Title: HERBICIDAL COMPOSITION COMPRISING AN AMINOPHOSPHATE OR AMINOPHOSPHONATE SALT AND A BETAINE

Abstract: The present invention relates to herbicidal compositions comprising an aminophosphate or aminophosphonate salt, particularly to herbicidal compositions comprising a relatively high amount of aminophosphate or aminophosphonate salt and a betaine-based surfactant composition of matter.
Herbicidal composition comprising an aminophosphate or aminophosphonate salt and a betaine

BACKGROUND OF THE INVENTION

The present invention relates to herbicidal compositions comprising an aminophosphate or aminophosphonate salt, particularly to herbicidal compositions comprising a relatively high amount of aminophosphate or aminophosphonate salt and a betaine-based surfactant composition of matter.

Among various presentations of compositions comprising glyphosate, concentrated liquid compositions that can be diluted by the end-user (typically a farmer) are of interest. Usually, the higher the glyphosate concentration is, the better it is, because the end-user can set the use concentration (the amount of active applied to the field) by adjusting the dilution rate, and can avoid handling much product (for example the higher the concentration is, the lower the weight is).

Concentrated compositions can comprise a high amount of glyphosate, water, and at least one surfactant compound that can be useful as a formulation aid (dispersion, dissolution and/or stability of the glyphosate in water), and/or as a biological activator (for example increasing the efficacy of glyphosate salt, for example by encouraging wetting of a weed to be eliminated, or by encouraging penetration of the glyphosate into the weed). The amount of glyphosate, the nature of surfactant(s), the amount thereof, and possible further ingredients might have also an effect onto the rheological properties of the composition (for example viscosity, or ability to be spread), as such, or upon dilution. The rheological properties of the composition as such or upon dilution are important for handling and spreading purpose.

Where the concentration of glyphosate is high, crystallization is to be avoided. Crystallization can occur at different temperatures, at different glyphosate concentrations, or when diluting with water. The crystallization is characterized by formation of small solid particles comprising glyphosate. These small particles can have the bad impact of filters clogging, nozzles clogging, creating unnecessary hazardous waste problems to dispose off the crystals, loss of activity (bioefficacy), and/or bad repartition of the active on the field.

Compositions comprising glyphosate and ethoxylated fatty amines surfactants are known. However these compounds are believed to be rather ecotoxic, irritant or slightly biodegradable. There is a need for replacing these compounds or for reducing the amount thereof in the compositions.
Document WO 01/17358 (Monsanto) describes compositions comprising a high amount glyphosate isopropylamine salt and a mixture of surfactants comprising a surfactant of formula R-CO-NR'-(CR')₂-COOM. The mixture of surfactants is taught enhancing herbicidal effectiveness. The surfactant is however expensive and there is a need for other solutions.

Document WO 03/063589 (Rhodia) describes compositions comprising 360 g/L of glyphosate isopropylamine salt (as glyphosate acid equivalent, 783 g/L as salt concentration), a betaine surfactant, and at least one further compound such as optionally ethoxylated amines or etheramines.

Document WO 01/17358 (Albright & Wilson) describes compositions comprising 360 g/L of glyphosate isopropylamine salt (as glyphosate acid equivalent), desalinated alkyl betaines or alkyl amidopropyl betaines surfactants, and optionally ether carboxylates. The document also describes compositions comprising 360 g/L of glyphosate isopropylamine, and alkyl betaines or alkyl amidopropyl betaines surfactants comprising 6 to 12 weight % NaCl. The document teaches that the stability of the composition is linked to presence inorganic salts and teaches that the total level of said inorganic salt is preferably of less than 0.39% by weight. The compositions having desalinated alkyl betaines or alkyl amidopropyl betaines surfactants are taught avoiding crystallization of glyphosate. However desalination is expensive. There is a need in less expensive compositions and/or in compositions comprising higher amounts of glyphosate that do not precipitate.

