Claims

[Claim 1]

A gas humidity regulating method comprising:

feeding gas subjected to treatment from an inlet port of a gas-liquid contact case into the gas-liquid contact case while a first medium serving as a liquid desiccant is disposed on a gas-liquid contact part and a second medium for temperature regulation is passed through a heat exchanging pipe, the gas-liquid contact part including the heat exchanging pipe in the gas-liquid contact case that has the inlet port for feeding gas subjected to treatment and an outlet port for discharging treated gas;

absorbing water content into the first medium from the gas subjected to treatment while making a gas-liquid contact with the first medium on the gas-liquid contact part; and

discharging the treated gas from the outlet port, wherein the first medium is a mixed solution of water and a solution mainly composed of an ionic liquid, wherein the ionic liquid is expressed by a chemical formula C^+A^- where C^+ is 1,3-dialkylimidazolium cation and A^- is acid anion, wherein an alkyl group of the 1,3-dialkylimidazolium cation is a methyl group or an ethyl group, and acid anion is carboxylate anion, sulfonate anion, or phosphate anion.

[Claim 2]

The gas humidity regulation method according to claim 1, wherein the ionic liquid is selected from 1,3-dimethylimidazolium acetate, 1,3-dimethylimidazolium methylsulfonate, 1-ethyl-3-methyl imidazolium diethylphosphate, 1,3-dimethylimidazolium propionate.

[Claim 3]

The gas humidity regulating method according to any one of claims 1 to 2, wherein the ionic liquid in the first medium has a concentration of 60 to 90 mass%.

[Claim 4]

The gas humidity regulating method according to any one of claims 1 to 2, wherein when the ionic liquid has a concentration of 80 mass%, the first medium has a saturation vapor pressure of 1.9 kPa or less and a viscosity of 13 to 21 mPa·s at 35°C.

[Claim 5]

The gas humidity regulating method according to any one of claims 1 to 2, wherein the first medium has a flow rate of 0.5 to 3 $kg/m^2 \cdot s$.

[Claim 6]

A gas humidity regulator,
comprising a heat exchanging pipe, a gas-liquid contact part, a gas-liquid contact case, an inlet port, an outlet port, a first medium and a second medium,

wherein the heat exchanging pipe and a fin are disposed as the gas-liquid contact part in a meandering manner in the gas-liquid contact case that includes the inlet port for feeding gas subjected to treatment and the outlet port for discharging treated gas, the regulator includes a sprinkling pipe provided above the heat exchanging pipe so as to spray the first medium onto the heat exchanging pipe, and a second medium is passed through the heat exchanging pipe, wherein a first medium is a mixed solution of water and a solution mainly composed of an ionic liquid, wherein the ionic liquid is expressed by a chemical formula C^+A^- where C^+ is 1,3-dialkylimidazolium cation and A^- is acid anion, wherein an alkyl group of the 1,3-dialkylimidazolium cation is a methyl group or an ethyl group, and acid anion is carboxylate anion, sulfonate anion, or phosphate anion.

[Claim 7]

The gas humidity regulator according to claim 6, further comprising a dehumidifier and a humidifier in a pair;

a first connecting pipe that passes the humidified first medium between the gas-liquid contact case of the dehumidifier and the sprinkling pipe of the humidifier; and

a second connecting pipe that passes the dehumidified first medium between the gas-liquid contact case of the humidifier and the sprinkling pipe of the dehumidifier.

[Claim 8]

The gas humidity regulator according to claim 6 or 7, wherein the heat exchanging pipe and the fin are made of metals.

[Claim 9]

The gas humidity regulator according to claim 8, wherein the heat exchanging pipe and the fin are made of aluminium or stainless steel.

[Claim 10]

The gas humidity regulator according to any one of claims 6 to 9, which is used for the gas humidity regulating method according to any one of claims 1 to 5.