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(54) **CONCENTRATED AQUEOUS SOLUTION OF AN AMPHOTERIC SURFACTANT PARTICULARLY BETAINE, AND METHOD FOR THE PREPARATION THEREOF**

KONZENTRIERTE WÄSSRIGE LÖSUNG EINES AMPHOTEREN TENSIDS, IM BESONDEREN BETAIN, UND HERSTELLUNGSVERFAHREN DAFÜR

SOLUTION AQUEUSE CONCENTRÉE D'UN TENSIOACTIF AMPHOTÈRE, EN PARTICULIER, LA BÉTAÏNE, ET SON PROCÉDÉ DE PRÉPARATION

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(56) References cited:
EP-A2- 0 573 329 US-A- 4 416 808
US-A- 5 840 676 US-A1- 2006 110 354

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Description

[0001] The present invention refers to a concentrated aqueous solution of an amphoteric surfactant, particularly betaine, and a method for the preparation thereof.

[0002] Amphoteric surfactants exhibit excellent foaming and detergent properties, combined with a very good dermatological compatibility and an ability to decrease the irritating power of anionic surfactants conventionally used in the cosmetic field, such as sodium lauryl/laurylethoxy sulfate. Amphoteric surfactants are used as raw materials for preparing both detergents, such as for example washing-up liquids, and cosmetic products, such as for example shampoos and bath foams.

[0003] Among amphoteric surfactants, alkyl betaines, and particularly alkyl amidobetaines, acquired a particular importance from the commercial point of view. Among these, the most important is doubtlessly cocamidopropyl betaine.

[0004] Amphoteric surfactants are marketed in the form of concentrated aqueous solutions. The tendency in this area is of increasing as much as possible the concentration of the active substance in the aqueous solutions to be marketed. However, limitations exist to the possibility of increasing the active substance, as at high concentrations the active substances tend to form an extremely viscous lamellar gel not easy to handle. The increase in viscosity or gelation can likewise occur during storage. For this reason, conventional amphoteric surfactant aqueous solutions, particularly alkylamido propyl betaine, are characterized by a concentration of about 30% of active matter and 35% as the dry residue.

[0005] Several attempts to obtain low viscosity betaine concentrated aqueous solutions are described in the prior art.

[0006] European patent EP 0560114 B1 describes adding a desired amount of free fatty acids, optionally in combination with glycerol. However, fatty acids are quite expensive additives and their presence in a detergent or cosmetic product not always is considered as acceptable, since frequently fatty acids form as processing residues, which implies that limitations may be imposed to the concentration thereof in the finished product. Moreover, a sensible reduction in the viscosity of surfactant solutions is only observed at free fatty acid concentration values higher than 1% by weight.

[0007] US patent 5962708 intends to reduce the viscosity of a betaine solution by adding hydroxycarboxylic acids or salts thereof, more particularly sodium citrate. Such additives are even more expensive than fatty acids, which makes this technical solution very little attractive.

[0008] US patent application US 200601100354 describes the use of at least one sulfate, particularly sodium sulfate from 0.01% to 5% by weight. However, sulfates are also considered as impurities, the presence of which not always is desirable in finished formulation.

[0009] US 5840676 discloses the use of urea as a solubilizing agent in microemulsions comprising low levels of betaine.

[0010] One object of the present invention is thus of providing a concentrated aqueous solution of an amphoteric surfactant, preferably betaine, which does not exhibit the drawbacks of the prior art.

[0011] This and other objects are achieved through a concentrated amphoteric surfactant aqueous solution as defined in the preamble of claim 1, characterised in that it comprises urea at a concentration of from 0.01% to 5% by weight of the total weight of the solution.

