

CLAIMS

- 1 A salt recovery solution suitable for recovering a salt from a salt containing aqueous solution,
the salt recovery solution comprising at least two or more components independently
5 selected from any combination of integers a), b), c) and d): where
- a) is a straight, branched or optionally substituted cyclic C₄-C₉ ether containing compound;
 - b) is a straight chain or branched C₃-C₉ alkyl substituted by -OH;
 - c) is a straight chain, branched or cyclic C₄-C₉ ketone or C₄-C₉ diketone; and
 - 10 d) is a straight chain or branched C₃-C₉ ester containing compound;
- wherein at least one component of the salt recovery solution is substantially immiscible with an aqueous solution of sodium chloride at a 1 molar concentration at or above 20 degrees Celsius and at 1 atmosphere.
- 2 The salt recovery solution as claimed in claim 1, wherein the ether containing compound is a
15 diether or polyether.
- 3 The salt recovery solution as claimed in claim 1 or claim 2, wherein the C₄-C₉ ether containing compound is selected from one or more of 2-methyltetrahydrofuran, 3-methyltetrahydrofuran, 2-ethyltetrahydrofuran, 3-ethyltetrahydrofuran, dioxane, 1-ethoxypropane, and a C₄-C₉ glycol ether or combinations thereof.
- 20 4 The salt recovery solution as claimed in any one of claims 1 to 3, wherein the straight chain or branched C₃-C₉ alkyl substituted by -OH is selected from one or more of 1-butanol, 2, butanol and 1-pentanol or combinations thereof.
- 5 The salt recovery solution as claimed in any one of claims 1 to 4, wherein the C₄-C₉ glycol ether is selected from one or more of propylene glycol methyl ether, dipropylene glycol methyl ethyl
25 acetate, dipropylene glycol n-propyl ether, propylene glycol n-butyl ether, dipropylene glycol n-butyl ether, tripropylene glycol n-butyl ether, propylene glycol phenyl ether, propylene glycol diacetate or combinations thereof.
- 6 The salt recovery solution as claimed in any one of claims 1 to 5, wherein the C₄-C₉ ketone or diketone is selected from one or more of acetonylacetone, 2-butanone or cyclohexanone.
- 30 7 The salt recovery solution as claimed in any one of claims 1 to 6, wherein the C₃-C₉ ester is methyl acetate or ethyl acetate.

- 8 The salt recovery solution as claimed in claim 1, wherein the salt recovery solution is a combination of 2-methyltetrahydrofuran and acetonylacetone.
- 9 The salt recovery solution as claimed in claim 1, wherein the salt recovery solution is a combination of 2-methyltetrahydrofuran and 1-butanol.
- 5 10 The salt recovery solution as claimed in claim 1, wherein the salt recovery solution is a combination of 2-methyltetrahydrofuran and 1-pentanol.
- 11 The salt recovery solution as claimed in claim 1, wherein the salt recovery solution is a combination of ethyl acetate and 2-butanone.
- 12 The salt recovery solution as claimed in claim 1, wherein the salt recovery solution is a combination of ethyl acetate and 2-methyltetrahydrofuran.
- 10 13 The salt recovery solution as claimed in claim 1, wherein salt recovery solution is a combination of ethyl acetate and 1-butanol.
- 14 The salt recovery solution as claimed in claim 1, wherein the salt recovery solution is a combination of ethyl acetate and acetonylacetone.
- 15 15 The salt recovery solution as claimed in any one of claims 1 to 14, wherein the salt containing aqueous solution is an industrial brine.
- 16 A process for recovering a salt from an aqueous solution, the process comprising the step of adding the salt containing first aqueous solution to a salt recovery solution as defined in any one of claims 1 to 15; and allowing the salt to precipitate on passage through the salt recovery solution.
- 20 17 The process as claimed in claim 16, wherein the process is a zero-liquid discharge process.
- 18 The process as claimed in claim 16 or claim 17 wherein the process is a counter current process.
- 19 The process as claimed in any one of claims 16 to 18, wherein the process is a non-membrane process.
- 25 20 The process as claimed in any one of claims 16 to 18 wherein the process is a non-osmotic process.
- 21 A process for concentrating a salt containing aqueous solution, the process comprising the steps of:
- 30 (a) adding the salt containing aqueous solution to a salt recovery solution as defined in any one of claims 1 to 15; and
- (b) allowing water from the salt containing aqueous solution to pass into the salt recovery solution.

- 22 The process as claimed in claim 21, the process being a non-membrane process.
- 23 The process as claimed in claim 21 or claim 22, the process being a non-osmotic process.
- 24 The process as claimed in any claim 21, the process being a non-membrane and non-osmotic process.
- 5 25 The process as claimed in any one of claims 21 to 24, wherein the process concentrates the first aqueous solution by at least 20%.
- 26 The process as claimed in any one of claims 21 to 25, wherein the process concentrates the first aqueous solution by at least 30%.
- 27 The process as claimed in any one of claims 21 to 26, wherein the process concentrates the first aqueous solution by at least 40%.
- 10 28 The process as claimed in any one of claims 21 to 27, wherein the process concentrates the first aqueous solution by at least 50%.
- 29 The process as claimed in any one of claims 21 to 28, wherein the process concentrates the first aqueous solution or by at least 60%.
- 15 30 The process as claimed in any one of claims 21 to 29, wherein the process concentrates the first aqueous solution or by at least 70%.
- 31 The process as claimed in any one of claims 21 to 30, wherein the process concentrates the first aqueous solution or by at least 80%.
- 32 The process as claimed in any one of claims 21 to 31, wherein the process concentrates the first aqueous solution by at least 90%.
- 20 33 The process as claimed in any one of claims 21 to 32 wherein the process is a minimal discharge process.
- 34 The process as claimed in any one of claims 21 to 33 wherein the process is a zero-liquid discharge process.
- 25 35 The process as claimed in any one of claims 21 to 34 wherein the aqueous solution is an industrial brine.