PATENT DOCUMENT

[0004]

Patent Document 1: Japanese Unexamined Patent Publication No. 2009-019863

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. The binder is resistant to acid.

[0008]

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

[0009]

In an embodiment, the binder is resistant to at least one of nitric acid or sulfuric acid.

[0010]

In the above embodiment, the binder is resistant to at least one of nitric acid or sulfuric acid as specific acid. Thus, deterioration of the adsorption layer is substantially prevented.

[0011]

In an embodiment, the binder is resistant to nitric acid.

[0012]

In the above embodiment, the binder is resistant to nitric acid as specific acid. Thus, deterioration of the adsorption layer is substantially prevented.

[0013]

In an embodiment, the binder has a mass loss of 35% 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.