [6]. Overall, the hybrid A/C system can be classified into solid desiccant-enhanced MVCR system [7], [8], [9], liquid desiccant-enhanced MVCR system [10 ...

Liquid cooling energy storage dehumidification. Energy for air dehumidification and cooling can be stored efficiently and non-dissipatively in liquid desiccants. For optimal storage capacity, new ...

Liquid desiccants, unlike traditional condensation dehumidification technologies, absorb moisture directly from the air, avoiding energy waste from excessive cooling and reheating [19]. These desiccants require regeneration to restore their dehumidification capacity, with the aerodynamic thermal method being the most advanced, though it is also ...

Liquid cooling energy storage dehumidification. Energy for air dehumidification and cooling can be stored

efficiently and non-dissipatively in liquid desiccants. For optimal storage capacity, new dehumidifiers have been developed and tested, dehumidifying air by a cooled microflow of a hygroscopic aqueous s Contact online >>

Energy for air dehumidification and cooling can be stored efficiently and non-dissipatively in liquid desiccants. For optimal storage capacity, new dehumidifiers have been ...

2.2.1 Liquid desiccant materials. Liquid desiccants are the liquid compounds that have a high affinity for water vapour, they can dehumidify air by absorbing water vapour from it. The parameters such as energy storage density, temperature for regeneration, boiling point elevation (BPE), availability and cost should be considered while choosing a liquid desiccant.

Solar powerd two-stage liquid desiccant dehumidification system: COP thermal is 0.94: Zhao et al. [75] 2016: Experiment and simulation: Solar liquid desiccant dehumidification and vapor compression air-conditioning system: COP thermal is 0.79-1.02: Qi et al. [6] 2017: Experiment and simulation: Polymer electrolyte membrane-based electrolytic ...

The growing demand for air conditioning, particularly in hot and humid climates has caused a significant increase in demand for energy resources. A promising solar technology with potential to alleviate the problem is an open absorption system, where humidity is absorbed directly from the air to be treated by direct contact with the absorbent. The absorbent is then ...

It can be used for temperature control of household and industrial and commercial energy storage battery cabinets, such as home energy storage, small merchant energy storage, industrial parks, and commercial building energy storage stations. 60kW energy storage liquid cooled unit

The global primary energy consumption is expected to rise by a factor of 5.0 by 2040 compared to 1970 [1].The world"s carbon emission is also envisioned to increase by a factor of 22.0 by 2040 compared to 1900 [1] the United States, the total energy consumption by residential and commercial buildings almost accounted for 39% of the total energy ...

Integrating an indirect evaporative cooling (IEC) and a liquid desiccant dehumidifier (LDD) as the liquid desiccant cooling system (LDCS) presents an energy-saving and emission-reducing solution to replace ...

Liquid-desiccant dehumidification typically has a higher moisture-holding capacity, ... The total cooling energy consumption of the LDD coupled system increases with increasing outdoor air moisture content. ... Performance analysis of a solar-driven liquid desiccant cooling system with solution storage under adjustable recirculation ratio. Sol ...

A survey of liquid desiccant cooling systems is presented, along with references to recent work and an

assessment of the potential and future research necessary for successful large-scale ...

The liquid desiccant dehumidification system has been mathematically modeled using MATLAB R2018b; primarily to study the amount of dehumidification, the system is able to produce using the energy supplied to it from the photovoltaic module.

Liquid-desiccant dehumidification unit has been recognized as an efficient system in handling air humidity. It has advantages of being driven by low grade heat such as solar energy and waste heat, high energy storage capacity and being easily combined with sensible cooling unit to form a hybrid system.

Heat pumps are an alternative to conventional air and water heating and cooling technology that can reduce a home"s energy use by up to 40% and use no fossil fuels. ... this IHP will be combined with an innovative two-stream ...

Energy for air dehumidification and cooling can be stored efficiently and non-dissipatively in liquid desiccants. For optimal storage capacity, new dehumidifiers have been developed and tested, dehumidifying air by a cooled microflow of a hygroscopic aqueous salt solution, e.g. LiCl H 2 O in an almost isothermal absorption process. A small, theoretically ...

Review on liquid desiccant materials and the potential of deep eutectic solvents as bio-desiccants for air dehumidification. Nanoparticles enhanced ion exchange membrane tendency to eliminate membrane fouling and improve regeneration performance. Non-thermal liquid desiccant regeneration techniques eliminate re-cooling energies requirement in ...

liquid desiccant properties along with its energy storage capabilities have been discussed in detail. In In addition, hybrid of LDSs with sensible cooling technologies has been studied.

Liquid desiccant cooling systems enable efficient energy storage for air dehumidification and air cooling. Using low temperature heat they are well suited to be driven ...

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Also, the development of liquid desiccant cooling systems employing innovative liquids like ionic solutions, and integrating thermal and thermo-chemical energy storage units with desiccant dehumidification based cooling systems would augment extend of the contribution that these system can potentially bring forward.

Currently common methods of air dehumidification in buildings include cooling condensation, solid desiccant, and liquid desiccant dehumidification. Among these methods, cooling condensation is the most common one and has been applied in most practical buildings. ... (60~90 °C) and a capacity of energy storage, liquid

desiccant dehumidification ...

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