**BRIEF SUMMARY OF THE INVENTION**

The invention addresses at least one of the concerns above. Thus the invention relates to a herbicidal aqueous composition comprising:
- at least 360 g/L of an aminophosphate or aminophosphonate salt, preferably a glyphosate or glufosinate salt,
- at least 80 g/L, preferably at least 100 g/L, of a surfactant system comprising:
  - a betaine surfactant composition of matter comprising:
    - water,
    - a betaine having formula R¹R²R³N⁺-CH₂COO⁻, wherein:
      - R¹ is a linear or branched hydrocarbon group, preferably an alkyl group containing 3 to 30 carbon atoms, preferably 3 to 20 carbon atoms,
      - R², identical or different, is a C₁-C₃ alkyl group, preferably a methyl group, and
- at least 1% by weight of a chloride based salt, preferably of a potassium chloride salt, and
- optionally at least one surfactant different from the betaine of the betaine surfactant composition of matter.

According to another aspect the invention relates to a process for preparing the herbicidal aqueous composition.

According to another aspect the invention relates to the use of the betaine surfactant composition of matter in a herbicidal aqueous composition comprising at least 360 g/L of an aminophosphate or aminophosphonate salt, preferably a glyphosate or glufosinate salt.

According to another aspect the invention relates to the use of a surfactant system comprising the betaine surfactant composition of matter and optionally the different surfactant, in a herbicidal aqueous composition comprising at least 360 g/L of an aminophosphate or aminophosphonate salt, preferably a glyphosate or glufosinate salt.

The invention also relates to the use of the composition.

**DETAILED DESCRIPTION OF THE INVENTION**

**Definitions**

In the present specification, unless otherwise provided, the amounts of aminophosphate or aminophosphonate salt, preferably a glyphosate or glufosinate salt salts are expressed as acid equivalents.

In the present specification, unless otherwise provided, the amounts of surfactant system or of betaine surfactant composition of matter, are the total amounts of a mixture or association (amounts "as is"), as opposed to amounts as active matter, dry matter amounts (solid content), or the like.

In the present specification, unless otherwise provided, the amounts of surfactant active matter, for a surfactant ingredient or system, for example the betaine surfactant composition of matter or the surfactant system, are defined as the dry matter amount of the surfactant ingredient or system, minus the total amount of salt in the surfactant ingredient or system.

In the present specification, "chloride based salts" refer to any salt having Cl⁻, particularly KCl or NaCl. The amounts thereof can be determined by conventional means. The amounts, unless otherwise provided relate to amounts by weight in the herbicidal composition.
In the present specification, "substantially no sodium cation" refers to amounts of sodium cations of lower than 1% by weight, preferably lower than 0.1%, preferably lower than 0.01%.

In the present specification, a "surfactant system" refers to an association or mixture of surfactants which are provided separately in the composition or as a mixture prepared before introduction.

Surfactants are usually reaction adducts comprising several different compounds. These different compounds have effects on the herbicidal composition. Hence it is referred to surfactant compositions of matter. Thus in the present specification a betaine surfactant composition of matter is understood as a mixture comprising water, a chlorine based salt, the betaine surfactant active molecule(s), and optionally further compounds such as pH buffers.

The ingredients of the composition are described below. Any combination thereof and therein can be implemented to define, and/or prepare the composition according to the invention, and/or the uses according to the invention.

**Aminophosphate or aminophosphonate salt**

Aminophosphate or aminophosphonate salts are known by the one skilled in the art. Preferred salts are glyphosate or glufosinate salts.

Glyphosate refers to N-(phosphonomethyl)glycine.

Glufosinate refers to 4-[hydroxy(methyl)phosphinoyl]-DL-homoalanine.

The salts include:

- sodium (Na) salts;
- potassium (K) salts;
- ammonium salts having N(R)₄⁺ cations wherein R groups, identical or different, represent a hydrogen atom or a linear or non linear, saturated or unsaturated C₁-C₆ hydrocarbon group optionally substituted by a hydroxyl group, for example isopropylamine salts;
- sulphonium salts; said salts being present alone or in a combination.

