CLAIMS

1. A process for the production of choline hydroxide comprising:

a) reacting at a temperature above 30.0°C, in the presence of an aqueous medium, primary reactants comprising ethylene oxide, trimethylamine, and water in such amounts as to form a diluted choline hydroxide solution having a choline hydroxide concentration of at most 38.0 wt%, and

b) removing at least a portion of the aqueous medium from the diluted choline hydroxide solution to form a concentrated aqueous choline hydroxide solution having a choline hydroxide concentration which is at least 1.05 times the choline hydroxide concentration of the diluted choline hydroxide solution.

2. The process according to claim 1, wherein the aqueous medium comprises a molar excess of water of 100% to 6000% relative to the stoichiometric amount theoretically required for forming the amount of choline hydroxide in the diluted choline hydroxide solution.

3. The process according to claim 1 or 2, wherein a molar excess of trimethylamine is used when reacting the ethylene oxide, trimethylamine, and water.

4. The process according to claim 3, wherein the molar excess of trimethylamine is in the range of 5% to 200% excess trimethylamine relative to the stoichiometric amount required for forming the amount of choline hydroxide in the diluted choline hydroxide solution.

5. The process according to claim 3 or 4, wherein excess trimethylamine is removed from the diluted choline hydroxide solution or from the concentrated choline hydroxide solution.

6. The process according to any one of the preceding claims, wherein the diluted choline hydroxide solution comprises choline hydroxide at a concentration of 10% to 38.0% by weight, based on the total weight of the diluted choline hydroxide solution.

7. The process according to any one of the preceding claims, wherein the primary reactants are in step a) reacted at a

temperature of at least 35°C, and optionally at most 150°C.

8. The process according to any one of the preceding claims, wherein the concentrated aqueous choline hydroxide solution has a choline hydroxide concentration which is at least 1.10 times the choline hydroxide concentration of the diluted choline hydroxide solution formed in step a).

9. The process according to any one of the preceding claims, wherein the aqueous medium is at least partially removed from the diluted choline hydroxide solution by at least one of evaporation, stripping, membrane based separation, and combinations thereof, preferably the evaporation at least partly being performed under vacuum, preferably the evaporation followed by at least partial condensation of the evaporated water and possibly present evaporated trimethylamine, more preferably the process further comprising the step of recycling at least part of the condensed water to step a).

10. The process according to any one of the preceding claims, wherein the concentrated aqueous choline hydroxide solution comprises choline hydroxide at a concentration of 30% to 60% by weight, based on total weight of the concentrated choline hydroxide solution.

11. The process according to any one of the preceding claims, wherein the concentrated aqueous choline hydroxide solution comprises a stabiliser.

12. The process according to the preceding claim, wherein the stabiliser comprises at least one of dithionite salts, amines, more particular hydroxylamines, sulphites, hydroquinones, hydrides, carboxylic acids, piperazines, and mixture thereof.

13. The process according to any one of the preceding claims which is performed in continuous mode.

14. The process according to any one of the preceding claims whereby the reaction is performed in at least one loop reactor.

15. The process according any one of the preceding claims whereby the reaction is performed in two reactors in series,

preferably in three reactors in series.

16. The process according to the preceding claim wherein the ethylene oxide addition is split and divided over more than one of the reactors.

17. The process according any one of the preceding claims wherein the water added to step a) is at least partly comprising water having a total metal concentration which is at most 5.0 ppm by weight, and optionally the total content of the metals belonging to the group consisting of Fe, Cr, Na, Al, Ca, Cu, K, Mg, Mn, Pb and Zn is at most 1000 ppb.

18. The process according any one of the preceding claims wherein the trimethylamine is produced by the reaction of methanol and ammonia, preferably over a solid acid catalyst, more preferably over a silica-alumina catalyst, even more preferably a catalyst selected from an amorphous silica-alumina catalyst and a shape-selective zeolite catalyst.

19. The process according any one of the preceding claims further comprising the step of using the concentrated choline hydroxide from step b) for the neutralisation of an acid compound, preferably in a formulation, such as a formulation selected from a detergent formulation, an agrochemical formulation, and combinations thereof.