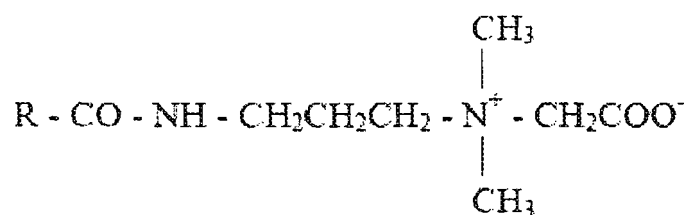
[0012] Further features of the solution according to the invention are defined in the appended subordinate claims that form an integral part of the specification.

[0013] The inventors have surprisingly found that adding a small amount of urea to a concentrated amphoteric surfactant aqueous solution is sufficient to reduce the viscosity at values equal to or lower than 3000 cps, preferably equal to or lower than 1000 cps (viscosity as measured with a model LV Brookfeld viscosimeter at 20°C, 20 r.p.m., spindle 3).

[0014] Urea is added in a suitable amount during or after the synthesis of the amphoteric surfactant. The urea concentration ranges from 0.01% to 5% by weight, preferably from 0.1% to 3% by weight, more preferably from 0.1% to 0.5% by weight, of the total weight of the surfactant solution.

[0015] In a preferred embodiment, the amphoteric surfactant is selected from the group consisting of alkyl betaines, alkylamido betaines, aminopropionates, aminoglycinates, imidazolium betaines, sulfobetaines and any mixture thereof.

[0016] More preferably, the alkylamido betaines are alkylamidopropyl betaines of formula (I):



(I)

wherein R is a linear or branched, saturated or unsaturated alkyl group having from 6 to 22 carbon atoms, or a mixture

of linear or branched, saturated or unsaturated alkyl groups having an average of 6 to 22 carbon atoms. A preferred value for R is the alkyl group from coconut fatty acids. The average composition of coconut fatty acids, derived from coconut oil, is specifically described in US 5 354 906. Such a description is hereby incorporated as reference.

5 [0017] Solutions of alkylamido propyl betaines of formula (I) contain electrolyte salts that neutralize the charges and are preferably selected from alkaline or alkaline earth metal chlorides or chlorides with other monovalent (such as for example Cu⁺), divalent (such as for example Pb²⁺), trivalent (such as for example Al³⁺), polyvalent (such as for example Sn⁴⁺ or NH₄⁺) cations or with amine bases selected from triethanolamine, monoethanolamine, diethanolamine, monoisopropanolamine, triisopropanolamine, 2-aminobutanol, aminoethylpropanediol, arginine, lysine, ornithine, aminomethylpropanol, aminomethylpropanediol, 2-amino-2-hydroxymethyl-1,3-propanediol. These electrolyte salts may be used individually or as a mixture.

10 [0018] The concentration of the amphoteric surfactant in the concentrated aqueous solution of the invention ranges from 25% to 60% by weight more preferably from 35% to 48% by weight, of the total weight of the solution.

15 [0019] According to another embodiment of the invention, the concentrated amphoteric surfactant aqueous solution comprises sodium phosphate as a further component capable of decreasing the viscosity and prevent gelation of the solution during storage. The concentration of sodium phosphate ranges between 0 and 5%, preferably between 0.01% and 5%, even more preferably between 0.1% and 3% and even more preferably between 0.1% and 0.5% by weight, of the total weight of the solution. Sodium phosphate is used in the form of Na₃PO₄, NaH₂PO₄, Na₂HPO₄ or any combination thereof.

20 [0020] A preferred composition according to the invention comprises the following ingredients:

- amphoteric surfactant (preferably alkylamido propyl betaines of formula (I)): from 25% to 60% by weight;
- urea: from 0.01% to 5% by weight;
- sodium phosphate: from 0.01% to 5%; and
- water: up to 100% by weight.

25 [0021] The aqueous solution of the invention does not include further active substances. However, manufacturing residues may be present, such as for instance electrolyte salts as mentioned previously (particularly sodium chloride) the amount of which, if present, generally adds up to 5-10% by weight, unreacted raw materials and small amounts of free fatty acids or salts thereof. The quantity of free fatty acids or salts thereof is maintained as much as possible at very low levels.