Ammonium salts that can in particular be cited include salts obtained from secondary or primary amines such as isopropylamine (IPA), dimethylamine, diamines such as ethylenediamine, or alkanolamines such as monoethanolamine (MEA). Trimethylsulphonium is a perfectly suitable sulphonium salt.

Preferred glyphosate salts for herbicidal application that can be cited are isopropylamine (IPA) salt, monoethanolamine (MEA) salt, trimethylsulphonium salt,
potassium salt, ammonium salt, and mixtures or associations thereof, for example as taught in documents WO01/26469 (Nufarm) and WO03/013241 (Nufarm).

In the present invention isopropylamine containing salts are preferred. Thus in a preferred embodiment the salt is a glyphosate isopropylamine salt. In a preferred embodiment, the ratio between the cation such as the cation of isopropylamine and glyphosate is of about 1/1. However the ratio can of higher than 1/1. Such a ratio provides compositions having higher pH. The higher the pH, the lower the crystallization. pH can be also managed by using any other basic compound, for example KOH or other buffers.

Surfactant system
The surfactant system comprises the betaine surfactant composition of matter and optionally at least one surfactant different from the betaine of the betaine surfactant composition of matter. The different surfactant(s) can be provided in the herbicidal composition as a separate ingredient; it can be thus referred to an association. In another embodiment, at least one of the different surfactant(s) can be provided as a mixture with the betaine surfactant composition of matter, it can be thus referred to a mixture or a blend. In that embodiment the different surfactant can be prepared separately and simply mixed with the betaine surfactant composition of matter, or prepared in the same course of process of the preparation of the betaine surfactant composition of matter. Some useful different surfactant(s) are described below as further ingredients and as further surfactants.

Betaine surfactant composition of matter:
Surfactants are usually reaction adducts comprising several different compounds. These different compounds have effects on the herbicidal composition. Hence it is referred to surfactant composition of matter.

The betaine surfactant composition of matter comprises:

- water,
- a betaine having formula R'\(^1\)R'\(^2\)R'\(^3\)N'-CH\(_3\)COO', wherein:
  - R'\(^1\) is a linear or branched hydrocarbon group, preferably an alkyl group containing 3 to 30 carbon atoms, preferably 3 to 20 carbon atoms,
  - R'\(^2\), identical or different, is a C\(_1\)-C\(_3\) alkyl group, preferably a methyl group,
- at least 1% by weight of a chloride based salt, preferably of potassium chloride salt.
The betaine is a main surfactant compound of the betaine surfactant composition of matter. It is preferably the main surfactant compound of the surfactant system. It is also referred to the main surfactant. By main surfactant compound it is meant that said surfactant compound represents the highest surfactant active matter compared to optional other surfactant(s). For example, in a mixture or association comprising 40 parts as active of surfactant 1, 30 parts as active of surfactant 2, and 30 parts as active of surfactant 3, surfactant 1 would be considered as main surfactant even if it represents lower than 50% of all surfactants.

Preferably the betaine active matter represents at least 30% by weight, preferably at least 50%, of the total surfactant active matter of the surfactant system in the composition.

Advantageously the betaine surfactant composition of matter comprises:

- at least 25%, preferably at least 30%, by weight as active surfactant matter of the betaine,
- at least 2%, preferably at least 5%, by weight of a potassium chloride salt.

Preferably the betaine surfactant composition of matter comprises:

- at least 30%, preferably at least 35% by weight as active surfactant matter of the betaine,
- at least 5% by weight of a potassium chloride salt, and
- substantially no sodium cation.

In a preferred embodiment, the total amount of inorganic salts in the surfactant system, preferably of chloride-based salts, is of higher than 0.4 % by weight, and preferably higher than 1% by weight.

In a preferred embodiment, the amount of inorganic salts, preferably of chloride-based salts, is of higher than 8%, preferably higher than 10%, preferably higher than 12%, by weight of the amount of the betaine surfactant composition of matter.

In a preferred embodiment, the total amount of inorganic salts, preferably of chloride-based salts, is of higher than 8%, preferably higher than 10%, preferably higher than 12%, by weight of the amount of the surfactant system.

