PATENT DOCUMENT

[0004]

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## SUMMARY OF THE INVENTION

### TECHNICAL PROBLEM

[0005]

In the adsorption heat exchanger, adsorption performance may deteriorate, especially when the adsorption layer deteriorates in a short period of time.

[0006]

Embodiments of the present disclosure substantially prevent deterioration of the adsorption layer in the adsorption heat exchanger.

### SOLUTION TO THE PROBLEM

[0007]

According to an aspect of the present disclosure, there is provided an adsorption heat exchanger including: a base sheet; and an adsorbent supported on the base sheet by using a binder, wherein the adsorbent desorbs and absorbs moisture with respect to air, and the binder is resistant to acid such that its mass loss is 35% or less when immersed in 10% nitric acid at 70°C for 40 hours.

[0008]

In the above aspect, the binder is resistant to acid. Thus, deterioration of the adsorption layer is substantially prevented.

[0009]

[0010]

[0011]

[0012]

[0013]

In an embodiment, the binder is resistant to acid such that its mass loss of 20% or less when immersed in 10% nitric acid at 70°C for 40 hours.

[0014]

In the above embodiment, the resistance of the binder to nitric acid is specifically stated. Thus, deterioration of the adsorption layer is substantially prevented more reliably.

[0015]

In an embodiment, the binder has a moisture permeation amount of equal to or higher than 40 $g/m^2$ per day when being a film having a thickness of 100 μm.

[0016]

In the above embodiment, the binder permeates moisture to a desired degree, which is advantageous for the performance of the adsorption heat exchanger.

[0017]

In an embodiment, an elongation percentage of the binder is equal to or greater than a

cubic root of (X/100)*100 (%) when an expansion rate of the adsorbent is X (%).

[0018]

In the above embodiment, even when the adsorbent expands due to moisture absorption, the binder is sufficiently elongated, thereby reducing the adsorbent (41) detached.

[0019]

In an embodiment, the binder has a tensile strength of 12 $N/mm^2$ or less.

[0020]

In the above embodiment, the binder is easily elongated. Thus, the binder is easily elongated even when the adsorbent expands, thereby reducing the adsorbent detached.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0021]

FIG. 1 is a piping system diagram illustrating a configuration of a refrigerant circuit in a humidity control apparatus. In FIG. 1, an illustration (A) illustrates an operation during a first operation, and an illustration (B) illustrates an operation during a second operation.

FIG. 2 is a schematic perspective view of an adsorption heat exchanger.

FIG. 3 is a side view of a heat exchanger unit constituting the adsorption heat exchanger.

FIG. 4 is a sectional view taken along line A-A in FIG. 3.

CLAIMS

1. An adsorption heat exchanger comprising:

a base sheet; and

an adsorbent supported on the base sheet by using a binder, wherein

the adsorbent desorbs and absorbs moisture with respect to air, and

the binder is resistant to acid such that its mass loss is 35% or less when immersed in 10% nitric acid at 70°C for 40 hours.

2. The adsorption heat exchanger of claim 1, wherein

the binder is resistant to acid such that its mass loss is 20% or less when immersed in 10% nitric acid at 70°C for 40 hours.

3. The adsorption heat exchanger of claim 1 or 2, wherein

the binder has a moisture permeation amount of equal to or higher than 40 $g/m^2$ per day when being a film having a thickness of 100 μm.

4. The adsorption heat exchanger of any one of claims 1 to 3, wherein

an elongation percentage of the binder is equal to or greater than a cubic root of (X/100)*100 (%) when an expansion rate of the adsorbent is X (%).

5. The adsorption heat exchanger of claim 4, wherein

the binder has a tensile strength of 12 $N/mm^2$ or less.