30 [0022] The aqueous solution of the invention can be acidic, neutral or basic, the pH value thereof being preferably comprised between 1 and 9.

35 [0023] Since the problem of the increase in viscosity of a concentrated amphoteric surfactant aqueous solution is mostly encountered with acidic solutions at pH ≤ 5, the use of urea in order to reduce viscosity results particularly advantageous with solutions having such pH values. Consequently, a preferred embodiment of the invention is a concentrated amphoteric surfactant aqueous solution as previously defined, having a pH value comprised between 1 and 5, more preferably comprised between 4.0 and 4.9. Further preferred pH ranges are the following: from 4.0 to 4.5; from 4.0 to 4.4; from 4.0 to 4.3; from 4.0 to 4.2; and from 4.0 to 4.1.

40 [0024] As previously indicated, one advantage of the present invention is that urea can be added during the course of the synthesis reaction for the surfactant or, alternatively, it can be added to the already-synthesized surfactant, during the processing of the final product. Adding urea to the already-synthesized surfactant is to be preferred when the surfactant viscosity must be adjusted at an extremely precise value. Sodium phosphate instead is added at the end of the synthesis reaction for the surfactant.

45 [0025] Thus, another object of the present invention is a method according to the preamble of claim 10, characterized in that it comprises synthesizing the said amphoteric surfactant in the presence of a quantity of urea suitable to provide a concentration from 0.01% to 5% by weight, preferably from 0.1% to 3% by weight, preferably from 0.1% to 0.5% by weight, of the total weight of the solution.

50 [0026] In an alternative embodiment, the method of the invention is characterized in that it comprises adding, to said amphoteric surfactant, a quantity of urea suitable to provide a concentration from 0.01% to 5% by weight, preferably from 0.1% to 3% by weight, preferably from 0.1% to 0.5% by weight, of the total weight of the solution.

[0027] Both the above-described method embodiments may include adding, to the amphoteric surfactant, a quantity of sodium phosphate suitable to provide a concentration comprised between 0 and 5% by weight, preferably comprised between 0.01% and 5% by weight, even more preferably comprised between 0.1% and 3% by weight and even more preferably comprised between 0.1% and 0.5% by weight, of the total weight of the solution.

55 [0028] Examples of synthesis reactions for the amphoteric surfactant are quaternization of fatty amines or fatty acid amidoamines with halocarboxylic acids or salts thereof, to give alkyl betaines or alkylamido betaines.

[0029] The following examples are provided merely by way of illustration and not limitation of the scope of the invention as defined in the appended claims.

Example 1

[0030] 200 g (0.78 mol) of a coconut fatty acid and 79.7 g (0.78 mol) of N,N-dimethyl aminopropylamine were inserted into a 2-liter 4-necked round-bottomed flask fitted with a thermometer, a condenser, a water separator, a nitrogen aspiration tube and a stirrer and were heated under nitrogen at 180°C. The condensation water was continuously removed. The reaction went on until the acidic value of the mixture dropped to under 5. The amine excess was then removed under vacuum. This way, 250 g of coconut fatty acid amidopropyl dimethylamine were obtained and adjusted with water at a concentration of active substance of 45% by weight. The obtained product was basically solid.

Example 2

[0031] Example 1 was repeated, with the exception that the reaction of the coconut fatty acid with N,N-dimethyl aminopropylamine was carried out in the presence of 0.81 g (corresponding to 0.3% by weight, on the basis of the final composition) urea. The mixture was adjusted with water at a concentration of active substance of 45% by weight with a Brookfield viscosity at 20°C of 210 cps.

Example 3

[0032] Amounts of 0.3% and 0.5% urea by weight were successively added to a cocoamidopropyl betaine aqueous preparation with a concentration of the active substance of 45% by weight obtained as described in Example 1. The appearance and viscosity of the pastes were then determined at 20°C. The results are reported in Table 1.

