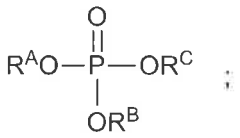
Claims

1. Process for dehumidifying a moist gas mixture **G**, in particular moist air, in an apparatus $\mathbf{V_1}$, comprising the steps of:

(a) contacting the moist gas mixture **G** with an aqueous liquid absorption medium $\mathbf{A_{VE}}$ comprising a mixture of at least one trialkyl phosphate of structure **(I)** where



(I)

and at least one salt **S** selected from the group consisting of $Q^+(R^1O)_2PO_2^-$,

wherein $\mathbf{A_{VE}}$ at least partially absorbs water from the moist gas mixture **G**,

to afford an aqueous liquid absorption medium $\mathbf{A_{VE1}}$ having an elevated water content compared to $\mathbf{A_{VE}}$ and a gas mixture $\mathbf{G_1}$ having a relatively low water content compared to the moist gas mixture **G**,

(b) partially removing water from $\mathbf{A_{VE1}}$ to obtain an aqueous liquid absorption medium $\mathbf{A_{VE2}}$ having a relatively low water content compared to $\mathbf{A_{VE1}}$,

wherein the apparatus $\mathbf{V_1}$ at least partially comprises a surface made of a steel material of construction $\mathbf{O_{st}}$ and in the apparatus $\mathbf{V_1}$ at least one of $\mathbf{A_{VE}}$, $\mathbf{A_{VE1}}$, $\mathbf{A_{VE2}}$ contacts the surface made of a steel material of construction $\mathbf{O_{st}}$ via at least one contact surface,

wherein

Q^+ is 1-ethyl-3-methylimidazolium, 1,3-diethylimidazolium,

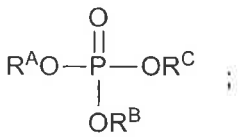
wherein R^A, R^B, R^C, R^1 are each ethyl.

2. Process according to Claim 1, wherein in the aqueous liquid absorption medium $\mathbf{A_{VE}}$ the total weight of all trialkyl phosphates of structure **(I)** and all salts **S** is in the range 65 wt% to 95 wt% based on the total weight of the aqueous solution.

3. Process according to Claim 1 or 2, wherein in the aqueous liquid absorption medium $\mathbf{A_{VE}}$ the ratio of the total weight of all trialkyl phosphates of structure **(I)** to the total weight of all salts **S** is in the range 1:9999 to 1:9.

4. Apparatus $\mathbf{V_2}$ for dehumidifying a moist gas mixture, comprising the components

(i) an aqueous liquid absorption medium $\mathbf{A_{VO}}$ which comprises a mixture of at least one trialkyl phosphate of structure **(I)** where



(I)

and at least one salt **S** selected from the group consisting of $Q^+(R^1O)_2PO_2^-$,

(ii) at least one water absorption unit $\mathbf{W_{abs2}}$ set up for contacting the moist gas mixture with the aqueous liquid absorption medium $\mathbf{A_{VO}}$,

(iii) at least one water desorption unit $\mathbf{W_{des2}}$ which comprises a heat exchanger $\mathbf{W_{x2}}$ and is set up for at least partially removing water from an aqueous liquid absorption medium $\mathbf{A_{VO}}$,

(iv) and a circuit $\mathbf{U_2}$ which connects the water absorption unit $\mathbf{W_{abs2}}$ with the water desorption unit $\mathbf{W_{des2}}$ and by means of which the aqueous liquid absorption medium $\mathbf{A_{VO}}$ may be circulated,

wherein at least one of the components water absorption unit $\mathbf{W_{abs2}}$, water desorption unit $\mathbf{W_{des2}}$, circuit $\mathbf{U_2}$ at least partially comprises a surface made of a steel material of construction $\mathbf{O_{ST}}$, and

wherein disposed in the apparatus $\mathbf{V_2}$ is at least one contact surface at which the aqueous liquid absorption medium $\mathbf{A_{VO}}$ contacts the surface made of a steel material of construction $\mathbf{O_{st}}$,

wherein

Q^+ is 1-ethyl-3-methylimidazolium, 1,3-diethylimidazolium,

wherein R^A, R^B, R^C, R^1 are each ethyl.

5. Apparatus $\mathbf{V_2}$ according to Claim 4, wherein in the aqueous liquid absorption medium $\mathbf{A_{VO}}$ the total weight of all trialkyl phosphates of structure **(I)** and all salts **S** is in the range 65 wt% to 95 wt% based on the total weight of the aqueous solution.

6. Apparatus $\mathbf{V_2}$ according to any Claim 4 or 5, wherein in the aqueous liquid absorption medium $\mathbf{A_{VO}}$ the ratio of the total weight of all trialkyl phosphates of structure **(I)** to the total weight of all salts **S** is in the range 1:9999 to 1:9.

7. Absorption heat pump, comprising an apparatus $\mathbf{V_2}$ according to any of Claims 4 to 6 and, as further components, a condenser, an evaporator and a coolant, wherein the coolant is water.