

**Claims:**

- 1 A solvent drying solution, the solution comprising:
- 5 a) at least one C<sub>3</sub>-C<sub>9</sub> alkyl amine or ammonium quaternary containing compound; or  
 b) at least one carboxylic acid containing compound or an alkylsulfonic acid; or  
 c) at least one straight chain or branched C<sub>3</sub>-C<sub>9</sub> alkyl substituted by -OH; or  
 d) a combination of a) to c) thereof,
- in a water containing solvent comprising at least two or more components
- 10 independently selected from any combination of integers i), ii), iii) and iv), where:
- i) is a straight, branched or optionally substituted cyclic C<sub>4</sub>-C<sub>9</sub> ether containing compound;
- ii) is a straight chain or branched C<sub>3</sub>-C<sub>9</sub> alkyl substituted by -OH;
- iii) is a straight chain, branched or cyclic C<sub>4</sub>-C<sub>9</sub> ketone or C<sub>4</sub>-C<sub>9</sub> diketone; and
- 15 iv) is a straight chain or branched C<sub>3</sub>-C<sub>9</sub> ester containing compound;
- wherein at least one component of the water containing solvent is substantially immiscible with an aqueous solution of 1 molar sodium chloride at or above 20 degrees Celsius and at 1 atmosphere.
- 20 2 The solvent drying solution as claimed in claim 1, wherein the carboxylic acid containing compound is selected from one or more of the following:
- c) a compound of Formula I,
- $$\begin{array}{c} \text{O} \\ \parallel \\ \text{HO}-\text{C}-\text{R}^* \end{array}$$
- Formula I
- wherein R\* is selected from, -C<sub>1</sub>-C<sub>7</sub> alkyl-OH, -C<sub>1</sub>-C<sub>7</sub> alkyl, -C<sub>1</sub>-C<sub>7</sub> alkyl-NH<sub>2</sub>, -C<sub>1</sub>-C<sub>7</sub> alkyl-NHR<sub>3</sub> and -C<sub>1</sub>-C<sub>7</sub> alkyl NR<sub>3</sub>R<sub>4</sub>, wherein each R<sub>3</sub> and R<sub>4</sub> are selected from -H, -OH, -halo, -C<sub>1</sub>-C<sub>7</sub> alkyl, -C<sub>1</sub>-C<sub>7</sub> alkyl-OH, -C(O)OH, -C(O)-H, or -C(O)-(C<sub>1</sub>-C<sub>7</sub> alkyl); and
- 25 d) a polymer containing one or more carboxylic acid groups.
- 3 The solvent drying solution as claimed in claim 1, comprising at least one C<sub>1</sub>-C<sub>7</sub> alkyl amine or
- 30 quaternary ammonium containing compound.

- 4 The solvent drying solution as claimed in claim 3, wherein the at least one C<sub>1</sub>-C<sub>7</sub> alkyl amine or quaternary ammonium containing compound of the solvent drying solution is selected from one or more of betaine, carnitine, urea and choline, each optionally with a counterion.
- 5 5 The solvent drying solution as claimed in claim 1 wherein the solvent drying solution comprises at least one straight chain or branched C<sub>3</sub>-C<sub>9</sub> alkyl substituted by -OH.
- 6 The solvent drying solution as claimed in claim 5, wherein the at least one straight chain or branched C<sub>3</sub>-C<sub>9</sub> alkyl substituted by -OH of the solvent drying solution includes at least two -OH substituents.
- 10 7 The solvent drying solution as claimed in claim 6, wherein the at least one straight chain or branched C<sub>3</sub>-C<sub>9</sub> alkyl substituted by -OH of the solvent drying solution is selected from 1,4-butanediol, glycerol or combinations thereof.
- 8 The solvent drying solution as claimed in claim 1 comprising at least one carboxylic acid containing compound.
- 15 9 The solvent drying solution as claimed in claim 1 wherein the water containing solvent comprises an amine containing compound as a substitute to one of integers i), ii), iii) and iv).
- 10 The solvent drying solution as claimed in claim 9, wherein the amine is a secondary or tertiary amine.
- 11 The solvent drying solution as claimed in claim 9 wherein the amine is a tertiary amine.
- 20 12 The solvent drying solution as claimed in claim 1, claim 4 or claim 5, wherein the solvent drying solution comprises betaine.
- 13 The solvent drying solution as claimed in claim 1, claim 4 or claim 5, wherein the solvent drying solution comprises choline chloride.
- 14 The solvent drying solution as claimed in any one of claims 1 to 3, wherein the solvent drying solution comprises sarcosine.
- 25 15 The solvent drying solution as claimed in claim 1 comprising a combination of betaine and sarcosine.
- 16 The solvent drying solution as claimed in claim 1 comprising a combination of choline chloride and 1,4-butanediol.

