TECHNOLOGY

Cascade Vapor Compression and Absorption Cycles Improve Building Air Conditioning

OVERVIEW

Background:

This invention pertains to water-lithium bromide (LiBr) absorption heat pumps for cooling and dehumidifying air in buildings. Currently, an air-cooled water/LiBr absorption heat pump would be incapable of operating at ambient temperatures above a critical value due to crystallization of the salt solution. The relatively low value of this critical temperature is a major barrier to the commercialization of air-cooled absorption heat pumps, since the ambient temperature regularly rises above the critical temperature in most climates that require significant amounts of building cooling.

Innovation:

Researchers at the University of Maryland have developed a novel cascade application for a vapor compression system (VCS) and absorption heat pump (AHP). In the proposed system, a VCS evaporator provides air conditioning and dehumidification to a space, and its condenser heat rejected to an air-cooled AHP evaporator. In this way, the air-cooled AHP avoids crystallization at high ambient temperature by operating at elevated evaporator temperature.

Advantages:

-- The proposed cascade AHP-VCS system uses less electricity than a VCS alone at high ambient temperatures, and very much less when the VCS component is not needed. If the AHP desorber heat is provided by solar heat or waste heat from an engine or other machine, then it also uses substantially less source energy to satisfy a given air-conditioning load.
-- The higher absorber pressures that result from higher evaporator temperature should mean better heat and mass transfer at high ambient temperatures, allowing the absorber to be less expensive.

Applications:

Air-cooled water/LiBr air conditioners for residential or commercial applications. It will be possible for these to be produced in the near term, since all of the required technology and components already exist.

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Additional Information

INSTITUTION

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PATENT STATUS

Patent(s) pending

LICENSE STATUS

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CATEGORIES

- Industrial Processing

EXTERNAL RESOURCES

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