Claims

[Claim 1]

A porous membrane comprising a hydrophobic polymer and a hydrophilic polymer, wherein

an average value T of ratios of the number of counts of ions derived from the hydrophilic polymer to the number of counts of ions derived from the hydrophobic polymer is 1.0 or more when a surface of the porous membrane is measured by time-of-flight secondary ion mass spectrometry (TOF-SIMS), wherein

the ion derived from the hydrophobic polymer is C_6H_4O (m/z = 92),

the ion derived from the hydrophilic polymer is $C_4H_5O_2$ (m/z = 85),

the hydrophilic polymer is a methacrylate-based polymer,

the hydrophobic polymer is a polysulfone-based polymer, and

a base material membrane comprising the hydrophobic polymer is coated with the hydrophilic polymer.

[Claim 2]

The porous membrane according to claim 1, wherein the hydrophilic polymer is a water-insoluble hydrophilic polymer.

[Claim 3]

The porous membrane according to claim 1 or 2, wherein the hydrophilic polymer is electrically neutral.

[Claim 4]

The porous membrane according to any one of claims 1-3, wherein the methacrylate-based polymer is polyhydroxyethyl methacrylate.

[Claim 5]

The porous membrane according to any one of claims 1-4, wherein the polysulfone-based polymer is polyethersulfone.

[Claim 6]

The porous membrane according to any one of claims 1 to 5, wherein a bubble point is 1.4 to 2.0 MPa.

[Claim 7]

The porous membrane according to any one of claims 1 to 6, wherein a pure water permeability is 150 to 500 $L/(hr \cdot m^2 \cdot bar)$.

[Claim 8]

The porous membrane according to any one of claims 1 to 7, for removing viruses.

[Claim 9]

The porous membrane according to any one of claims 1 to 8, wherein a viral log reduction value (LRV) is 4 or more.

[Claim 10]

The porous membrane according to any one of claims 1 to 9, wherein a content of the hydrophilic polymer is 5 to 20 wt% with respect to the hydrophobic polymer.

[Claim 11]

The porous membrane according to any one of claims 1 to 10, wherein the average value T is 1.0 or more and 7.0 or less.

[Claim 12]

A method for producing a porous membrane comprising a hydrophobic polymer and a hydrophilic polymer, the method comprising:

a hydrophilization process of coating and hydrophilizing a base material membrane comprising a hydrophobic polymer with a hydrophilic polymer to obtain a hydrophilized porous membrane; and

an adjustment process of treating the hydrophilized porous membrane so that an average value T of ratios of the number of counts of ions derived from the hydrophilic polymer to the number of counts of ions derived from the hydrophobic polymer is 1.0 or more when a surface of the porous membrane is measured by time-of-flight secondary ion mass spectrometry (TOF-SIMS), wherein

the ion derived from the hydrophobic polymer is C_6H_4O (m/z = 92),

the ion derived from the hydrophilic polymer is $C_4H_5O_2$ (m/z = 85),

the hydrophilic polymer is a methacrylate-based polymer,

the hydrophobic polymer is a polysulfone-based polymer, and

the adjustment process comprises subjecting the hydrophilized porous membrane to washing and/or high-pressure hot-water treatment.

[Claim 13]

A method for reducing membrane adhesion after hydrophilizing a base material membrane comprising a hydrophobic polymer, the method comprising:

a hydrophilization process of coating and hydrophilizing a base material membrane comprising a hydrophobic polymer with a hydrophilic polymer to obtain a hydrophilized porous membrane; and

an adjustment process of treating the hydrophilized porous membrane so that an average value T of ratios of the number of counts of ions derived from the hydrophilic polymer to the number of counts of ions derived from the hydrophobic polymer is 1.0 or more when a surface of the porous membrane is measured by time-of-flight secondary ion mass spectrometry (TOF-SIMS), wherein

the ion derived from the hydrophobic polymer is C_6H_4O (m/z = 92),

the ion derived from the hydrophilic polymer is $C_4H_5O_2$ (m/z = 85),

the hydrophilic polymer is a methacrylate-based polymer,

the hydrophobic polymer is a polysulfone-based polymer, and

the adjustment process comprises subjecting the hydrophilized porous membrane to washing and/or high-pressure hot-water treatment.

[Claim 14]

The method according to any one of claim 12 or 13, wherein the hydrophilization process comprises a process of making the base material membrane into a bundle and performing hydrophilization treatment.