The betaine has preferably \( R^2 \) being a methyl group (alkyldimethylbetaines).
R\textsuperscript{1} is an alkyl group. This group is usually actually a mixture of different groups having different numbers of carbon atoms, being linear or branched, and optionally having some insaturations. These mixtures come from the reagents used to prepare them, which are actually distillation cuts and/or have a natural origin. In the present specification the number of carbon atoms in the R\textsuperscript{1} group refers to the number of carbon atoms of the two most represented species.

In a preferred embodiment:

- R\textsuperscript{2} is a methyl group, and
- R\textsuperscript{1} is a lauryl alkyl group mixture, having more than 50% by weight of C\textsubscript{12}.

The betaine surfactant composition of matter can be obtained by, and is preferably obtained from, a process comprising the following steps:

step 1) reacting a compound of formula R\textsuperscript{1}R\textsuperscript{2}R\textsuperscript{3}N with chloroacetic acid, to obtain a reaction product;

step 2) adding potassium hydroxide to increase the pH,

step 3) optionally adding some further ingredients or adjusting the concentration or pH.

It is mentioned that step 1 and step 2 can also be performed simultaneously, by adding potassium hydroxide during reaction completion or by adding progressively chloroacetic acid and potassium hydroxide.

In another embodiment potassium chloroacetate is used in step 1) instead of chloroacetic acid, and step 2) is optional.

In a preferred embodiment, the process does not comprise any desalination step or ion exchange step. Thus the process is cost effective, and therefore the herbicidal composition can also be cost interesting.

Advantageously, the pH of the betaine surfactant composition of matter is of from 6 to 8, in a 1% by weight water solution.

Further ingredients

The herbicidal composition can comprise further ingredients, such as:

- surfactants different from the betaine of the betaine surfactant composition of matter, as part of the surfactant system,
- anti-foaming agents,

- solvents, preferably water miscible solvent, preferably polar solvents, or
- deposition control agents such as anti-rebound or anti-drift agents, optionally added afterward.
The one skilled in the art knows further ingredients that can be used for managing some properties or features of the composition and/or for adding benefits.

The formulations can for example comprise for example:

- organopolysiloxanes antifoaming agent;
- thickening agents such as xanthan gum type polysaccharides, alginates, carboxylated or hydroxylated methylcelluloses, synthetic macromolecules of the polyacrylate, polymaleate, polyvinylpyrrolidone, polyethylene glycol or polyvinyl alcohol type, or of the inorganic type such as bentonites.
- auxiliary additives such as antioxidants, anti-UV agents, colorants, etc.
- solvent such as an alcohol, for example isopropanol, typically up to 15% by weight.

The amount of these additives listed above is normally less than 10% by weight, preferably 1% by weight or less, advantageously 0.1% by weight or less compared with the composition weight.

Other surfactants

The herbicidal composition can comprise a further surfactant, different from the betaine of the betaine surfactant composition matter. This further surfactant can provide further advantages or synergies in term of costs, and/or bioefficacy, and/or rheology management, and/or environment concerns and/or sensitivity concerns.

Examples of further surfactants include:
- an ethoxylated fatty amine, a fatty amine,
- an ether carboxylate,
- an acid or non acid mono- and di-ester phosphate, optionally polyalkoxylated,
- an alkylmonoglycoside or alkylpolyglycoside, advantageously octylglycoside, an octylpolyglycoside, decylglycoside, a decylpolyglycoside, or a mixture thereof, or - mixtures thereof.

The fatty amines or ethoxylated fatty amines can comprise at least one hydrocarbon group containing 2 to 24 carbon atoms, optionally polyalkoxylated.

The fatty amines or ethoxylated fatty amines can more particularly be selected from amines comprising at least one linear or branched, saturated or unsaturated group containing 2 to 24 carbon atoms, preferably 8 to 18 carbon atoms, optionally comprising 2 to 30 oxyethylene groups, or a mixture of a plurality thereof. Examples include ethoxylated tallow amines.

