CLAIMS

1. A membrane separation method for a to-be-treated liquid having an osmotic pressure, the method comprising

a first step of separating the to-be-treated liquid into a first permeate and a first retentate by a reverse osmosis method using a loose RO membrane, wherein

the loose RO membrane is a membrane through which at least a part of a solute contained in the to-be-treated liquid passes together with a solvent, and

the to-be-treated liquid

(i) satisfies the following formula (1) when an osmotic pressure of a to-be-treated liquid side membrane surface concentration Cb' is represented by $\pi_{Cb'}$ and a maximum operating pressure difference is represented by ΔPmax,

$$\pi_{Cb'} > \Delta Pmax \quad (1)$$

and wherein an apparent blocking ratio Robs of a solute in the loose RO membrane is 20% or more and 90% or less under operating conditions.

2. The membrane separation method according to claim 1, wherein in the first step, an operating pressure difference ΔP falls within a range satisfying the following formula (2) when an osmotic pressure difference between a

to-be-treated liquid side and a permeation side is represented by Δπ, and a reflection coefficient of a solute of the loose RO membrane is represented by σ.

$$\Delta P > \sigma\Delta\pi \quad (2)$$

3. The membrane separation method according to claim 1, wherein the loose RO membrane has an apparent blocking ratio Robs of 20% or more and 90% or less when the to-be-treated liquid of a 25 wt% potassium hydrogen carbonate aqueous solution is subjected to a reverse osmosis method treatment at a liquid temperature of 40°C, an operating pressure difference of 8 MPa, a pH of 7 or more and 9 or less, and a recovery ratio of 10% or more and 20% or less.

4. The membrane separation method according to claim 1, comprising a second step of separating the first permeate into a second permeate and a second retentate by a reverse osmosis method using a reverse osmosis membrane, wherein

the reverse osmosis membrane has an apparent blocking ratio Robs of 95% or more.

5. The membrane separation method according to claim 1, wherein the number of the first steps is one or more and ten or less.

6. The membrane separation method according to claim 1, wherein for at least one of the loose RO membranes, a permeability coefficient Lp of pure water is 1×10^{-12} [$m^3/m^2/s/Pa$] or more and 1×10^{-9} [$m^3/m^2/s/Pa$] or less, a reflection coefficient σ of a solute is 0.2 or more and 0.9 or less, and a permeability coefficient P of the solute is 1×10^{-8} [m/s] or more and 1×10^{-5} [m/s] or less.

7. The membrane separation method according to claim 1, comprising a plurality of the first steps, wherein the loose RO membrane in at least one of the first steps that are continuous has a higher blocking ratio than the loose RO membrane in the first step in upstream.

8. The membrane separation method according to claim 4, wherein at least a part of the first retentate and/or the second retentate is used as a part of a first to-be-treated liquid and/or a second to-be-treated liquid.

9. The membrane separation method according to claim 1, wherein an operating pressure difference in at least one of the first steps is 5 MPa or more and 10 MPa or less.

10. The membrane separation method according to any

one of claims 1 to 9, wherein a loose RO membrane manufactured by the manufacturing method comprising bringing an oxidizing agent solution containing an oxidizing agent into contact with an RO membrane is used.