【CLAIMS】

【Claim 1】

A polyamide reverse osmosis membrane having excellent durability and antifouling properties, comprising:

a porous support;

a polymer support layer which is formed on at least one surface of the porous support;

a polyamide layer which is formed on the polymer support layer;

a fouling resistant layer which is formed by an antifouling coating agent on the polyamide layer; and

a protective coating layer which is formed by cross-linking with a fouling resistant layer on the fouling resistant layer,

wherein the protective coating layer comprises a cross-linked product of polyvinyl alcohol and glutaraldehyde,

wherein the protective coating layer is formed by a protective coating solution comprising polyvinyl alcohol, glutaraldehyde and a solvent,

wherein the fouling resistant layer comprises a reaction product obtained by reacting a primary amine compound comprising at least one of a hydroxy group and an alkoxy group; and a polyfunctional acid halide compound,

wherein the antifouling coating agent comprising a primary amine compound comprising one or more selected from ethanol amine and aminoacetaldehyde dimethyl acetal, and a solvent, and

wherein the reverse osmosis membrane has a salt removal reduction rate of less than 13.0% after exposure to chlorine as measured by Relationship Formula 1 below:

[Relationship Formula 1]

Salt removal reduction rate (%)=|Initial salt removal rate (%) - Salt removal rate after exposure to chlorine (%)| / (Initial salt removal rate (%)) × 100%,

wherein in Relationship Formula 1 above, the 'initial salt removal rate' refers to the salt removal rate measured by operating the polyamide reverse osmosis membrane at a pressure of 150 psi under the conditions of raw water comprising NaCl at a concentration of 1,500 ppm, and the 'salt removal rate after exposure to chlorine' refers to the salt removal rate measured when the polyamide osmosis membrane is operated for 6 hours under the conditions of an aqueous solution comprising 1,500 ppm NaCl and 1,000 ppm NaOCl.

【Claim 2】

The polyamide reverse osmosis membrane of claim 1, wherein the polyamide layer comprises a reaction product obtained by reacting an amine compound and a polyfunctional acid halide compound.

【Claim 3】

The polyamide reverse osmosis membrane of claim 1, wherein when the reverse osmosis membrane is operated for 1 hour at a temperature of 25°C and a pressure of 150 psi under the conditions of an aqueous solution comprising 1,500 ppm of sodium chloride (NaCl), the flow rate is 18.0 gfd or more.

【Claim 4】

The polyamide reverse osmosis membrane of claim 1, wherein when the flow

rate is measured after the reverse osmosis membrane is circulated in raw water comprising 1,500 ppm of sodium chloride (NaCl) by further adding 50 ppm of dry milk, which is an organic contaminant, for 2 hours at a pressure of 150 psi to contaminate the membrane, the ratio of the reduced flow rate compared to the initial flow rate is less than 20%.

【Claim 5】

A method for manufacturing a polyamide reverse osmosis membrane having excellent durability and antifouling properties, comprising the steps of:

forming a polymer support layer by applying and drying a polymer solution on the surface of a porous support;

forming a polyamide layer on the surface of the polymer support layer;

forming a fouling resistant layer by coating an antifouling coating agent on the surface of the polyamide layer, wherein the antifouling coating agent comprises a primary amine compound comprising one or more selected from ethanol amine and aminoacetaldehyde dimethyl acetal, and a solvent; and

forming a protective coating layer comprising a cross-linked product of polyvinyl alcohol and glutaraldehyde by coating a protective coating solution on the surface of the fouling resistant layer, wherein the protective coating solution comprises polyvinyl alcohol, glutaraldehyde and a solvent, and

wherein the reverse osmosis membrane has a salt removal reduction rate of less than 13.0% after exposure to chlorine as measured by Relationship Formula 1 below:

[Relationship Formula 1]

Salt removal reduction rate (%)=|Initial salt removal rate (%) - Salt removal

rate after exposure to chlorine (%)| / (Initial salt removal rate (%)) × 100%,

wherein in Relationship Formula 1 above, the 'initial salt removal rate' refers to the salt removal rate measured by operating the polyamide reverse osmosis membrane at a pressure of 150 psi under the conditions of raw water comprising NaCl at a concentration of 1,500 ppm, and the 'salt removal rate after exposure to chlorine' refers to the salt removal rate measured when the polyamide osmosis membrane is operated for 6 hours under the conditions of an aqueous solution comprising 1,500 ppm NaCl and 1,000 ppm NaOCl.

【Claim 6】

The method of claim 5, wherein the polymer solution comprises a polymer compound and a solvent, and

wherein the polymer compound comprises at least one selected from polysulfone-based polymers, polyethersulfone-based polymers, polyamide-based polymers, polyimide-based polymers, polyester-based polymers, olefin-based polymers, polyvinylidene fluoride and polyacrylonitrile.

【Claim 7】

The method of claim 5, wherein the antifouling coating agent comprises 0.001 to 10 wt.% of a primary amine compound comprising at least one of a hydroxy group and an alkoxy group; and a residual amount of solvent.