The fatty amines or ethoxylated fatty amines can be selected from ethoxylated fatty amines comprising at least one linear or branched, saturated or unsaturated groups
containing 6 to 24 carbon atoms, preferably 8 to 20 carbon atoms, comprising 2 to 30 oxyethylene groups, or a mixture of a plurality thereof. Examples include the compounds having the following formula:

\[(OA)_n\]

\[\text{R-O-(CH}_2\text{)}_3\text{-N}-(OA)_{n'}\]

wherein \(R\) represents a linear or branched, saturated or unsaturated hydrocarbon group containing 6 to 24 carbon atoms, preferably 8 to 20 carbon atoms; \(OA\) represents an oxypropylene group; and \(n, n'\), which may or may not be identical, represent a mean number in the range 1 to 30.

Examples of such amines that can be cited are amines derived from copra and containing 5 oxyethylene (OE) motifs, oleic amines containing 5 OE, amines derived from tallow containing 5-20 OE, for example 10, compounds corresponding to the above formula, in which \(R\) is an alkyl group containing 12 to 15 carbon atoms, the number of OE motifs being in the range 20 to 30.

The amount of fatty amines or ethoxylated fatty amines can be of from 0 (none) to 120 g/l of the composition, preferably of from 0 (none) to 60 g/l.

The ether carboxylate has preferably formula \(R(OCH_2CH_2)_nOCH_2CO_2^-\), wherein \(R\) is a linear or branched alkyl, alkenyl, alkylphenyl or polypropyleneoxy group having from 6 to 20, for example 8 to 14, aliphatic carbon atoms and \(n\) is of from 1 to 30, preferably of from 2 to 20. The ether carboxylate has preferably a counter ion being ammonium or potassium, or obtained from an amine or alkanolamine having up to 6 carbon atoms.

The acid or non acid mono- and di-ester phosphate, optionally polyalkoxylated is selected from acid or non acid phosphate mono- or di-esters, optionally polyalkoxylated, with the formula below:

\[(AO)_{3-m}P(=O)(OM)_m\]

wherein:

- \(A\), identical or different, represents a group \(R'^1-O(CH_2-CHR'^2-O)_n\), wherein:
  - \(R'^1\), identical or different, represents a linear or non linear, saturated or unsaturated \(C_6-C_{20}\) hydrocarbon group, preferably \(C_6-C_{10}\);
  - \(R'^2\), identical or different, represents a hydrogen atom or a methyl or ethyl group, preferably a hydrogen atom;
- \( n \) is a mean number of motifs in the range 0 to 10, preferably in the range 2 to 10;
- M, identical or different, represents a hydrogen atom, an alkali or alkaline-earth metal, a \( N(\text{R}^3)_4^\ast \) type radical wherein \( \text{R}^3 \), identical or different, represents a hydrogen atom or a linear or non-linear, saturated or unsaturated \( \text{C}_1^\text{C}_6 \) hydrocarbon group optionally substituted with a hydroxyl group;
- \( m \) is a whole or average number in the range 1 to 2.

The acid or non acid mono- and di-ester phosphate, optionally polyalkoxylated can be in the form of a monoester, a diester, or a mixture of these two esters.

The amount of acid or non acid mono- and di-ester phosphate, optionally polyalkoxylated can be of from 0 (none) to 120 g/l of the composition.

**Process** for preparing the herbicidal composition.

The compositions of the invention can be prepared by mixing their different constituents with moderate stirring.

This operation preferably takes place at a temperature in the range 15°C to 60°C, preferably at a temperature close to ambient temperature (15-30°C).

The surfactant composition of matter is preferably only added once the other constituents have been mixed.

Hence, a complete preferred process can comprise the following steps:
- step a) preparing a surfactant composition of matter by a process comprising the following steps:
  - step 1) reacting a compound of formula \( \text{R}^1\text{R}^2\text{R}^2\text{N} \) with chloroacetic acid, to obtain a reaction product;
  - step 2) adding potassium hydroxide to increase the pH,
  - step 3) optionally adding some further ingredients or adjusting the concentration or pH.
- step b) mixing the aminophosphate or aminophosphonate salt, the surfactant composition of matter and optionally further ingredients.

