[CLAIMS]

[Claim 1]

A wastewater treatment method for treating wastewater containing at least chloride ions, alkali metal ions, carbonate ions, and calcium ions, the wastewater treatment method comprising:

a soft water treatment of crystallizing calcium carbonate from wastewater to remove the calcium carbonate therefrom; and

an electrodialysis of separating some of the wastewater from which the calcium carbonate has been removed into electrodialysis concentrated water and electrodialysis diluted water by electrodialysis treatment;

an electrolysis of electrolyzing some or all of the wastewater from which the calcium carbonate has been removed electrodialysis concentrated water to obtain an acidic aqueous solution and an alkaline aqueous solution,; and

a reverse osmosis membrane treatment of separating some of the wastewater from which the calcium carbonate has been removed into reverse osmosis membrane treated water and reverse osmosis membrane concentrated water using a reverse osmosis membrane,

wherein a pH of the wastewater to be used in the soft water treatment is adjusted to 10 or more by circulating at least some of the alkaline aqueous solution is circulated to be used in the soft water treatment,

at least some of the acidic aqueous solution is circulated to be used in the electrodialysis, and

a pH of the wastewater to be used in the reverse osmosis membrane treatment is adjusted to be in a range of 8.5 to 9.5.

[Claim 2]

The wastewater treatment method according to claim 1,

wherein at least some of the acidic aqueous solution is circulated to be used in the electrolysis.

[Claim 3]

The wastewater treatment method according to claim 1 or 2, the wastewater treatment method further comprising an electrodialysis of separating some of the wastewater from which the calcium carbonate has been removed into electrodialysis concentrated water and

~~electrodialysis diluted water by electrodialysis treatment after the soft water treatment and before the electrolysis.~~

~~[Claim 4]~~

~~The wastewater treatment method according to any one of claims 1 to 3, the wastewater treatment method further comprising a reverse osmosis membrane treatment of separating some of the wastewater from which the calcium carbonate has been removed into reverse osmosis membrane treated water and reverse osmosis membrane concentrated water using a reverse osmosis membrane.~~

~~[Claim 5]~~

~~The wastewater treatment method according to claim 4, the wastewater treatment method further comprising mixing the acidic aqueous solution with the wastewater from which the calcium carbonate has been removed before the reverse osmosis membrane treatment.~~

[Claim ~~6~~ 3]

The wastewater treatment method according to ~~any one of claims 1 to 5~~ claim 1 or 2, the wastewater treatment method further comprising a sodium hypochlorite production of electrolyzing some or all of the ~~wastewater from which the calcium carbonate has been removed~~ electrodialysis concentrated water to produce a sodium hypochlorite aqueous solution.

[Claim ~~7~~ 4]

The wastewater treatment method according to any one of claims 1 to ~~5~~ 3, wherein the electrolysis is performed by a hydrogen oxidation reaction.

~~[Claim 8]~~

~~The wastewater treatment method according to any one of claims 1 to 7,~~

~~wherein the wastewater contains at least chloride ions, alkali metal ions, carbonate ions, and calcium ions.~~

~~[Claim 9]~~

~~The wastewater treatment method according to claim 8,~~

~~wherein a concentration of the chloride ions in the wastewater is 0.01 mg/L or more.~~

~~[Claim 10]~~

~~The wastewater treatment method according to claim 8 or 9,~~

~~wherein a concentration of the alkali metal ions in the wastewater is 0.01 mg/L or more.~~

~~[Claim 11]~~

~~The wastewater treatment method according to any one of claims 1 to 10, the wastewater treatment method further comprising:~~

~~a pH adjustment of adjusting a pH of the wastewater to 10 or more.~~

~~[Claim 12]~~

~~The wastewater treatment method according to any one of claims 1 to 11,~~

~~wherein, in the soft water treatment, treatment is performed such that a concentration of total calcium contained in the wastewater is 500 mg/L or less.~~

[Claim ~~13~~ 5]

The wastewater treatment method according to any one of claim ~~2~~ 1 to 4,

wherein the wastewater, whose pH is 10 or more, to be used in the electrodialysis is neutralized when at least some of the acidic aqueous solution ~~obtained in the electrolysis~~ is circulated to be used in the electrodialysis~~for cleaning an electrolysis device that performs the electrolysis~~.

[Claim ~~14~~ 6]

A wastewater treatment apparatus that treats wastewater containing at least chloride ions, alkali metal ions, carbonate ions, and calcium ions, the wastewater treatment apparatus comprising:

a crystallization device that crystallizes calcium carbonate from the wastewater to remove the calcium carbonate therefrom;

an electrodialysis device that separates some of the wastewater from which the calcium carbonate has been removed into electrodialysis concentrated water and electrodialysis diluted water by electrodialysis treatment;

an electrolysis device that electrolyzes some or all of the ~~wastewater from which the~~

~~calcium carbonate has been removed~~ electrodialysis concentrated water to produce an acidic aqueous solution and an alkaline aqueous solution; ~~and~~

a reverse osmosis membrane treatment device that separates some of the wastewater from which the calcium carbonate has been removed into reverse osmosis membrane treated water and reverse osmosis membrane concentrated water using a reverse osmosis membrane;

a first circulator that circulates at least some of the alkaline aqueous solution to the crystallization device;

an electrodialysis acidic water circulation pipe that circulates circulates at least some of the acidic aqueous solution to circulate in the electrodialysis device; and

a pH adjusting acidic water circulation pipe that circulates at least some of the acidic aqueous solution to circulate in the reverse osmosis membrane treatment device.

[Claim ~~15~~ 7]

The wastewater treatment apparatus according to claim ~~14~~ 6, the wastewater treatment apparatus further comprising a second circulator that circulates at least some of the acidic aqueous solution to the electrolysis device.

~~[Claim 16]~~

~~The wastewater treatment apparatus according to claim 14 or 15, the wastewater treatment apparatus further comprising an electrodialysis device that separates some of the wastewater from which the calcium carbonate has been removed into electrodialysis concentrated water and electrodialysis diluted water by electrodialysis treatment between the crystallization device and the electrolysis device.~~

~~[Claim 17]~~

~~The wastewater treatment apparatus according to any one of claims 14 to 16, the wastewater treatment apparatus further comprising a reverse osmosis membrane treatment device that separates some of the wastewater from which the calcium carbonate has been removed into reverse osmosis membrane treated water and reverse osmosis membrane concentrated water using a reverse osmosis membrane.~~

~~[Claim 18]~~

~~The wastewater treatment apparatus according to claim 17, the wastewater treatment apparatus further comprising a mixing portion that mixes the acidic aqueous solution with the~~

~~wastewater from which the calcium carbonate has been removed.~~

[Claim ~~19~~ 8]

The wastewater treatment apparatus according to ~~any one of claims 14 to 17~~ claim 6 or 7, the wastewater treatment apparatus further comprising a sodium hypochlorite production device that electrolyzes some or all of the ~~wastewater from which the calcium carbonate has been removed~~ electrodialysis concentrated water to produce a sodium hypochlorite aqueous solution.

[Claim ~~20~~ 9]

The wastewater treatment apparatus according to any one of claims ~~14~~ 6 to ~~18~~ 8, wherein the electrolysis device has an anode which is a hydrogen gas diffusion electrode.