Table 1

Appearance and viscosity of the cocoamidopropyl betaine pastes	Amount of added urea (% by weight)		
	0	0.3	0.5
Appearance at 20°C	gel	liquid	liquid
Viscosity at 20°C	/	320 cps	305 cps

[0033] The influence of pH was also assessed on the formulation containing 0.5% urea by weight. The results are reported in Table 2.

Table 2

pH	4.2	4.6	4.9	5.5	7.0
Viscosity at 20°C (cps)	solid tends to separate	305	306	310	325

Example 4

[0034] Amounts of 0.3% and 0.5% Na₃PO₄ by weight were successively added to a cocoamidopropyl betaine aqueous preparation with a concentration of the active substance of 45% by weight obtained as described in Example 1. The appearance and viscosity of the pastes were then determined at 20°C. The results are reported in Table 3.

Table 3

Appearance and viscosity of the cocoamidopropyl betaine pastes	Amount of added Na ₃ PO ₄ (% by weight)		
	0	0.3	0.5
Appearance at 20°C	gel	liquid	liquid
Viscosity at 20°C	/	360 cps	351 cps

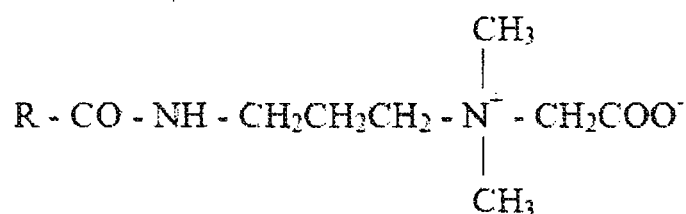
[0035] The influence of pH was also assessed on the formulation containing 0.5% Na₃PO₄ by weight. The results are reported in Table 4.

Table 4

pH	4.2	4.6	4.9	5.5	7.0
Viscosity at 20°C (cps)	solid tends to separate	305	306	310	325

Claims

1. A concentrated amphoteric surfactant aqueous solution with a viscosity lower than or equal to 3000 cps, preferably lower than or equal to 1000 cps, as measured with a model LV Brookfield viscosimeter at 20°C, 20 r.p.m., spindle 3, **characterized in that** it comprises urea at a concentration of from 0.01% to 5% by weight of the total weight of the solution and further **characterized in that** the concentration of the amphoteric surfactant is comprised between 25% and 60% by weight.
2. The concentrated aqueous solution according to claim 1, wherein the amphoteric surfactant is selected from the group consisting of alkyl betaines, alkylamido betaines, aminopropionates, aminoglycinates, imidazolinium betaines, sulfobetaines and mixtures thereof.
3. The concentrated aqueous solution according to claim 2, wherein the alkylamido betaines are alkylamido propyl betaines of formula (I):



(I)

wherein R is a linear or branched, saturated or unsaturated alkyl group having from 6 to 22 carbon atoms, or a mixture of linear or branched, saturated or unsaturated alkyl groups having an average of 6 to 22 carbon atoms.