Step b) for example comprises the steps of providing a mixture of water and the aminophosphate or aminophosphonate salt, and then adding the surfactant composition of matter.

It is mentioned that step 1 and step 2 can also be performed simultaneously, by adding potassium hydroxide during reaction completion or by adding progressively chloroacetic acid and potassium hydroxide.

In another embodiment potassium chloroacetate is used in step 1) instead of chloroacetic acid, and step 2) is optional.
Herbicidal composition preferred features

Advantageously, in the herbicidal composition, the total amount of surfactant active matter is of at least 24 g/L.

Advantageously, the surfactant active matter is of at least 25% by weight of the surfactant system. In other word, the surfactant system has at least 25% by weight as active surfactant matter of the betaine together with optional different surfactant(s).

Advantageously, the herbicidal composition comprises at least 80 g/L, preferably at least 100 g/L, of the betaine surfactant composition of matter. Thus the betaine surfactant composition of matter represents all of a part of the surfactant system in the herbicidal composition.

Advantageously, the herbicidal composition comprises:
- from 360 g/L to 560 g/L of the aminophosphate or aminophosphonate salt, preferably of glyphosate salt, preferably glyphosate isopropylamine salt, and
- from 80 g/L to 160 g/L of the surfactant system, preferably of the betaine surfactant composition of matter.

Advantageously, the composition comprises:
- from 400 to 500 g/L of glyphosate salt, preferably of glyphosate isopropylamine salt, and
- from 100 to 135 g/L of the surfactant system, preferably of the betaine surfactant composition of matter.

Preferably, the composition comprises:
- at least 500 g/L of the glyphosate salt, preferably of glyphosate isopropylamine salt, and
- at least 120g/L, preferably at least 135 g/L, of the surfactant system, preferably of the betaine surfactant composition of matter.

Is it preferred that the total amount of inorganic salts in the composition, preferably of chloride-based salts, is of higher than 0.4 % by weight, and preferably higher than 1% by weight.

At high loads of glyphosate salt, especially with salts different from potassium salts, for example with glyphosate isopropylamine salt, the invention allows among other handling less composition (higher load), with a good stability (no crystals) with an interesting bioefficacy and/or ecotoxic profile.

At low loads of glyphosate salt, especially with salts different from potassium salts, for example with glyphosate isopropylamine salt, the invention allows among other a
good stability (no crystal) with an interesting bioefficacy and/or ecotoxic profile as the load of surfactant can be increased.

**Downstream use**

The herbicidal composition of the invention can be thus used to treat plants, normally after diluting with water. The diluted composition can be applied onto a field by any appropriate mean.

The dilution, and the application onto the field, can be for example such that the amount of aminophosphate or amoniphosphonate salt, preferably glyphosate salt, is of from 500 g acid equivalent / ha to 1500 g acid equivalent / ha, typically from 600 to 1200 g/ha.

Upon dilution the end-user can admix other herbicides, pesticides, fertilizers, fungicides. For example the end-user can combine the glyphosate salt with other herbicides to address some weed-resistances to glyphosate. The composition according to the invention, especially with glyphosate salt different from potassium salt, for example with glyphosate isopropylamine salt, provides a good compatibility with other herbicides. The invention can allow high loads of glyphosate salts with good compatibility.

Some details or advantages of the invention will appear in the non-imitative examples below.

**EXAMPLES**

The following ingredients are used:

**Surfactant 1:** surfactant composition of matter comprising the following:  
- Alkyldimethylbetaine, wherein the alkyl is a mixture of about 70 weight % lauryl (C₁₂) and of about 30 weight % tetradecyl (C₁₄),  
- Solids: about 41 weight %  
- KCl: about 9 weight %

**Surfactant 2:** Mirataine D40, marketed by Rhodia  
**Surfactant 3:** Terwet 3780 Tallow amine ethoxylate, Hunstman  
**Glyphosate:** Glyphosate isopropylamine salt (46% of acid equivalent by weight)

The following compositions are prepared (C stands for comparative, ae stands for acid equivalent).