20. The process according any one of the preceding claims further comprising the step of reacting the choline hydroxide from step a) or from step b) to form an ionic surfactant, preferably a surfactant having the formula R-A-SO3- [(H3C)3N-CH2-CH2-OH]+, whereby A represents an oxygen atom or a group having the formula –[O-B]n–O-, whereby B represents an alkyl group having 2 to 4 carbon atoms and n represents an integer in the range of 1-20, and R represents a saturated or unsaturated, unbranched or branched alkyl group having from 8 to 30 carbon atoms.

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b) removing at least a portion of the aqueous medium from the diluted choline hydroxide solution to form a concentrated aqueous choline hydroxide solution having a choline hydroxide concentration which is at least 1.05 times the choline hydroxide concentration of the diluted choline hydroxide solution.

2. The process according to claim 1, wherein the aqueous medium comprises a molar excess of water of 100% to 6000% relative to the stoichiometric amount theoretically required for forming the amount of choline hydroxide in the diluted choline hydroxide solution.

3. The process according to claim 1 or 2, wherein a molar excess of trimethylamine is used when reacting the ethylene oxide, trimethylamine, and water.

4. The process according to claim 3, wherein the molar excess of trimethylamine is in the range of 5% to 200% excess trimethylamine relative to the stoichiometric amount required for forming the amount of choline hydroxide in the diluted choline hydroxide solution.

5. The process according to claim 3 or 4, wherein excess trimethylamine is removed from the diluted choline hydroxide solution or from the concentrated choline hydroxide solution.

6. The process according to any one of the preceding claims, wherein the diluted choline hydroxide solution comprises choline hydroxide at a concentration of 10% to 38.0% by weight, based on the total weight of the diluted choline hydroxide solution.

7. The process according to any one of the preceding claims, wherein the primary reactants are in step a) reacted at a temperature of

at least 35°C, and optionally at most 150°C.

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9. The process according to any one of the preceding claims, wherein the aqueous medium is at least partially removed from the diluted choline hydroxide solution by at least one of evaporation, stripping, membrane based separation, and combinations thereof, preferably the evaporation at least partly being performed under vacuum, preferably the evaporation followed by at least partial condensation of the evaporated water and possibly present evaporated trimethylamine, more preferably the process further comprising the step of recycling at least part of the condensed water to step a).

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12. The process according to the preceding claim, wherein the stabiliser comprises at least one of dithionite salts, amines, more particular hydroxylamines, sulphites, hydroquinones, hydrides, carboxylic acids, piperazines, and mixture thereof.

13. The process according to any one of the preceding claims which is performed in continuous mode.

14. The process according to any one of the preceding claims whereby the reaction is performed in at least one loop reactor.

15. The process according to any one of the preceding claims whereby the reaction is performed in two reactors in series, preferably in three reactors in series.

16. The process according to the preceding claim wherein the ethylene oxide addition is split and divided over more than one of the reactors.

17. The process according to any one of the preceding claims wherein the water added to step a) is at least partly comprising water having a total metal concentration which is at most 5.0 ppm by weight, and optionally the total content of the metals belonging to the group consisting of Fe, Cr, Na, Al, Ca, Cu, K, Mg, Mn, Pb and Zn is at most 1000 ppb.

18. The process according to any one of the preceding claims wherein the trimethylamine is produced by the reaction of methanol and ammonia, preferably over a solid acid catalyst, more preferably over a silica-alumina catalyst, even more preferably a catalyst selected from an amorphous silica-alumina catalyst and a shape-selective zeolite catalyst.

19. The use of the concentrated choline hydroxide produced in step b) according to any one of the preceding claims, for the neutralisation of an acid compound, preferably in a formulation, such as a formulation selected from a detergent formulation, an agrochemical formulation, and combinations thereof.

20. The process for the formation of an ionic surfactant comprising further reacting of the diluted choline hydroxide produced in step a) or the concentrated choline hydroxide produced in step b), according to any one of the preceding claims, wherein the surfactant is having the formula R-A-SO_3^- $[(H_3C)_3N\text{-}CH_2\text{-}CH_2\text{-}OH]^+$, whereby A represents an oxygen atom or a group having the formula $–[O\text{-}B]_n–O\text{-}$, whereby B represents an alkyl group having 2 to 4 carbon atoms and n represents an integer in the range of 1-20, and R represents a saturated or unsaturated, unbranched or branched alkyl group having from 8 to 30 carbon atoms.