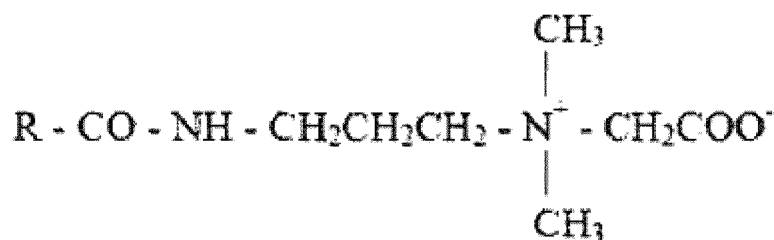
4. The concentrated aqueous solution according to any of claims 1 to 3, having a pH comprised between 1 and 9, preferably between 1 and 5, even more preferably between 4.0 and 4.9.
5. The concentrated aqueous solution according to claim 4, having a pH comprised between 4.0 and 4.5.
6. The concentrated aqueous solution according to any of claims 1 to 5, comprising, in addition to urea, sodium phosphate at a concentration comprised between 0.01% and 5% by weight, more preferably between 0.1% and 3% by weight, even more preferably between 0.1% and 0.5% by weight of the total weight of the solution.
7. The concentrated aqueous solution according to claim 6, wherein the sodium phosphate is selected from the group consisting of Na₃PO₄, NaH₂PO₄, Na₂HPO₄ and any combination thereof.
8. The concentrated aqueous solution according to any of claims 1 to 7, comprising one or more electrolyte salts, preferably at a concentration comprised between 5% and 10% by weight of the total weight of the solution.
9. The concentrated aqueous solution according to any of claims 1 to 8, comprising the amphoteric surfactant at a concentration of from 35% to 48% by weight of the total weight of the solution.
10. The concentrated aqueous solution according to any of claims 1 to 9, comprising urea at a concentration comprised between 0.1% and 3% by weight, preferably between 0.1% and 0.5% by weight of the total weight of the solution.
11. A method of preparing a concentrated aqueous amphoteric surfactant solution according to any of claims 1 to 10, **characterised in that** it comprises synthesizing said amphoteric surfactant in the presence of an amount of urea

suitable to provide a concentration from 0.01% to 5% urea by weight of the total weight of the final solution.

- 5
12. A method of preparing a concentrated aqueous Amphoteric surfactant solution according to any of claims 1 to 10, **characterised in that** it comprises the step of providing the amphoteric surfactant and the step of adding to said amphoteric surfactant an amount of urea suitable to provide a concentration from 0.01% to 5% by weight of the total weight of the final solution.
- 10
13. The method according to claim 11 or 12, further comprising adding to said amphoteric surfactant an amount of sodium phosphate suitable to provide a concentration from 0.01% to 5% by weight of the total weight of the final solution.

Patentansprüche

- 15
1. Konzentrierte wässrige Lösung von amphoterem Tensid mit einer Viskosität von weniger als oder gleich 3000 cps, bevorzugt weniger als oder gleich 1000 cps, wie mit einem Modell LV Brookfield-Viskosimeter bei 20°C, 20 r.p.m., Spindel 3 gemessen, **dadurch gekennzeichnet, dass** sie Harnstoff in einer Konzentration von 0,01 Gew.-% bis 5 Gew.-% des Gesamtgewichts der Lösung umfasst, und weiter **dadurch gekennzeichnet, dass** die Konzentration des amphoterem Tensids umfasst ist zwischen 25 Gew.-% und 60 Gew.-%.
- 20
2. Konzentrierte wässrige Lösung nach Anspruch 1, wobei das amphotere Tensid ausgewählt ist aus der Gruppe, bestehend aus Alkylbetainen, Alkylamidobetainen, Aminopropionaten, Aminoglycinaten, Imidazoliniumbetainen, Sulfobetainen und Mischungen davon.
- 25
3. Konzentrierte wässrige Lösung nach Anspruch 2, wobei die Alkylamidobetaine Alkylamidopropylbetaine der Formel (I) sind:



wobei R eine lineare oder verzweigte, gesättigte oder ungesättigte Alkylgruppe mit von 6 bis 22 Kohlenstoffatomen oder eine Mischung aus linearen oder verzweigten, gesättigten oder ungesättigten Alkylgruppen mit von 6 bis 22 Kohlenstoffatomen ist.