<table>
<thead>
<tr>
<th>Example</th>
<th>1</th>
<th>2</th>
<th>3C</th>
<th>4C</th>
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<tbody>
<tr>
<td>Glyphosate (ae)</td>
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<td>510 g/L</td>
<td>450 g/L</td>
<td>450 g/L</td>
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<tr>
<td>Surfactant 1</td>
<td>120 g/L</td>
<td>140 g/L</td>
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<tr>
<td>(amount as is)</td>
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<td></td>
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</tr>
<tr>
<td>Surfactant 2</td>
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<td></td>
<td>120 g/L</td>
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<tr>
<td>(amount as is)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surfactant 3</td>
<td></td>
<td></td>
<td></td>
<td>120 g/L</td>
</tr>
<tr>
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<td>4.5 as 7% solution</td>
<td>4.5 as 7% solution</td>
</tr>
<tr>
<td>Aspect</td>
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<td>No crystals</td>
<td>Some crystals</td>
<td>Not stable</td>
</tr>
</tbody>
</table>

This shows that the composition according to the invention have a surprising good stability, without crystals formation.

Meanwhile the compositions according to the examples have a better (lower fresh weight) and/or quicker bio-efficacy (higher brownout) on at least some significant weeds (annual ryegrass and wild radish).
14

CLAIMS

1. A herbicidal aqueous composition comprising:
- at least 360 g/L of an aminophosphate or aminophosphonate salt, preferably a
glyphosate or glufosinate salt,
- at least 80 g/L, preferably at least 100 g/L, of a surfactant system comprising:
  - a betaine surfactant composition of matter comprising:
    - water,
    - a betaine having formula $R^1 R^2 R^3 N^+ \cdot CH_2 COO^-$, wherein:
      - $R^1$ is a linear or branched hydrocarbon group, preferably an alkyl
        group containing 3 to 30 carbon atoms, preferably 3 to 20 carbon
        atoms,
      - $R^2$, identical or different, is a C$_1$-C$_3$ alkyl group, preferably a methyl
        group, and
      - at least 1% by weight of a chloride based salt, preferably of a potassium
        chloride salt, and
    - optionally at least one surfactant different from the betaine of the betaine
      surfactant composition of matter.

2. A composition according to claim 1, wherein the total amount of surfactant active
matter is of at least 24 g/L.

3. A composition according to claim 1 or 2, wherein the surfactant active matter is of at
least 25% by weight of the surfactant system.

4. A composition according to one of the preceding claims, wherein the betaine active
matter represents at least 30% by weight, preferably at least 50%, of the total surfactant
active matter of the surfactant system in the composition.

5. A composition according to one of the preceding claims, comprising at least 80 g/L,
preferably at least 100 g/L, of the betaine surfactant composition of matter.

6. A composition according to one of the preceding claims, wherein the betaine
surfactant composition of matter comprises:
- water,
- at least 25%, preferably at least 30%, by weight as active surfactant matter of the
  betaine,
7. A composition according to one of the preceding claims, wherein the betaine surfactant composition of matter comprises:

- water,
- at least 30%, preferably at least 35% by weight as active surfactant matter of the betaine,
- at least 5% by weight of a potassium chloride salt, and
- substantially no sodium cation.

8. A composition according to one of the preceding claims, wherein:
- the total amount of inorganic salts, preferably of chloride-based salts, is of higher than 0.4 % by weight, and preferably higher than 1% by weight.

9. A composition according to one of the preceding claims, wherein:
- the total amount of inorganic salts in the surfactant system, preferably of chloride-based salts, is of higher than 0.4 % by weight, and preferably higher than 1% by weight.

10. A composition according to one of the preceding claims, wherein:
- the amount of inorganic salts, preferably of chloride-based salts, is of higher than 8%, preferably higher than 10%, preferably higher than 12%, by weight of the amount of the betaine surfactant composition of matter.