- 17 The solvent drying solution as claimed in claim 16 wherein the molar ratio of choline chloride to 1,4-butanediol is about 1:2.
- 18 The solvent drying solution as claimed in claim 1 comprising a combination of choline chloride and glycerol.
- 5 19 The solvent drying solution as claimed in claim 18, wherein the molar ratio of choline chloride to glycerol is about 1:2.
- 20 The solvent drying solution as claimed in claim 1 comprising a combination of choline chloride and sarcosine.
- 10 21 The solvent drying solution as claimed in claim 20, wherein the molar ratio of choline chloride to sarcosine is about 1:2.
- 22 The solvent drying solution as claimed in claim 1 comprising a combination of choline chloride and urea.
- 23 The solvent drying solution as claimed in claim 22, wherein the molar ratio of choline chloride to urea is about 1:2.
- 15 24 The solvent drying solution as claimed in any one of claims 1 to 23, wherein the solvent comprises a C<sub>4</sub>-C<sub>9</sub> ether containing compound selected from one or more of 2-methyltetrahydrofuran, 3-methyltetrahydrofuran, 2-ethyltetrahydrofuran, 3-ethyltetrahydrofuran, dioxane, 1-ethoxypropane, and a C<sub>4</sub>-C<sub>9</sub> glycol ether or combinations thereof.
- 20 25 The solvent drying solution as claimed in any one of claims 1 to 23, wherein the solvent comprises a straight chain or branched C<sub>3</sub>-C<sub>9</sub> alkyl substituted by -OH selected from one or more of 1-butanol, 2-butanol and 1-pentanol or combinations thereof.
- 26 The solvent drying solution as claimed in any one of claims 1 to 23, wherein the solvent comprises a C<sub>4</sub>-C<sub>9</sub> glycol ether selected from one or more of propylene glycol methyl ether, 25 dipropylene glycol methyl ethyl 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.
- 27 The solvent drying solution as claimed in any one of claims 1 to 23, wherein the solvent comprises a C<sub>4</sub>-C<sub>9</sub> ketone or diketone selected from one or more of acetonylacetone or 2- 30 butanone.

- 28 The solvent drying solution as claimed in any one of claims 1 to 23, wherein the solvent comprises a C<sub>3</sub>-C<sub>9</sub> ester such as methyl acetate or ethyl acetate.
- 29 The solvent drying solution as claimed in any one of claims 1 to 23, wherein the solvent comprises a combination of 2-methyltetrahydrofuran and acetonylacetone.
- 5 30 The solvent drying solution as claimed in any one of claims 1 to 23, wherein the solvent comprises a combination of 2-methyltetrahydrofuran and 1-butanol.
- 31 The solvent drying solution as claimed in any one of claims 1 to 23, wherein the solvent comprises a combination of 2-methyltetrahydrofuran and 1-pentanol.
- 10 32 The solvent drying solution as claimed in any one of claims 1 to 23, wherein the solvent comprises a combination of ethyl acetate and 2-butanone.
- 33 The solvent drying solution as claimed in any one of claims 1 to 23, wherein the solvent comprises a combination of ethyl acetate and 2-methyltetrahydrofuran.
- 34 The solvent drying solution as claimed in any one of claims 1 to 23, wherein the solvent comprises a combination of ethyl acetate and 1-butanol.
- 15 35 The solvent drying solution as claimed in any one of claims 1 to 23, wherein the solvent comprises a combination of ethyl acetate and acetonylacetone.
- 36 The solvent drying solution as claimed in claim 9, wherein the solvent comprises triethylamine and 2-butanone.
- 20 37 A method of recovering water from a solvent drying solution, the method including the steps of contacting the water containing solvent as claimed in any one of claims 1 to 36 with:
- a) at least one C<sub>1</sub>-C<sub>7</sub> alkyl amine or quaternary ammonium containing compound and
  - b) at least one carboxylic acid containing compound, or an alkylsulfonic acid;
  - c) at least one at least one straight chain or branched C<sub>3</sub>-C<sub>9</sub> alkyl substituted by -OH; or
  - d) a combination of a) to c) thereof,
- 25 where upon contact the water is released from the water containing solvent to form an aqueous layer with the immiscible water depleted solvent.
- 38 The method as claimed in claim 37, wherein the method is included in a counter current process.

- 39 The method as claimed in claim 37 or claim 38, wherein the method includes the step of separating the recovered water from the immiscible water depleted solvent layer.
- 40 The method as claimed in any one of claims 37 to 39 further including the step of recovering the solvent.
- 5 41 The method as claimed in claim 40 wherein the recovered solvent drying solution is recycled for use in a further solvent drying process.
- 42 The method as claimed in claim 41, wherein the step of recovering the solvent drying solution is a continuous recovery process.
- 10 43 The method as claimed in claim 42, wherein the step of recovering the solvent drying solution is achieved by one or more of the following techniques, membrane distillation, pervaporation, osmosis, pressure driven membrane processes, osmotically driven membrane processes, osmotically assisted pressure driven membrane processes, pressure assisted osmotically driven membrane processes, filtration, mechanical vapor recompression, evaporation based processes, water specific reactant, or crystallisation techniques or the like.
- 15 44 The method as claimed in claim 43, wherein the step of recovering the solvent drying solution is achieved by a pressure assisted osmosis technique.