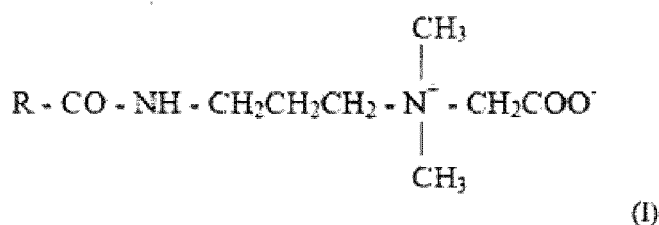
- 40
4. Konzentrierte wässrige Lösung nach einem der Ansprüche 1 bis 3 mit einem pH-Wert umfasst zwischen 1 und 9, bevorzugt zwischen 1 und 5, noch stärker bevorzugt zwischen 4,0 und 4,9.
- 45
5. Konzentrierte wässrige Lösung nach Anspruch 4 mit einem pH-Wert umfasst zwischen 4,0 und 4,5.
- 50
6. Konzentrierte wässrige Lösung nach einem der Ansprüche 1 bis 5, umfassend, zusätzlich zu Harnstoff, Natriumphosphat in einer Konzentration umfasst zwischen 0,01 Gew.-% und 5 Gew.-%, stärker bevorzugt zwischen 0,1 Gew.-% und 3 Gew.-%, noch stärker bevorzugt zwischen 0,1 Gew.-% und 0,5 Gew.-% des Gesamtgewichts der Lösung.
- 55
7. Konzentrierte wässrige Lösung nach Anspruch 6, wobei das Natriumphosphat ausgewählt ist aus der Gruppe, bestehend aus Na₃PO₄, NaH₂PO₄ und Na₂HPO₄ und einer beliebigen Kombination davon.
8. Konzentrierte wässrige Lösung nach einem der Ansprüche 1 bis 7, umfassend ein oder mehrere Elektrolytsalze, bevorzugt in einer Konzentration umfasst zwischen 5 Gew.-% und 10 Gew.-% des Gesamtgewichts der Lösung .
9. Konzentrierte wässrige Lösung nach einem der Ansprüche 1 bis 8, umfassend das amphotere Tensid in einer Konzentration von 35 Gew.-% bis 48 Gew.-% des Gesamtgewichts der Lösung.

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10. Konzentrierte wässrige Lösung nach einem der Ansprüche 1 bis 9, umfassend Harnstoff in einer Konzentration umfasst zwischen 0,1 Gew.-% und 3 Gew.-%, bevorzugt zwischen 0,1 Gew.-% und 0,5 Gew.-% des Gesamtgewichts der Lösung.
- 5 11. Verfahren zur Herstellung einer konzentrierten wässrigen Lösung von amphoterem Tensid nach einem der Ansprüche 1 bis 10, **dadurch gekennzeichnet, dass** es Synthetisieren des amphoterem Tensids in der Gegenwart einer Menge von Harnstoff umfasst, die geeignet ist, eine Konzentration von 0,01 Gew.-% bis 5 Gew.-% Harnstoff des Gesamtgewichts der fertigen Lösung bereitzustellen.
- 10 12. Verfahren zur Herstellung einer konzentrierten wässrigen Lösung von amphoterem Tensid nach einem der Ansprüche 1 bis 10, **dadurch gekennzeichnet, dass** es den Schritt des Bereitstellens des amphoterem Tensids und den Schritt der Zugabe einer Menge von Harnstoff zu dem amphoterem Tensid umfasst, welche geeignet ist, eine Konzentration von 0,01 Gew.-% bis 5 Gew.-% des Gesamtgewichts der fertigen Lösung bereitzustellen.
- 15 13. Verfahren nach Anspruch 11 oder 12, weiter umfassend die Zugabe einer Menge von Natriumphosphat zu dem amphoterem Tensid, welche geeignet ist, eine Konzentration von 0,01 Gew.-% bis 5 Gew.-% des Gesamtgewichts der fertigen Lösung bereitzustellen.