11. A composition according to one of the preceding claims, wherein
- the total amount of inorganic salts, preferably of chloride-based salts, is of higher than 8%, preferably higher than 10%, preferably higher than 12%, by weight of the amount of the surfactant system.

12. A composition according to one of the preceding claims, wherein the glyphosate salt is a glyphosate isopropylamine salt.

13. A composition according to one of the preceding claims, comprising:
- from 360 g/L to 560 g/L of the aminophosphate or aminophosphonate salt, preferably of glyphosate salt, and
- from 80 g/L to 160 g/L of the surfactant system, preferably of the betaine surfactant composition of matter.
14. A composition according to one of the preceding claims, comprising:
- from 400 to 500 g/L of glyphosate isopropylamine salt, and
- from 100 to 135 g/L of the surfactant system, preferably of the betaine surfactant composition of matter.

15. A composition according to one of claims 1 to 13, comprising:
- at least 500 g/L of glyphosate isopropylamine salt, and
- at least 120g/L, preferably at least 135 g/L, of the surfactant system, preferably of the betaine surfactant composition of matter.

16. A composition according to one of the preceding claims, wherein:
- \( R^2 \) is a methyl group, and
- \( R^1 \) is a lauryl alkyl group mixture, preferably having more than 50% by weight of \( C_{12} \).

17. A composition according to one of the preceding claims, wherein the betaine surfactant composition of matter is obtained by a process comprising the following steps:
step 1) reacting a compound of formula \( R^1 R^2 R^3 N \) with chloroacetic acid, to obtain a reaction product;
step 2) adding potassium hydroxide to increase the pH,
step 3) optionally adding some further ingredients or adjusting the concentration or pH.

18. A composition according to one of the preceding claims, wherein the pH of the betaine surfactant composition of matter is of from 6 to 8, in a 1% by weight water solution.

19. A composition according to one of the preceding claims, further comprising:
- surfactant(s) different from the betaine of the betaine surfactant composition of matter, as part of the surfactant system,
- anti-foaming agents,
- solvents, preferably water miscible solvent, preferably polar solvents, or
- deposition control agents such as anti-rebound or anti-drift agents, optionally added afterward.

20. A composition according to claim 19, wherein the surfactant different from the betaine of the betaine surfactant composition of matter is:
- an ethoxylated fatty amine,
- an ether carboxylate,
- an acid or non acid mono- and di-ester phosphate, optionally polyalkoxylated,
- an alkylmonoglycoside or alkylpolyglycoside, or
- mixtures thereof.

21. A process for preparing a composition according to one of the preceding claims, comprising the following steps:

- step a) preparing a betaine surfactant composition of matter by a process comprising the following steps:
  
  step 1) reacting a compound of formula $R^1R^2R^2N$ with chloroacetic acid, to obtain a reaction product,
  step 2) adding potassium hydroxide to increase the pH,
  step 3) optionally adding some further ingredients or adjusting the concentration or pH.

- step b) mixing the aminophosphate or aminophosphonate salt, the betaine surfactant composition of matter and optionally further ingredients.

22. A process according to claim 21, wherein step b) comprises the steps of providing a mixture of water and the glyphosate salt, and then adding the betaine surfactant composition of matter.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
INV. A01N57/20 A01N25/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A0IN

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, BIOSIS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>WO 00/38523 A (ALBRIGHT &amp; WILSON UK LIMITED; MILLE, FABIEN, HERVE, JOSEPH; OXFORD, PH) 6 July 2000 (2000-07-06) page 2 page 5 - page 6; claim 1; examples 1,2,4</td>
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X X X Further documents are listed in the continuation of Box C. X X X See patent family annex.

* Special categories of cited documents:

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*A* document member of the same patent family

Date of the actual completion of the international search: 11 May 2006

Date of mailing of the international search report: 24/05/2006

Name and mailing address of the ISA/ Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax. (+31-70) 340-3016

Romano Götsch, R
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