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FTO SEARCH

Submitted to:

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Client Reference No:

Date: 06- Jun-2016

Patent Number: US7459088

Priority Date: 13-Sep-2004

Title: Water desalination process and apparatus

Features to Search

E1: A process for treating a water stream comprising: feeding a water stream through a desalination process to produce a by-product stream, the by-product stream containing dissolved calcium ions and sulfate ions.

E2: Contacting the by-product stream with a cation-removal device and an anion-removal device to remove a substantial portion of the calcium ions and the sulfate ions, the calcium ions passing into a first salt stream, the sulfate ions passing into a second salt stream, the first salt stream containing chlorine ions, the second salt stream containing sodium ions;

E3: Separately feeding the first salt stream and the second salt stream to a calcium sulfate precipitation chamber for precipitating calcium sulfate. Collecting the precipitated calcium sulfate.

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Search Strategy

Database: AcclaimIP, USPTO, Patentscope, Espacenet, Google Patents.

Keywords:

Set1	Desalination, Removal of salt from Water, Water Treatment
Set2	Salt, Sodium Chloride, Sodium Ions, Chloride Ions
Set3	By product stream, Dissolved calcium ions, Dissolved sulphate ions

US Classification Codes with definitions

210/702: Making an insoluble substance or accreting suspended constituents

210/638: Including ion exchange or other chemical reaction

204/529: Metal or metal salt recovered or removed

International Classification Codes with definitions

B01D61/44: Ion-selective electrodialysis

B01D61/42: Electrodialysis; Electro-osmosis Electro-ultrafiltration

Search Results 1

Patent/Publication Number: [US3639231](#)

Title: Desalination process

Assignee/Applicant: Bresler And Associates Inc

Filing Date: 13-Nov-1970

Priority Date: 13-Nov-1970

Also Published as: None

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Relevant Excerpt for E1	Claims: 1.The process for removing inorganic salts from an aqueous solution containing the same, 8. The process of claim 2, wherein the ion exchange resin of (a) is regenerated with the stream obtained by regenerating said ion exchange resin of (b) with said inorganic salt product.
Relevant Excerpt for E2	Not Disclosed
Relevant Excerpt for E3	Not Disclosed

Search Results_2

Patent/Publication Number: [US3933610](#)

Title: Desalination process by improved multistage electro dialysis

Assignee/Applicant: Asahi Kasei Corp

Filing Date: 14-Mar-1975

Priority Date: 30-Mar-1974

Also Published as: AU7927475,AU7927475,JPS50129487

Relevant Excerpt for E1	Claims: 12. A process as claimed in claim 2, wherein concentrated aqueous solutions in different stages are joined into separate streams.
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Relevant Excerpt for E2	Claims: 2. In a process for desalination of an aqueous salt solution containing ions capable of forming gypsum by multi-stage electro dialysis with at least two stages which are connected in series to effect dilution in progressive steps, each stage having multiple pairs of anionic and cationic ion exchange membranes placed alternately therein to divide said stage into alternate dilution and concentration chambers, the improvement
	comprising using in at least one stage plural pairs of ion exchange membranes, at least one of the first membranes having a divalent ion permselectivity coefficient for calcium or sulfate ions of less than 0.7 as one of said anionic and cationic ion exchange membranes,
Relevant Excerpt for E3	Claims: 2. In a process for desalination of an aqueous salt solution containing ions capable of forming gypsum by multi-stage electro dialysis

Search Results 3

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Patent/Publication Number: [US4392959](#)

Title: Process for sterilization and removal of inorganic salts from a water stream

Assignee/Applicant: Coillet Dudley W

Filing Date: 15-May-1981

Priority Date: 15-May-1981

Also Published as: None

Relevant Excerpt for E1	Claims: 1.subjecting the first stage permeate stream to second stage reverse osmosis to form a second stage permeate stream of potable water and a second stage sodium chloride brine stream.
Relevant Excerpt for E2	Claims: 9. The process of claim 2 together with the steps of:
	(g) mixing the more concentrated sodium chloride stream with soluble calcium cations under acid conditions; (h) separating from the more concentrated sodium chloride stream a precipitate of calcium sulphate;

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Relevant Excerpt for E3	<p>Claims:</p> <p>1. A process for the desalination of unpotable feedwater comprising the steps of:</p> <p>(a) decarbonating said feedwater by adding sodium hydroxide to said feedwater in a quantity sufficient to raise the pH level to at least about 9.5 but no greater than 11 to thereby convert substantially bicarbonate to carbonate and to precipitate said carbonate substantially as calcium carbonate in a sludge and a supernatant saline stream;</p> <p>7. The more concentrated sodium chloride stream from step (e), containing dissolved calcium, is mixed with soluble carbonate under alkaline conditions to precipitate calcium carbonate; and</p> <p>(l) the calcium carbonate precipitate is separated from the more concentrated sodium chloride stream.</p>
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