20 Revendications

1. Solution aqueuse de tensioactif amphotère concentrée ayant une viscosité inférieure ou égale à 3 000 cps, de préférence inférieure ou égale à 1 000 cps, telle qu'elle est mesurée avec un viscosimètre Brookfield modèle LV à 20°C, 20 tr/min, mobile 3, **caractérisée en ce qu'elle** comprend de l'urée à une concentration de 0,01 % à 5 % en poids du poids total de la solution et **caractérisée en outre en ce que** la concentration du tensioactif amphotère est comprise entre 25 % et 60 % en poids.
- 25
2. Solution aqueuse concentrée selon la revendication 1, où le tensioactif amphotère est choisi dans le groupe consistant en les alkylbétaines, les alkylamidobétaines, les aminopropionates, les aminoglycinates, les imidazolium bétaines, les sulfobétaines et leurs mélanges.
- 30
3. Solution aqueuse concentrée selon la revendication 2, où les alkylamidobétaines sont des alkylamidopropylbétaines de formule (I) :



où R est un groupe alkyle saturé ou insaturé, linéaire ou ramifié, ayant de 6 à 22 atomes de carbone, ou un mélange de groupes alkyle saturés ou insaturés, linéaires ou ramifiés, ayant une moyenne de 6 à 22 atomes de carbone.

4. Solution aqueuse concentrée selon l'une quelconque des revendications 1 à 3 ayant un pH compris entre 1 et 9, de préférence entre 1 et 5, de préférence encore entre 4,0 et 4,9.
- 50 5. Solution aqueuse concentrée selon la revendication 4 ayant un pH compris entre 4,0 et 4,5.
6. Solution aqueuse concentrée selon l'une quelconque des revendications 1 à 5, comprenant, en plus de l'urée, un phosphate de sodium à une concentration comprise entre 0,01 % et 5 % en poids, de préférence encore entre 0,1 % et 3 % en poids, de manière encore préférable entre 0,1 % et 0,5 % en poids du poids total de la solution.
- 55 7. Solution aqueuse concentrée selon la revendication 6, où le phosphate de sodium est choisi dans le groupe consistant en Na₃PO₄, NaH₂PO₄, Na₂HPO₄ et toute combinaison de ceux-ci.

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8. Solution aqueuse concentrée selon l'une quelconque des revendications 1 à 7, comprenant un ou plusieurs sels électrolytes, de préférence à une concentration comprise entre 5 % et 10 % en poids du poids total de la solution.
- 5 9. Solution aqueuse concentrée selon l'une quelconque des revendications 1 à 8 comprenant le tensioactif amphotère à une concentration de 35 % à 48 % en poids du poids total de la solution.
10. Solution aqueuse concentrée selon l'une quelconque des revendications 1 à 9 comprenant de l'urée à une concentration comprise entre 0,1 % et 3 % en poids, de préférence entre 0,1 % et 0,5 % en poids du poids total de la solution.
- 10 11. Procédé de préparation d'une solution aqueuse de tensioactif amphotère concentrée selon l'une quelconque des revendications 1 à 10, **caractérisé en ce qu'il** comprend la synthèse dudit tensioactif amphotère en présence d'une quantité d'urée appropriée pour donner une concentration de 0,01 % à 5 % d'urée en poids du poids total de la solution finale.
- 15 12. Procédé de préparation d'une solution aqueuse de tensioactif amphotère concentrée selon l'une quelconque des revendications 1 à 10, **caractérisé en ce qu'il** comprend l'étape de fourniture du tensioactif amphotère et l'étape d'addition audit tensioactif amphotère d'une quantité d'urée appropriée pour donner une concentration de 0,01 % à 5 % en poids du poids total de la solution finale.
- 20 13. Procédé selon la revendication 11 ou 12, comprenant en outre l'addition audit tensioactif amphotère d'une quantité de phosphate de sodium appropriée pour donner une concentration de 0,01 % à 5 % en poids du poids total de la solution finale.

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 0560114 B1 [0006]
- US 5962708 A [0007]
- US 200601100354 A [0008]
- US 5840676 A [0009]
- US 5354906 A [0016]